

# **BURNS COOLEY DENNIS, INC.**

## **GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS**

### **Corporate Office**

551 Sunnybrook Road  
Ridgeland, MS 39157  
Phone: (601) 856-9911  
Fax: (601) 853-2077

### **Mailing Address**

Post Office Box 12828  
Jackson, MS 39236  
  
www.bcdgeo.com

### **Materials Laboratory**

278 Commerce Park Drive  
Ridgeland, MS 39157  
Phone: (601) 856-2332  
Fax: (601) 856-3552

August 2, 2017

Walker Circle Properties, LLC  
Post Office Box 180789  
Richland, Mississippi 39218

Attention: B.T. Steadman

Project No. 170287

### **Soils Data Report Truck Parking Facility Richland, Mississippi**

Gentlemen:

Submitted here is the report of our soil data report for the above-captioned project. This investigation was authorized by Mr. B.T. Steadman on May 17, 2017. The investigation was generally performed in accordance with proposal sent by email on May 10, 2017.

### **Introduction**

Plans are being made for the construction of a new truck parking facility on two parcels of land located at the southwest corner of the intersection of Leggett Drive and Old Highway 49 North in Richland, Mississippi. The facility would consist of two buildings and either asphalt or concrete pavements. Detail construction plans are not available at this time. A site plan showing the approximate locations of the buildings and the boring locations is presented on Figure 1 of this report. The scope of this study includes only obtaining soil data for the site; detailed geotechnical recommendations are not included as part of this study.

### **Field Exploration**

Subsurface soil conditions were explored by means of 15 borings. The boring locations and depths were determined by a Burns Cooley Dennis representative. The approximate locations of the borings are shown on Figure 1. The borings were located in the field by the use of a hand-held GPS unit with coordinates depicted from Google Earth. Approximate GPS coordinates for the boring locations are shown at the bottom of the graphical logs within the "Comments" section.

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. Graphical logs of the borings are presented on Figures 3 through 17. The graphical logs illustrate the types of soil and stratification encountered with depth below the existing ground surface at the individual boring locations.

Borings 1 through 15 were made to exploration depths of 6 ft and 10 ft. Borings 1 through 7 and 9 through 11 were made using a buggy-mounted drill rig. The remaining borings were made using a hand auger due to access restrictions for the drill rig. Representative disturbed samples of the soils encountered during drilling were taken directly from the auger cuttings at an approximate 2-ft to 3-ft intervals of depth. The depths at which the auger cutting samples were taken are illustrated as small I-shaped symbols under the "Samples" column of the graphic boring logs.

All soils encountered during drilling were examined and classified in the field by a geotechnical engineering technician. The auger cutting samples were sealed in jars to provide material for visual examination and testing in the laboratory. Unless other disposition is requested, we routinely discard soil samples after about six months of storage.

Observations were made continuously during auger drilling to detect free water entering the open boreholes. Notes pertaining to groundwater observations are included at the bottom right corner of the graphic boring logs. The boreholes were backfilled with bentonite-cement grout after completion of drilling and sampling. It should be noted that at the time of our initial attempt at field investigation, the site had standing water on the order of about 2 ft to 3 ft covering about 3/4<sup>th</sup> of the site. We had to allow the site to dry before we could complete the field investigation.

## **Laboratory Testing**

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

Classification Tests. The classifications and volume change properties of fine-grained soils were investigated by means 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 Atterberg 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. The proximity of the natural water content to the plastic limit is also an indicator of soil strength.

Water Content Tests. Water content tests were performed on samples to corroborate field classifications and to extend the usefulness of the 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.

## **General Subsurface Conditions**

A general description of subsurface soils and groundwater conditions revealed by the borings made for this investigation is provided in the following paragraphs. The graphical logs shown on Figures 3 through 17 should be referred to for specific soil and groundwater conditions encountered at each boring location. Stick logs of the borings are shown in profile on Figures 18 and 19 to aid in visualizing subsurface soil conditions. Tabulated adjacent to the stick logs are liquid and plastic limits and water contents.

The ground surface at the boring locations was found to be underlain by sandy and silty clays (CL) to depths ranging from 2 ft to 6-ft or 10-ft completion depths of the borings. The sandy and silty clays (CL) encountered within the borings are classified as soft to very stiff with respect to consistency and are considered to have low to high strength, low to high compressibility, and low shrink/swell potential.

The silty clays (CL) are underlain by clays (CH) in Borings 1, 4, 5, 7, 9, 10, 11, and 13. The clays (CH) extend to various depths including the 6-ft and 10-ft completion depths in some borings. The clays (CH) are classified as medium stiff to very stiff with respect to consistency and considered to have moderate to high strength, low to moderate compressibility, and have moderate to high shrink/swell potential.

The silty clays (CL) and clays (CH) are underlain by silty sands (SM) or clayey sands (SC) in Borings 4, 6, and 15. The silty and clayey sands (SM,SC) are characterized as medium dense with respect to density and are considered to have moderate-high strength, low compressibility, and are nonexpansive.

Groundwater. Free water was encountered within Borings 4, 6, and 12 at depths ranging from about 3.5 ft to 9 ft. After a brief 15 minute waiting period the water levels were recorded at depths ranging from 2 ft to 8.33 ft. It should be noted that at the time of our initial field investigation on June 30, 2017 that about 3/4<sup>th</sup> of the site had about 2 ft to 3 ft of standing water on it and it was not until July 20, 2017 that the site had dried up enough to complete drilling operations. In our opinion, groundwater conditions at the site will be influenced by rainfall, surface drainage, and by the rise and fall of water levels in nearby ditches, creeks, ponds or other bodies of water. Groundwater conditions at the site can also be influenced by man-made changes. Surficial soils can become saturated and weak to relatively shallow depths during periods of prolonged and heavy rainfall.

## Discussion

Subsurface soils encountered within the maximum 10-ft exploration depth of the borings made for this investigation generally consist of silty clays (CL), sands (SC and SM) and clays (CH) with lesser amounts of sandy clays (CL). The sands (SC and SM) have no potential for shrinking and swelling. The silty clays (CL) and sandy clays (CL) are considered to have low shrink/swell potential. The clays (CH) are expansive with moderate to high shrink/swell potential.

The weaker soft to medium stiff silty clays (CL) and clays (CH) that were encountered are considered to provide poor subgrade support strength for pavements and foundations. The remaining subsurface soils encountered in the borings are considered to be stronger and less compressible. The stronger silty clays (CL), sandy clays (CL) and sands (SC and SM) would provide good subgrade support strength for pavements and foundations. The clays (CH) would not provide adequate long term subgrade support for pavements and/or foundations due to their potential to shrinking and swelling due to potential changes in moisture content.

Shrink/swell movements associated with seasonal moisture content fluctuations can occur within the expansive clay (CH) soils that were encountered. Cover soils overlying expansive clays (CH) buffer moisture content changes within the clays (CH) caused by seasonal weather conditions and transpiration by plants and trees. Thus, the potential magnitude of moisture content changes and associated shrink/swell movements within expansive clays (CH) is proportionate to the thickness of overlying cover soils. Moisture content changes and shrink/swell movements within expansive clays (CH) are lower for greater thicknesses of cover soils. There is a general trend for expansive clays (CH) beneath pavements and/or foundations to swell due to an increase in water content caused by capillary and vapor phase movement of moisture within the clays (CH). Expansive clays (CH) will also experience considerable swelling if directly supplied with water from rainfall, sprinkler systems, broken underground water and sewer pipes, or any other source. Trees growing adjacent to pavements and/or foundations can extract a considerable amount of moisture from the ground, resulting in localized shrinkage of expansive clays (CH) accompanied by vertical and lateral movements. Overburden removal associated with the establishment of finished grades lower than existing ground surface elevations will cause stress relief in expansive clays (CH) resulting in long-term rebound. Expansive clay (CH) soils will also experience long-term downhill creep movements, depending on slope steepness.

Typically in this region when a site contains moderate to highly expansive clays (CH), building can be supported by a shallow foundation system and pavements can consist of either asphalt concrete or rigid Portland cement concrete (PCC) provided proper earthwork procedures are followed and there exists a low permeability and low shrink/swell potential soil buffer zone directly beneath foundations and pavements. Typically these buffers are 5 ft for structures and 3 ft for pavements.



## Report Limitations

We caution that this report merely presents subsurface conditions encountered at the locations of the borings. It should be understood that subsurface conditions between and beyond the borings might differ from those encountered at the boring locations. 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.

We appreciate the opportunity to be of service. If you should have any questions concerning this report, please do not hesitate to call us.

Very truly yours,

BURNS COOLEY DENNIS, INC.



Al Marioni, E. I.



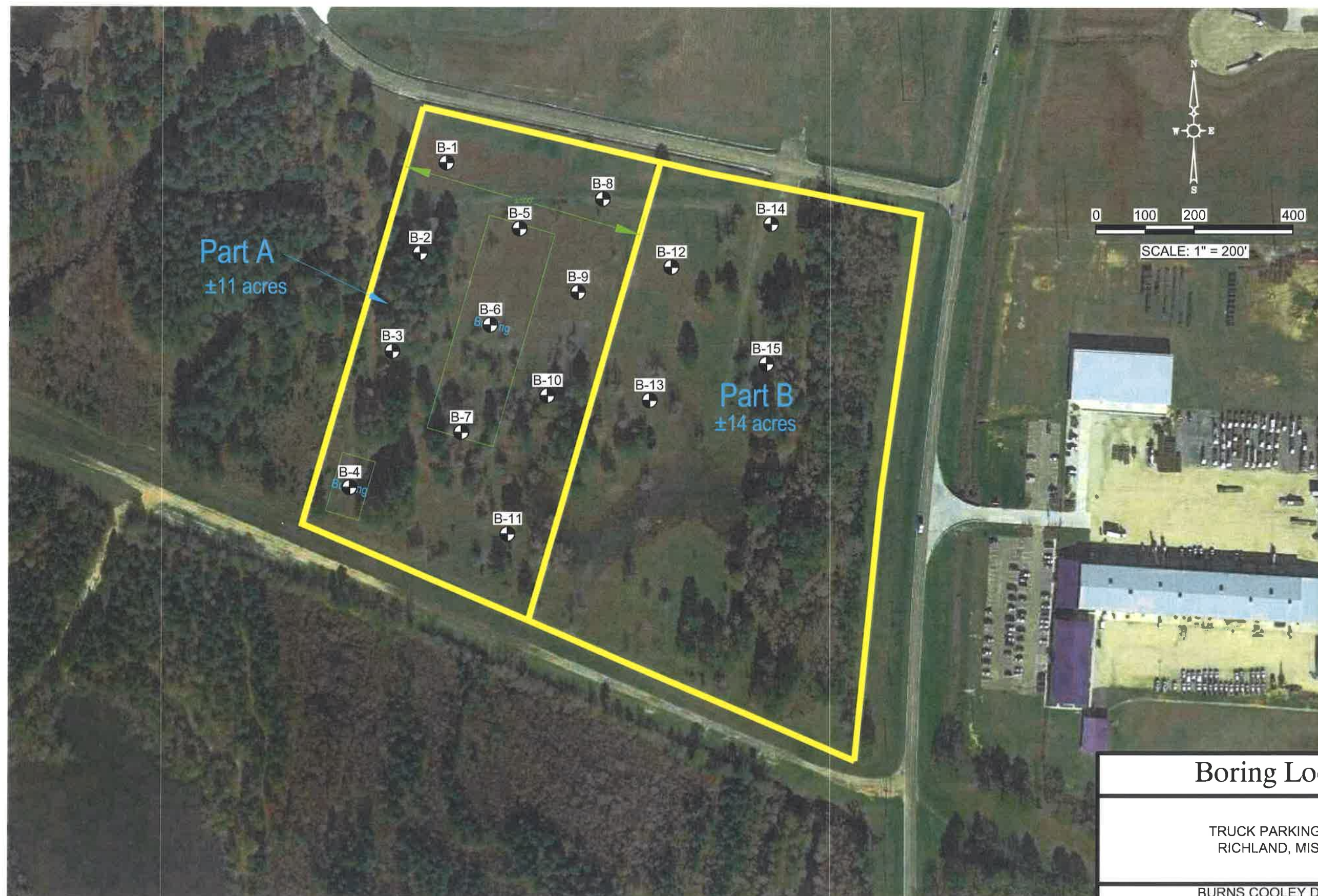
G. Thomas Dunlap, P.E.



APM/GTD/apm

Copies Submitted: Via electronic mail





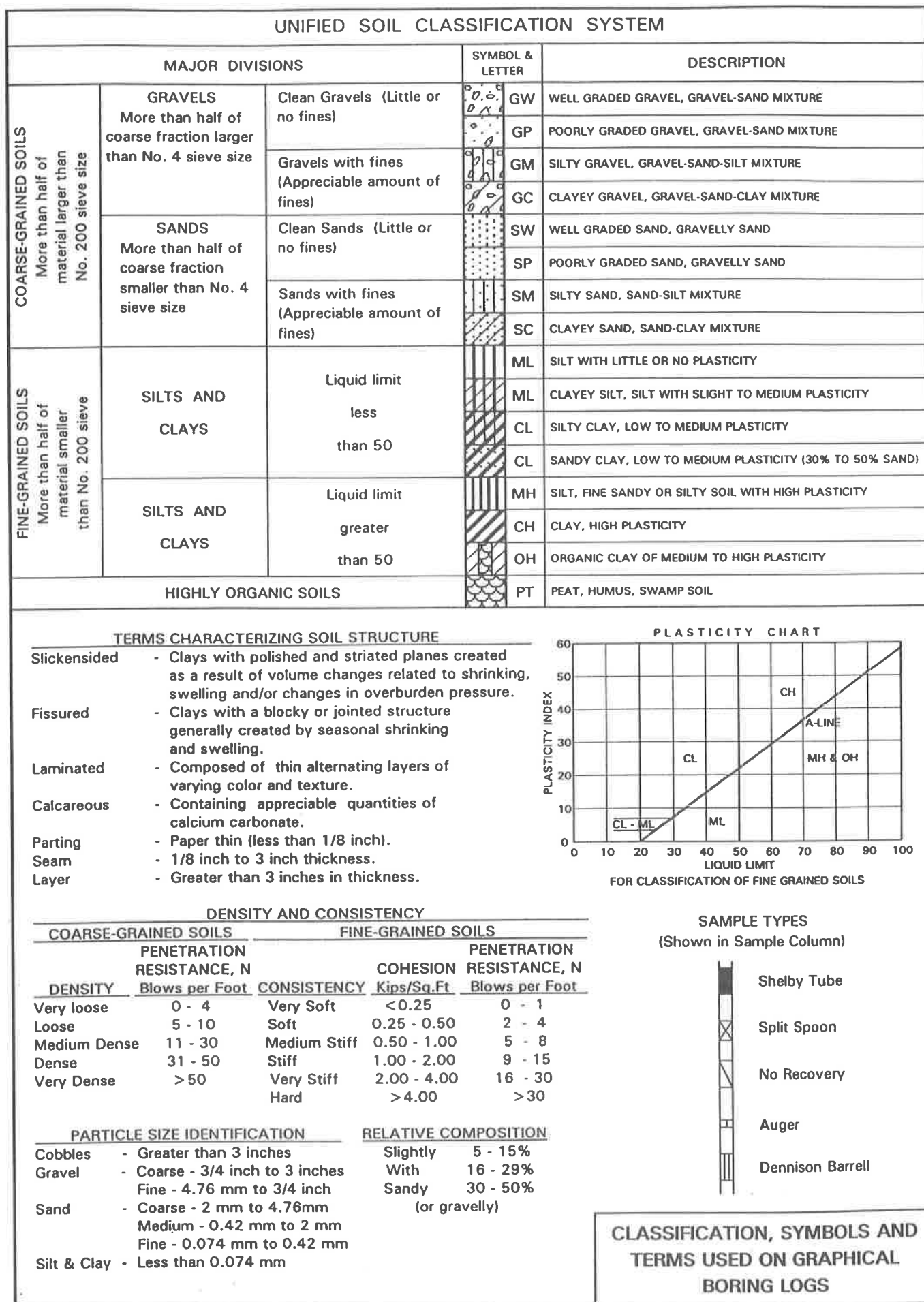
## Boring Locations

TRUCK PARKING FACILITY  
RICHLAND, MISSISSIPPI

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

JOB NO. 170287	SCALE: AS SHOWN	FIGURE 1
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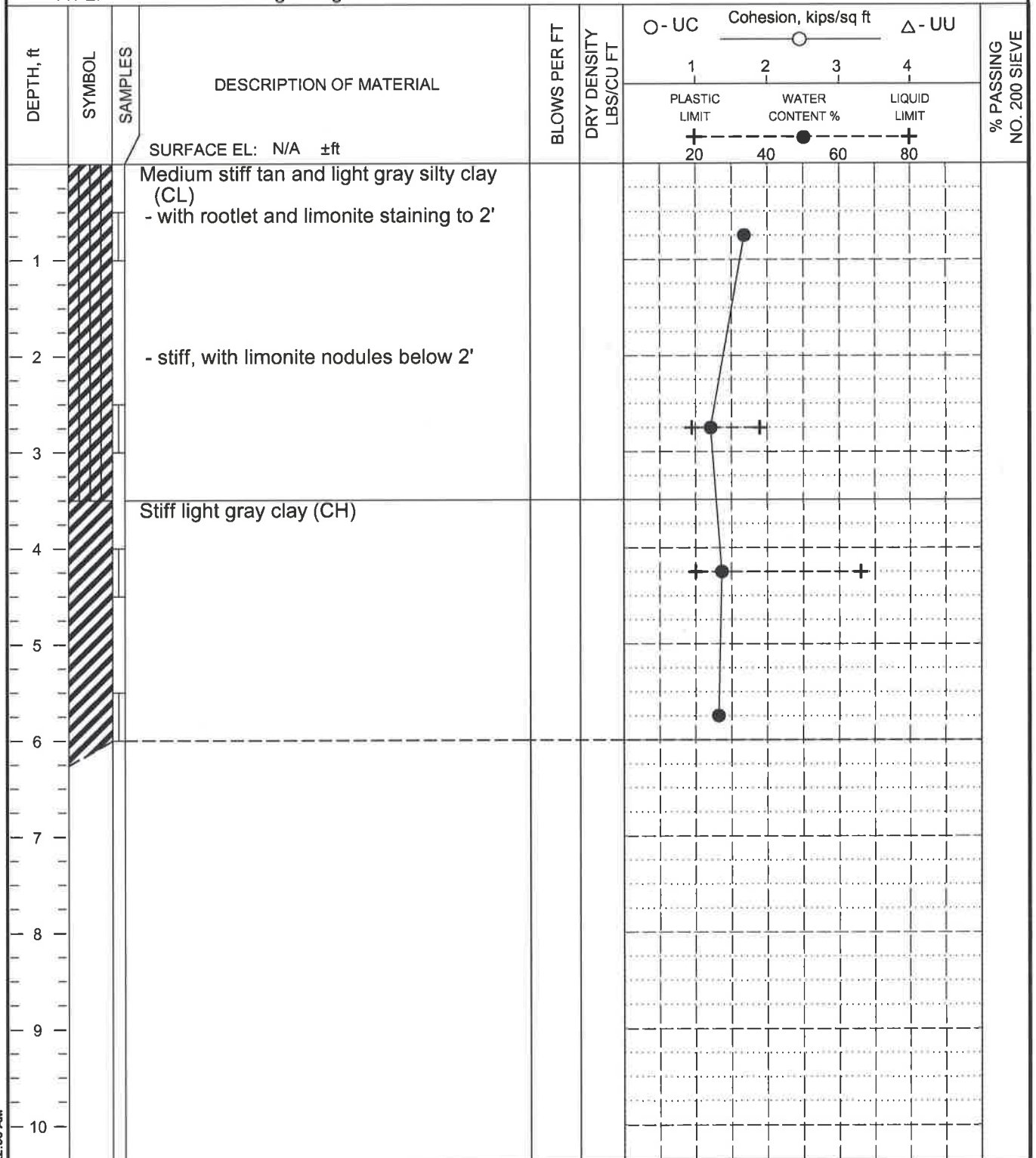
# LOG OF BORING NO. 1

## TRUCK PARKING FACILITY

### RICHLAND, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



BORING DEPTH: 6 ft

DATE: 07/20/17

COMMENTS: Borehole filled from bottom-to-top with cement grout upon completion of drilling and sampling.  
GPS Coordinates  
N 32° 15' 41.0"  
W 90° 10' 34.7"

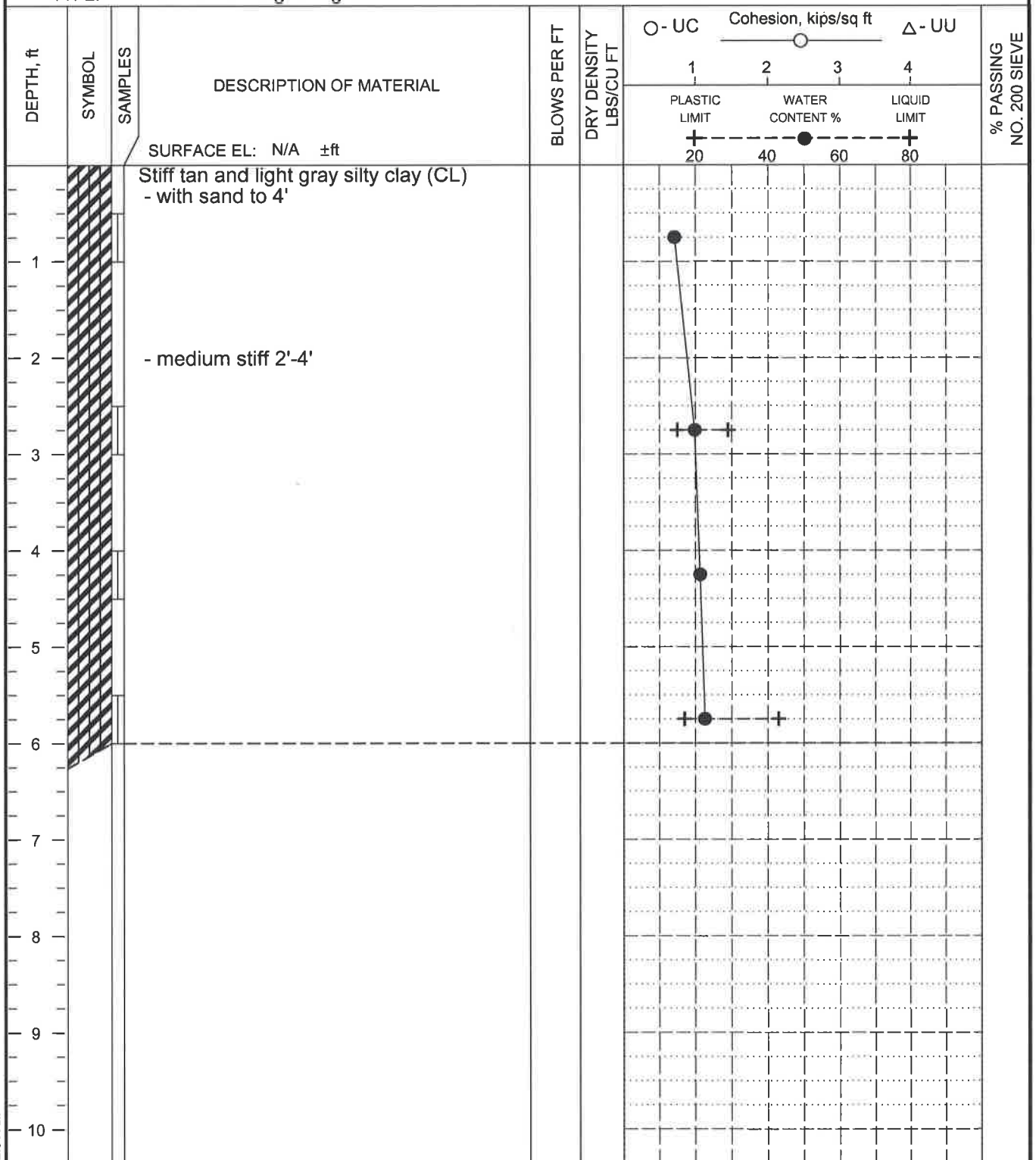
GROUNDWATER DATA: No free water encountered during auger drilling.



**LOG OF BORING NO. 2**  
TRUCK PARKING FACILITY  
RICHLAND, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



BORING DEPTH: 6 ft

DATE: 07/20/17

COMMENTS: Borehole filled from bottom-to-top with cement grout upon completion of drilling and sampling.  
GPS Coordinates  
N 32° 15' 39.2"  
W 90° 10' 35.4"

GROUNDWATER DATA: No free water encountered during auger drilling.

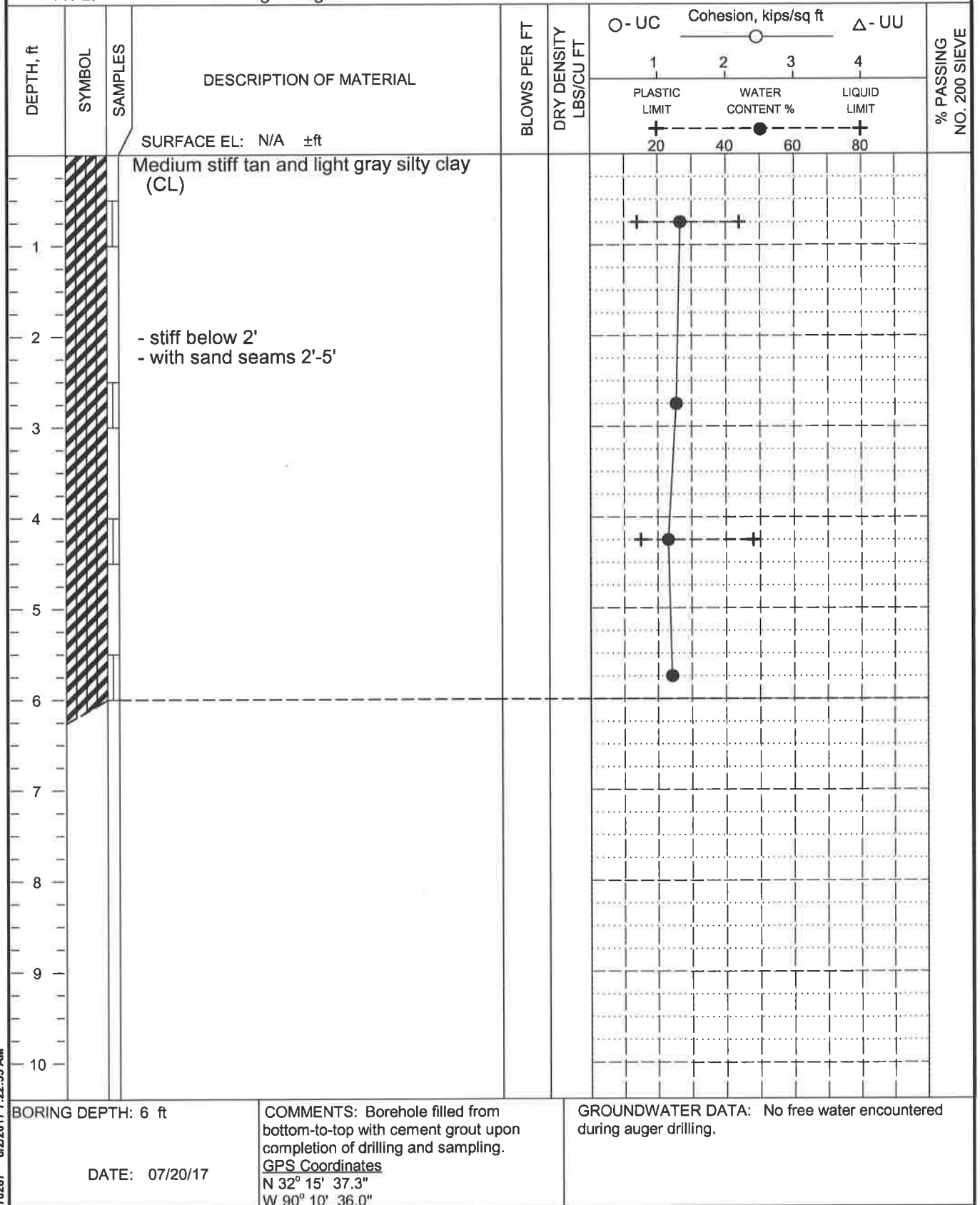
# LOG OF BORING NO. 3

## TRUCK PARKING FACILITY

### RICHLAND, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



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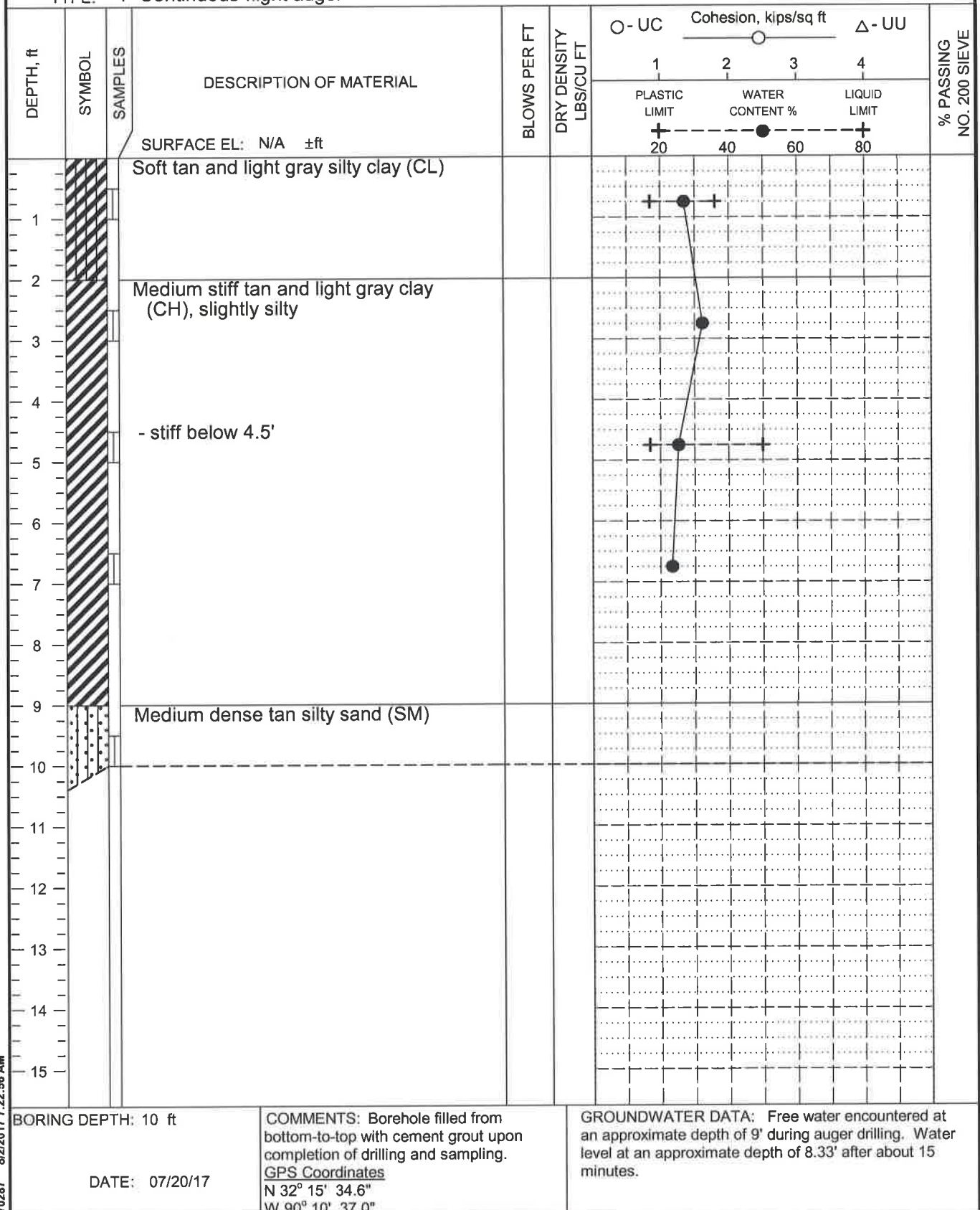
# LOG OF BORING NO. 4

## TRUCK PARKING FACILITY

### RICHLAND, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



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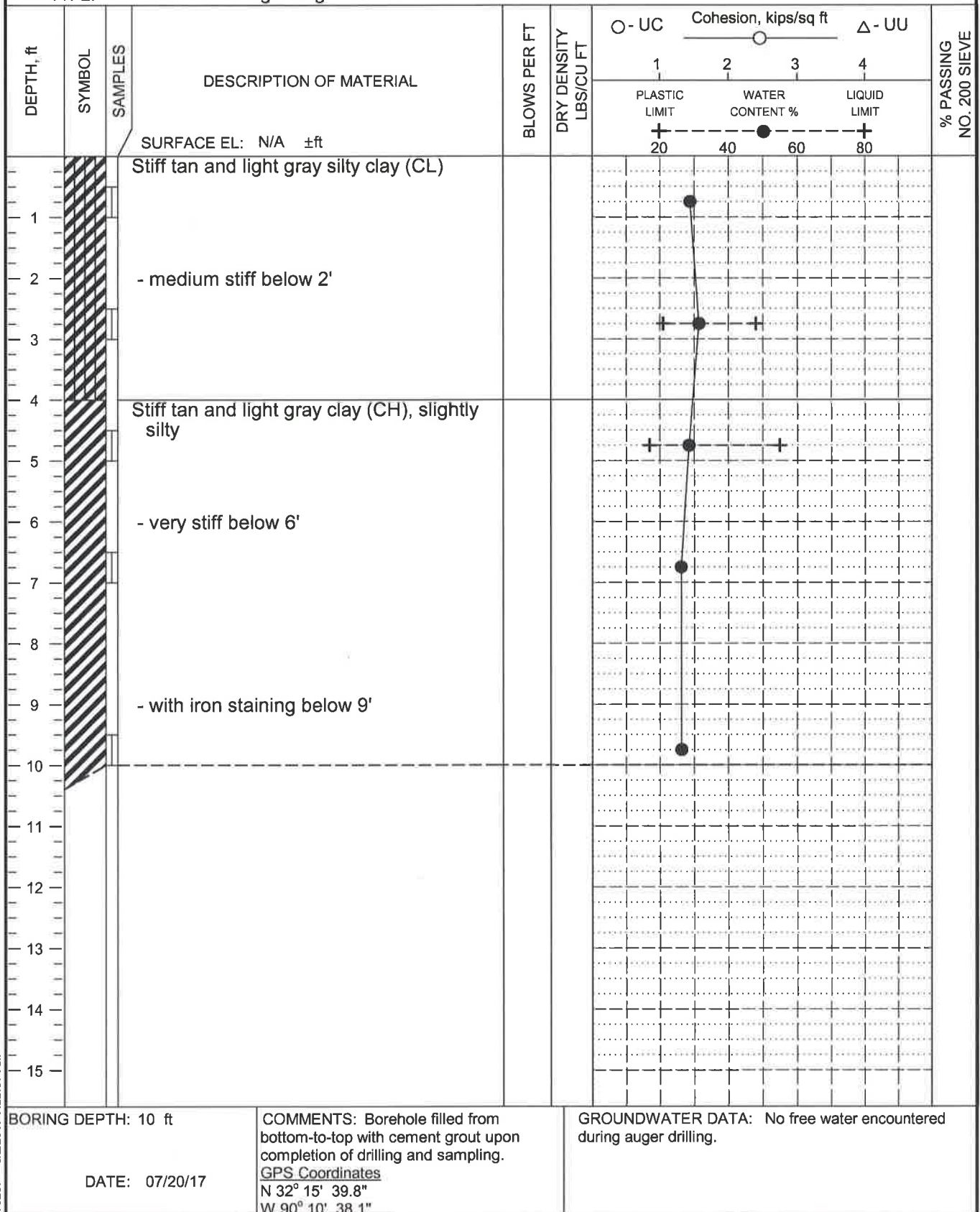
FIGURE 6



**LOG OF BORING NO. 5**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



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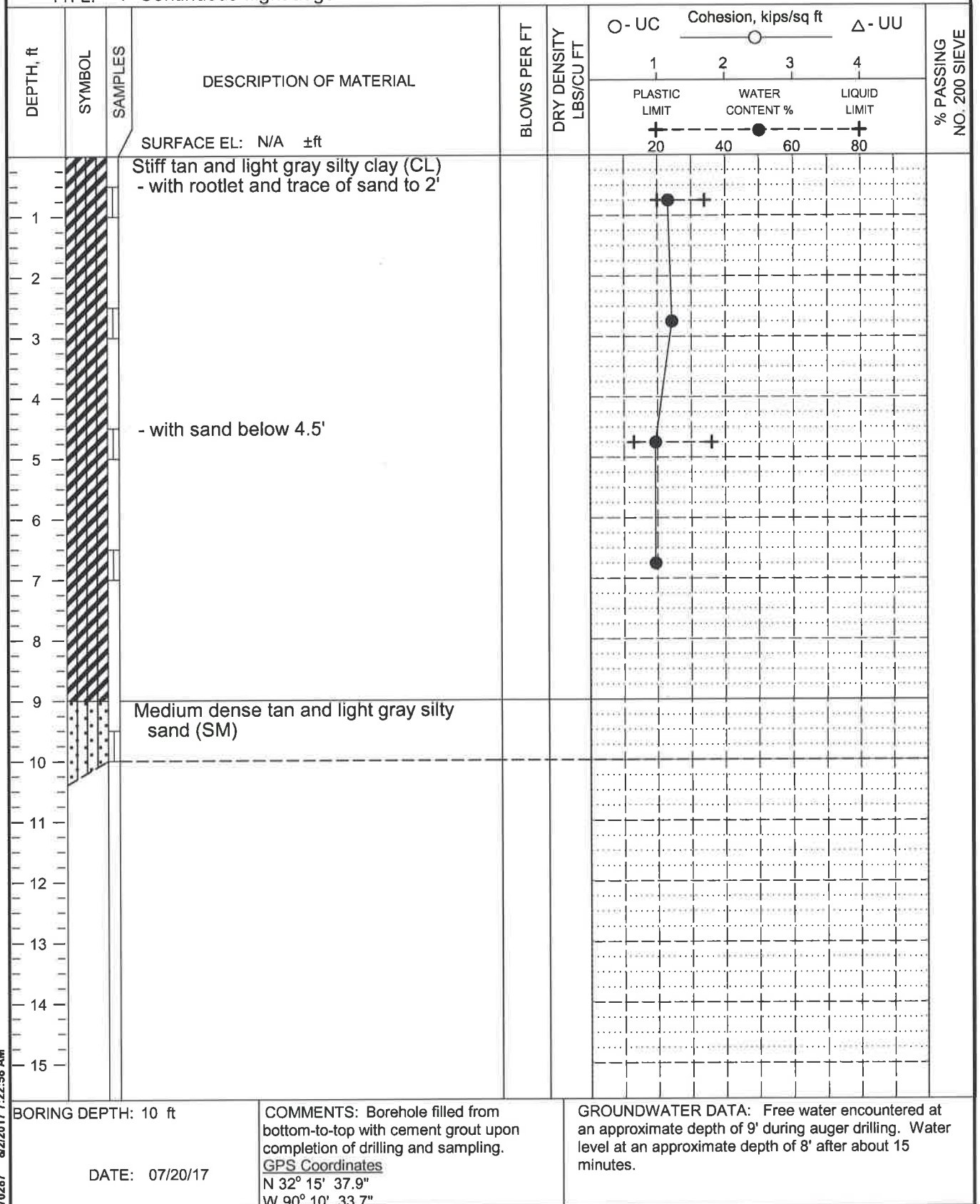
# LOG OF BORING NO. 6

## TRUCK PARKING FACILITY

### RICHLAND, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



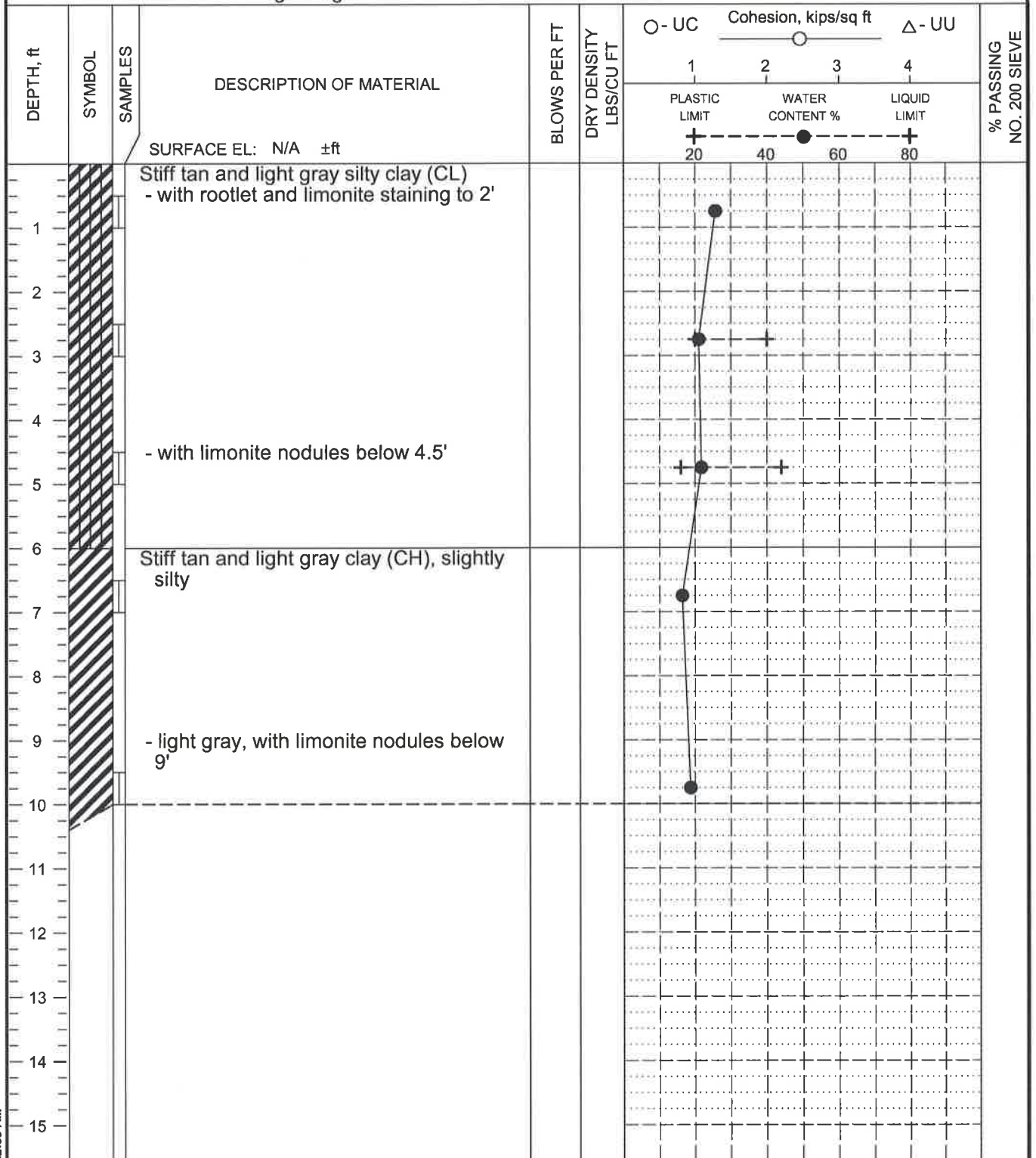
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**FIGURE 8**

**LOG OF BORING NO. 7**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



BORING DEPTH: 10 ft

DATE: 07/20/17

COMMENTS: Borehole filled from bottom-to-top with cement grout upon completion of drilling and sampling.  
GPS Coordinates  
 N 32° 15' 35.7"  
 W 90° 10' 34.4"

GROUNDWATER DATA: No free water encountered during auger drilling.

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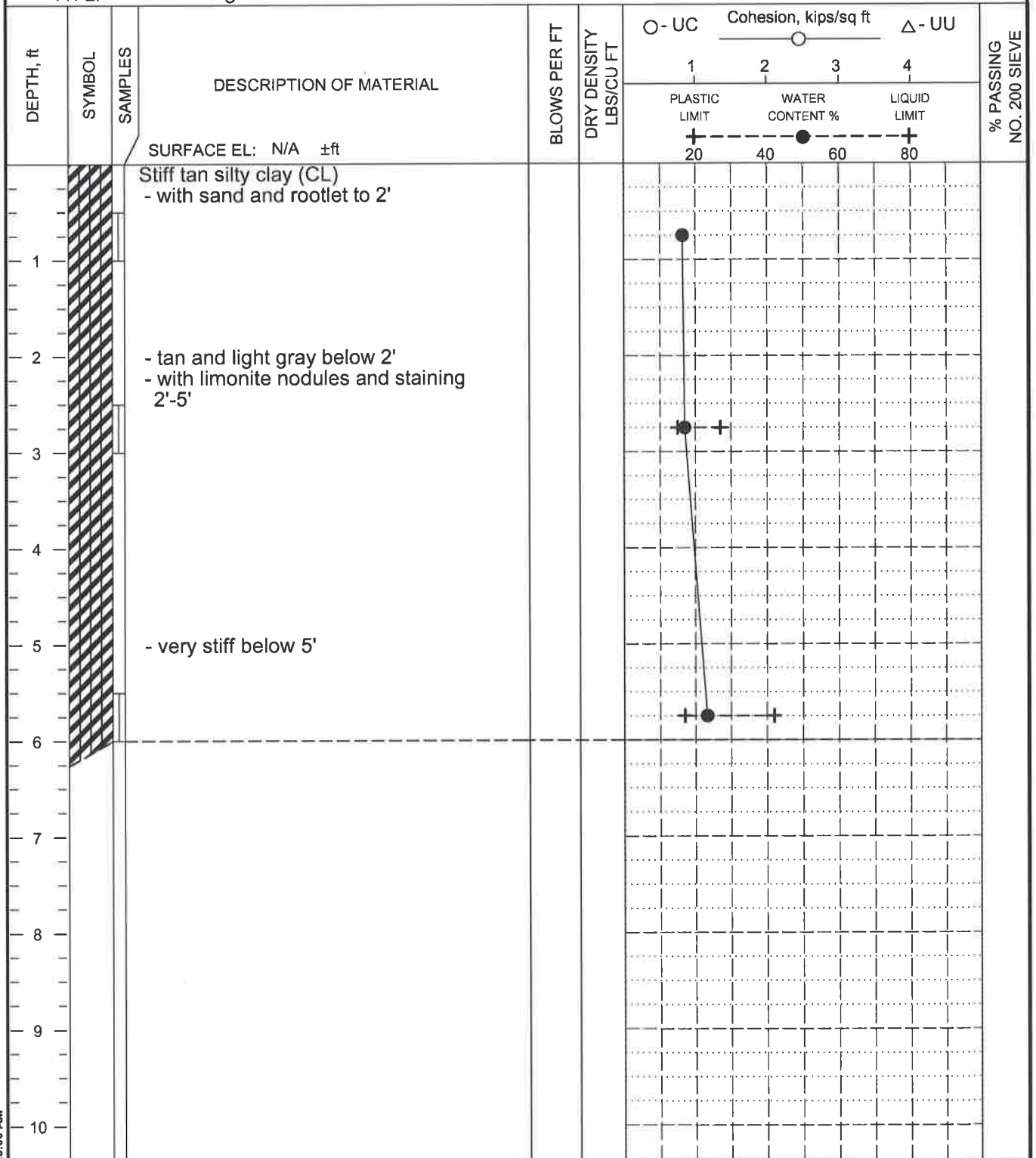
**FIGURE 9**



**LOG OF BORING NO. 8**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 3" Hand auger

LOCATION: See Figure 1



BORING DEPTH: 6 ft

DATE: 06/30/17

COMMENTS: Borehole filled from bottom-to-top with cement grout upon completion of drilling and sampling.  
GPS Coordinates  
 N 32° 15' 40.32"  
 W 90° 10' 31.0"

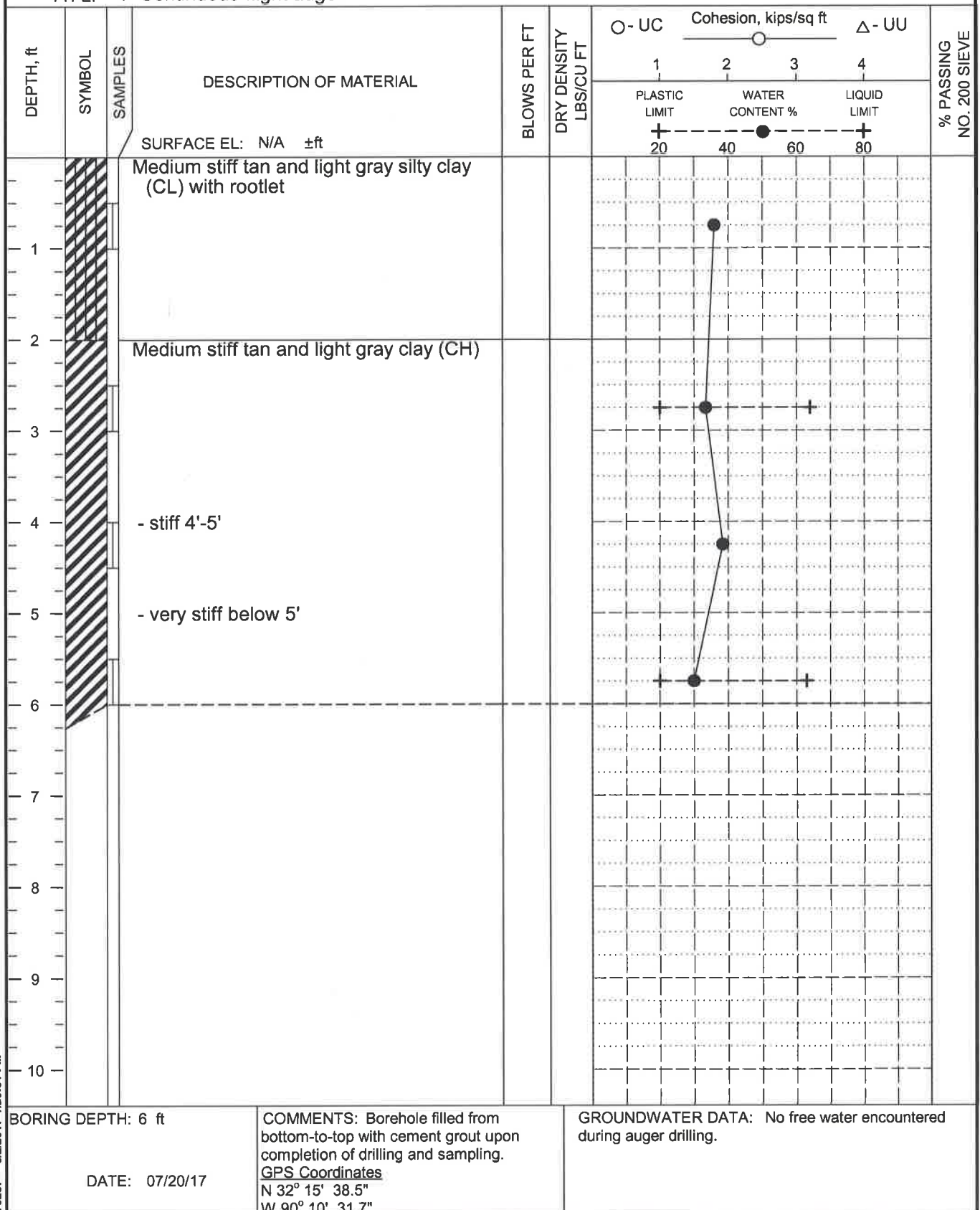
GROUNDWATER DATA: No free water encountered during auger drilling.

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**LOG OF BORING NO. 9**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



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**FIGURE 11**

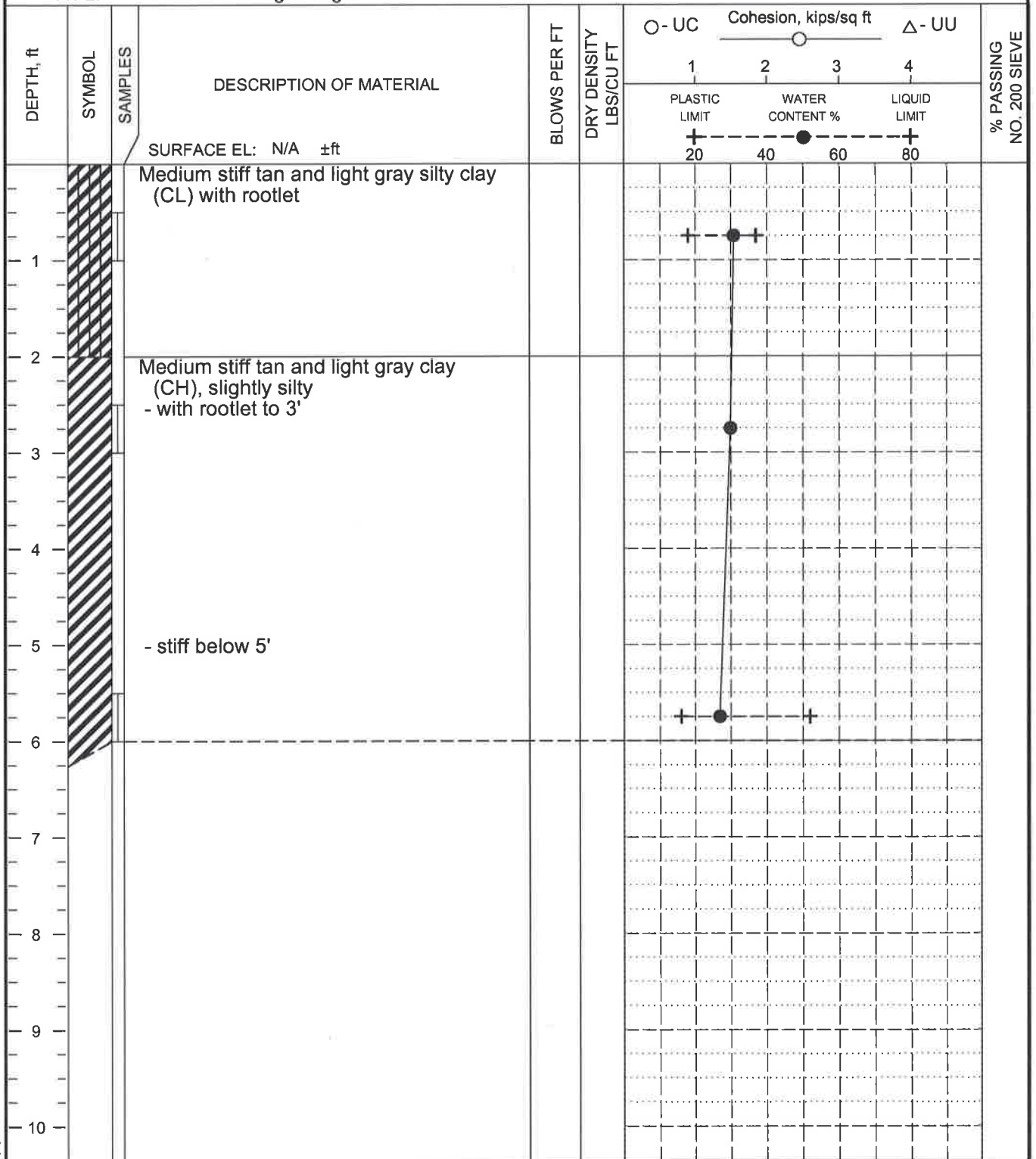
# LOG OF BORING NO. 10

## TRUCK PARKING FACILITY

### RICHLAND, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



BORING DEPTH: 6 ft

DATE: 07/20/17

COMMENTS: Borehole filled from bottom-to-top with cement grout upon completion of drilling and sampling.  
GPS Coordinates  
 N 32° 15' 36.3"  
 W 90° 10' 32.4"

GROUNDWATER DATA: No free water encountered during auger drilling.

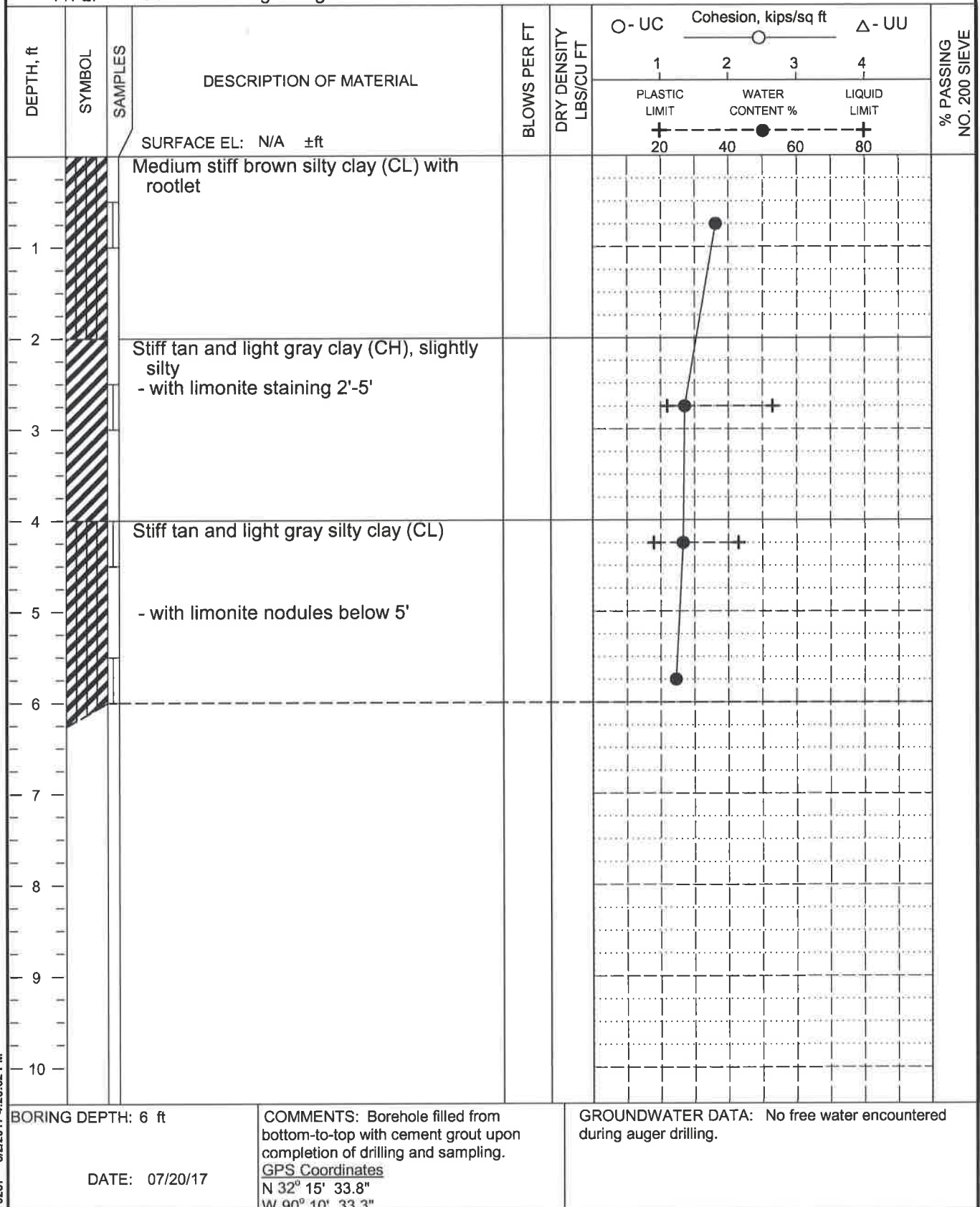
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**LOG OF BORING NO. 11**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



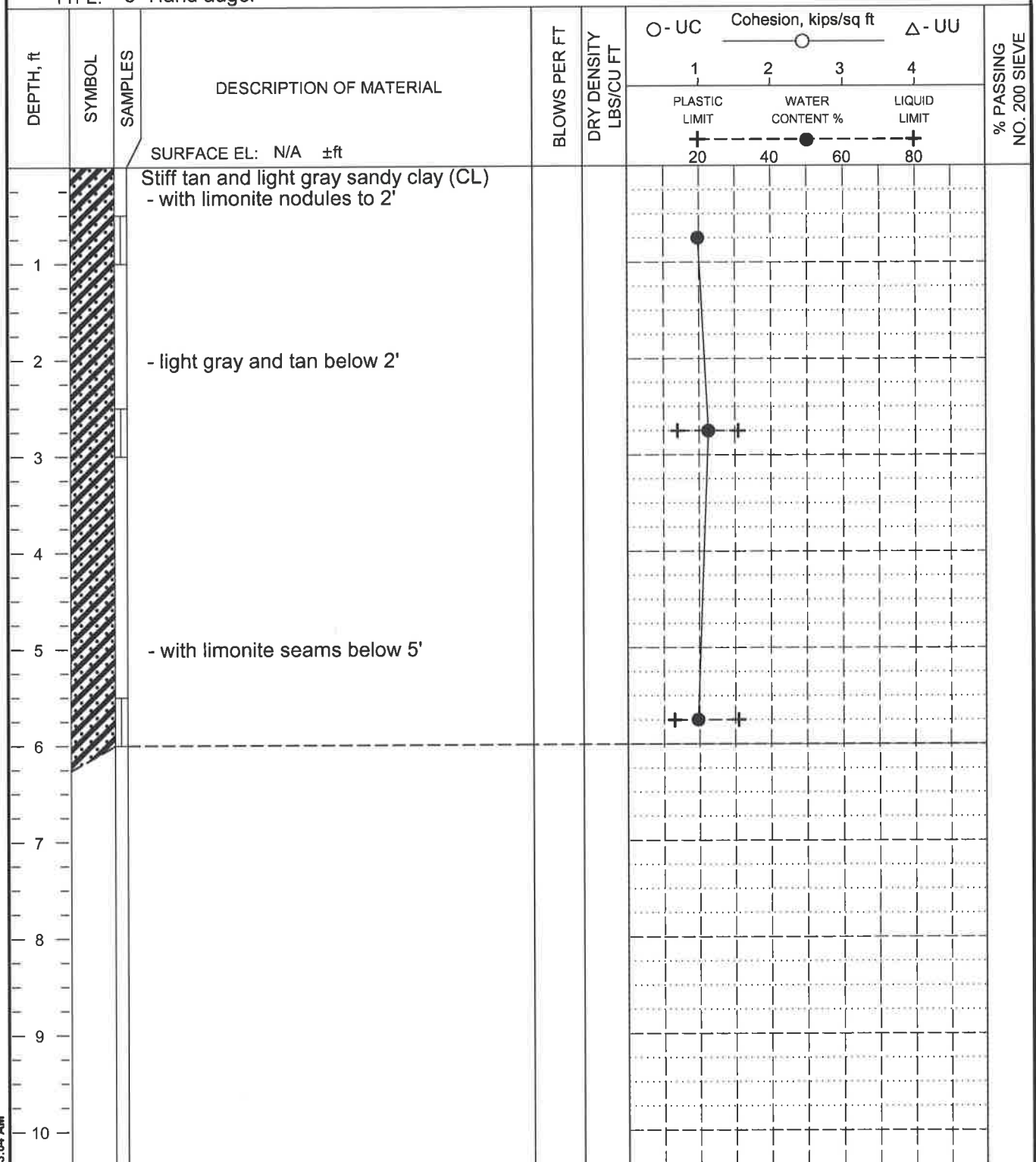
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**FIGURE 13**

**LOG OF BORING NO. 12**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 3" Hand auger

LOCATION: See Figure 1



BORING DEPTH: 6 ft

DATE: 06/30/17

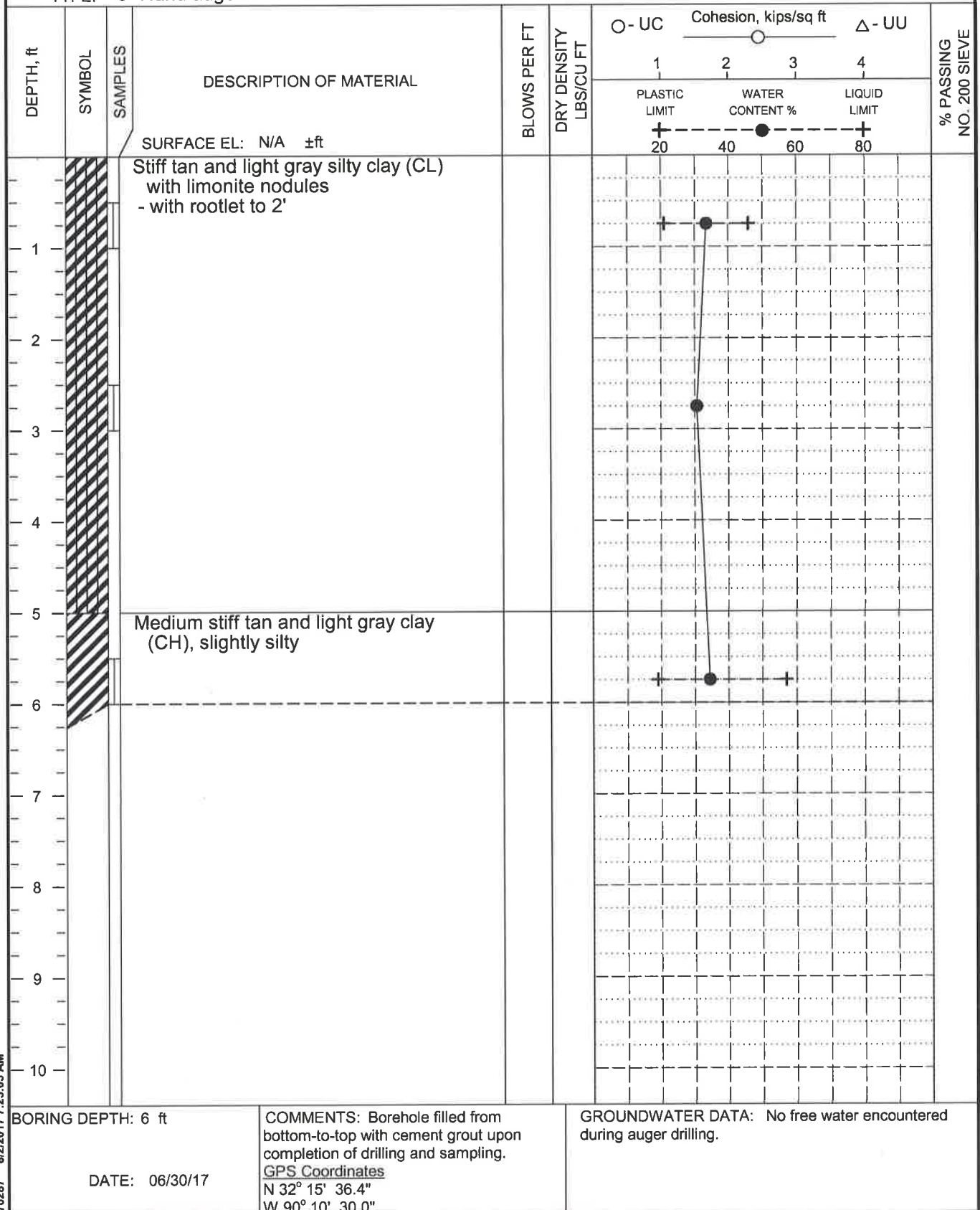
COMMENTS: Borehole filled from bottom-to-top with cement grout upon completion of drilling and sampling.  
GPS Coordinates  
 N 32° 15' 39.0"  
 W 90° 10' 29.5"

GROUNDWATER DATA: Free water encountered at an approximate depth of 3.5' during auger drilling. Water level at an approximate depth of 2' after about 15 minutes.

**LOG OF BORING NO. 13**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 3" Hand auger

LOCATION: See Figure 1



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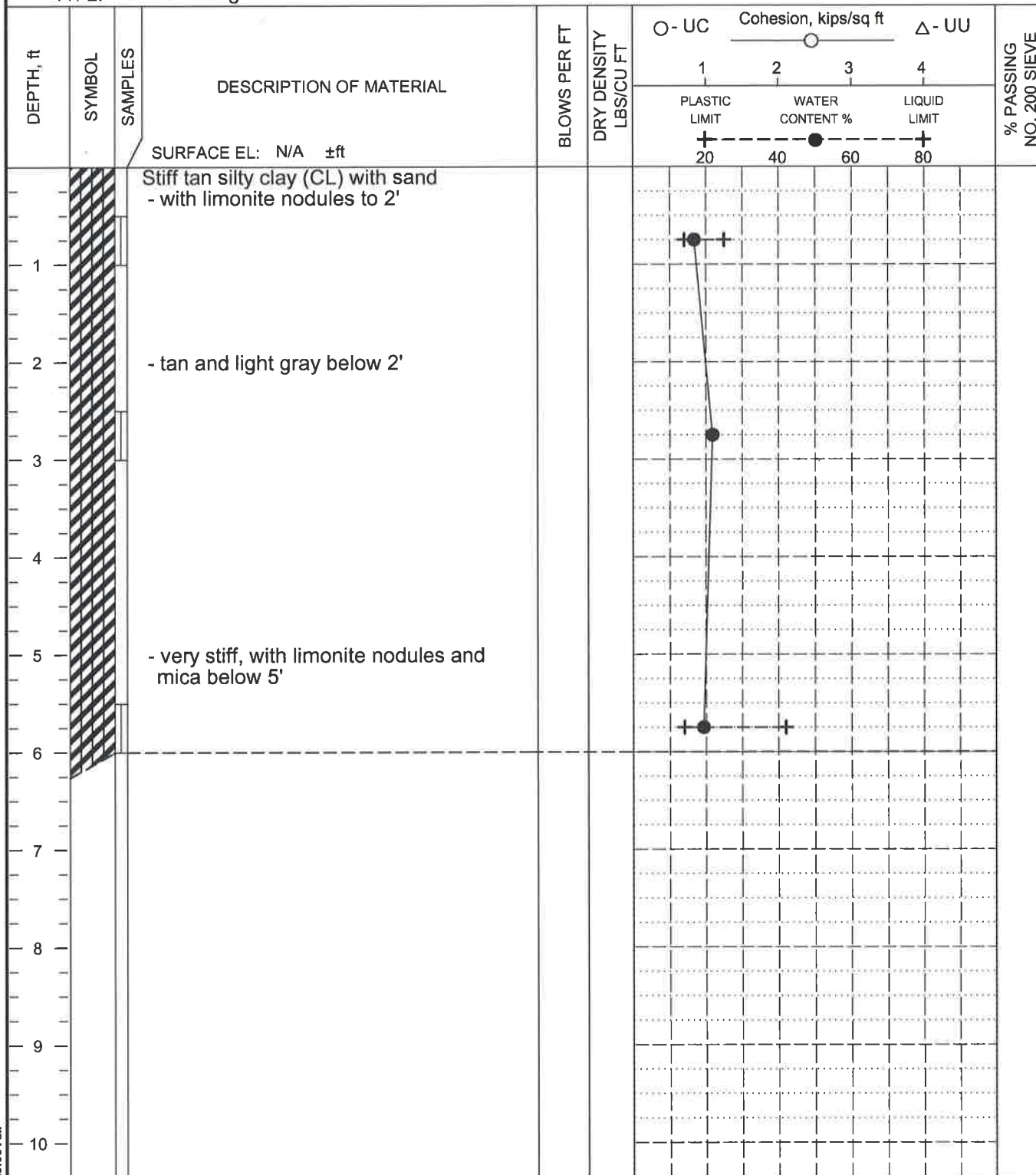
**FIGURE 15**



**LOG OF BORING NO. 14**  
**TRUCK PARKING FACILITY**  
**RICHLAND, MISSISSIPPI**

TYPE: 3" Hand auger

LOCATION: See Figure 1



BORING DEPTH: 6 ft

DATE: 06/30/17

COMMENTS: Borehole filled from  
bottom-to-top with cement grout upon  
completion of drilling and sampling.  
GPS Coordinates  
N 32° 15' 40.0"  
W 90° 10' 27.2"

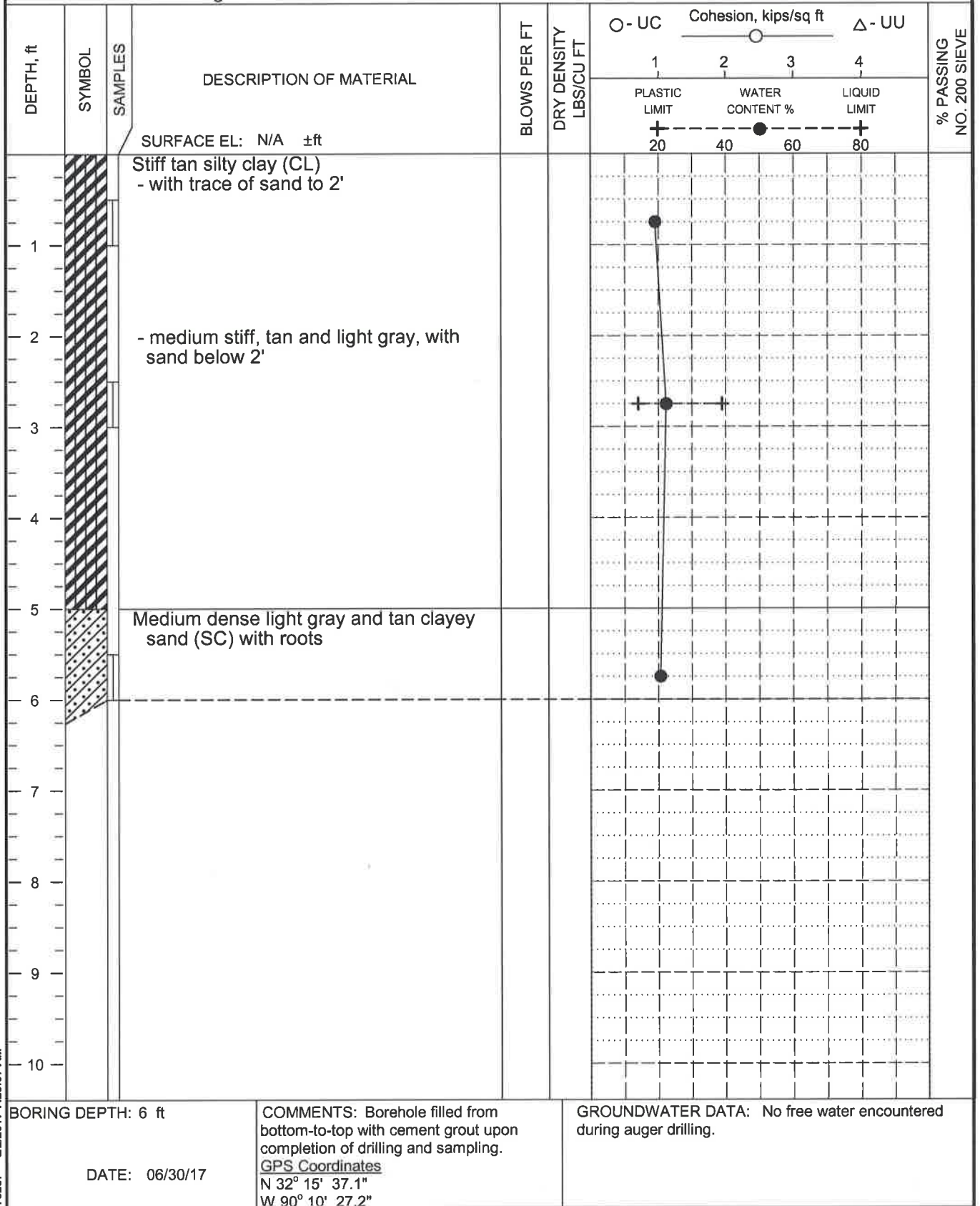
GROUNDWATER DATA: No free water encountered  
during auger drilling.

# LOG OF BORING NO. 15

TRUCK PARKING FACILITY  
RICHLAND, MISSISSIPPI

TYPE: 3" Hand auger

LOCATION: See Figure 1



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FIGURE 17

