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May 6, 2013

Denmon Engineering, Inc.
Post Office Box 8460
Monroe, Louisiana 71211

Project No. 130162
Report No. 3

Attention: Randy Denmon, P.E., P.L.S.

Preliminary Geotechnical Investigation
Holly Ridge NE Site
Richland Parish, Louisiana

Dear Mr. Denmon:

Submitted here is your geotechnical report for the above-captioned project. This investigation was authorized by your execution of our contract agreement on March 21, 2013.

We appreciate the opportunity to be of service and we will be happy to discuss any questions you may have concerning this report.

Very truly yours,

BURNS COOLEY DENNIS, INC.

Amber A. Templeton, E.I.

Richard L. Curtis, P.E.

AAT/RLC/khb
Copies Submitted: (2)

1.0 INTRODUCTION

1.1 General

Denmon Engineering, Inc. is preliminarily evaluating a site in Richland Parish for possible future development. The site being explored is the Holly Ridge NE site. The Holly Ridge NE site is a 260-acre parcel of land located southeast of the intersection of Highway 183 and Highway 80. The site is bordered by Interstate 20 to the south. The general site location of the Holly Ridge NE site is shown on Figure 1 of this report. Based on a review of available USGS topographic information, we estimate that the ground surface within the property ranges from approximately El. 85 ft to El. 75 ft. Details regarding specific structure sizes, structure locations, finished grades, and other site grading requirements have not been established at this time.

1.2 Purposes

The specific purposes of this investigation were:

1) to explore subsurface soil conditions within the three sites by means of three (3) widely-spaced soil borings;

2) to evaluate pertinent physical properties of the soils encountered in the borings by means of visual examination of the samples in the laboratory and tests performed on the samples; and

3) after analysis of the soil boring and laboratory test data, to provide preliminary assessments and recommendations for planning purposes for site preparation, earthwork construction and foundation/pavement design and construction for the site.

2.0 FIELD INVESTIGATION

2.1 General

Subsurface soil conditions within the site in Richland Parish was explored by means of three (3) borings. Denmon Engineering provided drawings showing the approximate site boundaries superimposed upon aerial photographs. Widely spaced boring locations were chosen to provide a general understanding of the subsurface stratigraphy across the project site. A hand-held global positioning system device was utilized to determine approximate boring locations in the field. The ground surface elevations were not determined. The approximate boring locations are superimposed upon aerial photographs presented on Figure 1 of this report.

All soils were classified in general accordance with the Unified Soil Classification System. A synopsis of the Unified Soil Classification System is presented on Figure 2 along with symbols and terminology typically utilized on graphical soil boring logs. Logs of the soil borings are presented on Figures 3 through 5. The graphical logs illustrate the types of soil and stratification encountered with depth below the existing ground surface at the individual boring locations.

2.2 Drilling Methods and Groundwater Observations

Borings HR-NE-2 and HR-NE-3 were made to an exploration depth of 25 ft. Boring HR-NE-1 within the Holly Ridge NE site was made to an exploration depth of 80 ft. The 25-ft deep borings were advanced full depth by augering. The 80-ft deep boring was initially advanced by augering to a depth of 20 ft, and then was extended to completion using rotary wash drilling procedures. Observations were made continuously during auger drilling to detect free water entering the open boreholes. Notes pertaining to groundwater observations are included at the lower right corner of the graphic boring logs.

2.3 Sampling Methods

Relatively undisturbed Shelby tube samples or disturbed split-spoon samples were obtained at approximate 3-ft to 5-ft intervals of depth in the borings. Relatively undisturbed samples of the soils encountered in the borings were obtained by pushing a 3-in. OD Shelby tube sampler approximately 1 ft to 2 ft into the soil. The Shelby tube samples were obtained within the depth intervals illustrated as shaded portions of the "Samples" column of the graphic logs for the borings. Disturbed samples of the soils encountered in the borings were obtained by driving a standard 2-in. OD split-spoon sampler 18 in. into the soil with a 140-lb hammer falling freely a distance of 30 inches. The depths at which the split-spoon samples were taken are illustrated as crossed rectangular symbols under the "Samples" column of the graphic logs for the borings. Standard penetration test (SPT) blow counts resulting from split-spoon sampling are recorded under the "Blows Per Ft" column of the graphic logs of the borings. Disturbed auger cutting samples were obtained at several depth intervals within 10 ft of the ground surface in the borings. The depths at which the auger cutting samples were taken are illustrated as small I-shaped symbols under the "Samples" column of the graphic logs for the borings.

2.4 Field Classification, Sample Preservation and Borehole Abandonment

All soils encountered during drilling were examined and classified in the field by a geotechnical engineering technician. Each undisturbed Shelby tube sample was extruded from the sampling tube in the field. An approximate 6-in. long portion of each Shelby tube sample was sealed with melted paraffin in a cylindrical cardboard container to prevent moisture loss and structural disturbance. An additional portion of each Shelby tube sample, representative portions of the split-spoon samples, and the auger cutting samples were sealed in jars to provide material for visual examination and testing in the laboratory. The boreholes were filled with grout after completion of drilling and sampling.

3.0 LABORATORY INVESTIGATION

3.1 General

All of the soil samples were examined in the laboratory and tests were performed on the samples to verify field classifications and to assist in evaluating the strengths and volume change properties of the soils encountered in the borings. The types of laboratory tests performed are described in the following paragraphs.

3.2 Strength Tests

The undrained shear strength characteristics of the fine-grained soils encountered in the borings were investigated by means of four (4) unconfined compression tests performed on selected undisturbed Shelby tube samples. The results of the unconfined compression tests in terms of cohesion are plotted as small open circles in the data section of the graphic boring logs. The water content and dry density were also determined for each unconfined compression test specimen. The water contents are plotted as small shaded circles in the data section of the graphic logs. The dry densities are tabulated to the nearest lb per cu ft under the "Dry Density" column of the logs.

3.3 Classification Tests

The classifications and volume change properties of the fine-grained soils encountered in the borings were investigated by means of four (4) sets of Atterberg liquid and plastic limit tests. The results of the liquid and plastic limit tests are plotted as small crosses interconnected by dashed lines in the data section of the graphic boring logs. In accordance with the Unified Soil Classification System, fine-grained soils are classified as either clays or silts of low or high plasticity based on the results of liquid and plastic limit tests. The numerical difference between the liquid limit and plastic limit is defined as the plasticity index (PI). The magnitudes of the liquid limit and plasticity index and the proximity of the natural water content to the plastic limit are indicators of the potential for a fine-grained soil to shrink or swell upon changes in moisture content or to consolidate under loading.

To aid in classifying the sandy soils and fine-grained soils containing sand, tests were performed on eight (8) samples to determine the percent fines passing the No. 200 sieve. The percentage of fines resulting from these tests is presented on the boring log in the far right column.

3.4 Water Content Tests

Water content tests were performed on nine (9) samples to corroborate field classifications and to extend the usefulness of the strength and plasticity data. The results of the water content tests are plotted as small shaded circles in the data section of the graphic boring logs. The water content data have been interconnected on the logs to illustrate a continuous profile with depth.

4.0 GEOLOGY AND GENERAL SUBSURFACE CONDITIONS

4.1 General

A general description of subsurface soils encountered in the borings made for this investigation is provided in the following paragraphs. The graphical logs shown on Figures 3 through 5 should be referred to for specific soil conditions encountered at each boring location. Stick logs of the borings are shown in profile on Figure 6 to aid in visualizing subsurface soil conditions. Tabulated adjacent to the stick logs are Atterberg limit and plastic limits, water contents, dry densities, cohesions and field SPT blow counts.

The soil survey of Holly Ridge NE site prepared by the U. S. Department of Agriculture, Natural Resources Conservation Service shows the distribution of soil types at the Richland Site (Figures 8 and 9). The soil covering over 60% of the site is described as Gigger-Gilbert silt loam

(Gg), a very deep, poor to moderately drained, low permeability soil that often is often found on broad flats or narrow depressional areas. Gilbert-Egypt (Gm) covers about 16% of the site and is also a poorly drained, low permeability soil. Other soil types shown on the soils map include Dexter silt loam (De and Df), Forestdale silty clay loam (Fr), Gilbert silt loam (Gk), and Perry clay (Pe). The Forestdale silty clay loam covers about 2% of the site area and is a poorly drained soil with very low permeability containing swelling clays in some areas. The Gilbert silt loam covers about 1% of the site area and is poorly drained with low permeability. The Dexter silt loams (De and Df) are well drained with moderate permeability. The remaining soils are poorly drained and have low permeability.

4.2 Geology

The site is situated in the Gulf Coastal Plain physiographic province of the Mississippi Embayment. The general geology of the site area is illustrated by the geology map presented on Figure 7. Sediments exposed on the surface are Pleistocene Braided Stream Terraces. The site is located on Macon Ridge, a north-south trending ridge that is higher in elevation than the surrounding alluvial deposits. The ridge is a Pleistocene relict-alluvial fan deposited by a braided regime of the Arkansas River during early valley alluviation. The topography of the region reflects the near-surface geology and drainage patterns resulting from the erosion of Pleistocene age sediments. The near-surface deposits are underlain by the Eocene age sediments of the Claiborne Group.

The near surface sediments consist of a fine-grained topstratum of clay, silty clay, and silt averaging about 10 ft to 20 ft thick. The topstratum is composed in part of weathered loess. The topstratum overlies an older thicker sequence of substratum sands and gravels. The substratum sands and gravels overlie the Cockfield Formation of the Tertiary Claiborne Group. The Cockfield Formation in the area of the site consists of lignitic clays, silts, and sands. Groundwater bearing sands and gravels occur in the braided stream deposits and in the sand lenses in the Cockfield Formation. The deeper groundwater zones may be salty.

4.3 Soil Conditions

The soils encountered at the boring locations were generally found to consist of fine-grained topstratum deposits underlain by a coarse-grained substratum of sands to the 25-ft and

80-ft boring completion depths. General descriptions of the stratification and physical properties of the soil types encountered in the borings taken at the site investigated are included in the following paragraphs. The graphical logs shown in Figures 3 through 5 should be referred to for specific soil conditions encountered at the boring locations.

The ground surface at Borings HR-NE-1, HR-NE-2 and HR-NE-3 was found to be underlain by silty clays (CL). The silty clays (CL) were encountered to approximate depths of 8 ft, 8 ft and 13 ft below the surface at Borings HR-NE-1, HR-NE-2 and HR-NE-3, respectively. The silty clays (CL) are classified as stiff, very stiff and hard with respect to consistency. The silty clays (CL) are considered to have moderate to high strength and moderate to very low compressibility. The silty clays (CL) are considered to have low shrink/swell potential.

The silty clays (CL) at Borings HR-NE-1, HR-NE-2 and HR-NE-3 were found to be underlain by silty sands (SM and SP-SM). The silty sands (SM and SP-SM) were encountered to a depth of about 18.5 ft at Borings HR-NE-1 and HR-NE-2, and to the terminal depth of 25 ft at Boring HR-NE-3. The silty sands (SM and SP-SM) at Borings HR-NE-1 and HR-NE-2 were found to be underlain by sands (SP) to the terminal depths of 80 ft and 25 ft, respectively. For the most part, the sands (SM, SP-SM and SP) are characterized as medium dense and dense; however, the sands (SM, SP-SM, and SC) within the approximate depth intervals of 8 ft to 18.5 ft at Boring HR-NE-1, and from a depth of about 18.5 ft to the 25-ft terminal depth of Boring HR-NE- 2 are characterized as very loose and loose. The medium dense and dense sands (SM, SP-SM, and SP) are considered to have moderate to high strength and low compressibility. The very loose and loose sands (SM, SP-SM, and SP) are considered to have low to low-moderate strength and moderate compressibility. The sands (SM, SP-SM, and SP) have no potential for shrinking and swelling.

Free water was encountered at Borings HR-NE-1, HR-NE-2, and HR-NE-3 at depths of about 13 ft, 18 ft, and 13 ft, respectively. After an approximate 15-minute observation period, the water level in the open boreholes for Borings HR-NE-1, HR-NE-2, and HR-NE-3 rose to depths of about 12 ft, 15 ft, and 12 ft, respectively. In our opinion, groundwater conditions at this site are influenced by rainfall, local drainage conditions and other environmental factors. Surficial soils can become saturated and weak to relatively shallow depths during periods of prolonged and heavy rainfall.

5.0 DISCUSSION

The Holly Ridge NE site in Richland Parish, Louisiana, is being considered for potential development. The Holly Ridge NE site is 260-acre parcel of land located near the intersection of Highway 80 and Highway 183. Details regarding specific structure sizes, structure locations, finished grades, and other site grading requirements have not been established at this time. However, we have considered that the facility would include commercial/industrial buildings and associated pavements. The buildings could vary from lightly to heavily loaded structures. The proposed sites are generally relatively flat. Available USGS topographic information indicates that existing grades within the sites generally vary between about El. 85 ft to El. 75 ft.

5.1 General Subsurface Conditions

Subsurface soils encountered within the 80-ft maximum exploration depth of the borings made for this preliminary geotechnical investigation generally include silty clays (CL) and sands (SM, SP-SM, and SP). For the most part, the subsurface soils encountered in the borings are generally considered to have moderate to high strength and low to moderate compressibility; however, relatively weak, loose and very loose sands (SM, SP-SM, and SP) were encountered at various depth intervals at the boring locations. The silty clays (CL) are considered to have low shrink/swell potential. The sandy silts (ML) and sands (SM, SP-SM and SP) have no potential for shrinking and swelling. Free water was encountered at Borings HR-NE-1, HR-NE-2, and HR-NE-3 at depths of about, 13 ft, 18 ft, and 13 ft, respectively.

Based on the subsurface soil conditions encountered at the boring location, it is our opinion that lightly to moderately loaded buildings constructed within the property could be supported on shallow foundation systems. More heavily loaded buildings constructed within the property could be supported by a deep foundation system. Preliminary guideline recommendations are included in the following section of this report.

5.2 Geotechnical Design Considerations

The primary geotechnical concerns for design and construction of any structures or pavements are differential movements caused by consolidation of the weaker soils under fill and structural loadings. Based on the subsurface soil conditions encountered at the boring locations it is our opinion that lightly to moderately loaded buildings constructed within the property could be supported on shallow foundation systems, provided weak surficial soils are removed and replaced with compacted select fill materials. For lightly to moderately loaded buildings, pre-loading could be utilized to consolidate deeper weak soils at the site prior to building construction. More heavily loaded buildings constructed within the property could be supported by a deep foundation system. Preliminary guideline recommendations are included in the following section of this report.

6.0 PRELIMINARY GUIDELINE RECOMMENDATIONS

6.1 Building Foundations

Based on the soil conditions encountered in the borings made for this preliminary investigation, we are of the opinion that lightly to moderately loaded buildings can likely be supported on a shallow foundation system. The shallow foundation system could consist of a moderately strong and stiff slab and grade beam foundation which is generously reinforced and made relatively stiff by means of perimeter and interior grade beams. Alternatively, the shallow foundation system could consist of spread footings. Buildings should be designed and constructed and earthwork performed to minimize and to tolerate differential movements caused by consolidation of the weaker soils under fill and structural loadings.

Based on the strengths of the existing soils, we expect that wall footings or grade beams could be designed to impose a bearing pressure in the range of 1,500 to 2,000 lbs per sq ft when total dead plus live loads are applied. The grade beams would need to be designed for both positive and negative bending. Individual column loads could be supported on widened, thickened grade beam sections or isolated square footings that we expect could be designed to impose a bearing pressure in the range of 2,000 to 2,500 lbs per sq ft when total dead plus live loads are applied.

Total settlement of the building foundation slab or spread footings under compressive structural loadings is expected to be within tolerable limits, provided maximum column loads do not exceed about 100 to 150 kips and wall loads are not greater than about 5 to 7 kips per ft. Greater column and wall loads may require deep foundations.

If deep foundation systems are required, they would likely include auger-cast piles or driven piles. Drilled shafts are not considered a viable deep foundation alternative because of the groundwater and sandy soils encountered during auger drilling for the borings made for this investigation. Many borings made for this preliminary investigation were not advanced deep enough to consider bearing capacities for deep foundation alternatives.

6.2 Drives and Parking Areas

We are of the opinion that either flexible asphalt concrete or rigid Portland cement concrete pavement could be utilized for this facility. A detailed pavement design should be performed for anticipated traffic volumes and loads during project design.

The strength and compressibility of the subgrade soils may need to be improved by lime treatment. If lime treatment of the subgrade soils is conducted, the improved subgrade soils would permit a reduction in the pavement thickness. We normally recommend that at least the top 8 in. of the subgrade soils be treated with lime. The lime would also improve the constructability during wet seasons of the year.

Flexible asphalt concrete pavement would better accommodate differential movement than rigid Portland cement concrete. We are the opinion that rigid Portland cement concrete would provide better support in front of garbage dumpsters, loading docks and in areas subject to significant heavy truck traffic. If the subgrade soils are prepared and select fill materials are placed in accordance with the recommendations given in this report, it is our opinion that a CBR on the order of 5 would be appropriate for flexible asphalt pavement design, and a modulus of subgrade reaction on the order of 150 lbs per cu in. would be appropriate for rigid Portland cement concrete pavement design. The actual pavement section required for this project would be highly dependent on the expected truck traffic and whether lime treatment is performed.

6.3 Site Preparation and Earthwork

No specifics with regard to earthwork or grading plans have been established at this time. As an initial step of site preparation, all trees and shrubs including their root systems should be removed within the building and pavement areas. Stripping should then be performed to remove organic-laden surficial soils, vegetation, debris, brush and roots. After stripping, any wet or weak soils should be excavated to expose suitably stable soils. The necessity of excavating any weak soils would need to be determined during earthwork construction and should be evaluated during the final investigation for the facility.

The surficial soils encountered at the ground surface at the boring locations were found to be relatively strong at the time of our field investigation. During wet seasons of the year, we expect that these soils could become weaker and wetter to some depth and could potentially require undercutting, drying by processing, or treatment of the in situ soils with admixtures, or a combination of these approaches, to achieve stable conditions that would support fill placement.

Special consideration should be given to the surficial soils at the site during earthwork planning and operations since the soils are very sensitive to disturbance and moisture content fluctuations. The construction techniques and types of equipment utilized and site drainage provided would have a great effect on the performance of these soils throughout the project.

Typical requirements for backfill and fill materials are that they be placed in 9-in. thick maximum loose lifts at moisture contents within 3 percentage points of standard Proctor optimum moisture content and be compacted to not less than 95 percent of standard Proctor maximum dry density (ASTM D 698) with stability present. Typically, field moisture/density tests are performed frequently within each compacted lift as needed to check if the required compaction criteria are being met.

7.0 REPORT LIMITATIONS

The preliminary guideline recommendations in this report are based on conditions as they existed at the time of our field investigation and further on the assumption that the single exploratory boring is representative of subsurface conditions throughout the site. It should be noted that actual subsurface conditions beyond the boring might differ from those encountered at the boring location.

We emphasize that this investigation is preliminary and the contents of this report should only be used for general planning and estimating purposes. The guideline recommendations included herein should be considered as tentative until additional borings, laboratory tests and analyses are performed for the actual planned facilities.

This preliminary report has been prepared for the exclusive use of the Denmon Engineering, Inc. for specific application to the geotechnical aspects of design and construction for proposed development site in Richland Parish, Louisiana. The only warranty made by us in connection with the services provided is we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, express or implied, is made or intended.

FIGURES

Boring Locations

HOLLY RIDGE NE SITE
RICHLAND PARISH, LOUISIANA

BURNS COOLEY DENNIS, INC.
551 SUNNYBROOK ROAD
RIDGELAND, MISSISSIPPI 39157

JOB NO.	130162	SCALE:	1"=600'	FIGURE 1

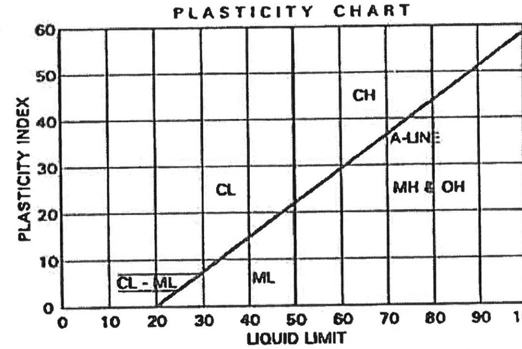
UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOL & LETTER	DESCRIPTION
COARSE-GRAINED SOILS More than half of material larger than No. 200 sieve size	GRAVELS More than half of coarse fraction larger than No. 4 sieve size	Clean Gravels (Little or no fines)	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURE
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURE
		Gravels with fines (Appreciable amount of fines)	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURE
			GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE
	SANDS More than half of coarse fraction smaller than No. 4 sieve size	Clean Sands (Little or no fines)	SW	WELL GRADED SAND, GRAVELLY SAND
			SP	POORLY GRADED SAND, GRAVELLY SAND
		Sands with fines (Appreciable amount of fines)	SM	SILTY SAND, SAND-SILT MIXTURE
			SC	CLAYEY SAND, SAND-CLAY MIXTURE
FINE-GRAINED SOILS More than half of material smaller than No. 200 sieve	SILTS AND CLAYS	Liquid limit less than 50	ML	SILT WITH LITTLE OR NO PLASTICITY
			ML	CLAYEY SILT, SILT WITH SLIGHT TO MEDIUM PLASTICITY
			CL	SILTY CLAY, LOW TO MEDIUM PLASTICITY
			CL	SANDY CLAY, LOW TO MEDIUM PLASTICITY (30% TO 50% SAND)
	SILTS AND CLAYS	Liquid limit greater than 50	MH	SILT, FINE SANDY OR SILTY SOIL WITH HIGH PLASTICITY
			CH	CLAY, HIGH PLASTICITY
			OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOIL

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided	- Clays with polished and striated planes created as a result of volume changes related to shrinking, swelling and/or changes in overburden pressure.
Fissured	- Clays with a blocky or jointed structure generally created by seasonal shrinking and swelling.
Laminated	- Composed of thin alternating layers of varying color and texture.
Calcareous	- Containing appreciable quantities of calcium carbonate.
Parting	- Paper thin (less than 1/8 inch).
Seam	- 1/8 inch to 3 inch thickness.
Layer	- Greater than 3 inches in thickness.

PLASTICITY CHART

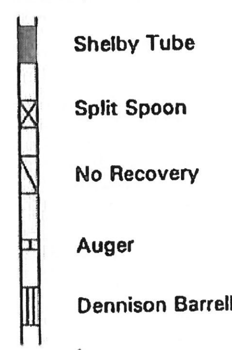


FOR CLASSIFICATION OF FINE GRAINED SOILS

DENSITY AND CONSISTENCY

COARSE-GRAINED SOILS		FINE-GRAINED SOILS		
DENSITY	PENETRATION RESISTANCE, N Blows per Foot	CONSISTENCY	COHESION Kips/Sq.Ft	PENETRATION RESISTANCE, N Blows per Foot
Very loose	0 - 4	Very Soft	<0.25	0 - 1
Loose	5 - 10	Soft	0.25 - 0.50	2 - 4
Medium Dense	11 - 30	Medium Stiff	0.50 - 1.00	5 - 8
Dense	31 - 50	Stiff	1.00 - 2.00	9 - 15
Very Dense	>50	Very Stiff	2.00 - 4.00	16 - 30
		Hard	>4.00	>30

SAMPLE TYPES
(Shown in Sample Column)



PARTICLE SIZE IDENTIFICATION

Cobbles	- Greater than 3 inches
Gravel	- Coarse - 3/4 inch to 3 inches
	Fine - 4.76 mm to 3/4 inch
Sand	- Coarse - 2 mm to 4.76mm
	Medium - 0.42 mm to 2 mm
	Fine - 0.074 mm to 0.42 mm
Silt & Clay	- Less than 0.074 mm

RELATIVE COMPOSITION

Slightly	5 - 15%
With	16 - 29%
Sandy (or gravelly)	30 - 50%

CLASSIFICATION, SYMBOLS AND TERMS USED ON GRAPHICAL BORING LOGS

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FIGURE 2

LOG OF BORING NO. HR-NE-1

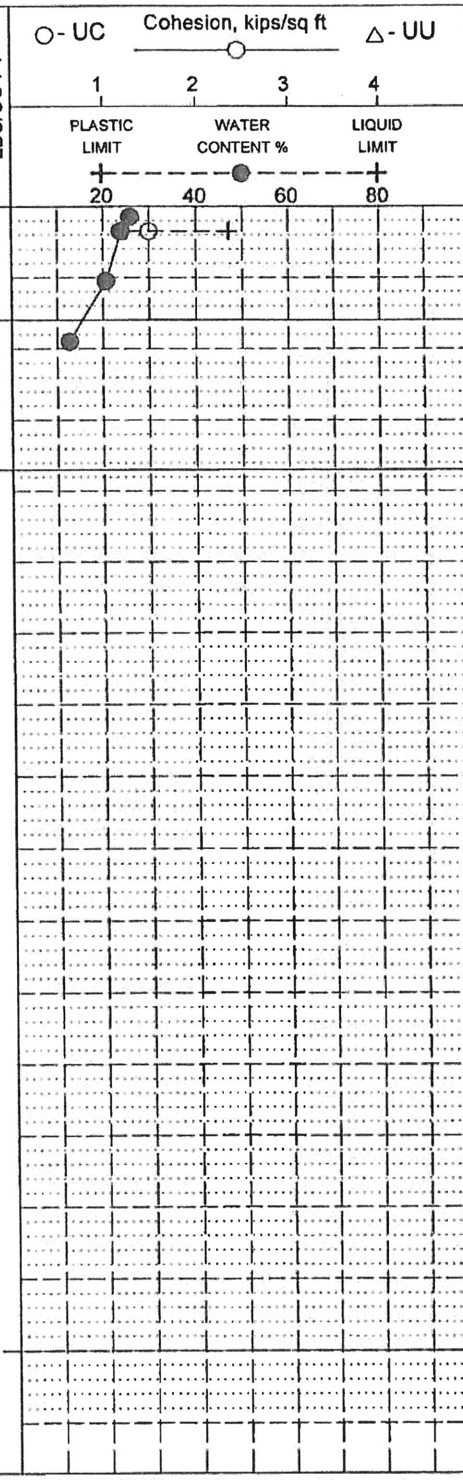
HOLLY RIDGE NE SITE
RICHLAND PARISH, LOUISIANA

TYPE: 6" Short-flight auger to 20', then rotary wash to completion.

LOCATION: See Figure 1

SURFACE EL: ±ft

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT	DRY DENSITY LBS/CU FT	% PASSING NO. 200 SIEVE
0 – 8	Stiff tan and light gray silty clay (CL) with limonite nodules - with sand pockets below 4'		97	
8 – 18	Loose tan silty fine sand (SM) - with clay pockets to 14'	9		18.5
		6		
18 – 80	Medium dense tan fine sand (SP)	14		
		15		2.1
		20		
		22		
		25		7.0
		24		
	- fine to coarse 50' - 60'	27		
		25		3.7
	- dense 60' - 65'	37		
	- fine to medium 65' - 75' - with trace of gravel below 65'	27		
		21		4.5
	- fine to coarse below 75' - dense below 78.5'	23		
		36		



BORING DEPTH: 80 ft

DATE: 04/10/13

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 32° 27' 42.7"
W 91° 37' 29.7"

GROUNDWATER DATA: Free water encountered at an approximate depth of 13' during auger drilling. Water level at an approximate depth of 12' after about 15 minutes.

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FIGURE 3

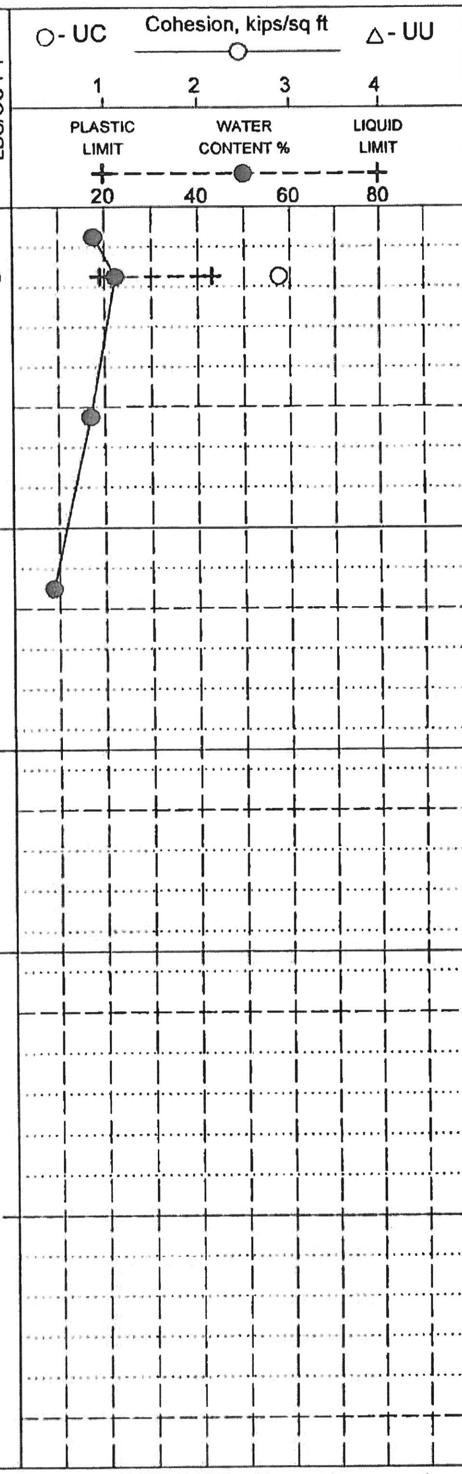
LOG OF BORING NO. HR-NE-2
HOLLY RIDGE NE SITE
RICHLAND PARISH, LOUISIANA

TYPE: 6" Short-flight auger

LOCATION: See Figure 1

SURFACE EL: ±ft

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT	DRY DENSITY LBS/CU FT	% PASSING NO. 200 SIEVE
0–8	Very stiff tan and light gray silty clay (CL) - with limonite nodules below 2' - hard, with sand pockets and seams below 4'		100	
8–13.5	Medium dense tan silty fine sand (SM) with mica	16		32.0
13.5–18.5	Medium dense tan fine sand (SP-SM), slightly silty - with clay pockets below 14'	18		
18.5–25	Very loose tan fine sand (SP) - loose below 23.5'	2 6		4.8



BORING DEPTH: 25 ft

DATE: 04/10/13

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 32° 27' 51.0"
W 91° 37' 11.5"

GROUNDWATER DATA: Free water encountered at an approximate depth of 18' during auger drilling. Water level at an approximate depth of 15' after about 15 minutes.

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FIGURE 4

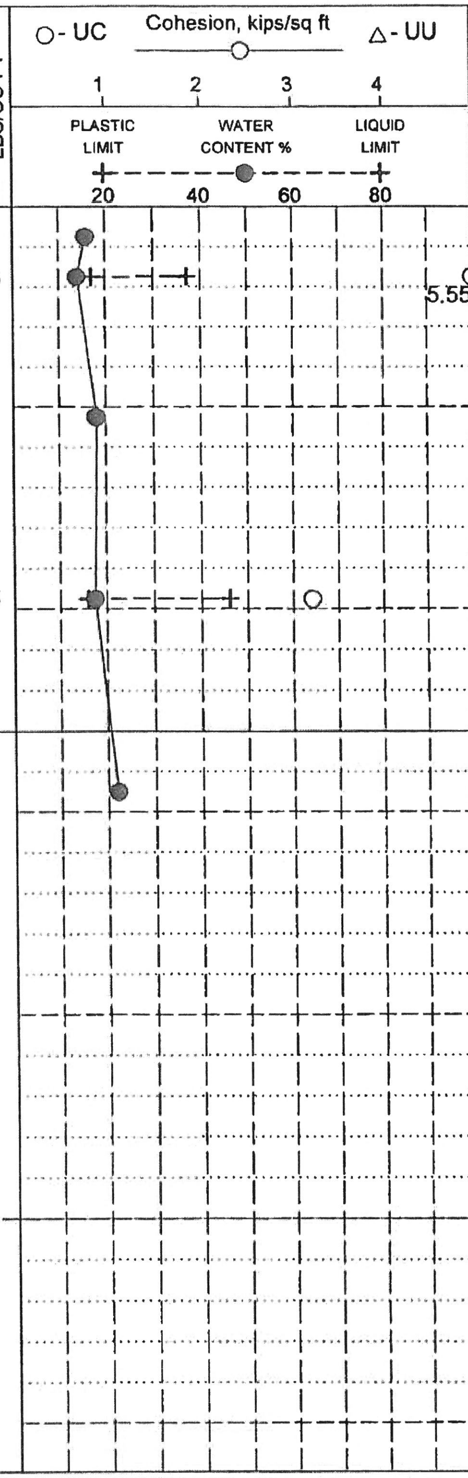
LOG OF BORING NO. HR-NE-3

HOLLY RIDGE NE SITE

RICHLAND PARISH, LOUISIANA

TYPE: 6" Short-flight auger LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL (SURFACE EL: ±ft)	BLOWS PER FT	DRY DENSITY LBS/CU FT	% PASSING NO. 200 SIEVE
0 – 13	Very stiff light gray silty clay (CL) with sand pockets - hard 2' - 10' - slightly sandy below 2' - with limonite nodules below 4' - very stiff, light gray and tan below 10'		113 111	
13 – 25	Medium dense tan silty fine sand (SM)	13 16 13		27.3



BORING DEPTH: 25 ft

DATE: 04/10/13

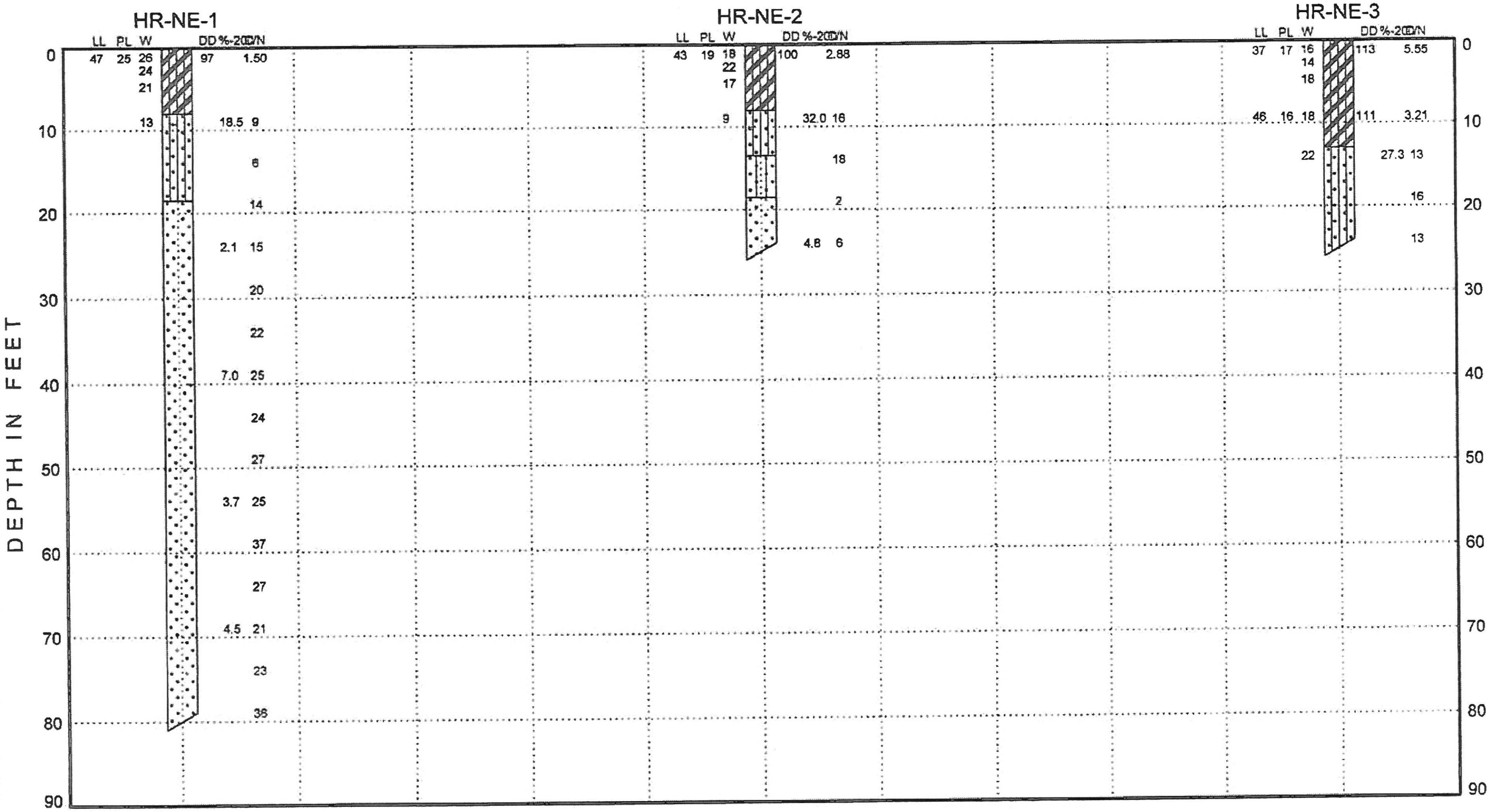
COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 32° 27' 28.2"
W 91° 37' 13.8"

GROUNDWATER DATA: Free water encountered at an approximate depth of 13' during auger drilling. Water level at an approximate depth of 12' after about 15 minutes.

130162 5/6/2013 10:21:22 AM

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 5



LEGEND:

LL = Liquid Limit
PL = Plastic Limit
W = Water Content
DD = Dry Density (pcf)
C/N = Cohesion (ksf)/Penetration Resistance, N (blows/ft) in the same column
MS = Matric Suction (tsf)
%-200 = % Passing No. 200 Sieve

NOTE: See Figure 2 for boring log legend.

SUBSURFACE SOIL PROFILE		
HOLLY RIDGE NE SITE RICHLAND PARISH, LOUISIANA		
Job No. 130162	Date 5/6/13	Figure 6

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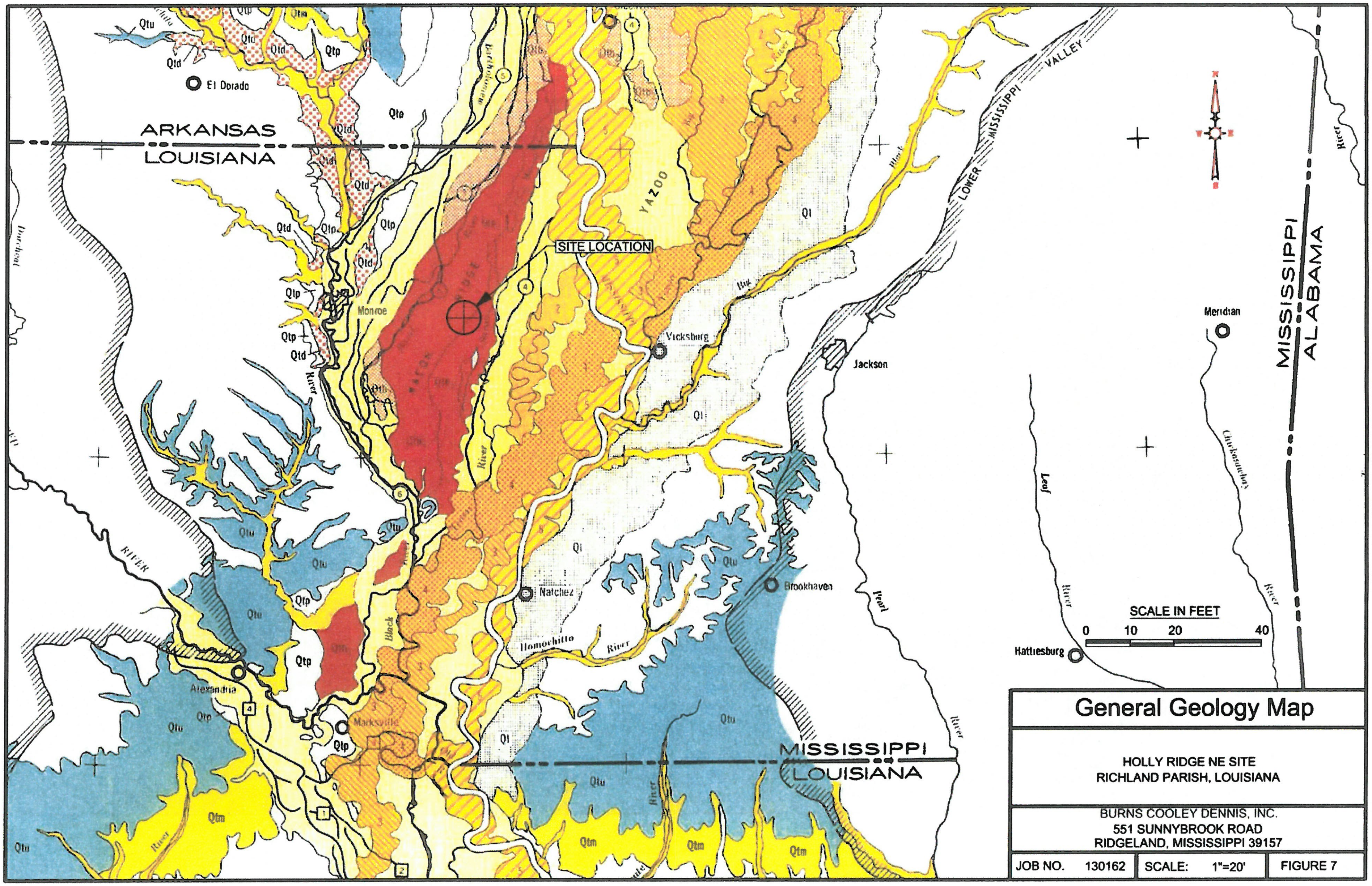

General Geology Map

HOLLY RIDGE NE SITE
RICHLAND PARISH, LOUISIANA

BURNS COOLEY DENNIS, INC.
551 SUNNYBROOK ROAD
RIDGELAND, MISSISSIPPI 39157

JOB NO.	130162	SCALE:	1"=20'	FIGURE 7

91° 37' 56"
91° 36' 32"
32° 28' 2"
32° 28' 1"
32° 27' 21"
32° 27' 21"
91° 37' 57"
91° 36' 33"
628600
628800
629000
629200
629400
629600
629800
630000
630200
630400
630600
3593000
3592800
3592600
3592400
3592200
3592000
80
Holloway Rd
Cobb Rd
Cood Rd
Map Scale: 1:6,080 if printed on B size (11" x 17") sheet.
Meters
0 100 200 400 600
Feet
0 400 800 1,600 2,400
N

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 or swamp
- 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

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:6,080 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 15N NAD83

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

Soil Survey Area: Richland Parish, Louisiana
Survey Area Data: Version 6, Apr 2, 2008

Date(s) aerial images were photographed: Data not available.

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

Richland Parish, Louisiana (LA083)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
De	Dexter silt loam, 1 to 3 percent slopes	9.5	3.7%
Df	Dexter silt loam, 3 to 5 percent slopes	7.1	2.8%
Fr	Forestdale silty clay loam	5.7	2.2%
Gg	Gigger-Gilbert silt loams, gently undulating	166.9	64.7%
Gk	Gilbert silt loam	18.4	7.1%
Gm	Gilbert-Egypt silt loams, gently undulating	41.9	16.3%
Pe	Perry clay, occasionally flooded	8.3	3.2%
Totals for Area of Interest		**257.8**	**100.0%**