ftn Associates Ltd.
water resources / environmental consultants

ENTERGY WHITE BLUFF PLANT
RECYCLE POND A AND RECYCLE POND B

DEMONSTRATION OF COMPLIANCE WITH EPA CCR RULE SITING CRITERIA §257.64, UNSTABLE AREAS

PREPARED IN COMPLIANCE WITH THE EPA FINAL RULE FOR THE DISPOSAL OF COAL COMBUSTION RESIDUALS TITLE 40 CODE OF FEDERAL REGULATIONS PART 257

OCTOBER 17, 2018

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RECYCLE POND A AND RECYCLE POND B

DEMONSTRATION OF COMPLIANCE WITH EPA CCR RULE SITING CRITERIA §257.64, UNSTABLE AREAS

Prepared for

Entergy Arkansas, Inc.
PO Box 551
Little Rock, AR 72203

Prepared by

FTN Associates, Ltd.
3 Innwood Circle, Suite 220
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FTN No. R07920-1862-001

October 17, 2018

PROFESSIONAL ENGINEER'S CERTIFICATION

With this certification, I certify that I, as a Professional Engineer in the State of Arkansas, am a qualified professional engineer as defined in §257.53 of Title 40 Code of Federal Regulations (40 CFR) Part 257, that this report has been prepared under my direction in accordance with generally accepted good engineering practices, that the findings are accurate to the best of my knowledge, and that the CCR unit that is subject to this certification meets the location restriction requirements under §257.64 of 40 CFR Part 257.

Dana L. Derrington, Arkansas PE #16372

10/17/2018
Date

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1.0 INTRODUCTION

Entergy Arkansas, Inc. (Entergy), operates the White Bluff plant located approximately 2.5 miles southeast of Redfield, Arkansas. The plant utilizes two recycle ponds, hereafter referred to as Recycle Pond A (south pond) and Recycle Pond B (north pond), for, among other things, the management of bottom ash transport water. Pursuant to §257.64 of Title 40 Code of Federal Regulations (40 CFR) Part 257, existing coal combustion residual (CCR) surface impoundments must not be located in an unstable area. An unstable area is defined by §257.53 as a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity, including structural components of some or all of the CCR unit that are responsible for preventing releases from such unit. Unstable areas can include poor foundation conditions, areas susceptible to mass movements, and karst terrains. This report presents the findings of an evaluation of Recycle Pond A and Recycle Pond B in support of the location restriction requirements of §257.64.

2.0 SITE DESCRIPTION

Recycle Pond A and Recycle Pond B are shown on Figure 1 (all figures are located in Appendix A). Recycle Pond A has an approximate surface area of 7.0 acres and Recycle Pond B has an approximate surface area of 6.5 acres[1]. The typical water level elevation in each pond is approximately 278 ft North American Vertical Datum of 1988 (NAVD88) based on a June 2018 field survey. Topography surrounding the immediate vicinity of the recycle ponds was graded during plant construction and is generally flat-lying, with existing ground surface elevations ranging from approximately 277 to 285 ft NAVD88, as shown on Figures 1 and 2. Natural topography in the vicinity of the ponds is gently to steeply sloping (Figure 2).

[1] Pond surface areas were estimated based on surveyed water levels during field activities in June 2018.

3.0 UNSTABLE AREA EVALUATION

Pursuant to §257.64(b), the owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

1. Onsite or local soil conditions that may result in significant differential settling;
2. Onsite or local geologic or geomorphologic features; and
3. Onsite or local human-made features or events (both surface and subsurface).

FTN Associates, Ltd. (FTN) performed a review of site-specific boring logs, geotechnical data, and publicly available documents published by the US Geological Survey. Findings from this review are discussed below within the context of the factors listed in §257.64(b).

3.1 Review of Onsite or Local Soil Conditions

A subsurface investigation was performed in the vicinity of Recycle Pond A and Recycle Pond B. Soil boring and associated geotechnical data from the investigation (Appendix B) show that onsite soils are comprised of low- to high-plasticity clays, low-plasticity silts, and clayey to silty fine-grained sands in the immediate vicinity of the recycle ponds. A review of the subsurface data included in Appendix B shows that no organic soils, which are prone to settlement due to their high compressibility, were encountered in any of the borings. There were also no apparent lateral changes in the underlying lithology that would indicate a notable change in the compressibility of foundation soils, as can be seen from the soil boring logs. These factors, coupled with the relatively uniform loading from the ponds on foundation soils, indicate that significant differential settling is unlikely.

3.2 Review of Onsite or Local Geologic or Geomorphologic Features

Recycle Pond A and Recycle Pond B are underlain by Tertiary-age deposits belonging to the Jackson Group as shown by the geological map included as Figure 3. The Jackson Group is reportedly up to 300 ft thick in Arkansas and is classified as a regional confining unit comprised mostly of unconsolidated clays (Kresse et al. 2014; Petersen, Broom, and Bush 1985). A review

of the area topography (Figures 1 and 2) and the geological map shows no evidence of karst features or areas susceptible to mass movement (i.e., landslides) in the vicinity of Recycle Pond A and Recycle Pond B.

3.3 Review of Onsite or Local Human-Made Features or Events (Both Surface and Subsurface)

Presently, there are no visible onsite or local human-made features or events that would cause the area in the immediate vicinity of the ponds to be unstable. As described in Section 3.2, the underlying lithology belongs to the Jackson Group and is classified as a regional confining unit. Groundwater in the Jackson Group is limited to thin, interbedded sandy units. Due to the high clay content of the formation, groundwater yield from the sandy units is insufficient in both quantity and quality for domestic, public, or industrial use (Kresse et al. 2014). As such, land subsidence due to groundwater removal is considered unlikely.

4.0 CONCLUSIONS

Based on a review of the available documentation in this report, neither Recycle Pond A nor Recycle Pond B is located in an unstable area and therefore both Recycle Pond A and Recycle Pond B at the Entergy White Bluff plant meet the location restriction requirements of §257.64.

5.0 REFERENCES

Kresse, T.M., P.D. Hays, K.R. Merriman, J.A. Gillip, D.T. Fugitt, J.L. Spellman, A.M. Nottmeier, D.A. Westerman, J.M. Blackstock, and J.L. Battreal. 2014. *Aquifers of Arkansas—Protection, Management, and Hydrologic and Geochemical Characteristics of Groundwater Resources in Arkansas* [USGS Scientific Investigations Report 2014-5149]. Prepared in cooperation with the Arkansas Natural Resources Commission. Reston, VA: US Geological Survey. 334 pp. doi: http://dx.doi.org/10.3133/sir20145149.

Petersen, J.C., M.E. Broom, and W.V. Bush. 1985. *Geohydrologic Units of the Gulf Coastal Plain in Arkansas* [USGS Water-Resources Investigations Report 85-4116]. Prepared in

cooperation with the Arkansas Department of Pollution Control and Ecology and the Arkansas Geological Survey. Denver, CO: US Geological Survey, Western Distribution Branch, Open-File Services Collection. 24 pp.

Stoeser, D.B., G.N. Green, L.C. Morath, W.D. Heran, A.B. Wilson, D.W. Moore, and B.S. Van Gosen. 2005. "The State of Arkansas." In *Preliminary Integrated Geologic Map Databases for the United States Central States: Montana, Wyoming, Colorado, New Mexico, Kansas, Oklahoma, Texas, Missouri, Arkansas, and Louisiana* [USGS Open-File Report 2005-1351]. Denver, CO: US Geological Survey. Available online at http://pubs.usgs.gov/of/2005/1351/.

USGS [US Geological Survey]. 2017a. "USGS US Topo 7.5-Minute Map for Redfield, AR 2017." Rolla, MO and Denver, CO: National Geospatial Technical Operations Center, US Geological Survey. Available online at https://www.sciencebase.gov/catalog/item/59647cabe4b0d1f9f059f935.

———. 2017b. "USGS US Topo 7.5-Minute Map for Wright, AR 2017." Rolla, MO and Denver, CO: National Geospatial Technical Operations Center, US Geological Survey. Available online at https://www.sciencebase.gov/catalog/item/59647d51e4b0d1f9f059ff88.

APPENDIX A

Figures

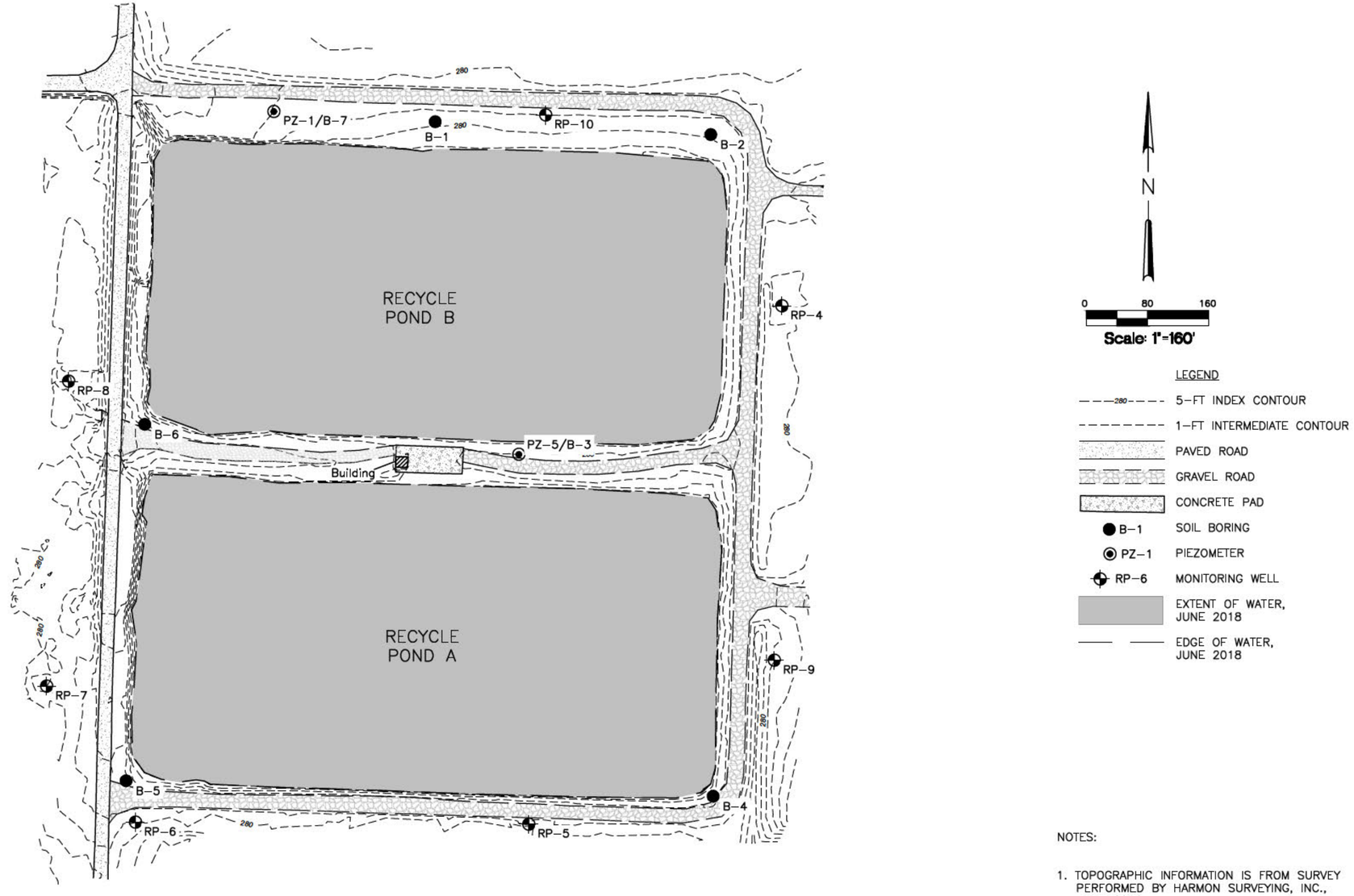


Figure 1. Site map, Entergy White Bluff recycle ponds.

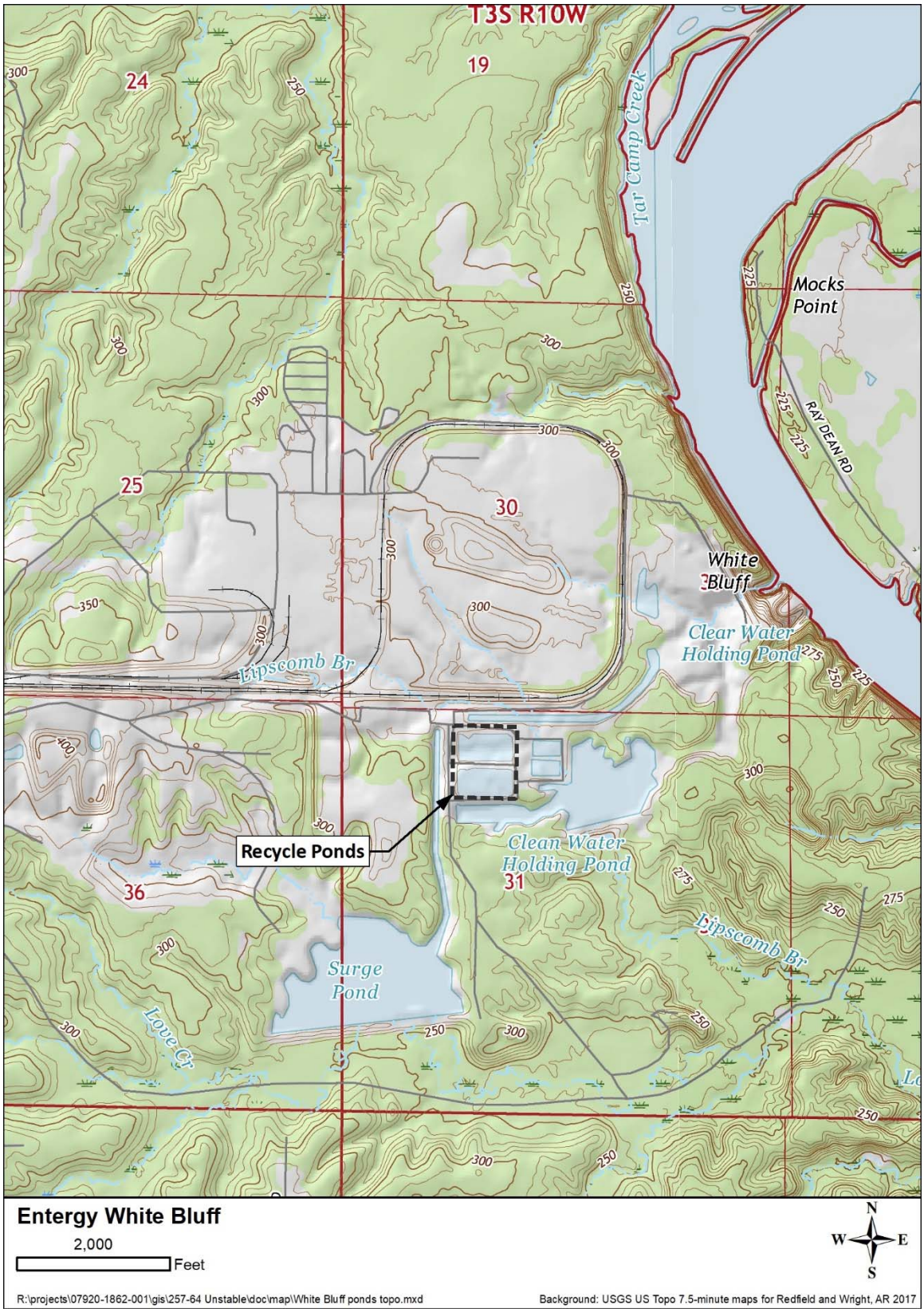


Figure 2. Topography of the recycle ponds and surrounding area based on USGS topographic quadrangles Redfield, AR, and Wright, AR (2017).

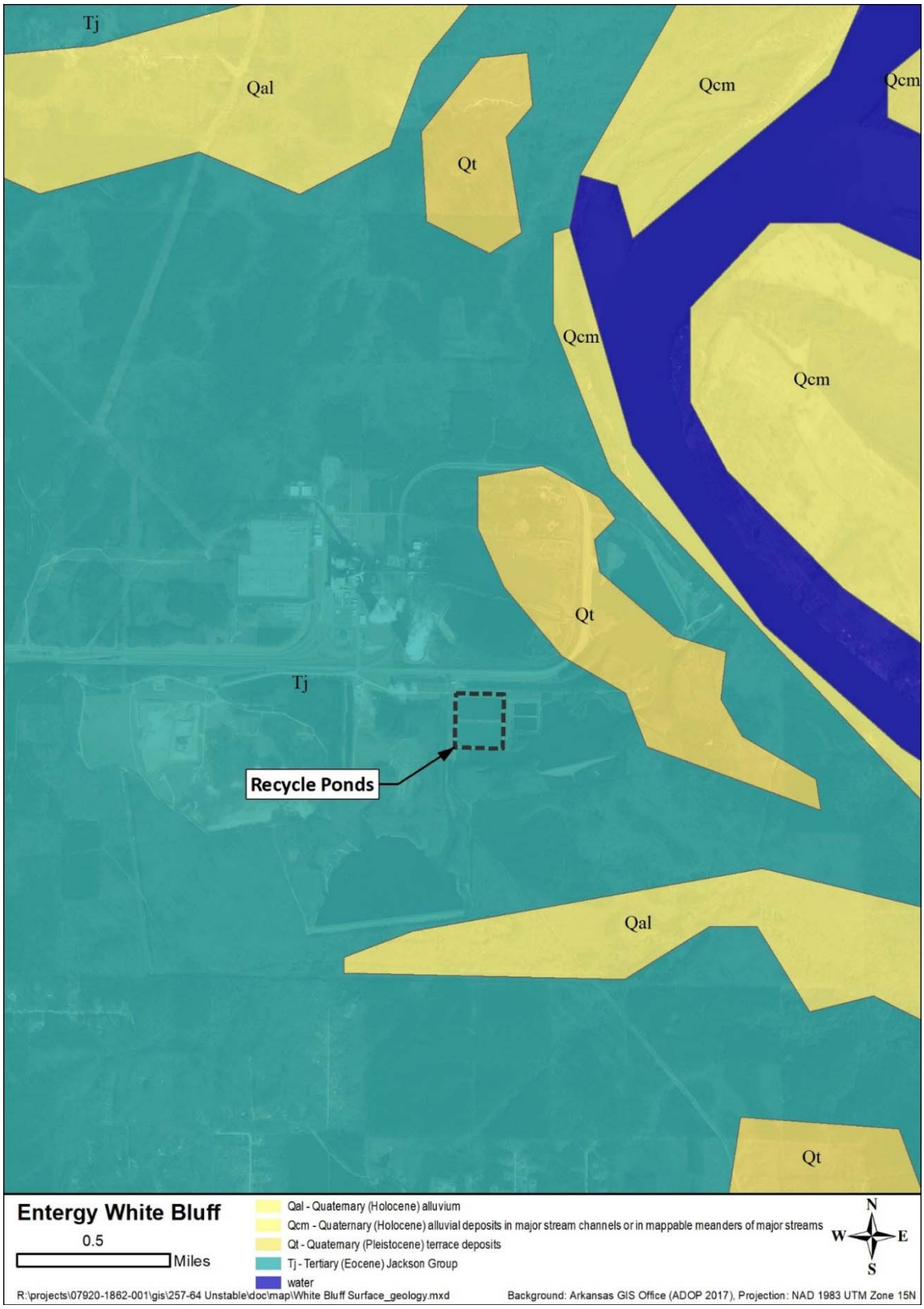


Figure 3. Surface geology of the recycle ponds and surrounding area based on Stoeser et al. 2005.

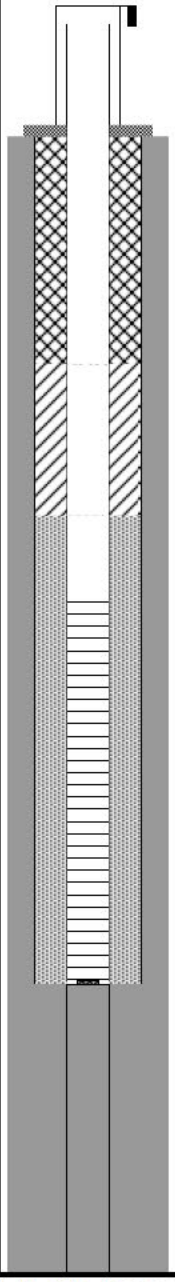
APPENDIX B

Well Construction Diagrams, Soil Boring Logs, and Geotechnical Data

Well Construction Diagrams and Soil Boring Logs

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-1**	
	LOCATION: **Entergy White Bluff Plant**	WELL ID: **RP-1**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1949807.4**	EASTING: **1273086.5**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND ELEVATION: **282.8 ft**	TOC ELEVATION: **285.72 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **25.3 ft below TOC**	DEPTH TO WATER: (7/17/2018) **8.97 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/13/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CL	TOP SOIL	
		LEAN CLAY, light gray with reddish brown and orange mottles, stiff, moist.	30
4			
	CL		
8			
		@ 10 ft, SANDY LEAN CLAY, pinkish tan with dark pinkish tan clay lenses and orange and bright yellow mottling. Stiff, moist.	
12			
	SC	CLAYEY SAND, tan with orange and bright yellow mottles, dense, moist.	100
16	CL	SANDY LEAN CLAY, pinkish tan with dark pinkish tan clay lenses and orange and bright yellow mottling, stiff, moist.	
	SC	CLAYEY SAND, tan with orange and bright yellow mottles, dense, moist.	
20			
		FAT CLAY, dark pinkish tan, laminated with light gray silt, stiff, moist.	100
24			
	CH	@ 26 ft, color changes to olive gray.	
28			



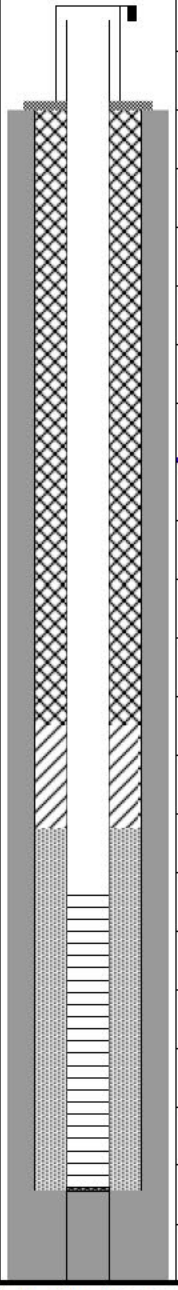
Well Construction

- Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.
- 15.2 ft of 4 in Sch. 40 PVC including 2.9 ft of stickup (vented below cap)
- Cement/bentonite grout from 0 to 6 ft bgs
- Bentonite seal from 6.0 to 10.0 ft. bgs
- Silica size 20/40 filter pack from 10.0 to 22.0 ft bgs
- 10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen
- 0.1 ft 4 in dia. Sch 40 PVC end cap
- Slough from 22.0 ft to 30.0 ft in 4 in dia., borehole.
- Drilling terminated at 30 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **RP-2**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **RP-2**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1950042**	EASTING: **1274004**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND ELEVATION: **288.9 ft**	TOC ELEVATION: **291.92 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **39.9 ft below TOC**	DEPTH TO WATER: (7/17/2018) **15.14 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/13/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CL	TOP SOIL	
		LEAN CLAY, light gray with orange mottles and light gray silt lenses, stiff, dry.	30
4			
8	CL		
12		@ 14 ft, color changes to greenish gray with orange mottles.	
		FAT CLAY, pinkish tan with orange and some bright yellow mottles, blocky, very stiff, moist.	100
16			
20		@ 20 ft, color to reddish light brown with few mottles.	
	CH	@ 22 3 ft, FAT SANDY CLAY, silty, olive gray, fine-grained, increasing sand content with depth, very stiff.	
24			100
28		CLAYEY SAND, fine-grained, olive gray, dense, moist.	
32	SC		
36			100
		FAT SANDY CLAY, olive gray, very stiff, moist.	
40	CH		



Well Construction

- -4: Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.
- 0: 29.8 ft of 4 in Sch. 40 PVC including 3.0 ft of stickup (vented below cap)
- 12: Cement/bentonite grout from 0 to 21 ft bgs
- 20: Bentonite seal from 21.0 to 24.5 ft bgs
- 24: Silica size 20/40 filter pack from 24.5 to 37.0 ft bgs
- 28: 10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen
- 36: 0.1 ft 4 in dia. Sch 40 PVC end cap
- 36: Slough from 37.0 ft to 40.0 ft in 4 in dia., borehole.
- 40: Drilling terminated at 40 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **RP-3**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **RP-3**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1949489.5**	EASTING: **1273729.9**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND ELEVATION: **281.0 ft**	TOC ELEVATION: **284.15 ft**
DRILLING METHOD: **Sonic with 4x6 core and case**		TOTAL WELL DEPTH: **36.3 ft below TOC**	DEPTH TO WATER: (7/17/2018) **8.6 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/12/2018**	DATE COMPLETED: **6/15/2018**

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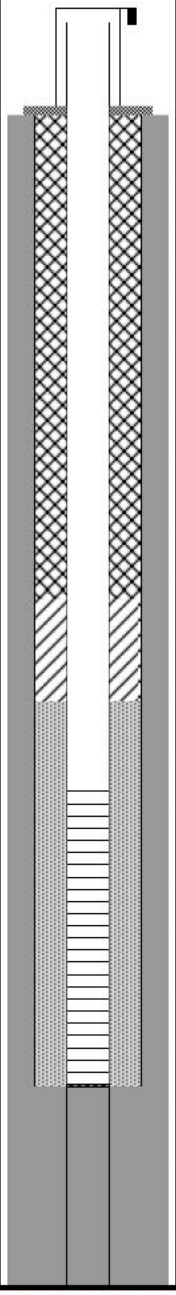
FTN Project # R07920-1845-001

Depth (feet)	USCS	Graphic Log	Description	% REC
-4				
0			FAT CLAY, tan with yellowish orange mottles and some fine-grained sand, stiff, moist.	30
4				
8	CH			
12				100
16				
20			CLAYEY SAND, olive gray, stiff, moist.	
24	SC			100
28			POORLY GRADED SAND, fine-grained, clayey , olive gray, soft, moist.	
32	SP		LEAN CLAY, olive gray, laminated with light gray silt and very fine-grained sand, stiff, moist	
36	CL			
40				

Well Construction



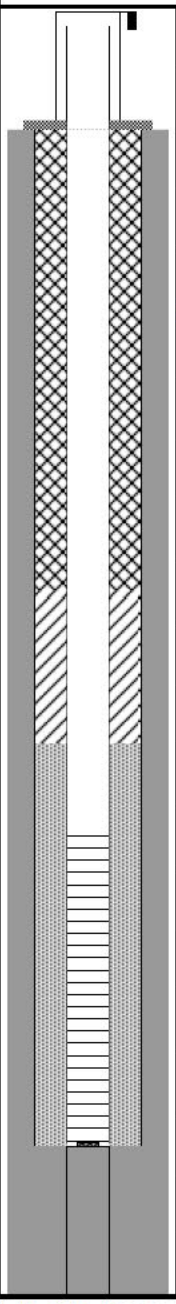
- Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.
- 26.2 ft of 4 in Sch. 40 PVC including 3.2 ft of stickup (vented below cap)
- Cement/bentonite grout from 0 to 16.5 ft bgs
- Bentonite seal from 16.5 to 20.0 ft bgs
- Silica size 20/40 filter pack from 20.0 to 33.0 ft bgs
- 10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen
- 0.1 ft 4 in dia. Sch 40 PVC end cap
- Slough from 33.0 ft to 40.0 ft in 4 in dia., borehole.
- Drilling terminated at 40 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**	BORING ID: **RP-4**		
LOCATION: **Entergy White Bluff Plant**	WELL ID: **RP-4**		
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1949249.3**	EASTING: **1272808.4**	
DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND ELEVATION: **280.8 ft**	TOC ELEVATION: **284.17 ft**	
FTN Project # R07920-1845-001 / DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **36.5 ft below TOC**	DEPTH TO WATER: (7/17/2018) **9.34 ft below TOC**	
LOGGED BY: **AJP** / SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/6/2018**	DATE COMPLETED: **6/15/2018**	

Depth (feet)	USCS	Description
0	CL	TOP SOIL FAT CLAY, yellowish orange with some fine-grained sand and small gravel, stiff, moist to dry.
4	CH	@ 4-5 5 ft, FAT SANDY CLAY with some well-rounded gravel (< 2 inch) dia, tan, stiff, moist @ 6-6 3 ft, with clayey sand, red, medium to coarse grained sand, stiff.
8	CL	SILTY to SANDY CLAY, light gray to tan with some orange and red staining, fine-grained sand, stiff, moist.
	CH	FAT CLAY, yellowish orange with some fine-grained sand and small gravel, stiff, moist to dry.
12	ML	SILT, gray with black organic matter, sulfur smell.
	CL/ML	LEAN CLAY to S LT with sand, gray, increasing sand content with depth, medium stiff, moist.
16	CH	FAT CLAY, yellowish orange, with orange mottles.
	SC	CLAYEY SAND, fine-grained, red and light gray, medium stiff, moist.
20	SM	SILTY SAND, red to bright red, stiff.
	CH	FAT CLAY, light gray with some red mottles, soft to medium stiff, moist.
24	ML/CL	CLAYEY S LT to LEAN CLAY, gray, sulfur smell.
	CH	FAT SANDY CLAY, yellowish orange to olive green with some orange and red mottles. @ 26.2 - 26.5 ft, with silt laminations.
28	ML	SILT, light gray with lenses of olive gray clay, soft, moist. @ 27 2 - 27 3 ft, layer of organic matter.
32	CH	FAT CLAY, laminated with lenses of white silt to fine-grained sand, stiff, moist.
36		@ 38 ft, decreasing silt and sand content with depth.

% REC
100
50
60
100



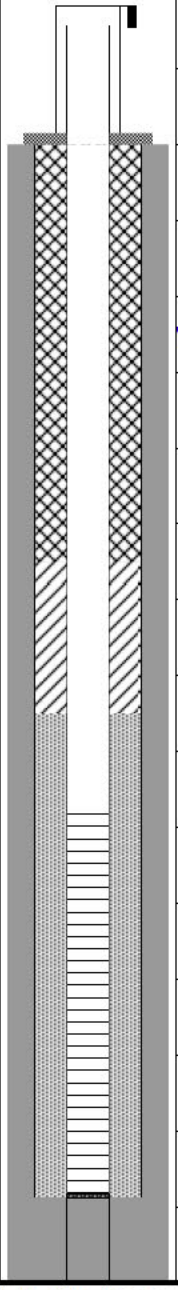
Well Construction

- Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.
- 26.4 ft of 4 in Sch. 40 PVC including 3.4 ft of stickup (vented below cap)
- Cement/benontite grout from 0 to 15.0 ft bgs
- Bentonite seal from 15.0 to 20.0 ft bgs
- Silica size 20/40 filter pack from 20.0 to 33.0 ft bgs
- 10 ft of 4 in dia. 0.010 in. slot, Sch 40 PVC well screen
- 0.1 ft 4 in dia. Sch 40 PVC end cap
- Slough from 33.0 ft to 38.0 ft in 4 in dia., borehole.
- Drilling terminated at 38 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **RP-5**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **RP-5**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1948586.2**	EASTING: **1272475.8**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND ELEVATION: **281.4 ft**	TOC ELEVATION: **284.57 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **30.9 ft below TOC**	DEPTH TO WATER: (7/17/2018) **8.23 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/5/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	FILL	F LL, consisting of nepheline syenite gravel.	
4		FAT CLAY, yellowish orange to tan with oxidized orange silt and sand lenses, medium stiff to stiff, moist.	20
8	CH		
12		@ 12 ft, FAT SANDY CLAY, increasing sand content with depth, yellow and orange silt and fine-grained sand lenses.	
	SC	CLAYEY SAND, yellow and orange silt lenses, decreasing clay content with depth, medium stiff, moist.	100
16	SC/SM	CLAYEY SAND to SILTY SAND, tan with orange oxidized staining that decreases with depth, increasing clay content with depth, soft to medium stiff to soft, wet.	
	CH	FAT SANDY CLAY, orange and yellow staining along silt and sand lenses.	
20	SC	CLAYEY SAND, fine-grained, olive gray, decreasing clay content with depth, loose to medium dense.	
24	SM	SILTY SAND, fine-grained, olive gray, medium dense, wet.	100
28	CH	FAT SANDY CLAY, olive gray, stiff, moist. @ 27 5 ft, FAT CLAY, laminated lenses of white silt to fine-grained sand with some greenish gray to green clay layers.	



Well Construction

-4 Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.

0

4 20.8 ft of 4 in Sch 40 PVC including 3.2 ft of stickup (vented below cap)

8 Cement/benonite grout from 0 to 11 ft bgs

12 Bentonite seal from 11.0 to 15.0 ft bgs

16 Silica size 20/40 filter pack from 15.0 to 28.0 ft bgs

20

10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen

24

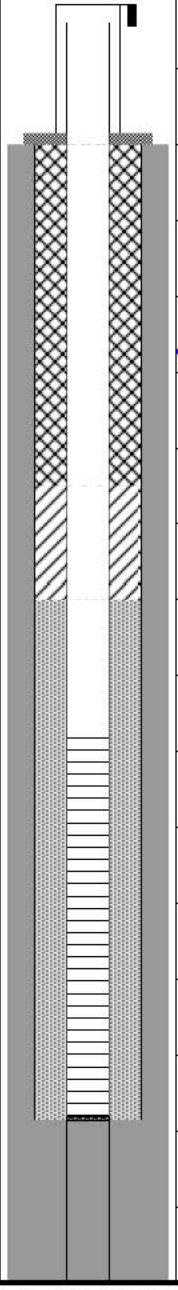
28 0.1 ft 4 in dia. Sch 40 PVC end cap
Slough from 28.0 ft to 30.0 ft in 4 in dia., borehole.

Drilling terminated at 30 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **RP-6**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **RP-6**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1948590.9**	EASTING: **1271958.9**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND ELEVATION: **280.6 ft**	TOC ELEVATION: **283.81 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **28.9 ft below TOC**	DEPTH TO WATER: (7/17/2018) **8.82 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/5/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CH	FAT CLAY, yellowish orange with some rootlets in upper 3 inches, medium stiff to stiff, moist.	
4	ML	SILT, with layers of fine-grained sand, yellowish orange with oxidation along silt layers, dry to moist with moisture increasing with depth.	
	CL	LEAN CLAY, yellowish orange, silt content decreases with depth, stiff, moist.	60
8	CH	FAT CLAY, yellowish brown with yellow and orange silt lenses that decrease in frequency with depth, moist. @ 9.7 ft, color changes to olive gray. @ 10 ft, increasing fine-grained sand content with depth.	
12	SC	CLAYEY SAND, fine-grained, olive gray, medium dense, moist.	
	CH	FAT SANDY CLAY, olive gray with lenses of fine-grained sand, stiff.	
16	SC	CLAYEY SAND, fine-grained, olive gray, medium dense, moist.	8
	CH	FAT SANDY CLAY, olive gray with lenses of fine-grained sand, stiff.	
20	SC	CLAYEY SAND, fine-grained, olive gray, decreasing sand content with depth, medium dense, moist.	
	SM	SILTY SAND, olive gray, medium dense. @ 23 8 ft, layer of organic matter.	100
24	SC	CLAYEY SAND, fine-grained, olive gray, increasing clay and lenses of white silt to fine-grained sand with depth, medium dense, moist.	
	CH	FAT CLAY, with laminated lenses of white silt to fine-grained sand, stiff, moist to dry. @ 25 ft, with greenish gray clay layers.	100
28			



Well Construction

-4: Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.

0: 18.8 ft of 4 in Sch 40 PVC including 3.2 ft of stickup (vented below cap)

4: Cement/bentonite grout from 0 to 9.0 ft bgs

8: Bentonite seal from 9.0 to 12.0 ft bgs

12: Silica size 20/40 filter pack from 12.0 to 26.0 ft bgs

16: 10 ft of 4 in dia. 0.010 in. slot, Sch 40 PVC well screen

20: 0.1 ft 4 in dia. Sch 40 PVC end cap

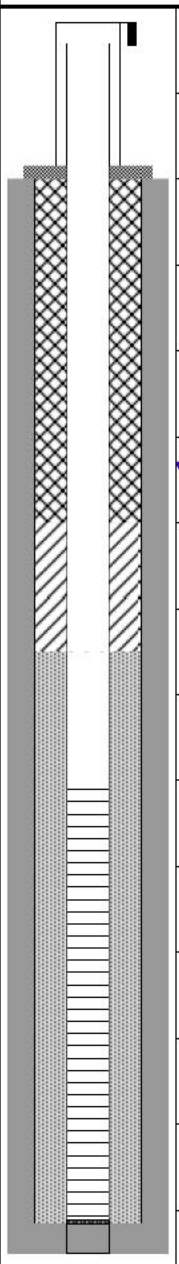
24: Slough from 26.0 ft to 30.0 ft in 4 in dia., borehole.

28: Drilling terminated at 30 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

FTN Associates Ltd. water resources / environmental consultants	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-7**	
	LOCATION: **Entergy White Bluff Plant**	WELL ID: **RP-7**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1948766.8**	EASTING: **1271839.4**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND ELEVATION: **281.3 ft**	TOC ELEVATION: **284.46 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **27.5 ft below TOC**	DEPTH TO WATER: (7/17/2018) **9.98 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/5/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
0	CL	TOP SO L and GRAVEL	
	CH	FAT SANDY CLAY, yellowish orange, rootlets, medium stiff, moist.	
	ML	SILT, with clayey fine-grained sand, yellowish orange, increasing clay content with depth, moist to dry.	
4	CL	LEAN CLAY, yellowish orange with lenses of oxidized silt to fine-grained sand, stiff, moist.	80
8	CH	FAT CLAY, olive gray with lenses of white silt to fine-grained sand, stiff, moist.	
12			
16	SC	CLAYEY SAND, fine-grained, medium dense, moist.	80
	CH	FAT SANDY CLAY, olive gray, medium stiff, moist.	
20	SC	CLAYEY SAND, fine-grained, medium dense, moist.	
	SM	SILTY SAND, fine-grained, olive gray, wet.	
	SC	CLAYEY SAND, fine-grained, medium dense, moist.	100
24	CH	FAT CLAY, with laminated lenses of white silt to fine-grained sand, very stiff, moisture decreases with depth.	



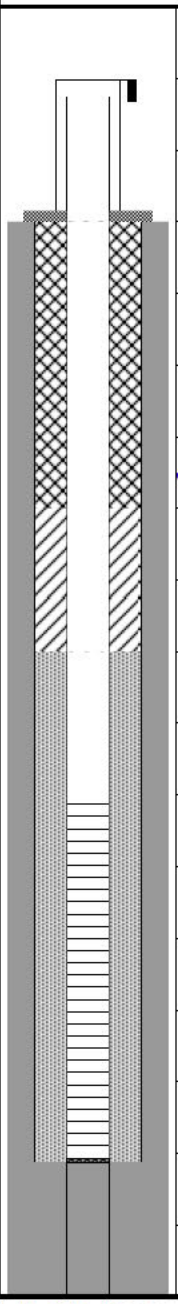
Well Construction

- Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.
- 17.4 ft of 4 in Sch 40 PVC including 3.2 ft stickup (vented below cap)
- Cement/bentonite grout from 0 to 8.0 ft bgs
- Bentonite seal from 8.0 to 11.0 ft bgs
- Silica size 20/40 filter pack from 11.0 to 24.0 ft bgs
- 10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen
- 0.1 ft 4 in dia. Sch 40 PVC end cap
- Slough from 24.0 ft to 25.0 ft in 4 in dia., borehole.
- Drilling terminated at 25 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **RP-8**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **RP-8**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1949162.5**	EASTING: **1271875.3**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND ELEVATION: **282.1 ft**	TOC ELEVATION: **285.60 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **29.7 ft below TOC**	DEPTH TO WATER: (7/17/2018) **10.75 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/4/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-6			
-2	CH	FAT SANDY CLAY, yellowish orange, increasing sand and silt content with depth, medium stiff, moist.	
2	ML	SILT, with clayey fine-grained sand, tan to yellowish orange with lenses of clay, moist to dry.	
6	CH/CL	FAT SANDY CLAY to LEAN CLAY, orange oxidized lenses of silt within fat sandy clay, sand content increasing with depth, stiff.	80
10		@ 10 ft, medium stiff, increasing moisture with depth.	
14	SC	CLAYEY SAND, yellowish brown, loose to medium dense. @ 13 8 ft, color changes to olive gray.	80
18	CH	FAT SANDY CLAY, olive gray, medium stiff to stiff, moist.	
	SC	CLAYEY SAND, yellowish brown, loose to medium dense. @ 20 ft, decreasing clay content with depth.	
22	SM	SILTY SAND, fine-grained, olive gray, loose, moist.	
26	CH	FAT CLAY, with laminated lenses of white silt to fine-grained sand.	100
30			



Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.

19.6 ft of 4 in Sch 40 PVC including 3.5 ft stickup (vented below cap)

Cement/bentonite grout from 0 to 8.0 ft bgs

Bentonite seal from 8.0 to 12.0 ft bgs

Silica size 20/40 filter pack from 12.0 to 26.3 ft bgs

10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen

0.1 ft 4 in dia. Sch 40 PVC end cap

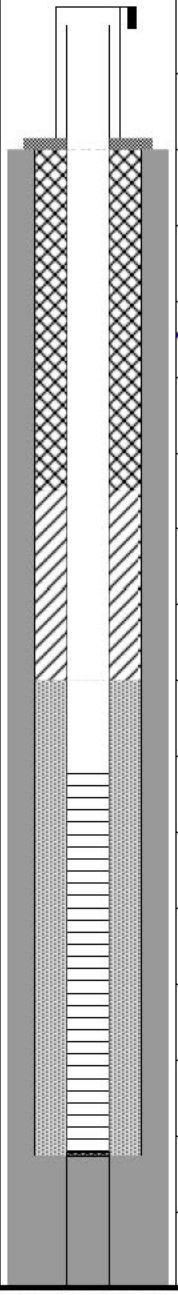
Slough from 26.3 ft to 30.0 ft in 4 in dia., borehole.

Drilling terminated at 30 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

FTN Associates Ltd. water resources / environmental consultants	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-9**	
	LOCATION: **Entergy White Bluff Plant**	WELL ID: **RP-9**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1948797.6**	EASTING: **1272803.3**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND ELEVATION: **281.4 ft**	TOC ELEVATION: **284.68 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **29.8 ft below TOC**	DEPTH TO WATER: (7/17/2018) **8.35 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/6/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CL	TOP SOIL	
	CH	FAT CLAY, yellowish orange to tan, rootlets in upper 1 ft, increasing silt with depth, hard, dry.	
4	ML	SILT, with fine-grained sand that increases with depth, tan, soft to medium stiff, moist.	
	SM	SILTY SAND, fine-grained, tan with orange oxide staining, medium stiff to stiff, moisture increases with depth.	100
	GC	CLAYEY GRAVEL with sand, well graded angular to subrounded sand with subrouneded to rounded gravel (<1 in), dry to moist.	
	SM	SILTY SAND, fine-grained, tan with orange oxide staining, medium stiff to stiff, moisture increases with depth.	
8	GM/SW	WELL GRADED SAND and GRAVEL, very fine-grained to coarse-grained, angular to subrounded sand and subangular to subrounded gravel (<2 in), dry to moist.	
	GW	WELL GRADED GRAVEL, angular to subrounded (<2 in).	
12	CH	FAT SANDY CLAY, tan with oxidized lenses of silt and fine-grained sand, sand content increases with depth, soft to medium stiff,	
	SC	CLAYEY SAND, light gray, soft, wet.	
	SM	SILTY SAND, light gray with some orange oxide staining, loose, wet.	100
16	CL/CH	LEAN SANDY CLAY to FAT SANDY CLAY, lenses of silt and sand, heavily oxidized, decreasing clay content with depth, soft, wet.	
	SM	SILTY SAND, fine-grained, tan to yellow, loose, wet.	
20			
24	CH	FAT CLAY, tan, stiff, moist.	100
		@ 25 ft, color changes to olive gray.	
28			



Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.

19.7 ft of 4 in Sch 40 PVC including 3.3 ft stickup (vented below cap)

Cement/bentonite grout from 0 to 9.0 ft bgs

Bentonite seal from 9.0 to 14.0 ft bgs

Silica size 20/40 filter pack from 14.0 to 26.5 ft bgs

10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen

0.1 ft 4 in dia. Sch 40 PVC end cap

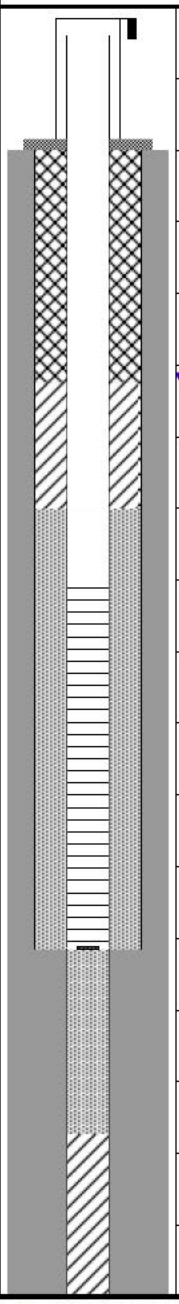
Slough from 26.5 ft to 30.0 ft in 4 in dia., borehole.

Drilling terminated at 30 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **RP-10**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **RP-10**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1949510.5**	EASTING: **1272499**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND ELEVATION: **280.5 ft**	TOC ELEVATION: **283.66 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **25.5 ft below TOC**	DEPTH TO WATER: (7/17/2018) **9.6 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/12/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	FILL	F LL, consisting of nepheline syenite gravel.	
4		FAT CLAY, tan with yellowish orange mottles, some fine-grained sand, stiff, moist.	40
8	CH		
12		@ 12 ft, SANDY FAT CLAY.	
	SC	CLAYEY SAND, fine-grained, gray with orange mottles, dense, moist.	
16		POORLY GRADED SAND, fine-grained, silty, gray with orange mottles, wet.	100
20	SP		
	CL	SILT and FAT CLAY, brownish tan clay with light gray silt, medium stiff, moist.	
24		FAT CLAY, dark gray with light gray laminated silt lenses, stiff, moist.	100
28	CH		
32			



Well Construction

- Above ground completion includes 3x3 ft concrete pad, four pipe bollards, and locking outer aluminum casing.
- 15.4 ft of 4 in Sch 40 PVC including 3.2 ft stickup (vented below cap)
- Cement/bentonite grout from 0 to 6.5 ft bgs
- Bentonite seal from 6.5 to 10.0 ft bgs
- Silica size 20/40 filter pack from 10.0 to 22.3 ft bgs
- 10 ft of 4 in dia. 0.010 in slot, Sch 40 PVC well screen
- 0.1 ft 4 in dia. Sch 40 PVC end cap
- Silica size 20/40 filter pack from 22.3 to 27.5 ft bgs in a 4 in dia. borehole
- Bentonite seal from 27.5 to 32.0 ft bgs in a 4 in dia. borehole
- Drilling terminated at 32 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **B-1**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **N/A**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1949501.9**	EASTING: **1272354.9**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND SURFACE ELEV.: **280.3 ft NAVD88**	
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4 in diameter core**	TOTAL DEPTH: **10 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **5/16/2018**	DATE COMPLETED: **5/16/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0		FILL		FILL
1	77	GW		WELL GRADED GRAVEL with sand, medium to coarse sand, fine to coarse-grained angular to round gravel, medium dense to loose, dry.
3	66	CH		FAT SANDY CLAY, tan with orange oxide staining, lenses of fine sand, stiff, moist.
8		CL		LEAN CLAY with fine-grained sand, silty yellowish brown and gray, moist.
10				Boring terminated at 10 ft bgs.

NOTES: Northings and eastings recorded using a Garmin eTrex30 and converted to AR State Plane NAD83 South
Borehole backfilled with bentonite to ground surface.

FTN Associates Ltd. water resources / environmental consultants	PROJECT: **Monitoring Well Installations**	BORING ID: **B-2**	
	LOCATION: **Entergy White Bluff Plant**	WELL ID: **N/A**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1949485.1**	EASTING: **1272715.5**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **280.2 ft NAVD88**	
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4 in diameter core**	TOTAL DEPTH: **10 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **5/16/2018**	DATE COMPLETED: **5/16/2018**

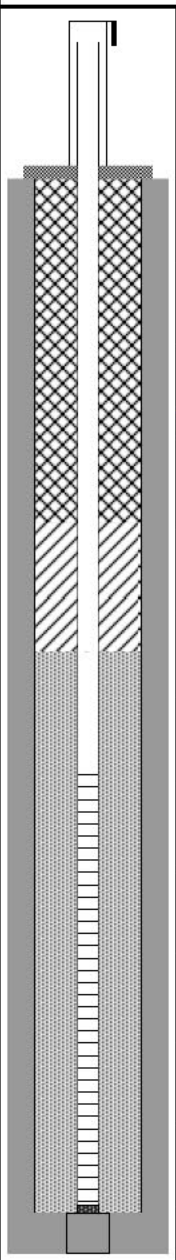
Depth (feet)	% REC	USCS	Graphic Log	Description
0				FAT SANDY CLAY, light gray with orange and red oxide staining, fine grained sand, rootlets, very stiff, dry to moist.
1				
2				
	100			
3				
4				
				@ 4.6 ft FAT CLAY with sand and some rounded gravels, soft, moist.
5		CH		@ 5 ft FAT SANDY CLAY, light gray with orange and red oxide staining, fine grained sand, very stiff, dry to moist.
6				
7				
	50			
8				
9				
10				

NOTES: Northings and eastings recorded using a Garmin eTrex30 and converted to AR State Plane NAD83 South
Borehole backfilled with bentonite to ground surface.

PROJECT: **Monitoring Well Installations**		BORING ID: **B-3**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **PZ-5**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1949067.5**	EASTING: **1272460.6**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND ELEVATION: **279.9 ft**	TOC ELEVATION: **283.01 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **27.2 ft below TOC**	DEPTH TO WATER: (7/17/2018) **8.72 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **5/15/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CH	FAT CLAY, light brown, stiff, moist. @ 4 8 ft, with rounded gravel.	50
4			
8	CL	SANDY CLAY, light gray to tan with some iron stained lenses, soft, moist.	33
12	SC	CLAYEY SAND, tan, soft, moist to wet.	
	CL	LEAN SANDY CLAY, light gray to tan with some iron stained lenses, soft, moist to wet.	80
	CH	FAT SANDY CLAY, tan with lenses of fine-grained sand, stiff, moist.	
16	SC	CLAYEY SAND,fine-grained, tan with orange oxide staining, clay content decreasing with depth, loose, wet.	100
20	SM	SILTY SAND, tan with some oxide staining, loose, wet. @ 20 8 - 21 ft layer of fat clay. @ 22 9 - 23 ft, lenses of olive gray clay.	100
24	CH	FAT CLAY, olive gray, laminated with white silt to fine-grained sand, stiff, dry.	

Well Construction



-4 Above ground completion includes 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing.

0 17.0 ft of 2 in Sch 40 PVC including 3.1 ft stickup (vented below cap)

4 Cement/bentonite grout from 0 to 8.0 ft bgs

8 Bentonite seal from 8.0 to 11.0 ft bgs

12 Silica size 20/40 filter pack from 11.0 to 24.0 ft bgs

16

20 10 ft of 2 in dia. 0.010 in slot, Sch 40 PVC well screen

24 0.18 ft 2 in dia. Sch 40 PVC end cap
Slough from 24 ft bgs to 25 ft bgs

Drilling terminated at 25 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

FTN Associates Ltd. water resources / environmental consultants	PROJECT: **Monitoring Well Installations**	BORING ID: **B-4**	
	LOCATION: **Entergy White Bluff Plant**	WELL ID: **N/A**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1948619**	EASTING: **1272718.6**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **280.8 ft NAVD88**	
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4 in diameter core**	TOTAL DEPTH: **10 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **5/17/2018**	DATE COMPLETED: **5/17/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0		FILL		FILL
				FAT CLAY with sand, yellowish orange with orange to red oxide staining, sand content increasing with depth, stiff, moist.
1				@1.6-1.7 ft layer of white silt.
2				
3				
4	88			@ 4 ft FAT SANDY CLAY, light gray to olive gray, fine grained, sand content increases with depth, stiff, moist.
5		CH		@ 5-5.3 ft small gravel.
6				
7				
8				
9				
10				Boring terminated at 10 ft bgs.

NOTES: Northings and eastings recorded using a Garmin eTrex30 and converted to AR State Plane NAD83 South
Borehole backfilled with bentonite to ground surface.

PROJECT: **Monitoring Well Installations**		BORING ID: **B-5**	
LOCATION: **Entergy White Bluff Plant**		WELL ID: **N/A**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **1948639.2**	EASTING: **1271950.5**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND SURFACE ELEV.: **281.0 ft NAVD88**	
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4 in diameter core**	TOTAL DEPTH: **12 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **5/17/2018**	DATE COMPLETED: **5/17/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0				FILL
1				
2	66	FILL		
3				LEAN CLAY with sand, yellowish orange with yellow and orange staining, stiff, dry.
4				
5				
6		CL		
7	100			
8				
9				FAT CLAY with sand, stiff, moist.
10		CH		
11				LEAN CLAY, light brown, silty, some fine-grained sand, trace fine-grained gravel, moist.
12		CL		Boring terminated at 12 ft bgs.

NOTES: Northings and eastings recorded using a Garmin eTrex30 and converted to AR State Plane NAD83 South
Borehole backfilled with bentonite to ground surface.

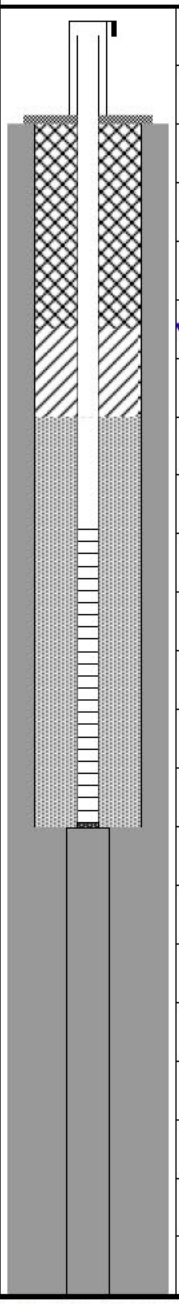
PROJECT: **Monitoring Well Installations**	BORING ID: **B-6**		
LOCATION: **Entergy White Bluff Plant**	WELL ID: **N/A**		
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1949105.8**	EASTING: **1271974.9**	
DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **281.9 ft NAVD88**		
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4 in diameter core**	TOTAL DEPTH: **30 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **6/14/2018**	DATE COMPLETED: **6/14/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0–2		FILL		FILL
2–10	25	CL		LEAN CLAY with sand, tan with lenses of sand and greenish gray silt, soft, wet.
10–16	100	SM		SILTY SAND, tan with lenses of orange to yellow oxidized sand. @ 15 ft color changes to tan and greenish gray, increasing clay content with depth.
16–18		CH		FAT SANDY CLAY, brown to tan with orange oxidation along sandy lenses, fine-grained sand, medium stiff, moist. @ 18 ft color changes to olive gray.
18–19		SC		CLAYEY SAND, olive gray, decreasing clay with depth, medium stiff, moist to wet.
19–26	100	SM		SILTY SAND, fine-grain, olive gray, medium stiff, saturated. @ 24-25 ft then lenses of dark gray clay.
26–30		CH		FAT CLAY with sand, olive gray to greenish gray clay with laminated lenses of white silt to fine-grained sand, stiff. Borehole terminated at 30 ft bgs.

NOTES: Northings and eastings recorded using a Garmin eTrex30 and converted to AR State Plane NAD83 South
Borehole backfilled with bentonite to ground surface.

FTN Associates Ltd. water resources / environmental consultants	PROJECT: **Monitoring Well Installations**	BORING ID: **B-7**	
	LOCATION: **Entergy White Bluff Plant**	WELL ID: **PZ-1**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **1949513.9**	EASTING: **1272146.8**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND ELEVATION: **281.9 ft**	TOC ELEVATION: **284.94 ft**
FTN Project # R07920-1845-001	DRILLING METHOD: **Sonic with 4x6 core and case**	TOTAL WELL DEPTH: **27.1 ft below TOC**	DEPTH TO WATER: (7/17/2018) **10.09 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft 4 in diameter core barrel**	DATE STARTED: **5/16/2018**	DATE COMPLETED: **6/15/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	FILL	FILL	46
4	CH	FAT SANDY CLAY, tan with orang staining, decreasing clay content with depth, medium stiff, moist.	
8	SC	CLAYEY SAND, tan with oxide staining, loose, moist to wet.	100
12	CH	FAT SANDY CLAY, tan with oxide staining along sandy lenses, stiff, moist.	
	SC	SANDY CLAY, oxide stained, decreasing sand content with depth, medium stiff, moist.	
16	SM	SILTY SAND, fine-grain, tan with oxide staining in upper 1 ft, very loose, wet.	100
20	SC	CLAYEY SAND, tan to orange with lenses of light gray to olive gray clay, moisture increases with depth. @ 23.2 fine-grained olive gray sand, loose, wet.	100
24	CH	FAT CLAY, with lenses of silt to very fine-grained sand, blocky, stiff to very stiff, moist. @ 25 ft laminations of white silt to fine-grained sand, blocky, stiff to hard, somewhat moist to dry.	100
28		@ 30 ft, silt and sand laminations decrease with depth.	
32			100
36		@ 38 ft, with lenses of fine to medium-grained olive gray to greenish gray sand.	
40			



Well Construction

- -4: Above ground completion includes 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing.
- 0: 16.9 ft of 2 in Sch 40 PVC including 3.0 ft stickup (vented below cap)
- 4: Cement/bentonite grout from 0 to 7 ft bgs
- 8: Bentonite seal from 7.0 to 10.0 ft bgs
- 12: Silica size 20/40 filter pack from 10.0 to 24.0 ft bgs
- 16: 10 ft of 2 in dia. 0.010 in slot, Sch 40 PVC well screen
- 20: 0.18 ft 2 in dia. Sch 40 PVC end cap
- 24: Slough from 24.0 ft to 40.0 ft in 4 in dia., borehole.
- 32
- 36
- 40: Drilling terminated at 40 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 13, 2018 (AR State Plane NAD83 South and NAVD88).

Geotechnical Data

FTN/ENTERGY WHITE BLUFF/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
B-1	UD	3.0-5.0'	CH	29.0	63	17	46	0.27	100.0	88.9	59.5	-	-	-	29.0	92.8	1.6E-08	-
B-1	UD	8.0-10.0'	CL	25.0	44	15	29	0.35	100.0	53.8	40.4	-	-	2.57	25.0	93.9	-	T-CU w/pp
B-3	UD	5.0-7.0'	CL	24.1	37	17	20	0.37	100.0	73.3	47.7	-	-	-	24.1	98.7	2.2E-08	-
B-3	UD	10.0-12.0'	SC	21.6	32	20	12	0.18	100.0	41.9	31.0	-	-	2.58	21.6	100.9	-	T-CU w/pp
B-3	UD	15.0-17.0'	SC	19.0	34	15	19	0.23	100.0	28.2	22.0	-	-	-	19.0	110.5	6.3E-06	-
B-3	UD	20.0-22.0'	SM	31.5	NP	NP	NP	NP	100.0	18.1	9.5	-	-	-	31.5	79.2	-	DS
B-4	UD	8.0-10.0'	CH	33.5	59	30	29	0.13	100.0	94.7	51.5	-	-	-	33.5	86.1	4.6E-08	-
B-5	UD	3.0-5.0'	CL	26.6	42	21	21	0.28	95.4	73.1	28.0	-	-	2.69	26.6	91.7	-	T-CU w/pp
B-5	UD	10.0-12.0'	CL	17.1	35	16	19	0.07	97.6	90.3	46.0	-	-	-	17.1	113.8	1.5E-08	-
B-7	UD	5.0-7.0'	SM	20.5	34	26	8	-0.73	90.4	40.0	21.1			2.66	20.5	104.7	-	T-CU w/pp
B-7	UD	7.0-9.0'	CL	21.8	34	20	14	0.13	100.0	52.7	34.5	-	-	-	21.8	98.1	6.7E-07	-
B-7	UD	15.0-17.0'	SC	21.9	28	19	9	0.36	100.0	36.5	24.0	-	-	2.62	21.9	102.2	-	T-CU w/pp
RP-4	UD	20.0-22.0'	CL	22.2	44	15	29	0.24	93.0	66.9	39.5	-	-	2.67	22.2	101.8	-	T-CU w/pp
RP-4	UD	30.0-32.0'	CH	37.1	54	21	33	0.47	100.0	96.3	57.4			-	37.1	80.2	3.5E-07	-
RP-9	UD	30.0-32.0'	CH	30.2	54	24	30	0.19	100.0	98.8	44.0	-	-	2.67	30.2	88.9	-	C

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

FTN/ENTERGY WHITE BLUFF/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
B-2	Bag	5.0-7.5'	CH	24.7	52	21	31	0.13	100.0	86.0	55.0	-	-	-	-	-	-	-
B-3 (P2-5)	Bag	13.0-14.0'	CL	23.3	40	19	21	0.18	100.0	54.1	41.0	-	-	-	-	-	-	-
B-3 (P2-5)	Bag	23.0-24.0'	SM	30.0	NP	NP	NP	NP	100.0	28.1	16.5	-	-	-	-	-	-	-
B-5	Bag	4.0-6.0'	ML	27.4	46	30	16	-0.17	100.0	70.7	33.0	-	-	-	-	-	-	-
B-5	Bag	9.0-10.0'	ML	26.3	49	31	18	-0.27	100.0	89.1	45.0	-	-	-	-	-	-	-
B-6	Bag	11.0-12.0'	SM	12.4	NP	NP	NP	NP	100.0	27.6	20.0	-	-	-	-	-	-	-
B-6	Bag	16.0-17.0'	CL	21.3	36	23	13	-0.11	100.0	54.2	38.0	-	-	-	-	-	-	-
B-6	Bag	22.0-24.0'	SM	10.9	NP	NP	NP	NP	100.0	28.6	18.9	-	-	-	-	-	-	-
B-7	Bag	18.0-20.0'	SM	22.8	NP	NP	NP	NP	100.0	21.4	15.0	-	-	-	-	-	-	-
RP-3	Bag	18.0-20.0'	CH	27.1	56	27	29	0.02	100.0	95.6	44.0	-	-	-	-	-	-	-
RP-3	Bag	29.0-30.0'	SM	22.4	NP	NP	NP	NP	100.0	26.3	20.0	-	-	-	-	-	-	-
RP-4	Bag	8.0-9.0'	CL	13.4	30	16	14	-0.17	100.0	50.8	29.0	-	-	-	-	-	-	-
RP-4	Bag	25.0-26.0'	ML	37.7	48	30	18	0.40	100.0	98.7	43.0	-	-	-	-	-	-	-
RP-5	Bag	15.0-18.0'	SC-SM	24.4	28	22	6	0.51	100.0	34.0	25.9	-	-	-	-	-	-	-
RP-7	Bag	16.6-17.4'	SC	22.3	36	19	17	0.20	100.0	46.7	34.0	-	-	-	-	-	-	-

ABBREVIATIONS:
LIQUID LIMIT (LL)
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P = pH

AUGUST 2018

18103173

7920-1845-001

FTN/ENTERGY WHITE BLUFF/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
RP-9	Bag	9.0-10.0'	SC-SM	4.2	20	15	5	-2.35	67.7	16.4	9.5	-	-	-	-	-	-	-
RP-9	Bag	26.0-27.0'	CH	31.3	50	20	30	0.36	100.0	98.1	54.0	-	-	-	-	-	-	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

Golder Associates Inc.

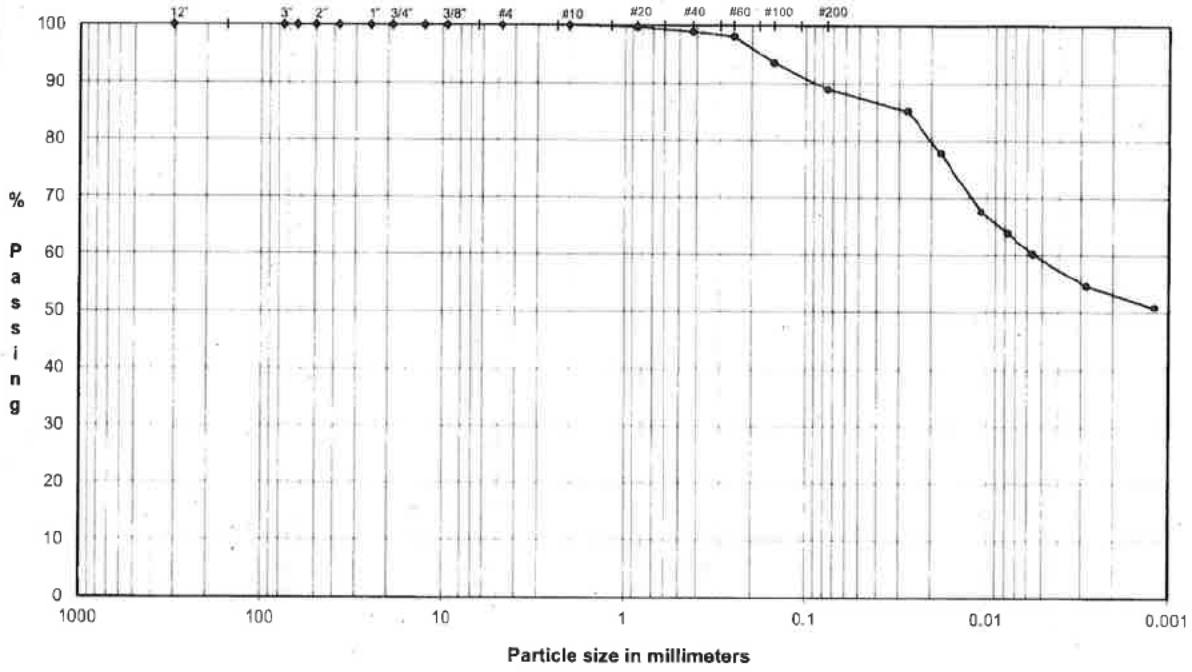
JUNE 2018

18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-1** Depth: **3.0-5.0'**
TYPE: **UD**



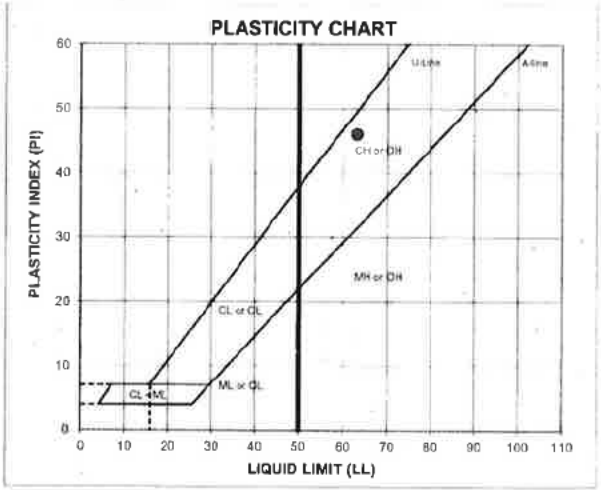
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	100.0	Coarse Sand	0.0
#20	0.85	99.6		
#40	0.43	98.9	Medium Sand	1.1
#60	0.25	98.1		
#100	0.15	93.5		
#200	0.075	88.9	Fine Sand	10.0

Hydrometer Analysis

(mm)	%Finer		
0.027	85.2		
0.018	77.8		
0.011	67.6	Fines	
0.0078	63.9	Silt or Clay	88.9
0.0056	60.2		
0.0028	54.6		
0.0012	50.9		



ATTERBERG LIMITS

Method -B (Dry preparation)

M.	LL	PL	PI	LI
29.0	63	17	46	0.27

LL (oven-dried) / 0.75 - ORGANIC (OL-OH)

DESCRIPTION: CLAY, some fine to medium sand; yellowish brown.

USCS: CH

TECH	TB
DATE	7/23/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		Board #	12	COMMENTS
PROJECT NUMBER	18103173		Flow Pump	2	
SAMPLE ID	B-1	3.0-5.0'	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.114	B-Value, f	0.97	Height, inches	3.142
Diameter, inches	2.836	Cell Pres.	88.0	Diameter, inches	2.858
Area, cm²	40.75	Bot. Pres.	80.0	Area, cm²	41.39
Volume, cm³	322.35	Top Pres.	80.0	Volume, cm³	330.31
Mass, g	618.40	Tot. B.P.	80.0	Mass, g	632.58
Moisture Content, %	29.04	Head, max.	137.16	Moisture Content, %	31.99
Dry Density, pcf	92.77	Head, min.	137.16	Dry Density, pcf	90.54
Spec. Gravity (assumed)	2.720	Max. Grad.	17.19	Volume Solids, cm³	176.19
Volume Solids, cm³	176.19	Min. Grad.	17.19	Volume Voids, cm³	154.12
Volume Voids, cm³	146.15			Void Ratio	0.87
Void Ratio	0.83			Saturation, %	99.5%
Saturation, %	95.2%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	618.40	715.61
Wt Soil & Tare, f	g	479.25	562.37
Wt Tare	g	0.00	83.41
Wt Moisture Lost	g	139.15	153.24
Wt Dry Soil	g	479.25	478.96
Water Content	%	29.04%	31.99%

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: CH

DESCRIPTION: CLAY, some fine to medium sand; yellowish brown.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
07/23/18	43304	9	0	20.5	0	0	0	0	1.95	137.16	17.19	1.6E-08
07/23/18	43304	9	5	20.5	5	5	300	300	1.95	137.16	17.19	1.6E-08
07/23/18	43304	9	10	20.5	5	10	300	600	1.95	137.16	17.19	1.6E-08
07/23/18	43304	9	15	20.5	5	15	300	900	1.95	137.16	17.19	1.6E-08 *
07/23/18	43304	9	20	20.5	5	20	300	1200	1.95	137.16	17.19	1.6E-08 *
07/23/18	43304	9	25	20.5	5	25	300	1500	1.95	137.16	17.19	1.6E-08 *
07/23/18	43304	9	30	20.5	5	30	300	1800	1.95	137.16	17.19	1.6E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.6E-08 cm/sec **

DATE	7/23/18
CHECK	
REVIEW	
APPROVE	

JULY 2018

18103173

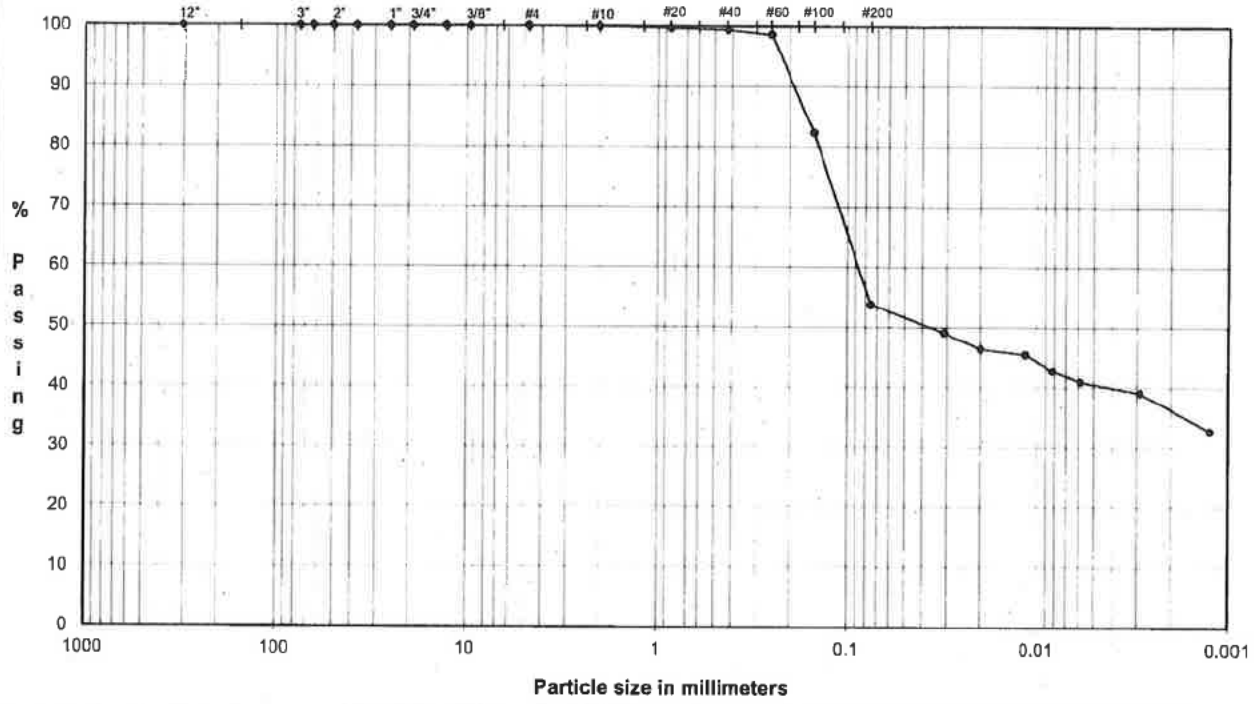
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **B-1** Depth: **8.0-10.0'**

TYPE: **UD**



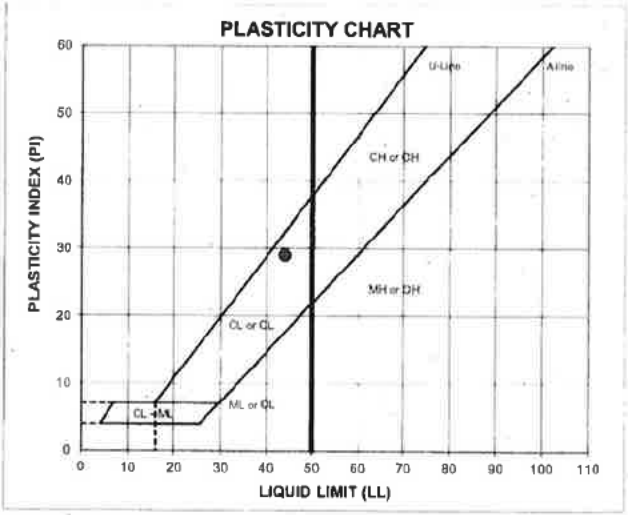
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.9	Coarse Sand	0.1
#20	0.85	99.7		
#40	0.43	99.4	Medium Sand	0.5
#60	0.25	98.6		
#100	0.15	82.3		
#200	0.075	53.8	Fine Sand	45.6

Hydrometer Analysis

(mm)	%Finer		
0.031	49.1		
0.020	46.4		
0.011	45.5	Fines	
0.0082	42.8	Silt or Clay	53.8
0.0059	40.9		
0.0029	39.1		
0.0012	32.8		



ATTERBERG LIMITS

Method -B (Dry preparation)

NL	LL	PL	PI	LI
25.0	44	15	29	0.35

LL (oven-dried) / 0.75 = ORGANK (OL/OH)

DESCRIPTION: SILTY CLAY and SAND, fine to coarse; yellowish brown and gray.

USCS: CL

TECH	TB/HH/BA
DATE	7/20/18
CHECK	
REVIEW	
APPROVE	

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	**FTN/ENTERGY WHITE BLUFF/AR**		
PROJECT NUMBER	**18103173**	**SAMPLE ID**	**B-1**
		SAMPLE TYPE	**UD**
TESTED FOR	**Gs**	**SAMPLE DEPTH**	**8.0-10.0'**

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	**203.53**
Weight Soil and Tare, Final (gm)	**203.11**
Weight Of Tare (gm)	**51.24**
Weight Of Moisture (gm)	**0.42**
Weight Of Dry Soil (gm)	**151.87**
Hygroscopic Moisture In (%)	**0.3%**

Test Method		**Method - B**
Pycnometer Number		**24**
Weight Pycnometer Empty (gm)		181.79
Volume of Pycnometer (gm)		499.61
Weight Pycnometer and Water (gm)		680.37
Mass of Pycnometer and Water at the test Temperture	(A)	679.99
Observed Temperature (Tb), for (Mb) In Degrees C		24.50
Weight of Soil, Water & Pycnometer (gm)	(B)	**710.61**
Temperature, C		**24.5**
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		**50.04**
Weight of Tare		**0.00**
Weight of Dry Soil (gm)	(C)	50.04
Temperature Coefficient		0.9990

SPECIFIC GRAVITY (G) **2.575**

$G @ 20^0 C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ
DATE	7/20/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit:	B-1		Boring or Test Pit:	B-1		Boring or Test Pit:	B-1	
Sample:	UD		Sample:	UD		Sample:	UD	
Depth:	8.0-10.0'	ft	Depth:	8.0-10.0'	ft	Depth:	8.0-10.0'	ft
Point No.:	1		Point No.:	2		Point No.:	3	
	Initial			**Initial**			**Initial**	
Length =	6.234	in	Length =	6.070	in	Length =	6.034	in
Diameter =	2.856	in	Diameter =	2.869	in	Diameter =	2.870	in
Wet Mass =	2.835	lb	Wet Mass =	2.565	lb	Wet Mass =	2.631	lb
Area =	6.406	in^2	Area =	6.465	in^2	Area =	6.469	in^2
Volume =	39.937	in^3	Volume =	39.241	in^3	Volume =	39.035	in^3
Specific Gravity =	2.57	(ASTM D854)	Specific Gravity =	2.57	(ASTM D854)	Specific Gravity =	2.57	(ASTM D854)
Dry Mass of Solids =	2.291	lb	Dry Mass of Solids =	2.079	lb	Dry Mass of Solids =	2.060	lb
Moisture Content =	23.8%		Moisture Content =	23.4%		Moisture Content =	27.7%	
Wet Unit Weight =	122.7	pcf	Wet Unit Weight =	112.9	pcf	Wet Unit Weight =	116.5	pcf
Dry Unit Weight =	99.1	pcf	Dry Unit Weight =	91.5	pcf	Dry Unit Weight =	91.2	pcf
Void Ratio =	0.62		Void Ratio =	0.75		Void Ratio =	0.76	
Percent Saturation =	99%		Percent Saturation =	80%		Percent Saturation =	94%	
	After Consolidation			**After Consolidation**			**After Consolidation**	
Length =	6.173	in	Length =	5.950	in	Length =	5.890	in
Diameter =	2.917	in	Diameter =	2.847	in	Diameter =	2.858	in
Area =	6.682	in^2 (Method B)	Area =	6.365	in^2 (Method B)	Area =	6.415	in^2 (Method B)
Volume =	41.249	in^3	Volume =	37.868	in^3	Volume =	37.784	in^3
Moisture Content =	26.1%		Moisture Content =	26.9%		Moisture Content =	27.3%	
Wet Unit Weight =	121.0	pcf	Wet Unit Weight =	120.3	pcf	Wet Unit Weight =	119.9	pcf
Dry Unit Weight =	96.0	pcf	Dry Unit Weight =	94.8	pcf	Dry Unit Weight =	94.2	pcf
Void Ratio =	0.67		Void Ratio =	0.69		Void Ratio =	0.70	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.99		B Parameter =	1.00		B Parameter =	0.97	
Shear Rate =	0.012%	/min.	Shear Rate =	0.012%	/min.	Shear Rate =	0.012%	/min.
t_{50} =	5.84	min.	t_{50} =	14.95	min.	t_{50} =	9.87	min.
Strain at Failure =	3.2%		Strain at Failure =	3.3%		Strain at Failure =	2.3%	
Cell Pressure =	89.0	psi	Cell Pressure =	98.0	psi	Cell Pressure =	107.0	psi
Back Pressure =	80.0	psi	Back Pressure =	80.0	psi	Back Pressure =	80.0	psi
Confining Pressure =	9.0	psi	Confining Pressure =	18.0	psi	Confining Pressure =	27.0	psi

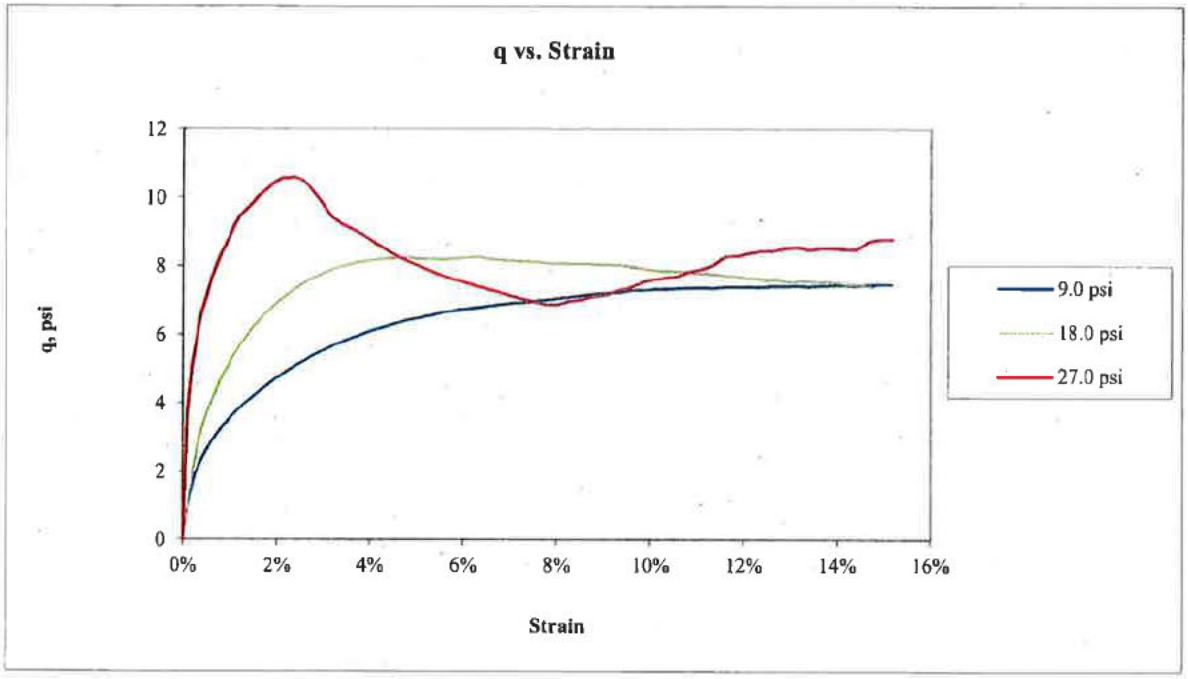
Notes: Sample description: (CL) SILTY CLAY and SAND, fine to coarse; yellowish brown and gray

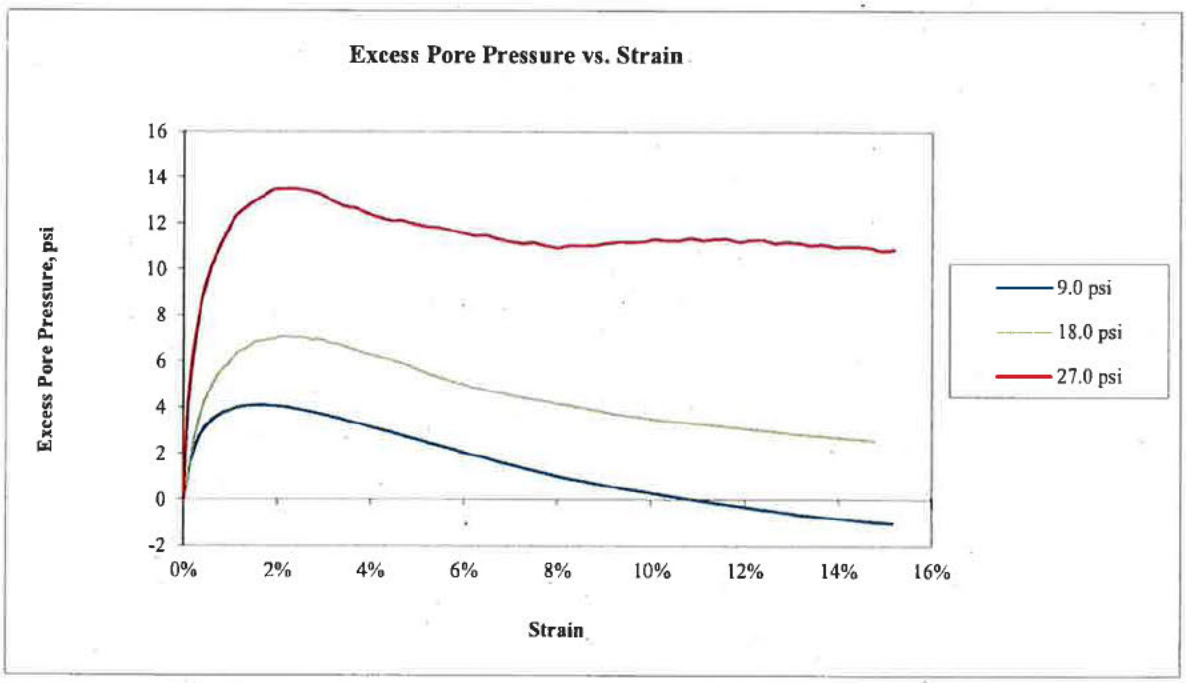
Atterberg limits: LL = 44 PL = 15 PI = 29 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 54% (ASTM D422, refer to separate report for gradation curve)

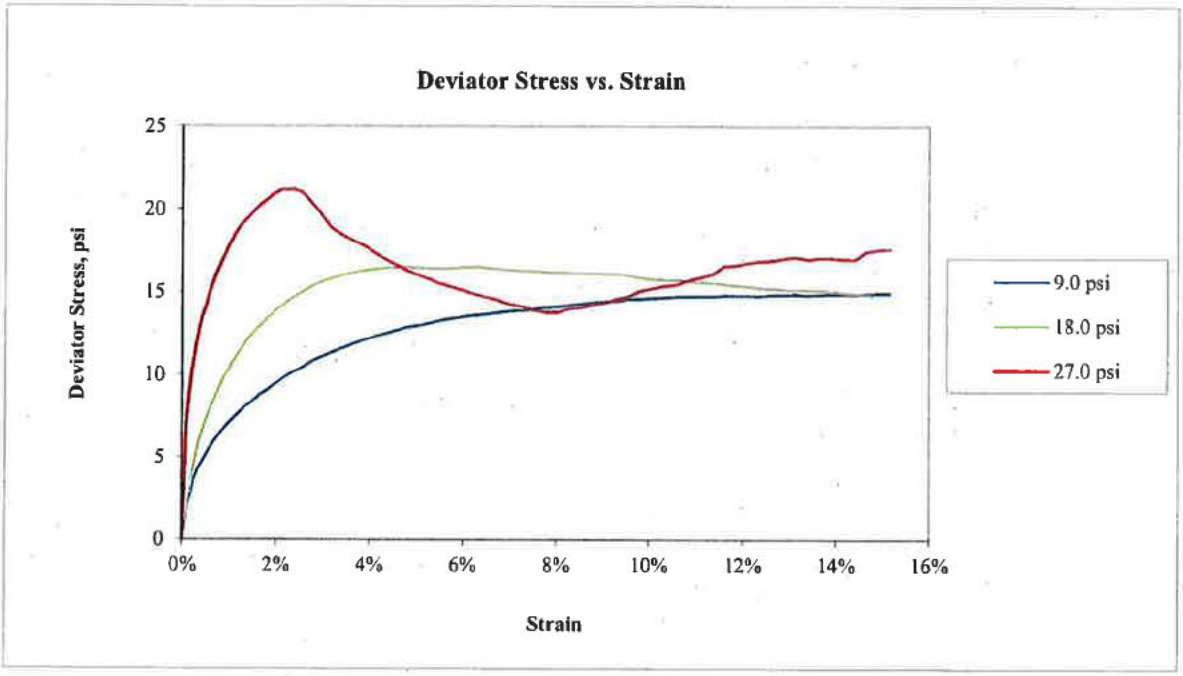
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

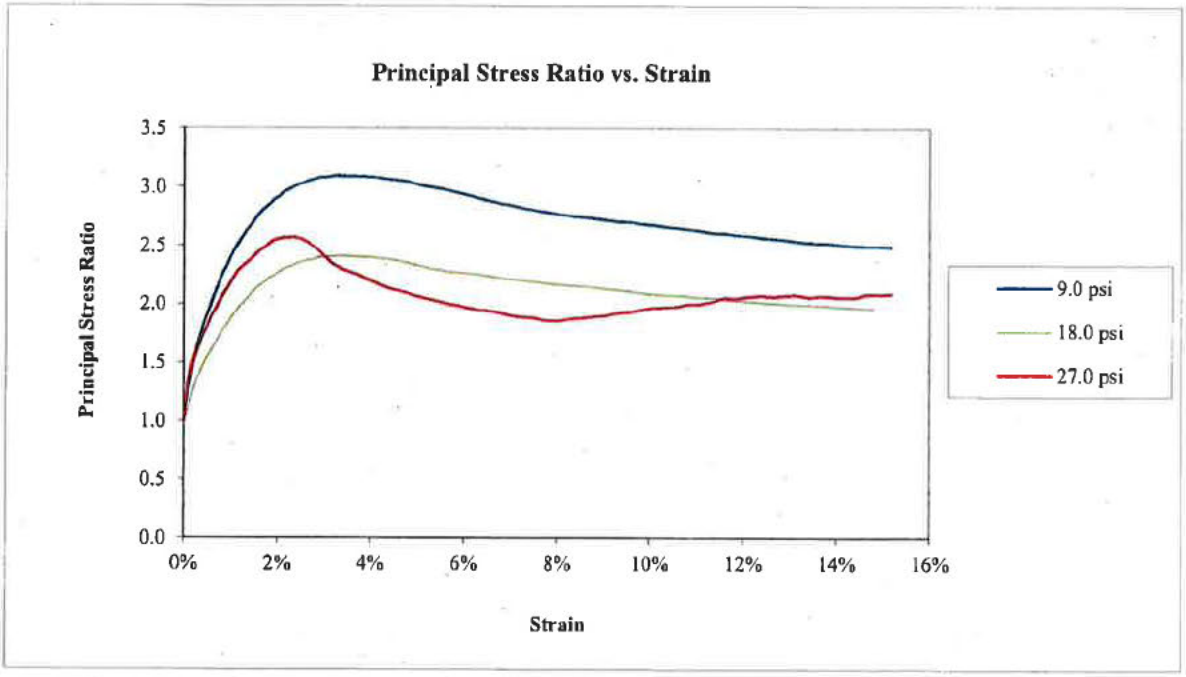
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-1 UD 8.0-10.0'**	**Technician:** **PWM/FT** **Checked:**	**Reviewed:** **Approved:**	**Start Date:** **7/17/2018**	**Job Number:** **18103173**	**Figure:** **1**





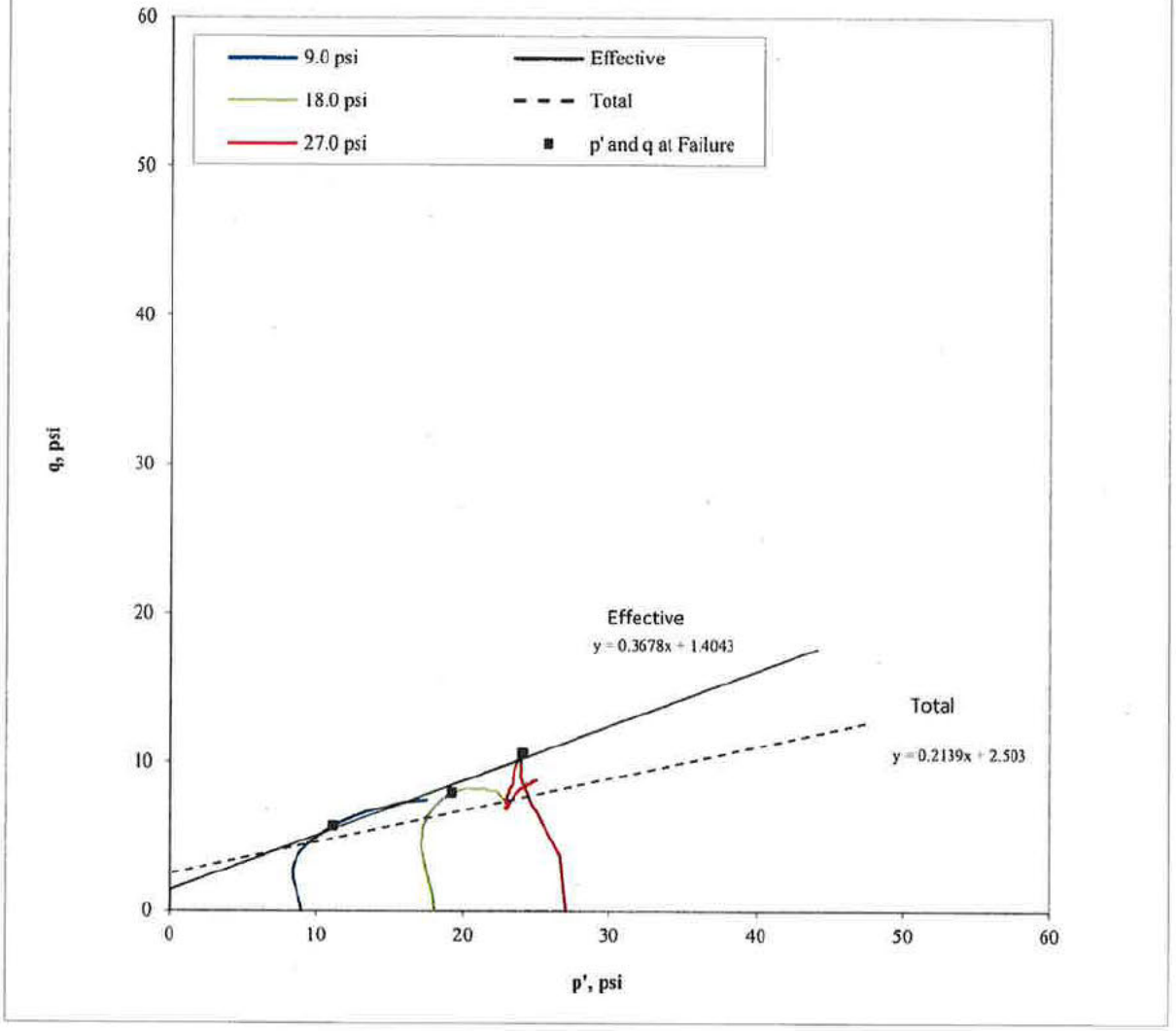
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-1 UD 8.0-10.0'**	**Technician:** **PWM/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **7/17/2018**	**Job Number:** **18103173**	**Figure:** **2**





Golder Associates Inc. Atlanta, Georgia	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT DEVIATOR STRESS AND PRINCIPAL STRESS RATIO PLOT				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-1 UD 8.0-10.0'	Technician: PWM/FT Check:	Reviewed: Approved:	Start Date: 7/17/2018	Job Number: 18103173	Figure: 3

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
9.0	14.7	11.1	5.7
18.0	26.0	19.2	8.0
27.0	37.6	24.1	10.6

Effective

α' =	20.2	degree
a' =	1.4	psi

Total

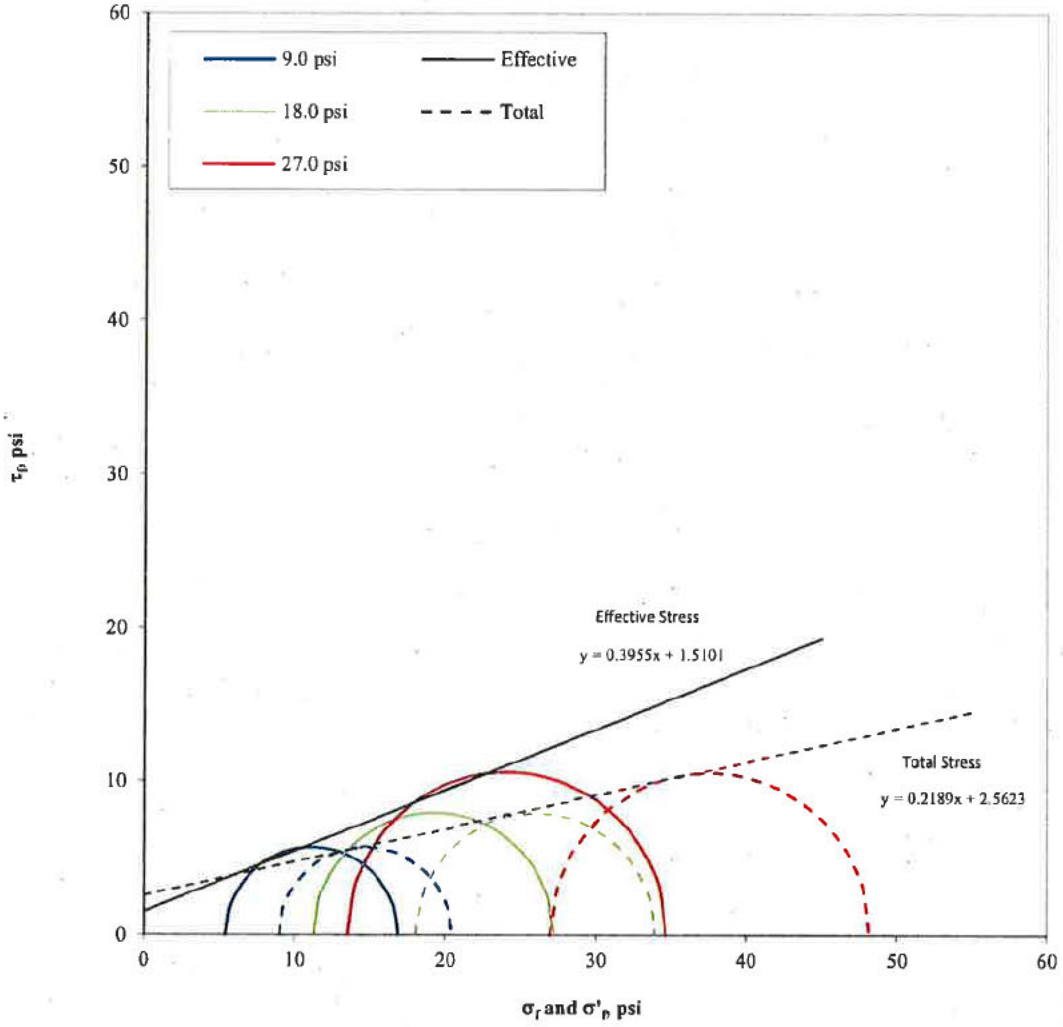
α =	12.1	degree
a =	2.5	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-1 UD 8.0-10.0'	PWM/FT Check:	Approved:	7/17/2018	18103173	4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
9.0	16.8	5.4	20.4	9.0
18.0	27.2	11.3	33.9	18.0
27.0	34.7	13.5	48.2	27.0

Effective

ϕ' =	21.6	degree
c' =	1.5	psi

Total

ϕ =	12.3	degree
c =	2.6	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-1 UD 8.0-10.0'	PWM/FT Check:	Approved:	7/17/2018	18103173	5

9.0 psi

18.0 psi

27.0 psi

NOTE: Pore pressure built up before shearing, adjusted results to initial backpressure.

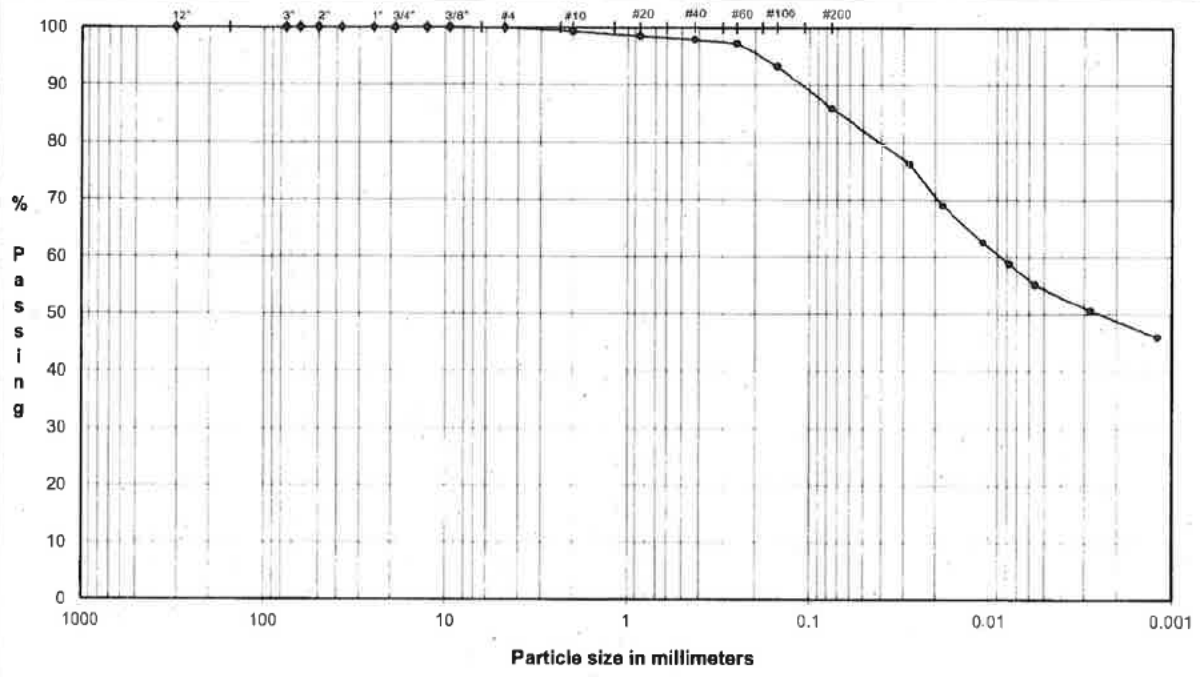
Golder Associates Inc. **Atlanta, Georgia**	Title: **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMENS PHOTOGRAPH - 9.0 / 18.0 / 27.0 psi**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-1 UD 8.0-10.0'**	**Technician:** **PWM/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **7/17/2018**	**Job Number:** **18103173**	**Figure:** **6**

AUGUST 2018 | 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-2** Depth: **5.0-7.5'**
TYPE: **Bag**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

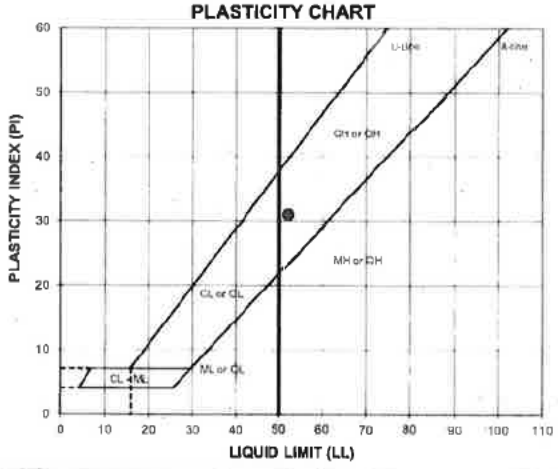
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.3**	Coarse Sand	**0.7**
#20	0.85	**98.5**		
#40	0.43	**97.9**	Medium Sand	**1.4**
#60	0.25	**97.4**		
#100	0.15	**93.2**		
#200	0.075	**86.0**	Fine Sand	**11.9**

Hydrometer Analysis

(mm)	%Finer		
0.028	**76.4**		
0.018	**69.0**		
0.011	**62.6**	Fines	
0.0078	**58.9**	Silt or Clay	**86.0**
0.0056	**55.2**		
0.0028	**50.6**		
0.0012	**46.0**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M,	LL	PL	PI	LI
24.7	52	21	31	0.13

LL (oven-dried) / 0.75 ORGANIC (OL OH)

DESCRIPTION: sandy CLAY, fine to coarse; yellowish brown

USCS: CH

TECH	HH/BA/TB
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

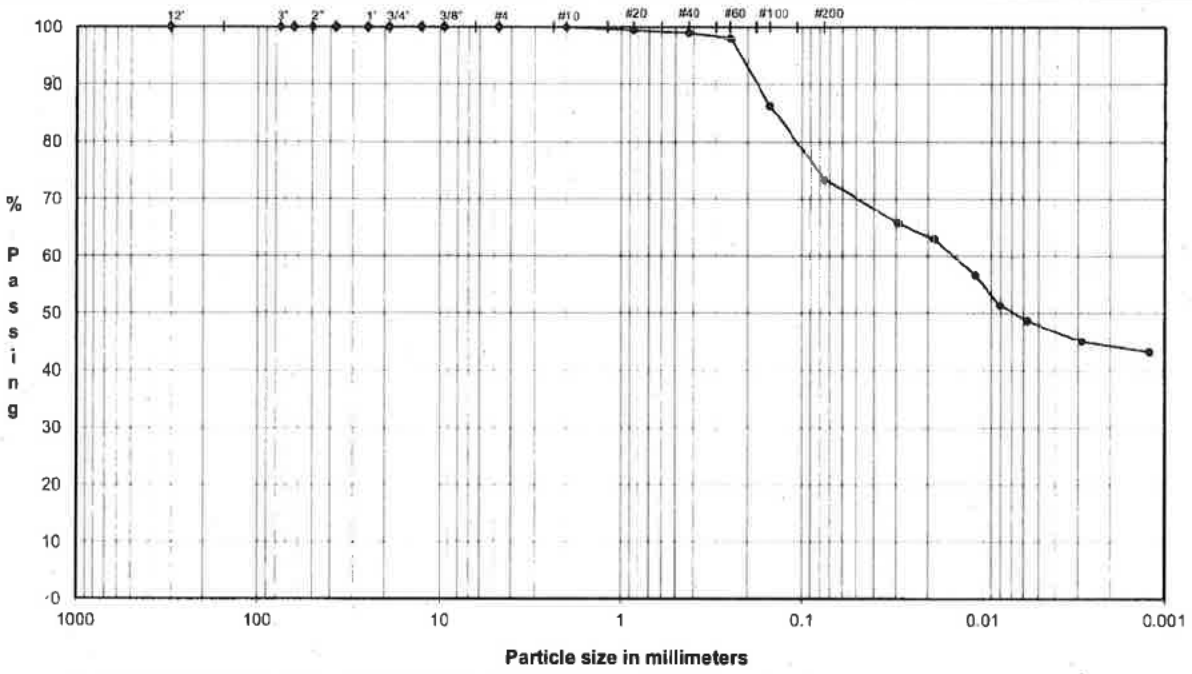
Golder Associates Inc.

JUNE 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-3** Depth: **5.0-7.0'**
TYPE: **UD**



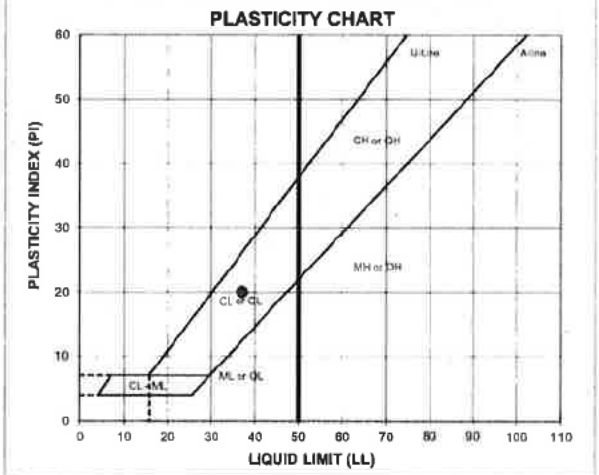
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**99.4**		
#40	0.43	**99.0**	Medium Sand	**1.0**
#60	0.25	**98.1**		
#100	0.15	**86.3**		
#200	0.075	**73.3**	Fine Sand	**25.6**

Hydrometer Analysis

(mm)	%Finer		
0.029	**65.8**		
0.019	**63.1**		
0.011	**56.8**	Fines	
0.0081	**51.4**	Silt or Clay	**73.3**
0.0057	**48.7**		
0.0029	**45.1**		
0.0012	**43.3**		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.1	**37**	**17**	**20**	**0.37**

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: sandy SILTY CLAY, fine to medium; yellowish brown, gray, and brown.

USCS: CL

TECH	BA/HH
DATE	7/26/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		Board #	9	COMMENTS
PROJECT NUMBER	18103173		Flow Pump	2	
SAMPLE ID	B-3	5.0-7.0'	Flow Pump Speed	10	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.147	B-Value, f	1.00	Height, inches	3.139
Diameter, inches	2.854	Cell Pres.	88.0	Diameter, inches	2.837
Area, cm²	41.27	Bot. Pres.	80.0	Area, cm²	40.78
Volume, cm³	329.91	Top Pres.	80.0	Volume, cm³	325.16
Mass, g	647.92	Tot. B.P.	80.0	Mass, g	656.52
Moisture Content, %	24.12	Head, max.	187.10	Moisture Content, %	25.76
Dry Density, pcf	98.74	Head, min.	187.10	Dry Density, pcf	100.18
Spec. Gravity (assumed)	2.750	Max. Grad.	23.47	Volume Solids, cm³	189.83
Volume Solids, cm³	189.83	Min. Grad.	23.47	Volume Voids, cm³	135.33
Volume Voids, cm³	140.08			Void Ratio	0.71
Void Ratio	0.74			Saturation, %	99.4%
Saturation, %	89.9%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	647.92	736.33
Wt Soil & Tare, f	g	522.03	601.84
Wt Tare	g	0.00	79.81
Wt Moisture Lost	g	125.89	134.49
Wt Dry Soil	g	522.03	522.03
Water Content	%	24.12%	25.76%

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CL

DESCRIPTION: sandy SILTY CLAY, fine to medium; yellowish brown, gray, and brown.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
07/26/18	43307	13	0	22.3	0	0	0	0	2.66	187.10	23.47	2.2E-08
07/26/18	43307	13	5	22.3	5	5	300	300	2.66	187.10	23.47	2.2E-08
07/26/18	43307	13	10	22.3	5	10	300	600	2.66	187.10	23.47	2.2E-08
07/26/18	43307	13	15	22.3	5	15	300	900	2.66	187.10	23.47	2.2E-08 *
07/26/18	43307	13	20	22.3	5	20	300	1200	2.66	187.10	23.47	2.2E-08 *
07/26/18	43307	13	25	22.3	5	25	300	1500	2.66	187.10	23.47	2.2E-08 *
07/26/18	43307	13	30	22.3	5	30	300	1800	2.66	187.10	23.47	2.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 2.2E-08 cm/sec **

DATE	7/26/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit:	B-3		Boring or Test Pit:	B-3		Boring or Test Pit:	B-3	
Sample:	UD		Sample:	UD		Sample:	UD	
Depth:	10.0-12.0 ft		Depth:	10.0-12.0 ft		Depth:	10.0-12.0 ft	
Point No.:	1		Point No.:	2		Point No.:	3	
	Initial			**Initial**			**Initial**	
Length =	6.001	in	Length =	5.995	in	Length =	5.996	in
Diameter =	2.829	in	Diameter =	2.871	in	Diameter =	2.858	in
Wet Mass =	2.610	lb	Wet Mass =	2.758	lb	Wet Mass =	2.793	lb
Area =	6.286	in^2	Area =	6.474	in^2	Area =	6.415	in^2
Volume =	37.721	in^3	Volume =	38.810	in^3	Volume =	38.466	in^3
Specific Gravity =	2.58	(ASTM D854)	Specific Gravity =	2.58	(ASTM D854)	Specific Gravity =	2.58	(ASTM D854)
Dry Mass of Solids =	2.117	lb	Dry Mass of Solids =	2.316	lb	Dry Mass of Solids =	2.285	lb
Moisture Content =	23.3%		Moisture Content =	19.1%		Moisture Content =	22.2%	
Wet Unit Weight =	119.6	pcf	Wet Unit Weight =	122.8	pcf	Wet Unit Weight =	125.5	pcf
Dry Unit Weight =	97.0	pcf	Dry Unit Weight =	103.1	pcf	Dry Unit Weight =	102.7	pcf
Void Ratio =	0.65		Void Ratio =	0.56		Void Ratio =	0.56	
Percent Saturation =	92%		Percent Saturation =	88%		Percent Saturation =	102%	
	After Consolidation			**After Consolidation**			**After Consolidation**	
Length =	5.941	in	Length =	5.957	in	Length =	5.930	in
Diameter =	2.844	in	Diameter =	2.884	in	Diameter =	2.879	in
Area =	6.353	in^2 (Method B)	Area =	6.533	in^2 (Method B)	Area =	6.508	in^2 (Method B)
Volume =	37.747	in^3	Volume =	38.920	in^3	Volume =	38.593	in^3
Moisture Content =	25.5%		Moisture Content =	21.8%		Moisture Content =	22.1%	
Wet Unit Weight =	121.6	pcf	Wet Unit Weight =	125.2	pcf	Wet Unit Weight =	124.9	pcf
Dry Unit Weight =	96.9	pcf	Dry Unit Weight =	102.8	pcf	Dry Unit Weight =	102.3	pcf
Void Ratio =	0.66		Void Ratio =	0.56		Void Ratio =	0.57	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.97		B Parameter =	0.97		B Parameter =	0.99	
Shear Rate =	0.012%	/min.	Shear Rate =	0.090%	/min.	Shear Rate =	0.090%	/min.
t_{50} =	28.79	min.	t_{50} =	2.39	min.	t_{50} =	1.03	min.
Strain at Failure =	2.3%		Strain at Failure =	4.3%		Strain at Failure =	4.7%	
Cell Pressure =	90.0	psi	Cell Pressure =	100.0	psi	Cell Pressure =	110.0	psi
Back Pressure =	80.0	psi	Back Pressure =	80.0	psi	Back Pressure =	80.0	psi
Confining Pressure =	10.0	psi	Confining Pressure =	20.0	psi	Confining Pressure =	30.0	psi

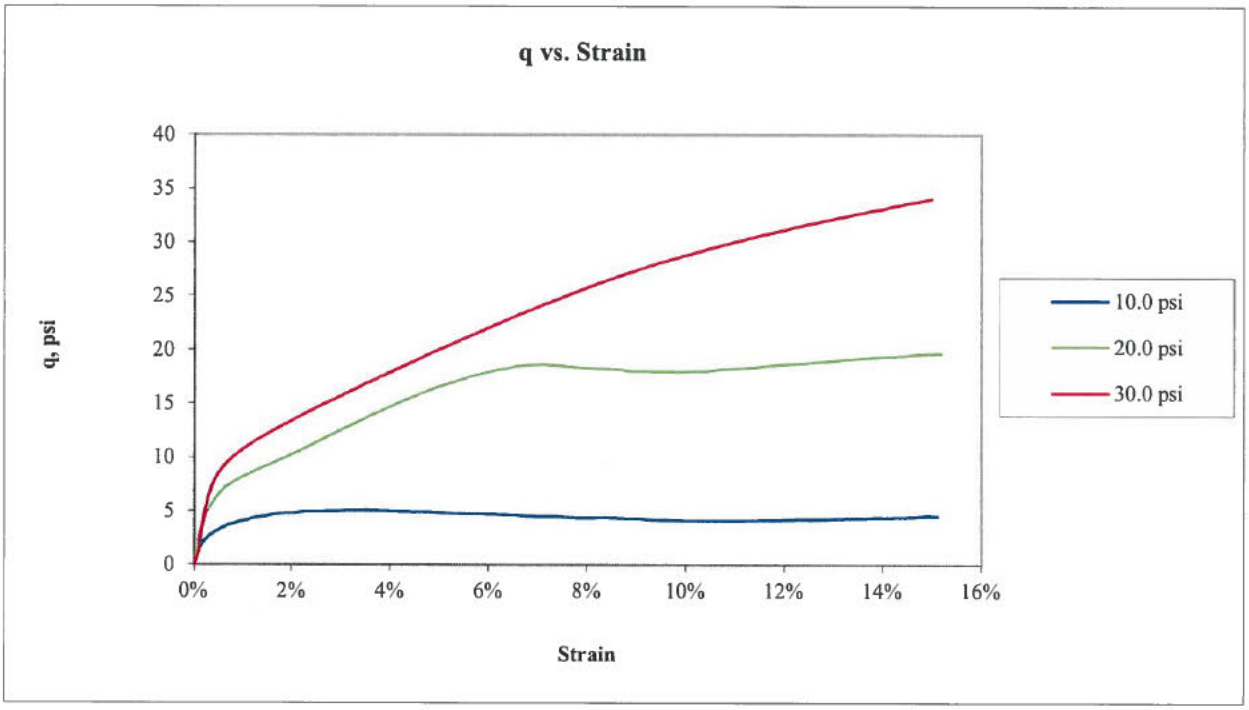
Notes: Sample description: (SC) SAND and SILTY CLAY, fine to coarse; light gray and yellow.

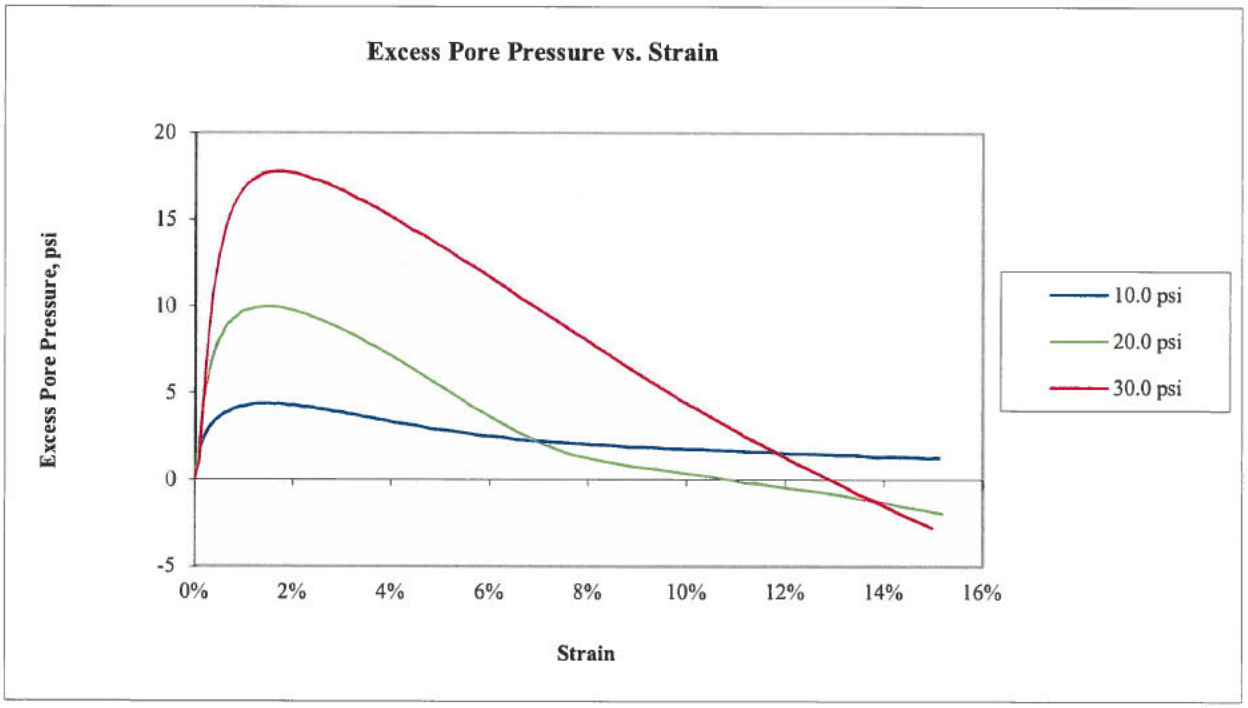
Atterberg limits: LL = 32 PL = 20 PI = 12 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 42% (ASTM D422, refer to separate report for gradation curve)

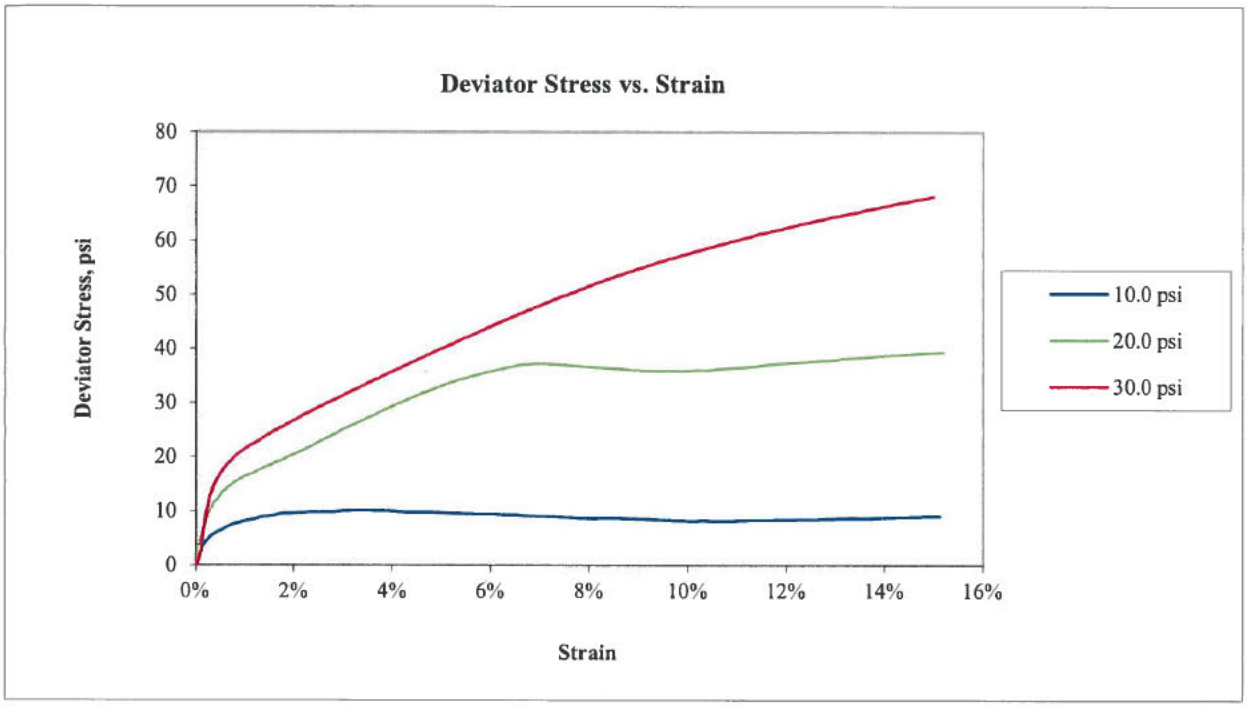
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

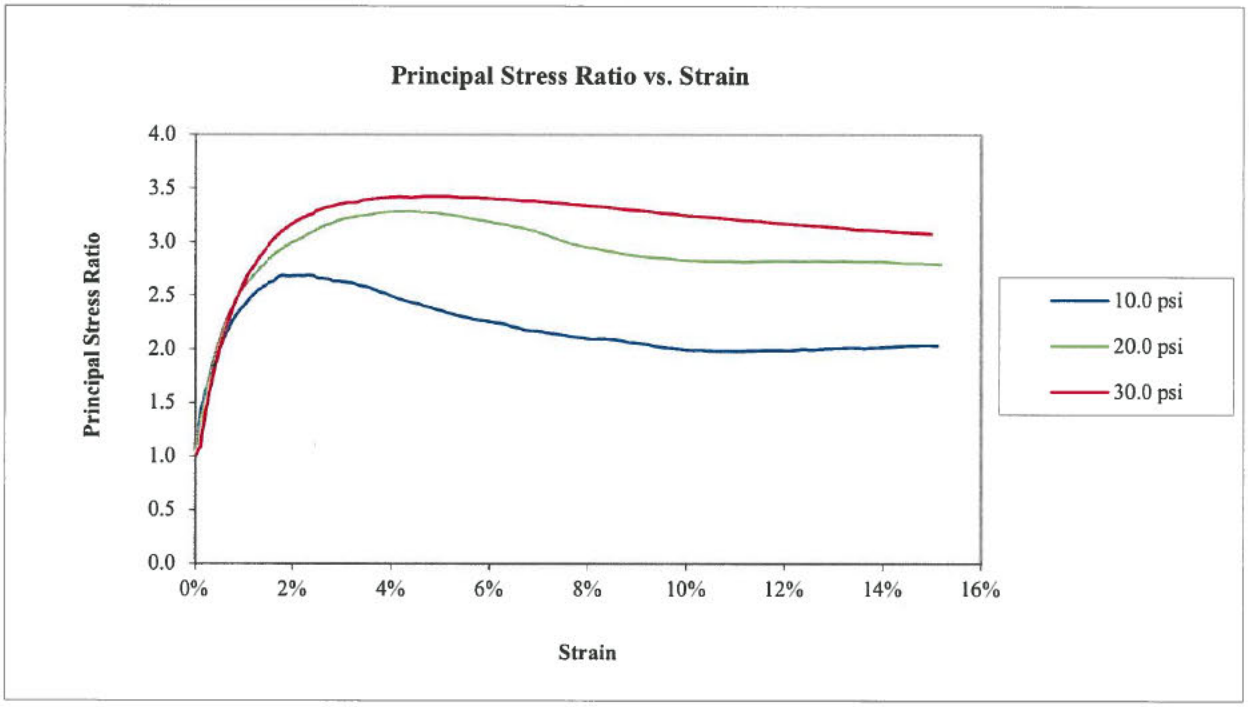
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-3 UD 10.0-12.0'**	**Technician:** **PWM/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **8/24/2018**	**Job Number:** **18103173**	**Figure:** **1**



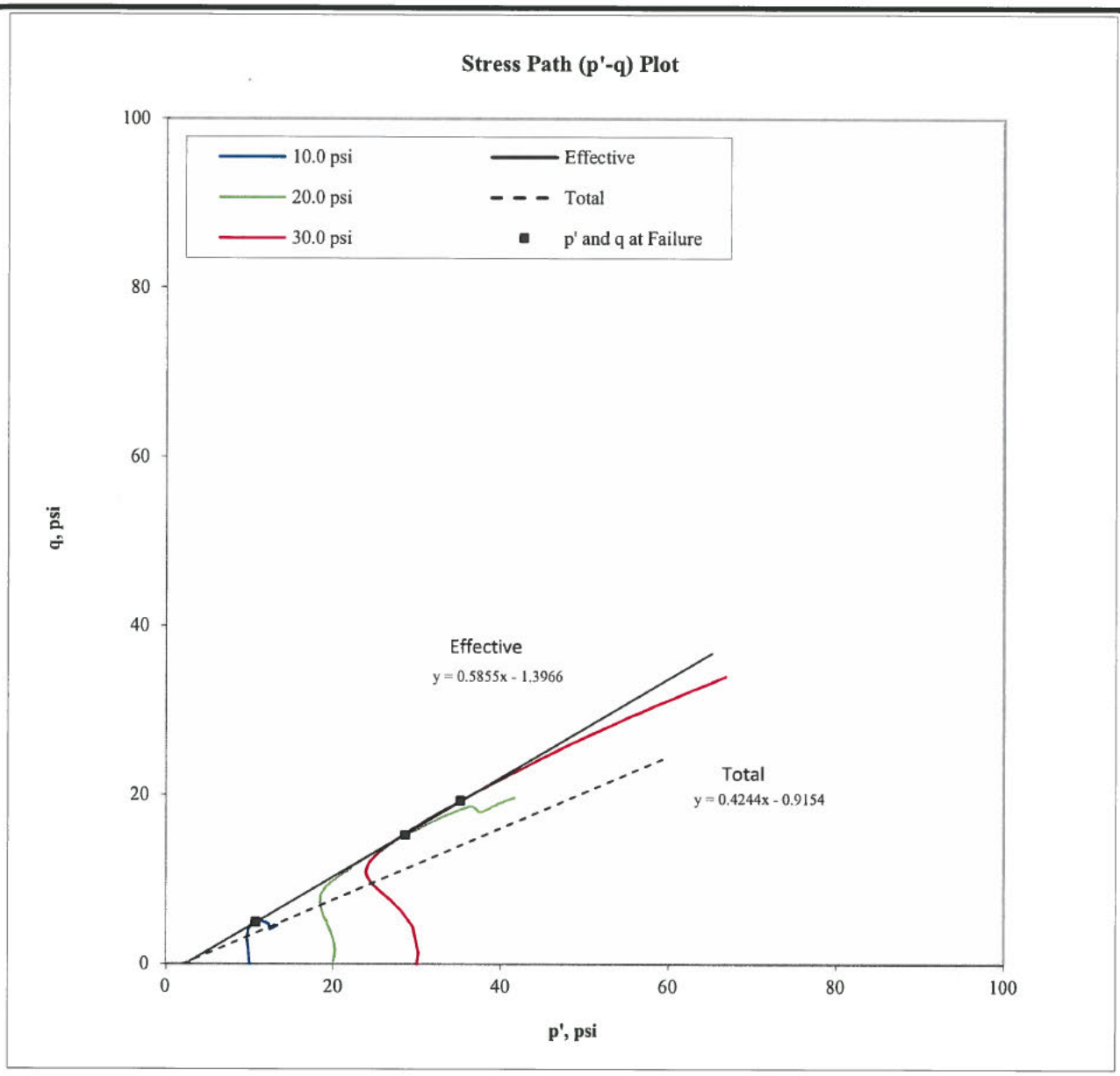


Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-3 UD 10.0-12.0'**	**Technician:** **PWM/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **8/24/2018**	**Job Number:** **18103173**	**Figure:** **2**





Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **DEVIATOR STRESS AND PRINCIPAL STRESS RATIO PLOT**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-3 UD 10.0-12.0'**	**Technician:** **PWM/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **8/24/2018**	**Job Number:** **18103173**	**Figure:** **3**



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
10.0	14.9	10.8	4.9
20.0	35.2	28.6	15.2
30.0	49.3	35.2	19.3

Effective

α ' =	28.3	degree
a' =	0.0	psi

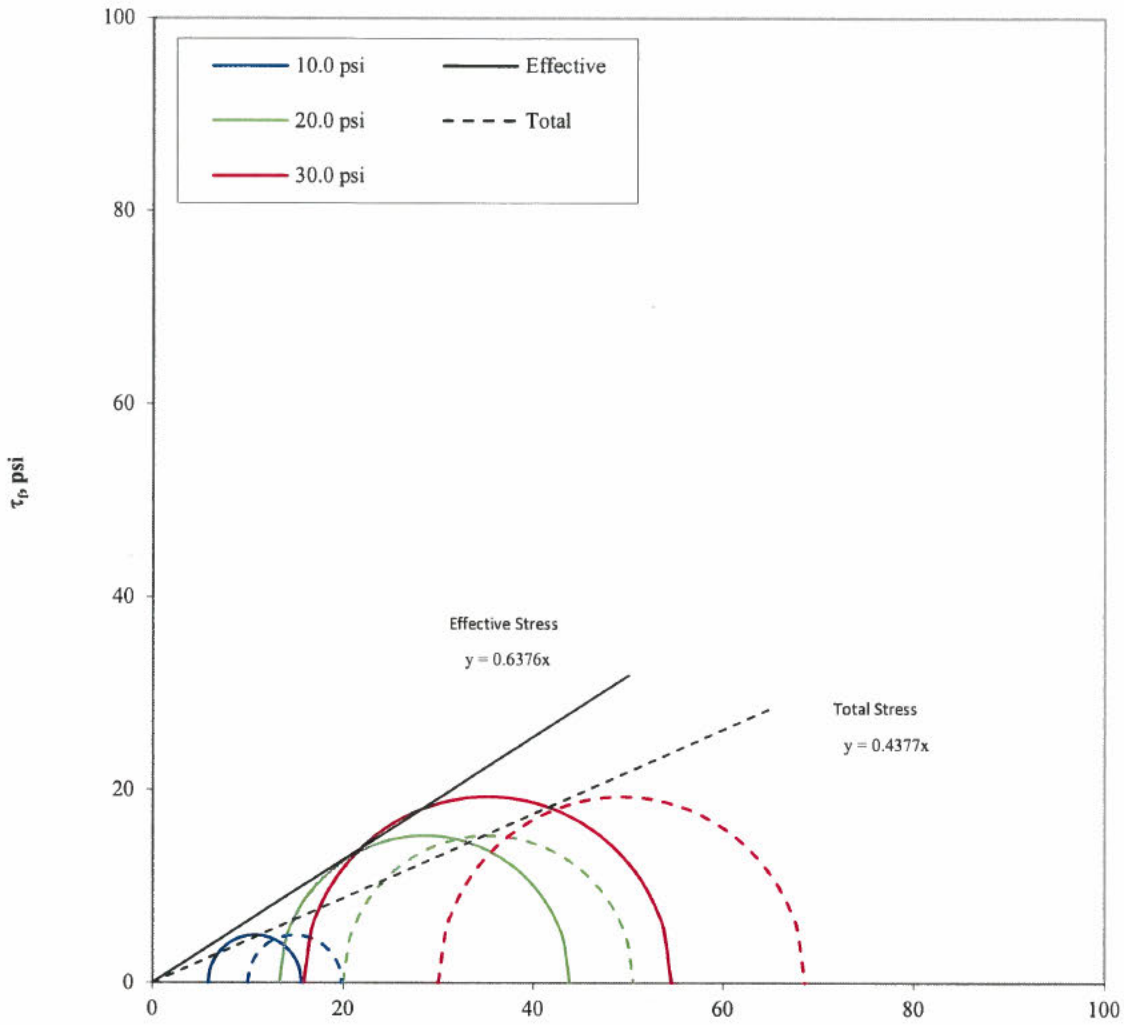
Total

α =	21.9	degree
a =	0.0	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. Atlanta, Georgia	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT STRESS PATH PLOT				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-3 UD 10.0-12.0'	**Technician:** PWM/FT **Check:** PWM	**Reviewed:** **Approved:**	**Start Date:** 8/24/2018	**Job Number:** 18103173	**Figure:** 4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
10.0	15.7	5.8	19.9	10.0
20.0	43.8	13.3	50.5	20.0
30.0	54.5	15.9	68.6	30.0

Effective

ϕ' =	32.5	degree
c' =	0.0	psi

Total

ϕ =	23.6	degree
c =	0.0	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
	PWM/FT				
B-3 UD 10.0-12.0'	Check: PWM	Approved:	8/24/2018	18103173	5

10.0 psi

20.0 psi

30.0 psi

Golder Associates Inc. **Atlanta, Georgia**	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMENS PHOTOGRAPH - 10.0 20.0 30.0 psi				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-3 UD 10.0-12.0'	Technician: PWM/FT Check:	Reviewed: Approved:	Start Date: 8/24/2018	Job Number: 18103173	Figure: 6

AUGUST 2018

18103173

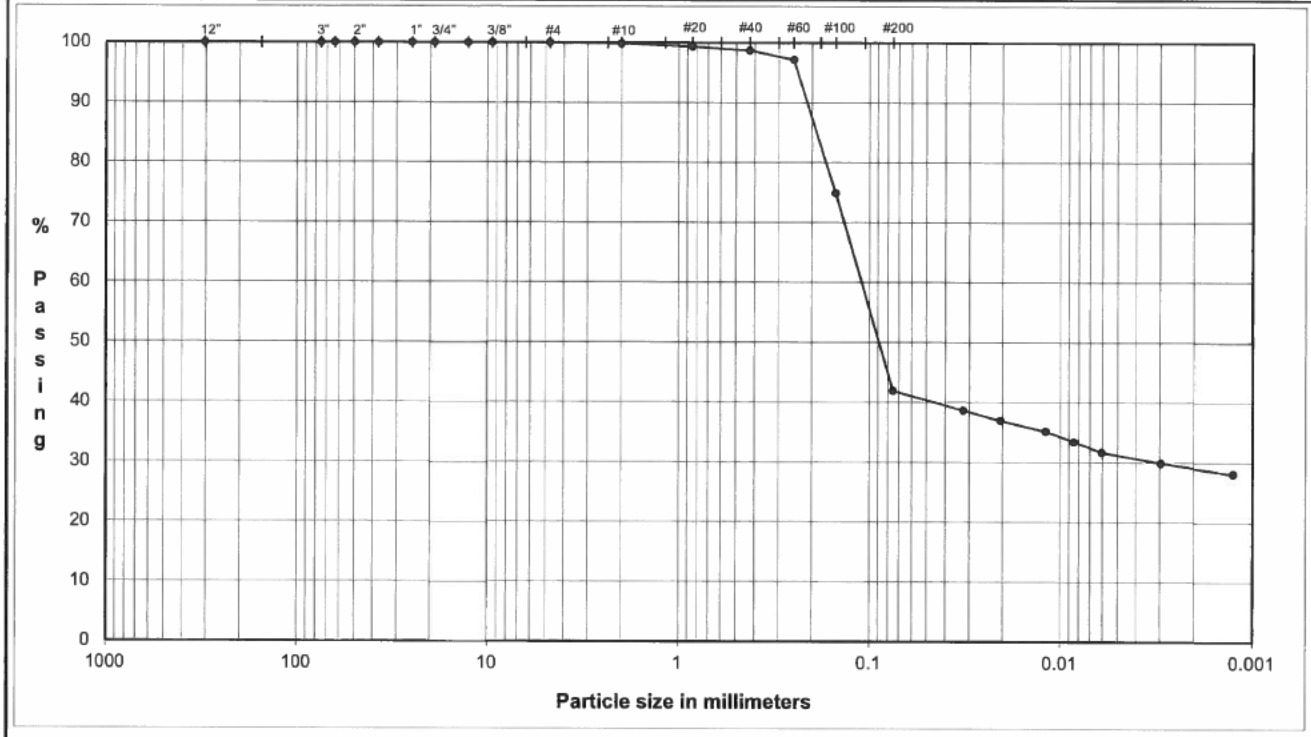
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **B-3** Depth: **10.0-12.0'**

TYPE: **UD**



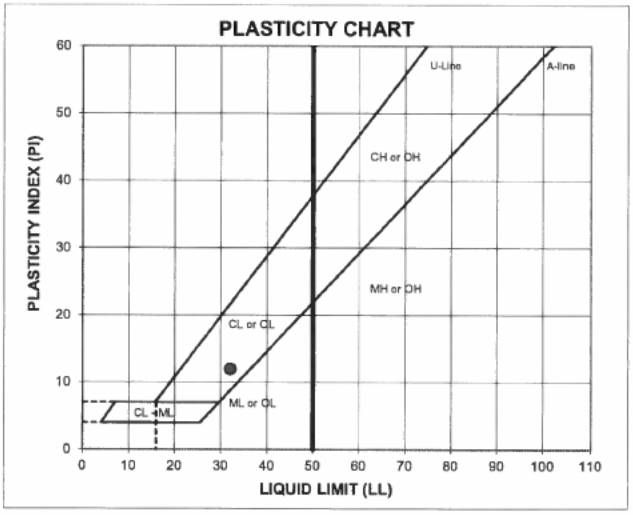
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.8**	Coarse Sand	**0.2**
#20	0.85	**99.3**		
#40	0.43	**98.7**	Medium Sand	**1.1**
#60	0.25	**97.1**		
#100	0.15	**74.9**		
#200	0.075	**41.9**	Fine Sand	**56.8**

Hydrometer Analysis

(mm)	%Finer		
0.032	**38.7**		
0.020	**36.9**		
0.012	**35.1**	Fines	
0.0085	**33.4**	Silt or Clay	**41.9**
0.0060	**31.6**		
0.0030	**29.9**		
0.0012	**28.1**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
21.6	**32**	**20**	**12**	**0.18**

LL (oven-dried) / < 0.75 – ORGANIC (OL/OH)

DESCRIPTION: SAND and SILTY CLAY, fine to coarse; light gray and yellow.

USCS: SC

TECH	TJ/BA/HH
DATE	8/23/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

AUGUST 2018

18103173

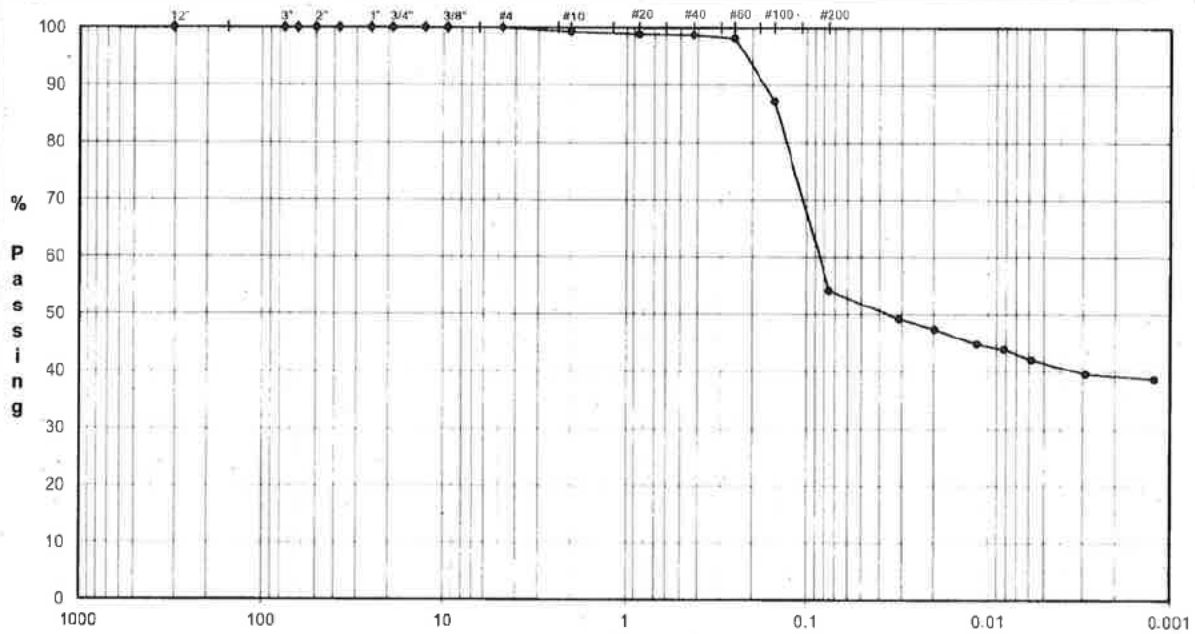
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **B-3 (P2-5)** Depth: **13.0-14.0'**

TYPE: **Bag**



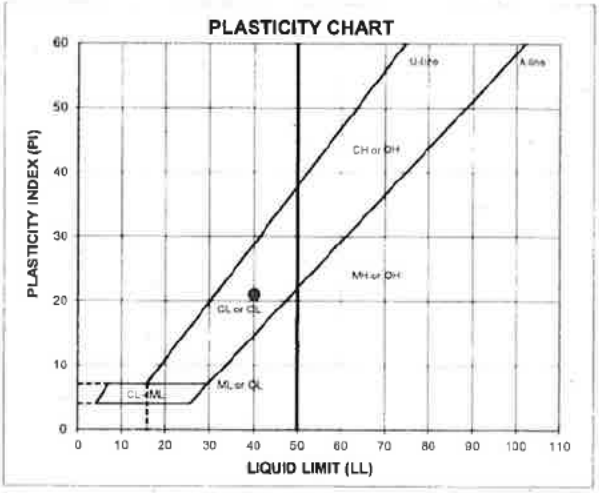
COBBLES	Coarse	GRAVEL Fine	Coarse	SAND Medium	Fine	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.3**	Coarse Sand	**0.7**
#20	0.85	**98.9**		
#40	0.43	**98.8**	Medium Sand	**0.5**
#60	0.25	**98.2**		
#100	0.15	**87.2**		
#200	0.075	**54.1**	Fine Sand	**44.7**

Hydrometer Analysis

(mm)	%Finer		
0.031	**49.2**		
0.020	**47.4**		
0.012	**44.8**	Fines	
0.0082	**43.9**	Silt or Clay	**54.1**
0.0058	**42.2**		
0.0029	**39.5**		
0.0012	**38.7**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
23.3	**40**	**19**	**21**	**0.18**

LL (oven-dried) / 0.75 ORGANIC (OL-OH)

DESCRIPTION: SILTY CLAY and SAND, fine to coarse; light gray.

USCS: CL

TECH	HH/BA/TJ
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

JUNE 2018

18103173

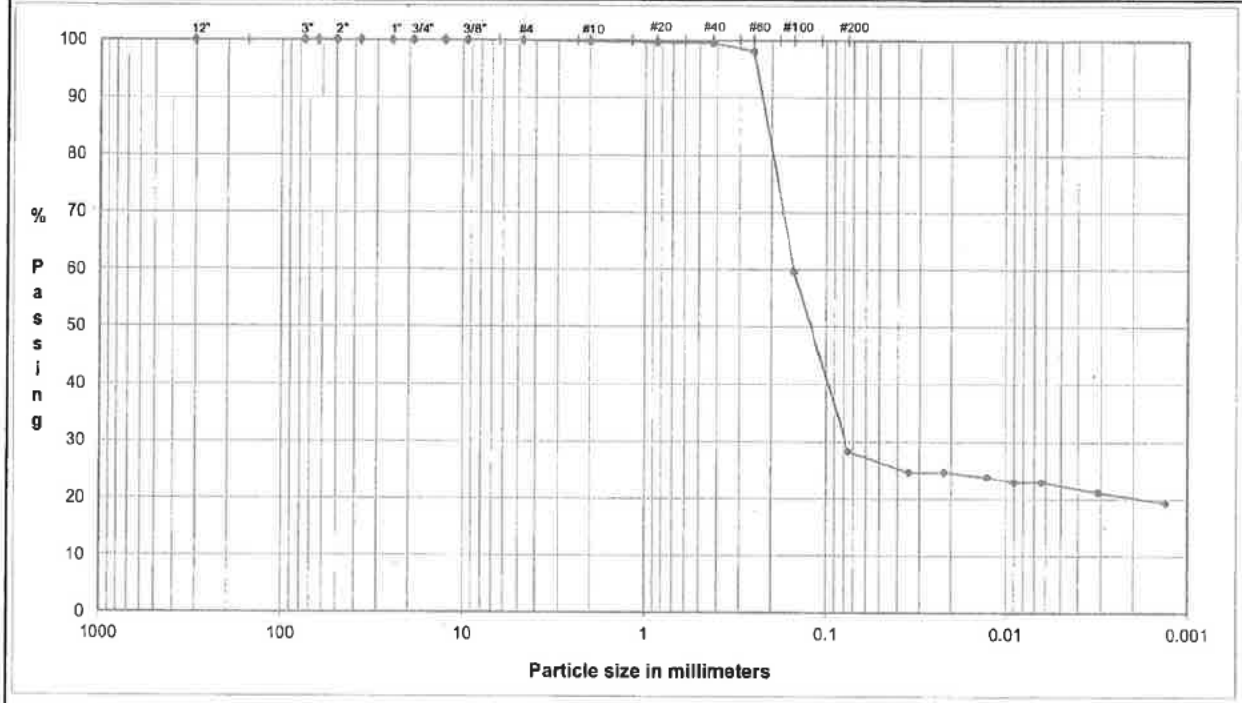
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **B-3** Depth: **15.0-17.0'**

TYPE: **UD**



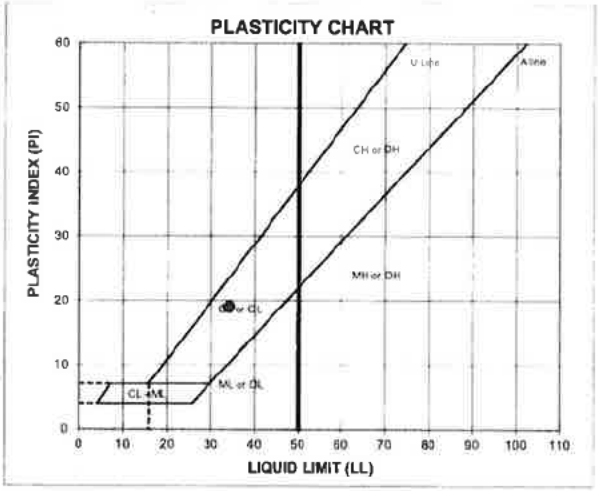
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.8	Coarse Sand	0.2
#20	0.85	99.6		
#40	0.43	99.6	Medium Sand	0.2
#60	0.25	98.1		
#100	0.15	59.6		
#200	0.075	28.2	Fine Sand	71.4

Hydrometer Analysis

(mm)	%Finer		
0.035	24.7		
0.022	24.7		
0.013	23.8	Fines	
0.0090	22.9	Silt or Clay	28.2
0.0063	22.9		
0.0031	21.1		
0.0013	19.4		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
19.0	34	15	19	0.23

LL (oven-dried) / 075 ORGANIC (OL,OH)

DESCRIPTION: CLAYEY SAND, fine to coarse; light brown.

USCS: SC

TECH	TB/BA
DATE	6/19/18
CHECK	
REVIEW	
APPROVE	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		Board #	5	COMMENTS
PROJECT NUMBER	18103173		Flow Pump	2	
SAMPLE ID	B-3	15.0-17.0'	Flow Pump Speed	5	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.008	B-Value, f	0.99	Height, inches	3.009
Diameter, inches	2.839	Cell Pres.	88.0	Diameter, inches	2.848
Area, cm²	40.84	Bot. Pres.	80.0	Area, cm²	41.10
Volume, cm³	312.03	Top Pres.	80.0	Volume, cm³	314.12
Mass, g	657.54	Tot. B.P.	80.0	Mass, g	660.77
Moisture Content, %	19.00	Head, max.	33.76	Moisture Content, %	19.59
Dry Density, pcf	110.50	Head, min.	33.76	Dry Density, pcf	109.76
Spec. Gravity (assumed)	2.700	Max. Grad.	4.42	Volume Solids, cm³	204.64
Volume Solids, cm³	204.64	Min. Grad.	4.42	Volume Voids, cm³	109.47
Volume Voids, cm³	107.39			Void Ratio	0.53
Void Ratio	0.52			Saturation, %	98.9%
Saturation, %	97.8%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	657.54	742.00
Wt Soil & Tare, f	g	552.54	634.47
Wt Tare	g	0.00	85.52
Wt Moisture Lost	g	105.00	107.53
Wt Dry Soil	g	552.54	548.95
Water Content	%	19.00%	19.59%

Flow Pump Rate: 1.17E-03 cm³/sec

USCS: SC

DESCRIPTION: CLAYEY SAND, fine to coarse; light brown.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/19/18	43270	10	0	20.9	0	0	0	0	0.48	33.76	4.42	6.3E-06
06/19/18	43270	10	5	20.9	5	5	300	300	0.48	33.76	4.42	6.3E-06
06/19/18	43270	10	10	20.9	5	10	300	600	0.48	33.76	4.42	6.3E-06
06/19/18	43270	10	15	20.9	5	15	300	900	0.48	33.76	4.42	6.3E-06 *
06/19/18	43270	10	20	20.9	5	20	300	1200	0.48	33.76	4.42	6.3E-06 *
06/19/18	43270	10	25	20.9	5	25	300	1500	0.48	33.76	4.42	6.3E-06 *
06/19/18	43270	10	30	20.9	5	30	300	1800	0.48	33.76	4.42	6.3E-06 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.3E-06 cm/sec **

DATE	6/19/18
CHECK	
REVIEW	
APPROVE	

JULY 2018

18103173

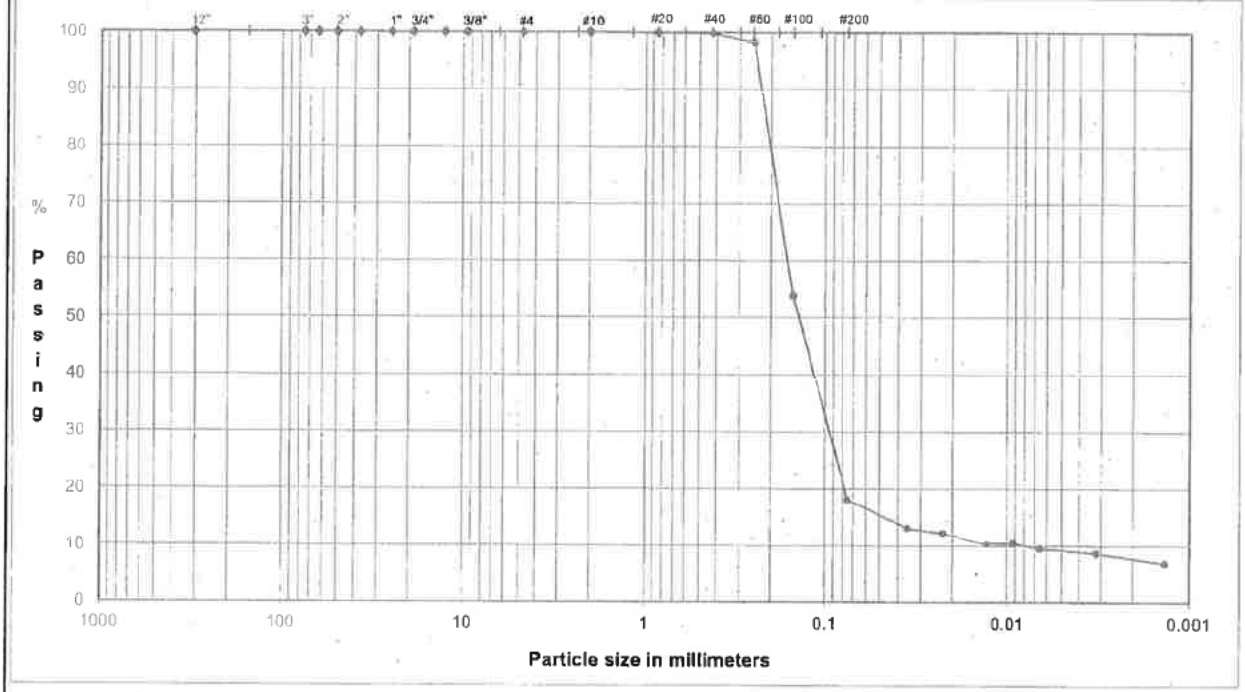
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **B-3** - Depth: **20.0-22.0'**

TYPE: **UD**



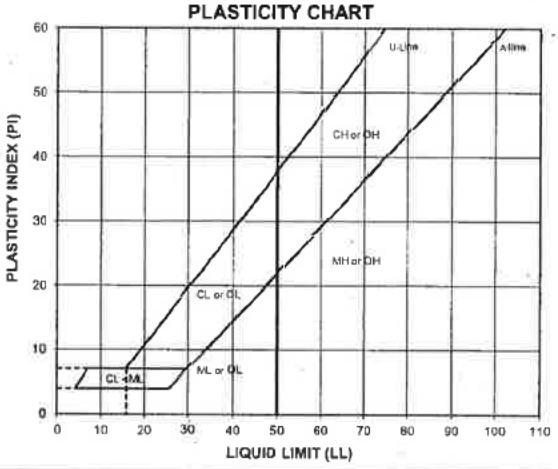
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	100.0	Coarse Sand	0.0
#20	0.85	99.9		
#40	0.43	99.8	Medium Sand	0.2
#60	0.25	98.3		
#100	0.15	53.8		
#200	0.075	18.1	Fine Sand	81.7

Hydrometer Analysis

	(mm)	%Finer		
	0.036	13.1		
	0.022	12.2		
	0.013	10.5	Fines	
	0.0092	10.5	Silt or Clay	18.1
	0.0066	9.6		
	0.0032	8.7		
	0.0013	7.0		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_f	LL	PL	PI	LI
31.5	NP	NP	NP	NP

LL (oven-dried) / 0.75 ORGANIC (OL-OH)

DESCRIPTION: SILTY SAND, fine to medium; light yellowish brown.

USCS: SM

TECH	TB
DATE	7/13/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

Boring or Test Pit: B-3	Boring or Test Pit: B-3	Boring or Test Pit: B-3
Sample: UD	Sample: UD	Sample: UD
Depth: 20.0-22.0'	Depth: 20.0-22.0'	Depth: 20.0-22.0'
Point No.: 1	Point No.: 2	Point No.: 3

Initial			Initial			Initial		
Thickness =	0.750	in	Thickness =	0.750	in	Thickness =	0.750	in
Diameter =	2.500	in	Diameter =	2.500	in	Diameter =	2.500	in
Wet Mass =	0.220	lb	Wet Mass =	0.211	lb	Wet Mass =	0.235	lb
Area =	4.909	in^2	Area =	4.909	in^2	Area =	4.909	in^2
Volume =	3.682	in^3	Volume =	3.682	in^3	Volume =	3.682	in^3
Specific Gravity =	2.67	(Assumed)	Specific Gravity =	2.67	(Assumed)	Specific Gravity =	2.67	(Assumed)
Dry Mass of Solids =	0.167	lb	Dry Mass of Solids =	0.160	lb	Dry Mass of Solids =	0.179	lb
Moisture Content =	31.5%		Moisture Content =	31.5%		Moisture Content =	31.5%	
Wet Unit Weight =	103.1	pcf	Wet Unit Weight =	99.0	pcf	Wet Unit Weight =	110.4	pcf
Dry Unit Weight =	78.4	pcf	Dry Unit Weight =	75.3	pcf	Dry Unit Weight =	83.9	pcf
Void Ratio =	1.12		Void Ratio =	1.21		Void Ratio =	0.98	
Percent Saturation =	75%		Percent Saturation =	70%		Percent Saturation =	86%	

Pre-Shear			Pre-Shear			Pre-Shear		
Thickness =	0.739	in	Thickness =	0.663	in	Thickness =	0.641	in
Diameter =	2.500	in	Diameter =	2.500	in	Diameter =	2.500	in
Area =	4.909	in^2	Area =	4.909	in^2	Area =	4.909	in^2
Volume =	3.628	in^3	Volume =	3.254	in^3	Volume =	3.147	in^3
Moisture Content =	35.1%		Moisture Content =	42.1%		Moisture Content =	28.2%	
Wet Unit Weight =	107.4	pcf	Wet Unit Weight =	121.0	pcf	Wet Unit Weight =	125.9	pcf
Dry Unit Weight =	79.5	pcf	Dry Unit Weight =	85.2	pcf	Dry Unit Weight =	98.2	pcf
Void Ratio =	1.09		Void Ratio =	0.95		Void Ratio =	0.70	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	

Shear Rate =	0.001	in/min	Shear Rate =	0.001	in/min	Shear Rate =	0.001	in/min
Normal Stress =	18	psi	Normal Stress =	36	psi	Normal Stress =	54	psi

Notes:

Sample description: (SM) SILTY SAND, fine to medium; light yellowish brown.

Atterberg limit: LL = NP PL = NP PI = NP (ASTM D4318)

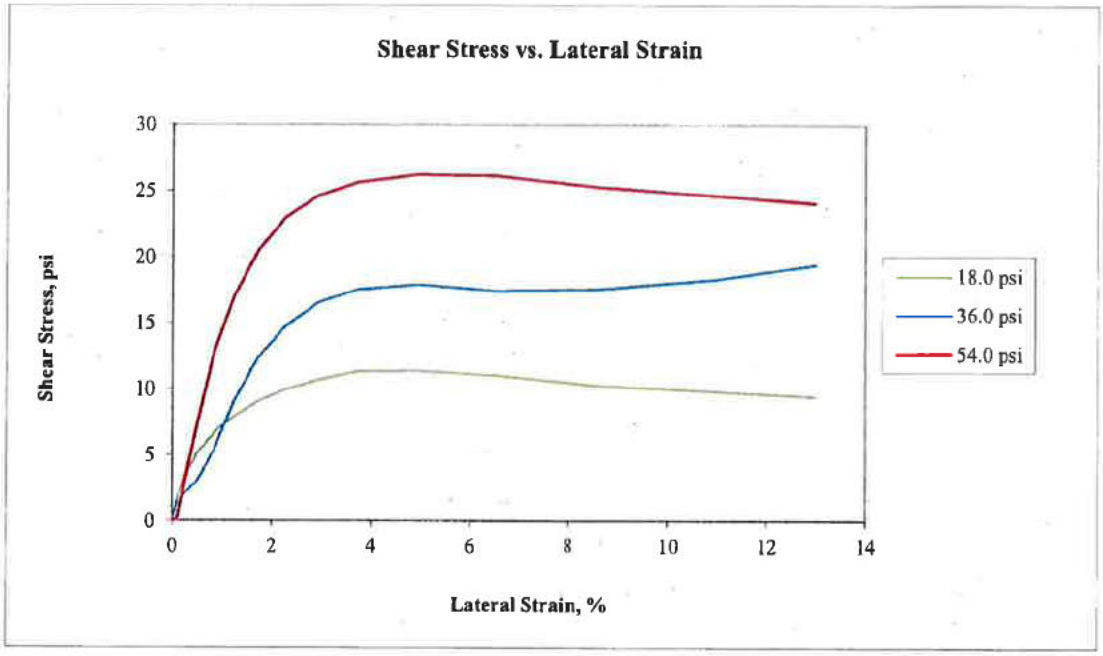
Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 18% (ASTM D422, refer to separate report)

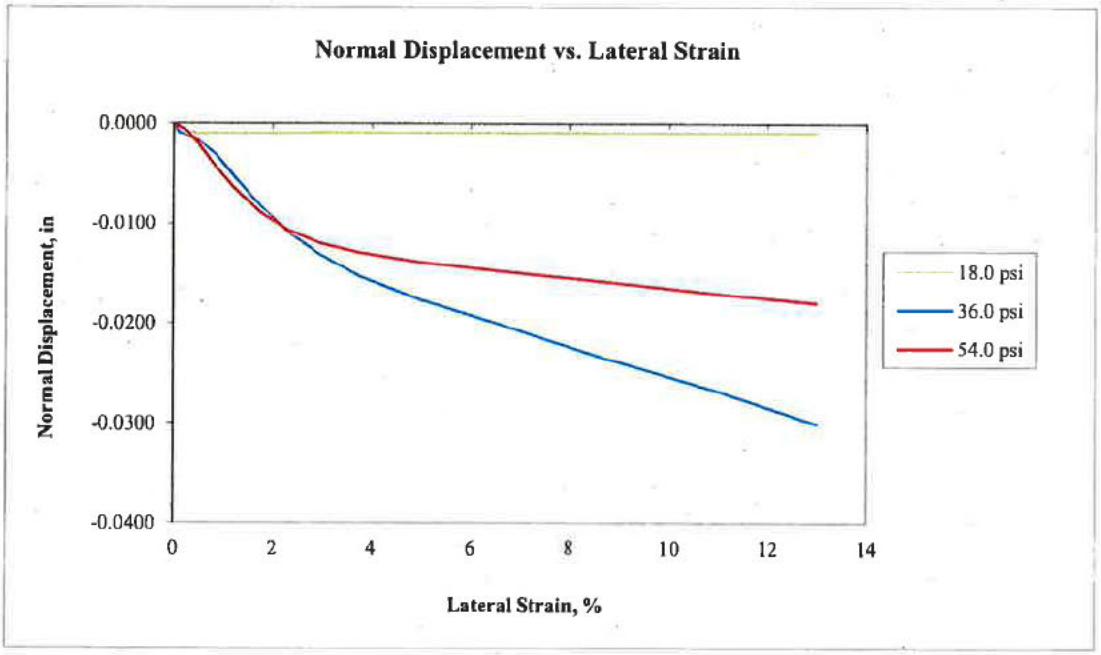
Specimen type: [X] Intact [ ] Reconstituted

Inundation: At seating load of approximately 100 psf

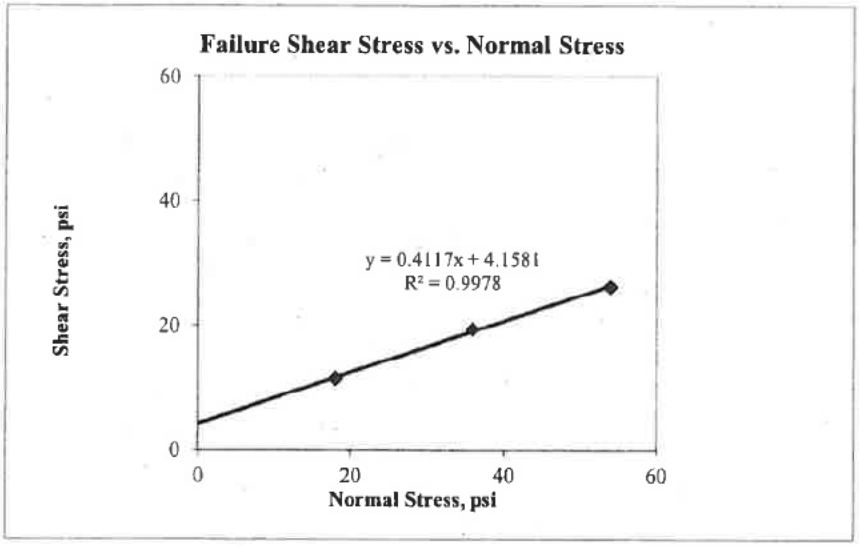
Apparatus: 2.5 -inch nominal diameter box, Humboldt Material Testing Software and Equipment.

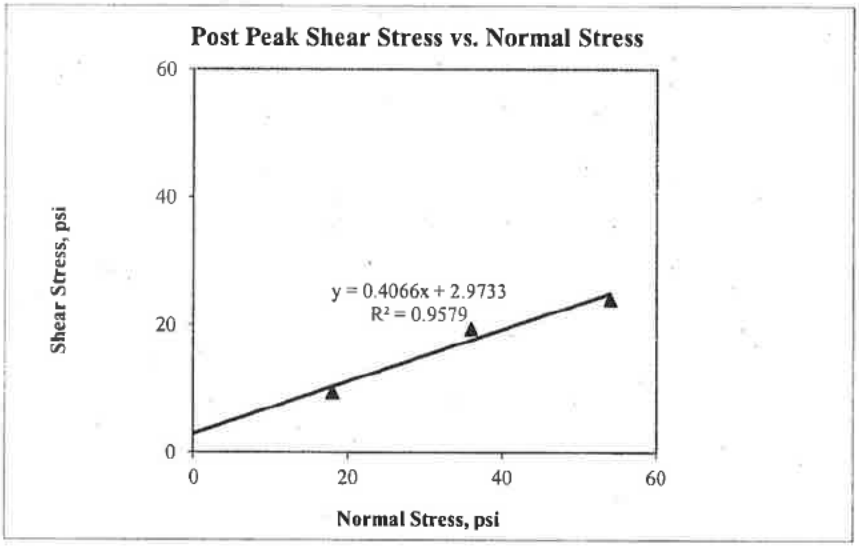
Golder Associates Inc. Atlanta, Georgia	Title: ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SAMPLE AND TEST DATA				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-3 UD 20.0-22.0'	Technician: FT	Checked: Reviewed:	Date: 7/16/2018	Job Number: 18103173	Figure: 1





Golder Associates Inc. Atlanta, Georgia	Title: ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SHEAR STRESS AND NORMAL DISPLACEMENT PLOTS				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-3 UD 20.0-22.0'	Technician: FT	Checked: Reviewed:	Date: 7/16/2018	Job Number: 18103173	Figure: 2





Normal Stress psi	Peak Shear Stress psi
18.0	11.4
36.0	19.4
54.0	26.2

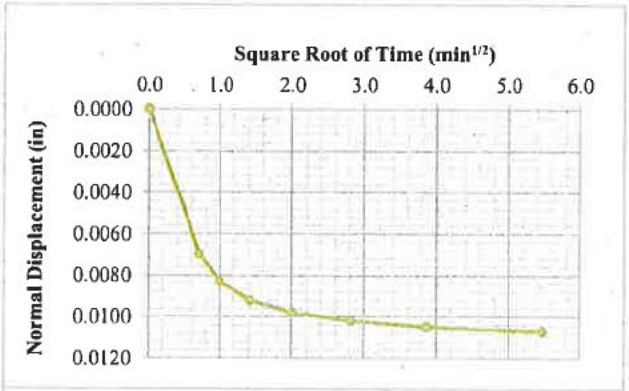
Normal Stress psi	Post Peak Shear Stress psi
18.0	9.4
36.0	19.4
54.0	24.0

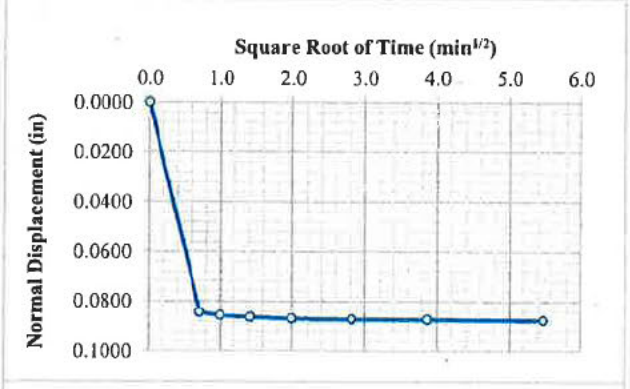
Failure	Post Peak
ϕ = 22.4 °	ϕ = 22.1 °
c = 4.2 psi	c = 3.0 psi

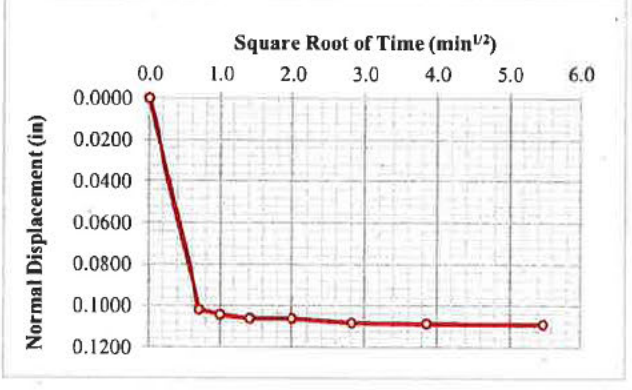
Golder Associates Inc. Atlanta, Georgia	**Title:** ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT FAILURE ENVELOPES				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-3 UD 20.0-22.0'	**Technician:** FT	**Checked/Reviewed:**	**Date:** 7/16/2018	**Job Number:** 18103173	**Figure:** 3

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D3080** **CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT** **SPECIMEN PHOTOGRAPH - 18 psi**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-3 UD 20.0-22.0'**	**Technician:** **FT**	**Reviewed:**	**Date:** **7/16/2018**	**Job Number:** **18103173**	**Figure:** **4**

Consolidation Data Used to Determine Shear Rate







TIME, MIN	SQUARE ROOT OF TIME	DIAL READING
Point No. 1		
0.000	0.00	0.0000
0.50	0.71	0.0070
1.0	1.00	0.0083
2.0	1.41	0.0092
4.0	2.00	0.0098
8.0	2.83	0.0102
15.0	3.87	0.0105
30.0	5.48	0.0107
Point No. 2		
0.000	0.00	0.0000
0.50	0.71	0.0846
1.0	1.00	0.0858
2.0	1.41	0.0865
4.0	2.00	0.0870
8.0	2.83	0.0873
15.0	3.87	0.0874
30.0	5.48	0.0877
Point No. 3		
0.000	0.00	0.0000
0.50	0.71	0.1021
1.0	1.00	0.1044
2.0	1.41	0.1062
4.0	2.00	0.1062
8.0	2.83	0.1082
15.0	3.87	0.1086
30.0	5.48	0.1090

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D3080** **CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT** **CONSOLIDATION DATA**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-3 UD 20.0-22.0'**	**Technician:** **FT**	**Reviewed:**	**Date:** **7/16/2018**	**Job Number:** **18103173**	**Figure:** **5**

AUGUST 2018

18103173

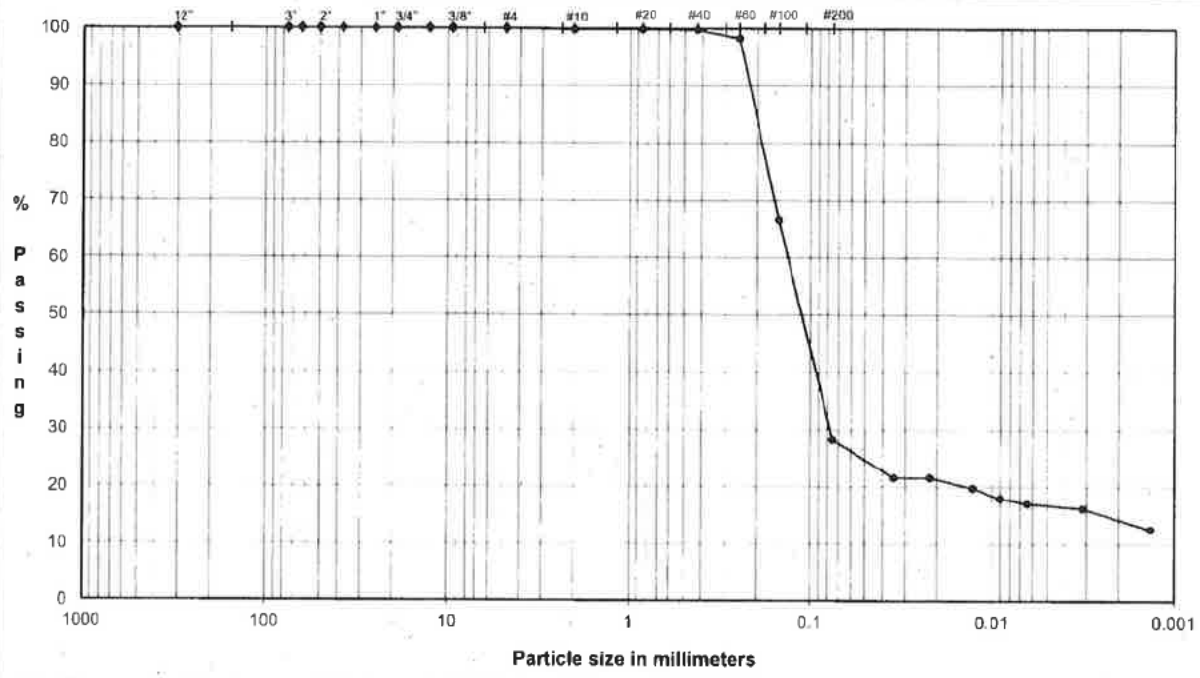
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **B-3 (P2-5)** Depth: **23.0-24.0'**

TYPE: **Bag**



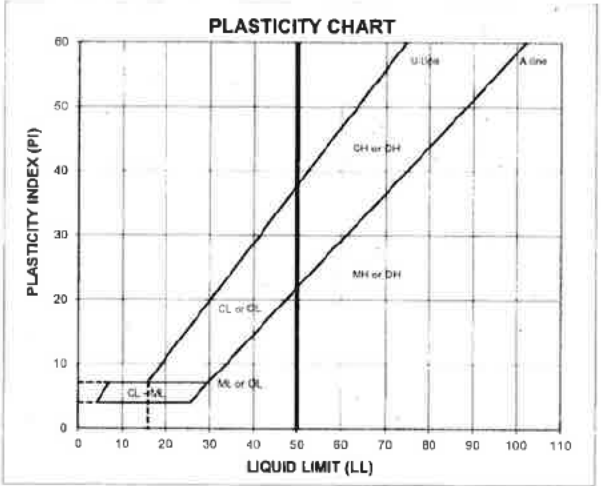
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.8**	Coarse Sand	**0.2**
#20	0.85	**99.8**		
#40	0.43	**99.7**	Medium Sand	**0.1**
#60	0.25	**98.3**		
#100	0.15	**66.5**		
#200	0.075	**28.1**	Fine Sand	**71.6**

Hydrometer Analysis

(mm)	%Finer		
0.035	**21.6**		
0.022	**21.6**		
0.013	**19.8**	Fines	
0.0090	**18.0**	Silt or Clay	**28.1**
0.0064	**17.1**		
0.0032	**16.2**		
0.0013	**12.6**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
30.0	**NP**	**NP**	**NP**	**NP**

LL (oven-dried) / 0.75 · ORGANIC (OL/OH)

DESCRIPTION: SILTY SAND, fine to coarse; brownish gray.

USCS: SM

TECH	HH/BA
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

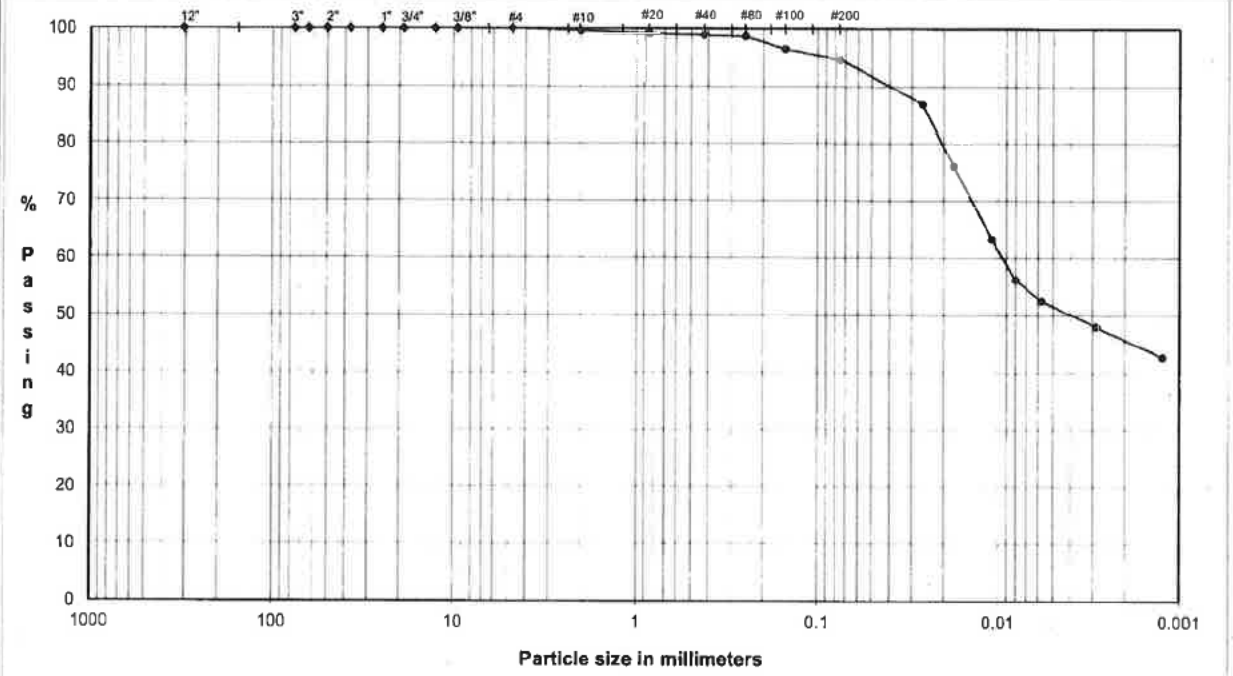
JUNE 2018

18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-4** Depth: **8.0-10.0'**
TYPE: **UD**



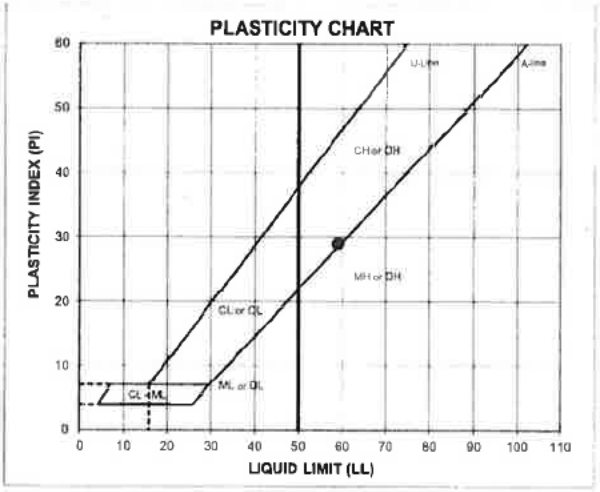
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.6**	Coarse Sand	**0.4**
#20	0.85	**99.2**		
#40	0.43	**98.9**	Medium Sand	**0.7**
#60	0.25	**98.7**		
#100	0.15	**96.5**		
#200	0.075	**94.7**	Fine Sand	**4.2**

Hydrometer Analysis

(mm)	%Finer		
0.026	**87.0**		
0.018	**76.1**		
0.011	**63.4**	Fines	
0.0080	**56.2**	Silt or Clay	**94.7**
0.0058	**52.6**		
0.0029	**48.0**		
0.0012	**42.6**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
33.5	**59**	**30**	**29**	**0.13**

LL (oven-dried) / 0.75 · ORGANIC (OL/OH)

DESCRIPTION: CLAY, some fine to coarse sand; yellowish brown.

USCS: CH

TECH	TJ/BA/TB
DATE	6/8/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		Board #	2	COMMENTS
PROJECT NUMBER	18103173		Flow Pump	2	
SAMPLE ID	B-4	8.0-10.0'	Flow Pump Speed	9	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.999	B-Value, f	0.99	Height, inches	3.002
Diameter, inches	2.869	Cell Pres.	88.0	Diameter, inches	2.899
Area, cm^2	41.71	Bot. Pres.	80.0	Area, cm^2	42.58
Volume, cm^3	317.71	Top Pres.	80.0	Volume, cm^3	324.71
Mass, g	585.31	Tot. B.P.	80.0	Mass, g	596.72
Moisture Content, %	33.46	Head, max.	162.49	Moisture Content, %	36.07
Dry Density, pcf	86.13	Head, min.	162.49	Dry Density, pcf	84.28
Spec. Gravity (assumed)	2.700	Max. Grad.	21.31	Volume Solids, cm^3	162.43
Volume Solids, cm^3	162.43	Min. Grad.	21.31	Volume Voids, cm^3	162.29
Volume Voids, cm^3	155.28			Void Ratio	1.00
Void Ratio	0.96			Saturation, %	97.5%
Saturation, %	94.5%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	585.31	686.79
Wt Soil & Tare, f	g	438.55	528.69
Wt Tare	g	0.00	90.33
Wt Moisture Lost	g	146.76	158.10
Wt Dry Soil	g	438.55	438.36
Water Content	%	33.46%	36.07%

Flow Pump Rate: 4.26E-05 cm^3/sec

USCS: CH

DESCRIPTION: CLAY, some fine to coarse sand; yellowish brown.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/08/18	43259	13	0	20.9	0	0	0	0	2.31	162.49	21.31	4.6E-08
06/08/18	43259	13	5	20.9	5	5	300	300	2.31	162.49	21.31	4.6E-08
06/08/18	43259	13	10	20.9	5	10	300	600	2.31	162.49	21.31	4.6E-08
06/08/18	43259	13	15	20.9	5	15	300	900	2.31	162.49	21.31	4.6E-08 *
06/08/18	43259	13	20	20.9	5	20	300	1200	2.31	162.49	21.31	4.6E-08 *
06/08/18	43259	13	25	20.9	5	25	300	1500	2.31	162.49	21.31	4.6E-08 *
06/08/18	43259	13	30	20.9	5	30	300	1800	2.31	162.49	21.31	4.6E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.6E-08 cm/sec **

DATE	6/8/18
CHECK	
REVIEW	
APPROVE	

JUNE 2018

18103173

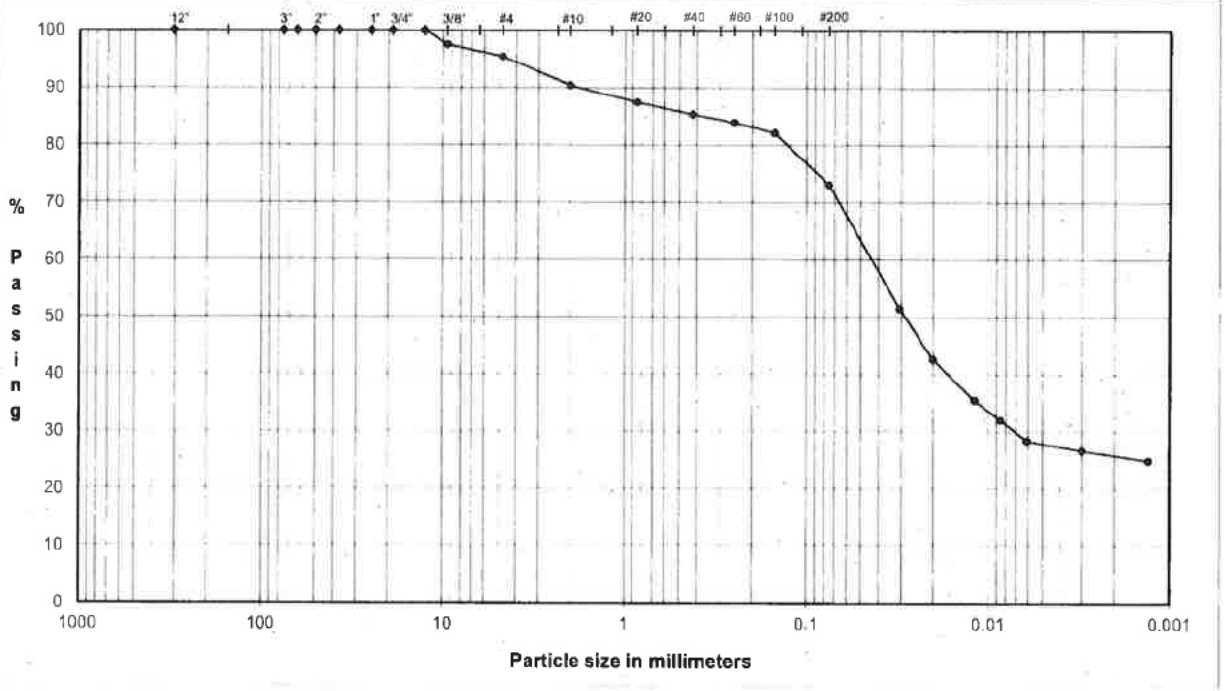
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **B-5** Depth: **3.0-5.0'**

TYPE: **UD**



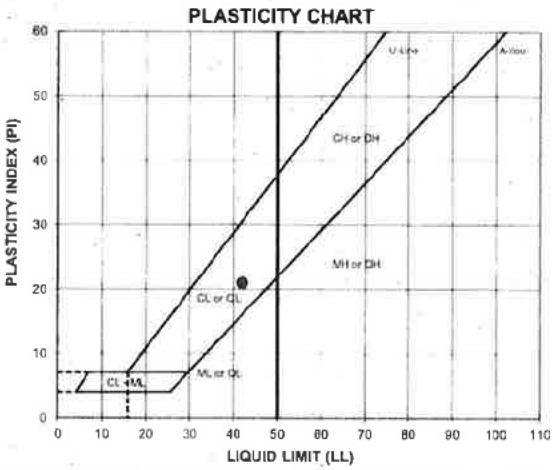
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**97.5**		
#4	4.8	**95.4**	Fine Gravel	**4.6**
#10	2.00	**90.4**	Coarse Sand	**5.0**
#20	0.85	**87.4**		
#40	0.43	**85.4**	Medium Sand	**5.0**
#60	0.25	**84.0**		
#100	0.15	**82.1**		
#200	0.075	**73.1**	Fine Sand	**12.3**

Hydrometer Analysis

(mm)	%Finer		
0.031	**51.4**		
0.020	**42.6**		
0.012	**35.5**	Fines	
0.0085	**31.9**	Silt or Clay	**73.1**
0.0061	**28.4**		
0.0030	**26.6**		
0.0013	**24.8**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
26.6	**42**	**21**	**21**	**0.28**

LL (oven-dried) / 0.75 - ORGANIC

DESCRIPTION: SAND and SILTY CLAY, fine to medium; dark brown.

USCS: CL

TECH	TB/HH/TJ
DATE	6/25/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

Boring or Test Pit:	B-5		Boring or Test Pit:			Boring or Test Pit:		
Sample:	I		Sample:			Sample:		
Depth:	3.0-5.0	ft	Depth:			Depth:		
Point No.:	1		Point No.:			Point No.:		
	Initial							
Length =	6.012	in	Length =	6.009		Length =	5.925	
Diameter =	2.877	in	Diameter =	2.842		Diameter =	2.863	
Wet Mass =	2.625	lb	Wet Mass =			Wet Mass =		
Area =	6.501	in^2	Area =			Area =		
Volume =	39.083	in^3	Volume =			Volume =		
Specific Gravity =	2.69	(ASTM D854)	Specific Gravity =			Specific Gravity =		
Dry Mass of Solids =	2.073	lb	Dry Mass of Solids =			Dry Mass of Solids =		
Moisture Content =	26.6%		Moisture Content =			Moisture Content =		
Wet Unit Weight =	116.1	pcf	Wet Unit Weight =			Wet Unit Weight =		
Dry Unit Weight =	91.7	pcf	Dry Unit Weight =			Dry Unit Weight =		
Void Ratio =	0.83		Void Ratio =			Void Ratio =		
Percent Saturation =	86%		Percent Saturation =			Percent Saturation =		
	After Consolidation			**After Consolidation**			**After Consolidation**	
Length =	6.009	in	Length =	5.925	in	Length =	5.849	in
Diameter =	2.842	in	Diameter =	2.863	in	Diameter =	2.881	in
Area =	6.345		Area =	6.436		Area =	6.519	in^2 (Method B)
Volume =	38.129		Volume =	38.129		Volume =	38.129	in^3
Moisture Content =			Moisture Content =			Moisture Content =	29.2%	
Wet Unit Weight =			Wet Unit Weight =			Wet Unit Weight =	121.4	pcf
Dry Unit Weight =			Dry Unit Weight =			Dry Unit Weight =	94.0	pcf
Void Ratio =			Void Ratio =			Void Ratio =	0.78	
Percent Saturation =			Percent Saturation =			Percent Saturation =	100%	
B Parameter =	0.99		B Parameter =	--		B Parameter =	--	
Shear Rate =	0.089%	/min.	Shear Rate =	0.099%	/min.	Shear Rate =	0.092%	/min.
t_{50} =	0.3	min.	t_{50} =	0.6	min.	t_{50} =	0.1	min.
Strain at Failure =	1.3%		Strain at Failure =	2.7%		Strain at Failure =	4.3%	
Cell Pressure =	74.0	psi	Cell Pressure =	80.0	psi	Cell Pressure =	85.0	psi
Back Pressure =	70.0	psi	Back Pressure =	70.0	psi	Back Pressure =	70.0	psi
Confining Pressure =	4.0	psi	Confining Pressure =	10.0	psi	Confining Pressure =	15.0	psi

Notes: Sample description: (CL) SAND and SILTY CLAY, fine to medium; dark brown.

Atterberg limits: LL = 42 PL = 21 PI = 21 (ASTM D4318)

Percent finer: 3/4 in. = 100.0% No. 4 = 95.4% No. 200 = 73.1% (ASTM D422, refer to separate report for gradation curve)

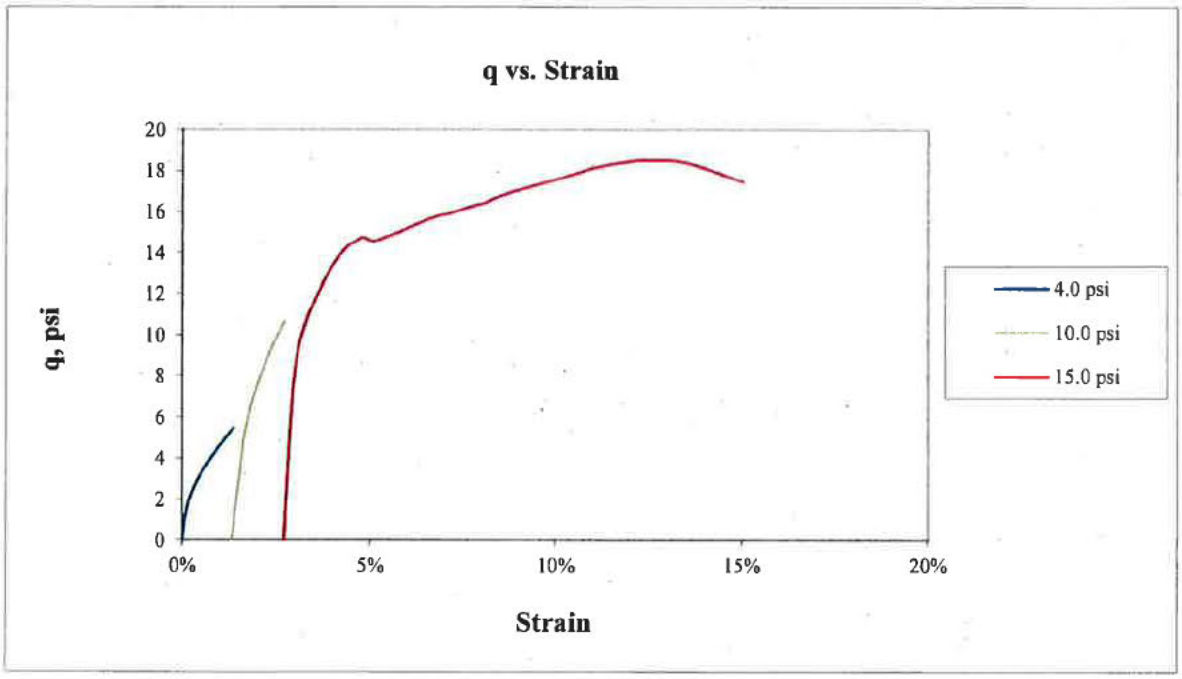
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

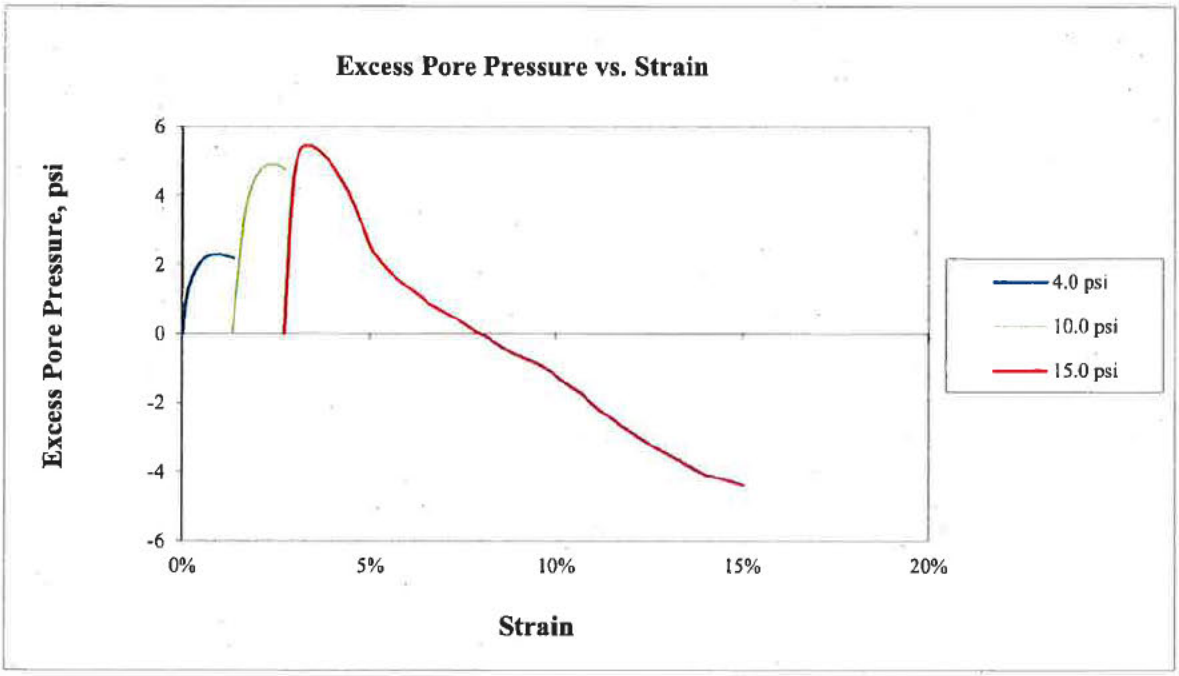
Golder Associates Inc.
Atlanta, Georgia

Job Short Title: FTN/ENTERGY WHITE BLUFF/AR

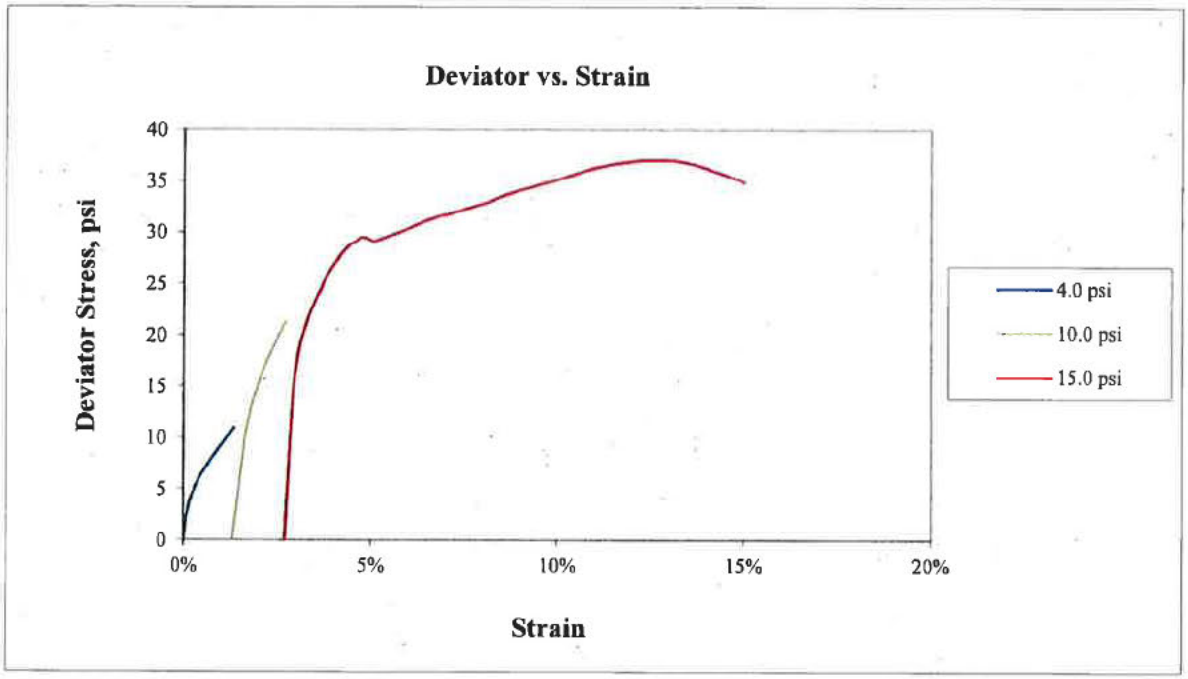
Title: MODIFIED (Multi-Stage) - ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SAMPLE AND TEST DATA

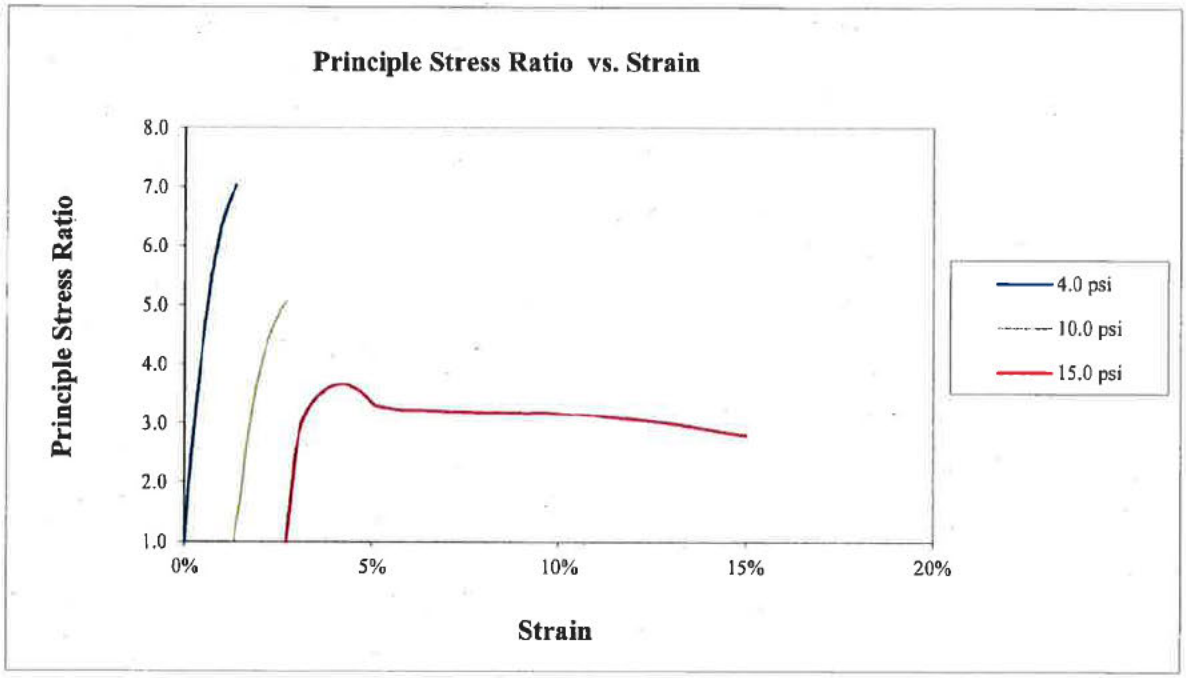
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-5 UD 3.0-5.0'	FT/PWM		7/10/2018	18103173	1
	Checked: AWA	Approved:			





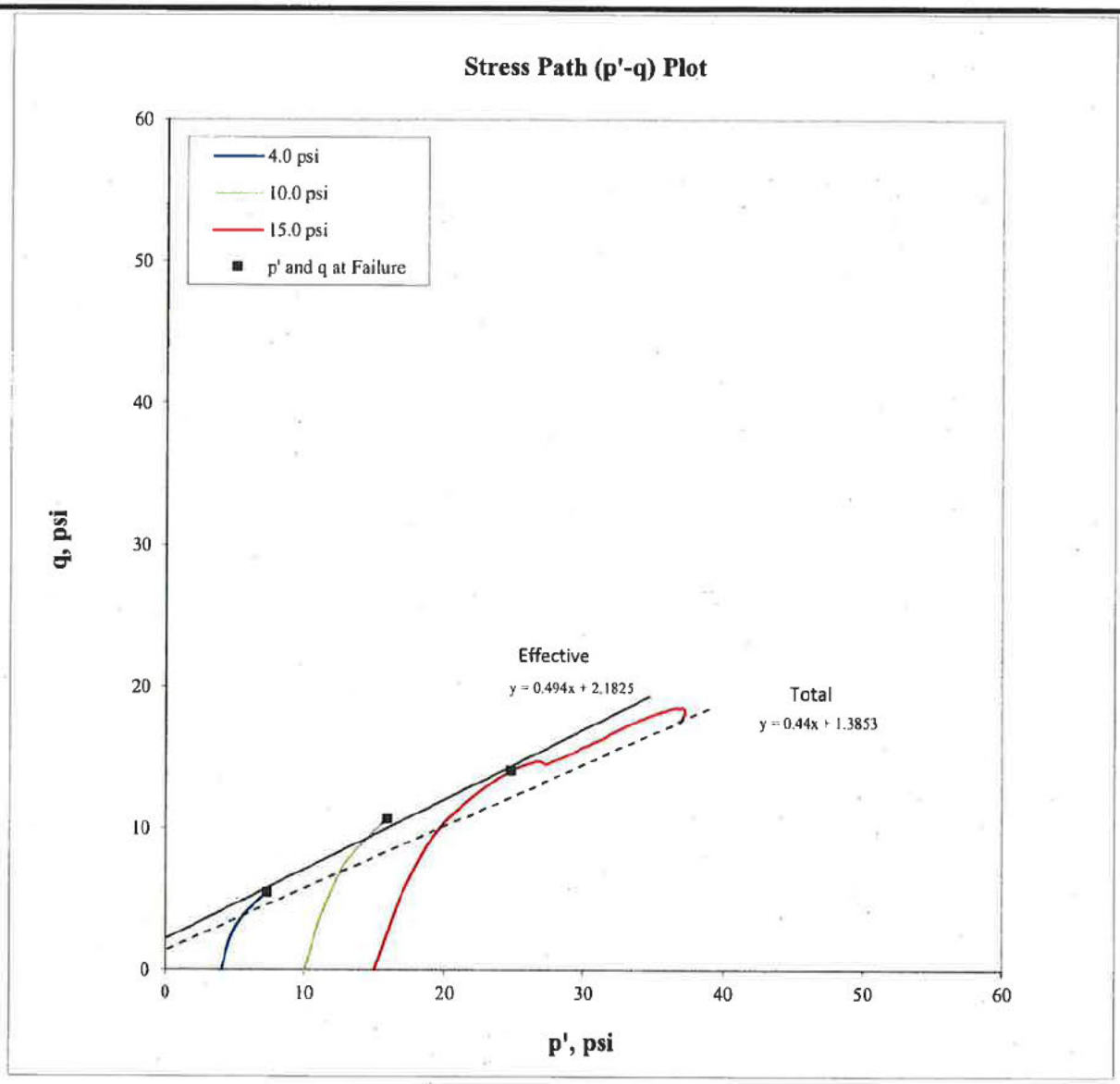
Golder Associates Inc. Atlanta, Georgia	Title: MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT q AND EXCESS PORE PRESSURE PLOTS				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-5 UD 3.0-5.0'	Technician: FT/PWM Check: TWM	Reviewed: SK Approved:	Start Date: 7/10/2018	Job Number: 18103173	Figure: 2





Golder Associates Inc. **Atlanta, Georgia**	Title: **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-5 UD 3.0-5.0'**	Technician: **FT/PWM** Check: **WM**	Reviewed: Approved:	Start Date: **7/10/2018**	Job Number: **18103173**	Figure: **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
4.0	9.5	7.3	5.5
10.0	20.6	15.9	10.6
15.0	29.1	24.7	14.1

Effective

α ' =	26.3	degree
a' =	2.2	psi

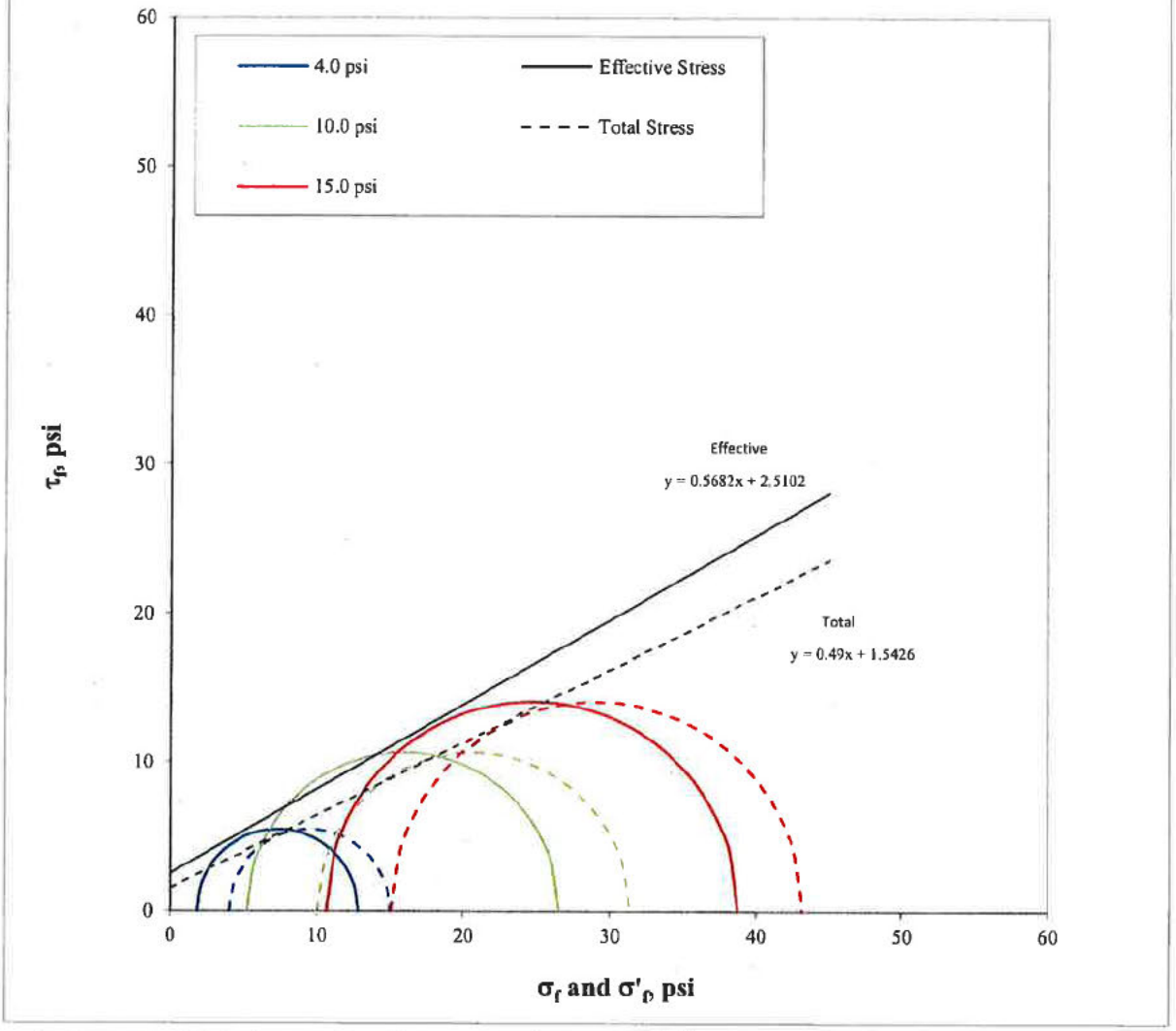
Total

α =	23.7	degree
a =	1.4	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. Atlanta, Georgia	**Title:** MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT STRESS PATH PLOT				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-5 UD 3.0-5.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 7/10/2018	**Job Number:** 18103173	**Figure:** 4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
4.0	12.8	1.8	15.0	4.0
10.0	26.5	5.2	31.3	10.0
15.0	38.8	10.6	43.2	15.0

Effective

ϕ' = 29.6 degree

c' = 2.5 psi

Total

ϕ = 26.1 degree

c = 1.5 psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. Atlanta, Georgia	**Title:** MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT MOHR'S CIRCLE DIAGRAM				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-5 UD 3.0-5.0'	**Technician:** FT/PWM **Check:** JWM	**Reviewed:** **Approved:**	**Start Date:** 7/10/2018	**Job Number:** 18103173	**Figure:** 5

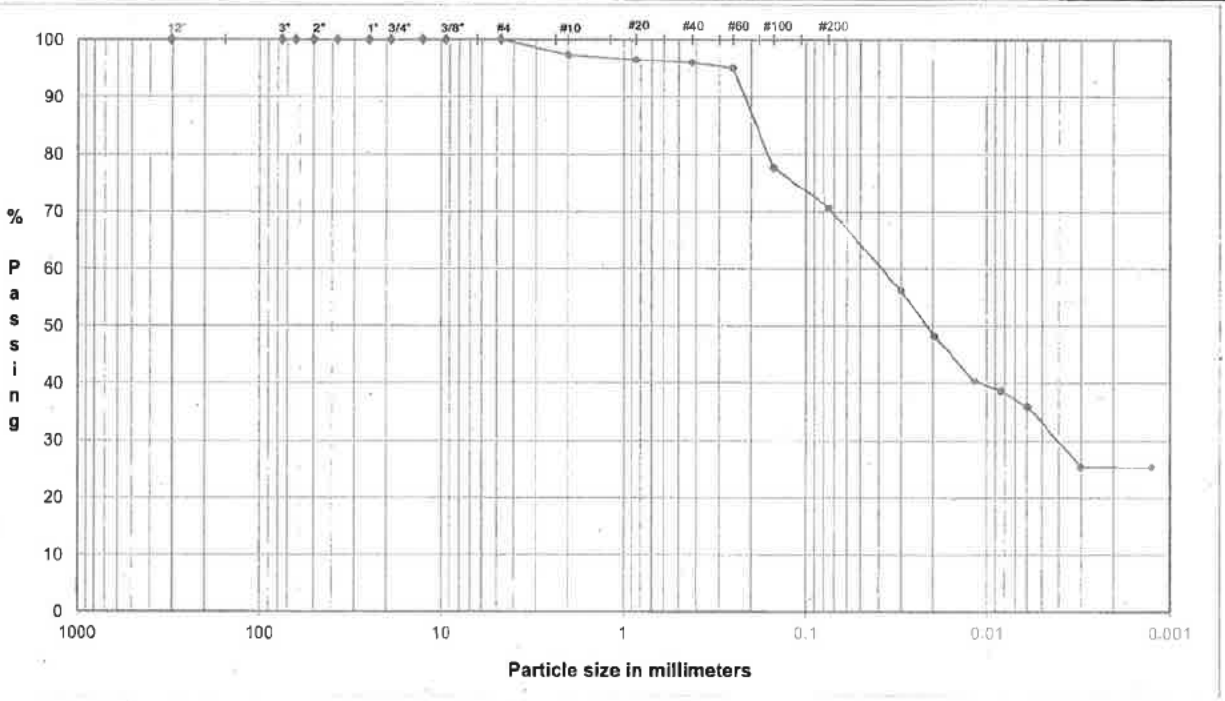
Golder Associates Inc. Atlanta, Georgia	Title: MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - Single Specimen				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-5 UD 3.0-5.0'	Technician: FT/PWM Check: tw	Reviewed: JC Approved:	Start Date: 7/10/2018	Job Number: 18103173	Figure: 6

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-5** Depth: 4.0-6.0'
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

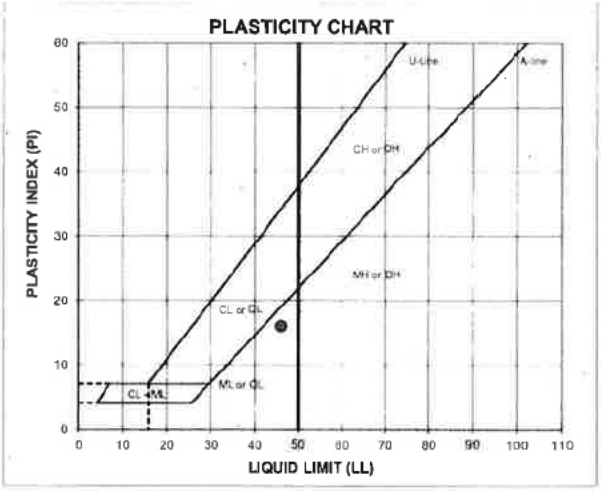
	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**97.4**	Coarse Sand	**2.6**
#20	0.85	**96.5**		
#40	0.43	**96.0**	Medium Sand	**1.4**
#60	0.25	**95.0**		
#100	0.15	**77.6**		
#200	0.075	**70.7**	Fine Sand	**25.3**

Hydrometer Analysis

(mm)	%Finer		
0.030	**56.1**		
0.020	**48.2**		
0.012	**40.3**	Fines	
0.0084	**38.6**	Silt or Clay	**70.7**
0.0060	**36.0**		
0.0030	**25.4**		
0.0013	**25.4**		

DESCRIPTION: sandy CLAYEY SILT, fine to coarse; yellowish brown.

USCS: ML



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
27.4	**46**	**30**	**16**	**-0.17**

LL (oven-dried) / 0.75 : ORGANIC (OL/OH)

TECH	HH/BA/TJ
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

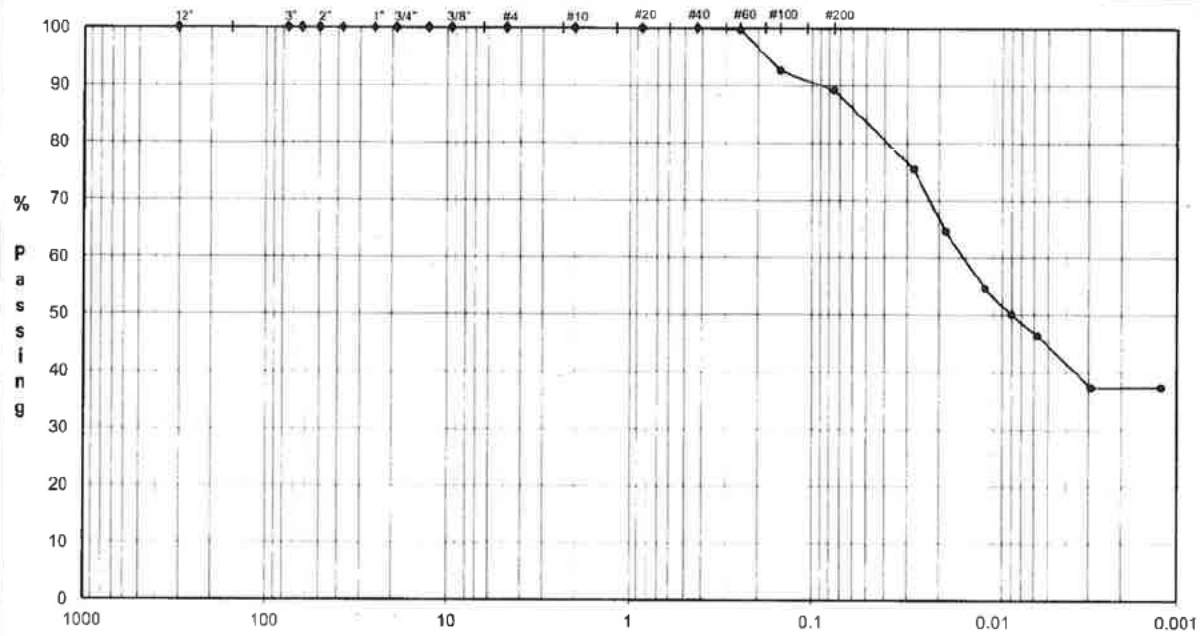
AUGUST 2018

18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-5** Depth: **9.0-10.0'**
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

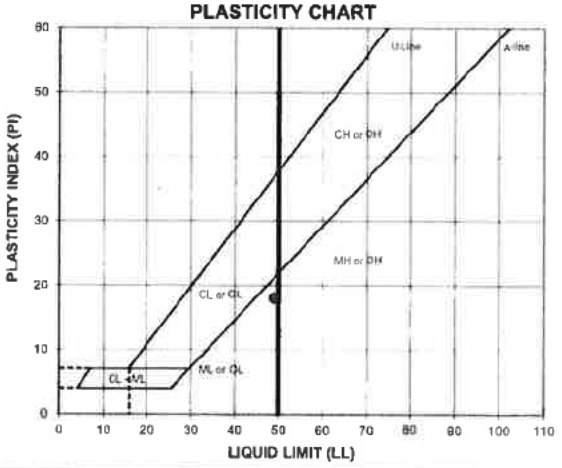
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**99.7**		
#100	0.15	**92.7**		
#200	0.075	**89.1**	Fine Sand	**10.9**

Hydrometer Analysis

(mm)	%Finer		
0.028	**75.6**		
0.018	**64.6**		
0.011	**54.6**	Fines	
0.0080	**50.1**	Silt or Clay	**89.1**
0.0058	**46.4**		
0.0029	**37.3**		
0.0012	**37.3**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

Mc	LL	PL	PI	LI
26.3	**49**	**31**	**18**	**-0.27**

LL (oven-dried) / 0.75 OR WK (OL/OH)

DESCRIPTION: CLAYEY SILT, some fine sand; dark gray.

USCS: ML

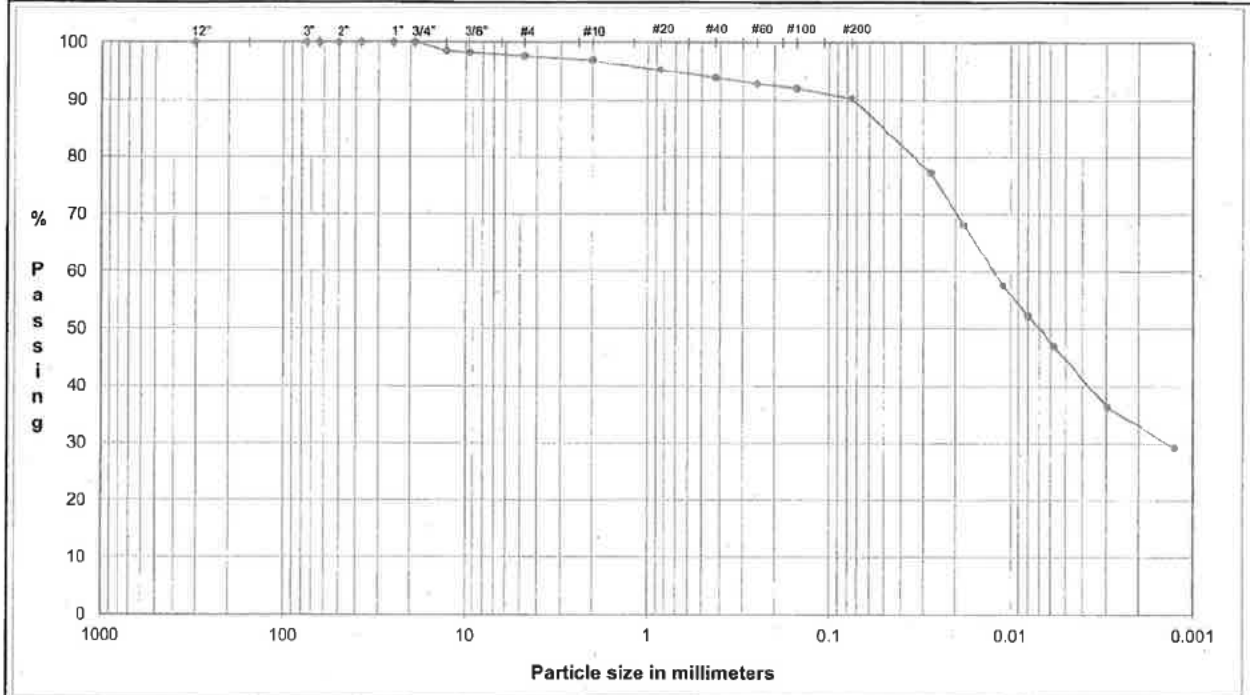
TECH	HH/BA/TJ
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

JUNE 2018 | 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-5** Depth: **10.0-12.0'**
TYPE: **UD**



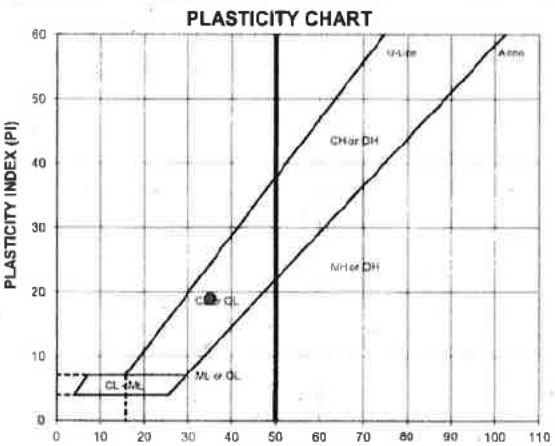
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**98.4**		
0.375"	9.5	**98.2**		
#4	4.8	**97.6**	Fine Gravel	**2.4**
#10	2.00	**96.9**	Coarse Sand	**0.7**
#20	0.85	**95.2**		
#40	0.43	**93.8**	Medium Sand	**3.1**
#60	0.25	**92.8**		
#100	0.15	**92.0**		
#200	0.075	**90.3**	Fine Sand	**3.5**

Hydrometer Analysis

(mm)	%Finer		
0.027	**77.2**		
0.018	**68.3**		
0.011	**57.7**	Fines	
0.0080	**52.3**	Silt or Clay	**90.3**
0.0058	**47.0**		
0.0030	**36.4**		
0.0013	**29.3**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
17.1	**35**	**16**	**19**	**0.07**

LL (oven-dried) / 0.75 ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, some fine to coarse sand, trace fine gravel; light brown.

USCS: CL

TECH	HH/TB
DATE	6/20/18
CHECK	
REVIEW	
APPROVE	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		Board #	8	COMMENTS
PROJECT NUMBER	18103173		Flow Pump	2	
SAMPLE ID	B-5	10.0-12.0'	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.000	B-Value, f	1.00	Height, inches	3.004
Diameter, inches	2.836	Cell Pres.	88.0	Diameter, inches	2.898
Area, cm²	40.75	Bot. Pres.	80.0	Area, cm²	42.56
Volume, cm³	310.55	Top Pres.	80.0	Volume, cm³	324.70
Mass, g	663.16	Tot. B.P.	80.0	Mass, g	674.45
Moisture Content, %	17.07	Head, max.	135.05	Moisture Content, %	19.06
Dry Density, pcf	113.82	Head, min.	135.05	Dry Density, pcf	108.86
Spec. Gravity (assumed)	2.700	Max. Grad.	17.70	Volume Solids, cm³	209.80
Volume Solids, cm³	209.80	Min. Grad.	17.70	Volume Voids, cm³	114.90
Volume Voids, cm³	100.75			Void Ratio	0.55
Void Ratio	0.48			Saturation, %	94.0%
Saturation, %	96.0%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	663.16	756.65
Wt Soil & Tare, f	g	566.46	648.69
Wt Tare	g	0.00	82.40
Wt Moisture Lost	g	96.70	107.96
Wt Dry Soil	g	566.46	566.29
Water Content	%	17.07%	19.06%

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: CL

DESCRIPTION: SILTY CLAY, some fine to coarse sand, trace fine gravel; light brown.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/25/18	43276	12	0	21.7	0	0	0	0	1.92	135.05	17.70	1.5E-08
06/25/18	43276	12	5	21.7	5	5	300	300	1.92	135.05	17.70	1.5E-08
06/25/18	43276	12	10	21.7	5	10	300	600	1.92	135.05	17.70	1.5E-08
06/25/18	43276	12	15	21.7	5	15	300	900	1.92	135.05	17.70	1.5E-08 *
06/25/18	43276	12	20	21.7	5	20	300	1200	1.92	135.05	17.70	1.5E-08 *
06/25/18	43276	12	25	21.7	5	25	300	1500	1.92	135.05	17.70	1.5E-08 *
06/25/18	43276	12	30	21.7	5	30	300	1800	1.92	135.05	17.70	1.5E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.5E-08 cm/sec **

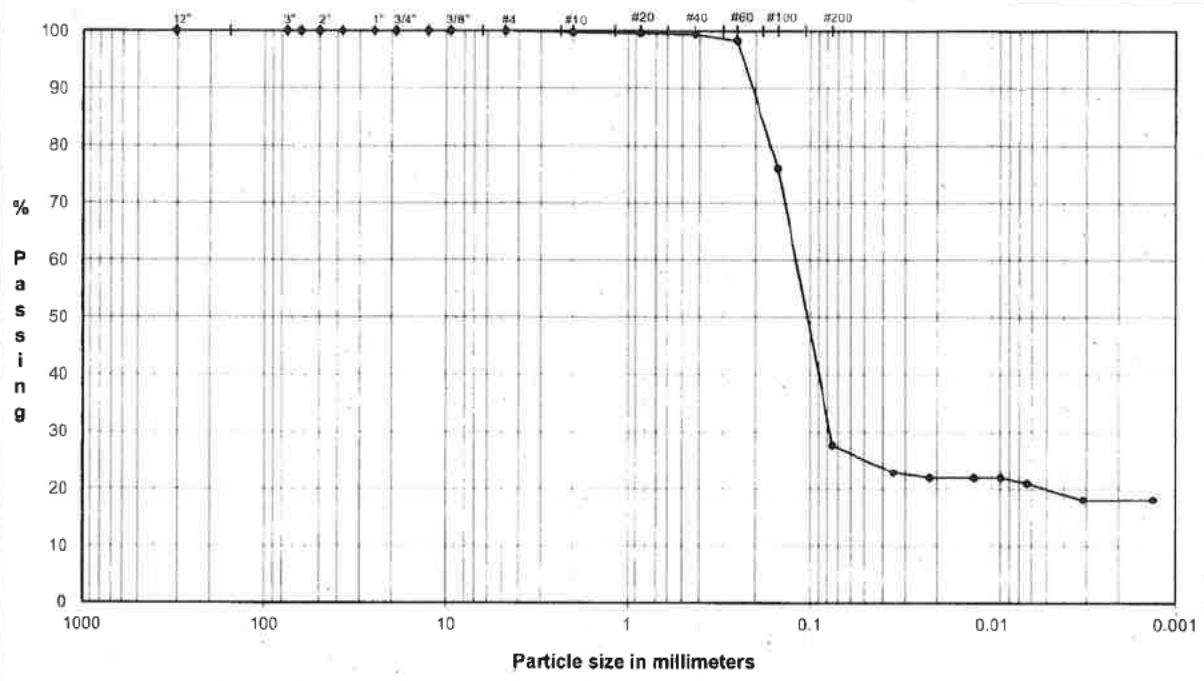
DATE	6/25/18
CHECK	
REVIEW	
APPROVE	

AUGUST 2018 | 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-6** Depth: **11.0-12.0'**
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

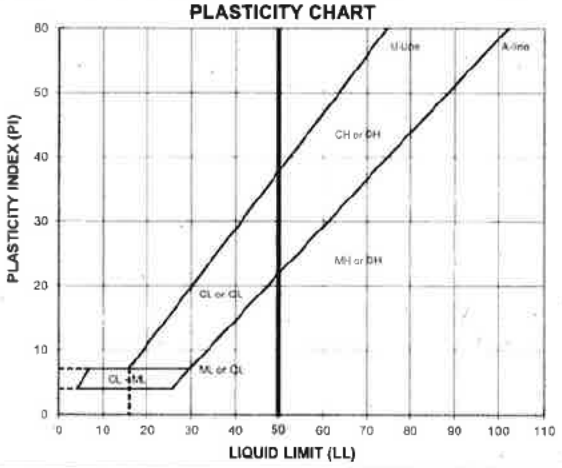
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.8**	Coarse Sand	**0.2**
#20	0.85	**99.6**		
#40	0.43	**99.4**	Medium Sand	**0.4**
#60	0.25	**98.3**		
#100	0.15	**76.0**		
#200	0.075	**27.6**	Fine Sand	**71.8**

Hydrometer Analysis

(mm)	%Finer		
0.035	**22.9**		
0.022	**21.9**		
0.013	**21.9**	Fines	
0.0089	**21.9**	Silt or Clay	**27.6**
0.0064	**21.0**		
0.0031	**18.1**		
0.0013	**18.1**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
12.4	NP	NP	NP	NP

LL (oven-dried) / 0.75 · ORGANIC (OL OH)

DESCRIPTION: SILTY SAND, fine to coarse; yellowish brown.

USCS: SM

TECH	TJ/BA/HH
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

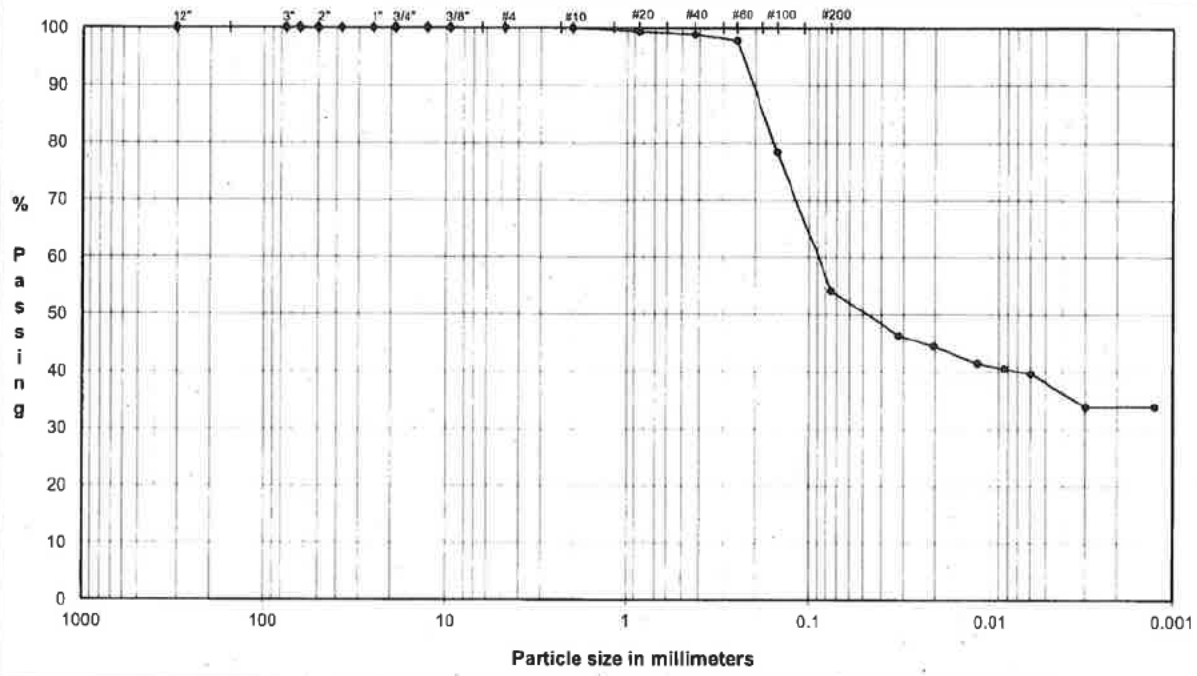
AUGUST 2018

18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: FTN/ENTERGY WHITE BLUFF/AR
SAMPLE ID: B-6 Depth: 16.0-17.0'
TYPE: Bag



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

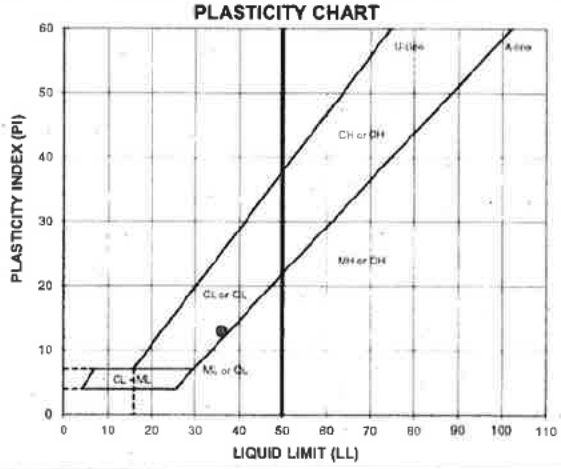
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.9	Coarse Sand	0.1
#20	0.85	99.4		
#40	0.43	98.9	Medium Sand	1.0
#60	0.25	97.9		
#100	0.15	78.3		
#200	0.075	54.2	Fine Sand	44.8

Hydrometer Analysis

(mm)	%Finer		
0.032	46.4		
0.020	44.5		
0.012	41.6	Fines	
0.0084	40.6	Silt or Clay	54.2
0.0060	39.6		
0.0030	33.8		
0.0012	33.8		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
21.3	36	23	13	-0.11

LL (oven-dried) / 0.75 · ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY and SAND, fine to coarse; dark yellowish brown

USCS: CL

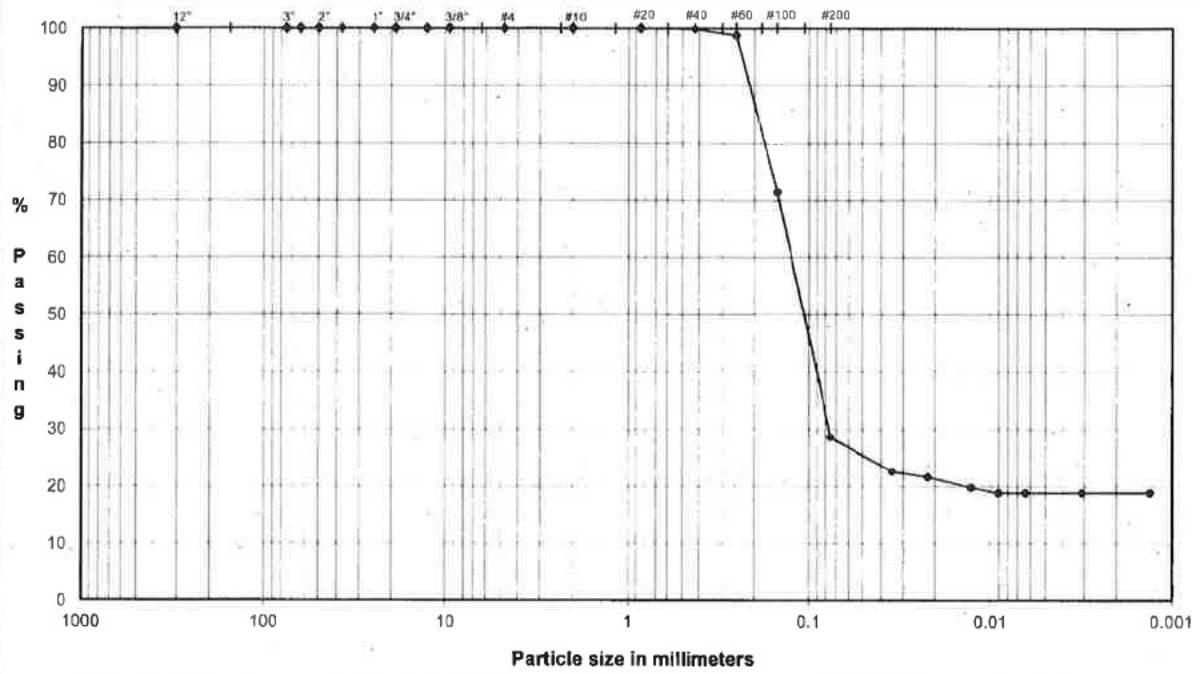
TECH	TJ/BA/HH
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-6** Depth: **22.0-24.0'**
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

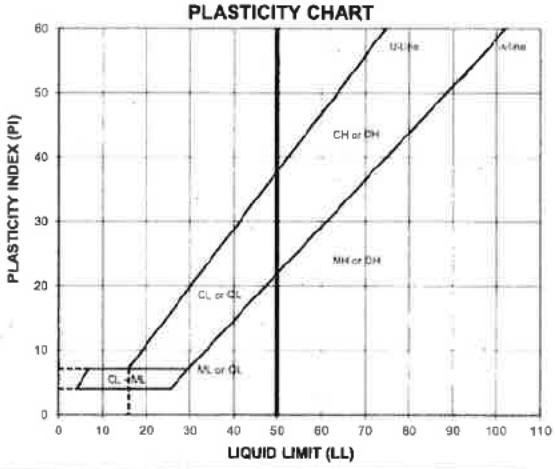
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**99.9**	Medium Sand	**0.1**
#60	0.25	**98.8**		
#100	0.15	**71.5**		
#200	0.075	**28.6**	Fine Sand	**71.3**

Hydrometer Analysis

(mm)	%Finer		
0.034	**22.5**		
0.022	**21.6**		
0.013	**19.8**	Fines	
0.0090	**18.9**	Silt or Clay	**28.6**
0.0064	**18.9**		
0.0031	**18.9**		
0.0013	**18.9**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M	LL	PL	PI	LI
10.9	**NP**	**NP**	**NP**	**NP**

LL (oven-dried)
0.75 · ORGANIC (OL/OH)

DESCRIPTION: SILTY SAND, fine to medium; dark gray.

USCS: SM

TECH	TJ/BA/HH
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

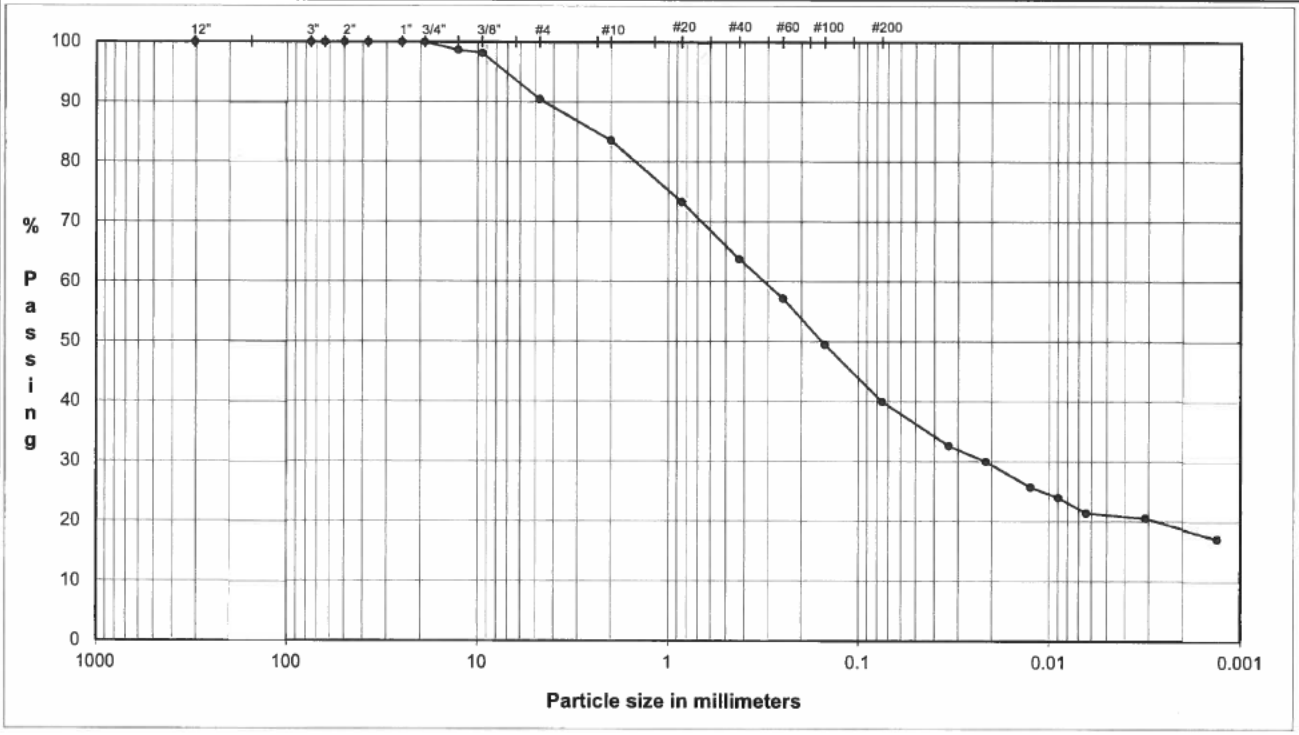
Golder Associates Inc.

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-7** Depth: **5.0-7.0'**
TYPE: **UD**



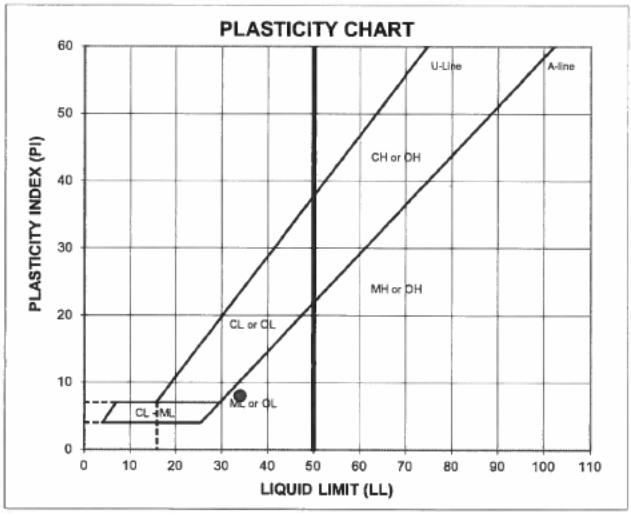
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	98.6		
0.375"	9.5	98.1		
#4	4.8	90.4	Fine Gravel	9.6
#10	2.00	83.6	Coarse Sand	6.9
#20	0.85	73.2		
#40	0.43	63.8	Medium Sand	19.8
#60	0.25	57.2		
#100	0.15	49.5		
#200	0.075	40.0	Fine Sand	23.8

Hydrometer Analysis

(mm)	%Finer		
0.034	32.6		
0.021	30.0		
0.013	25.7	Fines	
0.0089	24.0	Silt or Clay	40.0
0.0064	21.4		
0.0031	20.6		
0.0013	17.1		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
20.5	34	26	8	-0.73

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY SAND, fine to coarse, some fine gravel; gray.

USCS: SM

TECH	TJ/HH/BA
DATE	8/14/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit:	B-7		Boring or Test Pit:			Boring or Test Pit:		
Sample:	1		Sample:			Sample:		
Depth:	5.0-7.0	ft	Depth:			Depth:		
Point No.:	1		Point No.:			Point No.:		
	Initial							
Length =	6.041	in	Length =	6.023		Length =	5.966	
Diameter =	2.848	in	Diameter =	2.883		Diameter =	2.897	
Wet Mass =	2.811	lb	Wet Mass =			Wet Mass =		
Area =	6.370	in^2	Area =			Area =		
Volume =	38.484	in^3	Volume =			Volume =		
Specific Gravity =	2.66	(ASTM D854)	Specific Gravity =			Specific Gravity =		
Dry Mass of Solids =	2.332	lb	Dry Mass of Solids =			Dry Mass of Solids =		
Moisture Content =	20.5%		Moisture Content =			Moisture Content =		
Wet Unit Weight =	126.2	pcf	Wet Unit Weight =			Wet Unit Weight =		
Dry Unit Weight =	104.7	pcf	Dry Unit Weight =			Dry Unit Weight =		
Void Ratio =	0.58		Void Ratio =			Void Ratio =		
Percent Saturation =	94%		Percent Saturation =			Percent Saturation =		
	After Consolidation			**After Consolidation**			**After Consolidation**	
Length =	6.023	in	Length =	5.966	in	Length =	5.920	in
Diameter =	2.883	in	Diameter =	2.897	in	Diameter =	2.908	in
Area =	6.529		Area =	6.592		Area =	6.643	in^2 (Method B)
Volume =	39.326		Volume =	39.326		Volume =	39.326	in^3
Moisture Content =			Moisture Content =			Moisture Content =	23.2%	
Wet Unit Weight =			Wet Unit Weight =			Wet Unit Weight =	126.3	pcf
Dry Unit Weight =			Dry Unit Weight =			Dry Unit Weight =	102.5	pcf
Void Ratio =			Void Ratio =			Void Ratio =	0.62	
Percent Saturation =			Percent Saturation =			Percent Saturation =	100%	
B Parameter =	0.96		B Parameter =	--		B Parameter =	--	
Shear Rate =	0.088%	/min.	Shear Rate =	0.087%	/min.	Shear Rate =	0.090%	/min.
t_{50} =	1.2	min.	t_{50} =	0.9	min.	t_{50} =	0.8	min.
Strain at Failure =	0.5%		Strain at Failure =	1.9%		Strain at Failure =	2.8%	
Cell Pressure =	66.0	psi	Cell Pressure =	72.0	psi	Cell Pressure =	78.0	psi
Back Pressure =	60.0	psi	Back Pressure =	60.0	psi	Back Pressure =	60.0	psi
Confining Pressure =	6.0	psi	Confining Pressure =	12.0	psi	Confining Pressure =	18.0	psi

Notes: Sample description: (SM) SILTY SAND, fine to coarse, some fine gravel; gray.

Atterberg limits: LL = 34 PL = 26 PI = 8 (ASTM D4318)

Percent finer: 3/4 in. = 100.0% No. 4 = 90.4% No. 200 = 40.0% (ASTM D422, refer to separate report for gradation curve)

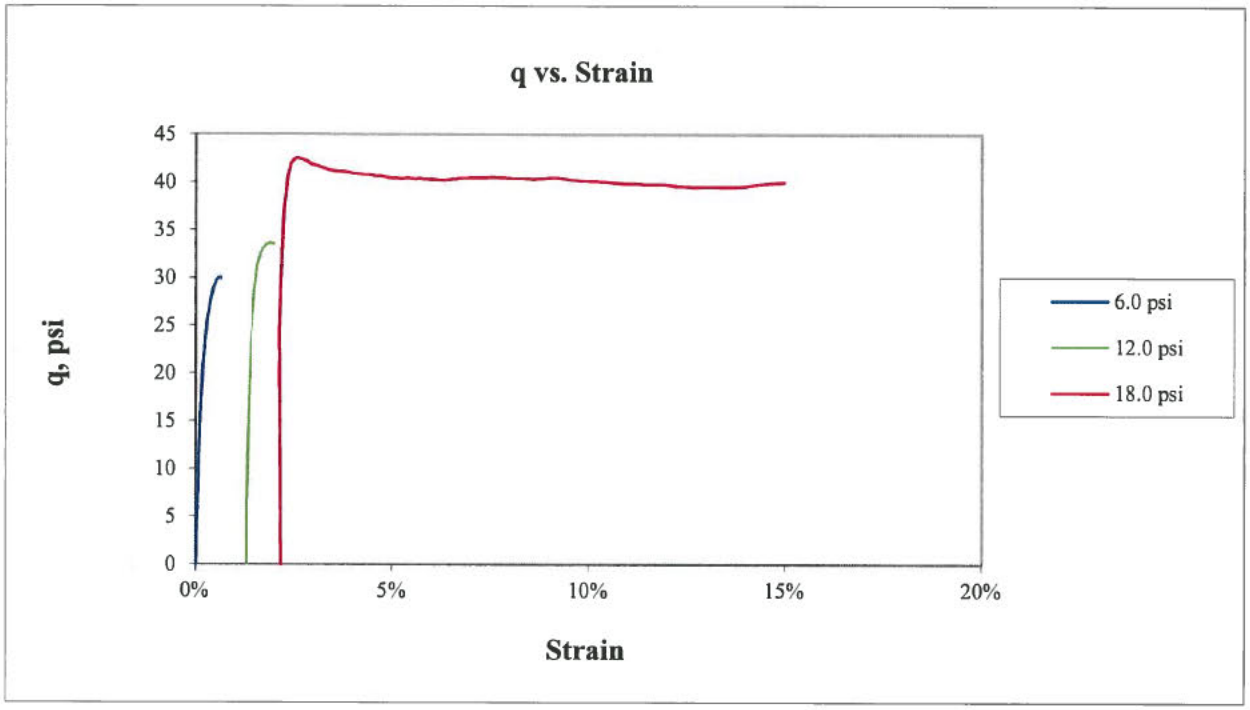
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ [ ] % strain
Membrane effect:	X	Corrected		Not Corrected

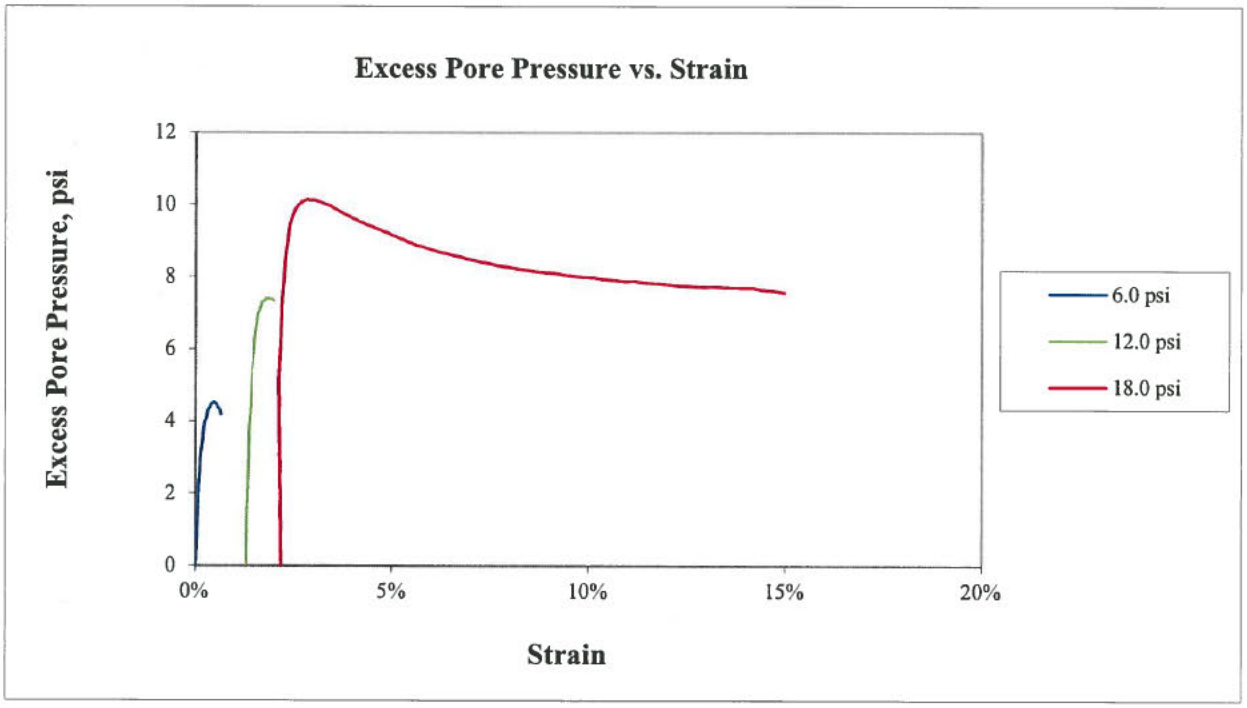
Golder Associates Inc.
Atlanta, Georgia

Job Short Title:
FTN/ENTERGY WHITE BLUFF/AR

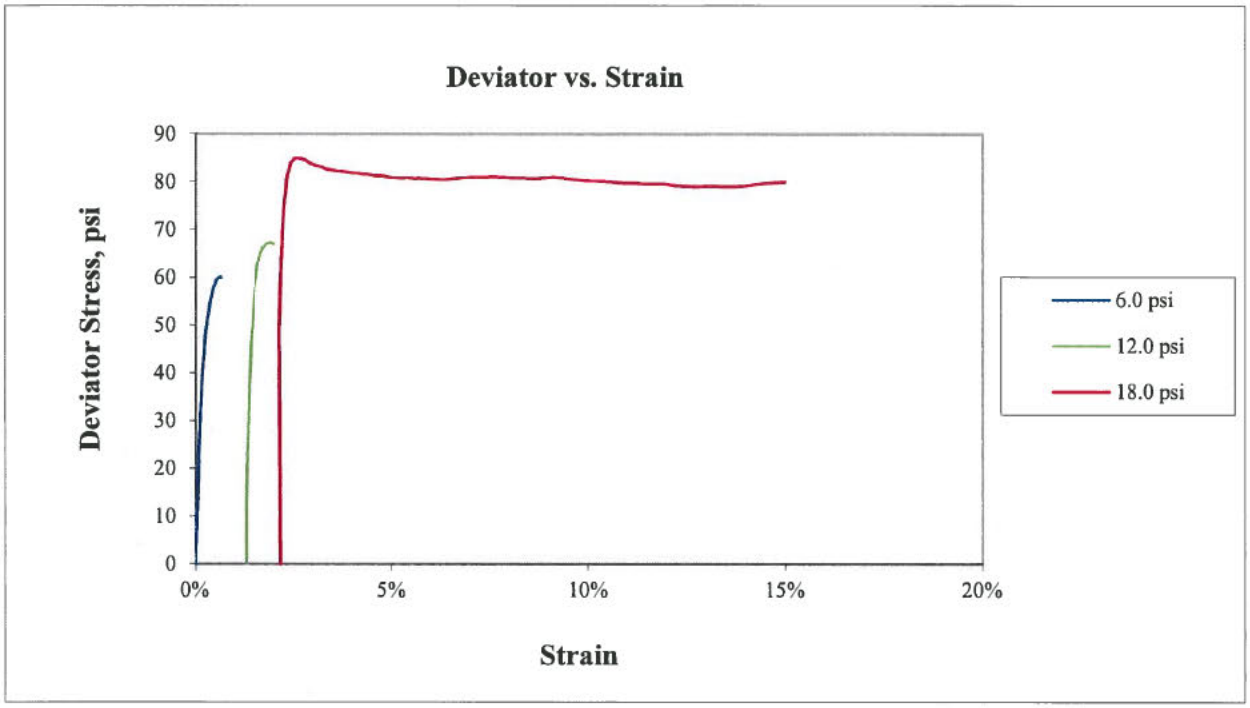
Title:
MODIFIED (Multi-Stage) - ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SAMPLE AND TEST DATA

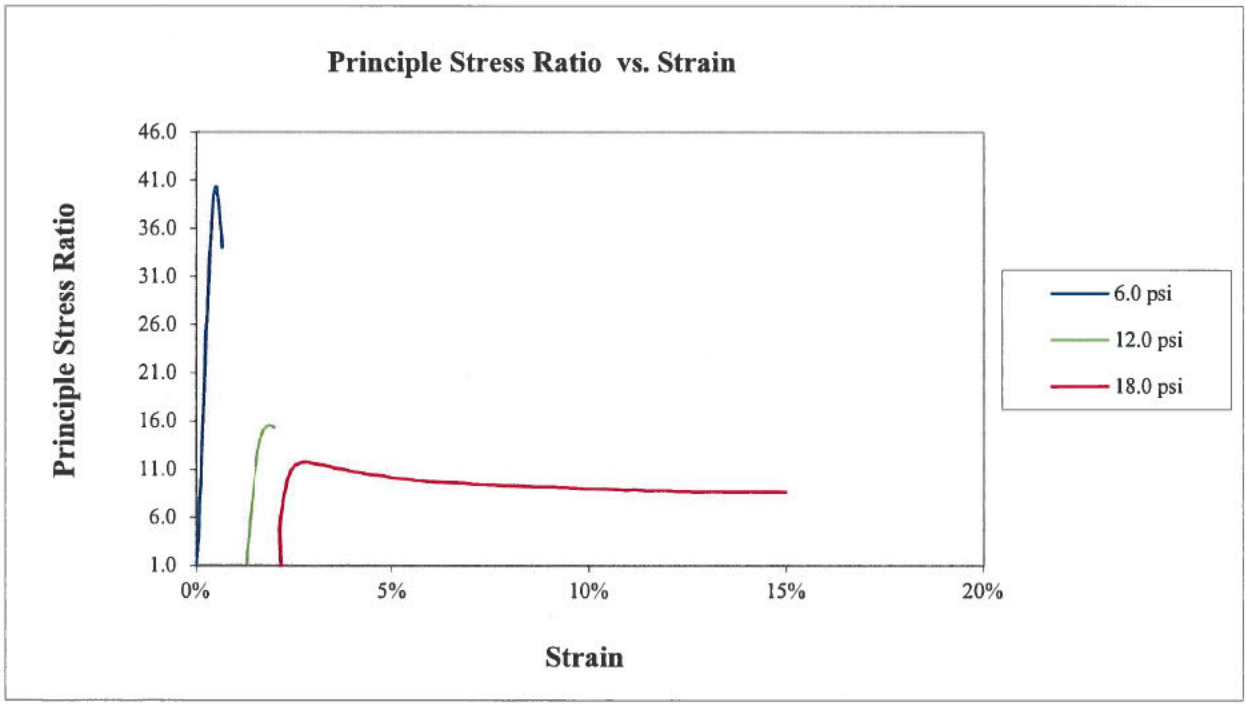
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-7 UD 5.0-7.0'	FT/PWM Check: PWM	Approved:	8/29/2018	18103173	1





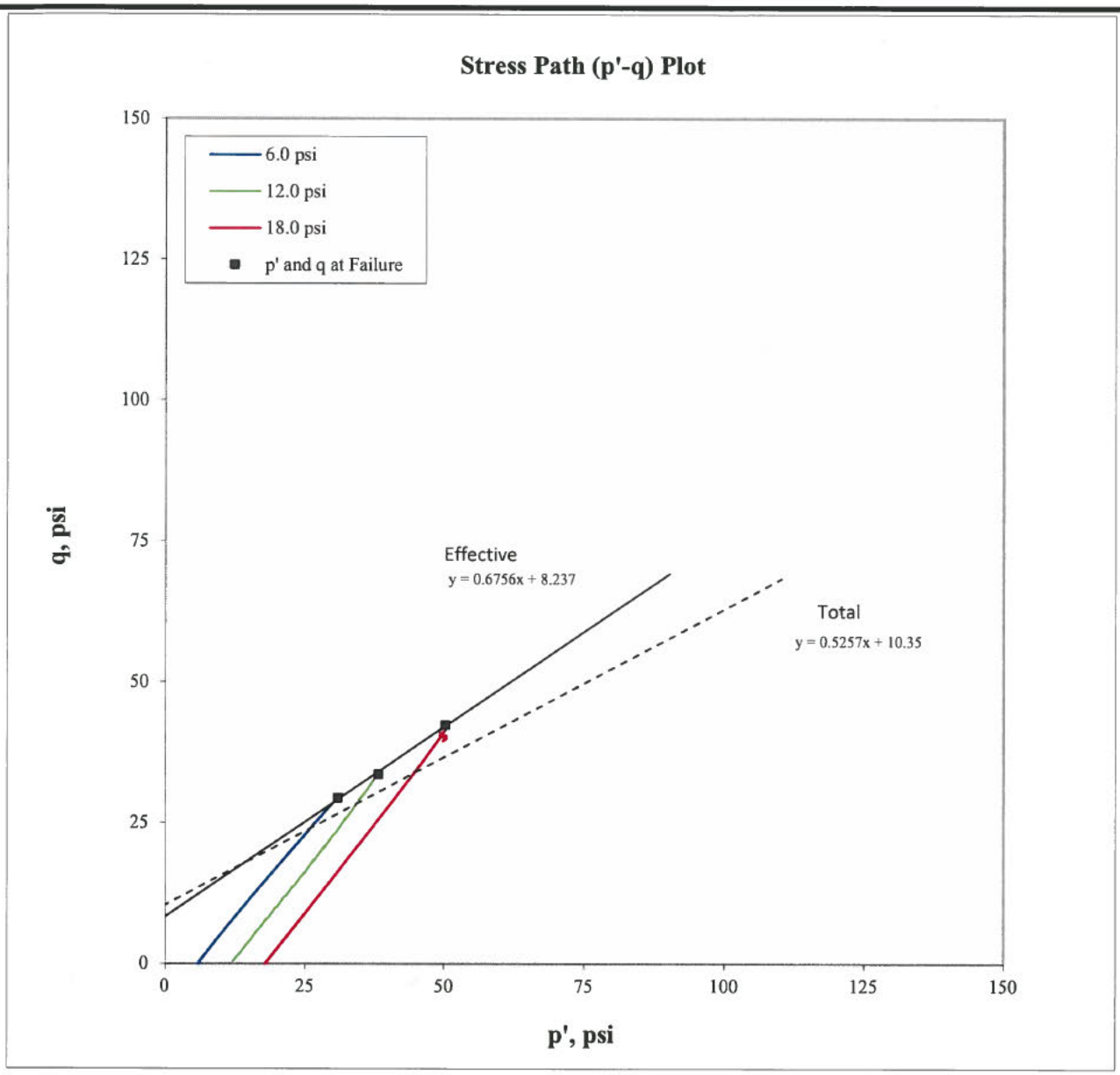
Golder Associates Inc. Atlanta, Georgia	Title: MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT q AND EXCESS PORE PRESSURE PLOTS				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-7 UD 5.0-7.0'	Technician: FT/PWM Check:	Reviewed: Approved:	Start Date: 8/29/2018	Job Number: 18103173	Figure: 2





Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-7 UD 5.0-7.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **8/29/2018**	**Job Number:** **18103173**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
6.0	35.4	30.9	29.4
12.0	45.6	38.2	33.6
18.0	60.4	50.3	42.4

Effective

α ' =	34.0	degree
a' =	8.2	psi

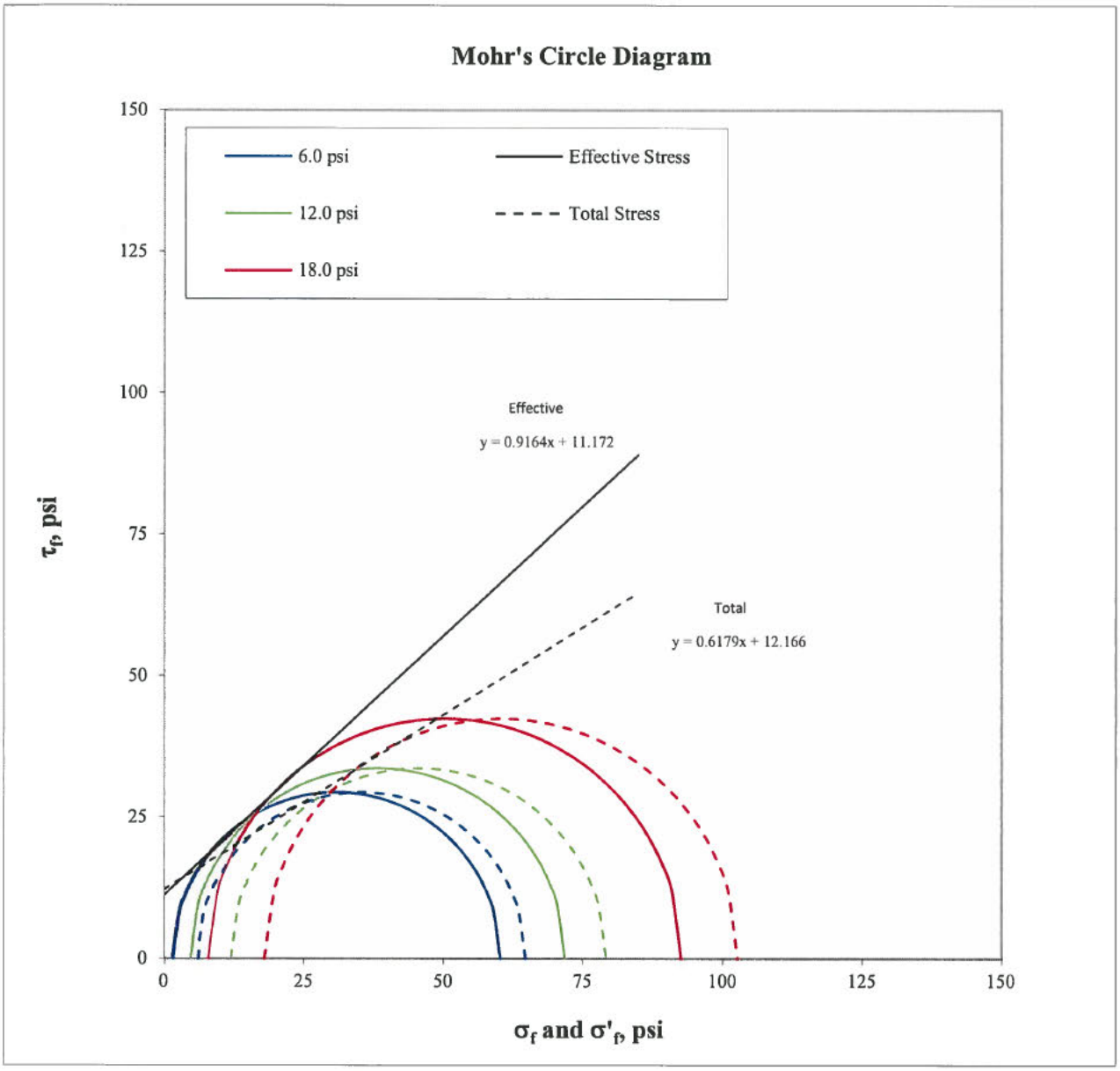
Total

α =	27.7	degree
a =	10.3	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. Atlanta, Georgia	**Title:** MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT STRESS PATH PLOT				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-7 UD 5.0-7.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 8/29/2018	**Job Number:** 18103173	**Figure:** 4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
6.0	60.2	1.5	64.7	6.0
12.0	71.8	4.6	79.2	12.0
18.0	92.7	7.9	102.8	18.0

Effective

ϕ' =	42.5	degree
c' =	11.2	psi

Total

ϕ =	31.7	degree
c =	12.2	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-7 UD 5.0-7.0'	FT/PWM Check:	Approved:	8/29/2018	18103173	5

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMEN PHOTOGRAPH - Single Specimen**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-7 UD 5.0-7.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **8/29/2018**	**Job Number:** **18103173**	**Figure:** **6**

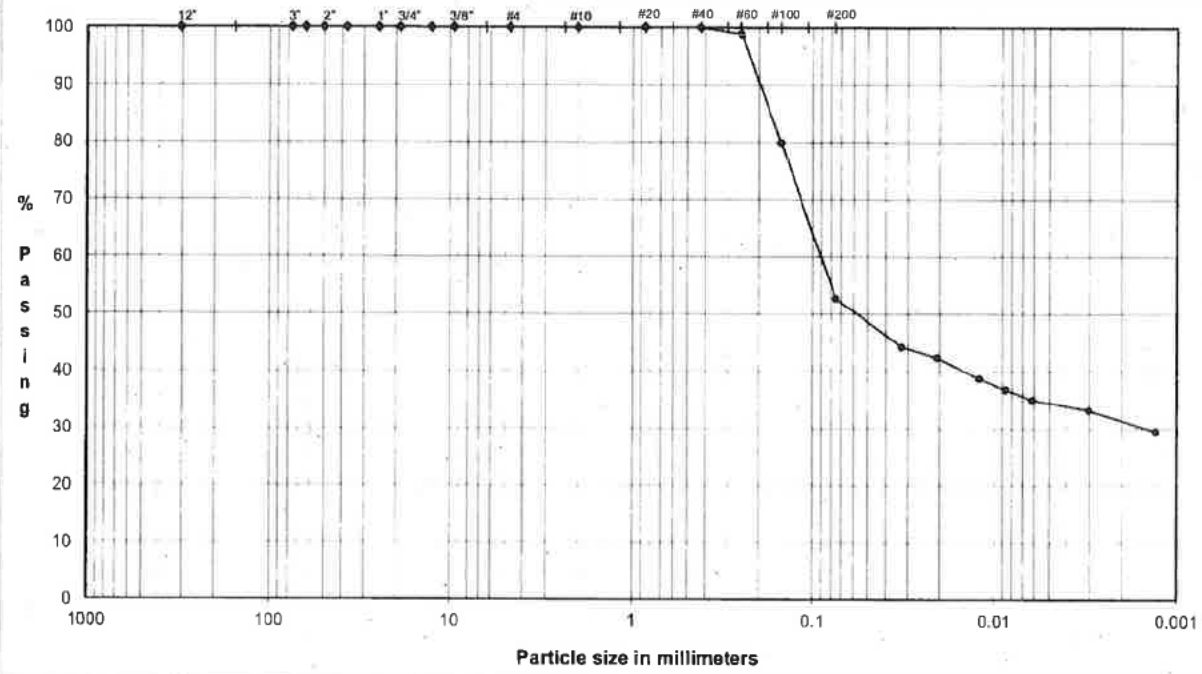
JUNE 2018

18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-7** Depth: **7.0-9.0'**
TYPE: **UD**



COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

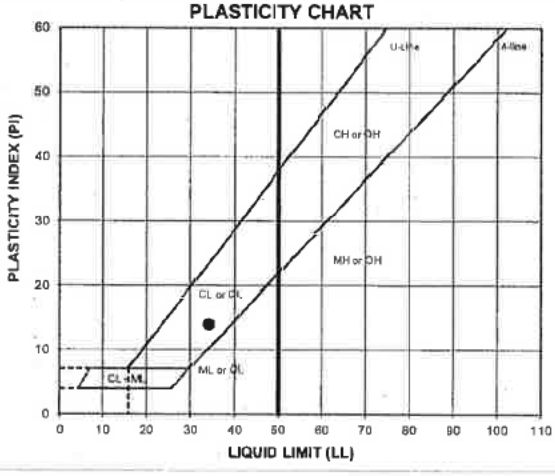
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**98.9**		
#100	0.15	**79.9**		
#200	0.075	**52.7**	Fine Sand	**47.3**

Hydrometer Analysis

(mm)	%Finer		
0.033	**44.2**		
0.021	**42.4**		
0.012	**38.7**	Fines	
0.0086	**36.8**	Silt or Clay	**52.7**
0.0062	**35.0**		
0.0030	**33.2**		
0.0013	**29.5**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
21.8	**34**	**20**	**14**	**0.13**

LL (oven-dried) / 0.75 ORGANIC (OLOH)

DESCRIPTION: SILTY CLAY and SAND, fine to medium; yellowish brown.

USCS: CL

TECH	TJ
DATE	6/7/18
CHECK	
REVIEW	
APPROVE	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		Board #	15	COMMENTS
PROJECT NUMBER	18103173		Flow Pump	2	
SAMPLE ID	B-7	7.0-9.0'	Flow Pump Speed	7	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.000	B-Value, f	0.98	Height, inches	3.001
Diameter, inches	2.883	Cell Pres.	88.0	Diameter, inches	2.874
Area, cm²	42.12	Bot. Pres.	80.0	Area, cm²	41.85
Volume, cm³	320.92	Top Pres.	80.0	Volume, cm³	319.03
Mass, g	614.74	Tot. B.P.	80.0	Mass, g	632.69
Moisture Content, %	21.80	Head, max.	61.90	Moisture Content, %	25.36
Dry Density, pcf	98.14	Head, min.	61.90	Dry Density, pcf	98.72
Spec. Gravity (assumed)	2.700	Max. Grad.	8.12	Volume Solids, cm³	186.93
Volume Solids, cm³	186.93	Min. Grad.	8.12	Volume Voids, cm³	132.10
Volume Voids, cm³	133.99			Void Ratio	0.71
Void Ratio	0.72			Saturation, %	96.9%
Saturation, %	82.1%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	614.74	714.76
Wt Soil & Tare, f	g	504.72	586.83
Wt Tare	g	0.00	82.29
Wt Moisture Lost	g	110.02	127.93
Wt Dry Soil	g	504.72	504.54
Water Content	%	21.80%	25.36%

Flow Pump Rate: 2.38E-04 cm³/sec

USCS: CL

DESCRIPTION: SILTY CLAY and SAND, fine to medium; yellowish brown.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/08/18	43259	14	30	21.8	0	0	0	0	0.88	61.90	8.12	6.7E-07
06/08/18	43259	14	35	21.8	5	5	300	300	0.88	61.90	8.12	6.7E-07
06/08/18	43259	14	40	21.8	5	10	300	600	0.88	61.90	8.12	6.7E-07
06/08/18	43259	14	45	21.8	5	15	300	900	0.88	61.90	8.12	6.7E-07 *
06/08/18	43259	14	50	21.8	5	20	300	1200	0.88	61.90	8.12	6.7E-07 *
06/08/18	43259	14	55	21.8	5	25	300	1500	0.88	61.90	8.12	6.7E-07 *
06/08/18	43259	15	0	21.8	5	30	300	1800	0.88	61.90	8.12	6.7E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 6.7E-07 cm/sec **

DATE	6/8/18
CHECK	
REVIEW	
APPROVE	

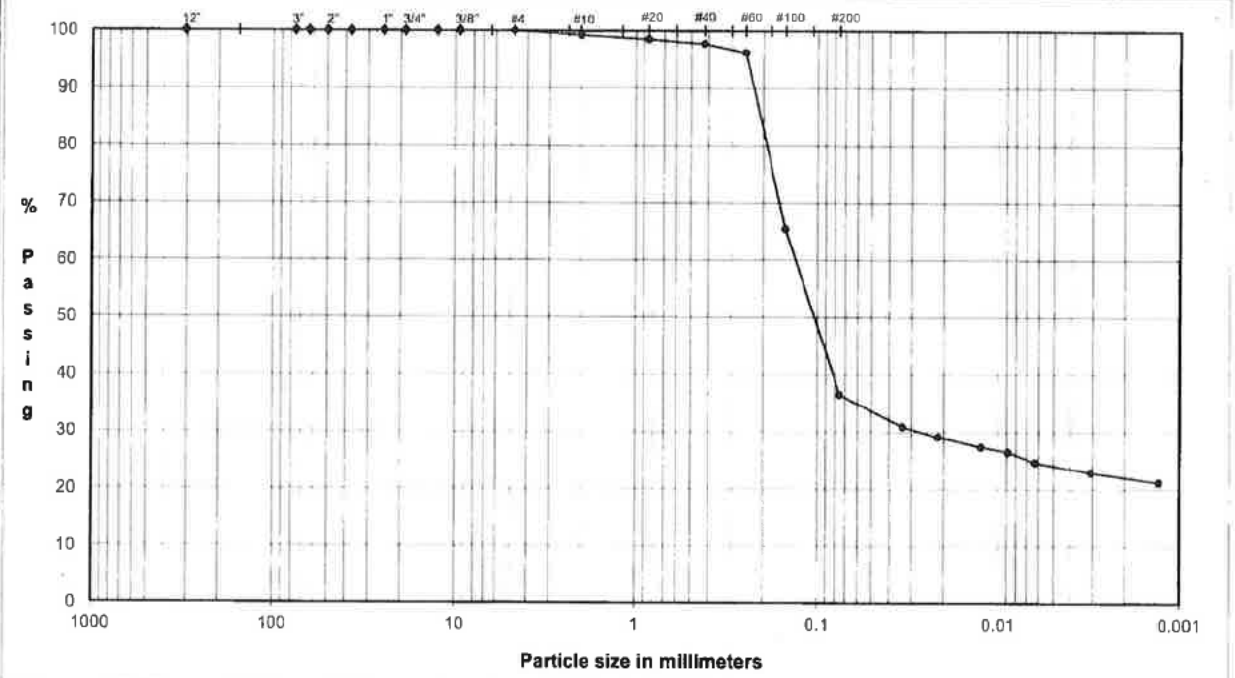
JULY 2018

18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-7** Depth: **15.0-17.0'**
TYPE: **UD**



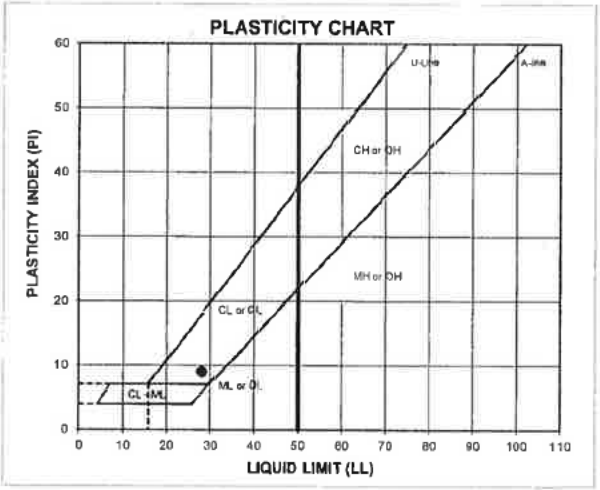
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.3**	Coarse Sand	**0.7**
#20	0.85	**98.5**		
#40	0.43	**97.8**	Medium Sand	**1.5**
#60	0.25	**96.2**		
#100	0.15	**65.4**		
#200	0.075	**36.5**	Fine Sand	**61.3**

Hydrometer Analysis

(mm)	%Finer		
0.034	**30.9**		
0.021	**29.1**		
0.013	**27.4**	Fines	
0.0088	**26.5**	Silt or Clay	**36.5**
0.0063	**24.7**		
0.0031	**22.9**		
0.0013	**21.2**		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
21.9	**28**	**19**	**9**	**0.36**

LL (oven-dried) / 0.75 · ORGANIC (OL/OH)

DESCRIPTION: SAND and SILTY CLAY, fine to coarse; grayish brown and yellow.

USCS: SC

TECH	HH/BA/TJ
DATE	7/27/18
CHECK	
REVIEW	
APPROVE	

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		
PROJECT NUMBER	18103173	**SAMPLE ID**	B-7
		SAMPLE TYPE	UD
TESTED FOR	Gs	**SAMPLE DEPTH**	15.0-17.0'

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	166.24
Weight Soil and Tare, Final (gm)	165.14
Weight Of Tare (gm)	42.93
Weight Of Moisture (gm)	1.10
Weight Of Dry Soil (gm)	122.21
Hygroscopic Moisture In (%)	0.9%

Test Method		**Method - B**
Pycnometer Number		11
Weight Pycnometer Empty (gm)		159.54
Volume of Pycnometer (gm)		499.57
Weight Pycnometer and Water (gm)		658.13
Mass of Pycnometer and Water at the test Temperture	(A)	657.81
Observed Temperature (Tb), for (Mb) In Degrees C		23.50
Weight of Soil, Water & Pycnometer (gm)	(B)	688.66
Temperature, C		23.5
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		49.87
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	49.87
Temperature Coefficient		0.9992

SPECIFIC GRAVITY (G) 2.620

$G @ 20^{0} C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	FT
DATE	7/31/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit: B-7	Boring or Test Pit:	Boring or Test Pit:
Sample: 1	Sample:	Sample:
Depth: 15.0-17.0 ft	Depth:	Depth:
Point No.: 1	Point No.:	Point No.:

Initial							
Length =	6.012	in	Length =	5.936	Length =	5.798	
Diameter =	2.877	in	Diameter =	2.889	Diameter =	2.923	
Wet Mass =	2.817	lb	Wet Mass =		Wet Mass =		
Area =	6.501	in^2	Area =		Area =		
Volume =	39.083	in^3	Volume =		Volume =		
Specific Gravity =	2.62	(ASTM D854)	Specific Gravity =		Specific Gravity =		
Dry Mass of Solids =	2.311	lb	Dry Mass of Solids =		Dry Mass of Solids =		
Moisture Content =	21.9%		Moisture Content =		Moisture Content =		
Wet Unit Weight =	124.5	pcf	Wet Unit Weight =		Wet Unit Weight =		
Dry Unit Weight =	102.2	pcf	Dry Unit Weight =		Dry Unit Weight =		
Void Ratio =	0.60		Void Ratio =		Void Ratio =		
Percent Saturation =	96%		Percent Saturation =		Percent Saturation =		

After Consolidation									
Length =	5.936	in	Length =	5.798	in	Length =	5.704	in	
Diameter =	2.889	in	Diameter =	2.923	in	Diameter =	2.947	in	
Area =	6.556		Area =	6.712		Area =	6.822	in^2	(Method B)
Volume =	38.914		Volume =	38.914		Volume =	38.914	in^3	
Moisture Content =			Moisture Content =			Moisture Content =	22.5%		
Wet Unit Weight =			Wet Unit Weight =			Wet Unit Weight =	125.8	pcf	
Dry Unit Weight =			Dry Unit Weight =			Dry Unit Weight =	102.6	pcf	
Void Ratio =			Void Ratio =			Void Ratio =	0.59		
Percent Saturation =			Percent Saturation =			Percent Saturation =	100%		

B Parameter =	1.00		B Parameter =	--		B Parameter =	--		
Shear Rate =	0.094%	/min.	Shear Rate =	0.100%	/min.	Shear Rate =	0.099%	/min.	
t_{50} =	1.0	min.	t_{50} =	0.7	min.	t_{50} =	0.8	min.	
Strain at Failure =	1.0%		Strain at Failure =	2.7%		Strain at Failure =	4.7%		
Cell Pressure =	64.0	psi	Cell Pressure =	78.0	psi	Cell Pressure =	92.0	psi	
Back Pressure =	50.0	psi	Back Pressure =	50.0	psi	Back Pressure =	50.0	psi	
Confining Pressure =	14.0	psi	Confining Pressure =	28.0	psi	Confining Pressure =	42.0	psi	

Notes: Sample description: (SC) SAND and SILTY CLAY, fine to coarse; grayish brown and yellow.

Atterberg limits: LL = 28 PL = 19 PI = 9 (ASTM D4318)

Percent finer: 3/4 in. = 100.0% No. 4 = 100.0% No. 200 = 36.5% (ASTM D422, refer to separate report for gradation curve)

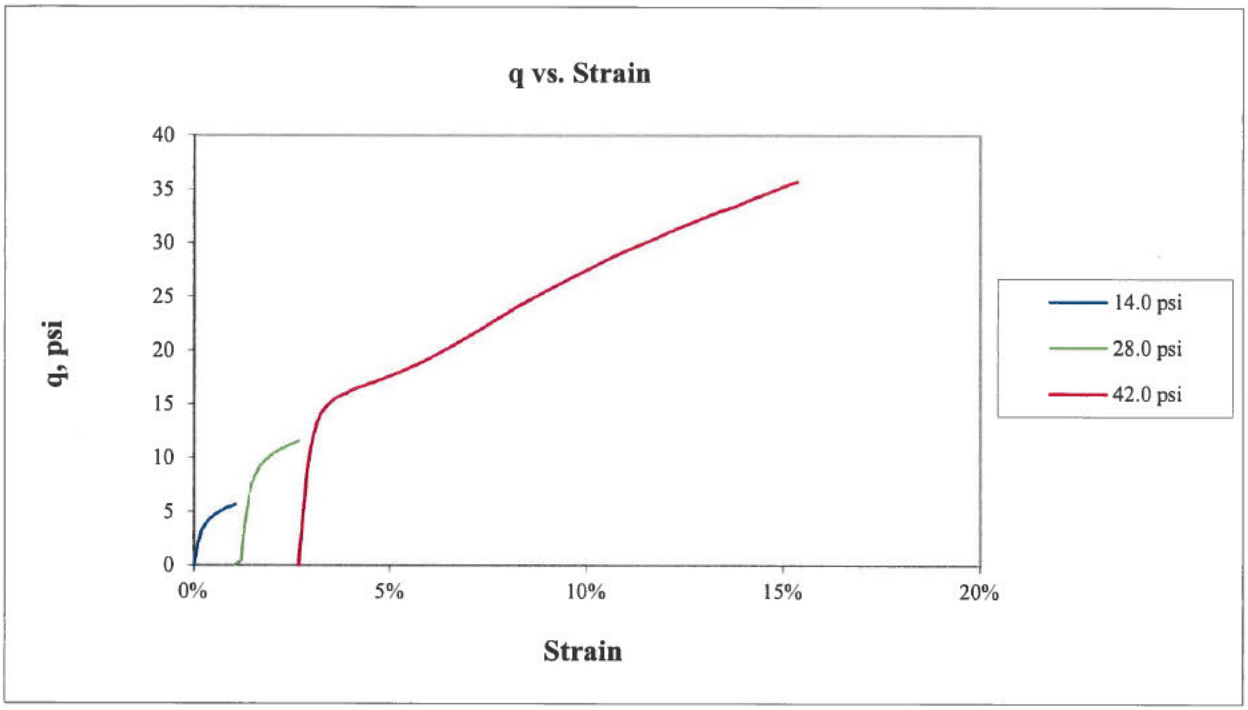
Specimen type:	X	Intact		Reconstituted	
Moisture from:		Cuttings	X	Entire specimen	
Saturation method:	X	Wet		Dry	
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$	% strain
Membrane effect:	X	Corrected		Not Corrected	

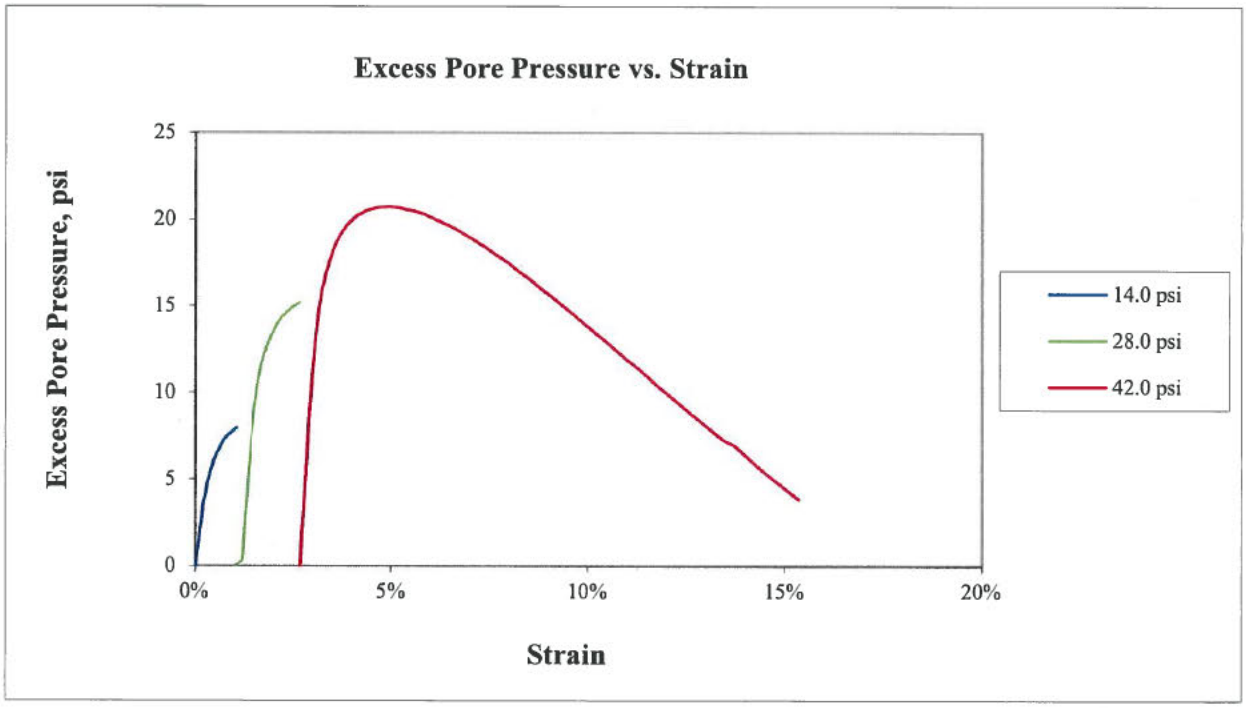
Golder Associates Inc.
Atlanta, Georgia

Title:
MODIFIED (Multi-Stage) - ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SAMPLE AND TEST DATA

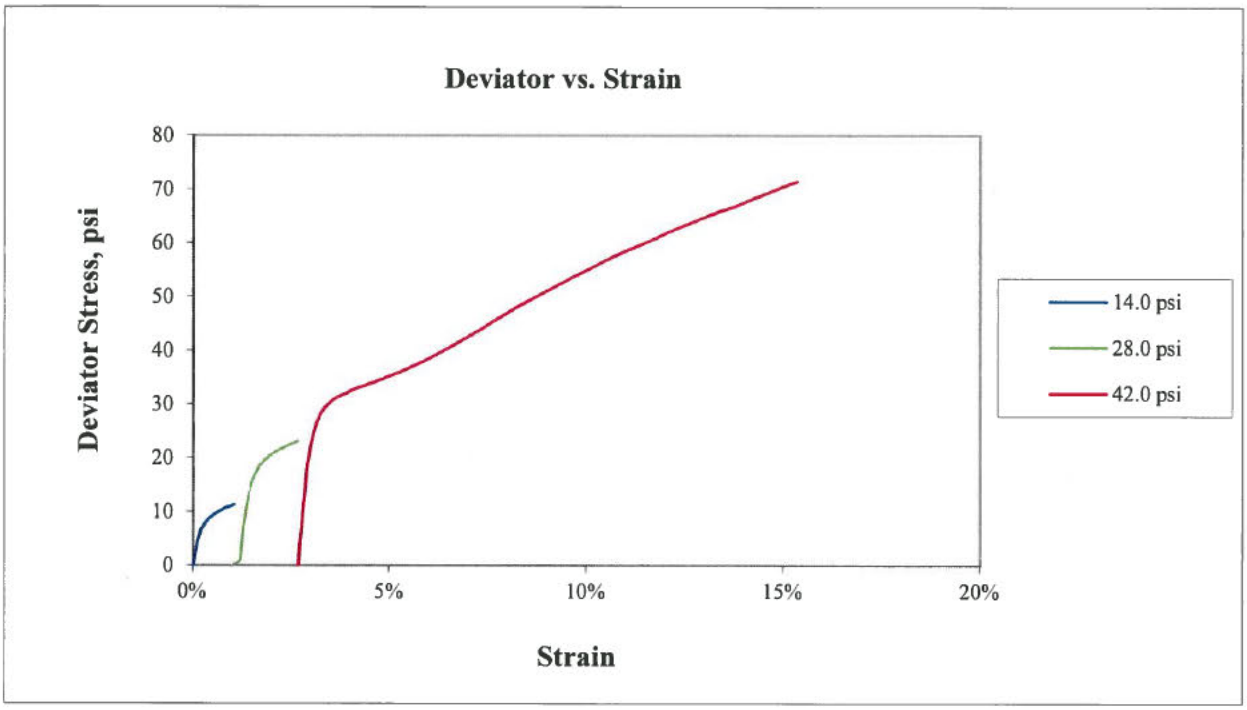
Job Short Title:
FTN/ENTERGY WHITE BLUFF/AR

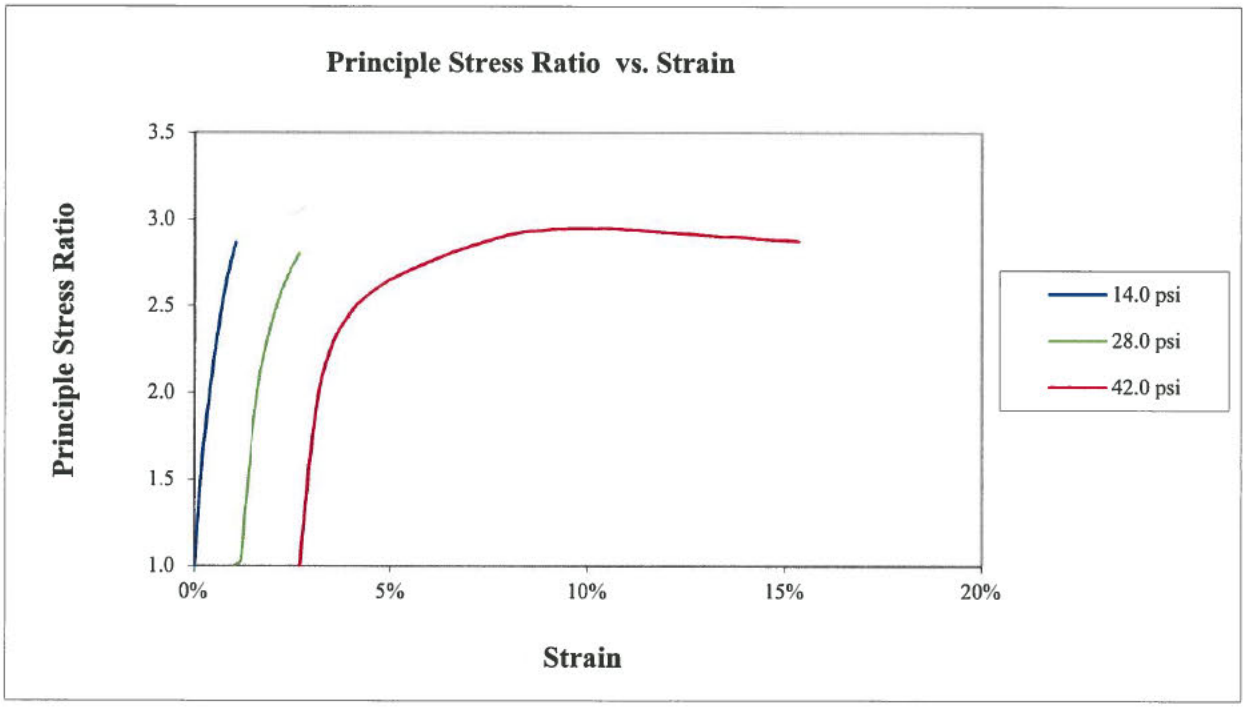
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-7 UD 15.0-17.0'	FT/PWM Check: JWL	Approved:	7/10/2018	18103173	1





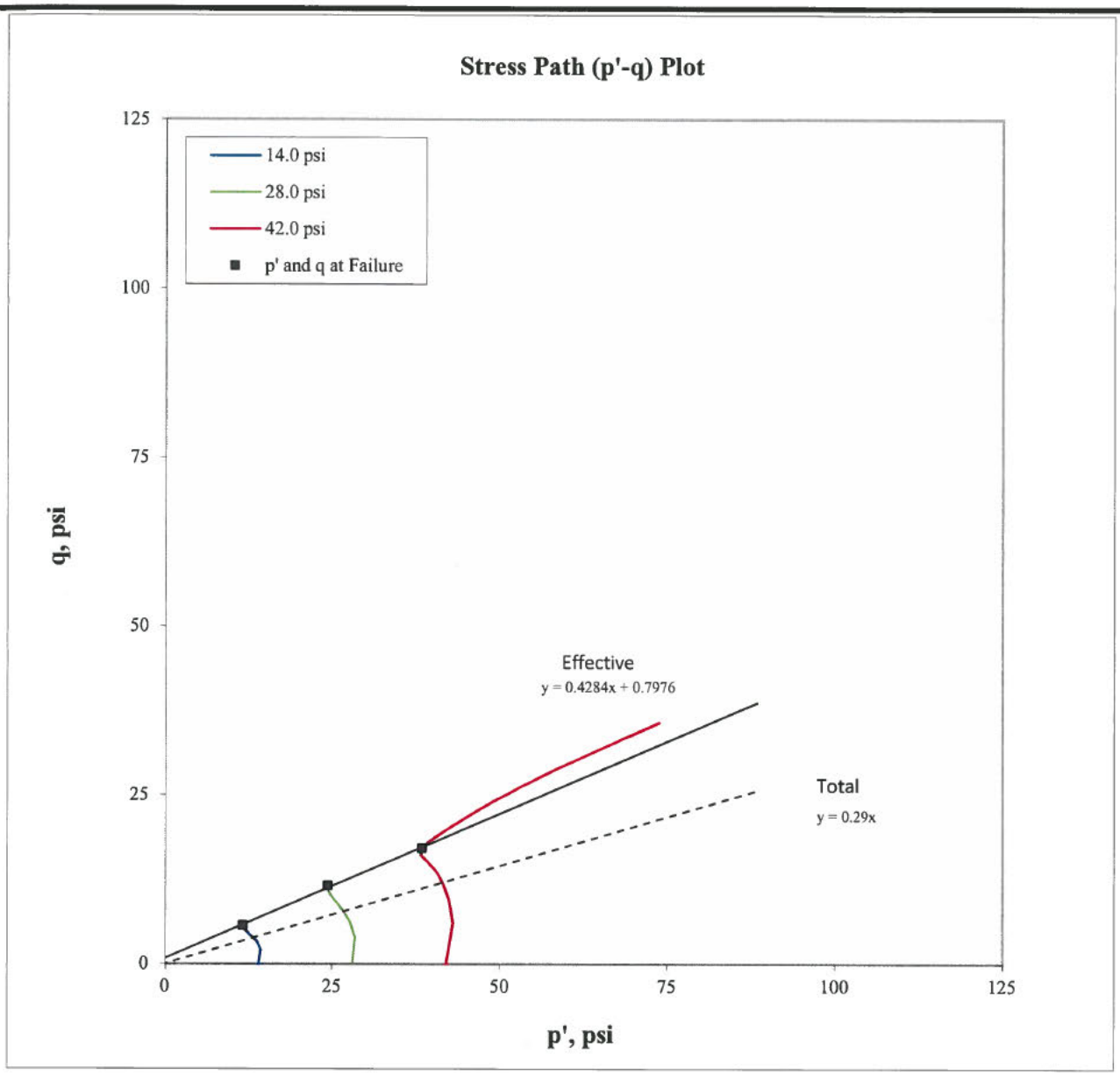
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-7 UD 15.0-17.0'**	**Technician:** **FT/PWM** **Check:** IWN	**Reviewed:** **Approved:**	**Start Date:** **7/10/2018**	**Job Number:** **18103173**	**Figure:** **2**





Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **B-7 UD 15.0-17.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **7/10/2018**	**Job Number:** **18103173**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
14.0	19.6	11.7	5.6
28.0	39.6	24.4	11.6
42.0	59.1	38.4	17.1

Effective

α ' =	23.2	degree
a' =	0.8	psi

Total

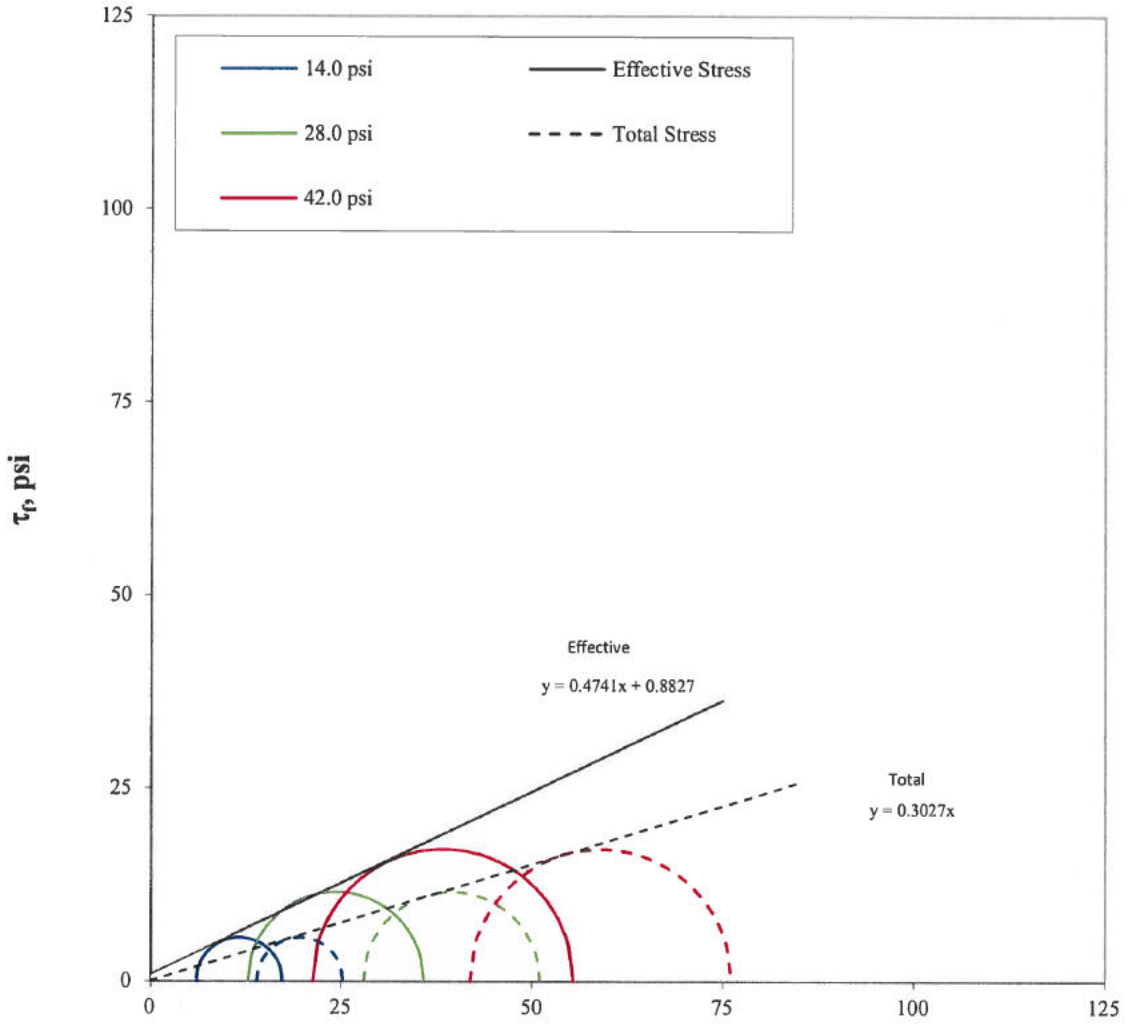
α =	16.2	degree
a =	0.0	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-7 UD 15.0-17.0'	FT/PWM Check:	Approved:	7/10/2018	18103173	4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
14.0	17.3	6.0	25.3	14.0
28.0	35.9	12.8	51.1	28.0
42.0	55.5	21.3	76.2	42.0

Effective

ϕ' =	25.4	degree
c' =	0.9	psi

Total

ϕ =	16.9	degree
c =	0.0	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. Atlanta, Georgia	**Title:** MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT MOHR'S CIRCLE DIAGRAM				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-7 UD 15.0-17.0'	**Technician:** FT/PWM **Check:** AW 4	**Reviewed:** **Approved:**	**Start Date:** 7/10/2018	**Job Number:** 18103173	**Figure:** 5

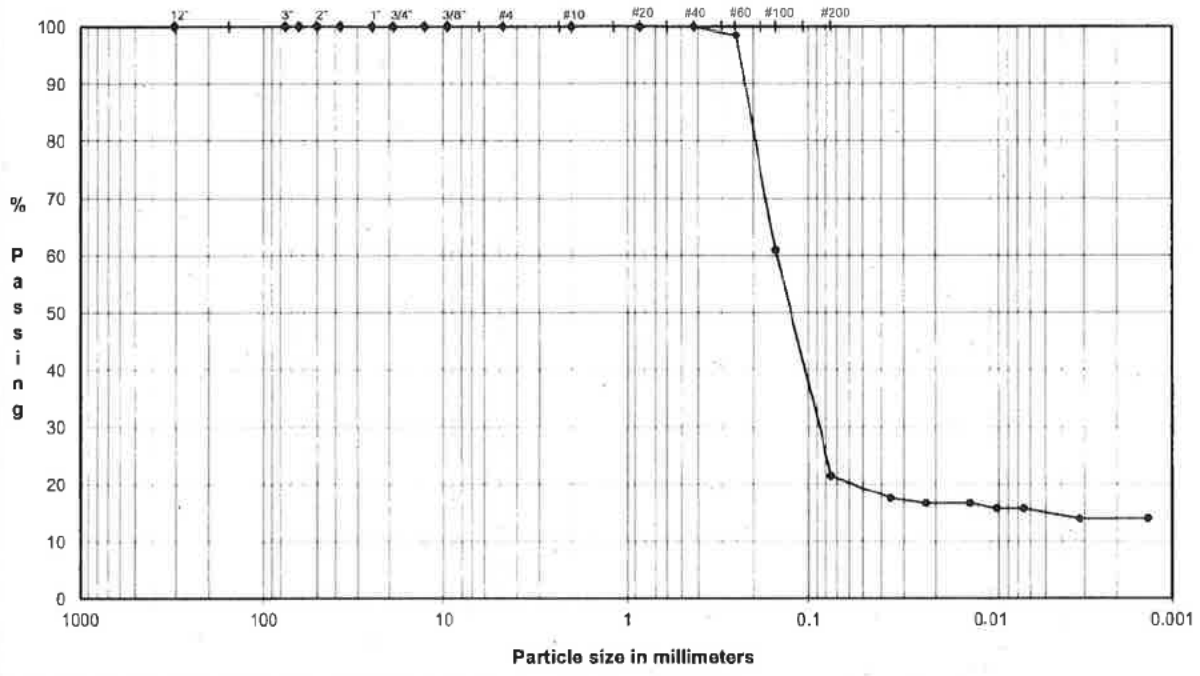
Golder Associates Inc. Atlanta, Georgia	Title: MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - Single Specimen				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: B-7 UD 15.0-17.0'	Technician: FT/PWM Check:	Reviewed: Approved:	Start Date: 7/10/2018	Job Number: 18103173	Figure: 6

AUGUST 2018 | 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **B-7** Depth: **18.0-20.0'**
TYPE: **Bag**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

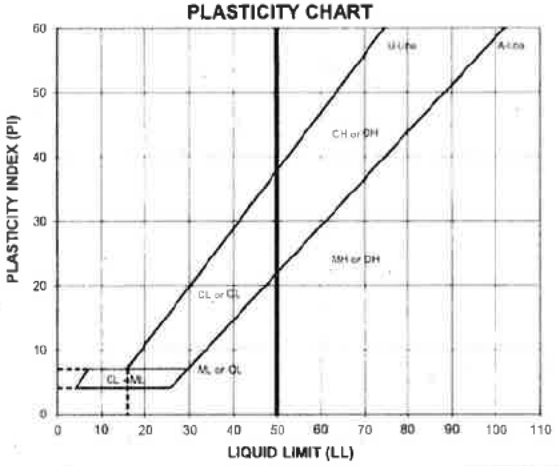
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**98.5**		
#100	0.15	**60.9**		
#200	0.075	**21.4**	Fine Sand	**78.5**

Hydrometer Analysis

(mm)	%Finer		
0.035	**17.5**		
0.023	**16.6**		
0.013	**16.6**	Fines	
0.0092	**15.8**	Silt or Clay	**21.4**
0.0065	**15.8**		
0.0032	**14.0**		
0.0013	**14.0**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.8	**NP**	**NP**	**NP**	**NP**

LL (oven-dried) / 0.75 = ORG MC (OL OH)

DESCRIPTION: SILTY SAND, fine; light gray.

USCS: SM

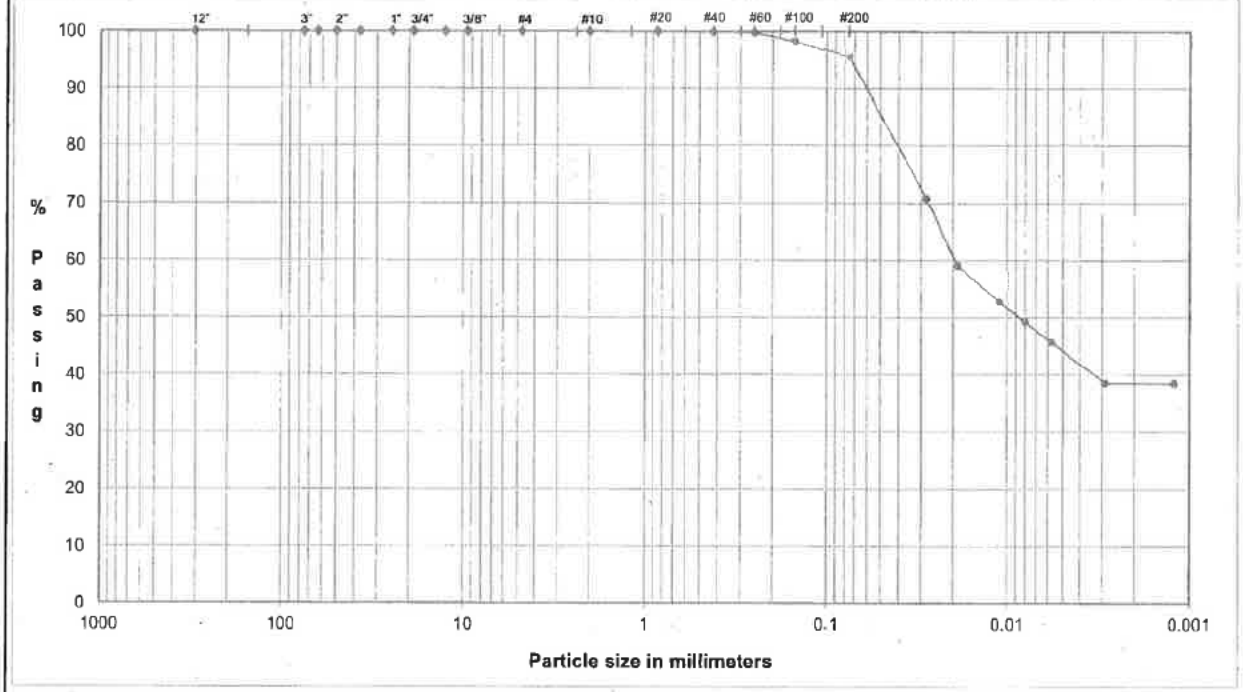
TECH	TJ/BA/HH
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-3** Depth: **18.0-20.0'**
TYPE: **Bag**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

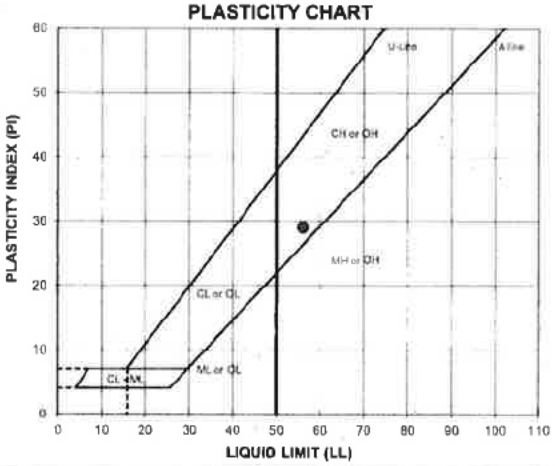
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**99.9**	Medium Sand	**0.1**
#60	0.25	**99.8**		
#100	0.15	**98.2**		
#200	0.075	**95.6**	Fine Sand	**4.3**

Hydrometer Analysis

(mm)	%Finer		
0.028	**70.8**		
0.019	**59.1**		
0.011	**52.8**	Fines	
0.0080	**49.3**	Silt or Clay	**95.6**
0.0058	**45.7**		
0.0029	**38.5**		
0.0012	**38.5**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
27.1	**56**	**27**	**29**	**0.02**

LL (oven-dried) / 0.75 · ORGANIC (OL/OH)

DESCRIPTION: CLAY, trace fine to medium sand; dark gray.

USCS: CH

TECH	HH/BA/TJ
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

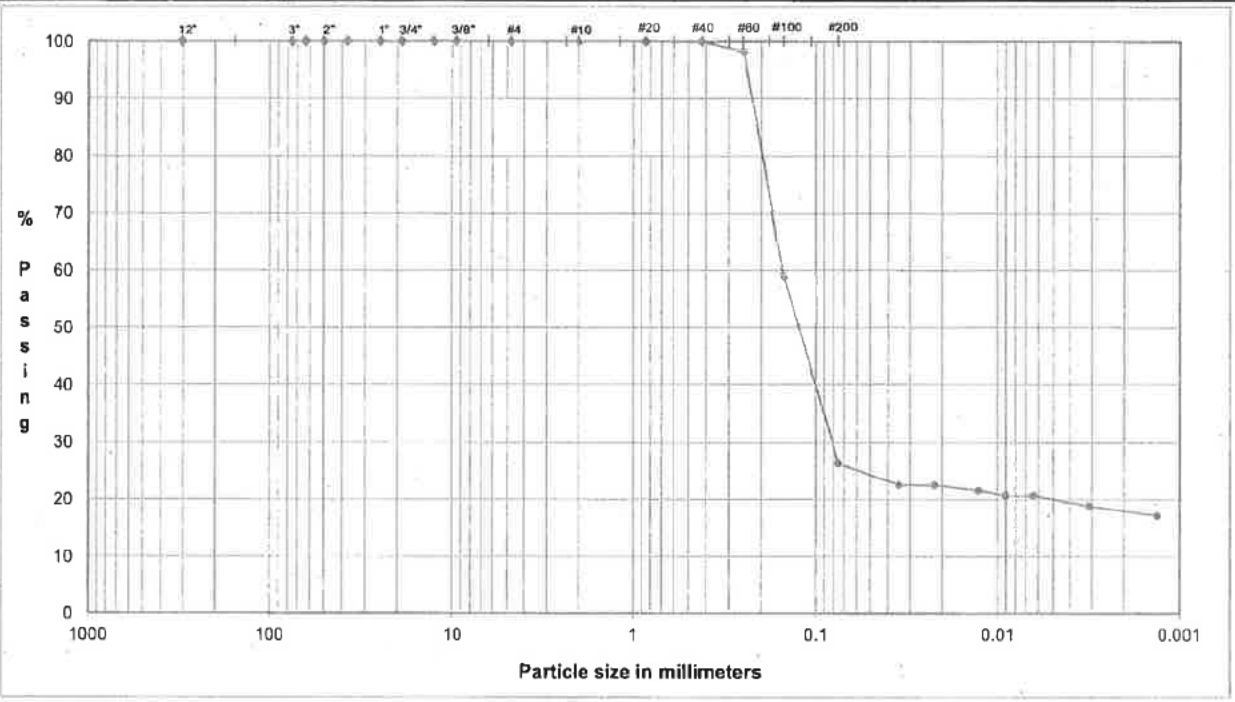
Golder Associates Inc.

AUGUST 2018 | 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-3** Depth: **29.0-30.0'**
TYPE: **UD**



COBBLES	GRAVEL: Coarse	GRAVEL: Fine	SAND: Coarse	SAND: Medium	SAND: Fine	FINES: Silt or Clay

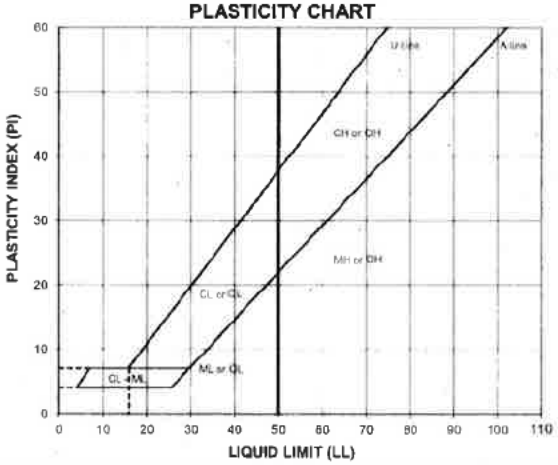
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**98.2**		
#100	0.15	**58.9**		
#200	0.075	**26.3**	Fine Sand	**73.7**

Hydrometer Analysis

(mm)	%Finer		
0.035	**22.4**		
0.022	**22.4**		
0.013	**21.5**	Fines	
0.0090	**20.6**	Silt or Clay	**26.3**
0.0064	**20.6**		
0.0032	**18.8**		
0.0013	**17.1**		

PLASTICITY CHART



ATTERBERG LIMITS
Method -B (Dry preparation)

NL	LL	PL	PI	LI
22.4	NP	NP	NP	NP

LL (oven-dried) / 0.75 · OROANIC (OLOD)

DESCRIPTION: SILTY SAND, fine; dark gray.

USCS: SM

TECH	HH/TJ
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

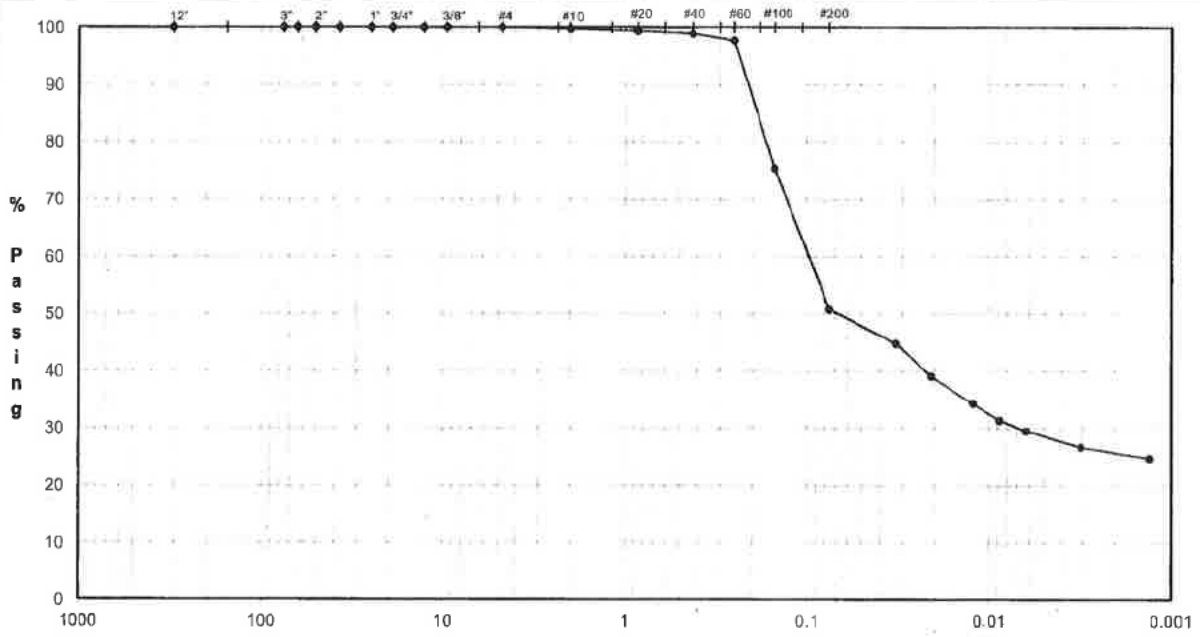
Golder Associates Inc.

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-4** Depth: **8.0-9.0'**
TYPE: **Bag**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

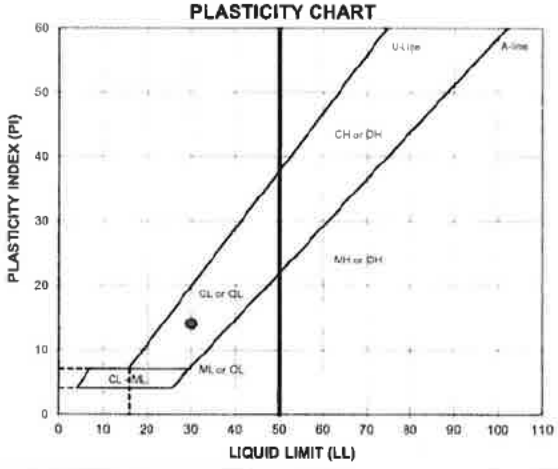
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.8**	Coarse Sand	**0.2**
#20	0.85	**99.4**		
#40	0.43	**99.0**	Medium Sand	**0.8**
#60	0.25	**97.8**		
#100	0.15	**75.4**		
#200	0.075	**50.8**	Fine Sand	**48.2**

Hydrometer Analysis

(mm)	%Finer		
0.032	**44.7**		
0.021	**39.0**		
0.012	**34.3**	Fines	
0.0088	**31.4**	Silt or Clay	**50.8**
0.0063	**29.5**		
0.0031	**26.7**		
0.0013	**24.8**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

NL	LL	PL	PI	LI
13.4	30	16	14	-0.17

LL (oven-dried) / 0.75 ORGANIC (OL,OH)

DESCRIPTION: SILTY CLAY and SAND, fine to coarse; brown

USCS: CL

TECH	TJ/HH/HEH
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

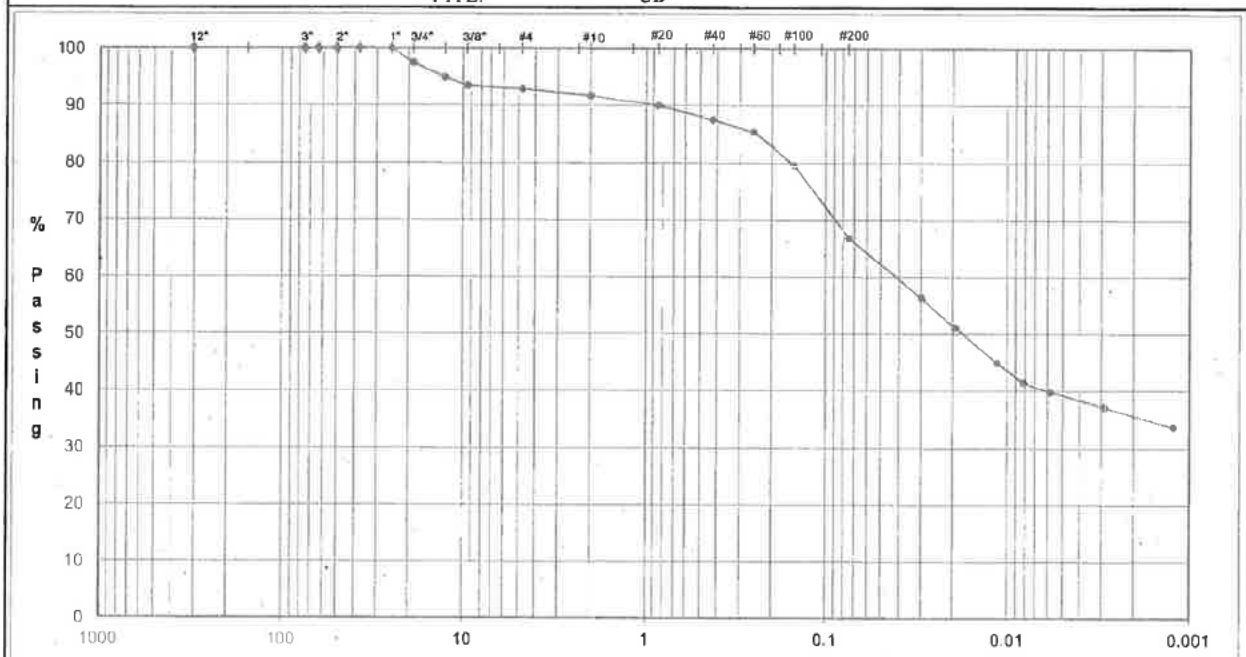
JULY 2018

18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-4** - Depth: **20.0-22.0'**
TYPE: **UD**



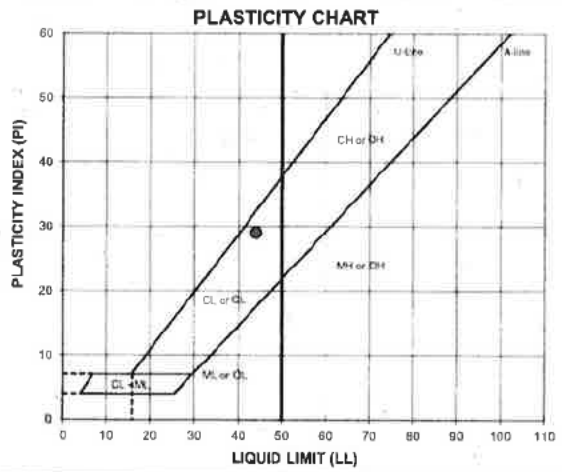
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**97.6**	Coarse Gravel	**2.4**
0.50"	12.7	**94.9**		
0.375"	9.5	**93.5**		
#4	4.8	**93.0**	Fine Gravel	**4.7**
#10	2.00	**91.8**	Coarse Sand	**1.2**
#20	0.85	**90.0**		
#40	0.43	**87.6**	Medium Sand	**4.2**
#60	0.25	**85.4**		
#100	0.15	**79.6**		
#200	0.075	**66.9**	Fine Sand	**20.7**

Hydrometer Analysis

(mm)	%Finer		
0.030	**56.3**		
0.019	**51.1**		
0.011	**45.0**	Fines	
0.0082	**41.6**	Silt or Clay	**66.9**
0.0058	**39.8**		
0.0029	**37.2**		
0.0012	**33.8**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.2	**44**	**15**	**29**	**0.24**

LL (oven-dried) / 0.75 ORGANIC (OL/OH)

DESCRIPTION: sandy SILTY CLAY, fine to coarse, some fine to coarse gravel; yellowish brown.

USCS: CL

TECH	TB/HH/BA
DATE	7/17/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	**FTN/ENTERGY WHITE BLUFF/AR**		
PROJECT NUMBER	**18103173**	**SAMPLE ID**	**RP-4**
		SAMPLE TYPE	**UD**
TESTED FOR	**Gs**	**SAMPLE DEPTH**	**20.0-22.0'**

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	**196.37**
Weight Soil and Tare, Final (gm)	**192.05**
Weight Of Tare (gm)	**51.66**
Weight Of Moisture (gm)	**4.32**
Weight Of Dry Soil (gm)	**140.39**
Hygroscopic Moisture In (%)	**3.1%**

Test Method		**Method - B**
Pycnometer Number		**14**
Weight Pycnometer Empty (gm)		185.81
Volume of Pycnometer (gm)		499.41
Weight Pycnometer and Water (gm)		684.20
Mass of Pycnometer and Water at the test Temperture	(A)	683.75
Observed Temperature (Tb), for (Mb) In Degrees C		25.00
Weight of Soil, Water & Pycnometer (gm)	(B)	**714.40**
Temperature, C		**25.0**
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		**48.92**
Weight of Tare		**0.00**
Weight of Dry Soil (gm)	(C)	48.92
Temperature Coefficient		0.9988

SPECIFIC GRAVITY (G) **2.674**

G @ 20^0 C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD

METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	BA
DATE	7/18/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit:	RP-4		Boring or Test Pit:	RP-4		Boring or Test Pit:	RP-4	
Sample:	UD		Sample:	UD		Sample:	UD	
Depth:	20.0-22.0 ft		Depth:	20.0-22.0 ft		Depth:	20.0-22.0 ft	
Point No.:	1		Point No.:	2		Point No.:	3	
Initial			**Initial**			**Initial**		
Length =	5.901	in	Length =	6.114	in	Length =	6.178	in
Diameter =	2.881	in	Diameter =	2.863	in	Diameter =	2.819	in
Wet Mass =	2.777	lb	Wet Mass =	2.837	lb	Wet Mass =	2.765	lb
Area =	6.519	in^2	Area =	6.438	in^2	Area =	6.241	in^2
Volume =	38.468	in^3	Volume =	39.360	in^3	Volume =	38.559	in^3
Specific Gravity =	2.67	(ASTM D854)	Specific Gravity =	2.67	(ASTM D854)	Specific Gravity =	2.67	(ASTM D854)
Dry Mass of Solids =	2.261	lb	Dry Mass of Solids =	2.346	lb	Dry Mass of Solids =	2.253	lb
Moisture Content =	22.9%		Moisture Content =	20.9%		Moisture Content =	22.7%	
Wet Unit Weight =	124.8	pcf	Wet Unit Weight =	124.5	pcf	Wet Unit Weight =	123.9	pcf
Dry Unit Weight =	101.5	pcf	Dry Unit Weight =	103.0	pcf	Dry Unit Weight =	100.9	pcf
Void Ratio =	0.64		Void Ratio =	0.62		Void Ratio =	0.65	
Percent Saturation =	95%		Percent Saturation =	91%		Percent Saturation =	93%	
After Consolidation			**After Consolidation**			**After Consolidation**		
Length =	5.819	in	Length =	6.040	in	Length =	6.119	in
Diameter =	2.862	in	Diameter =	2.841	in	Diameter =	2.814	in
Area =	6.431	in^2 (Method B)	Area =	6.341	in^2 (Method B)	Area =	6.219	in^2 (Method B)
Volume =	37.424	in^3	Volume =	38.298	in^3	Volume =	38.050	in^3
Moisture Content =	22.3%		Moisture Content =	21.5%		Moisture Content =	23.5%	
Wet Unit Weight =	127.7	pcf	Wet Unit Weight =	128.6	pcf	Wet Unit Weight =	126.4	pcf
Dry Unit Weight =	104.4	pcf	Dry Unit Weight =	105.8	pcf	Dry Unit Weight =	102.3	pcf
Void Ratio =	0.60		Void Ratio =	0.57		Void Ratio =	0.63	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.96		B Parameter =	0.98		B Parameter =	0.98	
Shear Rate =	0.009%	/min.	Shear Rate =	0.009%	/min.	Shear Rate =	0.008%	/min.
t_{50} =	6.94	min.	t_{50} =	37.68	min.	t_{50} =	30.90	min.
Strain at Failure =	4.9%		Strain at Failure =	3.5%		Strain at Failure =	10.5%	
Cell Pressure =	68.0	psi	Cell Pressure =	86.0	psi	Cell Pressure =	104.0	psi
Back Pressure =	50.0	psi	Back Pressure =	50.0	psi	Back Pressure =	50.0	psi
Confining Pressure =	18.0	psi	Confining Pressure =	36.0	psi	Confining Pressure =	54.0	psi

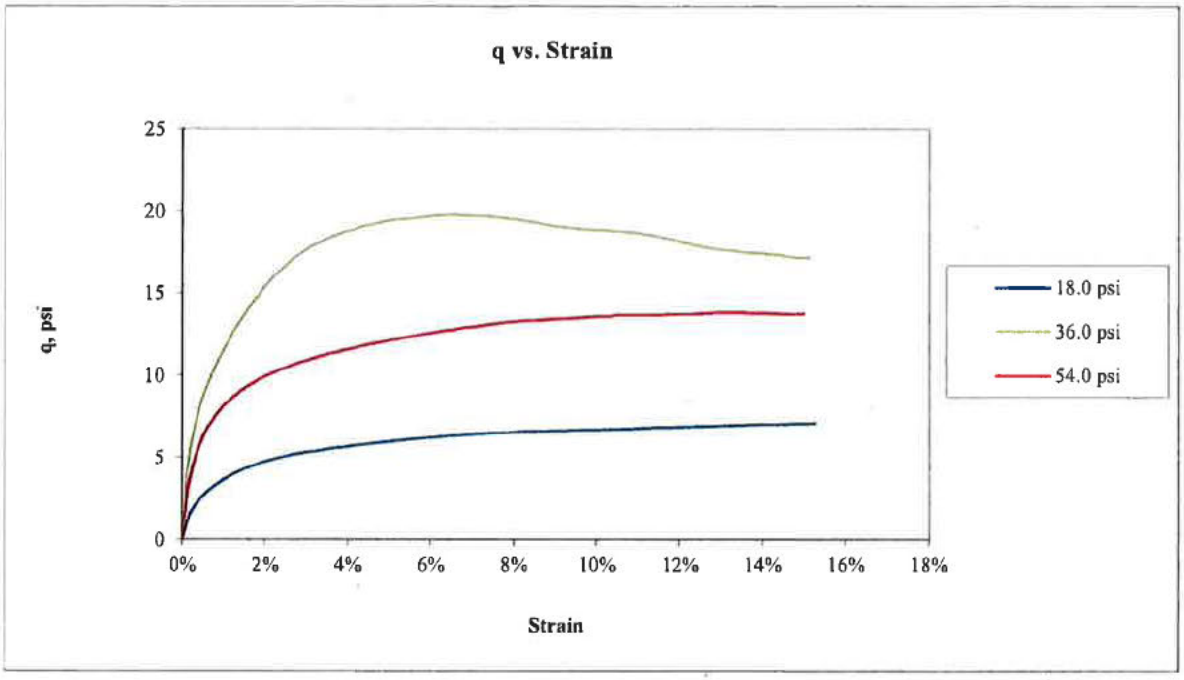
Notes: Sample description: (CL) sandy SILTY CLAY, fine to coarse, some fine to coarse gravel; yellowish brown.

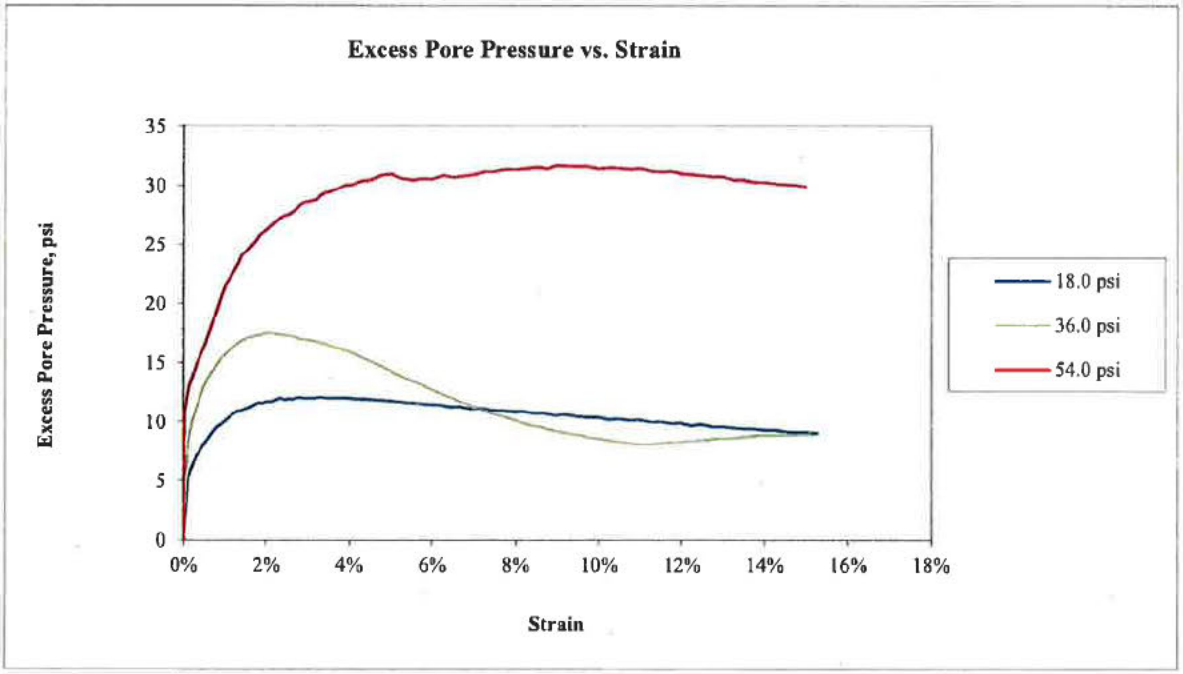
Atterberg limits: LL = 44 PL = 15 PI = 29 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 93% No. 200 = 67% (ASTM D422, refer to separate report for gradation curve)

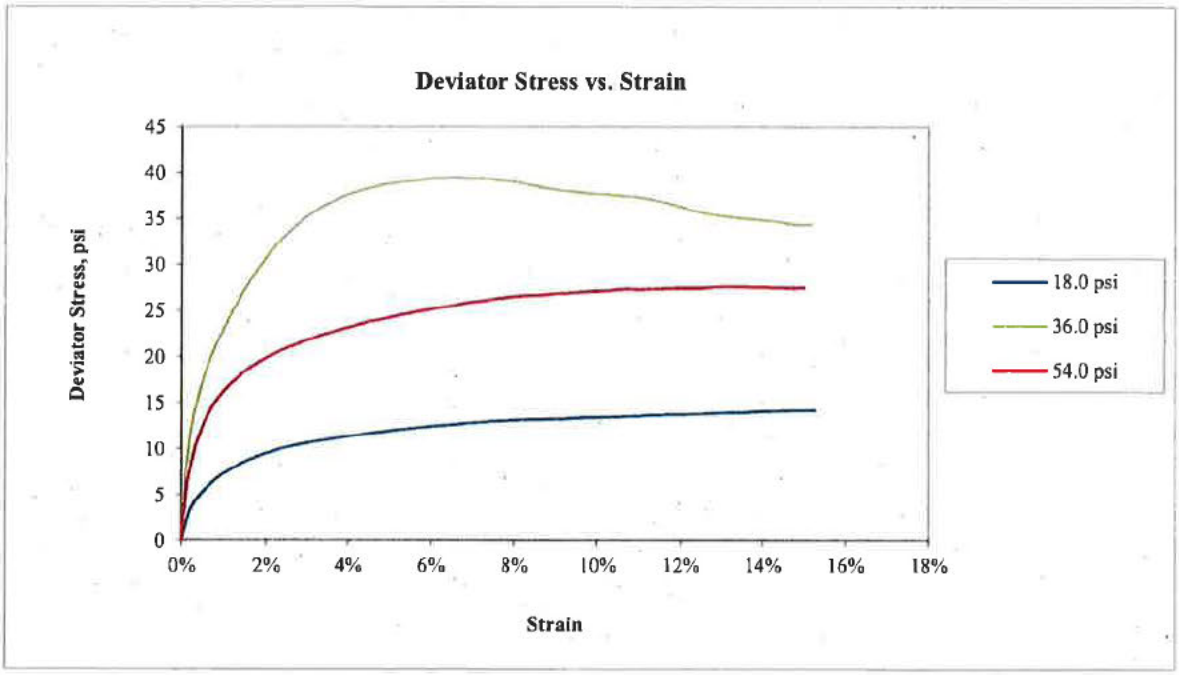
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ [ ] % strain
Membrane effect:	X	Corrected		Not Corrected

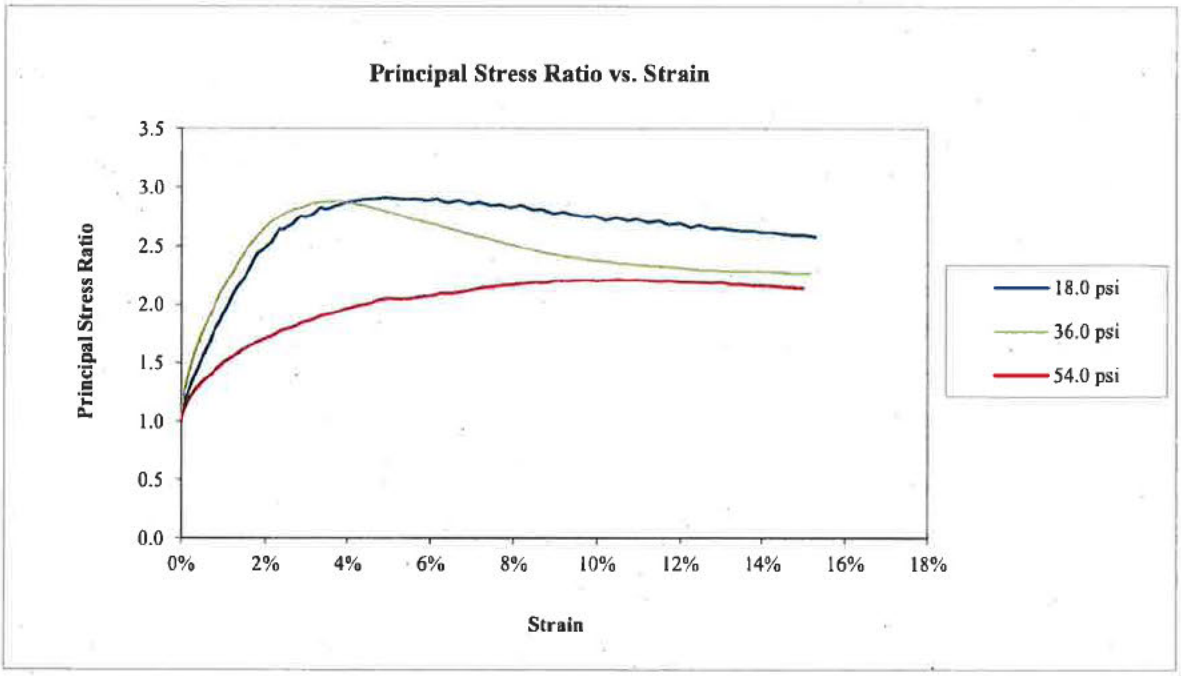
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**			
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**				
Sample: **RP-4 UD 20.0-22.0'**	**Technician:** **PWM/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **7/17/2018**	**Job Number:** **18103173**	**Figure:** **1**





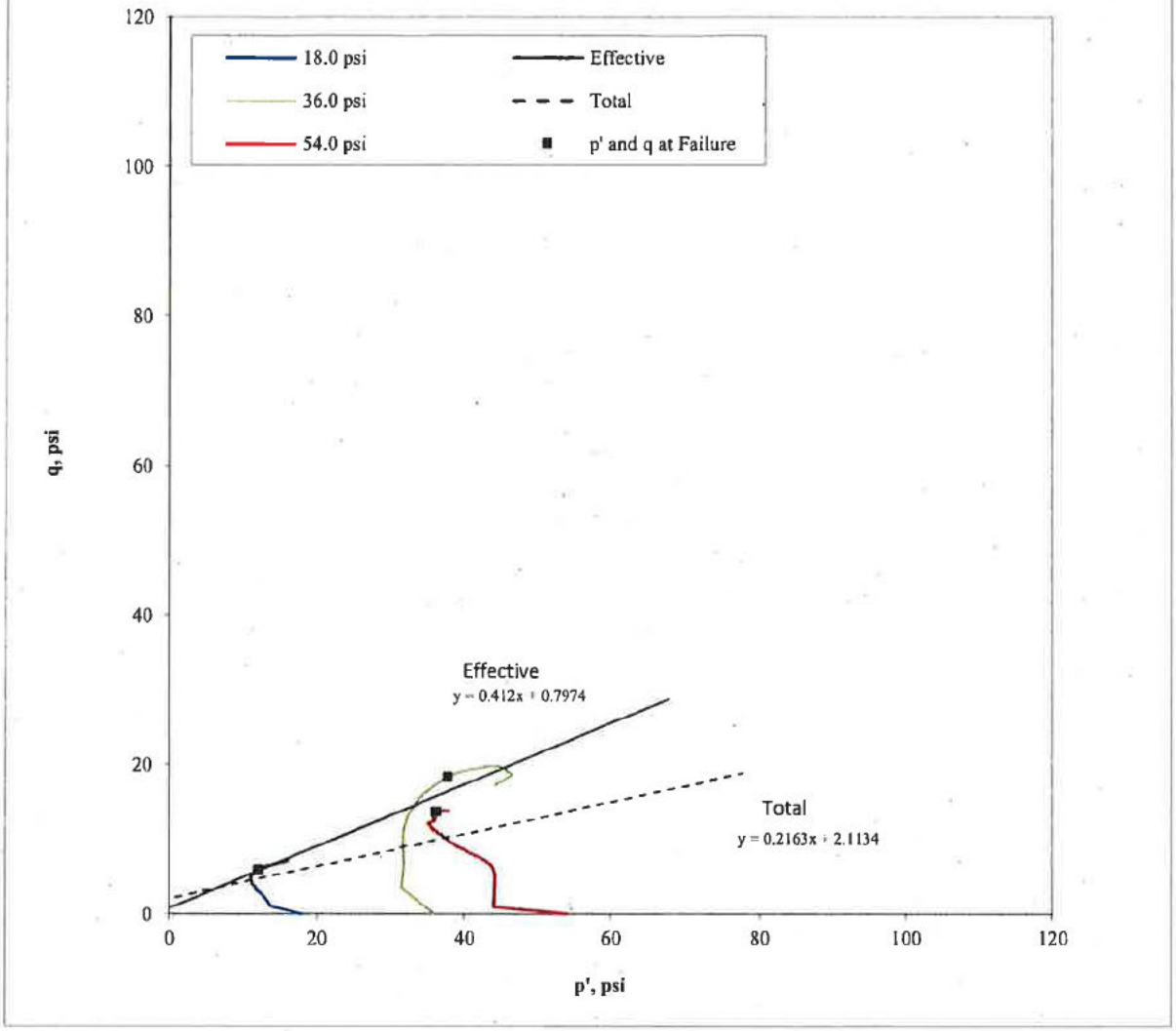
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample:	**Technician:** **PWM/FT**	**Reviewed:** SP	**Start Date:**	**Job Number:**	**Figure:**
	Check: PWM	**Approved:**			
RP-4 UD 20.0-22.0'			**7/17/2018**	**18103173**	**2**





Golder Associates Inc. Atlanta, Georgia	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT DEVIATOR STRESS AND PRINCIPAL STRESS RATIO PLOT				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: RP-4 UD 20.0-22.0'	Technician: PWM/FT Check:	Reviewed: Approved:	Start Date: 7/17/2018	Job Number: 18103173	Figure: 3

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
18.0	23.9	12.2	5.9
36.0	54.3	37.8	18.3
54.0	67.7	36.2	13.7

Effective

α' =	22.4	degree
a' =	0.8	psi

Total

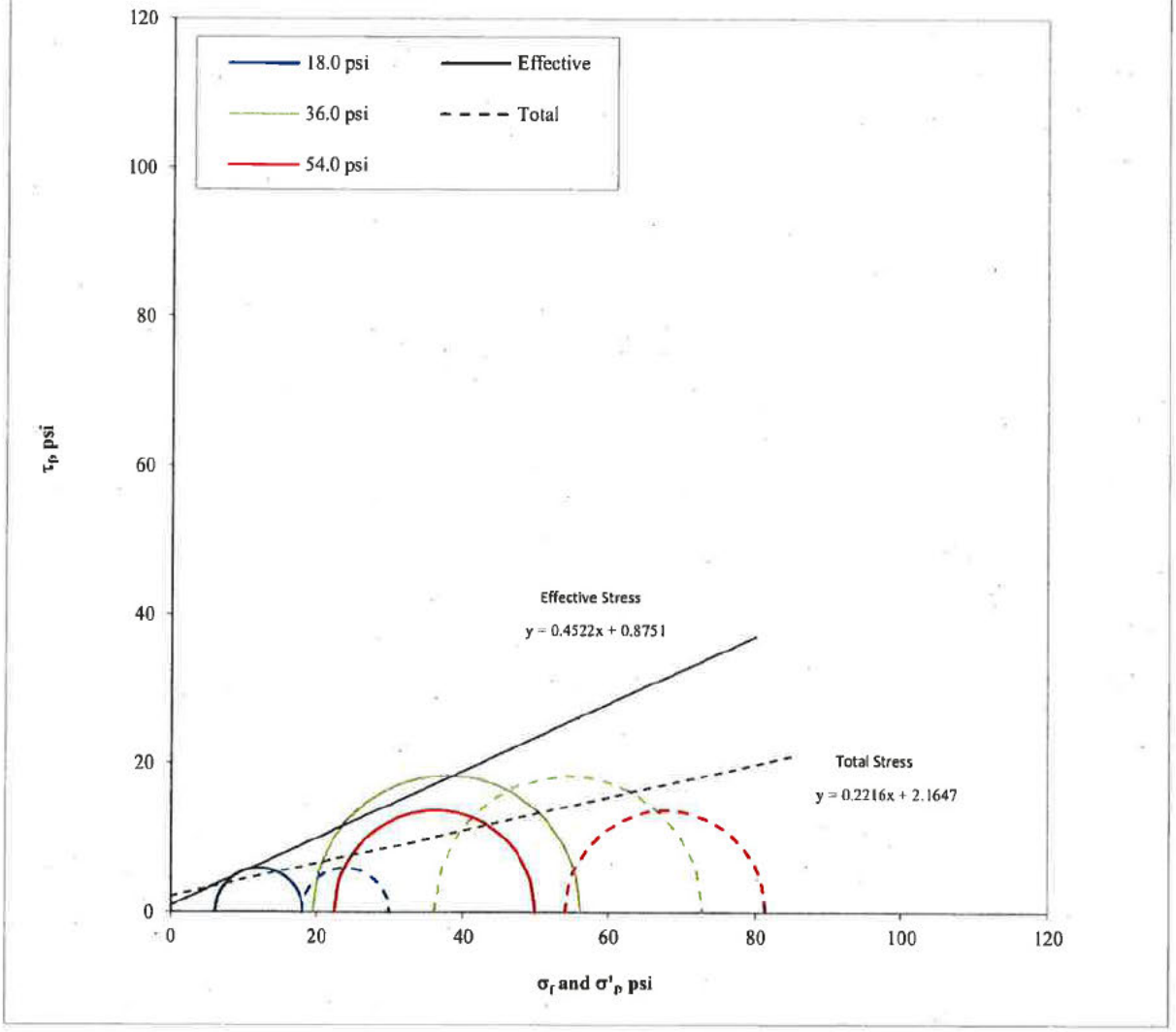
α =	12.2	degree
a =	2.1	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RP-4 UD 20.0-22.0'	PWM/FT Check:	Approved:	7/17/2018	18103173	4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
18.0	18.1	6.2	29.9	18.0
36.0	56.1	19.5	72.6	36.0
54.0	49.9	22.6	81.3	54.0

Effective

ϕ' =	24.3	degree
c' =	0.9	psi

Total

ϕ =	12.5	degree
c =	2.2	psi

Note: The laboratory testing relates only to the sample tested. GAI neither accepts responsibility for nor makes claims to the final use and purpose of the material.

Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RP-4 UD 20.0-22.0'	PWM/FT Check:	Approved:	7/17/2018	18103173	5

18.0 psi

36.0 psi

54.0 psi

NOTE: Pore pressure built up before shearing, adjusted results to initial backpressure.

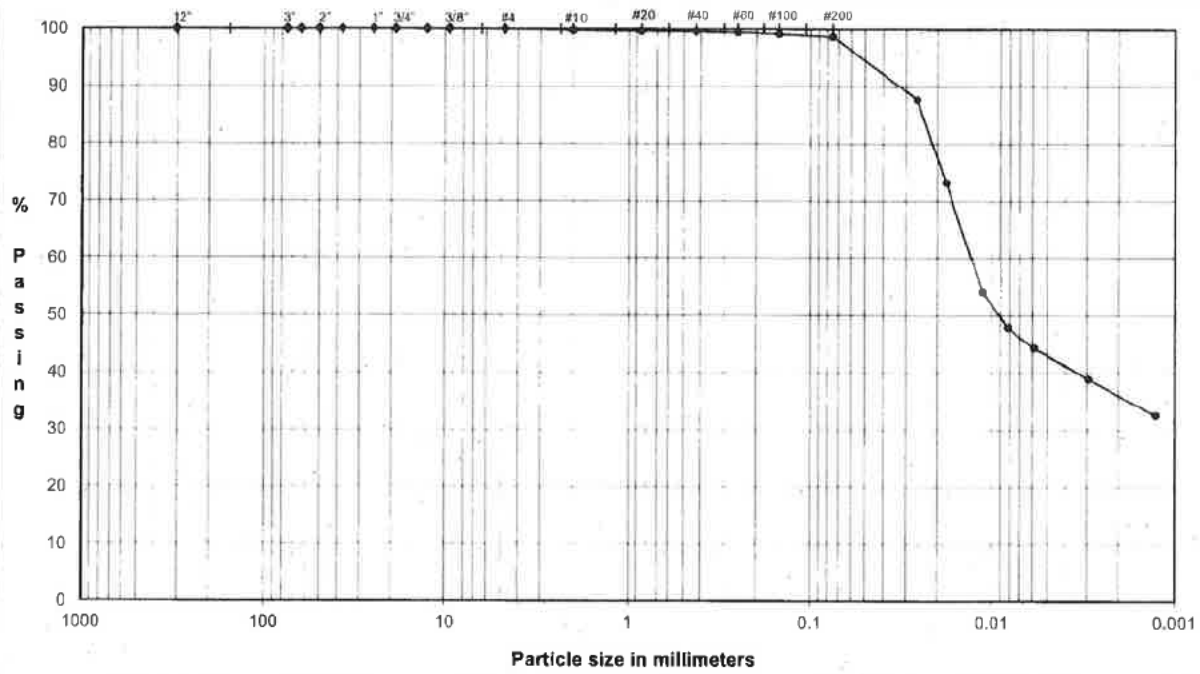
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMENS PHOTOGRAPH - 18.0 36.0 54.0 psi**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **RP-4 UD 20.0-22.0'**	**Technician:** **PWM/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **7/17/2018**	**Job Number:** **18103173**	**Figure:** **6**

AUGUST 2018 | 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-4** Depth: **25.0-26.0'**
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

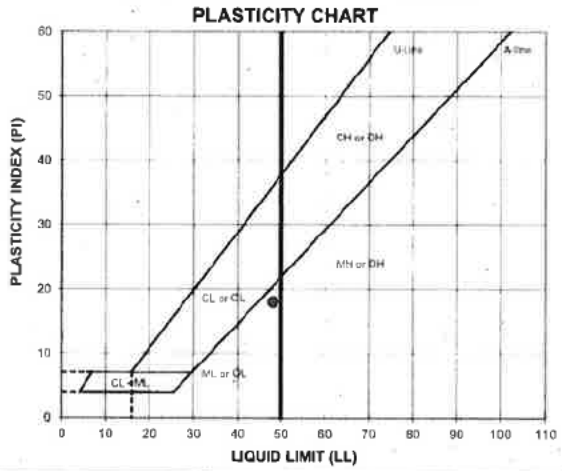
	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.8**	Coarse Sand	**0.2**
#20	0.85	**99.7**		
#40	0.43	**99.6**	Medium Sand	**0.2**
#60	0.25	**99.5**		
#100	0.15	**99.2**		
#200	0.075	**98.7**	Fine Sand	**0.9**

Hydrometer Analysis

(mm)	%Finer		
0.026	**87.7**		
0.018	**73.2**		
0.011	**54.2**	Fines	
0.0082	**47.9**	Silt or Clay	**98.7**
0.0059	**44.3**		
0.0029	**38.9**		
0.0013	**32.5**		

DESCRIPTION: CLAYEY SILT, trace fine to coarse sand; dark yellowish brown.

USCS: ML



ATTERBERG LIMITS

Method -B (Dry preparation)

NL	LL	PL	PI	LI
37.7	**48**	**30**	**18**	**0.40**

LL (oven-dried) / 0.75 : ORGANIC (OL OR)

TECH	HH/HEH/TJ
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

AUGUST 2018

18103173

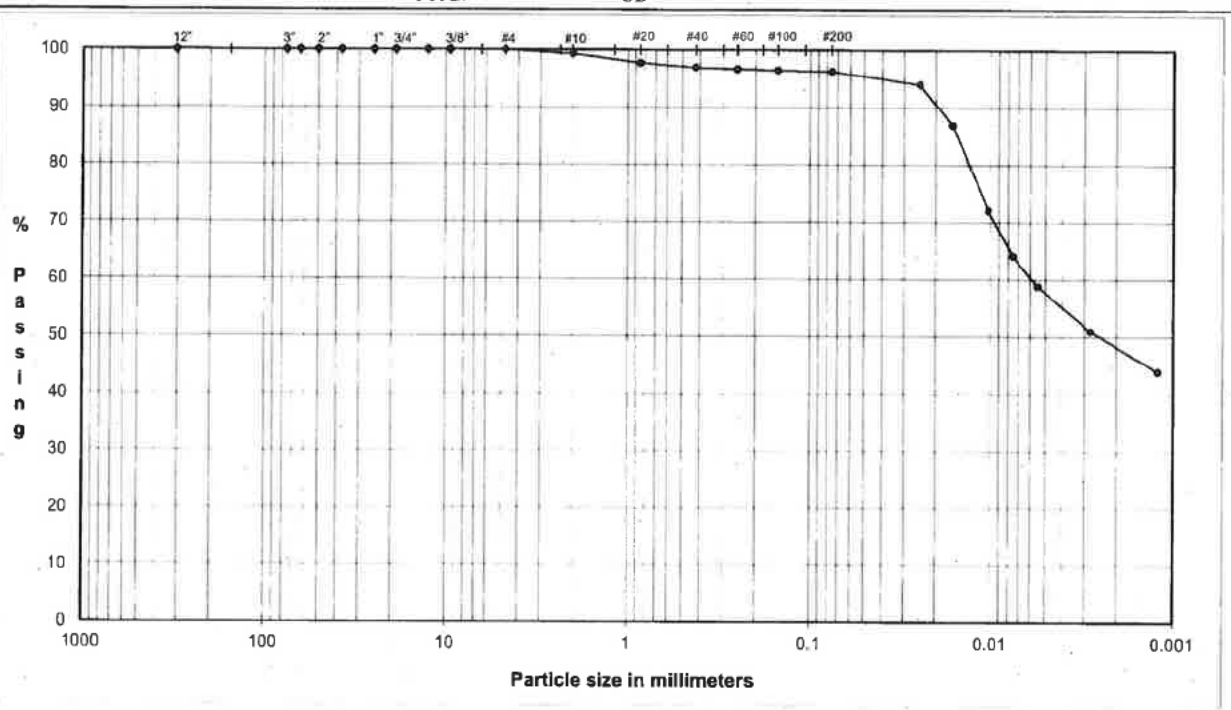
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**

SAMPLE ID: **RP-4** Depth: **30.0-32.0'**

TYPE: **UD**



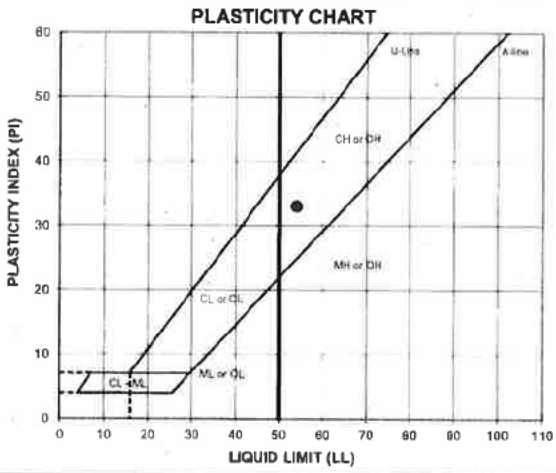
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.3**	Coarse Sand	**0.7**
#20	0.85	**97.8**		
#40	0.43	**97.0**	Medium Sand	**2.3**
#60	0.25	**96.7**		
#100	0.15	**96.5**		
#200	0.075	**96.3**	Fine Sand	**0.7**

Hydrometer Analysis

(mm)	%Finer		
0.024	**94.0**		
0.016	**87.0**		
0.010	**72.1**	Fines	
0.0075	**64.2**	Silt or Clay	**96.3**
0.0055	**58.9**		
0.0028	**51.0**		
0.0012	**43.9**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
37.1	**54**	**21**	**33**	**0.47**

LL (oven-dried) / 0.75 = ORGANIC (OL OH)

DESCRIPTION: CLAY, trace fine to coarse sand; brown, yellow, and gray.

USCS: CH

TECH	TB/HH/HEH
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/ENTERGY WHITE BLUFF/AR		
PROJECT NUMBER	18103173		
SAMPLE ID	RP-4	30.0-32.0'	
SAMPLE TYPE	UD		

Board #	7
Flow Pump	2
Flow Pump Speed	7
Technician	FT

COMMENTS

Sample Data, Initial

Height, inches	3.137	B-Value, f	1.00
Diameter, inches	2.879	Cell Pres.	90.0
Area, cm^2	42.00	Bot. Pres.	80.0
Volume, cm^3	334.65	Top Pres.	80.0
Mass, g	589.95	Tot. B.P.	80.0
Moisture Content, %	37.08	Head, max.	123.80
Dry Density, pcf	80.25	Head, min.	123.80
Spec. Gravity (assumed)	2.700	Max. Grad.	15.55
Volume Solids, cm^3	159.40	Min. Grad.	15.55
Volume Voids, cm^3	175.25		
Void Ratio	1.10		
Saturation, %	91.1%		

Sample Data, Final

Height, inches	3.135
Diameter, inches	2.878
Area, cm^2	41.97
Volume, cm^3	334.20
Mass, g	596.75
Moisture Content, %	38.66
Dry Density, pcf	80.36
Volume Solids, cm^3	159.40
Volume Voids, cm^3	174.81
Void Ratio	1.10
Saturation, %	95.2%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	589.95	711.15
Wt Soil & Tare, f	g	430.37	544.79
Wt Tare	g	0.00	114.47
Wt Moisture Lost	g	159.58	166.36
Wt Dry Soil	g	430.37	430.32
Water Content	%	37.08%	38.66%

DESCRIPTION

CLAY, trace fine to coarse sand; brown, yellow, and gray.

Flow Pump Rate: 2.38E-04 cm^3/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
08/02/18	43314	10	0	21.4	0	0	0	0	1.76	123.80	15.55	3.5E-07
08/02/18	43314	10	5	21.4	5	5	300	300	1.76	123.80	15.55	3.5E-07
08/02/18	43314	10	10	21.4	5	10	300	600	1.76	123.80	15.55	3.5E-07
08/02/18	43314	10	15	21.4	5	15	300	900	1.76	123.80	15.55	3.5E-07 *
08/02/18	43314	10	20	21.4	5	20	300	1200	1.76	123.80	15.55	3.5E-07 *
08/02/18	43314	10	25	21.4	5	25	300	1500	1.76	123.80	15.55	3.5E-07 *
08/02/18	43314	10	30	21.4	5	30	300	1800	1.76	123.80	15.55	3.5E-07 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.5E-07 cm/sec **

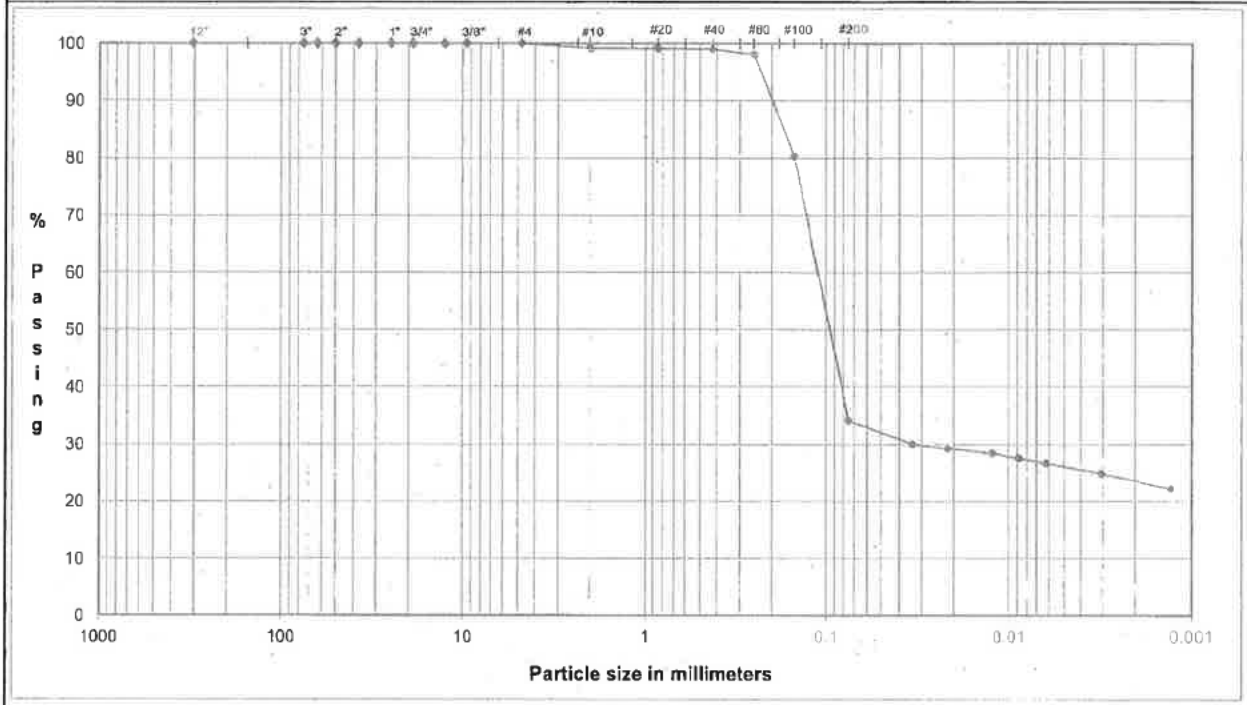
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-5** Depth: **15.0-18.0'**
TYPE: **Bag**



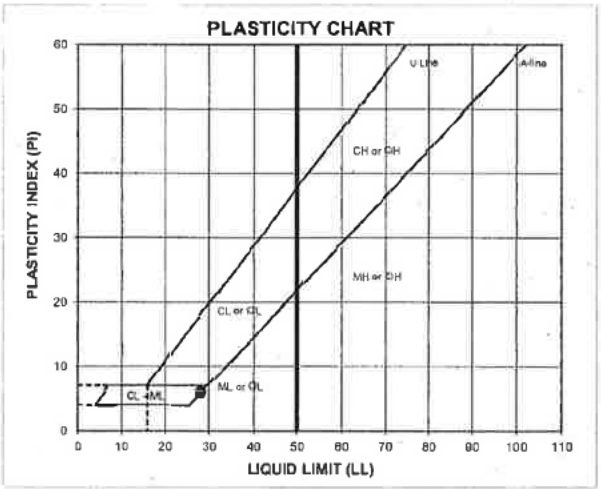
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.2**	Coarse Sand	**0.8**
#20	0.85	**99.1**		
#40	0.43	**99.0**	Medium Sand	**0.2**
#60	0.25	**98.0**		
#100	0.15	**80.3**		
#200	0.075	**34.0**	Fine Sand	**65.0**

Hydrometer Analysis

(mm)	%Finer		
0.034	**30.0**		
0.021	**29.2**		
0.012	**28.3**	Fines	
0.0088	**27.5**	Silt or Clay	**34.0**
0.0063	**26.6**		
0.0031	**24.9**		
0.0013	**22.3**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.4	28	22	6	0.51

LL (oven-dried) / 0.75 · ORGANIC (OL/OH)

DESCRIPTION: CLAYEY SAND to SILTY SAND, fine to coarse; yellowish brown.

USCS: SC-SM

TECH	HH/HEH/TJ
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

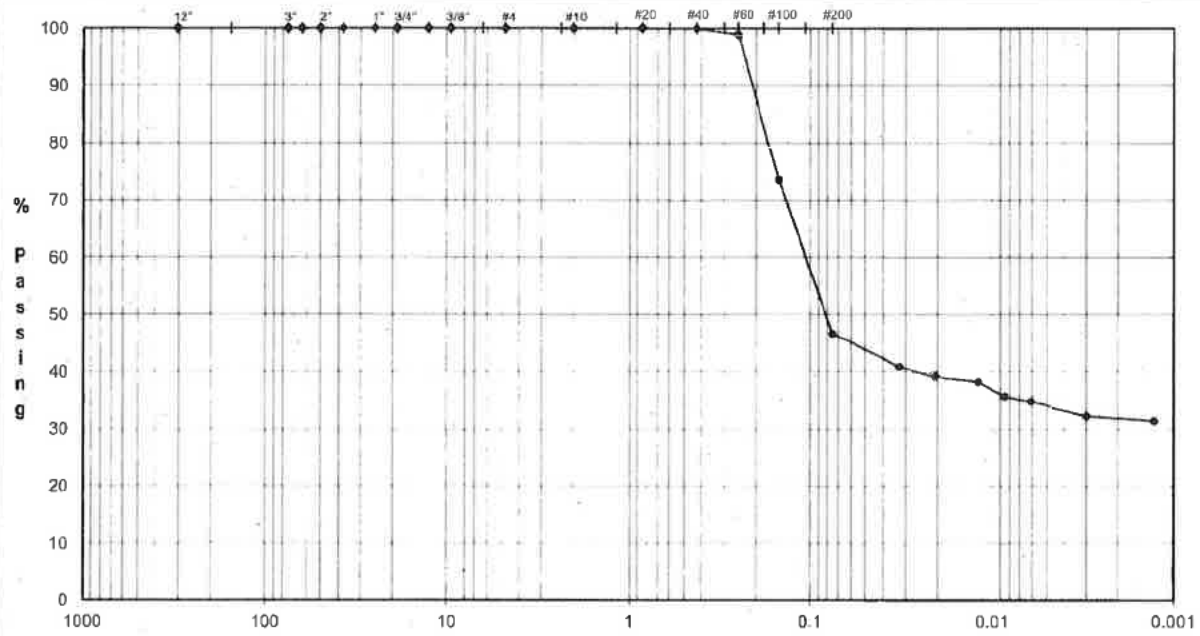
Golder Associates Inc.

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-7** Depth: **16.6-17.4'**
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

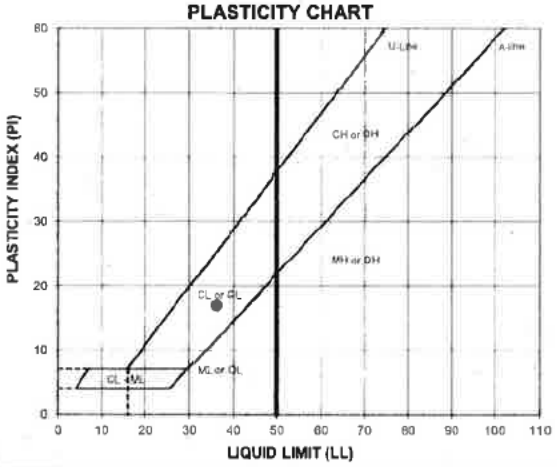
U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**99.9**	Medium Sand	**0.1**
#60	0.25	**98.9**		
#100	0.15	**73.6**		
#200	0.075	**46.7**	Fine Sand	**53.3**

Hydrometer Analysis

(mm)	%Finer		
0.032	**40.9**		
0.021	**39.2**		
0.012	**38.3**	Fines	
0.0085	**35.7**	Silt or Clay	**46.7**
0.0061	**34.8**		
0.0030	**32.2**		
0.0013	**31.4**		

PLASTICITY CHART



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.3	**36**	**19**	**17**	**0.20**

LL (oven-dried) / 0.75 ORGANIC (OL/OH)

DESCRIPTION: SAND and SILTY CLAY, fine to medium; dark gray.

USCS: SC

TECH	HH/HEH/TJ
DATE	8/2/18
CHECK	
REVIEW	
APPROVE	

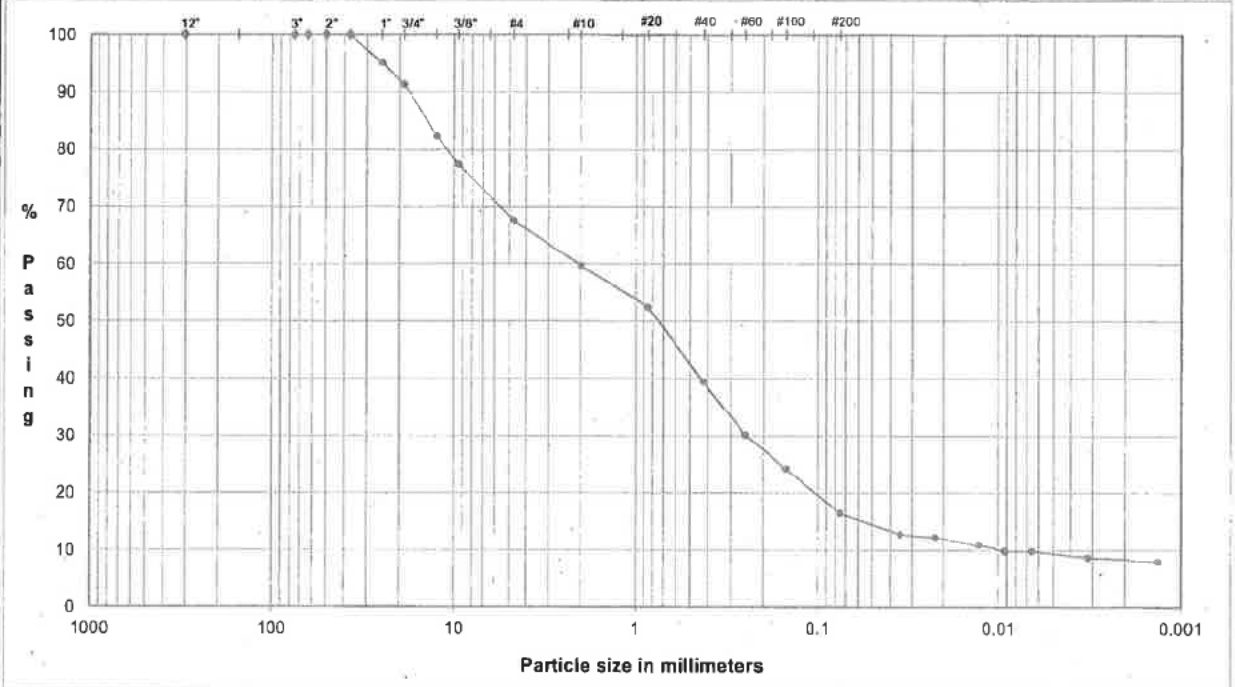
Golder Associates Inc.

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-9** Depth: **9.0-10.0'**
TYPE: **Bag**



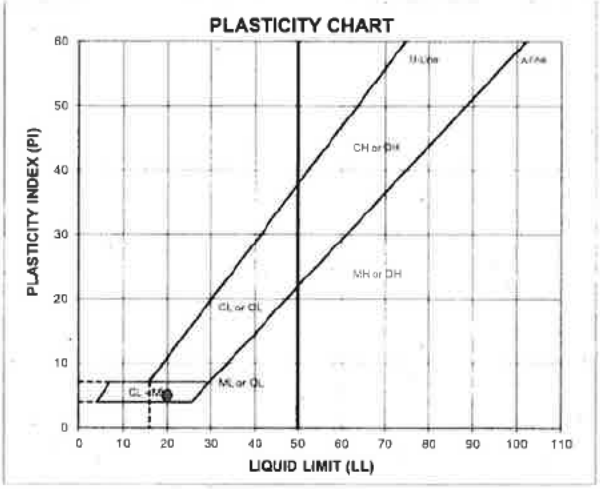
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**95.1**		
0.75"	19.0	**91.4**	Coarse Gravel	**8.6**
0.50"	12.7	**82.4**		
0.375"	9.5	**77.3**		
#4	4.8	**67.7**	Fine Gravel	**23.7**
#10	2.00	**59.7**	Coarse Sand	**8.0**
#20	0.85	**52.5**		
#40	0.43	**39.4**	Medium Sand	**20.3**
#60	0.25	**30.2**		
#100	0.15	**24.2**		
#200	0.075	**16.4**	Fine Sand	**23.0**

Hydrometer Analysis

(mm)	%Finer		
0.035	**12.8**		
0.022	**12.2**		
0.013	**11.0**	Fines	
0.0092	**9.9**	Silt or Clay	**16.4**
0.0065	**9.9**		
0.0032	**8.7**		
0.0013	**8.1**		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
4.2	**20**	**15**	**5**	**-2.35**

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: gravelly CLAYEY SAND to SILTY SAND, fine to coarse, fine to coarse gravel; reddish brown.

USCS: SC-SM

TECH	HH/HEH/TJ
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

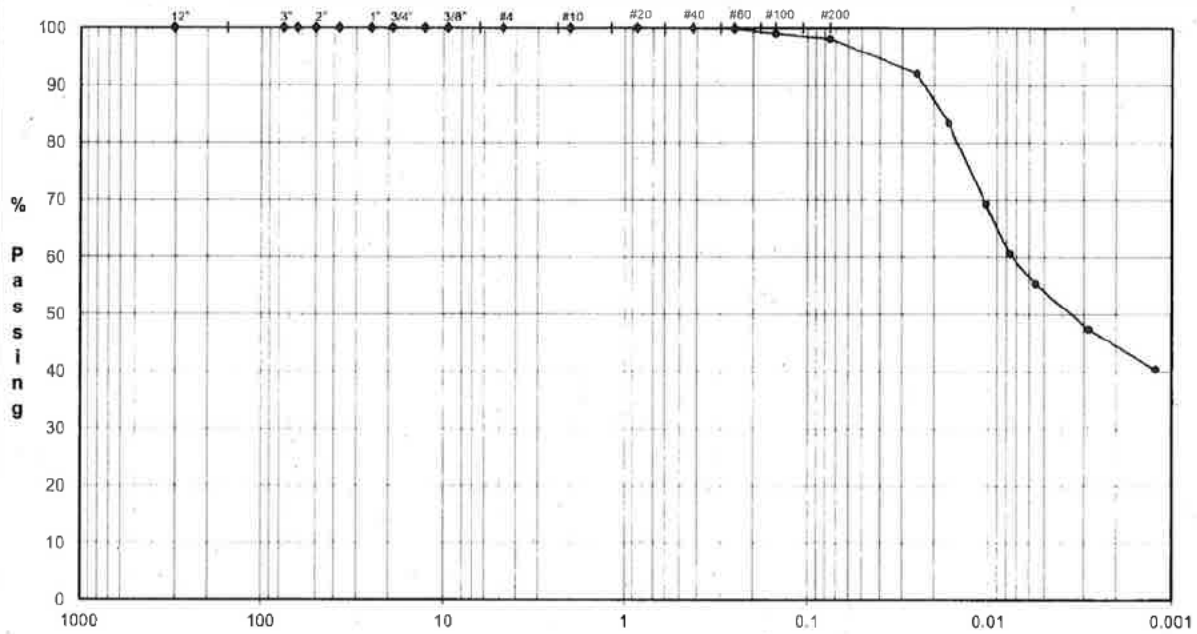
NOTE: Insufficient sample received to perform in accordance with ASTM Standards

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-9** Depth: **26.0-27.0'**
TYPE: **Bag**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

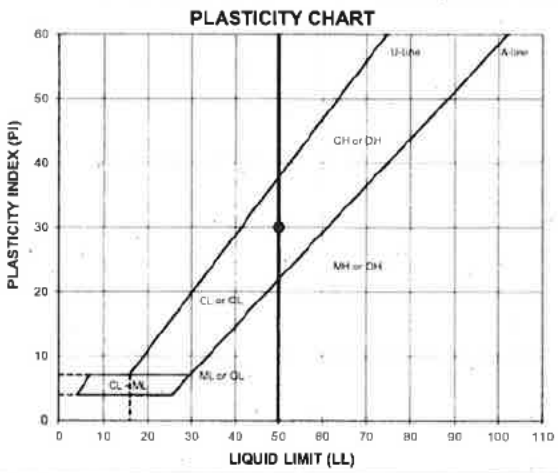
	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**99.9**		
#100	0.15	**99.0**		
#200	0.075	**98.1**	Fine Sand	**1.8**

Hydrometer Analysis

(mm)	%Finer		
0.025	**92.1**		
0.017	**83.4**		
0.010	**69.3**	Fines	
0.0077	**60.6**	Silt or Clay	**98.1**
0.0056	**55.3**		
0.0028	**47.4**		
0.0012	**40.4**		

DESCRIPTION: CLAY, trace fine sand; gray.

USCS: CH



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
31.3	**50**	**20**	**30**	**0.36**

LL (oven-dried) / LL (not dried) = 0.75 : ORGANIC (OL/OH)

TECH	HH/HEH/TB
DATE	8/1/18
CHECK	
REVIEW	
APPROVE	

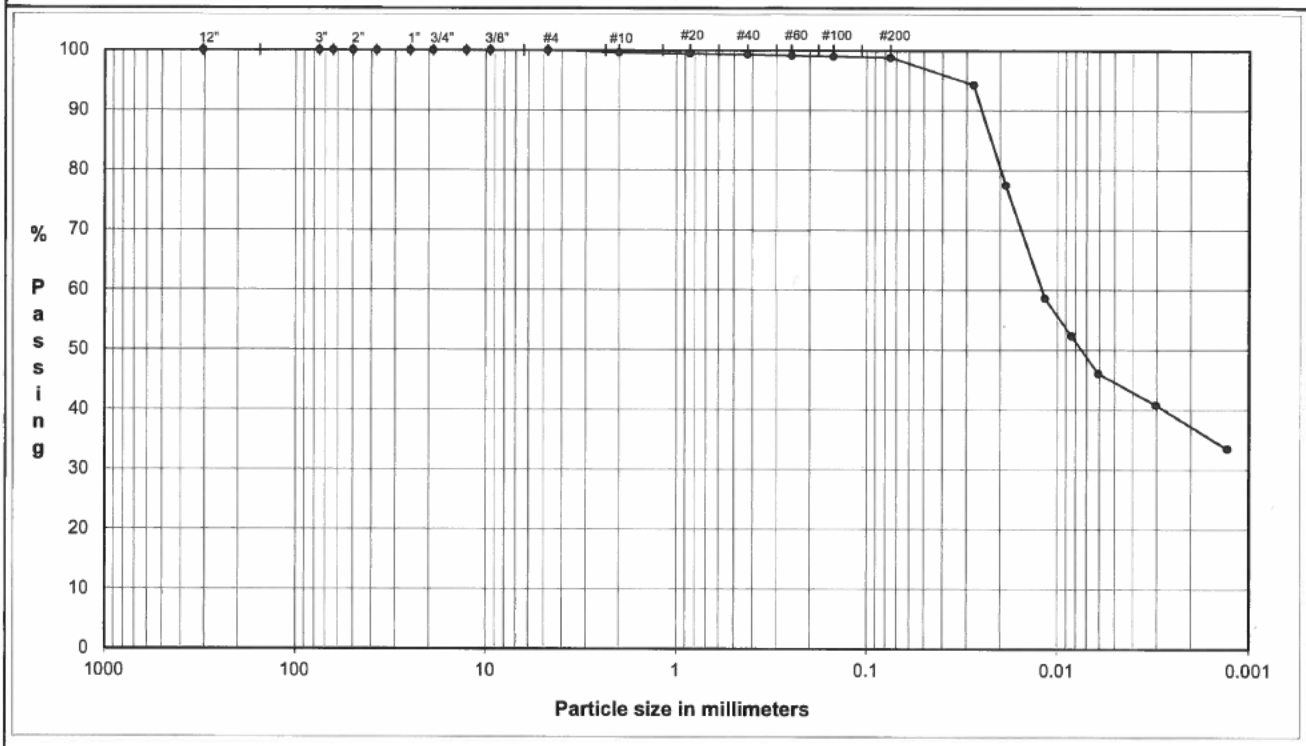
Golder Associates Inc.

AUGUST 2018 18103173

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY WHITE BLUFF/AR**
SAMPLE ID: **RP-9** Depth: **30.0-32.0'**
TYPE: **UD**



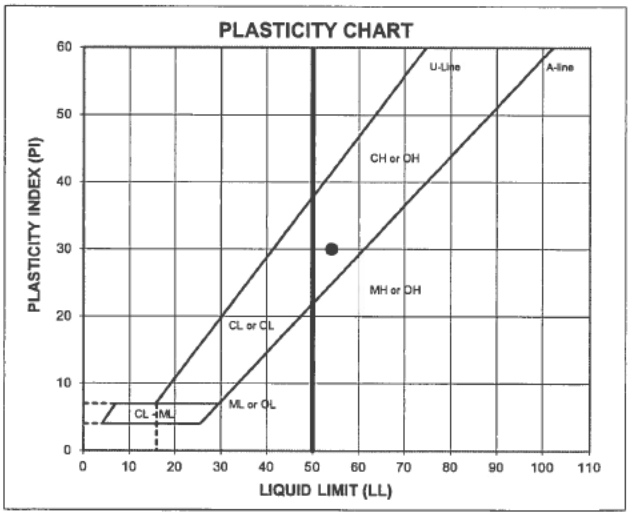
COBBLES	GRAVEL			SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine		Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.6	Coarse Sand	0.4
#20	0.85	99.5		
#40	0.43	99.3	Medium Sand	0.3
#60	0.25	99.2		
#100	0.15	99.0		
#200	0.075	98.8	Fine Sand	0.5

Hydrometer Analysis

(mm)	%Finer		
0.027	94.3		
0.019	77.5		
0.012	58.7	Fines	
0.0084	52.4	Silt or Clay	98.8
0.0061	46.1		
0.0030	40.9		
0.0013	33.5		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
30.2	54	24	30	0.19

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: CLAY, trace fine to coarse sand; olive gray.

USCS: CH

TECH	HEH/HH/HB/TJ
DATE	8/27/18
CHECK	
REVIEW	
APPROVE	

	Initial		Final		Notes
Height =	1.000	in	0.988	in	Visual description (Golder procedure): (CH) CLAY, trace fine to coarse sand; olive gray.
Diameter =	2.500	in	2.500	in	Atterberg Limits (ASTM D4318): LL = 54 PL = 24 PI = 30
Area =	4.909	in^2	4.909	in^2	Percent Finer (ASTM D422): 3/4 in. = 100% No. 4 = 100% No. 200 = 99%
Volume =	4.909	in^3	4.848	in^3	Specimen Type: [X] Intact [ ] Reconstituted
Water Content =	30.2%		34.0%		Remold Targets:
Specific Gravity =	2.67	(ASTM D854)	2.67	(ASTM D854)	Water Content of Trimmings (ASTM D2216): -
Height of Solids =	0.5345	in	0.5345	in	Trimming Procedure: Trimming ring
Void Ratio =	0.871		0.848		Inundation: [ ] Not inundated [X] Inundated at 1.70 ksf
Degree of Saturation =	92.5%		100.0%		Test Method: [ ] A [X] B
Wet Mass =	0.329	lb	0.338	lb	Apparatus: GeoTac automated consolidometer
Dry Mass =	0.253	lb	0.253	lb	Final Water Content Specimen: [X] Entire [ ] Partial
Wet Unit Weight =	115.7	pcf	120.6	pcf	Final Differential Height: 0.0000 in
Dry Unit Weight =	88.9	pcf	90.0	pcf	Estimated Preconsolidation Stress: ksf

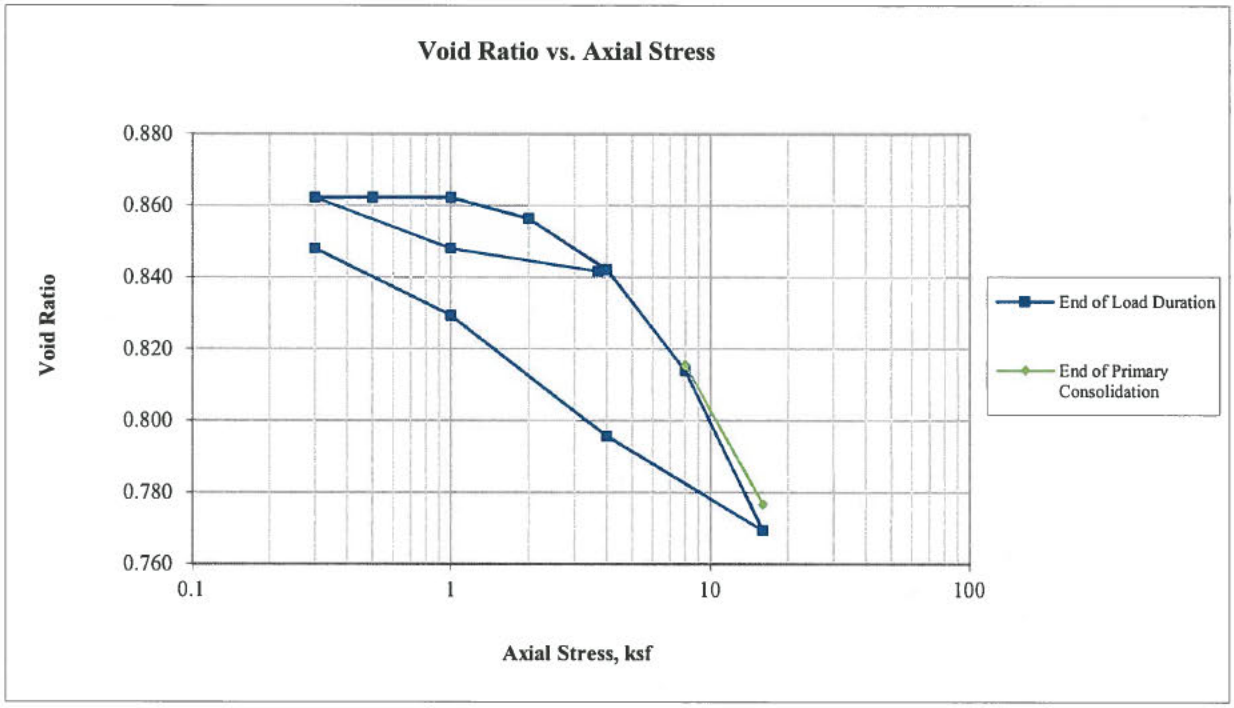
			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating*	1.70	60					0.0000	0.9925	0.00	0.857				
1	3.7	60					0.0082	0.9843	0.82	0.842				
2	1.0	60					0.0047	0.9877	0.47	0.848				
3	0.3	17					-0.0028	0.9953	-0.28	0.862				
4	0.5	60					-0.0029	0.9953	-0.29	0.862				
5	1.0	60					-0.0028	0.9953	-0.28	0.862				
6	2.0	60					0.0003	0.9922	0.03	0.856				
7	4.0	60					0.0080	0.9845	0.80	0.842				
8	8.0	240	0.0221	0.9704	2.21	0.816	0.0230	0.9695	2.30	0.814	2 (Root time)	0.822	0.322	1.3
9	16.0	240	0.0429	0.9496	4.29	0.777	0.0468	0.9457	4.68	0.769	2 (Root time)	0.790	0.247	1.8
10	4.0	240					0.0327	0.9597	3.27	0.796				
11	1.0	120					0.0147	0.9777	1.47	0.829				
12	0.3	27					0.0048	0.9877	0.48	0.848				

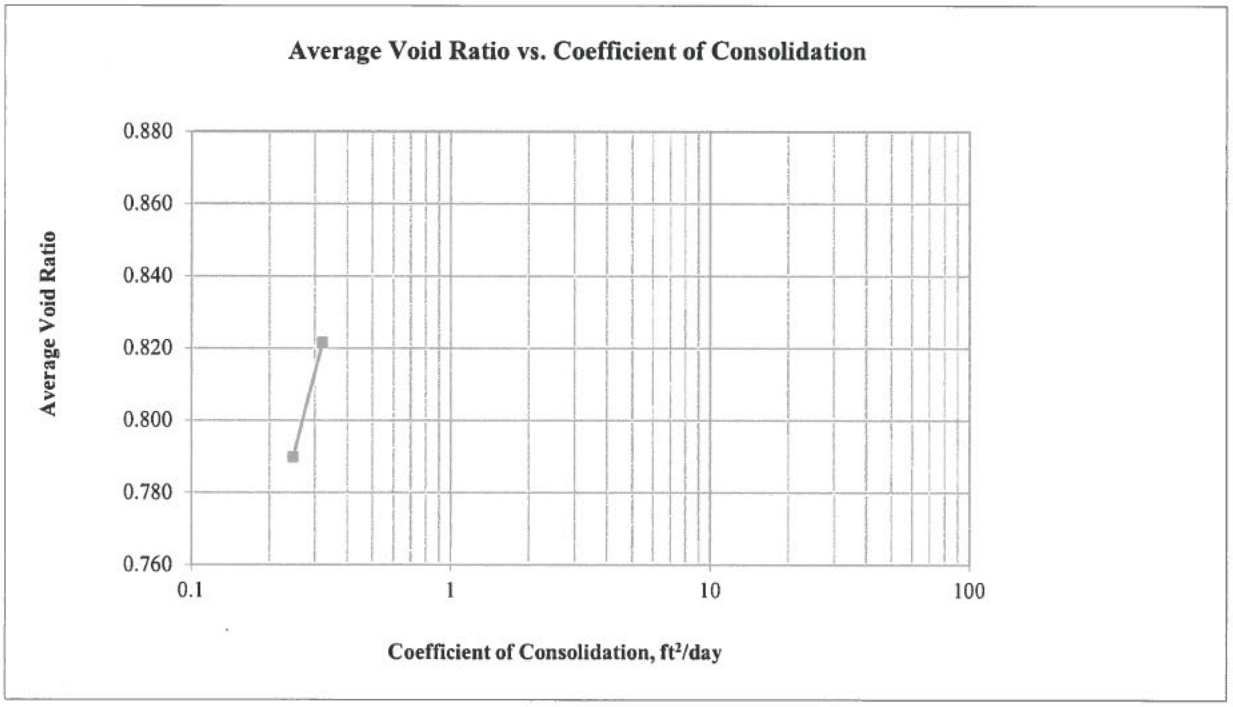
Golder Associates Inc.
Atlanta, Georgia

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

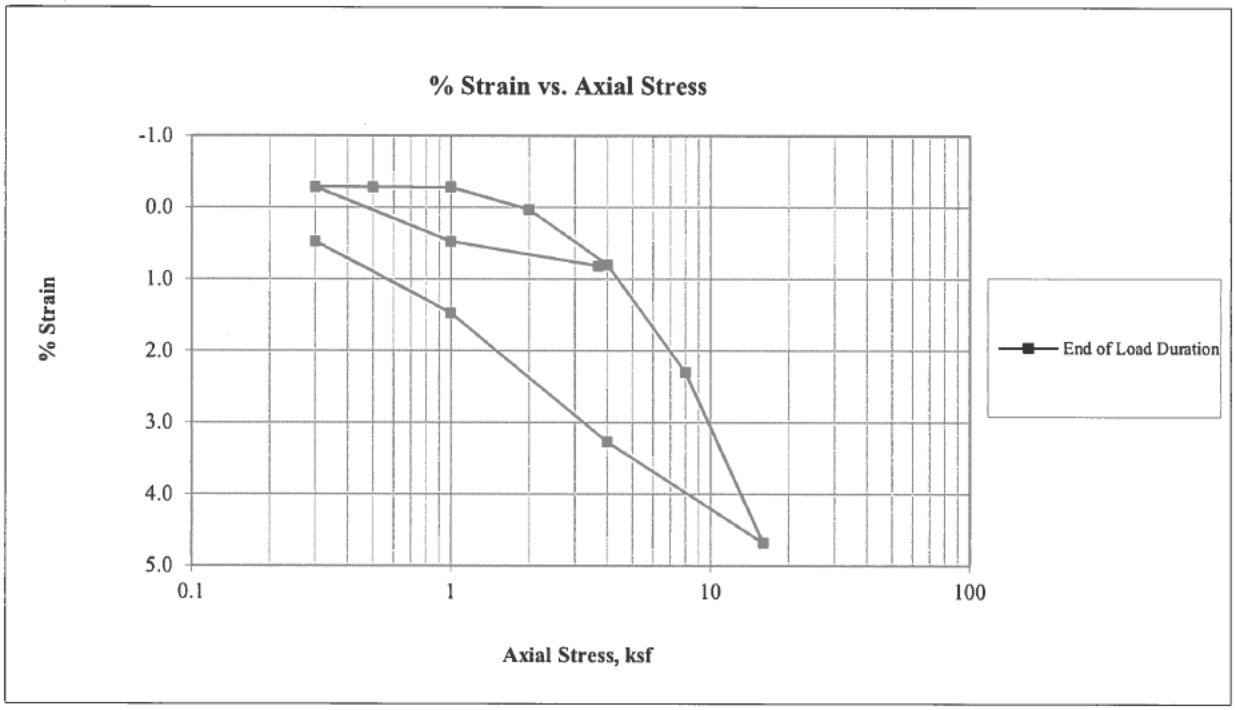
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR

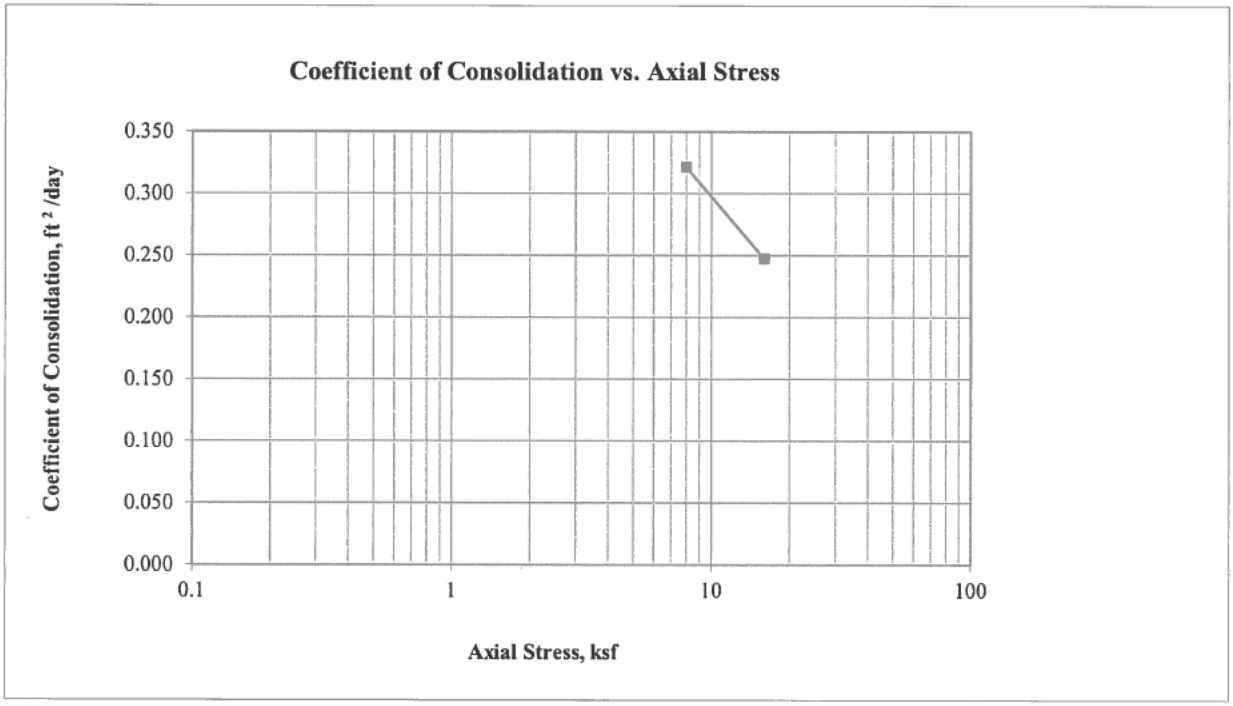
Sample:	Technician:	Checked:	Reviewed:	Approved:	Start Date:	Job Number:	Figure:
RP-9 UD 30.0-32.0'	PWM/FT	PWM			8/28/2018	18103173	1





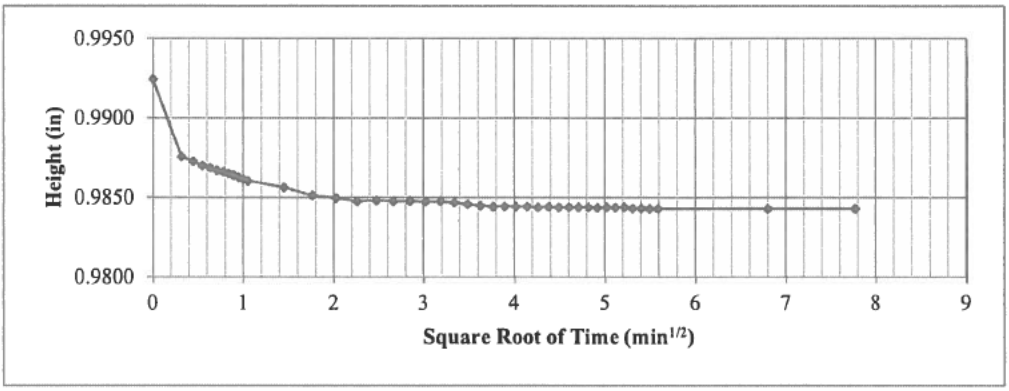
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **RP-9 UD 30.0-32.0'**	**Technician:** **PWM/FT**	**Reviewed:**	**Start Date:** **8/28/2018**	**Job Number:** **18103173**	**Figure:** **2**



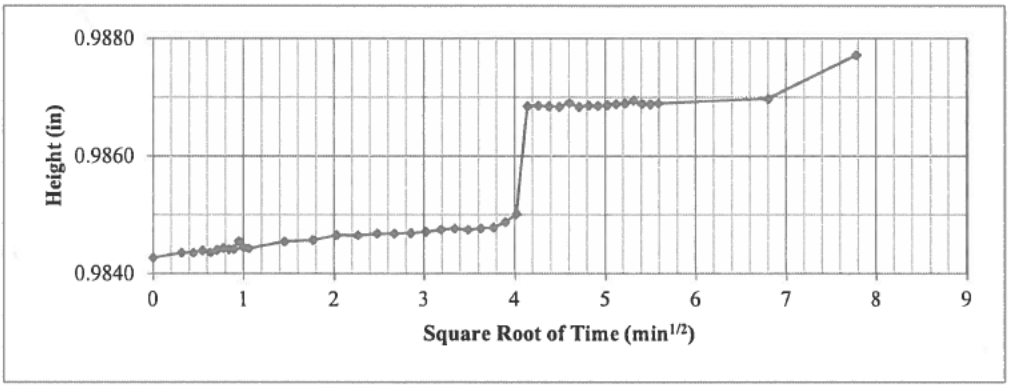


Golder Associates Inc. Atlanta, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: RP-9 UD 30.0-32.0'	Technician: PWM/FT	Reviewed:	Start Date: 8/28/2018	Job Number: 18103173	Figure: 2A

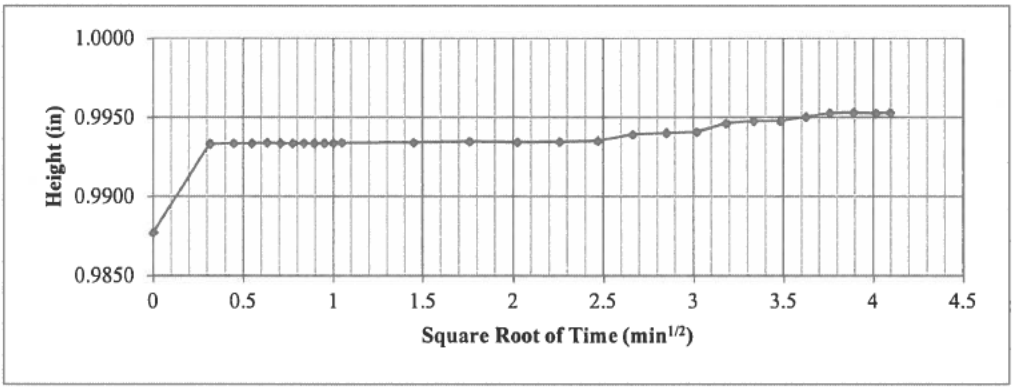
3.7 ksf



1.0 ksf

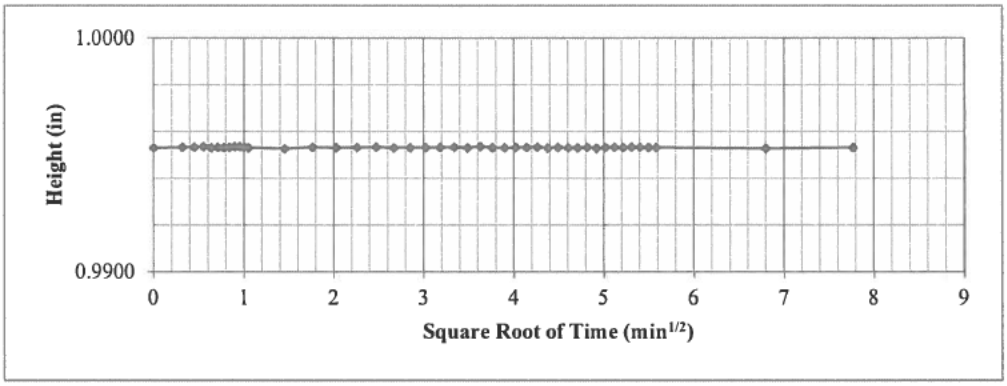


0.3 ksf

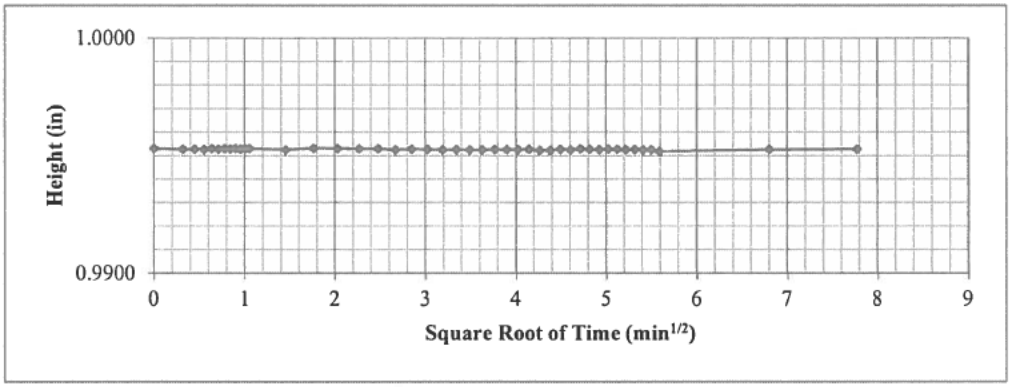


Golder Associates Inc. Atlanta, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS (1)				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: RP-9 UD 30.0-32.0'	Technician: PWM/FT	Reviewed:	Start Date: 8/28/2018	Job Number: 18103173	Figure: 3

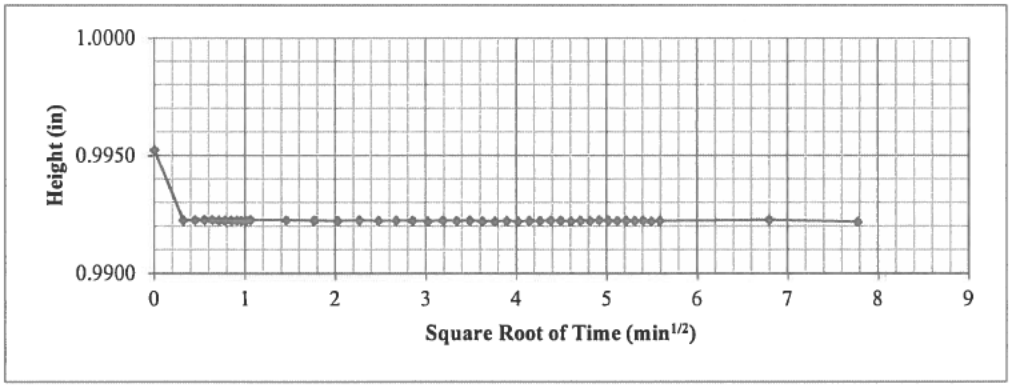
0.5 ksf



1.0 ksf

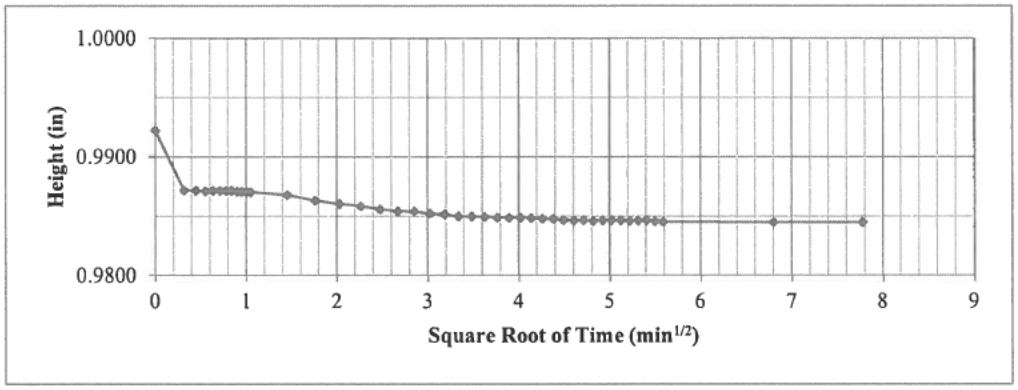


2.0 ksf

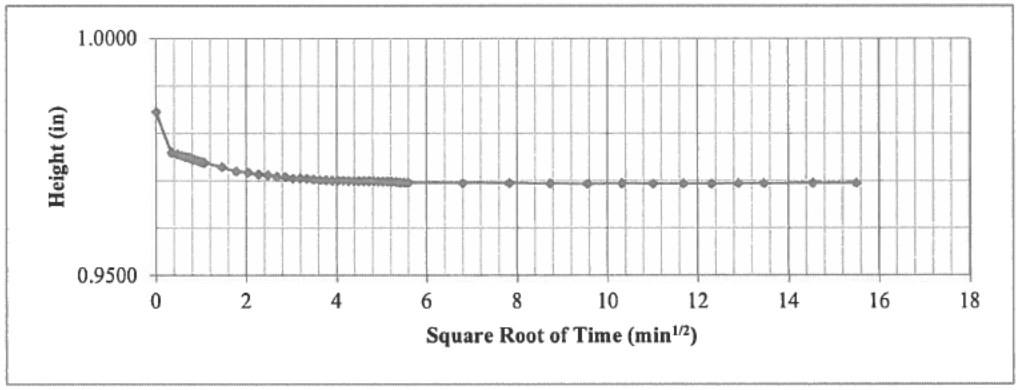


Golder Associates Inc. Atlanta, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS (2)				
Job Short Title: FTN/ENTERGY WHITE BLUFF/AR					
Sample: RP-9 UD 30.0-32.0'	Technician: PWM/FT	Reviewed:	Start Date: 8/28/2018	Job Number: 18103173	Figure: 4

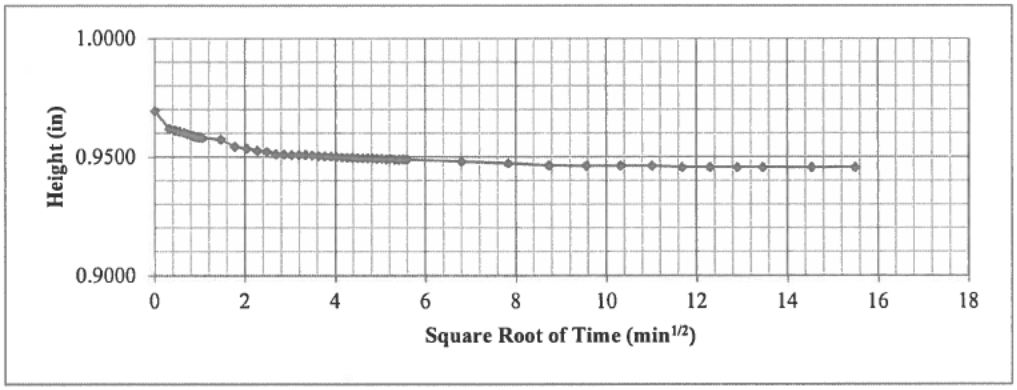
4.0 ksf



8.0 ksf

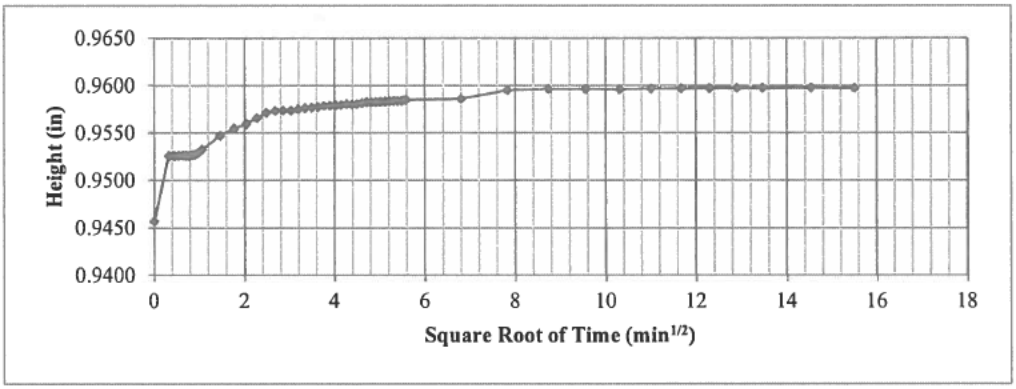


16.0 ksf

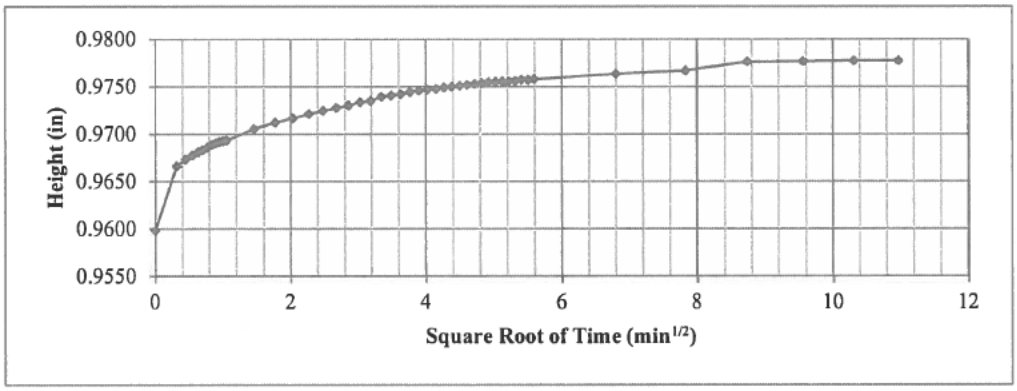


Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (3)**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **RP-9 UD 30.0-32.0'**	**Technician:** **PWM/FT**	**Reviewed:**	**Start Date:** **8/28/2018**	**Job Number:** **18103173**	**Figure:** **5**

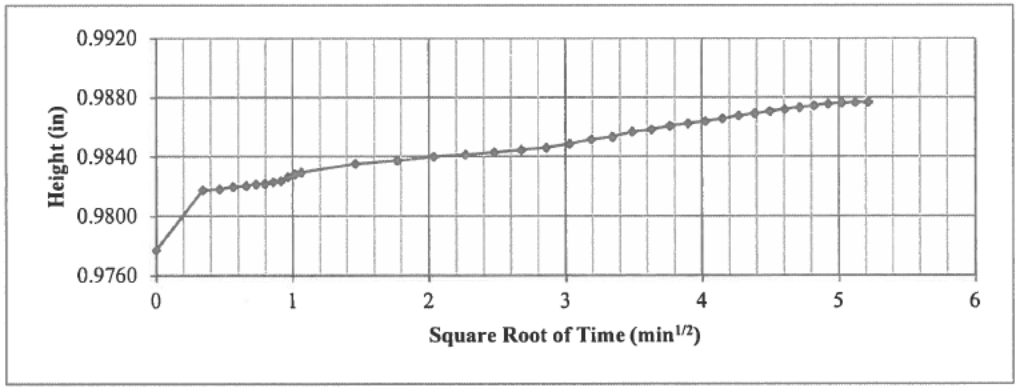
4.0 ksf



1.0 ksf



0.3 ksf



Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (4)**				
Job Short Title: **FTN/ENTERGY WHITE BLUFF/AR**					
Sample: **RP-9 UD 30.0-32.0'**	**Technician:** **PWM/FT**	**Reviewed:**	**Start Date:** **8/28/2018**	**Job Number:** **18103173**	**Figure:** **6**