Exhibit CC. Waterloo Site Preliminary Geotechnical Engineering Report

Geotechnical Engineering Services

Waterloo Operations Spar Building
Geismar, Louisiana

for
Barber Brothers Contracting Company, LLC.

February 24, 2012

GeoEngineers

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Geotechnical Engineering Services
Waterloo Operations Spar Building
Geismar, Louisiana

File No. 20430-001-00

February 24, 2012

Prepared for:

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GEOENGINEERS

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INTRODUCTION AND PROJECT UNDERSTANDING

GeoEngineers Inc. (GeoEngineers) has prepared this report of geotechnical services performed for the proposed Waterloo Operations Spar Building in Geismar, Louisiana. These services were completed in general accordance with our proposal dated January 25, 2012.

Based on the information provided, Barber Brothers intends to build a spar storage building approximately 200 feet wide by 500 feet long. The building will be metal with steel frame. Columns will be supported on shallow square footings. The footings dimensions are provided in the table below:

Footing Mark*	Dimensions of Square Footing (Length x Width x Thickness) (feet)
F1	12 x 12 x 5
F2	11 x 11 x 5
F3	8 x 8 x 5
F4	4 x 4 x 5

*Note X: Footing Schedule in Fox-Nesbit Engineering, LLC drawing 11338 dated 01-18-12 (Figure 7)

The footings will be installed at a depth of 5 feet below the existing ground surface. Design bearing pressure underneath the footings is 1500 psf. Inside the building, the spar stockpile height will be 3-feet 8-inches at the side wall and 35-feet at the center of the building pad. Our experience indicates the spar can weigh between 90 to 150 pounds per cubic foot, depending on its compaction and moisture content. Spar stockpile will generate lateral movement of the shallow foundation as well as 2 to 3 feet of vertical settlement. The spar stockpile will fail if stacked to a height of 35 feet unless additional measures are considered. The factors of safety for various stockpile dimensions are provided in the Spar Stockpile Analysis section below.

SOIL CONDITIONS

General

GeoEngineers completed geotechnical engineering exploration (exploration) for the project on February 7, 2012. We developed an understanding of site subsurface conditions based on our exploration, previous geotechnical engineering report (dated August 15, 1980), and review of published geologic resources. Three soil borings (B-1 to B-3) were performed for the current project and their approximate locations are provided in Figure 2. At the time of our exploration, the site was covered with two feet of "Florolite" material (florolite). The project area in general was relatively flat. Since no ground elevations were provided at the boring locations, all data in this report are referenced as depth in feet below ground surface (zero depth).

The second component is the subsoil deformation. The weight of the stockpile will cause the subsurface soil to consolidate or settle downward as well as move laterally outward when the load is applied. Estimates of vertical and horizontal movements are presented later under the section titled, Spar Stockpile Analysis. We recommend survey control measures around the building and footings to allow for evaluation of experienced settlements.

Site Preparation and Fill

It is important when preparing the site for construction to first establish drainage in the upper soils. If not adequately managed, site drainage can dictate construction schedule and foundation performance.

To prepare the site for construction, any foundations, abandoned utilities, piping, debris from previous facilities, etc. should be removed from the new construction areas. Any existing underground utilities, piping, etc should be removed or relocated. The uncontrolled fill and florolite material should be removed prior to construction from the building pad area. Any sloughs, swales, or ditches beneath the construction area should be cleaned of muck and organic materials. The depth of stripping required to remove these materials will vary across the site. The intent will be to remove all miscellaneous deleterious matter and leave as much inorganic soil as possible to take advantage of the natural surficial crust of stiff to very stiff clay.

After the area to be developed is stripped, it should be proof-rolled with a loaded sheepsfoot roller or a 10-kip roller or equivalent, capable of approximately 1 kip per lineal foot, to identify any soft, wet, unstable areas of unsuitable soil. Any soft, loose or otherwise unsuitable areas identified during proof-rolling should be removed, dried, and recompacted if practical or removed and replaced with imported structural clay fill. Subgrade proof-rolling should be observed by a representative of our firm to assess the adequacy of the subgrade conditions and to identify areas needing remedial work.

Stripped and exposed clay soils can pump and cause trafficability problems as a result of too many passes with a dozer or other equipment or when they become wet or saturated. If equipment traffic or inclement weather or wet conditions result in subsurface pumping, it will be necessary to stabilize the subgrade with lime or cement, or remove and replace the pumping material with compacted dry fill. If initial stabilization was performed to develop a working table, damage caused by pumping soil may necessitate repairs after traffic loading by construction vehicles.

Structural Fill

All new fill under the ground-supported foundations should be placed and compacted as structural fill. Soils used as structural fill should be non-expansive clay with a plasticity index (PI) between 10 and 32 and with a liquid limit (LL) between 20 and 45, in general accordance with ASTM International (ASTM) D2487. Structural fill should be free of organic material or other degradable material and debris. Well-graded crushed stone aggregates such as an ASTM D1241 gradation C stone is also appropriate. Based on our subsurface investigation and laboratory testing, the on-site low plasticity (CL) soils meet the requirements for structural fill given above.

The fill should be placed in horizontal lifts not exceeding 8 inches in loose thickness, or less if necessary to obtain adequate compaction. Each lift must be thoroughly and uniformly moisture-conditioned to

The contractor has control of construction operations and is responsible for the stability of cut slopes, as well as excavation safety. All shoring and temporary slopes must conform to applicable local, state and federal safety regulations. All operations should be performed under the supervision of qualified site personnel in accordance with OSHA regulations.

Shallow Foundations

Soil Bearing Pressures

Footings located at the 5-foot depth below existing ground surface can be designed for a net allowable soil bearing pressure of 1,500 pounds per square foot (psf) for square footings with dimensions as given in the "Note X: Footing Schedule" in Fox-Nesbit Engineering, LLC drawing 11338 dated 01-18-12 (Figure 7). Footings can be placed as near to the ground surface as practical to allow for ease of construction and to reduce possible difficulties in excavation activities. Column footings should have a minimum dimension of 30 inches.

Footings located in structural clay fill compacted as described above in the section titled, Structural fill can be designed for a net allowable soil bearing pressure of 1,500 psf for square footings.

A factor of safety of 2 is included in is allowable bearing pressure.

Settlement

The major settlement of spread footings here will be caused by the are stockpile loading inside the building. Estimated settlements of square spread footings up tp 12 feet wide caused by a structure loading of 1500 psf are 1 inch or less. Settlement associated with the stockpile loading is given in the settlement section under Spar Stockpile Design Data.

Uplift Resistance

The ultimate uplift capacity is the buoyant weight of the foundation and the soil above it. Buoyant weights of the soil and concrete may be assumed to be 55 and 85 pcf, respectively. A factor of safety should be applied by the design engineer.

Mud Mat

During wet seasons, the base of the excavations could be disturbed by construction activity, making it difficult to maintain a uniform base and clean reinforcement. For such conditions, the base of excavations can be protected with 3 to 4 inches of lean concrete. In some cases, placement of geotextile fabric and crushed limestone may be needed to maintain the base before placing the lean concrete. This will allow the placement of forms and reinforcing steel without intermixing with mud.

Spar Stockpile Design Data

Spar Stockpile Analysis

Based on information provided by Barber Brothers, the spar stockpile height in the building will be 3-feet 8-inches at the side wall and 35-feet at the center of the building pad. Since the spar stockpile will be built over a period of time, we have calculated the height for the stockpile such that the load applied at the center of the stockpile is about 2000 psf. This height was estimated to be 17.4 feet at the center of

Subsoil Deformations

Based on the soil profiles developed for the current project and information provided in "Louis J. Cappozzoli & Associates, Inc., Geotechnical Engineering – New Spar Facility at HF Plant, Geismar, Louisiana, dated August 15, 1980", we estimate a lateral displacement of 1 to 1.5 inches within the upper 6 feet of the soil profile. The larger displacement is estimated to be at a depth of about 20 feet below ground surface and is estimated to be approximately 2 inches. We recommend survey control measures around the building and footings to allow for evaluation of experienced settlements.

Settlement

The SETANL program was used to estimate settlement of the stockpile. The program calculates settlement based on Terzaghi's one dimensional linear consolidation theory. We have estimated the consolidation settlement or long term settlement for the stockpile for two different heights (17.4 feet and 35 feet). The results are shown in the table below:

Settlement Point Location (Figure 5)	Settlement for 17.4 feet High Stockpile (Inches)	Settlement for 35* feet High Stockpile (Inches)
1-Center of the Building Pad	25	36
2-Edge of the Crown	17	24
3-At the Wall	13	17

* Installation of spar stockpile to a height of 35 feet will cause a global slope stability failure.

Approximately 50 percent of the consolidation settlement will occur in the first 4 months, 90 percent will require in about 1½ years. Intermittent loadings will result in slower settlement rates.

LIMITATIONS

We have prepared this report for Barber Brothers Contracting Company LLC and their authorized agents for the Waterloo Operations Spar Building Project located in Giesmar, Louisiana, as shown in Figures 1, 2 and 3.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Any electronic form or hard copy of this document (email, text, table, and/or figure), if provided, and any attachments are only a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix E titled Report Limitations and Guidelines for Use for additional information pertaining to use of this report.

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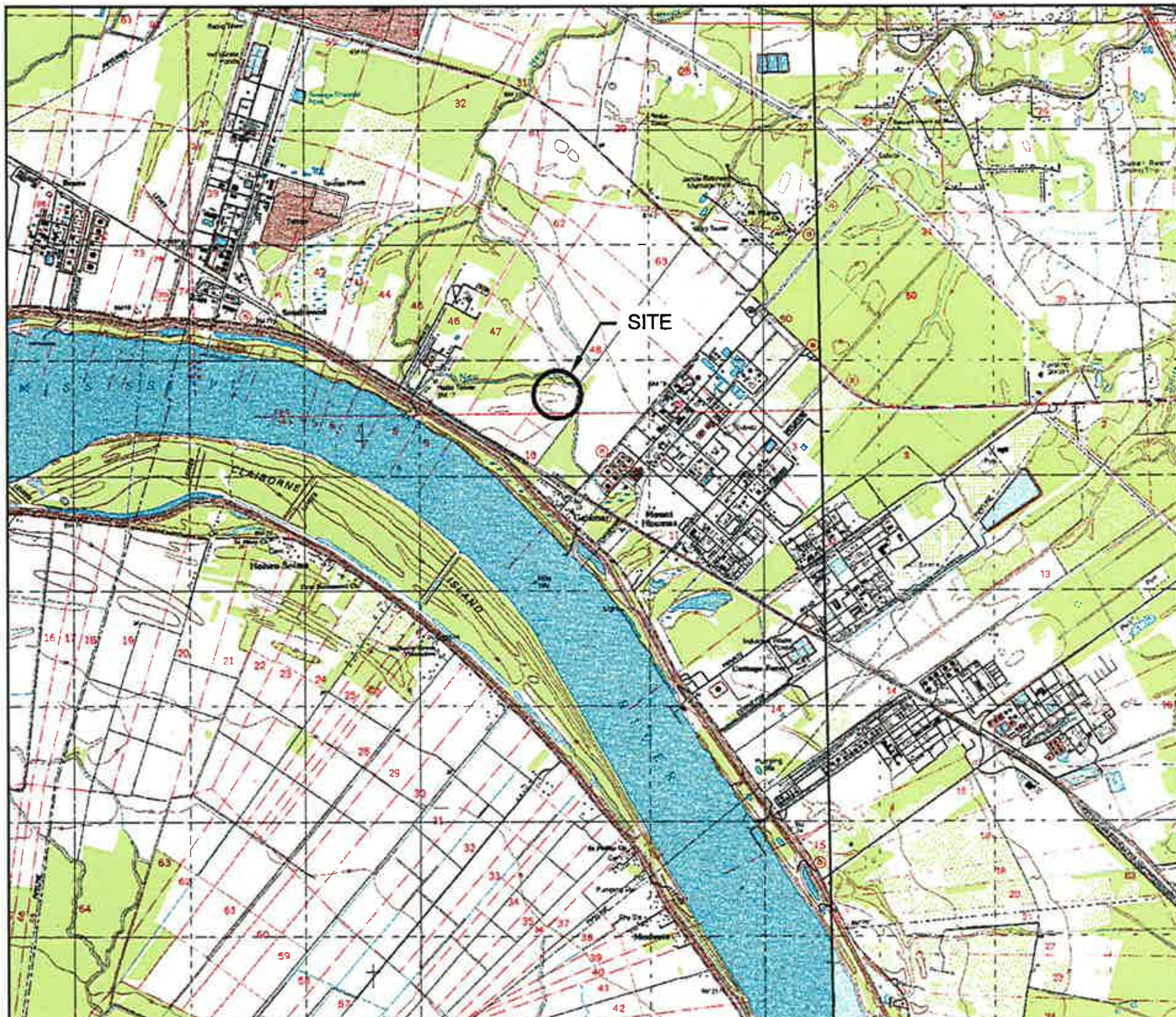

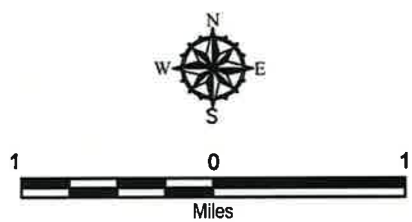

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Topographic maps taken from USGS, 24K template, Quads: Carville & Gonzales, Dated: 1991 & 1992

VICINITY MAP

Waterloo Operations Spar Building
Geismar, Louisiana

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Figure 1

P:\20\20430001\00\CAD\Boring Location Plan.dwg\TAB:Layout1 modified on Feb 22, 2012 - 3:33pm

VT : KMC

Legend

B-1 Borehole Location

A A' Cross Section

N W E S

500 0 500

FEET

Notes:
1. The locations of all features shown are approximate.
Reference: Aerial image taken from Google Earth Pro, Licensed to GeoEngineers Inc., Dated 11/16/2011

SOIL BORING LOCATION PLAN

Waterloo Operations Spar Building
Geismar, Louisiana

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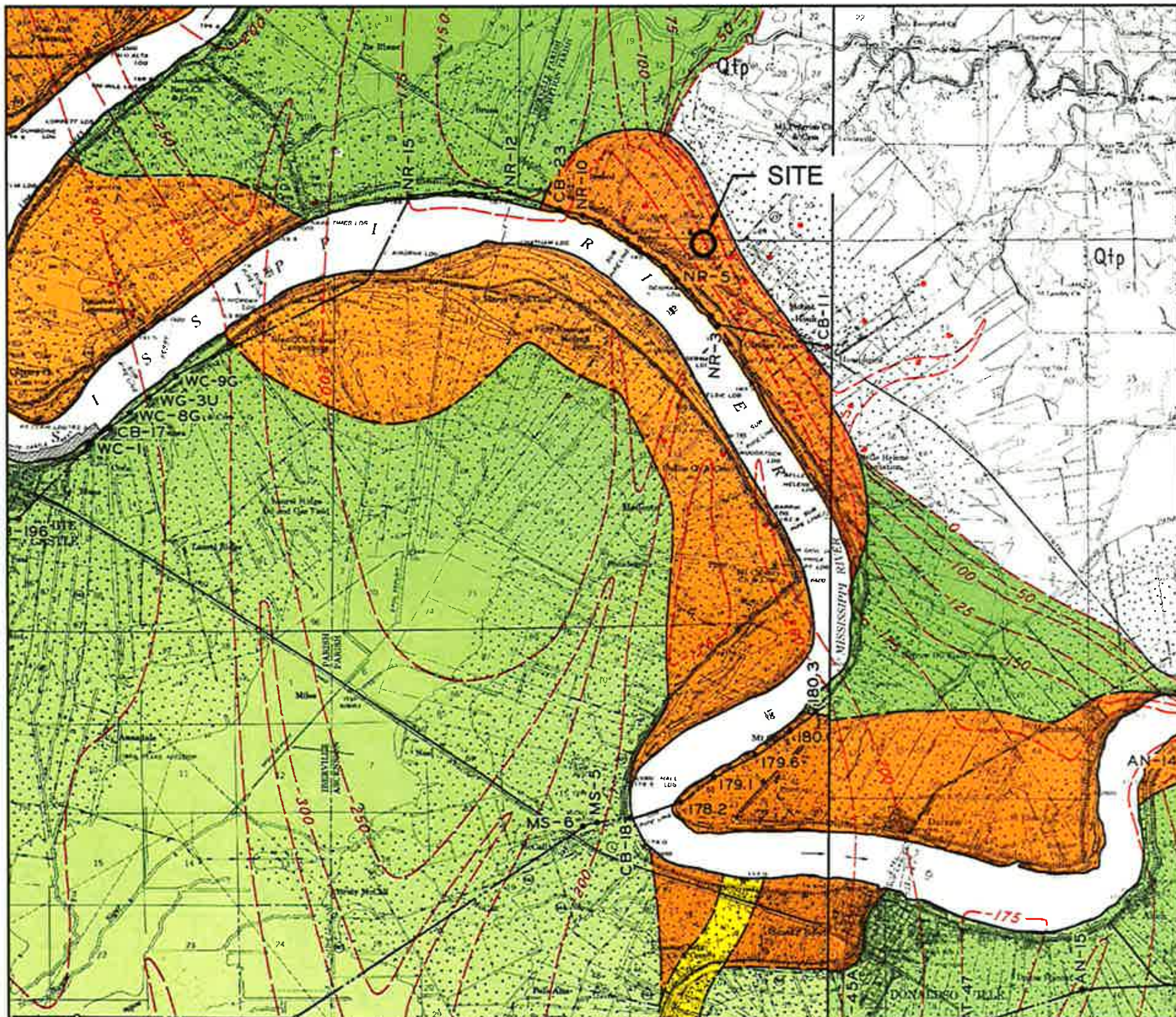
Figure 2

P:\20\20430001\00\CAD\Area Geology Map.dwg\TAB:Layout1 modified on Feb 22, 2012 - 10:24am

VT : KMC



Legend

- NATURAL LEVEE
- POINT BAR
- POINT BAR AREAS CONTAINING UNUSUALLY LARGE AMOUNTS OF FINE-GRAINED MATERIALS
- BACKSWAMP
- ABANDONED DISTRIBUTARIES
- INDEFINITE CONTACT
- CORPS OF ENGINEERS BORINGS
- BORINGS BY OTHER AGENCIES
- ELEVATION OF TOP OF PLEISTOCENE DEPOSITS IN FEET MSL
- Qtp PLEISTOCENE PRAIRIE TERRACE
- BORINGS USED TO CONTOUR BURIED TERTIARY OR PLEISTOCENE SURFACE

N W E S

2 0 2
Miles

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Geology map taken from USACE, Distribution of Alluvial Deposits, Quads: White Castle& Donaldsonville, Dated 1987

AREA GEOLOGY MAP

Waterloo Operations Spar Buidling
Geismar, Louisiana

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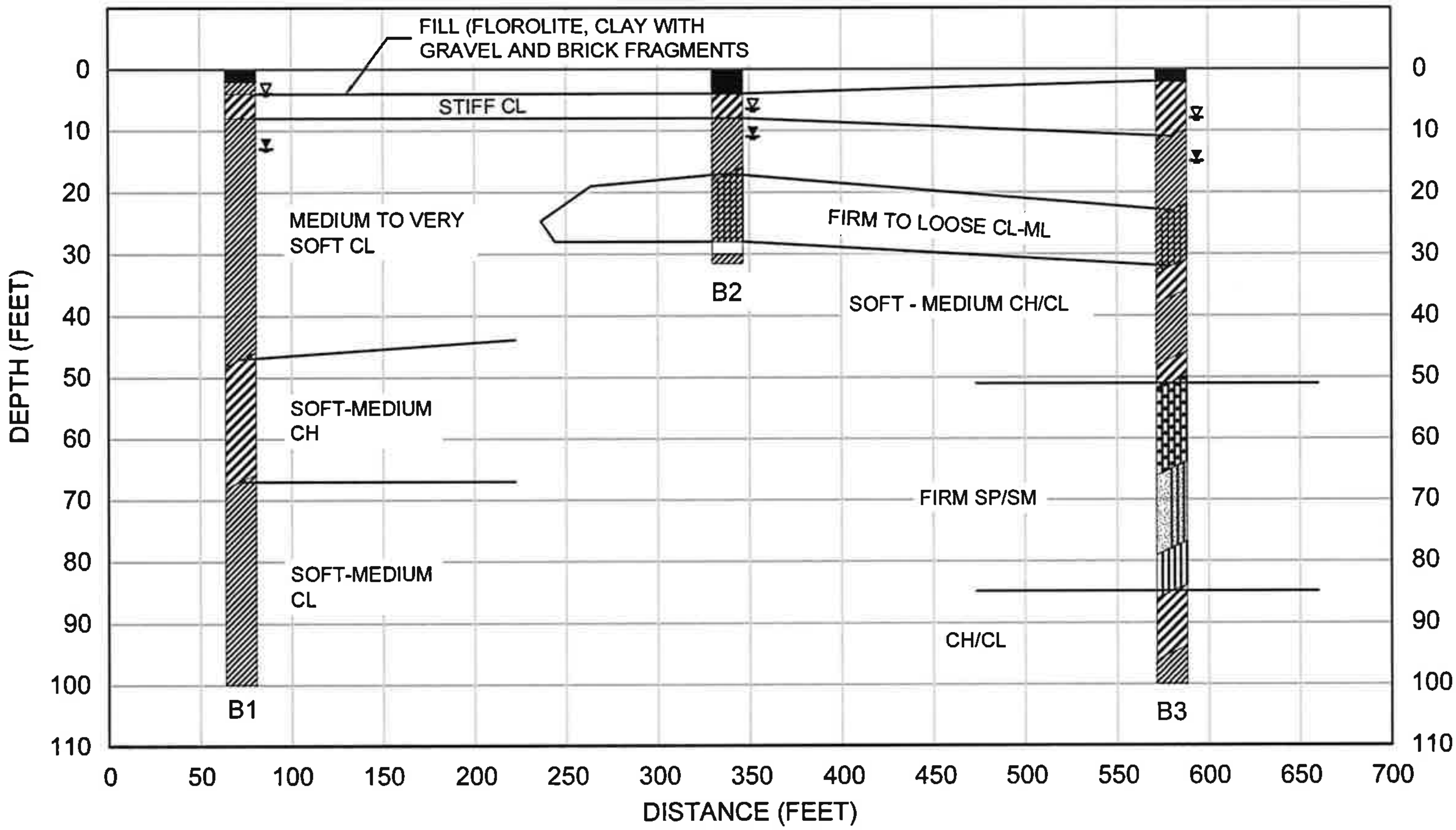
Figure 3



SUBSURFACE PROFILE A-A'

Waterloo Operations Spar Building
Geismar, Louisiana

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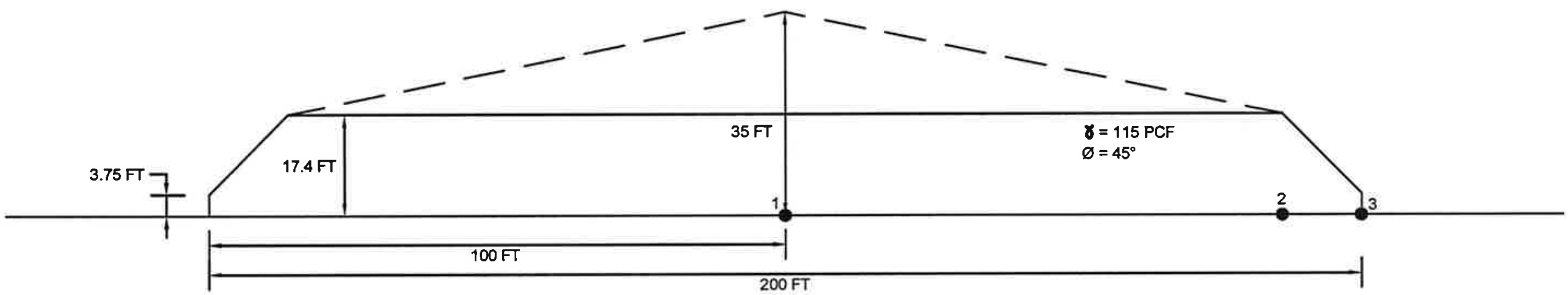
Figure 4

Notes:
1. The locations of all features shown are approximate.
2. Soil conditions shown are assumed between the boring locations.

P:\20\20430001\00\CAD\Spar Stockpile.dwg\TAB:Layout1 modified on Feb 23, 2012 - 1:44pm VT : KMC



POINTS WHERE SETTLEMENT FROM SPAR STOCKPILE WAS CALCULATED.
1. CENTER OF THE BUILDING PAD
2. EDGE OF THE CROWN
3. AT THE WALL

SPAR STOCKPILE LAYOUT

Waterloo Operations Spar Building
Geismar, Louisiana

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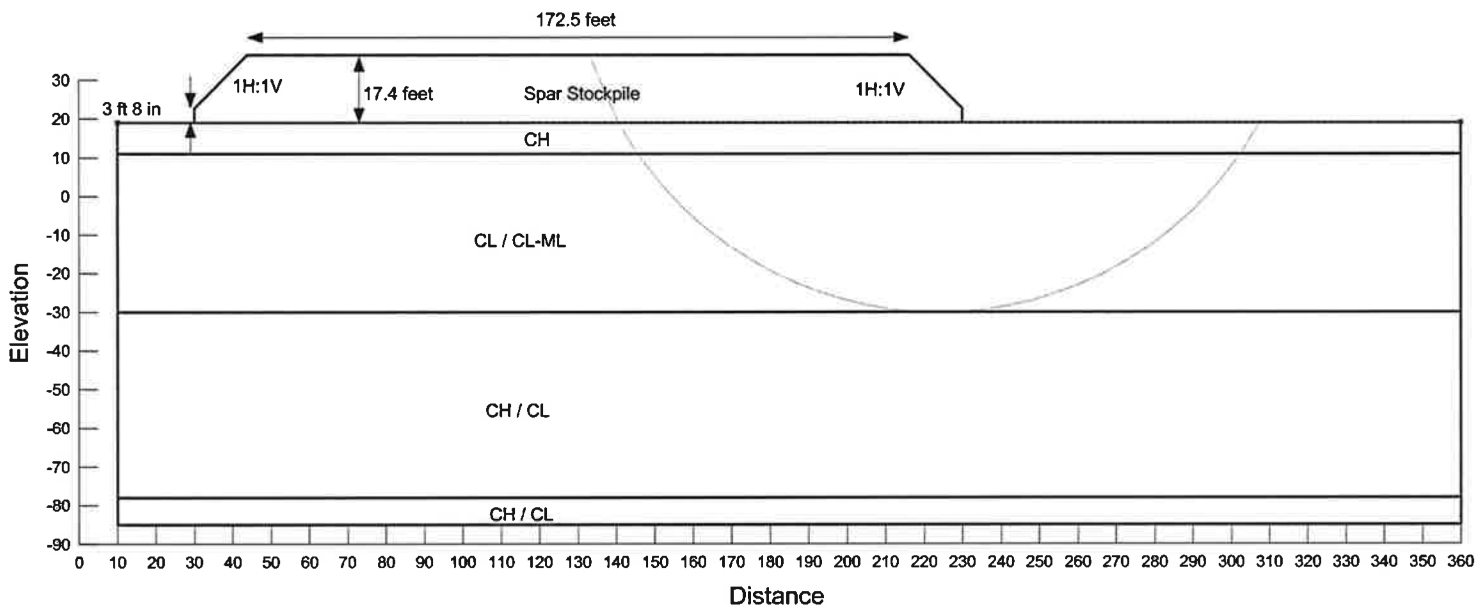
Figure 5

Title: Waterloo Operations Spar Building

Name: Spar Stockpile Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion: 0 psf Phi: 45 °
Name: CH Model: Mohr-Coulomb Unit Weight: 114.5 pcf Cohesion: 1400 psf Phi: 0 °
Name: CL / CL-ML Model: Mohr-Coulomb Unit Weight: 115.7 pcf Cohesion: 300 psf Phi: 0 °
Name: CH / CL (SP / ML in B-3) Model: Mohr-Coulomb Unit Weight: 113 pcf Cohesion: 560 psf Phi: 0 °
Name: CH / CL Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 350 psf Phi: 0 °

FOS: 1.102



SPAR STOCKPILE SLOPE STABILITY

Waterloo Operations Spar Building
Geismar, Louisiana

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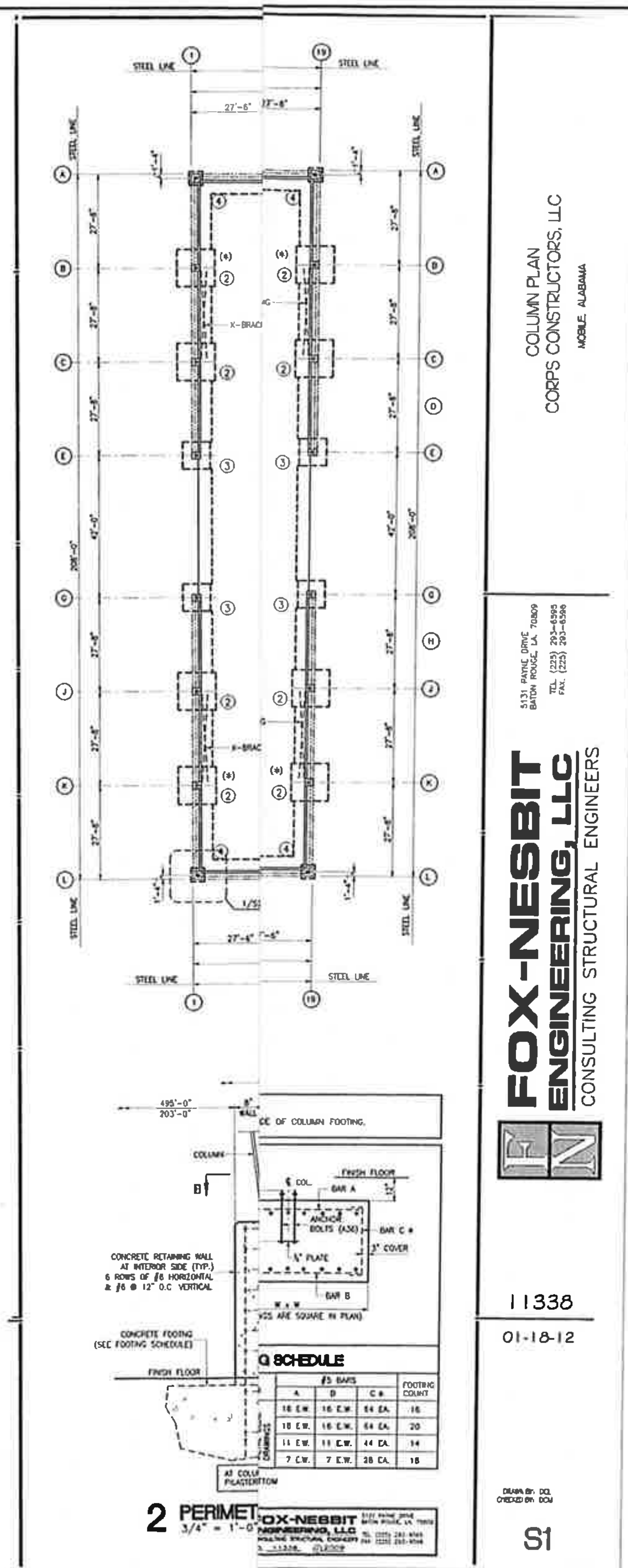
Figure 6



INFORMATION PROVIDED BY FOX-NESBIT

Waterloo Operations Spar Building
Geismar, Louisiana

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Figure 7

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to as
document. GeoEngineers, Inc. can not guarantee the accu
by GeoEngineers, Inc. and will serve as the official record o

Reference: PDF provided by Fox-Nesbit Engineering, LLC, Co

APPENDIX A
Field Explorations and Laboratory Testing

APPENDIX A
FIELD EXPLORATIONS AND LABORATORY TESTING

Field Explorations

This appendix describes the field exploration and laboratory testing program performed by GeoEngineers to support this project. The basis for our work was our proposal dated January 25, 2012 to Barber Brothers Contracting Company, LLC.

Soil conditions were evaluated in the project area by advancing three soil borings (B-1, B-2 and B-3). Borings B-1 and B-3 were extended to a depth of 100 feet below ground surface (bgs) and B-2 was extended to 30 feet bgs.

The borings were completed on February 7, 2012, using our truck-mounted drill rig. The drilling operations were monitored by an experienced senior technician from GeoEngineers, who examined and classified the soils encountered, obtained representative samples, observed groundwater conditions when possible and prepared a detailed log of each exploration. The soil encountered was classified visually in general accordance with ASTM International (ASTM) D-2488-90, which is described in Figure A-1. The approximate locations of the explorations are shown in the Soil Boring Location Plan, Figure 2.

In general, soil samples were obtained from the borings continuously in the top 10 feet, then on 5-foot-depth intervals to 50 feet and thereafter at 10-foot-depth intervals to 100 feet using a thin-walled Shelby tube sampler. The Shelby tube samplers were pushed approximately 24 inches with the weight of the drill rig. Classification samples of granular materials (sand and silt) were extracted using a standard penetration test (SPT) split spoon sampler. This test required driving a 24-inch-long, 2-inch O.D., sample tube into the ground with a 140-pound hammer falling 30 inches. The penetration resistance was recorded as the number of hammer blows required to advance the sampler 12 inches after first seating it for 6 inches. Each boring was backfilled to the full depth.

The exploration logs from our February 2012 geotechnical exploration are presented in Figures A-2 and A-3. The logs are based on our interpretation of the field data and indicate the various types of soil encountered. They also indicate the approximate depths at which the subsurface conditions change, although the change may actually be gradual. Moisture content, Total Unit Weight and Shear Strength vs. Depth for the entire site are presented in Charts A-2, A-3 and A-4, respectively.

Laboratory Testing

General

Soil samples obtained from the explorations were transported to our Baton Rouge, Louisiana, laboratory and examined to confirm or modify field classifications, as well as to evaluate engineering properties of the samples. Representative samples were selected for laboratory testing consisting of moisture content determinations, Atterberg limits, unit weight, unconfined compression and unconsolidated undrained compression tests. The laboratory testing procedures are discussed in more detail below.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	CC	Cement Concrete
	AC	Asphalt Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Measured groundwater level at time noted on log

Initial groundwater level observed at time of exploration

Perched water observed at time of exploration

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PP	Pocket penetrometer
SA	Sieve analysis
UU	Triaxial compression
UC	Unconfined compression
VS	Vane shear

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

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FIGURE A-1

Drilled	Start 2/7/2012	End 2/7/2012	Total Depth (ft)	100	Logged By DAS / Checked By VT	Driller GeoEngineers, Inc.	Drilling Method	Dry Auger 0 - 15' / Wet Rotary >15'

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Safety Hammer/Cathead 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-Mounted - Failing 1500
Latitude / Longitude	N30° 12' 45.5" / W91° 01' 27.5"	System / Datum	Geographic / NAD83 (feet)	Groundwater	

Notes: See Figure A-1 for explanation of symbols. Cement-bentonite grout backfill top 25 feet.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
2/7/2012	6.0	

Sample Name	Group Classification	Material Description	Water Content, %	Dry Density, (pcf)	Compressive Strength (TSF)[1]	Confining Pressure (KSF)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Pocket Pen (TSF)	Passing No. 200 Sieve, %
1	FILL	Tan and gray florite and silty clay (fill)									
2	FILL	Stiff tan and gray silty clay with ferrous nodules, gravel and brick fragments (fill)	17	101.3	1.56		5				
3	CH	Stiff tan and gray clay with silt traces, ferrous nodules and roots	35	85.9	1.87		8				
4		Medium tan clay with trace silt and ferrous nodules	40	84.7	0.98		5				
5	CL	Soft tan and gray silty clay with ferrous nodules	33	84.8	0.33		3				
					0.66*		5				
6		Soft tan and gray silty clay with ferrous nodules	37	84.4	0.43		15				
7		Soft gray very silty clay	33	87	0.32	1.09	14	34	12		
8		Soft gray very silty clay	36	83.9	0.33		15				
9		Very soft gray very silty clay	38								
10		Soft gray very silty clay	30	92.9	0.31	1.96	5	29	9		

Depth (feet): 0, 5, 10, 15, 20, 25, 30, 35

[1]An Asterisk indicates a remold was used for strength testing.

Log of Boring B-1

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Project: Waterloo Operations Spar Building
Project Location: Geismar, Louisiana
Project Number: 20430-001-00

Figure A-2
Sheet 1 of 3

Baton Rouge: Date:2/23/12 Path:P:\20\20430001\GINT\WATERLOO OPERATIONS SPAR BUILDING BORING LOGS.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_LAB

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Water Content, %	Dry Density, (pcf)	Compressive Strength (TSF)[1]	Confining Pressure (KSF)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Pocket Pen (TSF)	Passing No. 200 Sieve, %
						16				Medium gray clay with silt, sand streaks and lenses	43	78.3	0.76		11				
	80																		
	85																		
						17				Medium gray silty clay with silty sand streaks and lenses	39								
	90																		
	95																		
						18				Soft gray clay with silt and sand streaks	34	89.5	0.38		14				
	100																		

[1]An Asterisk indicates a remold was used for strength testing.

Log of Boring B-1 (continued)

GEOENGINEERS

Project: Waterloo Operations Spar Building
Project Location: Geismar, Louisiana
Project Number: 20430-001-00

Drilled	Start 2/6/2012	End 2/6/2012	Total Depth (ft)	100	Logged By DAS / Checked By VT	Driller GeoEngineers, Inc.	Drilling Method	Dry Auger 0 - 15' / Wet Rotary >15'

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Safety Hammer/Cathead 140 (lbs) / 30 (in) Drop	Drilling Equipment	Truck-Mounted - Falling 1500
Latitude / Longitude	N30° 12' 42.3" / W91° 01' 22.9"	System / Datum	Geographic / NAD83 (feet)	Groundwater	

Notes: See Figure A-1 for explanation of symbols. Cement-bentonite grout backfill top 25 feet.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
2/6/2012	8.0	

Depth (feet)	Blows/foot	Sample Name	Group Classification	MATERIAL DESCRIPTION	Water Content, %	Dry Density, (pcf)	Compressive Strength (TSF)[1]	Confining Pressure (KSF)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Pocket Pen (TSF)	Passing No. 200 Sieve, %
0		1	FILL	Tan, gray and light gray florite with clayey silt (fill)									
		2	CH	Stiff tan and gray clay with trace silt and ferrous nodules	27	90.3	1.78		10	62	39		
		3		Stiff tan and gray clay with trace silt and ferrous nodules	39	86.4	1.37		12				
5		4		Medium gray clay with ferrous nodules	46	75	0.52		5	91	61		
		5		Medium gray clay with ferrous nodules	57	68	0.59		4				
10			CL										
		6		Soft tan and gray clay with trace silt and ferrous nodules	33								
15													
		7		Very soft gray clay with silt lenses and 3-inch clayey silt layer	33	84.8	0.24	1.09	14				
20													
		8	CL-ML	Firm gray clayey silt	30	89.5	0.54	1.38	15				
25	7	9		Loose gray clayey silt	32					24	6		
	11	10		Firm gray clayey silt with trace sand	30					21	5		
30			CH										
		11		Soft gray clay with silt lenses	44	76.5	0.44	1.96	14				
35													

[1]An Asterisk Indicates a remold was used for strength testing.

Log of Boring B-3

GEOENGINEERS

Project: Waterloo Operations Spar Building
Project Location: Geismar, Louisiana
Project Number: 20430-001-00

Figure A-4

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Water Content, %	Dry Density, (pcf)	Compressive Strength (TSF)[1]	Confining Pressure (KSF)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Pocket Pen (TSF)	Passing No. 200 Sieve, %
				41		17			ML	Dense gray sandy silt with clay lenses and ½-inch clay layer									69
	80																		
	85								CH										
				25		18				Very stiff gray clay with 3-inch silty sand layer at top	42								
	90																		
	95								CL										
						19				Soft gray sandy clay with silt lenses	35	85	0.32		12				
	100																		

[1]An Asterisk indicates a remold was used for strength testing.

Log of Boring B-3 (continued)

GEOENGINEERS

Project: Waterloo Operations Spar Building
Project Location: Geismar, Louisiana
Project Number: 20430-001-00

Figure A-4
Sheet 3 of 3

ELEVATION (FT): 20, 10, 0, -10, -20, -30, -40, -50, -60, -70, -80, -90

SOIL CLASSIFICATION	MOISTURE CONTENT	TOTAL UNIT WEIGHT	SHEAR STRENGTH
CH/CL	M = 34%	γ = 114.5 PCF	C = 1400 PSF
CL/CL-ML	M = 34%	γ = 115.7 PCF	C = 300 PSF
CH	M = 42%	γ = 113 PCF	C = 1400 PSF
CH/SM/SP-SM/ML (SAND B-3)	M = 42%	γ = 113 PCF	C = 572 PSF
CH/SM/SP-SM/ML (SAND B-3)	M = 35%	γ = 117 PCF	C = 350 PSF
CH/CL	M = 35%	γ = 117 PCF	C = 572 PSF

SOIL SUMMARY

Waterloo Operations Spar Building
Geismar, Louisiana

GEOENGINEERS

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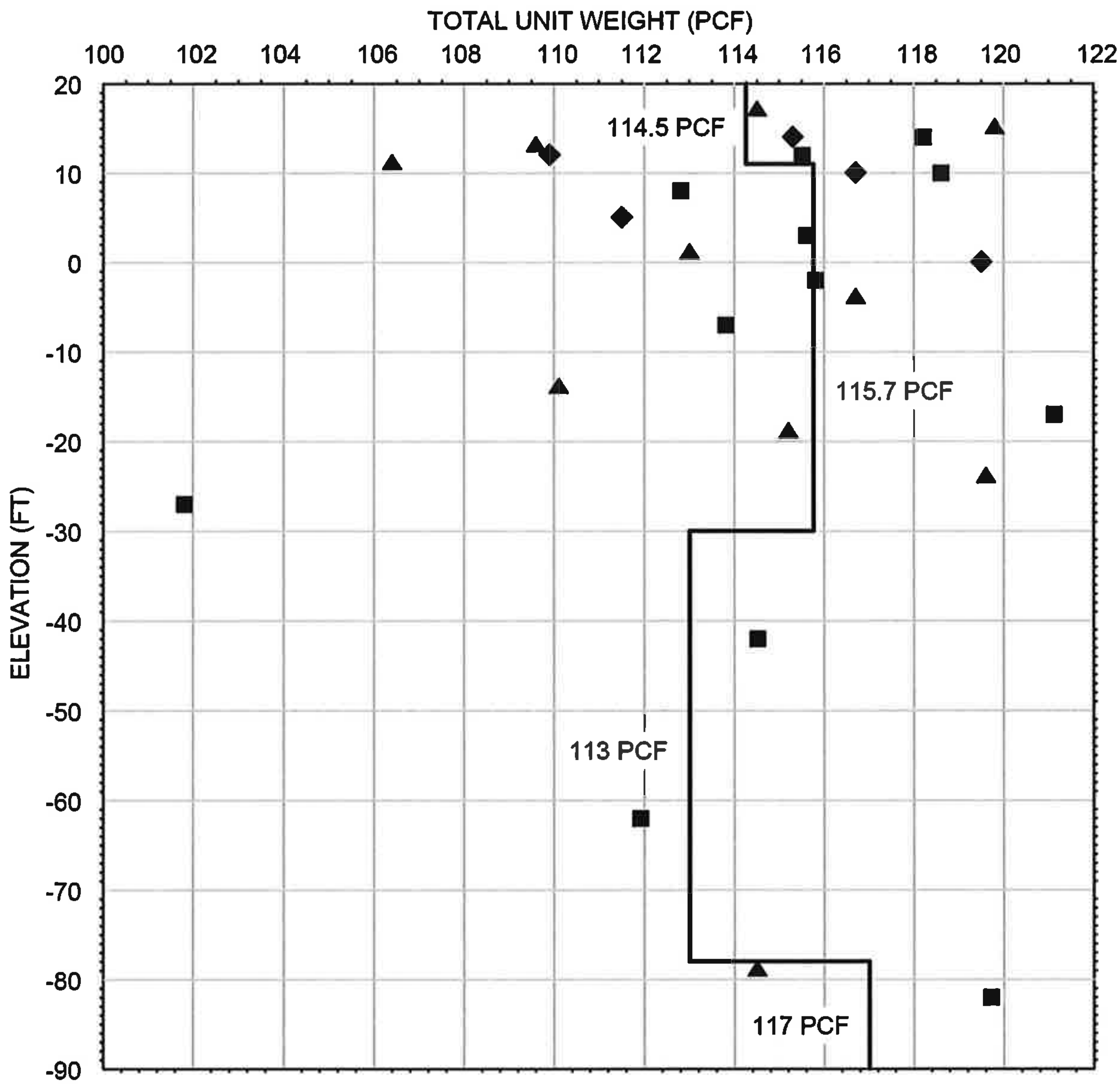

LEGEND

- ■ B-1
- ◆ B-2
- ▲ B-3

JPV : KMC

P:\20\20430001\00\CAD\GRAPH-MC.dwg\TAB:FIGURE A-1 (2) modified on Feb 22, 2012 - 3:40pm

TOTAL UNIT WEIGHT VS DEPTH

Waterloo Operations Spar Building
Geismar, Louisiana

GEOENGINEERS

A-3

Appendix B
Specifications for Fill Material

APPENDIX B
SPECIFICATIONS FOR FILL MATERIAL

Fill used on this site should be low plasticity (CL) clay or crushed limestone. The plasticity index (PI) should be between 10 and 32 with a liquid limit (LL) between 20 and 45. Fill beneath footings, slabs-on-grade and pavements should be compacted to 90 percent of its maximum modified proctor dry density for clay or 70 percent relative density for crushed limestone. These compaction percentages are per modified proctor density (ASTM International [ASTM] D1557) for clays and per relative density (ASTM D4253 and D4254) for granular material. Sand should not be used under foundation elements. Specifications for the compaction of both granular materials and clay soils are presented in Appendices C and D, respectively.

Flowable fill may be used as an alternative structural fill. Flowable fill must produce a 7-day 100 pounds per square inch (psi) compressive strength. Specific mix design will require the review and approval of the design engineer.

Cement-stabilized sand may be used in cases of overexcavation and replacement of utility line excavations. In general, granular materials to be stabilized should be well-graded and have the following grain size characteristics:

U.S. Sieve Standard Size	Percent Passing
No. 4	55 to 100
No. 10	37 to 100
No. 40	24 to 80
No. 200	10 to 20

The materials should be slightly silty, but not clayey. For estimating purposes, 6 to 7 percent cement should be added to the sand, and the mixture should be compacted to a dry density of at least 90 percent of maximum density as determined by ASTM D1557 procedures. We recommend that laboratory tests be performed to determine optimum cement content once a sand source has been located. The cement-stabilized sand should have a minimum 7-day compressive strength of 100 psi. Placement of cement-stabilized sand should be at slightly dry (2 percent) of optimum moisture content using a loose lift thickness of 6 to 8 inches. The material should be placed and compacted to the required density within 3 to 4 hours of mixing.

The table below summarizes the gradations for ASTM D1241 Gradation C, commercially available crushed limestone locally referred to as "610" gradation, and crushed limestone gradation based on the Louisiana Department of Transportation and Development (LADOTD) Standard Specification for Roads and Bridges Section 1003.03 – Stone Base Course.

APPENDIX C
Specifications for Compaction of Granular Fill

APPENDIX C
SPECIFICATIONS FOR COMPACTION OF GRANULAR FILL

After the subgrade where fill is to be placed has been approved by the engineer, the contractor can start compaction operations. No fill should be placed on any area of the subgrade that has not been accepted by the engineer. Notwithstanding the engineer's acceptance of the subgrade, if the contractor identifies any soft spots where the desired compaction may be difficult to obtain, the soft soil shall be removed and replaced with compacted backfill as described herein.

One week prior to placing any fill on the site, the contractor shall inform the engineer of the borrow pit that the contractor intends to use as the source of the borrow. The engineer will examine the borrow pit to verify that the material meets the specifications. The engineer will also obtain the necessary control curves. Initial acceptance of the fill in the borrow source does not mean acceptance of the entire borrow pit because the material in the pit can vary.

These materials shall be compacted in lifts to the average density shown on the drawings or in the job specifications. In obtaining the average density of any lift, the lift will be rejected if any density is more than 2 percent below the specified average. Compacted lift thickness can start at 8 inches. Adjustments to greater or lesser thicknesses will depend upon the progress of the compaction.

The contractor shall use vibratory equipment of sufficient mass and energy needed for compaction. This vibratory equipment may be tamping plates, steel vibratory rollers or any equipment with sufficient mass and vibration energy to compact the soil. The vibratory frequency shall be adjustable so as to obtain a resonant condition between the compaction equipment and the soil. A meter shall be permanently attached to the vibratory equipment to measure the amplitude of vibration. In the absence of a permanently attached meter, a portable vibration meter will be acceptable.

The contractor may attempt to obtain the desired compaction with the vibrations from a bulldozer of a D-7 size or larger. If sufficient density is not obtained in this manner, vibratory rollers shall be used.

To obtain the required compaction, the material must be positioned on the site in a drained condition. Material excavated underwater shall be allowed to drain before being delivered to the site.

At all times, water flow in the fill shall be in a downward direction to facilitate compaction. Compaction shall be done with the fill sufficiently wet so that bulking will be eliminated. This may require the addition of water to the fill. Generally, sufficient water will be present when free water just begins to appear on the fill surface when the material is compacted to the proper density.

To verify that the desired quality of fill is being obtained, the contractor's operations will be inspected by a qualified soil technician under the supervision of the engineer. The soil technician will be on-site during all working hours and will accept or reject a lift within two hours after being requested. No material will be placed on any lift that has not been accepted.

APPENDIX D
Specifications for Compaction of Clay Soils

APPENDIX D
SPECIFICATIONS FOR COMPACTION OF CLAY SOILS

After the subgrade where fill is to be placed has been approved by the engineer, the contractor can start compaction operations. Notwithstanding the engineer's acceptance of the subgrade, if the contractor identifies any soft spots where the desired compaction may be difficult to obtain, the soft soil shall be removed and replaced with compacted backfill as described herein.

One week prior to placing any fill on the site, the contractor shall inform the engineer of the borrow pit that the contractor intends to use as the source of the borrow. The engineer will examine the borrow pit to verify that the soil meets the fill specifications. The engineer will also obtain the necessary fill control curves. Initial acceptance of the soil in the borrow pit does not mean acceptance of the entire borrow pit because the soil encountered in the pit can vary.

The material shall be placed on the site and either dried or moistened to get the moisture content within 3 percent of optimum. The thickness of lifts used shall be no more than the height of the teeth on footed rollers. Generally, for 48-inch-diameter or smaller drum rollers, the maximum compacted lift thickness acceptable is 6 inches. For rollers with drums of 60 inches in diameter and larger, with teeth about 9 inches long, a 9-inch final compacted lift thickness will be acceptable. The sole determination of the thickness of a lift will be the capability of the contractor's equipment to obtain the required compaction.

When obtaining the average density of a lift to determine its conformance to specifications, the lift will be immediately rejected if any density is more than 2 percent below the required average.

Although footed rollers are generally most suitable for compaction of clay soils, the contractor may use spiketooth rollers, rubber-tired rollers or any fill compaction equipment that has sufficient mass to compact the soil. Generally, the drum of a footed roller should be filled with water or, for additional weight, with both water and sand. Tractors or other vehicles used primarily for hauling will not be allowed as fill compaction equipment. The contractor should also have smooth wheel rollers to seal the working area at the end of the day so that overnight rains will not saturate the soil and delay the work. These rollers should also be used to seal the surface whenever rainfall is imminent. The soil engineer will instruct the contractor to modify or remove from the site any equipment that in the engineer's opinion is not capable of compacting the fill to the required density.

The soil engineer's representative will be on-site during all working hours and will accept or reject a lift within two hours after being requested. No material will be placed on any lift that has not been accepted by the engineer.

APPENDIX E
Report Limitations and Guidelines for Use

APPENDIX E
REPORT LIMITATIONS AND GUIDELINES FOR USE

This appendix provides information to help you manage your risks with respect to the use of this report.

Geotechnical and Environmental Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Barber Brothers Contracting Company LLC and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Similarly, an environmental assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each study is unique, each report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Environmental Report Is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Waterloo Operations Spar Building Project located in Geismar, Louisiana. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.