ftn Associates Ltd.
water resources / environmental consultants

ENTERGY INDEPENDENCE PLANT
EAST AND WEST RECYCLE PONDS

DEMONSTRATION OF COMPLIANCE WITH EPA CCR RULE SITING CRITERIA §257.60, PLACEMENT ABOVE THE UPPERMOST AQUIFER

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

ENTERGY INDEPENDENCE PLANT
EAST AND WEST RECYCLE PONDS

DEMONSTRATION OF COMPLIANCE WITH
EPA CCR RULE SITING CRITERIA
§257.60, PLACEMENT ABOVE THE UPPERMOST AQUIFER

Prepared for

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

Prepared by

FTN Associates, Ltd.
3 Innwood Circle, Suite 220
Little Rock, AR 72211

FTN No. R07920-1861-001

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 §257.60 of 40 CFR Part 257.

Dana L. Derrington, Arkansas PE #16372

10/17/2018
Date

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

Entergy Arkansas, Inc. (Entergy), operates the Independence plant located approximately 2 miles southeast of Newark, Arkansas. The plant utilizes two recycle ponds, hereafter referred to as the East and West Recycle Ponds, for, among other things, the management of bottom ash transport water. Pursuant to §257.60 of Title 40 Code of Federal Regulations (40 CFR) Part 257, existing coal combustion residual (CCR) surface impoundments must be constructed such that a separation distance of 1.52 meters (5 ft) is maintained between the base of the pond units and the uppermost aquifer or such that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations including the seasonal high water table. This report presents the findings of an evaluation of the East and West Recycle Ponds in support of the location restriction requirements of §257.60.

2.0 SITE DESCRIPTION

The East and West Recycle Ponds are shown on Figure 1 (all figures are located in Appendix A). The East Recycle Pond has an approximate surface area of 6.2 acres and the West Recycle Pond has an approximate surface area of 6.8 acres[1]. Based on surveys completed during June 2018, the East Recycle Pond has a maximum depth of 20 ft below ground surface (ft bgs) and the West Recycle Pond has a maximum depth of 18 ft bgs. The typical water level elevation in the recycle ponds is approximately 235 ft North American Vertical Datum of 1988 (NAVD88) based on field observations during June 2018. At the time of this evaluation, the West Recycle Pond was being drained for maintenance. Drained water from the West Recycle Pond was being pumped into and stored in the East Recycle Pond. Topography surrounding the East and West Recycle Ponds is generally flat-lying, with ground surface elevations ranging from approximately 234 to 239 ft NAVD88, as shown on Figures 1 and 2.

[1] Pond surface areas were estimated based on the water level (East Recycle Pond) and water level line (West Recycle Pond) during field activities in June 2018.

3.0 UPPERMOST AQUIFER ELEVATION

The uppermost aquifer in the region is the Mississippi River Valley alluvial aquifer (hereafter referred to as the "Aquifer"). The Aquifer is comprised of unconsolidated Quaternary alluvial and terrace deposit sands and gravels that generally grade upward to clays and silts, which form a confining unit over the Aquifer. At the plant, the Aquifer is bounded below by Paleozoic rocks and associated residuum. During periods when recharge to the Aquifer is the greatest and the demand is low, groundwater is under confined conditions at the plant. As such, the elevation of the Aquifer is defined by the maximum elevation of the underlying water-bearing sands and gravels. Based on a review of geotechnical data and lithological descriptions of soil borings advanced at the perimeter of the recycle ponds, the maximum elevation of the Aquifer lies at 213 ft NAVD88. The geotechnical data and soil boring logs reviewed as part of this evaluation are included in Appendix B.

4.0 POND DEPTH ELEVATIONS

The East Recycle Pond bottom was profiled by a geophysical survey performed by GeoView, Inc., of St. Petersburg, Florida (Appendix C). Based on this survey, the minimum elevation of the East Recycle Pond lies at 220 ft NAVD88. The exposed pond bottom of the drained West Recycle Pond was surveyed by B&F Engineering, Inc., of Hot Springs, Arkansas (Appendix D). Based on this survey, the minimum elevation of the West Recycle Pond lies at 222 ft NAVD88. Cross-section views of the East and West Recycle Pond bottom profiles relative to the underlying lithology are provided as Figures 3 and 4 (Appendix A).

5.0 CONCLUSIONS

Based on a review of the available documentation in this report, both the East and West Recycle Ponds at the Entergy Independence plant meet the location restriction requirements of §257.60.

6.0 REFERENCES

USGS [US Geological Survey]. 1962 (rev 1981). "USGS 1:24000-Scale Quadrangle for Newark, AR 1962." US Geological Survey. Available online at https://www.sciencebase.gov/catalog/item/5a8a29e6e4b00f54eb3c797b.

APPENDIX A

Figures

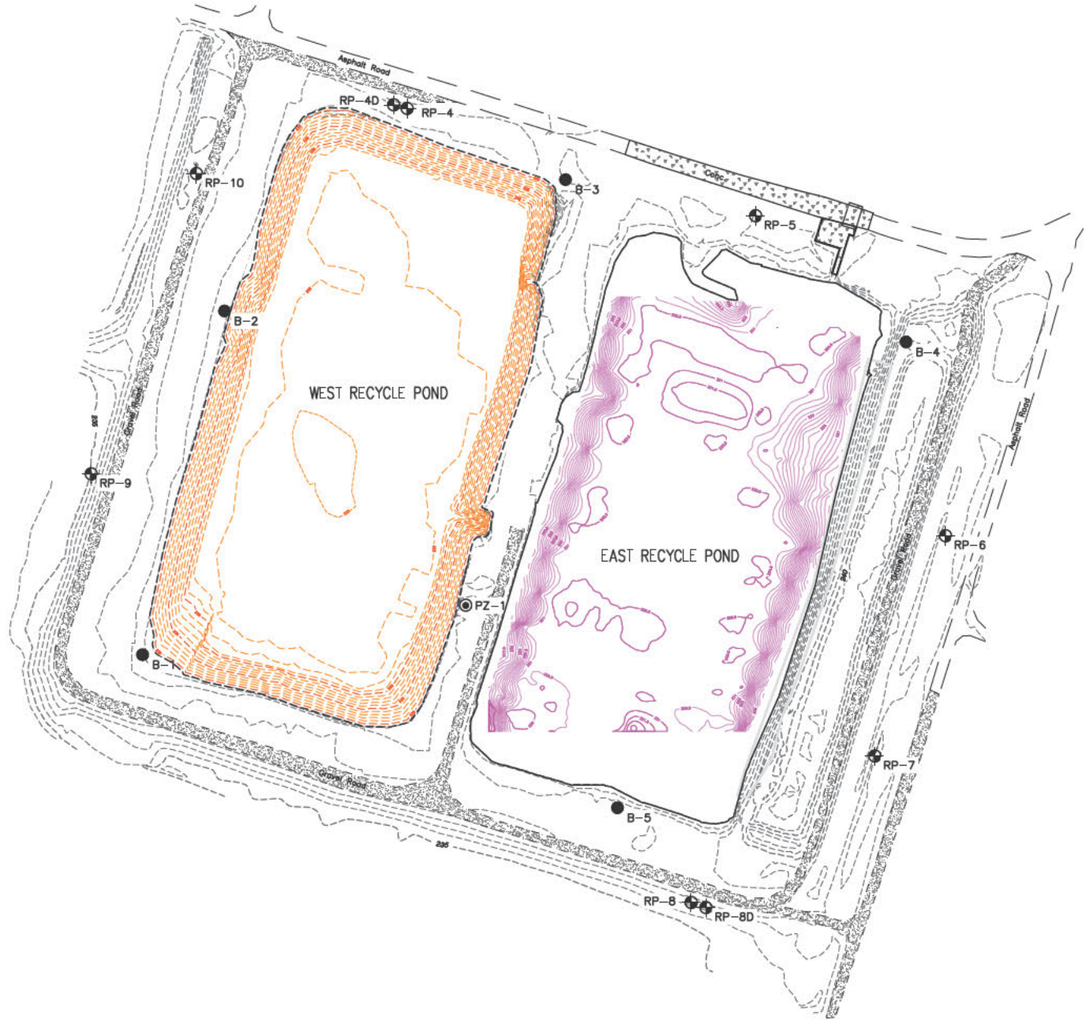


Figure 1. Site map, Entergy Independence recycle ponds.

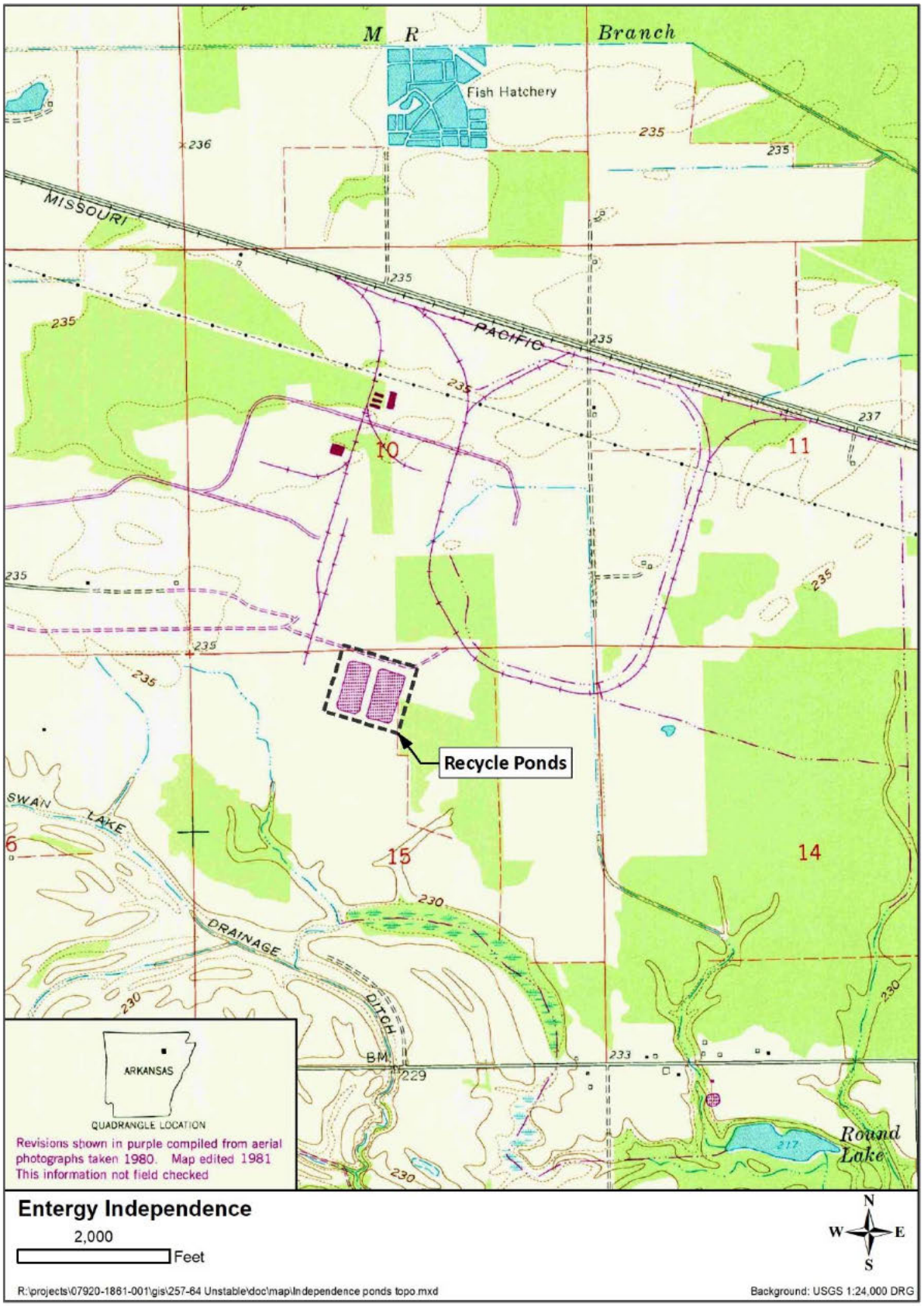
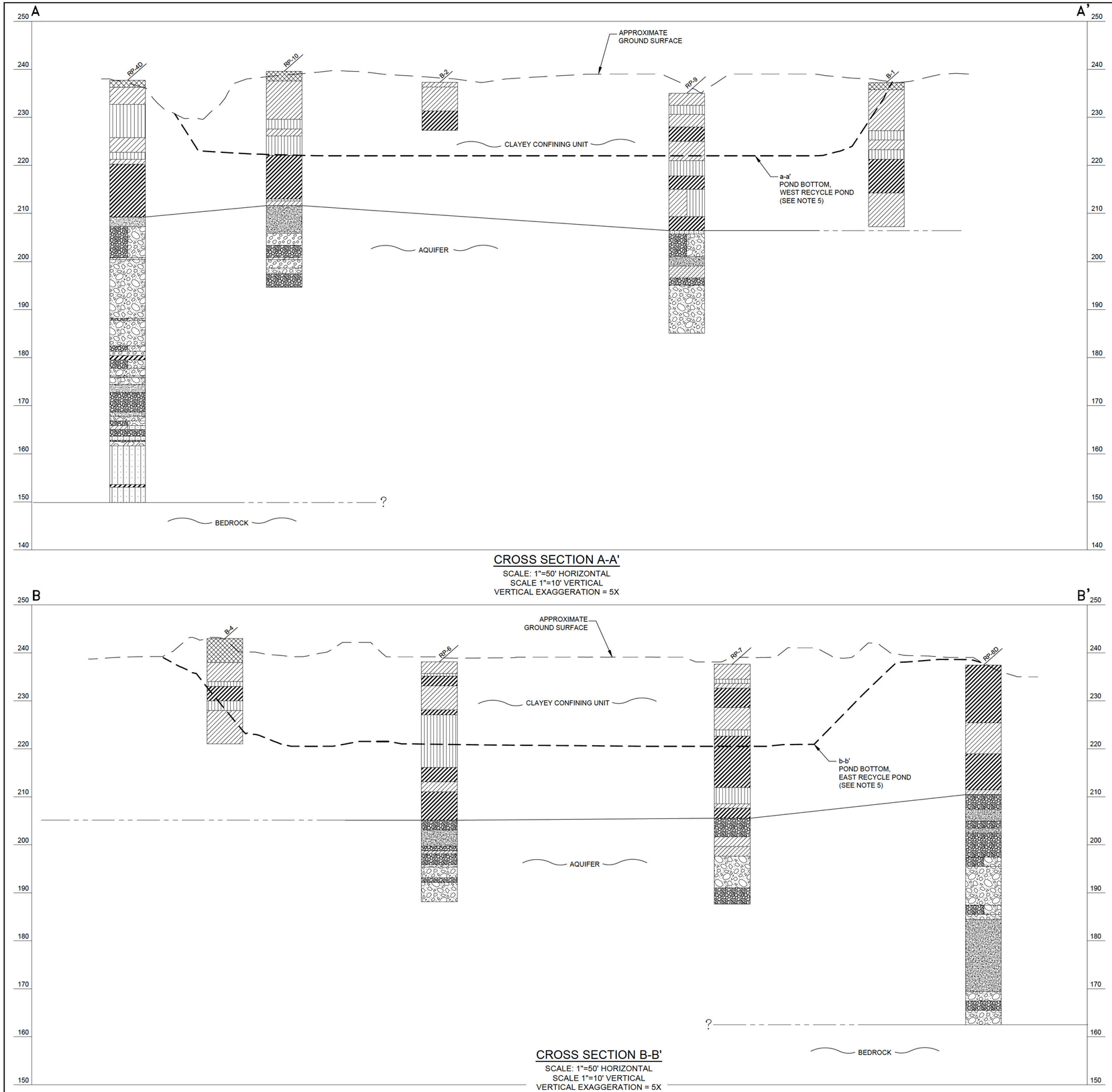


Figure 2. Topographic map of recycle ponds and surrounding area based on USGS topographic quadrangle Newark, AR (1981).



CROSS SECTION A-A'

SCALE: 1"=50' HORIZONTAL
SCALE 1"=10' VERTICAL
VERTICAL EXAGGERATION = 5X

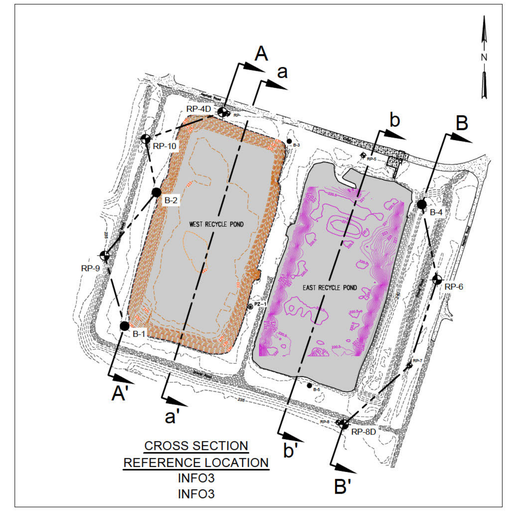
CROSS SECTION B-B'

SCALE: 1"=50' HORIZONTAL
SCALE 1"=10' VERTICAL
VERTICAL EXAGGERATION = 5X

R:\projects\07920-1861-001\cad\dwg\257-60 Groundwater\07920-1861-001-CX01.DWG

LEGEND

- FILL
- LOW PLASTICITY INORGANIC CLAY
- HIGH PLASTICITY INORGANIC CLAY
- INORGANIC SILT
- CLAYEY SAND
- SILTY SAND
- POORLY GRADED SAND
- WELL GRADED SAND
- CLAYEY GRAVEL
- SILTY GRAVEL
- POORLY GRADED GRAVEL
- WELL GRADED GRAVEL
- STRATIGRAPHIC CONTACT
- INFERED STRATIGRAPHIC CONTACT
- APPROXIMATE GROUND SURFACE
- APPROXIMATE POND BOTTOM PROFILE



CROSS SECTION REFERENCE LOCATION
INFO3
INFO3

NOTES:

1. CONTACTS BETWEEN UNITS ARE APPROXIMATE AND MAY VARY IN FIELD.
2. BORING NORTHINGS AND EASTINGS WERE RECORDED USING A GARMIN eTrex30 AND CONVERTED TO AR STATE PLANE NAD83 SOUTH.
3. WELL/PIEZOMETER HORIZONTAL AND VERTICAL DATA ARE BASED ON THE HARMON SURVEYING INC., REPORT DATED JULY 12, 2018 (AR STATE PLANE NAD83 SOUTH).
4. EAST RECYCLE POND BOTTOM PROFILE PROVIDED BY GEOVIEW, INC. (2018). WEST RECYCLE POND BOTTOM PROVIDED BY B&F ENGINEERING, INC. (2018).
5. POND BOTTOM PROFILES FROM TRANSECTS a-a', and b-b' ARE SUPERIMPOSED ON CROSS-SECTIONS A-A', AND B-B' AS SHOWN ON THE CROSS-SECTION LOCATION MAP.

REV	DATE	DESCRIPTION	BY	APVD

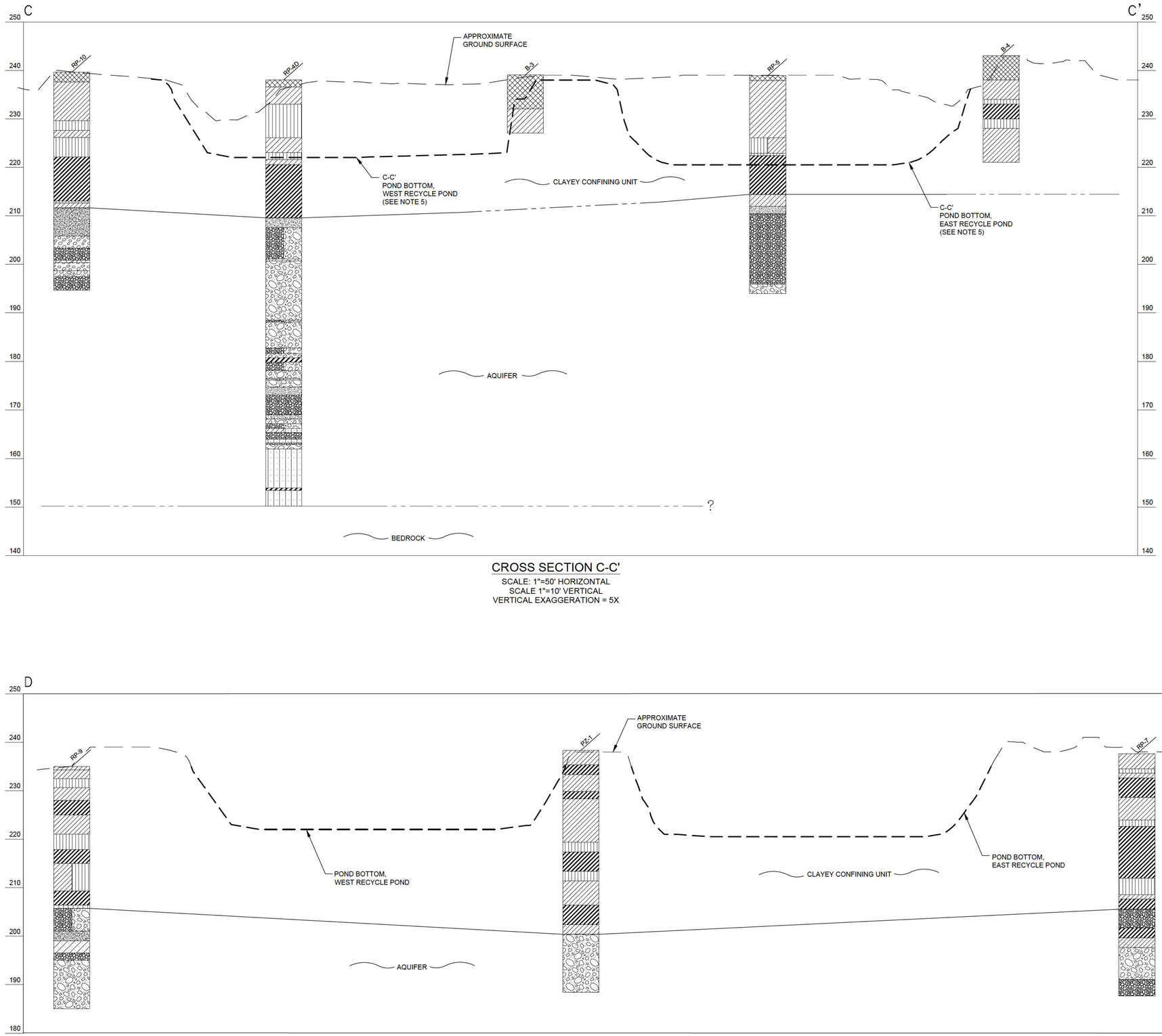
trinity associates, ltd.
water resources / environmental consultants

EAST AND WEST RECYCLE PONDS
ENTERGY INDEPENDENCE

INDEPENDENCE COUNTY, ARKANSAS

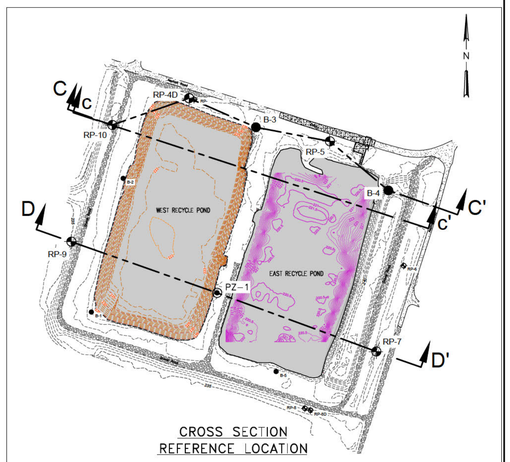
FIGURE 3
CROSS-SECTION A-A' AND B-B'

DRAWN BY: JT	FILE NAME: CX01.DWG
APPROVED: BCD	PROJECT NO. 07920-1861-001
SCALE: AS SHOWN	DATE: 09/19/2018
SHEET NO. 1 OF 2	



CROSS SECTION C-C'

SCALE: 1"=50' HORIZONTAL
SCALE 1"=10' VERTICAL
VERTICAL EXAGGERATION = 5X



CROSS SECTION
REFERENCE LOCATION

CROSS SECTION D-D'

SCALE: 1"=50' HORIZONTAL
SCALE 1"=10' VERTICAL
VERTICAL EXAGGERATION = 5X

NOTES:

1. CONTACTS BETWEEN UNITS ARE APPROXIMATE AND MAY VARY IN FIELD.
2. BORING NORTHINGS AND EASTINGS WERE RECORDED USING A GARMIN eTrex30 AND CONVERTED TO AR STATE PLANE NAD83 SOUTH.
3. WELL/PIEZOMETER HORIZONTAL AND VERTICAL DATA ARE BASED ON THE HARMON SURVEYING INC. REPORT DATED JULY 12, 2018 (AR STATE PLANE NAD83 SOUTH).
4. EAST RECYCLE POND BOTTOM PROFILE PROVIDED BY GEOVIEW, INC. (2018). WEST RECYCLE POND BOTTOM PROVIDED BY B&F ENGINEERING, INC. (2018)
5. POND BOTTOM PROFILES FROM TRANSECTS c-c' ARE SUPERIMPOSED ON CROSS-SECTIONS C-C' AS SHOWN ON THE CROSS-SECTION LOCATION MAP.

REV	DATE	DESCRIPTION	BY	APVD

trinity associates, ltd.
water resources / environmental consultants

EAST AND WEST RECYCLE PONDS
ENTERGY INDEPENDENCE
INDEPENDENCE COUNTY, ARKANSAS

FIGURE 4
CROSS-SECTION C-C' AND D-D'

DRAWN BY: JT	FILE NAME: CX02.DWG
APPROVED: BEB	PROJECT NO. 07920-1861-001
SCALE: AS SHOWN	DATE: 09/19/2018
SHEET NO. 2 OF 2	

R:\projects\07920-1861-001\cad\dwg\257-60 Groundwater\07920-1861-001-CX02.DWG

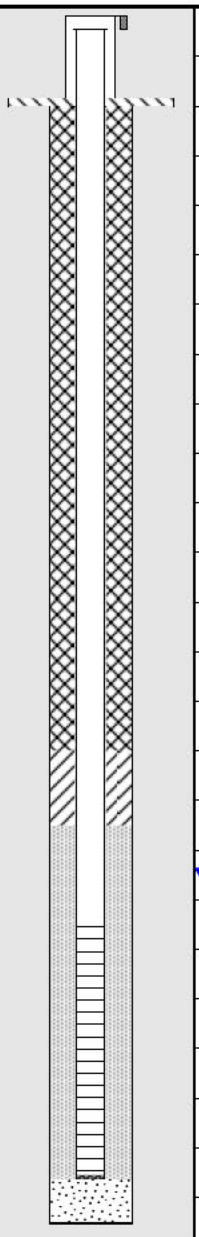
APPENDIX B

Well Construction Diagrams, Soil Boring Logs, and Geotechnical Data

Well Construction Diagrams and Soil Boring Logs

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-4**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-4**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **488173.8**	EASTING: **1487765.3**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.4 ft**	TOC ELEVATION: **240.54 ft**
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **46.4 ft below TOC**	DEPTH TO WATER: 7/23/2018 **34.19 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/21/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CL	LEAN CLAY, tan to yellowish brown with orange and brown mottles, upper 1.5 ft rootlets, very stiff, dry.	66
4	ML	SILT to CLAYEY SILT, light gray, increasing clay content with depth, moist to dry. @ 7.9-10 ft bgs containing carbonaceous material.	70
8	CL	LEAN CLAY, brown, stiff, moist.	
12	ML	CLAYEY SILT, tan with brown and orange staining, soft, moist.	70
16	CH	FAT CLAY, tan with brown and orange mottles, black carbonaceous material, moist. @ 20 ft bgs color changes to light gray with small amounts of brown mottles. @ 24 bgs 1 inch thick silt layer. @ 26.1 ft bgs 1 inch thick silt layer. @ 27 ft bgs color changes to brown, increasing sand content with depth.	100
20			
24			
28	CL	SANDY CLAY, brown with clay content decreasing with depth, soft, wet.	
32	SP	POORLY GRADED SAND, fine-grained, tan to brown, very loose, saturated. @ 30 ft bgs fine to medium-grained.	
36	SW	WELL GRADED SAND and GRAVEL, fine to coarse-grained sand; fine to coarse-grained, angular to subrounded gravel, saturated. @ 34-34.5 ft bgs black coating on gravel. @ 35.6-36.2 ft bgs black coating on gravel.	100
40	GC	CLAYEY GRAVEL with sand, fine to medium-grained sand with fine-grained, subangular to rounded gravel.	
	GW	WELL GRADED GRAVEL, angular to rounded (<3.25" dia), very loose, saturated.	
	SW/GW	WELL GRADED SAND and GRAVEL, fine to coarse-grained sand; fine to coarse-grained, angular to subrounded gravel, saturated.	100
44	GW	WELL GRADED GRAVEL, angular to rounded (<3.25" dia), very loose, saturated.	
	SW/GW	WELL GRADED SAND and GRAVEL, fine to coarse-grained sand; fine to coarse-grained, angular to subrounded gravel, saturated.	
48			



Well Construction

- 4 / 0: Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 4: 36.2 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.1 ft of stickup
- 16: Cement/bentonite grout from 0 ft bgs to 26.0 ft bgs
- 28: Bentonite pellet seal from 26.0 ft bgs to 29.0 ft bgs
- 32: Silica size 10/20 filter pack from 29.0 ft bgs to 43.0 ft bgs
- 36: 10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
- 40: 0.25 ft, 2 in dia., Sch. 40 PVC end cap
- 44: Collapse of native material from 43.0 to 45.0 ft bgs
- 48: Drilling terminated at 45.0 ft

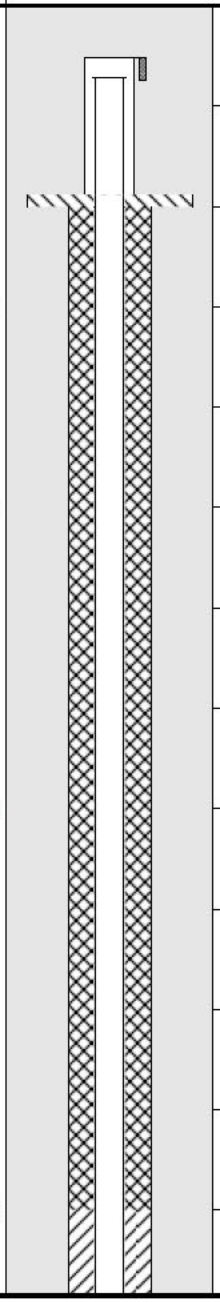
NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-4D**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-4D**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **488178.6**	EASTING: **1487747.8**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.7 ft**	TOC ELEVATION: **240.94 ft**
	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **80.7 ft below TOC**	DEPTH TO WATER: 7/23/2018 **34.59 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/31/2018**	DATE COMPLETED: **6/3/2018**

ftn Associates Ltd.
water resources / environmental consultants

Depth (feet)	USCS	Graphic Log	Description	% REC
-5				
0	FILL		LIMESTONE GRAVEL FILL	
	CL		LEAN CLAY, tan to yellowish brown with orange and brown mottles, upper 1.5 ft rootlets, very stiff, dry.	40
5	ML		SILT to CLAYEY SILT, light gray with brown to tan upper 1 inch, increasing clay content with depth, moist to dry.	20
			@ 7.9-10 ft bgs containing carbonaceous material.	
10	CL		LEAN CLAY, brown to tan, increasing silt content with depth, stiff, moist.	
15	ML		SILT, tan with brown and orange staining, soft, moist.	100
	CL		LEAN CLAY, brown with brown and orange mottles, decreasing silt content with depth, medium stiff, moist.	
	CH		FAT CLAY, tan with brown and orange mottles, black carbonaceous material, moist.	
20				
25			@ 25.9-26 ft bgs light gray silt. @ 26 ft bgs color change to brown with increasing sand content with depth.	100
			@ 28 ft bgs FAT SANDY CLAY, brown with fine-grained	

Well Construction



Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing

70.4 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.2 ft of stickup

Cement/bentonite grout from 0 ft bgs to 25.0 ft bgs

Bentonite pellet seal from 25.0 ft bgs to 28.0 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

ftn Associates Ltd. water resources / environmental consultants	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-4D**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-4D**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **488178.6**	EASTING: **1487747.8**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.7 ft**	TOC ELEVATION: **240.94 ft**
	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **80.7 ft below TOC**	DEPTH TO WATER: 7/23/2018 **34.59 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/31/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Description	% REC
		sand, sand content increases with depth, medium stiff, moist.	
30	SP	POORLY GRADED SAND, fine-grained, tan to brown, very loose, saturated. @ 30 ft bgs fine to medium-grained.	60
	SW/GW	WELL GRADED SAND and GRAVEL, fine to coarse-grained sand, fine to coarse-grained, angular to subrounded gravel, saturated. @ 35-35.6 ft bgs black coating on gravels.	
35			100
	GC	CLAYEY GRAVEL with sand, fine to medium-grained sand with fine-grained subangular to rounded gravel.	
	GW	WELL GRADED GRAVEL, angular to rounded (<3.25" dia), very loose, saturated. @ 40 ft bgs with coarse-grained, angular to subrounded sand. @ 42 ft bgs coarse-grained subangular to subrounded sand.	50
40			
45			63
50	SW/GW	WELL GRADED SAND and GRAVEL, angular to subrounded, orange, very loose, saturated.	
	GW	WELL GRADED GRAVEL, subangular to rounded (<3" dia), light brown to orangish brown, very loose, saturated.	50
55			
	SW/GW	WELL GRADED SAND and GRAVEL, angular to subrounded sand, subangular to subrounded gravel (<2" dia), very loose, saturated.	100
	GP		
	CH	POORLY GRADED GRAVEL, subangular to subrounded (<1" dia), very loose, saturated.	
	SW/GW	FAT SANDY CLAY, tan to brownish tan with fine to	

Well Construction

- 30
- 35
- 40
- 45
- 50
- 55

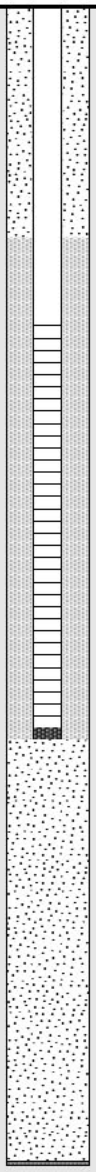
Silica size 10/20 filter pack from 28.0 ft bgs to 39.0 ft bgs

Collapse of native material from 39.0 to 65.0 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **RP-4D**	
LOCATION: **Entergy Independence Plant**		WELL ID: **RP-4D**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **488178.6**	EASTING: **1487747.8**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND SURFACE ELEV.: **237.7 ft**	TOC ELEVATION: **240.94 ft**
DRILLING METHOD: **Sonic with 4x6 in dia, core and case**		TOTAL WELL DEPTH: **80.7 ft below TOC**	DEPTH TO WATER: 7/23/2018 **34.59 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/31/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Description	% REC
60		medium-grained sand and some fine-grained gravel, soft, saturated.	
	GW	WELL GRADED SAND and GRAVEL, angular to subrounded sand, subangular to subrounded gravel (<2" dia), very loose, saturated.	50
	SP		
	GW	WELL GRADED GRAVEL, subangular to rounded (<1.5" dia), light brown to orangish brown, very loose, saturated.	
	SP	POORLY GRADED SAND, medium-gained to some fine-grained , tan to light brown.	
65		WELL GRADED GRAVEL, angular to subrounded (<2" dia), yellowish orange, very loose, saturated.	
		POORLY GRADED SAND, medium-grained to some fine-grained sand, tan to light brown.	88
	SW	WELL GRADED SAND, fine to coarse-grained subrounded to rounded, yellowish orange, saturated. @ 68.5 ft bgs with subrounded to rounded gravel. @ 68.7-69 ft SANDSTONE, well-rounded, fine-grained.	
	SP	POORLY GRADED SAND, fine to medium-grained, light gray with some rounded black and white gravel, very loose, saturated.	
70	GW		
	SW/GW	WELL GRADED GRAVEL, subangular to rounded (<3" dia), light brown to orangish brown, very loose, saturated.	50
	SC/SM	WELL GRADED SAND and GRAVEL , subangular to rounded gravel, greenish gray.	
	SW	CLAYEY SAND to SILTY SAND, fine to medium-grained, olive gray, soft, saturated.	
	SM	WELL GRADED SAND, fine to coarse-grained subrounded to well rounded, very loose, saturated. @ 73.5 ft bgs with gravel (<2" dia)	100
75	SW		
	GM		
		SILTY SAND, olive to dark gray, soft, saturated.	
		WELL GRADED SAND, fine to coarse-grained subrounded to well rounded, very loose, saturated.	
		WELL GRADED GRAVEL, with some silt and fine-grained sand, gravel (<2" dia), dark gray, very loose, saturated.	
		SILTY SAND, dark gray, loose, saturated.	
80	SM	@ 80.5 ft bgs clayey.	
	CH	FAT SANDY CLAY, olive gray with lenses of fine-grained sand to silt.	
85		SILTY SAND, dark gray, loose, saturated. @ 85.5-88 ft bgs clayey.	
	SM		
90			



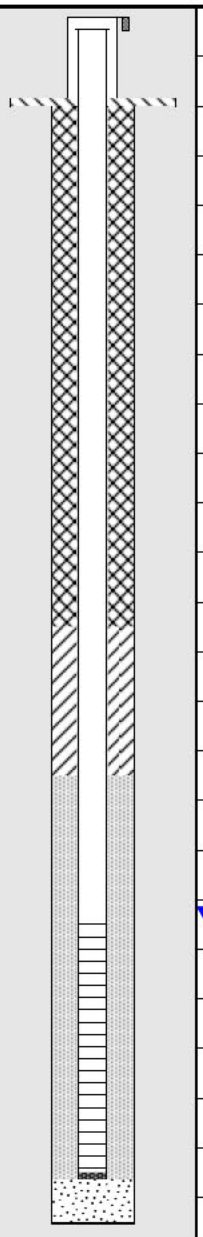
Well Construction

- 60
- 65 — Silica size 10/20 filter pack from 65.0 ft bgs to 78.0 ft bgs
- 70 — 10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
- 75 — 0.25 ft, 2 in dia., Sch. 40 PVC end cap
- 80 — Collapse of native materials from 78 to 88 ft bgs
- 85 — Drilling terminated due to refusal at 88.0 ft bgs
- 90

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

ftn Associates Ltd. water resources / environmental consultants FTN Project # R07920-1844-001	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-5**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-5**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **488032.2**	EASTING: **1488225.5**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **238.9 ft**	TOC ELEVATION: **241.97 ft**
	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **46.4 ft below TOC**	DEPTH TO WATER: 7/23/2018 **35.68 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/24/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Description	% REC
0	FILL	LIMESTONE GRAVEL FILL	
0	CL	LEAN CLAY, light gray to tan with orange and black mottles, black carbonaceous material, medium stiff, moist.	40
8		@ 10 ft bgs color change to brown.	
12	CL/ML	LEAN CLAY to CLAYEY SILT, light gray with orange and brown mottles, stiff, moist.	100
16	ML	SILT, light gray, soft, moist.	
16	CH	FAT CLAY, brown with some black mottles, stiff, moist.	
20		@ 20-24 ft bgs color alternating between brown and light gray.	
24		@ 24-24.5 ft bgs FAT SANDY CLAY, brown to dark brown fine-grained sand, medium stiff, moist.	
24	SC	CLAYEY SAND, brown, decreasing clay content with depth, loose, moist to saturated.	100
28	SP	POORLY GRADED SAND, fine-grained sand, very loose, saturated.	
28	SW	WELL GRADED SAND with GRAVEL, fine to coarse-grained subangular to subrounded sand, subangular to subrounded gravel (<1.5" dia), very loose, saturated.	100
40			
44	GW	WELL GRADED GRAVEL, fine to coarse-grained, angular to rounded gravel (<3" dia), very loose, saturated.	100

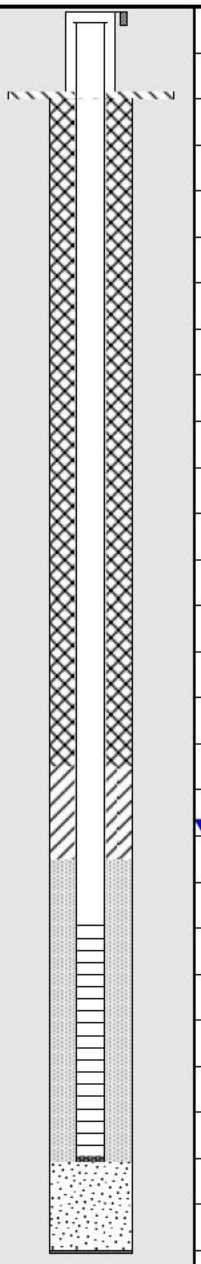


Well Construction	
4	Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing
4	36.1 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.1 ft of stickup
12	Cement/bentonite grout from 0 ft bgs to 21.0 ft bgs
20	Bentonite pellet seal from 21.0 ft bgs to 27.0 ft bgs
28	Silica size 10/20 filter pack from 27.0 ft bgs to 43.0 ft bgs
32	▼
36	10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
40	0.25 ft, 2 in dia., Sch. 40 PVC end cap
44	Collapse of native materials from 43.3 to 45 ft bgs
	Drilling terminated at 45.0 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-6**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-6**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487610.0**	EASTING: **1488476.2**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **238.0 ft**	TOC ELEVATION: **241.27 ft**
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **49.5 ft below TOC**	DEPTH TO WATER: 7/23/2018 **34.90 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/23/2018**	DATE COMPLETED: **6/2/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CL	TOP SOIL	
	CL	LEAN CLAY, silty, light brown to tan, very stiff, moist to dry.	
	ML	SILT, tan, medium stiff, moist to dry.	100
4	CH	FAT CLAY, orange and brown mottles with black carbonaceous material, stiff, moist.	
	CL	LEAN CLAY, silty, yellowish orange to gray with brown and orange mottles, stiff, moist to dry. @ 7.5 ft bgs color change to brown with black carbonaceous deposits.	100
8			
	CH	FAT CLAY, brown, stiff, moist.	
12		SILT, tan, soft, moist.	
			30
16	ML		
20			
	CH	FAT CLAY, tan with brown and orange mottles, stiff, moist. @ 24-25 ft bgs thin white silt lenses.	100
24			
	CL	LEAN CLAY, tan with silt content increasing with depth, soft, moist.	
28		@ 27-27.1 silt, tan with orange staining, soft.	100
	CH	FAT CLAY, light gray to tan, very soft, wet.	
		@ 30 ft bgs color change to dark gray.	
32			100
	SW	WELL GRADED SAND with GRAVEL, fine to coarse-grained sand; fine to coarse-grained, subangular to subrounded gravel, very loose, saturated.	
36	SP	@ 34.6-24.8 ft bgs clayey, light gray.	
		POORLY GRADED SAND, fine to medium-grained, very loose, saturated.	100
	SW		
40	SC	WELL GRADED SAND with GRAVEL, angular to subrounded gravel (<1" dia), very loose, saturated.	
	SW	CLAYEY SAND, with black well rounded gravel, soft, wet.	
	GC	WELL GRADED SAND with GRAVEL, angular to subrounded gravel (<1" dia), very loose, saturated.	100
44	GW	CLAYEY GRAVEL with sand, fine to coarse-grained, subangular to round sand; fine-grained, subangular to rounded gravel, dark gray.	
	SW		
48	GW	WELL GRADED GRAVEL with sand, fine-grained, subangular to rounded gravel, very loose, saturated.	100
		WELL GRADED SAND, fine to coarse-grained, saturated.	
		WELL GRADED GRAVEL, fine to coarse-grained gravel with some small cobbles, very loose, saturated.	
52			

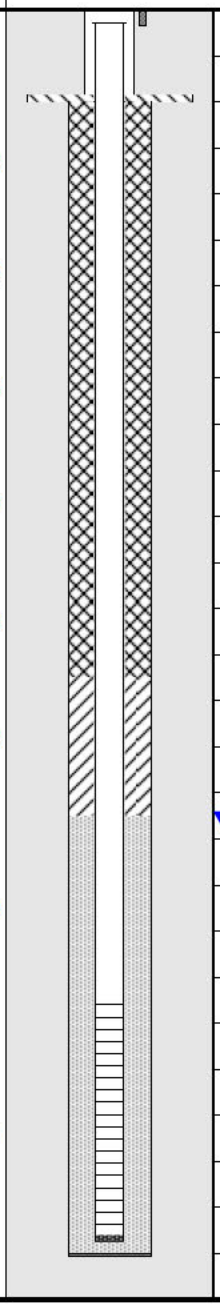


Well Construction	
4	Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing
0	
	39.2 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.3 ft of stickup
4	
8	
12	
16	Cement/bentonite grout from 0 ft bgs to 29.0 ft bgs
20	
24	
28	
32	Bentonite pellet seal from 29.0 ft bgs to 33.0 ft bgs
36	Silica size 10/20 filter pack from 33.0 ft bgs to 50.0 ft bgs
40	10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
44	0.25 ft, 2 in dia., Sch. 40 PVC end cap
48	Collapse of native material from 46.2 to 50 ft bgs
52	Drilling terminated at 50 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-7**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-7**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487319.3**	EASTING: **1488382.9**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.6 ft**	TOC ELEVATION: **241.04 ft**
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **52.9 ft below TOC**	DEPTH TO WATER: 7/23/2018 **34.60 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/24/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Description	% REC
-4			
0	CL	LEAN CLAY, brown to tan, medium stiff to stiff, moist. @ .5-.7 ft bgs subrounded to rounded gravel. @ 2.1-2.4 ft bgs subrounded to rounded gravel.	100
4	ML / CL	SILT with clayey fine-grained sand, light gray, rootlets, medium stiff, moist.	
	CH	LEAN CLAY, olive gray to light gray with heavy oxidation and carbonaceous material along silty fractures, stiff to medium stiff.	100
8		FAT CLAY, tan to yellowish orange with some orange mottles, stiff, moist.	
	CL	LEAN CLAY, tan with orange and brown mottles along with black carbonaceous material, medium stiff, moist.	100
12	ML	SILT, tan, soft, moist.	
16	CH	FAT CLAY, tan stiff, moist.	100
20		@ 21.8-22 ft bgs with silt lenses and brown and orange mottles.	100
24			
28	ML	CLAYEY SILT to SILT, light gray to tan alternating layers of clayey silt and silt, very soft, wet.	100
	CL	LEAN CLAY, olive gray, medium stiff, moist.	
32	CH	FAT CLAY, dark gray, very soft, wet.	
	SW	WELL GRADED SAND with GRAVEL, fine to coarse-grained, subangular to subrounded sand; fine to coarse-grained, angular to subrounded gravel, saturated.	100
36	CL	LEAN CLAY with sand, grayish brown with sand content increases with depth, soft to very soft, saturated. @ 37.9-38 ft bgs with black gravel.	
40	SC	CLAYEY SAND with gravel, fine to coarse-grained gravel, decreasing clay with depth, loose to medium dense sand, saturated.	
	GW	WELL GRADED GRAVEL, fine to coarse-grained, subangular to subrounded (<2.5" dia), very loose, saturated.	70
44			
48	SW	WELL GRADED SAND with GRAVEL, fine to coarse-grained, subangular to subrounded sand; fine to coarse-grained, angular to subrounded gravel (<2.5" dia), saturated.	
52			

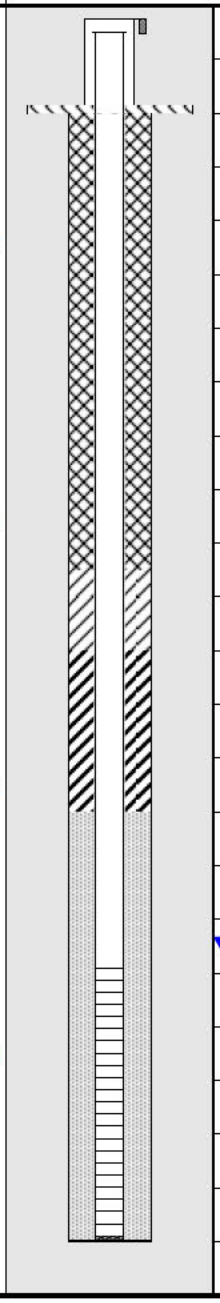


Well Construction	
4	Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing
0	
4	42.6 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.4 ft of stickup
8	
12	
16	Cement/bentonite grout from 0 ft bgs to 25.0 ft bgs
20	
24	
28	Bentonite pellet seal from 25.0 ft bgs to 31.0 ft bgs
32	Silica size 10/20 filter pack from 31.0 ft bgs to 50.0 ft bgs
36	
40	10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
44	
48	0.25 ft, 2 in dia., Sch. 40 PVC end cap Collapse of native materials from 43.3 to 45 ft bgs
52	Drilling terminated at 50.0 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-8**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-8**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487126.0**	EASTING: **1488140.5**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.4 ft**	TOC ELEVATION: **240.43 ft**
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **45.0 ft below TOC**	DEPTH TO WATER: 7/23/2018 **33.95 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/20/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Description	% REC
-4			
0		FAT CLAY, brown, medium stiff, moist.	
4	CH		70
8			
12		LEAN CLAY, silty, brown with some light grey, yellow, and orange mottles, soft to medium stiff, moist.	
16	CL		70
20		FAT CLAY, brown with some dark brown staining, stiff, moist.	
24	CH		
	ML	CLAYEY SILT, dark gray.	80
	SC	CLAYEY SAND, fine to medium-grained, soft to loose, moist.	
28	SW	WELL GRADED SAND, fine to coarse-grained, yellowish orange, with fine-grained, subangular to subrounded gravel (<1" dia), loose.	
	SP	POORLY GRADED SAND, fine-grained, yellowish orange, loose, saturated.	
32		@ 30-30.6 ft, clayey.	
	SW	WELL GRADED SAND, fine to coarse-grained, yellowish orange, with fine-grained, subangular to subrounded gravel (<1" dia), loose.	
	SP	POORLY GRADED SAND, fine-grained, yellowish orange, loose, saturated.	100
36			
	SW	WELL GRADED SAND, fine to coarse-grained, yellowish orange, with fine-grained, subangular to subrounded gravel (<3" dia), loose.	
40	SW/GW	WELL GRADED SAND and GRAVEL, yellowish orange, subangular to subrounded gravel (<1" dia), saturated.	0
44			



Well Construction

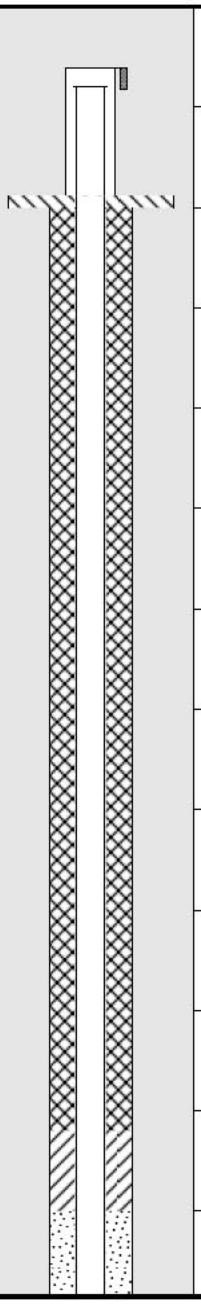
- 4: Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing
- 0
- 4: 34.8 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.0 ft of stickup
- 8
- 12: Cement/bentonite grout from 0 ft bgs to 17.0 ft bgs
- 16: Bentonite pellet seal from 17.0 ft bgs to 20 ft bgs
- 20
- 24: Collapse of native material from 20 to 26 ft bgs
- 28: Silica size 10/20 filter pack from 26.0 ft bgs to 42.0 ft bgs
- 32
- 36: 10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
- 40: 0.2 ft, 2 in dia., Sch. 40 PVC end cap; Drilling terminated at 42 ft bgs
- 44

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-8D**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-8D**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487119.5**	EASTING: **1488159.9**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.4 ft**	TOC ELEVATION: **240.41 ft**
	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **78.2 ft below TOC**	DEPTH TO WATER: 7/23/2018 **33.90 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/19/2018**	DATE COMPLETED: **6/3/2018**

ftn Associates Ltd.
water resources / environmental consultants

Depth (feet)	USCS	Graphic Log	Description	% REC
-5				
0			FAT CLAY, brown, medium stiff, moist.	
5	CH			40
10				
15	CL		LEAN CLAY, silty, brown with some light grey, yellow, and orange mottles, soft to medium stiff, moist.	60
20	CH		FAT CLAY, brown with some dark brown staining, stiff, moist.	
25	SC		CLAYEY SAND, fine to medium-grained, soft to loose, moist.	80



Well Construction

Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing

68.0 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.0 ft of stickup

Cement/bentonite grout from 0 ft bgs to 23.0 ft bgs

Bentonite pellet seal from 23.0 ft bgs to 25.0 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-8D**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-8D**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487119.5**	EASTING: **1488159.9**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.4 ft**	TOC ELEVATION: **240.41 ft**
	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **78.2 ft below TOC**	DEPTH TO WATER: 7/23/2018 **33.90 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/19/2018**	DATE COMPLETED: **6/3/2018**

ftn Associates Ltd.
water resources / environmental consultants

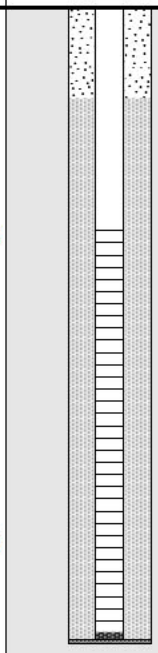
Depth (feet)	USCS	Description	% REC	Well Construction
30	SW	WELL GRADED SAND, fine to coarse-grained, yellowish orange, with fine-grained, subangular to subrounded gravel (<1" dia), loose.		30 ▼
	SP	POORLY GRADED SAND, fine-grained, yellowish orange, loose, saturated. @ 30-30.6 ft, clayey.		
	SW	WELL GRADED SAND, fine to coarse-grained, yellowish orange, with fine-grained, subangular to subrounded gravel (<1" dia), loose.		
35	SP	POORLY GRADED SAND, fine-grained, yellowish orange, loose, saturated. @ 30-30.6 ft, clayey.	80	35
	SW	WELL GRADED SAND, fine to coarse-grained, yellowish orange, with fine-grained, subangular to subrounded gravel (<3" dia), loose.		
40	SW/GW	WELL GRADED SAND and GRAVEL, subangular to subrounded gravel (<1" dia), yellowish orange, saturated.		40 Formation collapse from 25.0 ft bgs to 61.5 ft bgs
45	GW	WELL GRADED GRAVEL with sand, medium to coarse-grained, subangular to subrounded gravel (<3" dia), yellowish orange; coarse-grained sand, loose, saturated.	60	45
50	SW/GW	WELL GRADED SAND and GRAVEL, subangular to subrounded gravel (<1" dia), yellowish orange, saturated.		50
	GW	WELL GRADED GRAVEL with sand, medium to coarse-grained, subangular to subrounded gravel (<3.5" dia), yellowish orange; coarse-grained sand, loose, saturated.		
55		POORLY GRADED SAND with GRAVEL, medium-grained, medium dense, yellowish orange. Gravel is subangular to subrounded, increasing gravel content with depth. Saturated.	100	55

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-8D**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-8D**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487119.5**	EASTING: **1488159.9**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **237.4 ft**	TOC ELEVATION: **240.41 ft**
	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **78.2 ft below TOC**	DEPTH TO WATER: 7/23/2018 **33.90 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/19/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Graphic Log	Description	% REC
60	SP		@ 60-62 ft bgs with gravel.	
65				100
	GW		WELL GRADED GRAVEL with SAND, gravel (<3.5" dia), yellowish orange, saturated.	
70	SW		WELL GRADED SAND and GRAVEL, fine to coarse-grained; fine-grained, subangular to angular gravel (<1" dia), yellowish orange, saturated.	
	GW		WELL GRADED GRAVEL with SAND, angular to rounded, yellowish orange; coarse-grained sand, saturated.	100
75			@ 74.5-75 ft bgs greenish-gray silt, no odor.	
80				
85				
90				

Well Construction



Silica size 10/20 filter pack from 61.5 ft bgs to 75.0 ft bgs

10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen

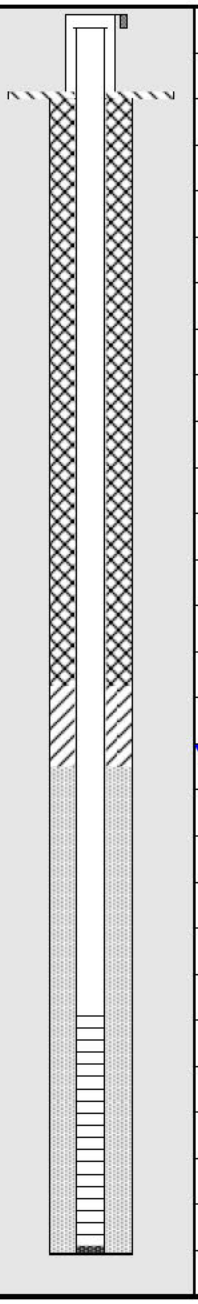
0.2 ft, 2 in dia., Sch. 40 PVC end cap

Drilling terminated due to refusal at 75 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-9**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-9**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487691.6**	EASTING: **1487348.7**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **235 ft**	TOC ELEVATION: **238.14 ft**
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **53.5 ft below TOC**	DEPTH TO WATER: 7/23/2018 **31.55 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/21/2018**	DATE COMPLETED: **6/3/2018**

Depth (feet)	USCS	Description	% REC
0	CL	TOP SOIL	
	CL	LEAN CLAY, brown, stiff, moist to dry.	
4	ML	SILT, light gray with small amounts of orangish yellow staining, medium stiff, dry.	72
	CL	LEAN CLAY, light gray with some orange staining, rootlets, very stiff, dry.	
8	CH	@ 5 ft bgs color change to dark brown, soft, moist, increasing clay content with depth.	80
		FAT CLAY, dark brown with round black carbonaceous deposits, stiff, moist.	
12	CL	LEAN CLAY, dark brown with black round carbonaceous deposits, increasing silt content with depth, medium stiff, moist.	
16	ML	SILT, brownish gray with some oxide staining, very soft, moist.	50
	CH	FAT CLAY, brown to tan with brown and orange mottles, stiff, moist.	
20		LEAN CLAY to CLAYEY SILT, brown with light gray silt lenses within, very soft, moist.	
24	CL/ML		70
	CH	FAT CLAY, light gray with orange and dark brown mottles, some silt, medium stiff to stiff, moist.	
28	SM	SILTY SAND, brown to tan, fine to medium-grained, very loose, saturated.	
32	SW/GW	WELL GRADED SAND with GRAVEL, fine to coarse-grained, fine to medium rounded gravel (<1" dia), saturated.	
	SP	POORLY GRADED SAND, tan to brownish orange, fine to medium-grained sand, very loose, saturated.	100
36	SC	CLAYEY SAND, light to dark gray, very soft, saturated. @ 37.5-38.5 ft, contains dark subrounded gravel.	
	SW	WELL GRADED SAND with gravel, fine to coarse-grained, fine to medium rounded gravel (<1" dia), saturated.	
40		WELL GRADED GRAVEL, with coarse-grained sand, fine to coarse-grained rounded to subround gravel (<2" dia), yellowish orange, very loose, saturated.	
44	GW		80
48			
52			

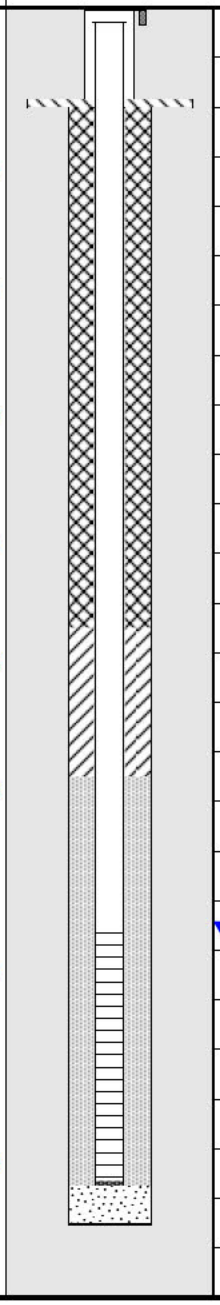


Well Construction
Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing
43.2 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.1 ft of stickup
Cement/bentonite grout from 0 ft bgs to 25.5 ft bgs
Bentonite pellet seal from 25.5 ft bgs to 29.0 ft bgs
Silica size 10/20 filter pack from 29.0 ft bgs to 50.0 ft bgs
10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
0.25 ft, 2 in dia., Sch. 40 PVC end cap
Drilling terminated at 50.0 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

	PROJECT: **Monitoring Well Installations**	BORING ID: **RP-10**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **RP-10**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **488087.8**	EASTING: **1487487.4**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **239.6 ft**	TOC ELEVATION: **242.99 ft**
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **46.9 ft below TOC**	DEPTH TO WATER: 7/23/2018 **36.55 ft below TOC**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/23/2018**	DATE COMPLETED: **6/2/2018**

Depth (feet)	USCS	Description	% REC
0	FILL	LIMESTONE GRAVEL FILL	
4	CL	LEAN CLAY, silty, brownish tan, stiff, moist.	40
8	ML	SILT, yellowish orange with orange and brown staining, medium stiff, moist.	40
12	CL	LEAN CLAY, silty, olive gray with some orange mottles, silt content increases with depth, moist.	100
16	ML	SILT, tan to light gray, moist, soft. @ 15 ft bgs increasing clay content with depth.	80
20	CH	FAT CLAY, brown with dark brown mottles, moist. @ 20 ft bgs color change to tan to brown with orange mottles, medium stiff, moist. @ 22 ft bgs color changes to light gray to greenish gray.	100
24	ML	CLAYEY SILT, brown to tan, soft, moist.	
28	CL	SANDY CLAY, fine-grained sand, brown, soft moist.	100
32	SP	POORLY GRADED SAND, fine to medium-grained sand, tan, very loose.	
36	GP	POORLY GRADED GRAVEL, subangular to subrounded gravel, brown, very loose, saturated. @ 33.8-34.8 ft bgs black coating on rock.	80
	SW	WELL GRADED SAND with GRAVEL, fine to coarse-grained, angular to subrounded, gravel (<2.5" dia), very loose, saturated.	
40	GC	CLAYEY GRAVEL with sand, subrounded to round, soft, wet.	
	GP	POORLY GRADED GRAVEL, subangular to subrounded, brown, very loose, saturated.	
44	GW	WELL GRADED GRAVEL, subrounded to rounded, very loose, saturated.	100
	SW	WELL GRADED SAND with GRAVEL, fine to coarse-grained, angular to subrounded gravel (<2.5" dia), very loose, saturated.	
48			



Well Construction
Above ground completion including 2x2 ft concrete pad, four pipe bollards, and locking outer aluminum casing
36.7 ft of 2 in dia., Sch. 40 PVC solid riser, including 3.4 ft of stickup
Cement/bentonite grout from 0 ft bgs to 21.0 ft bgs
Bentonite pellet seal from 21.0 ft bgs to 27.0 ft bgs
Silica size 10/20 filter pack from 27.0 ft bgs to 42.5 ft bgs
10.0 ft of 2 in dia., 0.010 in slot, Sch. 40 PVC screen
0.20 ft, 2 in dia., Sch. 40 PVC end cap
Drilling terminated at 45 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

PROJECT: **Monitoring Well Installations**		BORING ID: **B-1**	
LOCATION: **Entergy Independence Plant**		WELL ID: **B-1**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **487451.1**	EASTING: **1487413.6**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND SURFACE ELEV.: **237.3 ft**	
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL DEPTH: **30.0 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/18/2018**	DATE COMPLETED: **5/18/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0		FILL		FILL
	100			LEAN CLAY, dark brown, stiff, moist to dry.
	100			
5		CL		@ 5-10 ft bgs with fine-grain sand and silt.
	60			
10				
	100	ML		CLAYEY SILT, trace fine-grained sand, light brown to greyish brown, moist
		CL		LEAN CLAY, silty, light gray with brown and orange mottles, black carbonaceous deposits, medium stiff, moist.
15		ML		SILT, light gray to yellowish orange, very soft, moist.
	100			FAT CLAY, light gray and yellowish orange with black carbonaceous deposits, stiff, moist.
		CH		
20				
	100			
				LEAN CLAY, very silty, light gray with yellow and orange mottles, soft, moist.
25	100			
		CL		@ 26 ft bgs color changes to medium gray.
	100			
30				Drilling terminated at 30 ft bgs.

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

PROJECT: **Monitoring Well Installations**		BORING ID: **B-2**	
LOCATION: **Entergy Independence Plant**		WELL ID: **B-2**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **487904.5**	EASTING: **1487521.7**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND SURFACE ELEV.: **237.3 ft**	
DRILLING METHOD: **Sonic with 4x6 in dia, core and case**		TOTAL DEPTH: **10.0 ft bgs**	DEPTH TO WATER: **N/A**
SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**		DATE STARTED: **5/18/2018**	DATE COMPLETED: **5/18/2018**

FTN Project # R07920-1844-001

LOGGED BY: **DLD**

Depth (feet)	% REC	USCS	Graphic Log	Description
0		CL		TOP SOIL, brown, roots, moist to dry.
	20	CL		LEAN CLAY, silty, brown with some dry sand like intervals that might be ash, stiff, moist.
5	100	CH		FAT CLAY, brown with yellowish orange mottles, some black carbonaceous deposits, medium stiff to stiff, moist.
	100			
10				Drilling terminated at 10 ft bgs.

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

PROJECT: **Monitoring Well Installations**		BORING ID: **B-3**	
LOCATION: **Entergy Independence Plant**		WELL ID: **B-3**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **488077.9**	EASTING: **1487971.8**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND SURFACE ELEV.: **239.0 ft**	
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL DEPTH: **12.0 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/22/2018**	DATE COMPLETED: **5/22/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0	100	FILL		FILL, CCR material
5		FILL		FILL, gravel
	50	CL		LEAN CLAY, brown and orange with large round black carbonaceous deposits, medium stiff, moist.
10	100			Boring terminated at 12 ft bgs.

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

PROJECT: **Monitoring Well Installations**		BORING ID: **B-4**	
LOCATION: **Entergy Independence Plant**		WELL ID: **B-4**	
DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**		NORTHING: **487863.7**	EASTING: **1488421.3**
DRILLING EQUIPMENT: **Geoprobe 8150LS**		GROUND SURFACE ELEV.: **207.5 ft**	
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL DEPTH: **22.0 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **AJP**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/22/2018**	DATE COMPLETED: **5/22/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0				FILL
	100	FILL		
5				LEAN CLAY, brown and green with orange mottles, brown carbonaceous deposits, medium stiff, moist.
	100	CL		
		ML		CLAYEY SILT, light gray with fine concretions, medium stiff, moist.
10				FAT CLAY, brown to tan with orange and brown mottles and black carbonaceous deposits, stiff, moist.
	100	CH		
		ML		SILT, brownish tan with black and brown staining, stiff, moist to dry.
15				LEAN CLAY, silty, orange and brown staining, moist.
	40	CL		
20				
	100			Boring terminated at 22 ft bgs.

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

FTN Associates Ltd. water resources / environmental consultants	PROJECT: **Monitoring Well Installations**	BORING ID: **B-5**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **B-5**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487249.2**	EASTING: **1488040.3**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **238.3 ft**	
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL DEPTH: **10.0 ft bgs**	DEPTH TO WATER: **N/A**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/18/2018**	DATE COMPLETED: **5/19/2018**

Depth (feet)	% REC	USCS	Graphic Log	Description
0		CL		TOP SOIL
	100			LEAN CLAY, silty, light brown, stiff, dry to moist.
				@ 2 ft bgs color changes to light gray with yellow and orange mottles.
	100			
5		CL		
	60			
10				Boring terminated at 10 ft bgs.

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

	PROJECT: **Monitoring Well Installations**	BORING ID: **B-6**	
	LOCATION: **Entergy Independence Plant**	WELL ID: **PZ-1**	
	DRILLING CONTRACTOR: **Walker-Hill Environmental, Inc.**	NORTHING: **487518.1**	EASTING: **1487843.0**
	DRILLING EQUIPMENT: **Geoprobe 8150LS**	GROUND SURFACE ELEV.: **238.3 ft**	TOC ELEVATION: **241.41 ft**
FTN Project # R07920-1844-001	DRILLING METHOD: **Sonic with 4x6 in dia, core and case**	TOTAL WELL DEPTH: **52.9 ft below TOC**	DEPTH TO WATER: 7/23/2018 **34.92 ft below TOC**
LOGGED BY: **DLD**	SAMPLING METHOD: **Continuous with 10 ft, 4 in dia. core barrel**	DATE STARTED: **5/20/2018**	DATE COMPLETED: **5/20/2018**

Depth (feet)	USCS	Description	% REC
0	CL	LEAN CLAY, silty, brown, very stiff, dry.	100
4	CH	FAT CLAY, light gray with brown bottles, very stiff, dry to moist.	
	CL	LEAN CLAY, silty, brown, very stiff, dry.	100
8	CH	FAT CLAY, light gray with brown mottles, very stiff, dry to moist.	100
		LEAN CLAY, silty, light gray to dark brown with orange oxide staining, medium stiff, moist.	100
12	CL		100
16			100
20	ML	CLAYEY SILT, brown to yellowish orange, very soft, saturated.	
	CH	FAT CLAY, gray with brown and yellowish orange mottles, manganese staining and calcite gravels thought, stiff, moist.	100
24	ML	SILT, clayey, light brown to yellowish orange, very soft, moist.	
28	CL	LEAN CLAY, silty, light brown to yellowish orange and some light gray mottles, stiff, to medium stiff, moist.	100
32	CH	FAT CLAY, gray, stiff, moist. @ 32-34 ft with orange mottles.	
			100
36	CL	LEAN CLAY, silty, gray, very moist, soft.	
40	GW	WELL GRADED GRAVEL with SAND, medium to coarse-grained sand, angular to subrounded gravel (<1.5" dia), yellowish orange, wet.	
44			100
48			
52			

Well Construction

- 42.6 ft of 1 in dia., Sch. 40 PVC solid riser, including 3.1 ft of stickup
- Cement/bentonite grout from 0 ft bgs to 35.0 ft bgs
- Bentonite pellet seal from 35 ft bgs to 38.0 ft bgs
- Silica size 10/20 filter pack from 38 ft bgs to 49.8 ft bgs
- 10.0 ft of 1 in dia., 0.010 in slot, Sch. 40 PVC screen
- 0.25 ft, 1 in dia., Sch. 40 PVC end cap
- Drilling terminated at 50 ft bgs

NOTES: Horizontal and vertical data are based on the Harmon Surveying report dated July 12, 2018 (AR State Plane NAD83 North and NAVD88).

Geotechnical Data

FTN/ENTERGY INDEPENDENCE/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'	SC-SM	10.8	19	13	6	-0.31	96.7	35.5	19.0	-	-	-	-	-	-	-
B-1	UD	10.0-12.0'	ML	31.3	44	29	15	0.16	100.0	98.3	40.2	-	-	-	31.3	89.6	1.2E-08	-
B-1	UD	20.0-22.0'	CH	39.1	68	23	45	0.37	100.0	96.1	57.2	-	-	2.71	39.1	81.6	-	T-CU w/pp
B-1	UD	28.0-30.0'	CH	51.6	50	27	23	1.04	100.0	99.7	50.5	-	-	2.67	51.6	71.4	-	T-CU w/pp
B-2	UD	8.0-10.0'	CH	26.3	55	21	34	0.16	100.0	96.2	39.7	-	-	2.72	26.3	95.3	-	T-CU w/pp
B-3	UD	3.0-5.0'	ML	42.9	NP	NP	NP	NP	100.0	52.8	16.5	-	-	-	-	-	-	-
B-3	UD	10.0-12.0'	CL	30.1	45	20	25	0.41	98.2	97.2	30.9	-	-	-	30.1	91.4	1.1E-06	-
B-4	UD	5.0-7.0'	CL	23.2	35	15	20	0.40	100.0	96.5	45.0	-	-	-	23.2	103.1	4.9E-06	-
B-4	UD	15.0-17.0'	CH	34.1	50	26	24	0.36	100.0	96.1	40.5	-	-	2.67	34.1	86.1	-	C
B-4	UD	20.0-22.0'	CL	27.4	35	20	15	0.51	100.0	91.9	25.0	-	-	-	27.4	94.9	1.1E-06	-
B-5	UD	3.0-5.0'	CL	19.0	38	16	22	0.13	98.6	89.6	34.0	-	-	2.69	19.0	108.7	-	T-CU w/pp
RP-8	UD	8.0-10.0'	CL	24.6	49	24	25	0.04	100.0	95.6	43.1	-	-	-	24.6	98.5	3.4E-08	-
PZ-1	UD	5.0-7.0'	CL	22.8	43	24	19	-0.04	100.0	95.1	51.0	-	-	-	22.8	102.9	3.0E-08	-
PZ-1	UD	10.0-12.0'	CL	30.9	46	19	27	0.45	100.0	97.1	42.0	-	-	2.72	30.9	91.1	-	T-CU w/pp
PZ-1	UD	15.0-17.0'	CL	28.9	38	17	21	0.56	100.0	97.0	35.0	-	-	2.78	28.9	95.2	-	T-CU w/pp

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 INDEPENDENCE/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)		
PZ-1	Bag	45.0-47.0'	GW	7.6	NP	NP	NP	NP	31.3	1.3	1.1	-	-	-	-	-	-	-
RP-6	Bag	30.0-33.0'	CH	46.5	67	30	37	0.45	100.0	97.5	65.0	-	-	-	-	-	-	-
RP-7	Bag	36.0-38.0'	CL	23.2	29	15	14	0.56	96.9	80.0	31.0	-	-	-	-	-	-	-
RP-8D	Bag	27.0-30.0'	SP-SM	10.2	NP	NP	NP	NP	59.8	11.0	3.5	-	-	-	-	-	-	-
RP-8D	Bag	42.0-50.0'	GW	3.9	NP	NP	NP	NP	23.6	0.6	0.4	-	-	-	-	-	-	-
RP-8D	Bag	68.0-70.0'	GW	7.2	-	-	-	-	15.8	2.3	1.5	-	-	-	-	-	-	-
RP-9	Bag	24.0-26.0'	CH	37.5	74	33	41	0.10	100.0	98.4	78.0	-	-	-	-	-	-	-
RP-9	Bag	45.0-46.0'	GW	7.8	NP	NP	NP	NP	16.0	1.5	0.8	-	-	-	-	-	-	-
RP-10	Bag	24.0-25.0'	CH	32.9	66	31	35	0.06	100.0	99.2	74.0	-	-	-	-	-	-	-
RP-10	Bag	33.0-35.0'	GP	6.6	NP	NP	NP	NP	18.6	0.6	0.3	-	-	-	-	-	-	-

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

TABLE 1
FTN/ENERGY INDEPENDENCE/AR
SUMMARY OF SOIL DATA

Sample Type	Sample Identification	Sample Depth (ft.)	USCS Soil Classification	Delivered Moisture (%)	Atterberg Limits			Grain Size Distribution			Specific Gravity	Moisture/Density Relationship Standard Proctor		Additional Tests Comments (See Notes)
					LL	PL	PI	% Finer 3/4"	% Finer #4	% Finer #200		Dry Density (pcf)	Moisture (%)	
B	RP-4D	38-39	GP-GM	--	NP	NP	NP	78	31	5	--	--	--	DS
B	RP-4D	64 5-67.4	SP	--	NP	NP	NP	100	97	4	--	--	--	DS
B	RP-4D	76.2-78	SM	--	NP	NP	NP	100	100	15	--	--	--	DS
B	RP-5	27-28	SP-SM	--	NP	NP	NP	100	79	8	--	--	--	DS
B	RP-8D	53-60	SP-SM	--	NP	NP	NP	98	91	7	--	--	--	DS

NOTES:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT
PI= PLASTIC INDEX
SL= SHRINKAGE LIMIT
UW= UNIT WEIGHT
T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
PERM = PERMEABILITY

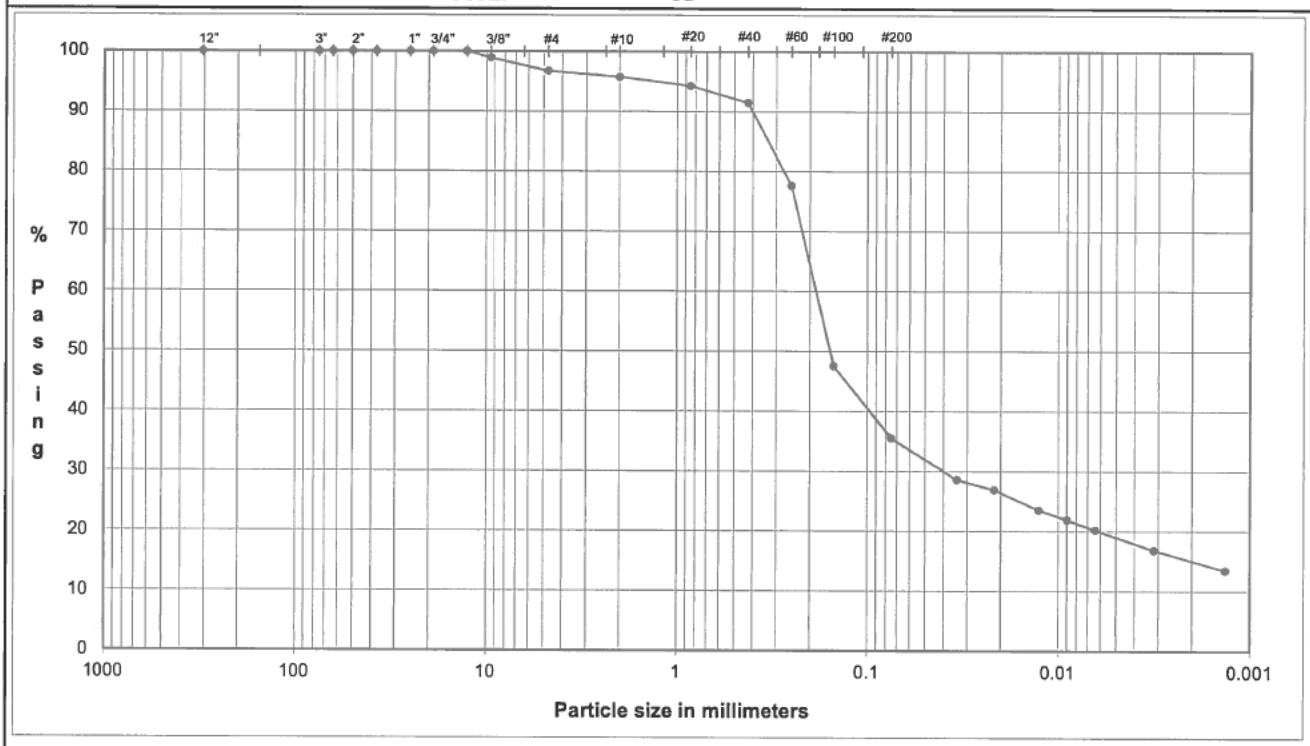
AUGUST 2018

18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

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



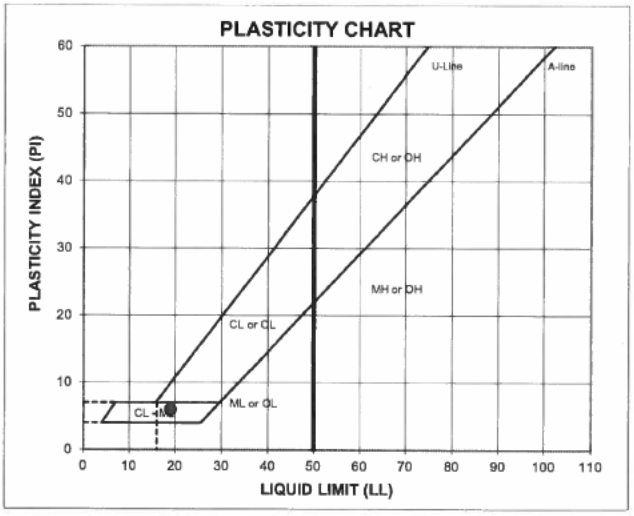
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	98.9		
#4	4.8	96.7	Fine Gravel	3.3
#10	2.00	95.7	Coarse Sand	1.0
#20	0.85	94.3		
#40	0.43	91.4	Medium Sand	4.3
#60	0.25	77.6		
#100	0.15	47.6		
#200	0.075	35.5	Fine Sand	55.9

Hydrometer Analysis

(mm)	%Finer		
0.034	28.6		
0.022	26.9		
0.013	23.5	Fines	
0.0090	21.9	Silt or Clay	35.5
0.0064	20.2		
0.0032	16.8		
0.0013	13.5		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
10.8	19	13	6	-0.31

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

DESCRIPTION: SILTY CLAYEY to CLAYEY SILT and SAND, fine to coarse, trace fine gravel; grayish brown.

USCS: SC-SM

TECH	TJ/HH
DATE	8/9/18
CHECK	
REVIEW	
APPROVE	

JUNE 2018

18103172

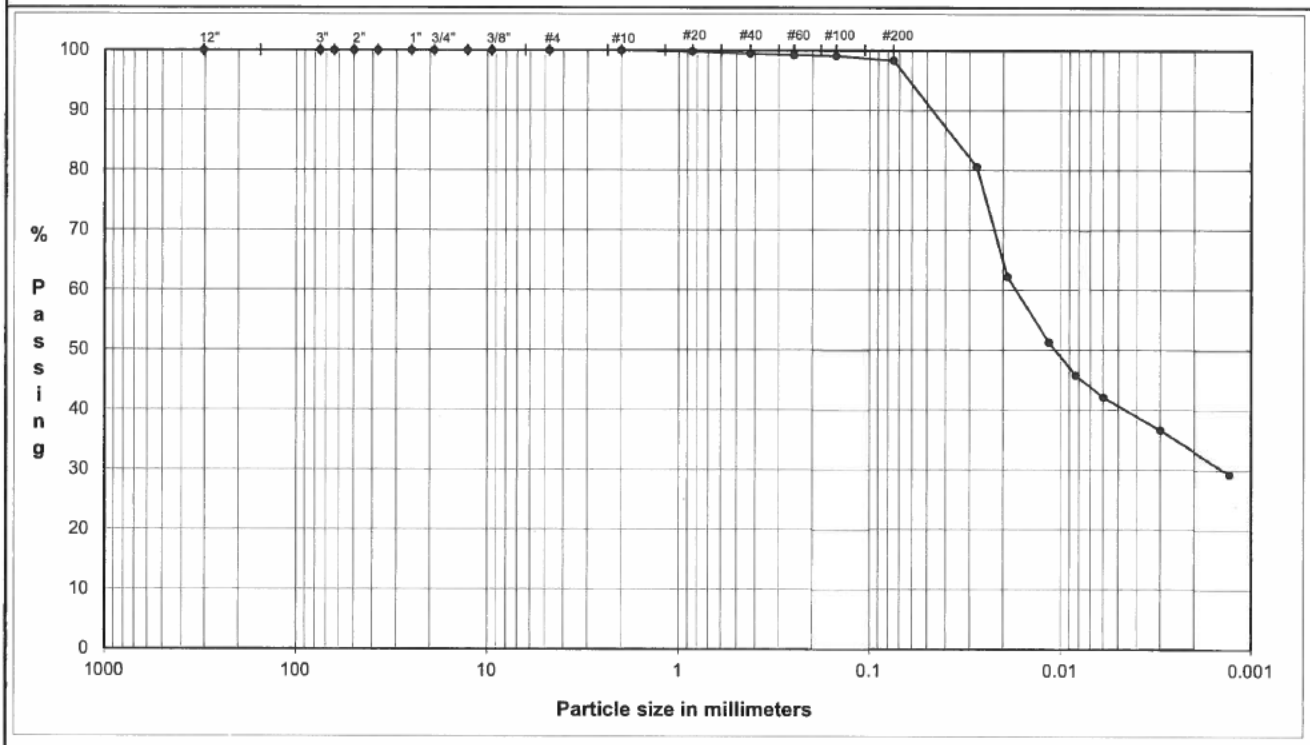
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **B-1** Depth: **10.0-12.0'**

TYPE: **UD**



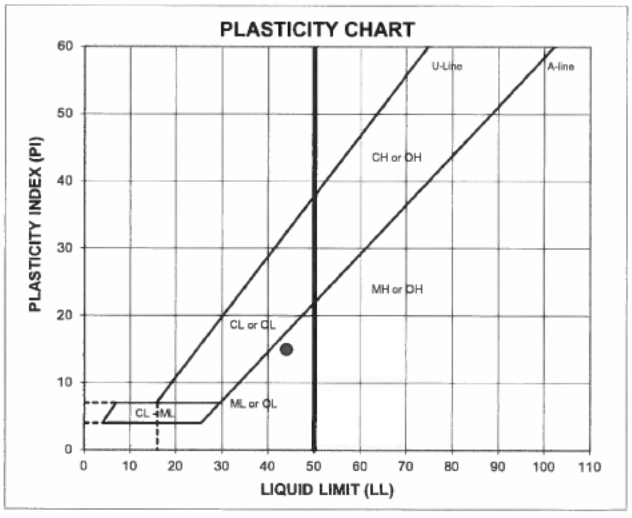
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

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	**100.0**	Coarse Sand	**0.0**
#20	0.85	**99.8**		
#40	0.43	**99.5**	Medium Sand	**0.5**
#60	0.25	**99.2**		
#100	0.15	**99.0**		
#200	0.075	**98.3**	Fine Sand	**1.2**

Hydrometer Analysis

(mm)	%Finer		
0.027	**80.6**		
0.019	**62.3**		
0.012	**51.3**	Fines	
0.0083	**45.8**	Silt or Clay	**98.3**
0.0060	**42.1**		
0.0030	**36.6**		
0.0013	**29.3**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
31.3	**44**	**29**	**15**	**0.16**

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

DESCRIPTION: CLAYEY SILT, trace fine to medium sand; light grayish brown and dark brown.

USCS: ML

TECH	TJ
DATE	6/6/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

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

PROJECT TITLE	FTN/ENTERGY INDEPENDENCE/AR		Board #	7	COMMENTS
PROJECT NUMBER	18103172		Flow Pump	2	
SAMPLE ID	B-1	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	3.001
Diameter, inches	2.871	Cell Pres.	88.0	Diameter, inches	2.873
Area, cm^2	41.77	Bot. Pres.	80.0	Area, cm^2	41.82
Volume, cm^3	318.26	Top Pres.	80.0	Volume, cm^3	318.81
Mass, g	599.69	Tot. B.P.	80.0	Mass, g	611.01
Moisture Content, %	31.28	Head, max.	166.00	Moisture Content, %	33.76
Dry Density, pcf	89.56	Head, min.	166.00	Dry Density, pcf	89.41
Spec. Gravity (assumed)	2.750	Max. Grad.	21.78	Volume Solids, cm^3	166.11
Volume Solids, cm^3	166.11	Min. Grad.	21.78	Volume Voids, cm^3	152.70
Volume Voids, cm^3	152.15			Void Ratio	0.92
Void Ratio	0.92			Saturation, %	100.0%
Saturation, %	93.9%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	599.69	692.85
Wt Soil & Tare, f	g	456.79	538.65
Wt Tare	g	0.00	81.92
Wt Moisture Lost	g	142.90	154.20
Wt Dry Soil	g	456.79	456.73
Water Content	%	31.28%	33.76%

DESCRIPTION: CLAYEY SILT, trace fine to medium sand; light grayish brown and dark brown.

Flow Pump Rate: 1.18E-05 cm^3/sec USCS: ML

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	30	21.6	0	0	0	0	2.36	166.00	21.78	1.2E-08
06/08/18	43259	13	35	21.6	5	5	300	300	2.36	166.00	21.78	1.2E-08
06/08/18	43259	13	40	21.6	5	10	300	600	2.36	166.00	21.78	1.2E-08
06/08/18	43259	13	45	21.6	5	15	300	900	2.36	166.00	21.78	1.2E-08 *
06/08/18	43259	13	50	21.6	5	20	300	1200	2.36	166.00	21.78	1.2E-08 *
06/08/18	43259	13	55	21.6	5	25	300	1500	2.36	166.00	21.78	1.2E-08 *
06/08/18	43259	14	0	21.6	5	30	300	1800	2.36	166.00	21.78	1.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.2E-08 cm/sec **

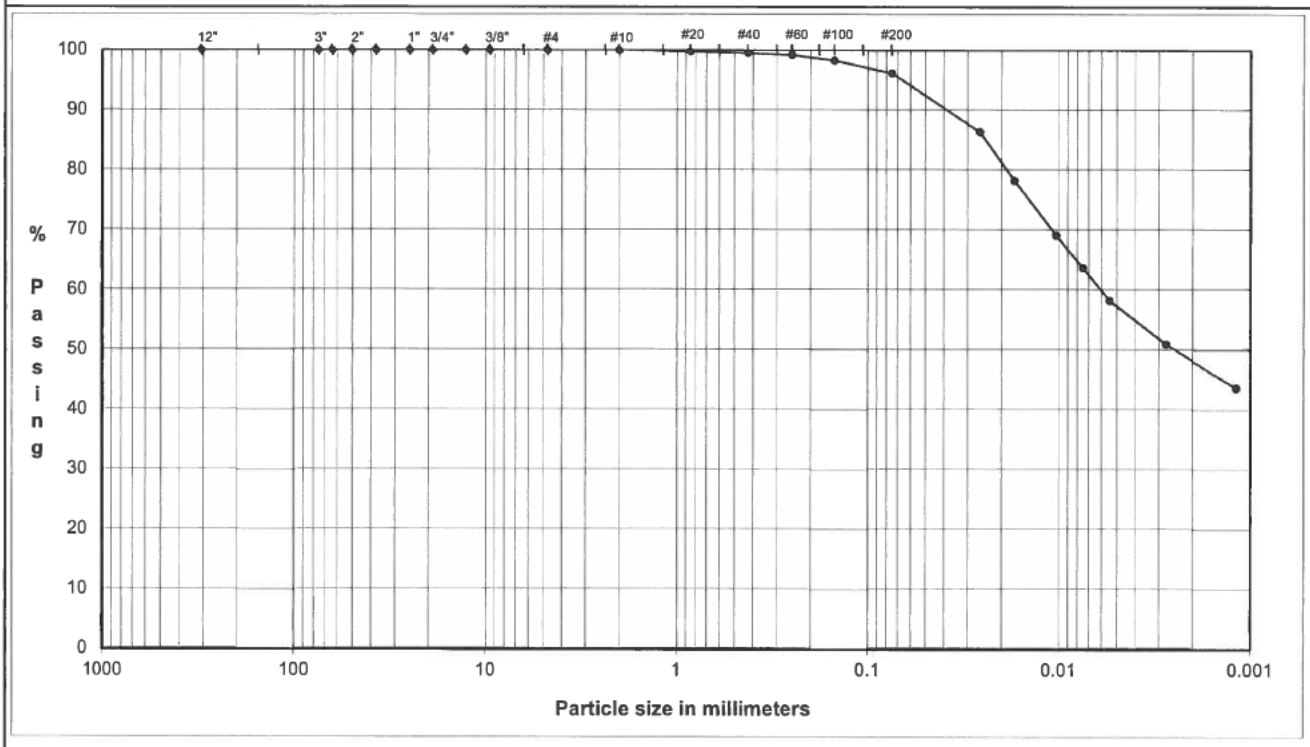
DATE	6/8/18
CHECK	
REVIEW	
APPROVE	

JUNE 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **B-1** - Depth: **20.0-22.0'**
TYPE: **UD**



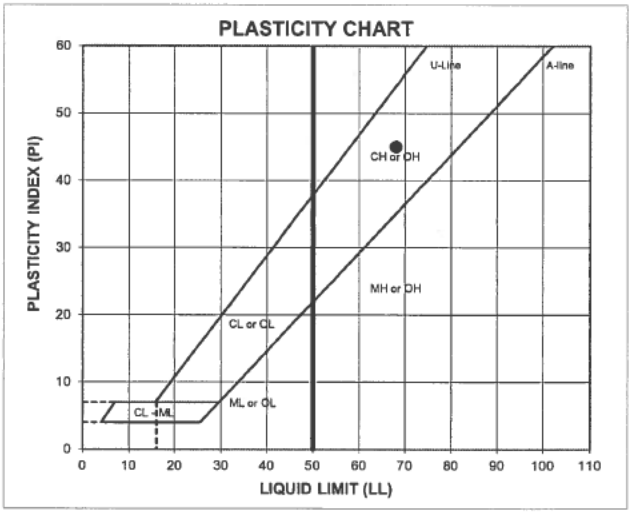
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	99.9	Coarse Sand	0.1
#20	0.85	99.7		
#40	0.43	99.4	Medium Sand	0.5
#60	0.25	99.2		
#100	0.15	98.2		
#200	0.075	96.1	Fine Sand	3.4

Hydrometer Analysis

(mm)	%Finer		
0.026	86.3		
0.017	78.1		
0.010	69.0	Fines	
0.0075	63.6	Silt or Clay	96.1
0.0054	58.1		
0.0027	50.9		
0.0012	43.6		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
39.1	68	23	45	0.37

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

DESCRIPTION: CLAY; grayish brown.

USCS: CH

TECH	HH/PWM
DATE	6/1/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit:	B-1		Boring or Test Pit:	B-1		Boring or Test Pit:	B-1	
Sample:	1		Sample:	1		Sample:	1	
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 =	6.005	in	Length =	6.006	in	Length =	6.009	in
Diameter =	2.859	in	Diameter =	2.865	in	Diameter =	2.869	in
Wet Mass =	2.602	lb	Wet Mass =	2.538	lb	Wet Mass =	2.466	lb
Area =	6.420	in^2	Area =	6.447	in^2	Area =	6.465	in^2
Volume =	38.551	in^3	Volume =	38.719	in^3	Volume =	38.847	in^3
Specific Gravity =	2.71	(ASTM D854)	Specific Gravity =	2.71	(ASTM D854)	Specific Gravity =	2.71	(ASTM D854)
Dry Mass of Solids =	1.988	lb	Dry Mass of Solids =	1.817	lb	Dry Mass of Solids =	1.680	lb
Moisture Content =	30.9%		Moisture Content =	39.7%		Moisture Content =	46.8%	
Wet Unit Weight =	116.6	pcf	Wet Unit Weight =	113.3	pcf	Wet Unit Weight =	109.7	pcf
Dry Unit Weight =	89.1	pcf	Dry Unit Weight =	81.1	pcf	Dry Unit Weight =	74.7	pcf
Void Ratio =	0.90		Void Ratio =	1.09		Void Ratio =	1.26	
Percent Saturation =	93%		Percent Saturation =	99%		Percent Saturation =	101%	
After Consolidation			**After Consolidation**			**After Consolidation**		
Length =	5.867	in	Length =	5.898	in	Length =	5.824	in
Diameter =	2.799	in	Diameter =	2.842	in	Diameter =	2.860	in
Area =	6.153	in^2 (Method B)	Area =	6.344	in^2 (Method B)	Area =	6.425	in^2 (Method B)
Volume =	36.098	in^3	Volume =	37.412	in^3	Volume =	37.419	in^3
Moisture Content =	28.6%		Moisture Content =	37.4%		Moisture Content =	43.5%	
Wet Unit Weight =	122.4	pcf	Wet Unit Weight =	115.3	pcf	Wet Unit Weight =	111.3	pcf
Dry Unit Weight =	95.2	pcf	Dry Unit Weight =	83.9	pcf	Dry Unit Weight =	77.6	pcf
Void Ratio =	0.78		Void Ratio =	1.02		Void Ratio =	1.18	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	1.00		B Parameter =	0.97		B Parameter =	1.00	
Shear Rate =	0.002%	/min.	Shear Rate =	0.003%	/min.	Shear Rate =	0.003%	/min.
t_{50} =	350.00	min.	t_{50} =	155.00	min.	t_{50} =	135.00	min.
Strain at Failure =	5.1%		Strain at Failure =	4.2%		Strain at Failure =	2.9%	
Cell Pressure =	68.0	psi	Cell Pressure =	76.0	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 =	26.0	psi	Confining Pressure =	54.0	psi

Notes: Sample description: (CH) CLAY; grayish brown.

Atterberg limits: LL = 68 PL = 23 PI = 45 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 96% (ASTM D422, refer to separate report for gradation curve)

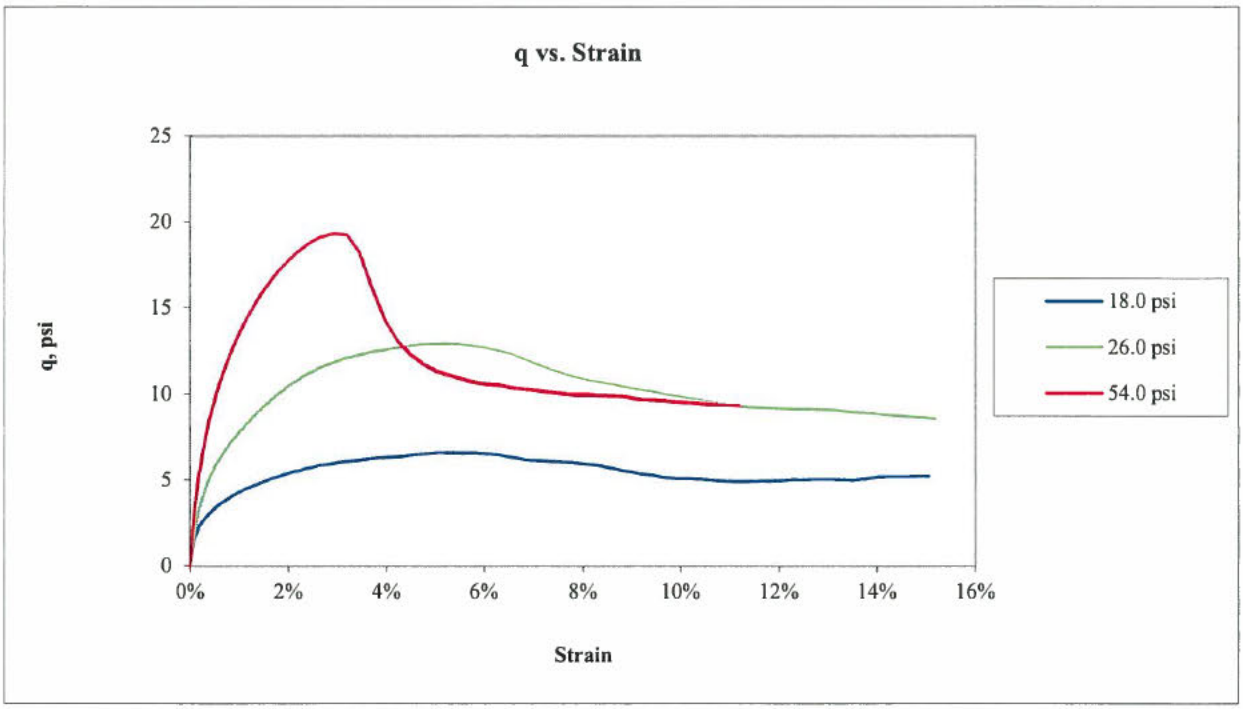
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ % strain
Membrane effect:	X	Corrected		Not Corrected

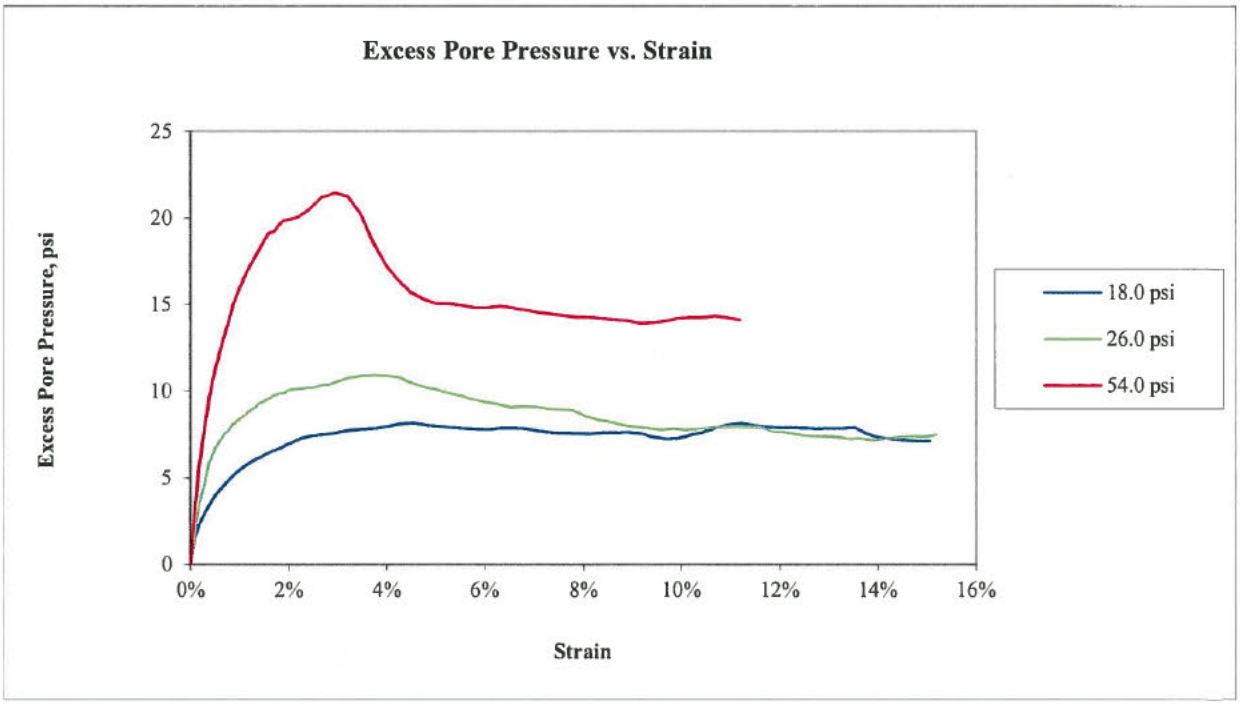
Golder Associates Inc.
Atlanta, Georgia

Title:
ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SAMPLE AND TEST DATA

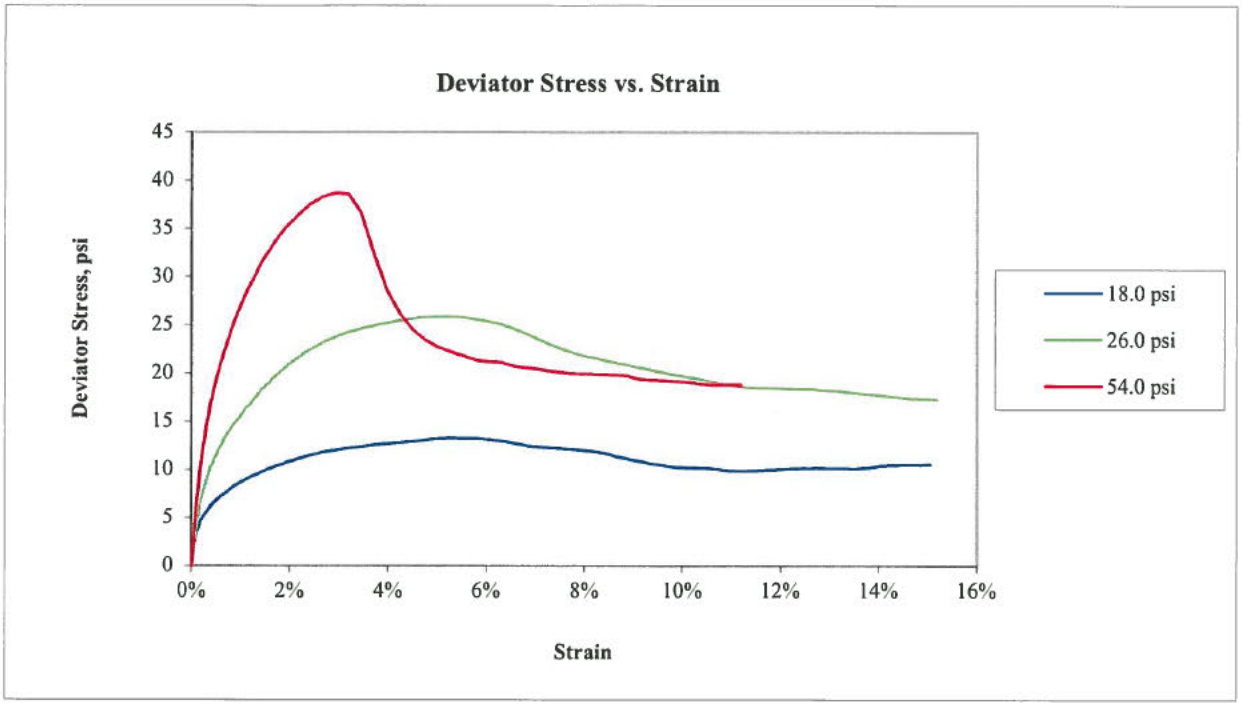
Job Short Title:
FTN/ENTERGY INDEPENDENCE/AR

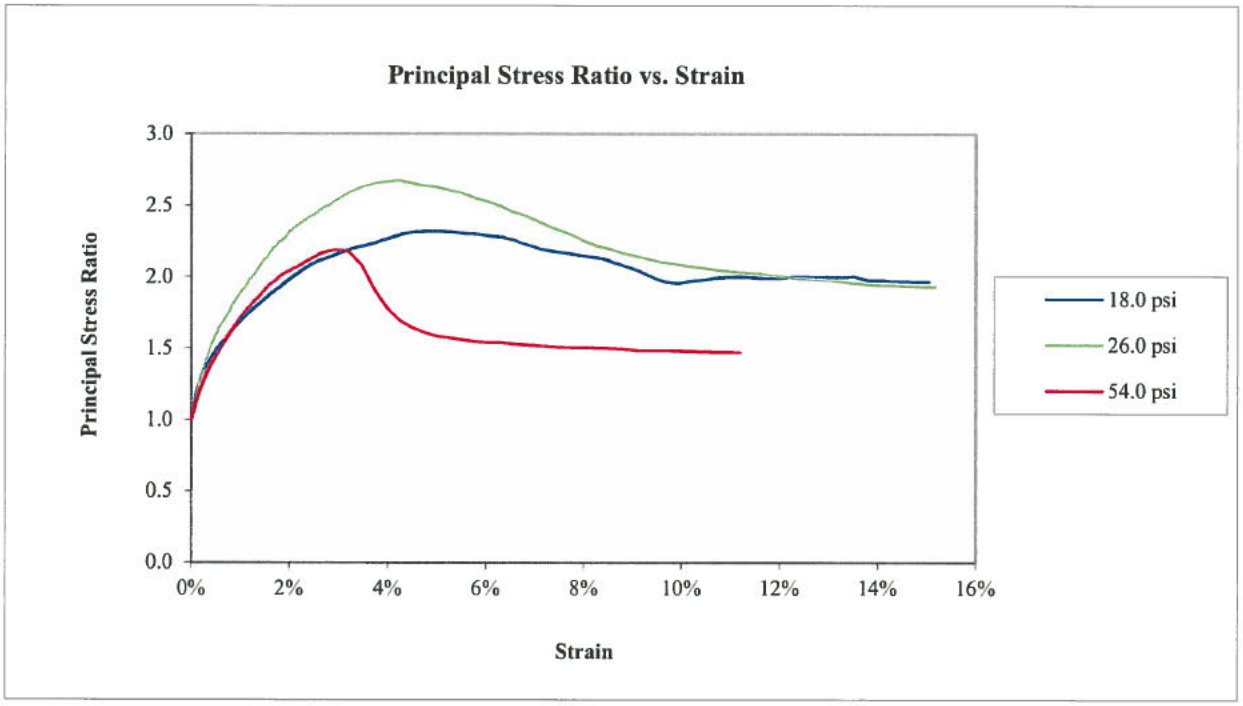
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-1 20.0-22.0'	FT/PWM Check:	Approved:	6/5/2018	18103172	1





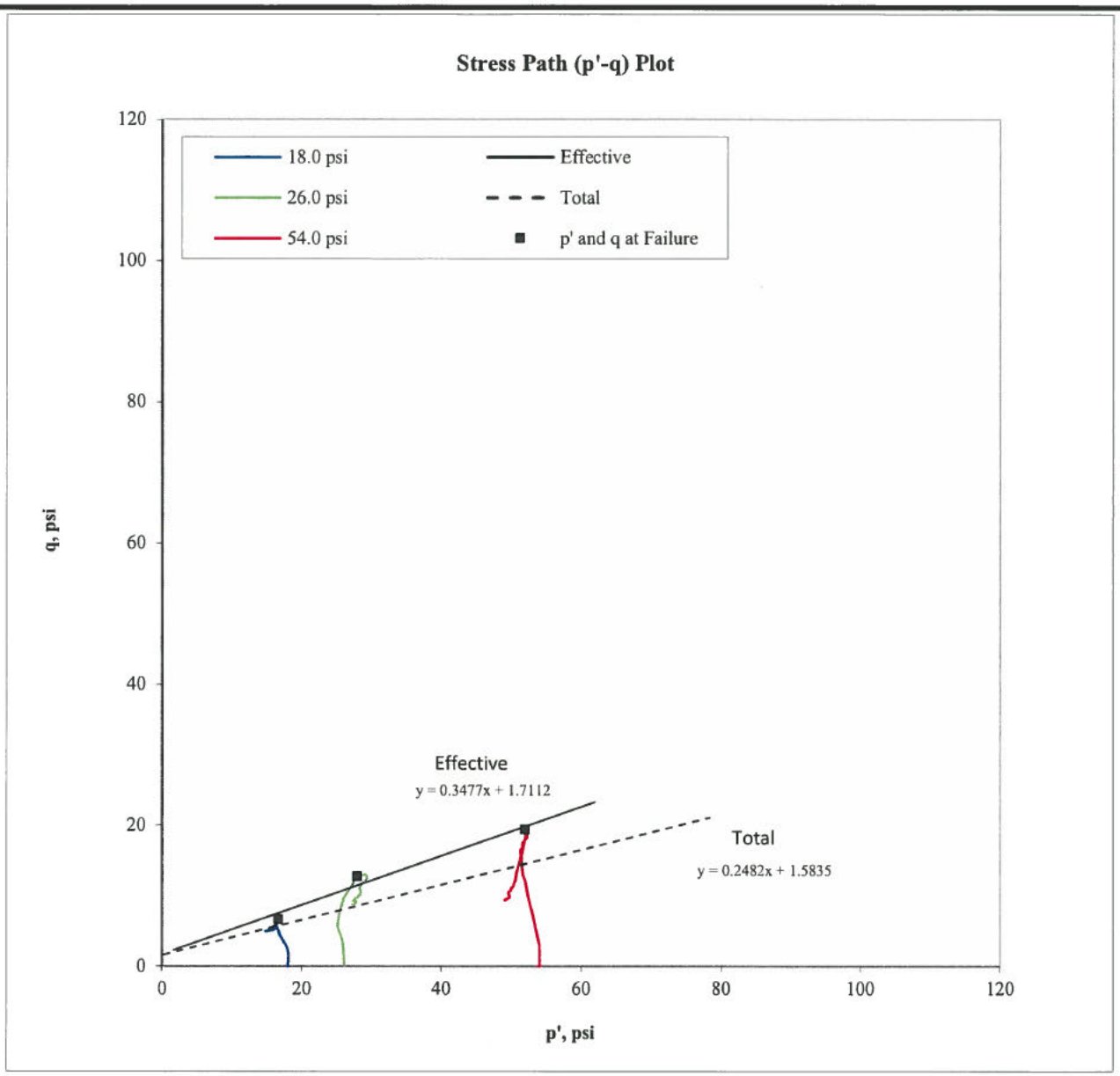
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-1 20.0-22.0'**	**Technician:** **FT/PWM** **Check:** MWM	**Reviewed:** **Approved:**	**Start Date:** **6/5/2018**	**Job Number:** **18103172**	**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 INDEPENDENCE/AR**					
Sample: **B-1 20.0-22.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/5/2018**	**Job Number:** **18103172**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
18.0	24.6	16.6	6.6
26.0	38.7	27.9	12.7
54.0	73.4	51.9	19.4

Effective

α ' =	19.2	degree
a' =	1.7	psi

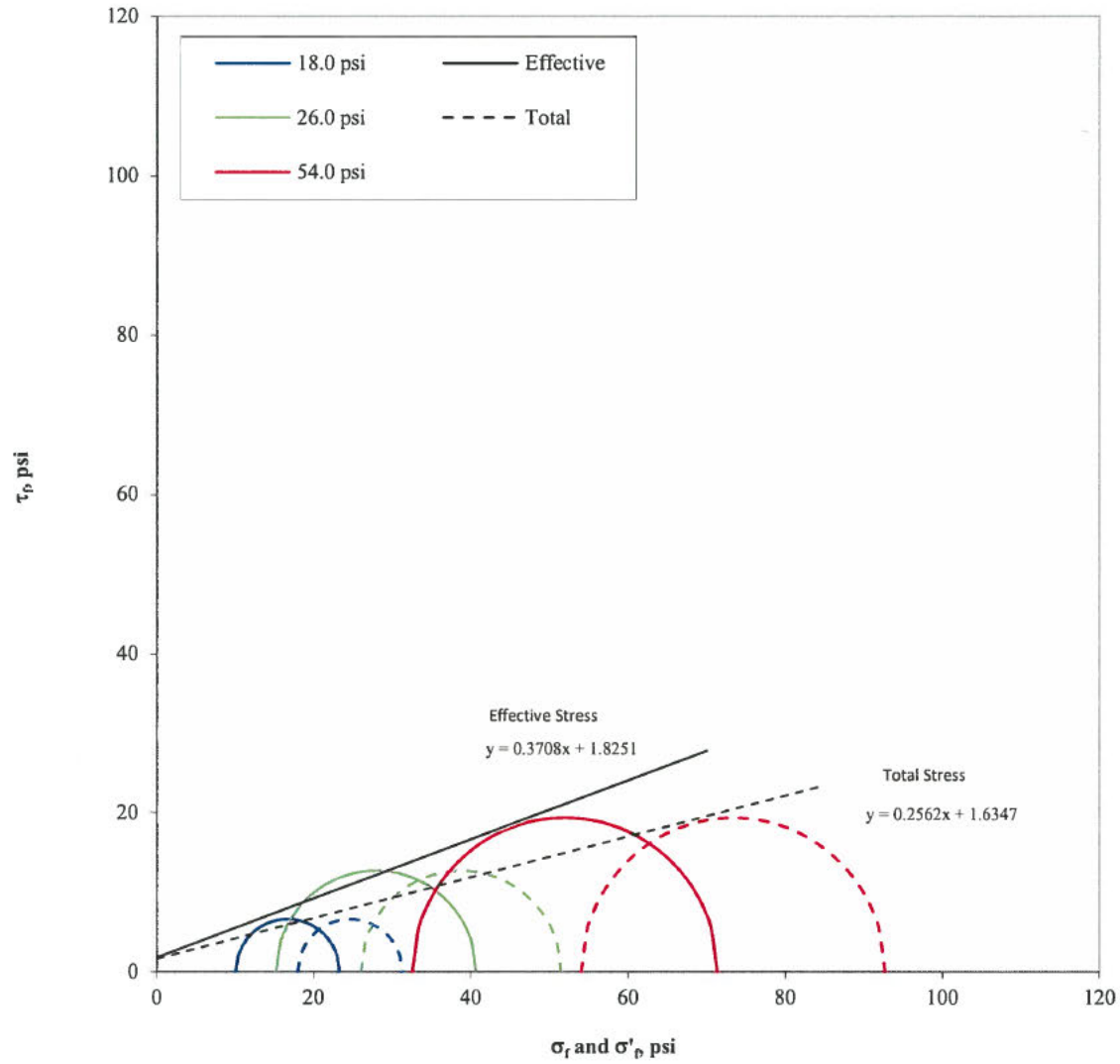
Total

α =	13.9	degree
a =	1.6	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 STRESS PATH PLOT				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-1 20.0-22.0'	**Technician:** FT/PWM **Check:** JWL	**Reviewed:** **Approved:**	**Start Date:** 6/5/2018	**Job Number:** 18103172	**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)
18.0	23.3	10.0	31.2	18.0
26.0	40.6	15.2	51.4	26.0
54.0	71.3	32.6	92.7	54.0

Effective

ϕ' =	20.3	degree
c' =	1.8	psi

Total

ϕ =	14.4	degree
c =	1.6	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 INDEPENDENCE/AR					
Sample: B-1 20.0-22.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 6/5/2018	**Job Number:** 18103172	**Figure:** 5

18.0 psi

26.0 psi

54.0 psi

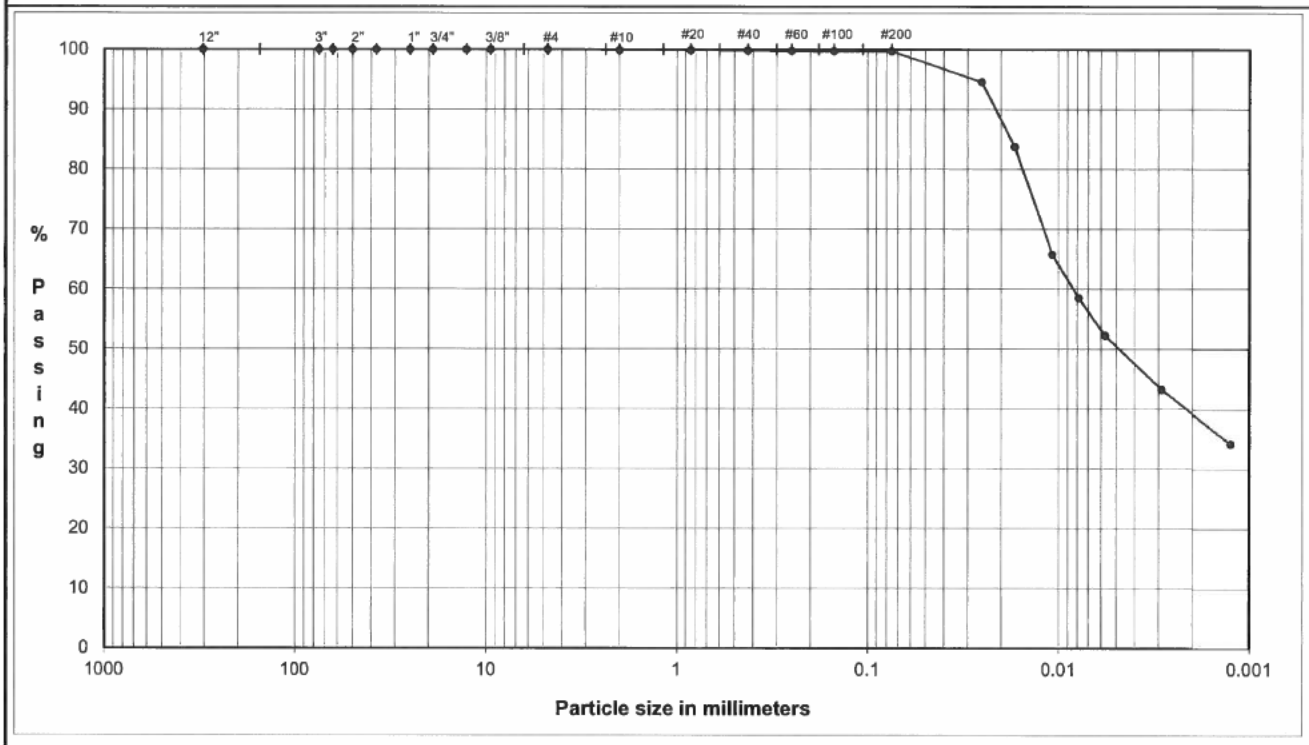
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMENS PHOTOGRAPH - 18.0 26.0 54.0 psi**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-1 20.0-22.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/5/2018**	**Job Number:** **18103172**	**Figure:** **6**

AUGUST 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **B-1** Depth: **28.0-30.0'**
TYPE: **UD**



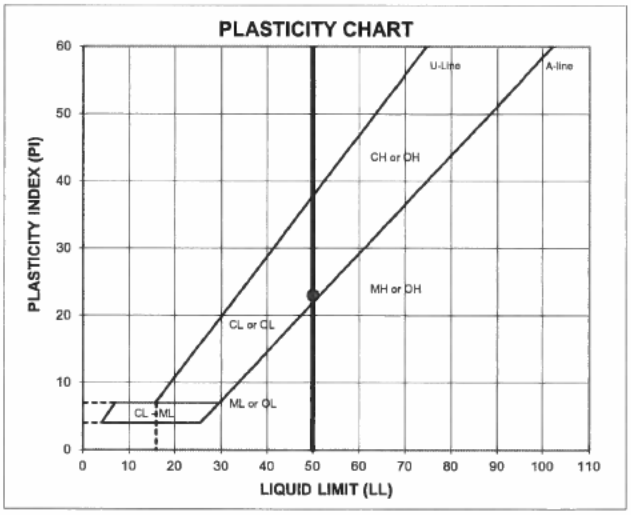
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	**99.9**	Coarse Sand	**0.1**
#20	0.85	**99.9**		
#40	0.43	**99.8**	Medium Sand	**0.1**
#60	0.25	**99.8**		
#100	0.15	**99.7**		
#200	0.075	**99.7**	Fine Sand	**0.1**

Hydrometer Analysis

(mm)	%Finer		
0.025	**94.5**		
0.017	**83.7**		
0.011	**65.7**	Fines	
0.0079	**58.5**	Silt or Clay	**99.7**
0.0057	**52.2**		
0.0029	**43.2**		
0.0013	**34.2**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
51.6	**50**	**27**	**23**	**1.04**

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

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

USCS: CH

TECH	TJ/HH/BA
DATE	8/9/18
CHECK	
REVIEW	
APPROVE	

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	**FTN/ENTERGY INDEPENDENCE/AR**		
PROJECT NUMBER	**18103172**	**SAMPLE ID**	**B-1**
		SAMPLE TYPE	**UD**
TESTED FOR	**Gs**	**SAMPLE DEPTH**	**28.0-30.0'**

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	**84.00**
Weight Soil and Tare, Final (gm)	**82.79**
Weight Of Tare (gm)	**51.68**
Weight Of Moisture (gm)	**1.21**
Weight Of Dry Soil (gm)	**31.11**
Hygroscopic Moisture In (%)	**3.9%**

Test Method		**Method - B**
Pycnometer Number		**13**
Weight Pycnometer Empty (gm)		177.87
Volume of Pycnometer (gm)		499.40
Weight Pycnometer and Water (gm)		676.24
Mass of Pycnometer and Water at the test Temperture	(A)	676.17
Observed Temperature (Tb), for (Mb) In Degrees C		21.90
Weight of Soil, Water & Pycnometer (gm)	(B)	**706.30**
Temperature, C		**21.9**
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		**48.19**
Weight of Tare		**0.00**
Weight of Dry Soil (gm)	(C)	48.19
Temperature Coefficient		0.9996

SPECIFIC GRAVITY (G) **2.668**

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

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	8/16/18
CHECK	
REVIEW	
APPROVE	

	Boring or Test Pit:	Sample:	Depth:	Point No.:
	B-1	1	28.0-30.0 ft	1
	B-1	1	28.0-30.0 ft	2
	B-1	1	28.0-30.0 ft	3

Initial									
Length =	6.307	in	Length =	6.385	in	Length =	6.348	in
Diameter =	2.817	in	Diameter =	2.801	in	Diameter =	2.803	in
Wet Mass =	2.455	lb	Wet Mass =	2.462	lb	Wet Mass =	2.465	lb
Area =	6.233	in^2	Area =	6.162	in^2	Area =	6.171	in^2
Volume =	39.308	in^3	Volume =	39.344	in^3	Volume =	39.172	in^3
Specific Gravity =	2.67	(ASTM D854)	Specific Gravity =	2.67	(ASTM D854)	Specific Gravity =	2.67	(ASTM D854)
Dry Mass of Solids =	1.636	lb	Dry Mass of Solids =	1.609	lb	Dry Mass of Solids =	1.624	lb
Moisture Content =	50.1%		Moisture Content =	53.1%		Moisture Content =	51.8%	
Wet Unit Weight =	107.9	pcf	Wet Unit Weight =	108.1	pcf	Wet Unit Weight =	108.7	pcf
Dry Unit Weight =	71.9	pcf	Dry Unit Weight =	70.7	pcf	Dry Unit Weight =	71.6	pcf
Void Ratio =	1.31		Void Ratio =	1.35		Void Ratio =	1.32	
Percent Saturation =	102%		Percent Saturation =	105%		Percent Saturation =	105%	

After Consolidation									
Length =	6.105	in	Length =	6.125	in	Length =	5.998	in
Diameter =	2.779	in	Diameter =	2.701	in	Diameter =	2.677	in
Area =	6.063	in^2 (Method B)	Area =	5.729	in^2 (Method B)	Area =	5.627	in^2 (Method B)
Volume =	37.017	in^3	Volume =	35.088	in^3	Volume =	33.752	in^3
Moisture Content =	44.1%		Moisture Content =	41.2%		Moisture Content =	37.5%	
Wet Unit Weight =	110.1	pcf	Wet Unit Weight =	111.8	pcf	Wet Unit Weight =	114.3	pcf
Dry Unit Weight =	76.4	pcf	Dry Unit Weight =	79.2	pcf	Dry Unit Weight =	83.1	pcf
Void Ratio =	1.18		Void Ratio =	1.10		Void Ratio =	1.00	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	

B Parameter =	0.99		B Parameter =	0.99		B Parameter =	0.98	
Shear Rate =	0.003%	/min.	Shear Rate =	0.0005%	/min.	Shear Rate =	0.006%	/min.
t_{50} =	109.0	min.	t_{50} =	1245	min.	t_{50} =	54.7	min.
Strain at Failure =	8.1%		Strain at Failure =	11.1%		Strain at Failure =	8.1%	

Cell Pressure =	65.0	psi	Cell Pressure =	90.0	psi	Cell Pressure =	115.0	psi
Back Pressure =	40.0	psi	Back Pressure =	40.0	psi	Back Pressure =	40.0	psi
Confining Pressure =	25.0	psi	Confining Pressure =	50.0	psi	Confining Pressure =	75.0	psi

Notes: Sample description: (CH) CLAY, trace fine to coarse sand; gray.

Atterberg limits: LL = 50 PL = 27 PI = 23 (ASTM D4318)

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

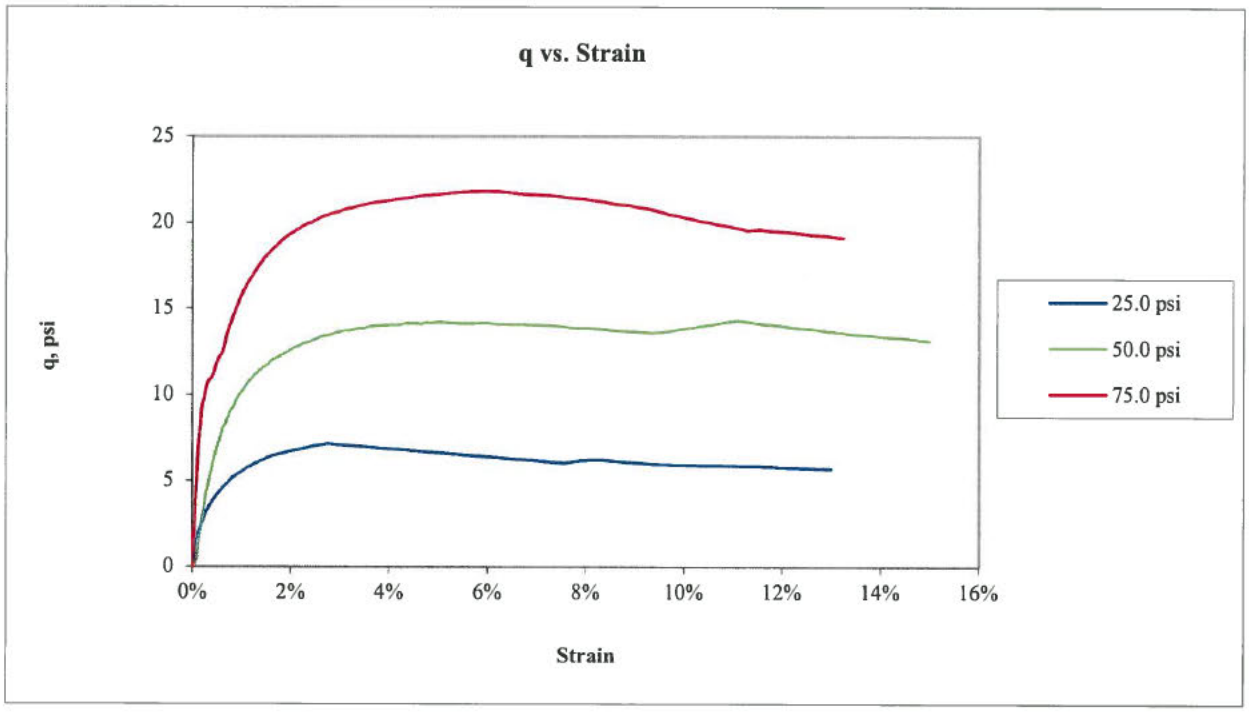
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

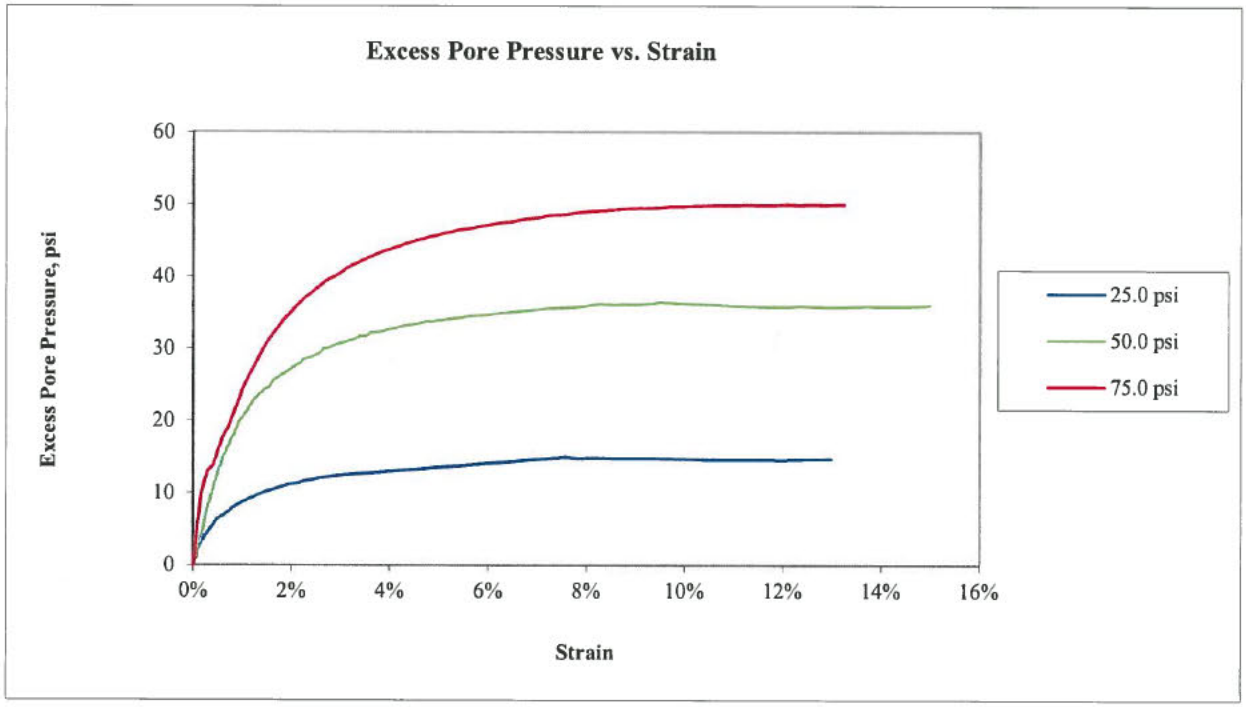
Golder Associates Inc.
Atlanta, Georgia

Job Short Title:
FTN/ENTERGY INDEPENDENCE/AR

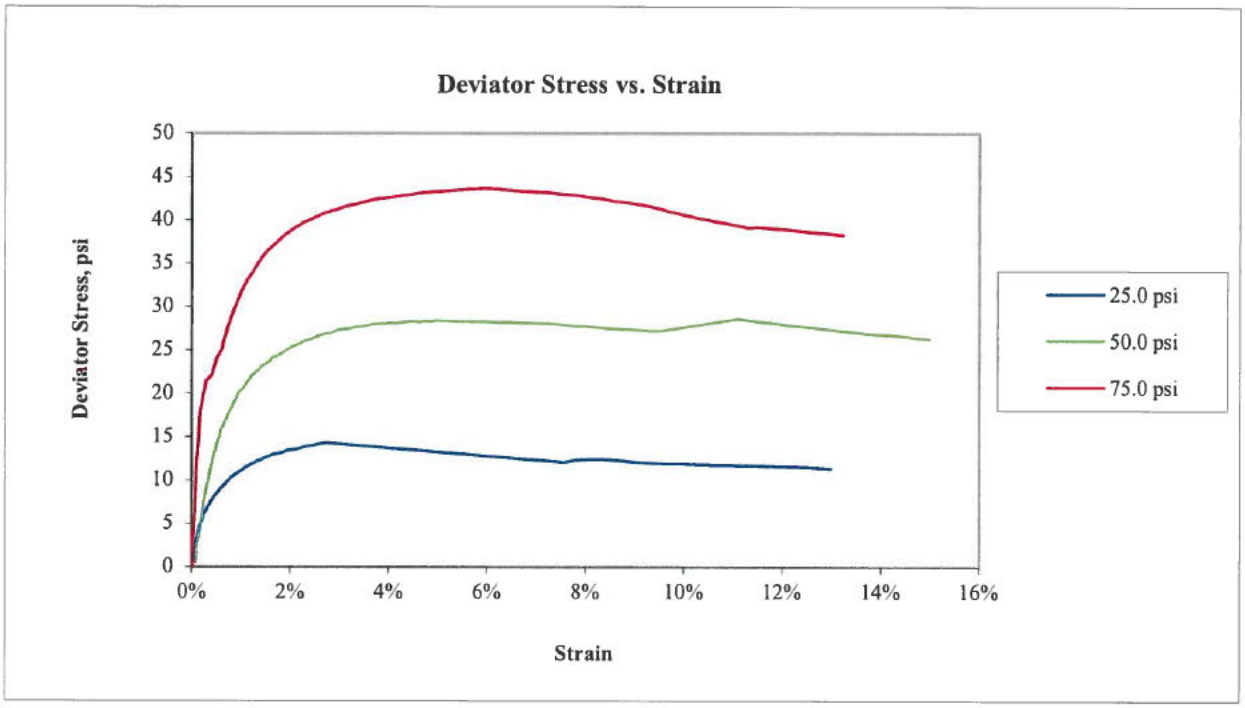
Title:
ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SAMPLE AND TEST DATA

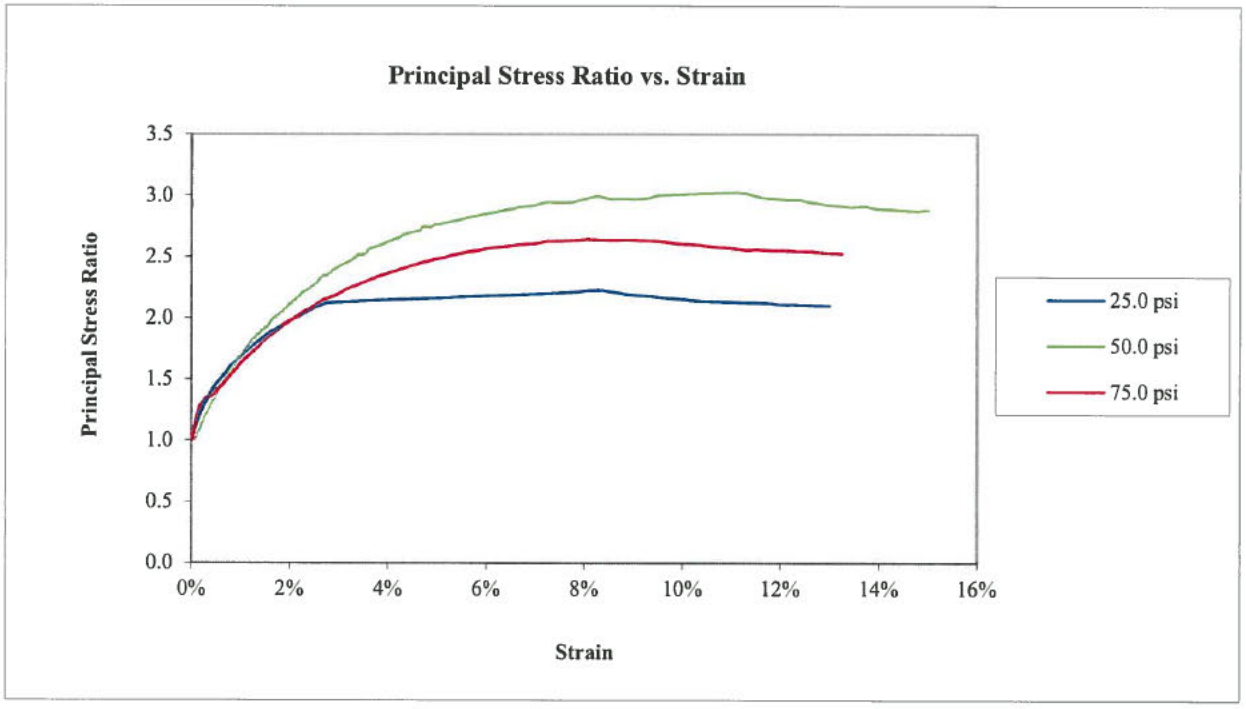
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-1 UD 28.0-30.0'	FT/PWM	DA	8/13/2018	18103172	1
	Check: PWM	Approved:			





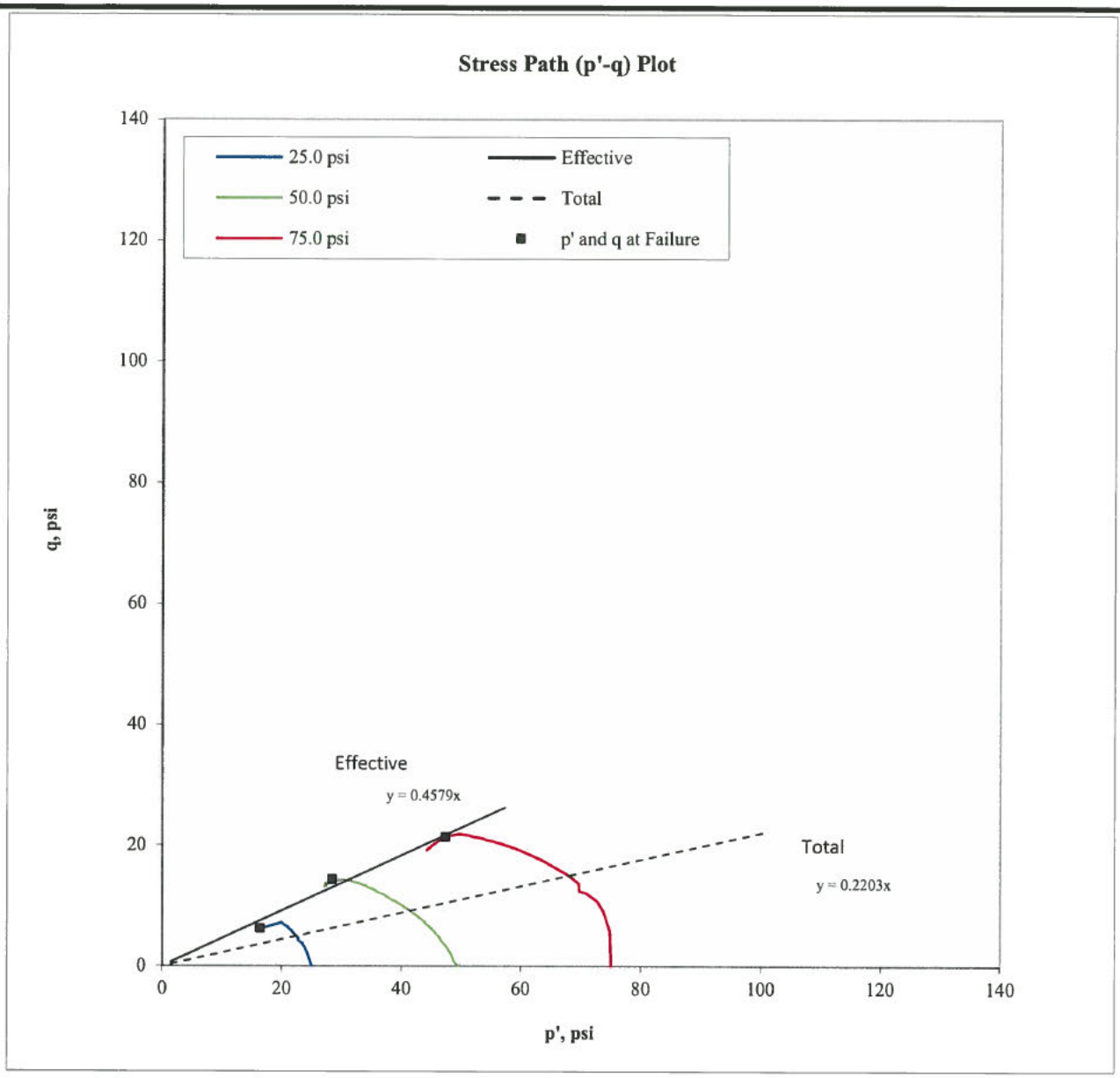
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-1 UD 28.0-30.0'**	**Technician:** **FT/PWM** **Check:** /WA	**Reviewed:** DA **Approved:**	**Start Date:** **8/13/2018**	**Job Number:** **18103172**	**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 INDEPENDENCE/AR					
Sample: B-1 UD 28.0-30.0'	Technician: FT/PWM Check:	Reviewed: Approved:	Start Date: 8/13/2018	Job Number: 18103172	Figure: 3

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
25.0	31.2	16.4	6.2
50.0	64.3	28.4	14.3
75.0	96.3	47.3	21.3

Effective

α ' =	24.6	degree
a' =	0.0	psi

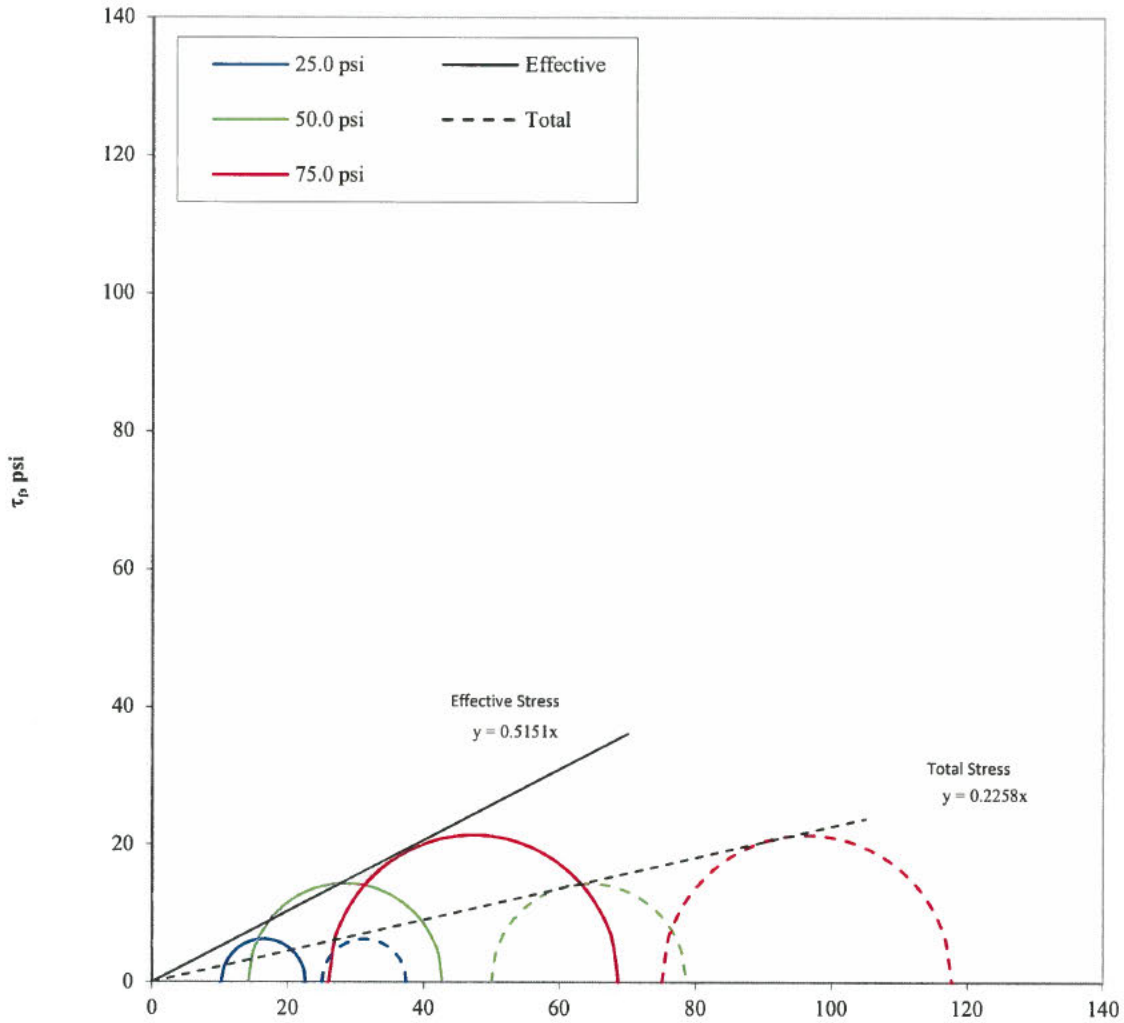
Total

α =	12.4	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 INDEPENDENCE/AR					
Sample: B-1 UD 28.0-30.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** DA **Approved:**	**Start Date:** 8/13/2018	**Job Number:** 18103172	**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)
25.0	22.6	10.1	37.4	25.0
50.0	42.7	14.1	78.6	50.0
75.0	68.7	26.0	117.7	75.0

Effective

ϕ' =	27.3	degree
c' =	0.0	psi

Total

ϕ =	12.7	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 INDEPENDENCE/AR					
Sample: B-1 UD 28.0-30.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 8/13/2018	**Job Number:** 18103172	**Figure:** 5

25.0 psi

50.0 psi

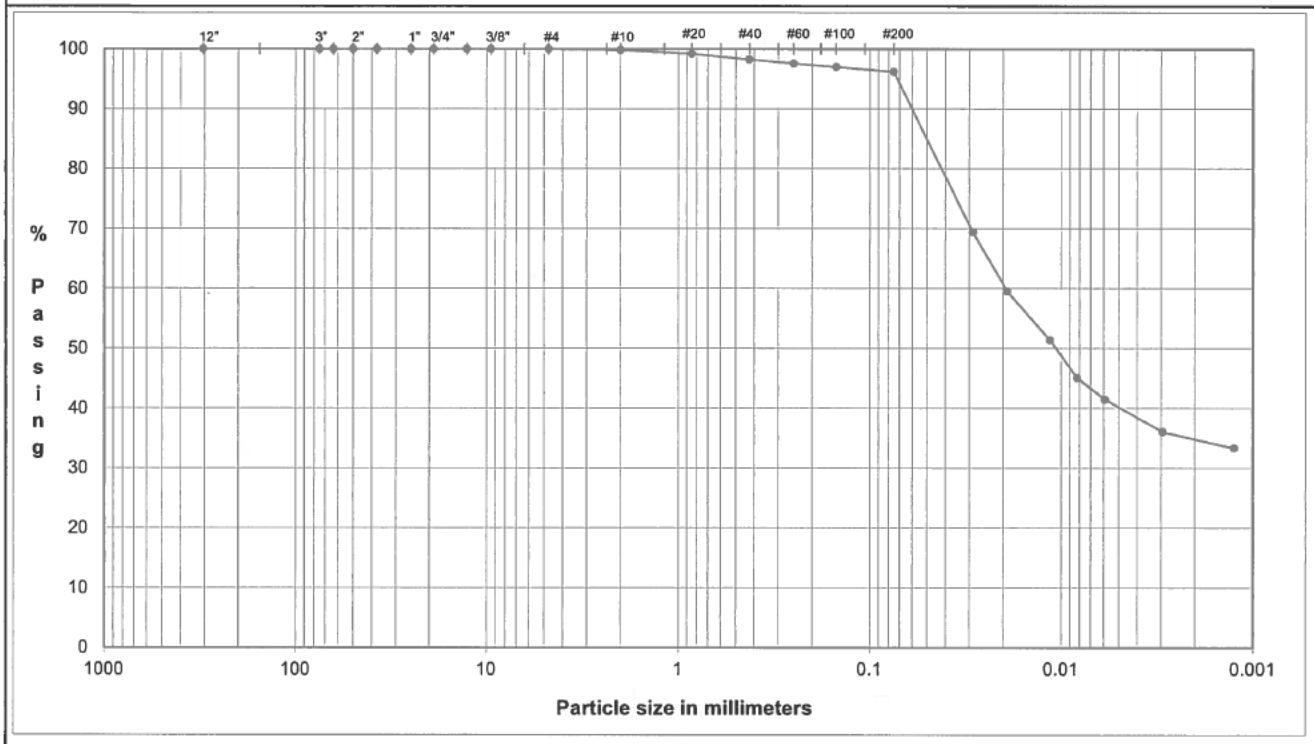
75.0 psi

Golder Associates Inc. **Atlanta, Georgia**	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMENS PHOTOGRAPH - 25.0 | 50.0 | 75.0 psi				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-1 UD 28.0-30.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** DA **Approved:**	**Start Date:** 8/13/2018	**Job Number:** 18103172	**Figure:** 6

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **B-2** - Depth: **8.0-10.0'**
TYPE: **UD**



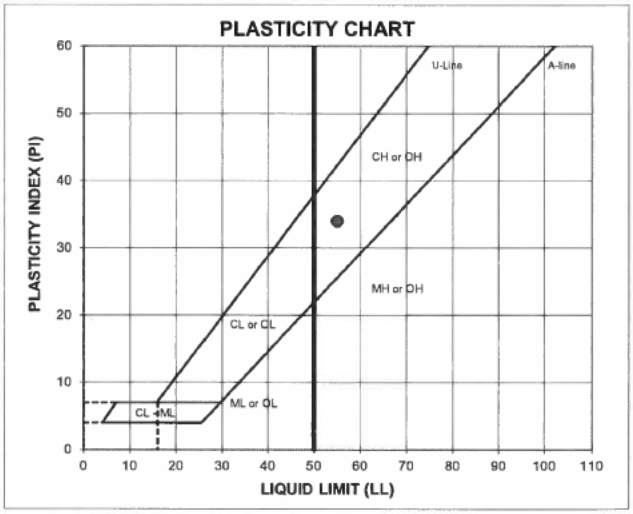
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

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	99.8	Coarse Sand	0.2
#20	0.85	99.2		
#40	0.43	98.3	Medium Sand	1.6
#60	0.25	97.5		
#100	0.15	97.0		
#200	0.075	96.2	Fine Sand	2.1

Hydrometer Analysis

(mm)	%Finer		
0.029	69.4		
0.019	59.5		
0.011	51.4	Fines	
0.0082	45.1	Silt or Clay	96.2
0.0059	41.5		
0.0030	36.1		
0.0013	33.4		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
26.3	55	21	34	0.16

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

DESCRIPTION: CLAY; dark brown, dark olive brown and brown.

USCS: CH

TECH	HEH
DATE	6/1/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit:	B-2		Boring or Test Pit:	B-2		Boring or Test Pit:	B-2	
Sample:	1		Sample:	1		Sample:	1	
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 =	6.019	in	Length =	5.999	in	Length =	6.020	in
Diameter =	2.901	in	Diameter =	2.856	in	Diameter =	2.906	in
Wet Mass =	2.750	lb	Wet Mass =	2.747	lb	Wet Mass =	2.734	lb
Area =	6.610	in^2	Area =	6.406	in^2	Area =	6.633	in^2
Volume =	39.784	in^3	Volume =	38.431	in^3	Volume =	39.928	in^3
Specific Gravity =	2.72	(ASTM D854)	Specific Gravity =	2.72	(ASTM D854)	Specific Gravity =	2.72	(ASTM D854)
Dry Mass of Solids =	2.166	lb	Dry Mass of Solids =	2.204	lb	Dry Mass of Solids =	2.146	lb
Moisture Content =	26.9%		Moisture Content =	24.6%		Moisture Content =	27.4%	
Wet Unit Weight =	119.4	pcf	Wet Unit Weight =	123.5	pcf	Wet Unit Weight =	118.3	pcf
Dry Unit Weight =	94.1	pcf	Dry Unit Weight =	99.1	pcf	Dry Unit Weight =	92.9	pcf
Void Ratio =	0.80		Void Ratio =	0.71		Void Ratio =	0.82	
Percent Saturation =	91%		Percent Saturation =	94%		Percent Saturation =	90%	
	After Consolidation			**After Consolidation**			**After Consolidation**	
Length =	5.978	in	Length =	5.961	in	Length =	5.954	in
Diameter =	2.893	in	Diameter =	2.869	in	Diameter =	2.878	in
Area =	6.571	in^2 (Method B)	Area =	6.464	in^2 (Method B)	Area =	6.507	in^2 (Method B)
Volume =	39.284	in^3	Volume =	38.531	in^3	Volume =	38.745	in^3
Moisture Content =	28.6%		Moisture Content =	26.3%		Moisture Content =	28.3%	
Wet Unit Weight =	122.5	pcf	Wet Unit Weight =	124.8	pcf	Wet Unit Weight =	122.8	pcf
Dry Unit Weight =	95.3	pcf	Dry Unit Weight =	98.9	pcf	Dry Unit Weight =	95.7	pcf
Void Ratio =	0.78		Void Ratio =	0.71		Void Ratio =	0.77	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.98		B Parameter =	0.97		B Parameter =	0.99	
Shear Rate =	0.065%	/min.	Shear Rate =	0.008%	/min.	Shear Rate =	0.015%	/min.
t_{50} =	5.61	min.	t_{50} =	39.49	min.	t_{50} =	23.36	min.
Strain at Failure =	1.7%		Strain at Failure =	2.1%		Strain at Failure =	2.5%	
Cell Pressure =	78.0	psi	Cell Pressure =	86.0	psi	Cell Pressure =	94.0	psi
Back Pressure =	70.0	psi	Back Pressure =	70.0	psi	Back Pressure =	70.0	psi
Confining Pressure =	8.0	psi	Confining Pressure =	16.0	psi	Confining Pressure =	24.0	psi

Notes: Sample description: (CH) CLAY, dark brown, dark olive brown and brown.

Atterberg limits: LL = 55 PL = 21 PI = 34 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 96% (ASTM D422, refer to separate report for gradation curve)

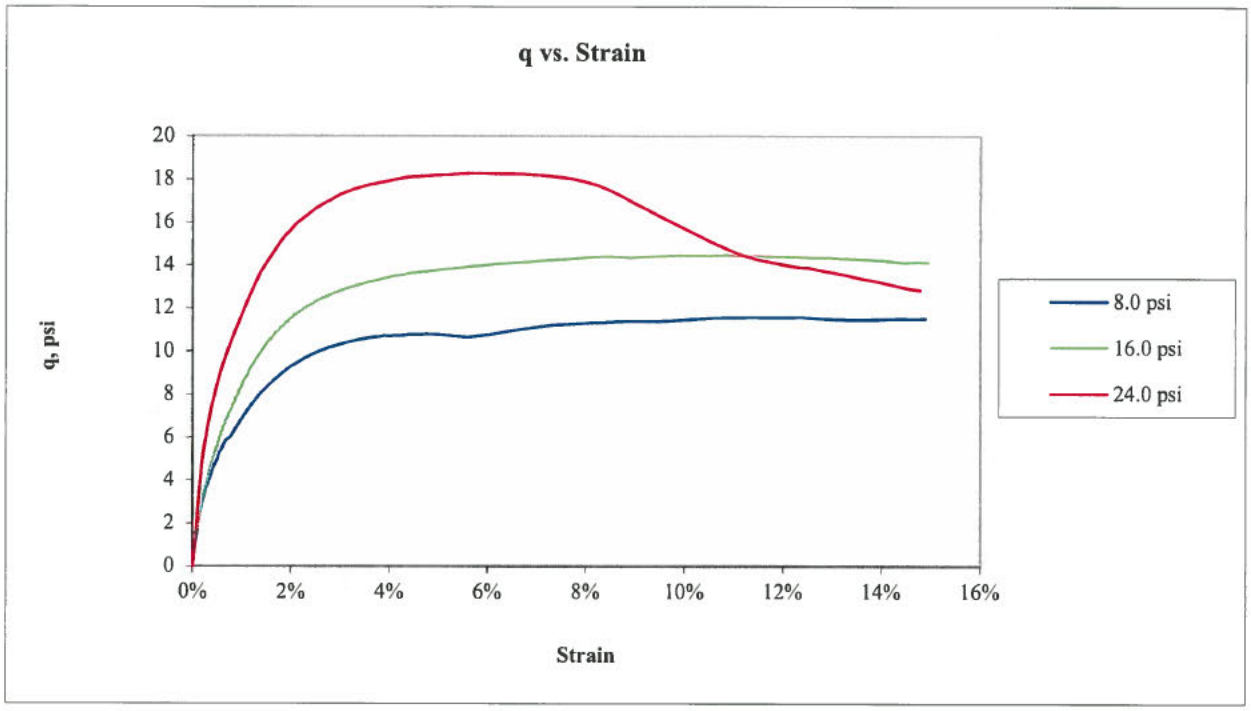
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

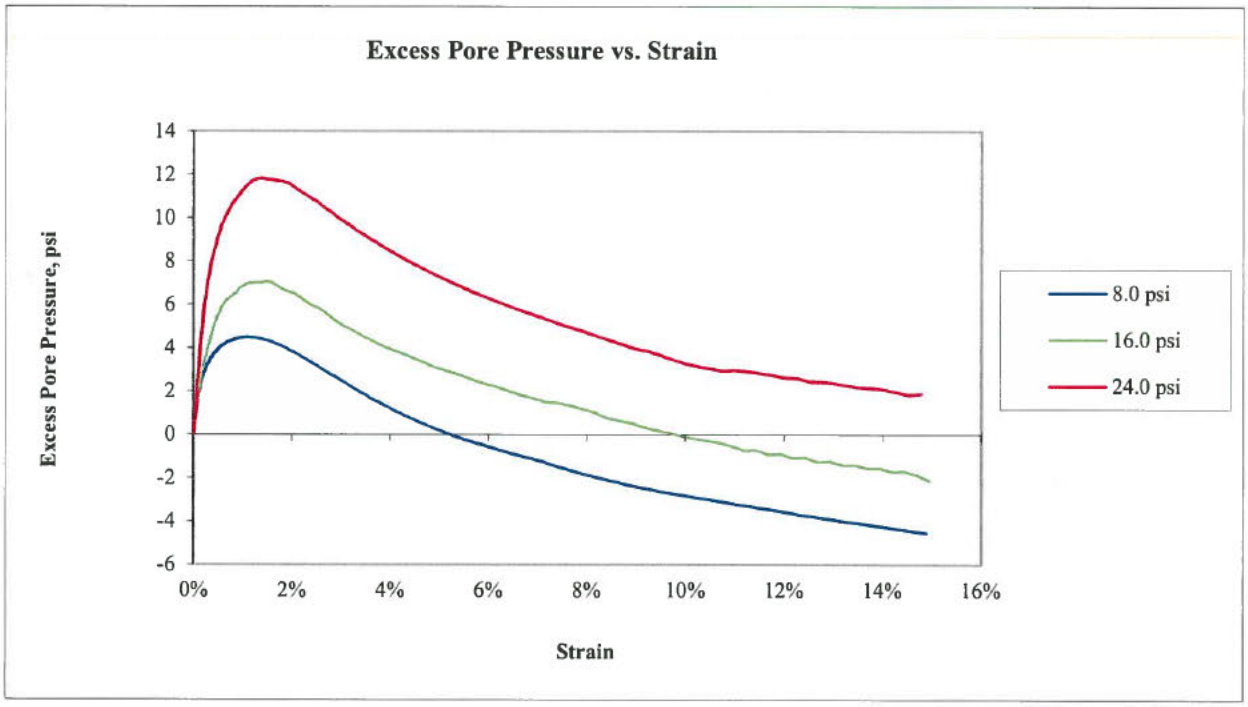
Golder Associates Inc.
Atlanta, Georgia

Title:
ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SAMPLE AND TEST DATA

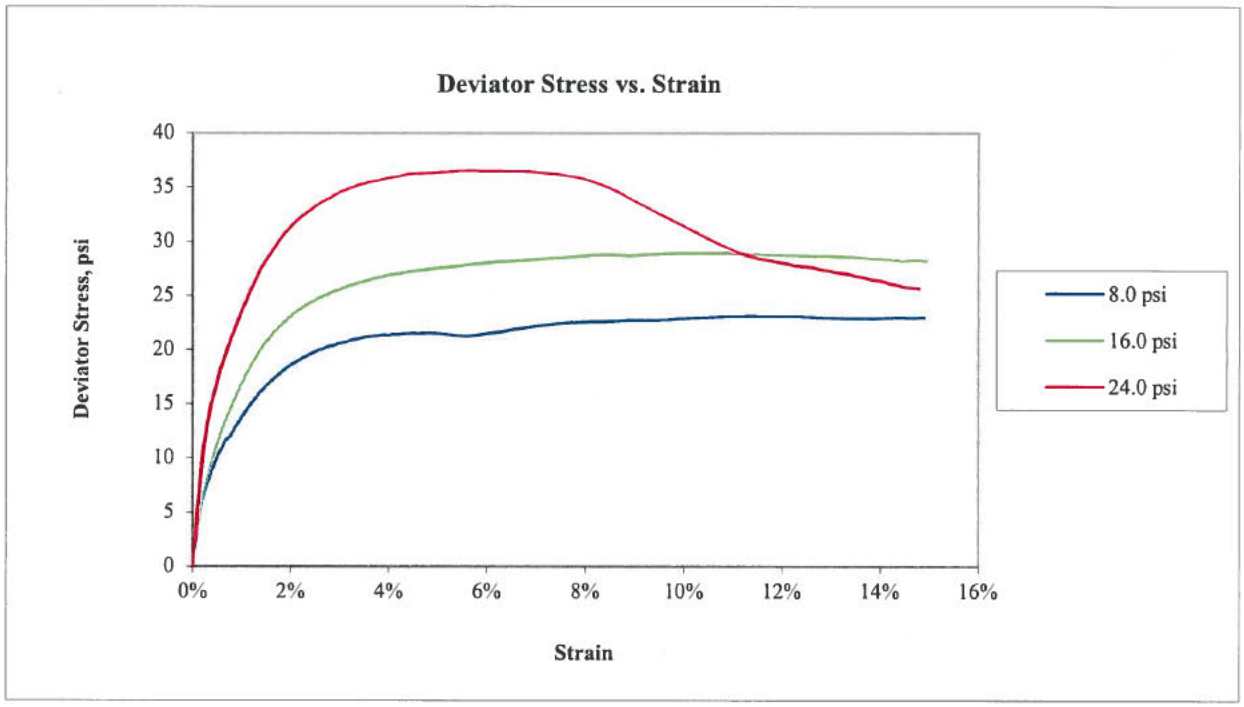
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR

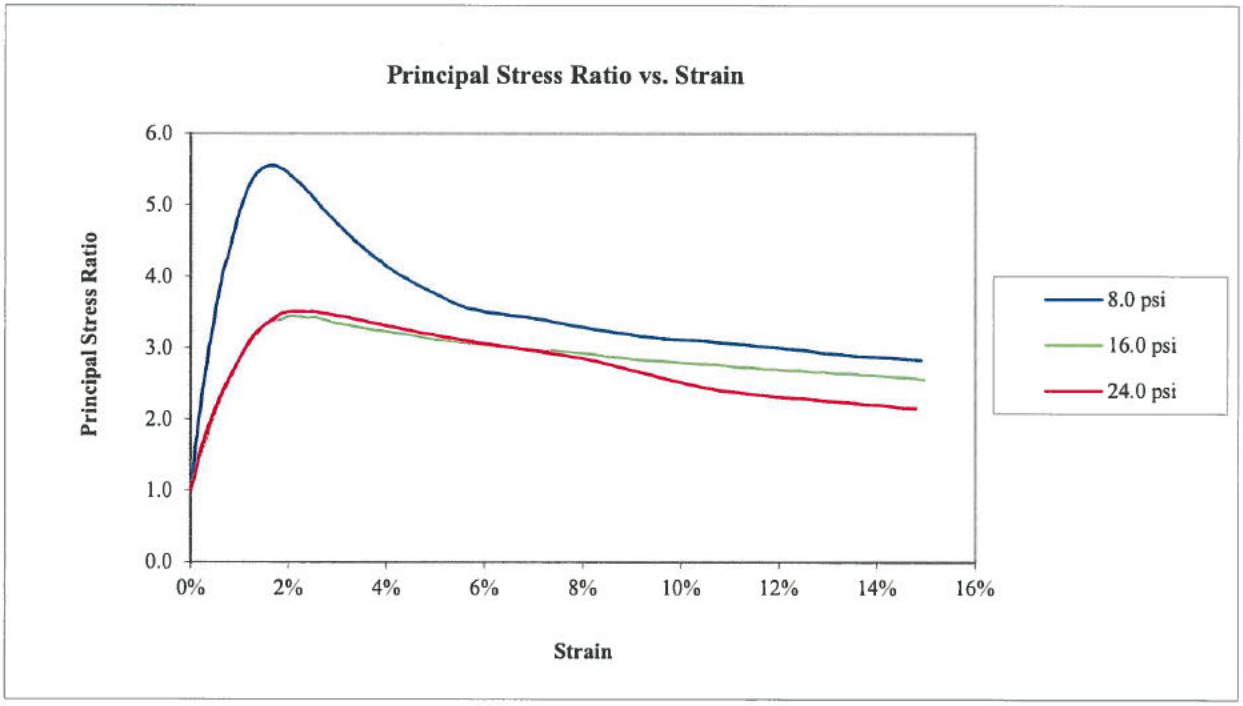
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-2 8.0-10.0'	FT/PWM Check:	Approved:	6/11/2018	18103172	1





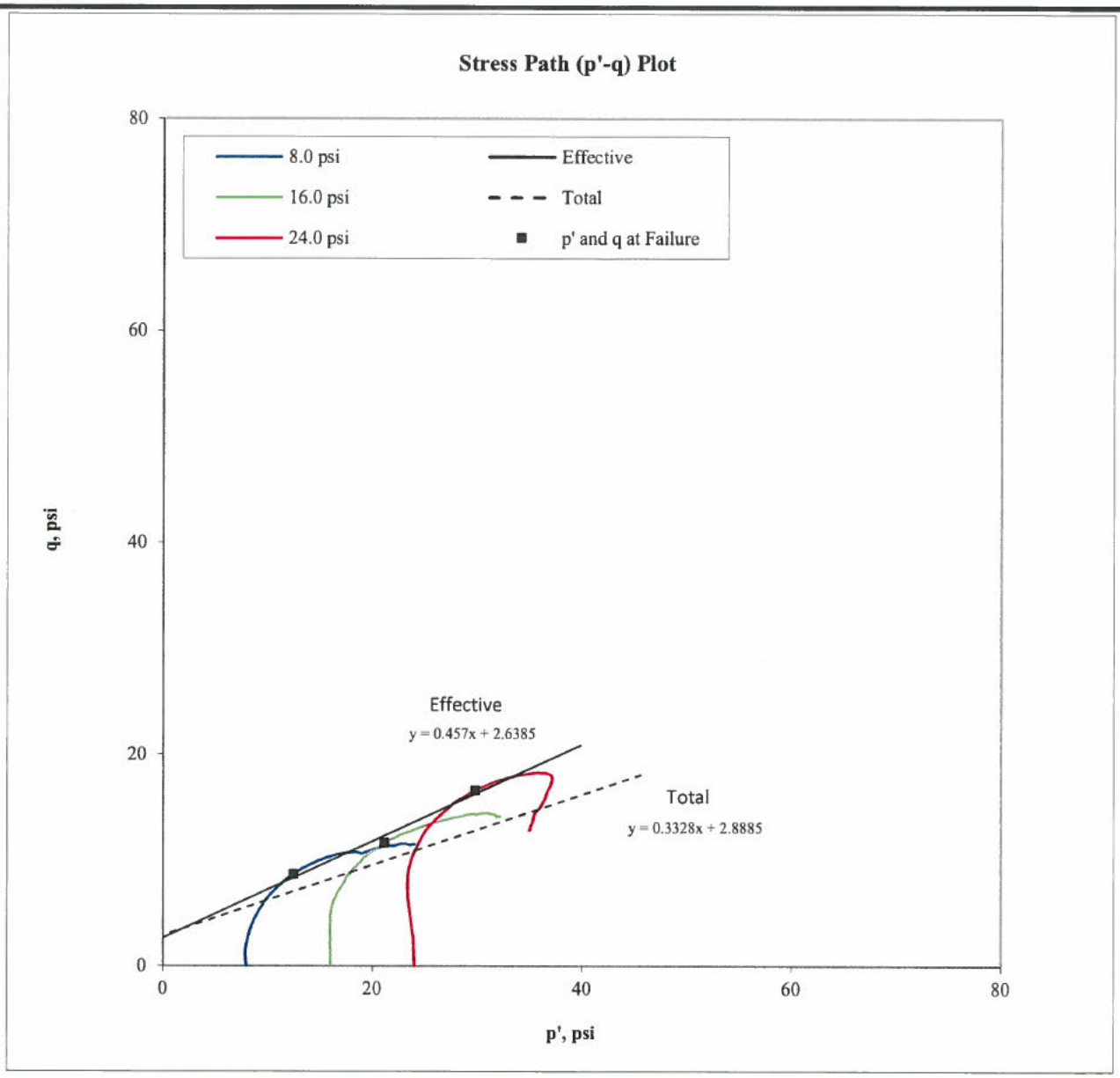
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-2 8.0-10.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/11/2018**	**Job Number:** **18103172**	**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 INDEPENDENCE/AR**					
Sample: **B-2 8.0-10.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/11/2018**	**Job Number:** **18103172**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
8.0	16.7	12.5	8.7
16.0	27.7	21.2	11.7
24.0	40.6	29.8	16.6

Effective

α ' =	24.6	degree
a' =	2.6	psi

Total

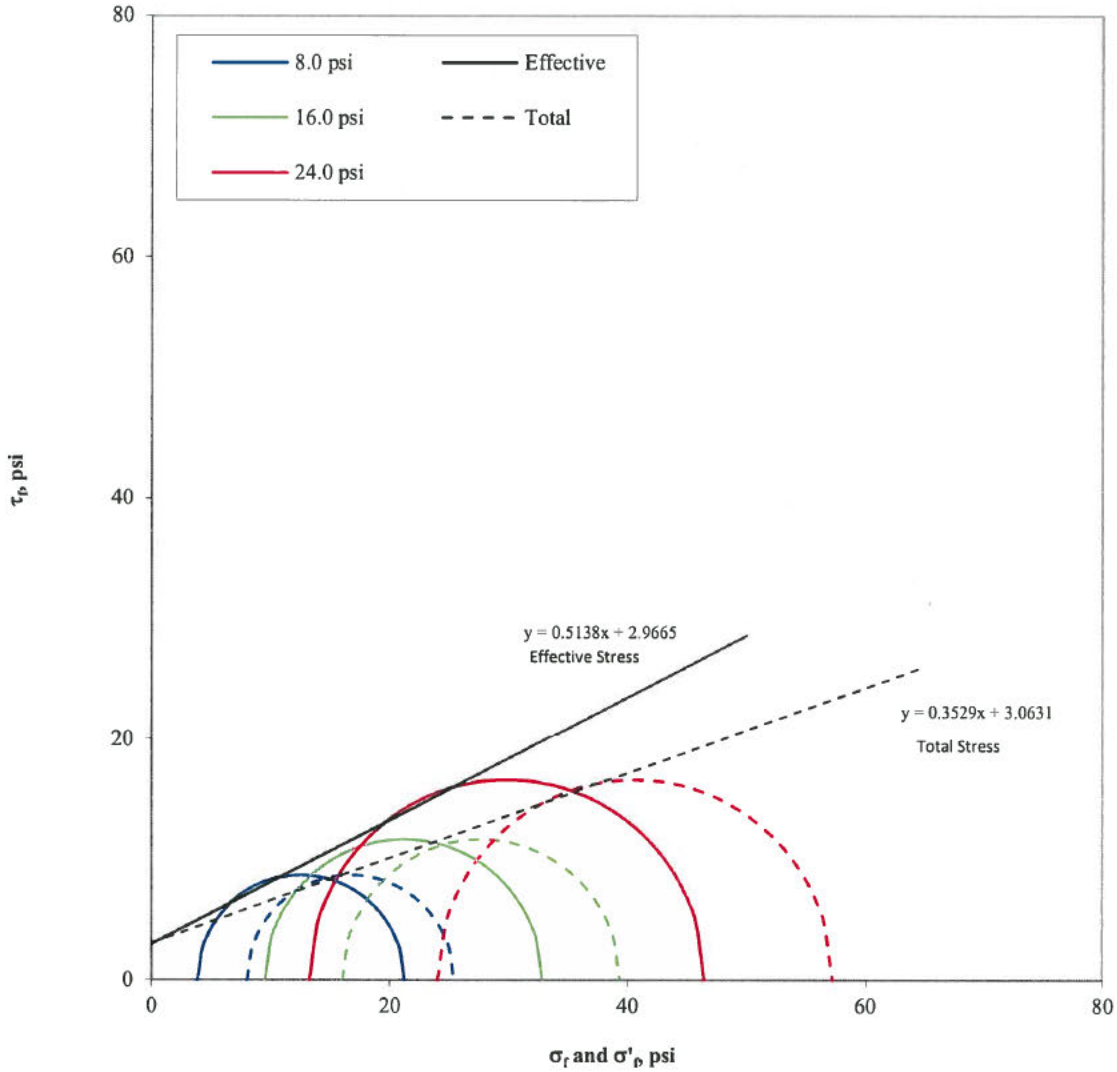
α =	18.4	degree
a =	2.9	psi

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 INDEPENDENCE/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-2 8.0-10.0'	FT/PWM Check:	Approved:	6/11/2018	18103172	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)
8.0	21.2	3.8	25.4	8.0
16.0	32.8	9.5	39.3	16.0
24.0	46.4	13.2	57.2	24.0

Effective

ϕ' =	27.2	degree
c' =	3.0	psi

Total

ϕ =	19.4	degree
c =	3.1	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 MOHR'S CIRCLE DIAGRAM				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-2 8.0-10.0'	**Technician:** FT/PWM **Check:** IWM	**Reviewed:** **Approved:**	**Start Date:** 6/11/2018	**Job Number:** 18103172	**Figure:** 5

8.0 psi

16.0 psi

24.0 psi

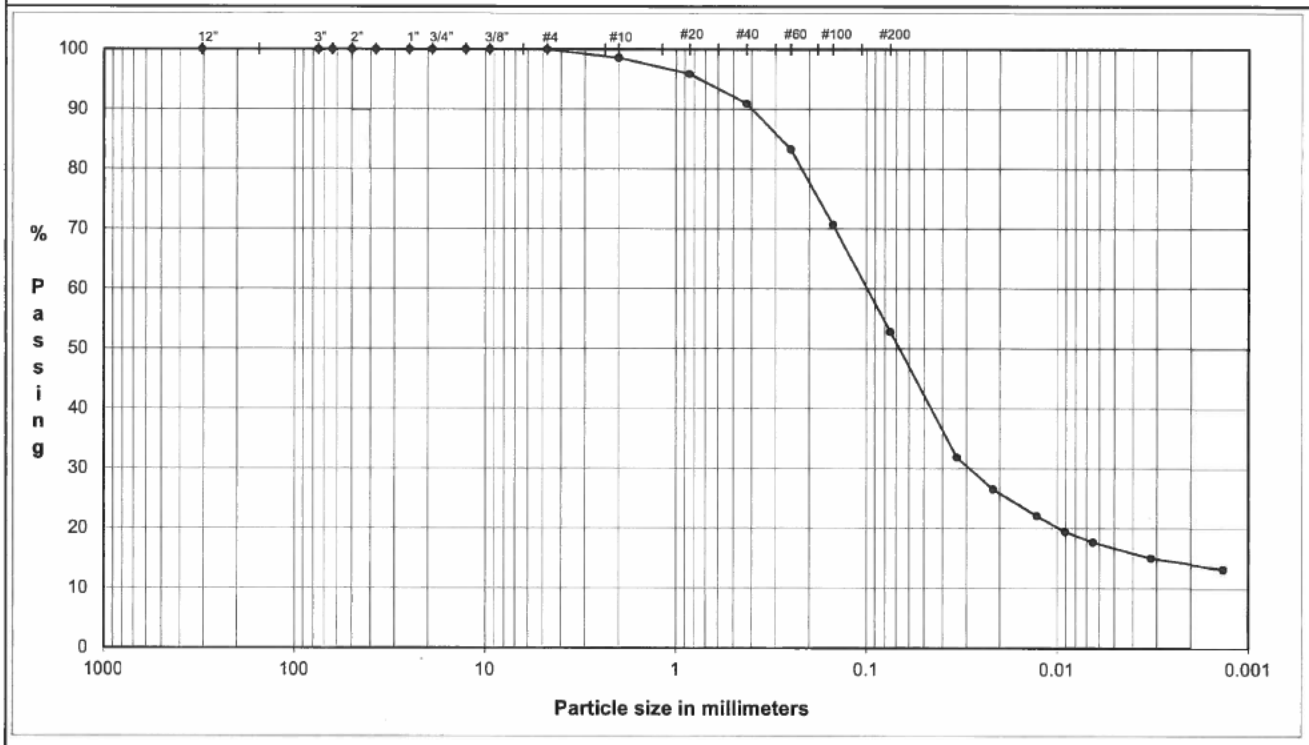
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMENS PHOTOGRAPH - 8.0 | 16.0 | 24.0 psi**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-2 8.0-10.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:**	**Start Date:** **6/11/2018**	**Job Number:** **18103172**	**Figure:** **6**

AUGUST 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: FTN/ENTERGY INDEPENDENCE/AR
SAMPLE ID: B-3 - Depth: 3.0-5.0'
TYPE: UD



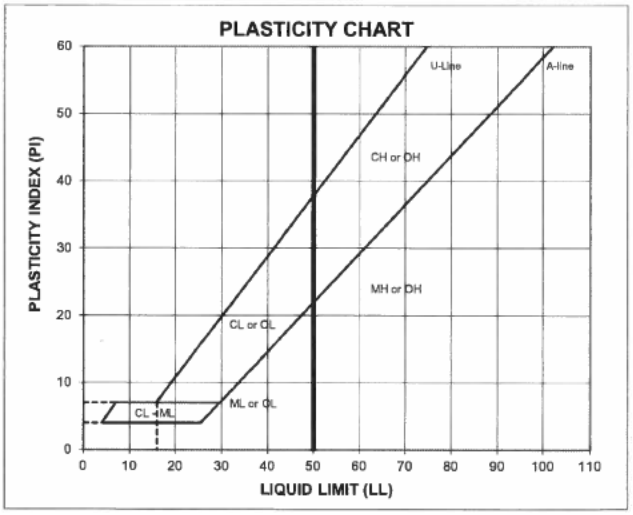
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	98.5	Coarse Sand	1.5
#20	0.85	95.9		
#40	0.43	90.9	Medium Sand	7.6
#60	0.25	83.3		
#100	0.15	70.7		
#200	0.075	52.8	Fine Sand	38.1

Hydrometer Analysis

(mm)	%Finer		
0.034	31.8		
0.022	26.5		
0.013	22.1	Fines	
0.0091	19.5	Silt or Clay	52.8
0.0065	17.7		
0.0032	15.0		
0.0013	13.3		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
42.9	NP	NP	NP	NP

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

DESCRIPTION: SILT and SAND, fine to coarse; grayish brown.

USCS: ML

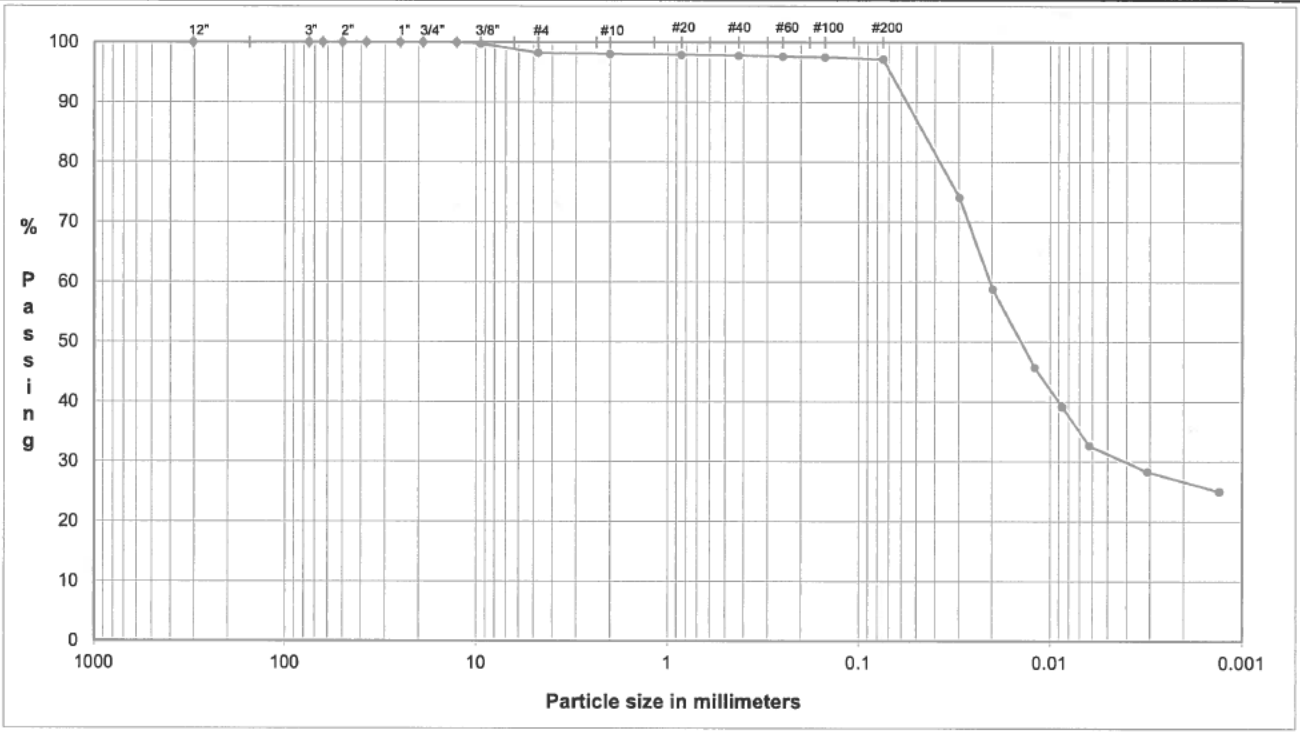
TECH	TJ/HH/BA
DATE	8/9/18
CHECK	DA
REVIEW	Tjaly
APPROVE	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **B-3** - Depth: **10.0-12.0'**
TYPE: **UD**



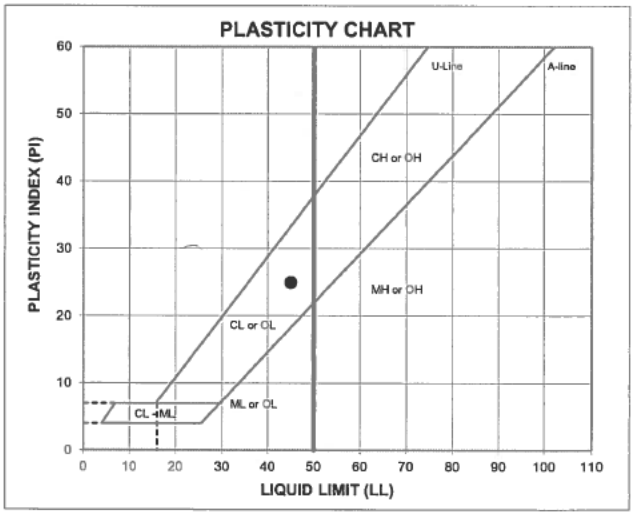
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

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	**99.7**		
#4	4.8	**98.2**	Fine Gravel	**1.8**
#10	2.00	**98.1**	Coarse Sand	**0.2**
#20	0.85	**97.9**		
#40	0.43	**97.8**	Medium Sand	**0.3**
#60	0.25	**97.7**		
#100	0.15	**97.5**		
#200	0.075	**97.2**	Fine Sand	**0.6**

Hydrometer Analysis

(mm)	%Finer		
0.030	**74.0**		
0.020	**58.8**		
0.012	**45.7**	Fines	
0.0087	**39.2**	Silt or Clay	**97.2**
0.0063	**32.7**		
0.0031	**28.3**		
0.0013	**25.0**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
30.1	**45**	**20**	**25**	**0.41**

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

DESCRIPTION: SILTY CLAY, trace fine to coarse sand, trace fine gravel; dark brown, dark olive brown and brown.

USCS: CL

TECH	HEH/HH/TJ
DATE	6/27/18
CHECK	
REVIEW	
APPROVE	

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

PROJECT TITLE	FTN/ENTERGY INDEPENDENCE/AR		Board #	3	COMMENTS
PROJECT NUMBER	18103172		Flow Pump	2	
SAMPLE ID	B-3	10.0-12.0'	Flow Pump Speed	6	
SAMPLE TYPE	UD		Technician	PWM	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.000	B-Value, f	0.99	Height, inches	2.995
Diameter, inches	2.867	Cell Pres.	88.0	Diameter, inches	2.848
Area, cm²	41.65	Bot. Pres.	80.0	Area, cm²	41.10
Volume, cm^3	317.37	Top Pres.	80.0	Volume, cm^3	312.66
Mass, g	605.25	Tot. B.P.	80.0	Mass, g	609.01
Moisture Content, %	30.1	Head, max.	79.48	Moisture Content, %	30.95
Dry Density, pcf	91.4	Head, min.	79.48	Dry Density, pcf	92.82
Spec. Gravity(assumed)	2.750	Max. Grad.	10.45	Volume Solids, cm^3	169.12
Volume Solids, cm^3	169.12	Min. Grad.	10.45	Volume Voids, cm^3	143.54
Volume Voids, cm^3	148.25			Void Ratio	0.85
Void Ratio	0.88			Saturation, %	100.0%
Saturation, %	94.5%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	605.25	691.29
Wt Soil & Tare, f	g	465.08	547.39
Wt Tare	g	0.00	82.41
Wt Moisture Lost	g	140.17	143.90
Wt Dry Soil	g	465.08	464.98
Water Content	%	30.14%	30.95%

Flow Pump Rate: 4.70E-04 cm^3/sec

USCS: CL

DESCRIPTION: SILTY CLAY, trace fine to coarse sand, trace fine gravel; dark brown, dark olive brown 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)
06/28/18	43279	8	15	20.6	0	0	0	0	1.13	79.48	10.45	1.1E-06
06/28/18	43279	8	20	20.6	5	5	300	300	1.13	79.48	10.45	1.1E-06
06/28/18	43279	8	25	20.6	5	10	300	600	1.13	79.48	10.45	1.1E-06
06/28/18	43279	8	30	20.6	5	15	300	900	1.13	79.48	10.45	1.1E-06 *
06/28/18	43279	8	35	20.6	5	20	300	1200	1.13	79.48	10.45	1.1E-06 *
06/28/18	43279	8	40	20.6	5	25	300	1500	1.13	79.48	10.45	1.1E-06 *
06/28/18	43279	8	45	20.6	5	30	300	1800	1.13	79.48	10.45	1.1E-06 *

TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.1E-06 cm/sec **

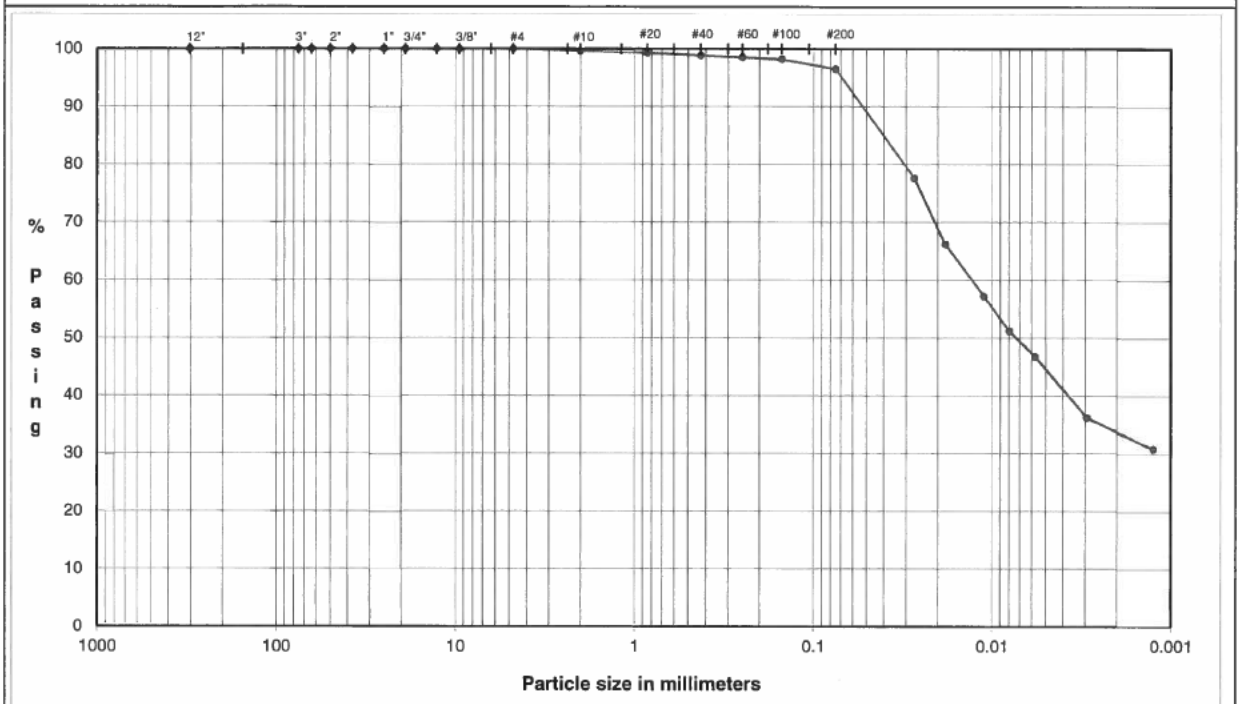
DATE	6/28/18
CHECK	
REVIEW	
APPROVE	

JULY 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: FTN/ENTERGY INDEPENDENCE/AR
SAMPLE ID: B-4 - Depth: 5.0-7.0'
TYPE: UD



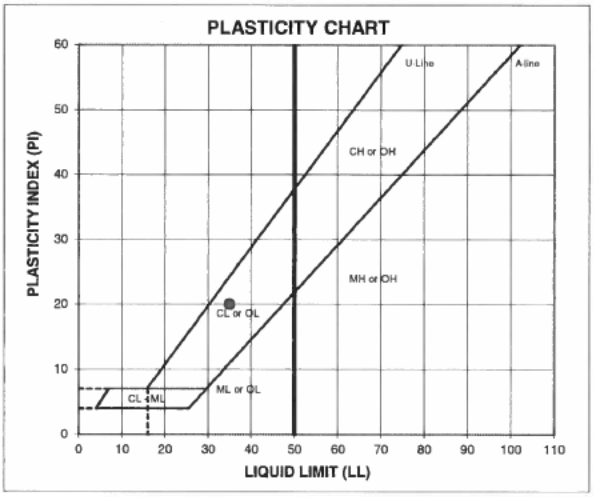
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

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	99.6	Coarse Sand	0.4
#20	0.85	99.3		
#40	0.43	98.8	Medium Sand	0.8
#60	0.25	98.5		
#100	0.15	98.2		
#200	0.075	96.5	Fine Sand	2.3

Hydrometer Analysis

(mm)	%Finer		
0.027	77.6		
0.018	66.1		
0.011	57.1	Fines	
0.0080	51.1	Silt or Clay	96.5
0.0057	46.7		
0.0029	36.2		
0.0013	30.9		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
23.2	35	15	20	0.40

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

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

USCS: CL

TECH	HH/TB
DATE	7/10/18
CHECK	
REVIEW	
APPROVE	

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

PROJECT TITLE	FTN/ENTERGY INDEPENDENCE/AR		Board #	10	COMMENTS
PROJECT NUMBER	18103172		Flow Pump	2	
SAMPLE ID	B-4	5.0-7.0'	Flow Pump Speed	5	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.085	B-Value, f	1.00	Height, inches	3.074
Diameter, inches	2.825	Cell Pres.	88.0	Diameter, inches	2.818
Area, cm²	40.44	Bot. Pres.	80.0	Area, cm²	40.24
Volume, cm³	316.87	Top Pres.	80.0	Volume, cm³	314.18
Mass, g	645.28	Tot. B.P.	80.0	Mass, g	647.52
Moisture Content, %	23.2	Head, max.	43.61	Moisture Content, %	23.66
Dry Density, pcf	103.1	Head, min.	43.61	Dry Density, pcf	104.00
Spec. Gravity(assumed)	2.750	Max. Grad.	5.59	Volume Solids, cm³	190.42
Volume Solids, cm³	190.42	Min. Grad.	5.59	Volume Voids, cm³	123.76
Volume Voids, cm³	126.46			Void Ratio	0.65
Void Ratio	0.66			Saturation, %	100.0%
Saturation, %	96.2%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	645.28	727.25
Wt Soil & Tare, f	g	523.64	603.40
Wt Tare	g	0.00	79.88
Wt Moisture Lost	g	121.64	123.85
Wt Dry Soil	g	523.64	523.52
Water Content	%	23.23%	23.66%

Flow Pump Rate: 1.17E-03 cm³/sec

USCS: CL

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

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)
07/11/18	43292	13	30	22.8	0	0	0	0	0.62	43.61	5.59	4.9E-06
07/11/18	43292	13	32	22.8	2	2	120	120	0.62	43.61	5.59	4.9E-06
07/11/18	43292	13	34	22.8	2	4	120	240	0.62	43.61	5.59	4.9E-06
07/11/18	43292	13	36	22.8	2	6	120	360	0.62	43.61	5.59	4.9E-06 *
07/11/18	43292	13	38	22.8	2	8	120	480	0.62	43.61	5.59	4.9E-06 *
07/11/18	43292	13	40	22.8	2	10	120	600	0.62	43.61	5.59	4.9E-06 *
07/11/18	43292	13	42	22.8	2	12	120	720	0.62	43.61	5.59	4.9E-06 *

TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.9E-06 cm/sec **

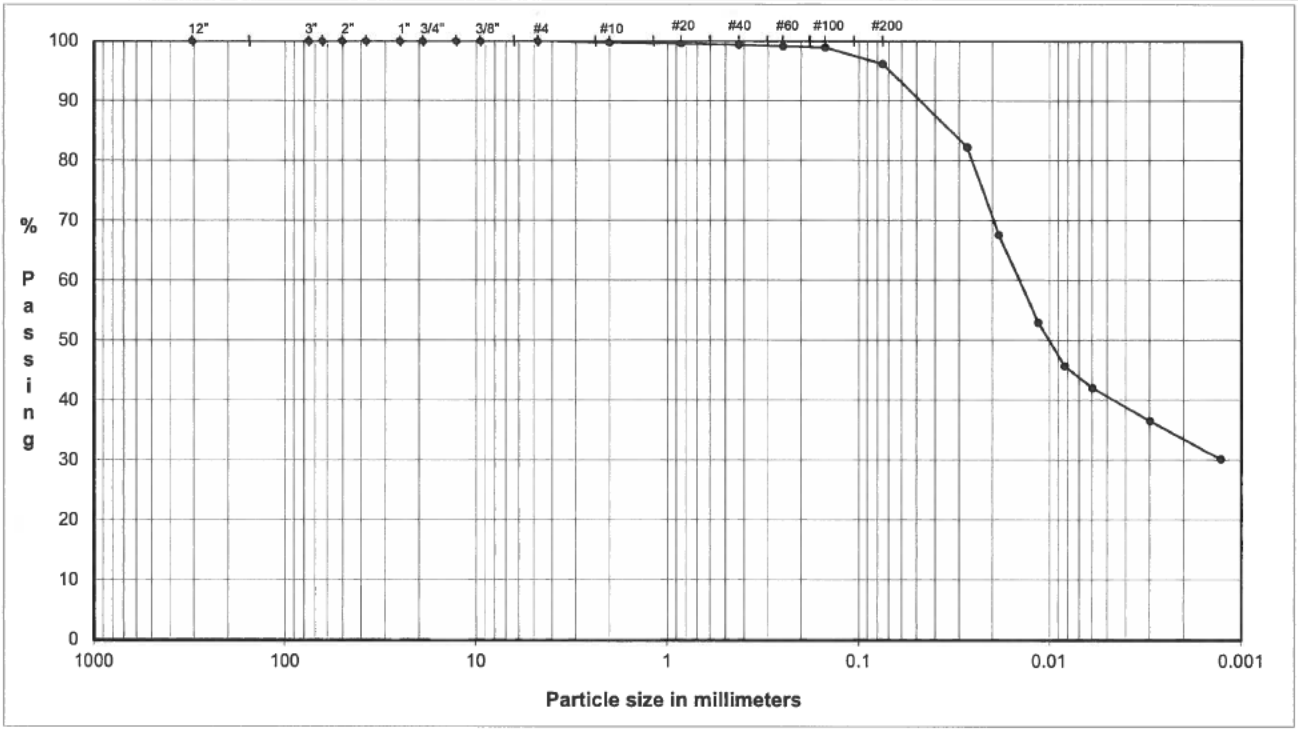
DATE	7/11/18
CHECK	
REVIEW	
APPROVE	

AUGUST 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **B-4** - Depth: **15.0-17.0'**
TYPE: **UD**



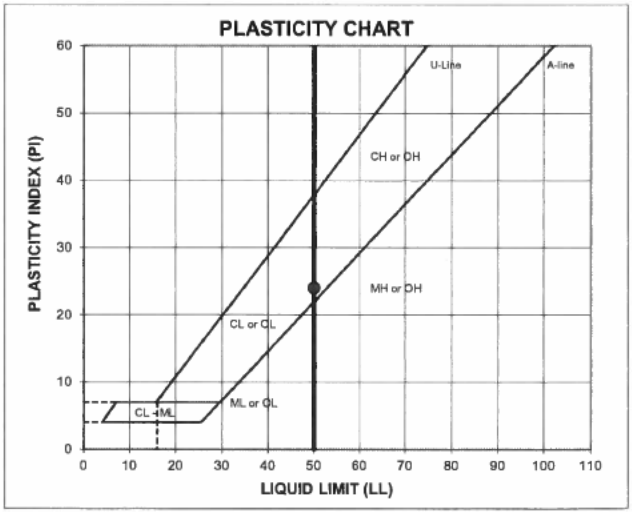
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

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	**99.7**	Coarse Sand	**0.3**
#20	0.85	**99.5**		
#40	0.43	**99.3**	Medium Sand	**0.4**
#60	0.25	**99.1**		
#100	0.15	**98.8**		
#200	0.075	**96.1**	Fine Sand	**3.2**

Hydrometer Analysis

(mm)	%Finer		
0.027	**82.2**		
0.018	**67.6**		
0.011	**53.0**	Fines	
0.0083	**45.7**	Silt or Clay	**96.1**
0.0060	**42.0**		
0.0030	**36.5**		
0.0013	**30.1**		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
34.1	**50**	**26**	**24**	**0.36**

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

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

USCS: CH

TECH	TJ/BA
DATE	8/29/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	FTN/ENTERGY INDEPENDENCE/AR		
PROJECT NUMBER	18103172	**SAMPLE ID**	B-4
		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)	147.69
Weight Soil and Tare, Final (gm)	145.02
Weight Of Tare (gm)	51.54
Weight Of Moisture (gm)	2.67
Weight Of Dry Soil (gm)	93.48
Hygroscopic Moisture In (%)	2.9%

Test Method		Method - B
Pycnometer Number		13
Weight Pycnometer Empty (gm)		177.87
Volume of Pycnometer (gm)		499.40
Weight Pycnometer and Water (gm)		676.24
Mass of Pycnometer and Water at the test Temperture	(A)	676.10
Observed Temperature (Tb), for (Mb) In Degrees C		22.50
Weight of Soil, Water & Pycnometer (gm)	(B)	706.51
Temperature, C		22.5
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		48.66
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	48.66
Temperature Coefficient		0.9995

SPECIFIC GRAVITY (G) 2.665

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

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	9/4/18
CHECK	
REVIEW	
APPROVE	

	Initial		Final		Notes
Height =	1.000	in	0.900	in	Visual description (Golder procedure): (CH) CLAY, trace fine to coarse sand; brown.
Diameter =	2.500	in	2.500	in	Atterberg Limits (ASTM D4318): LL = 50 PL = 26 PI = 24
Area =	4.909	in^2	4.909	in^2	Percent Finer (ASTM D422): 3/4 in. = 100% No. 4 = 100% No. 200 = 96%
Volume =	4.909	in^3	4.416	in^3	Specimen Type: [X] Intact [ ] Reconstituted
Water Content =	34.1%		30.1%		Remold Targets:
Specific Gravity =	2.67	(ASTM D854)	2.67	(ASTM D854)	Water Content of Trimmings (ASTM D2216): -
Height of Solids =	0.5173	in	0.5173	in	Trimming Procedure: trimming ring
Void Ratio =	0.933		0.739		Inundation: [ ] Not inundated [X] Inundated at 0.10 ksf
Degree of Saturation =	97.7%		100.0%		Test Method: [ ] A [X] B
Wet Mass =	0.328	lb	0.318	lb	Apparatus: GeoTac automated consolidometer
Dry Mass =	0.245	lb	0.245	lb	Final Water Content Specimen: [X] Entire [ ] Partial
Wet Unit Weight =	115.5	pcf	124.4	pcf	Final Differential Height: 0.0000 in
Dry Unit Weight =	86.1	pcf	95.7	pcf	Estimated Preconsolidation Stress: ksf

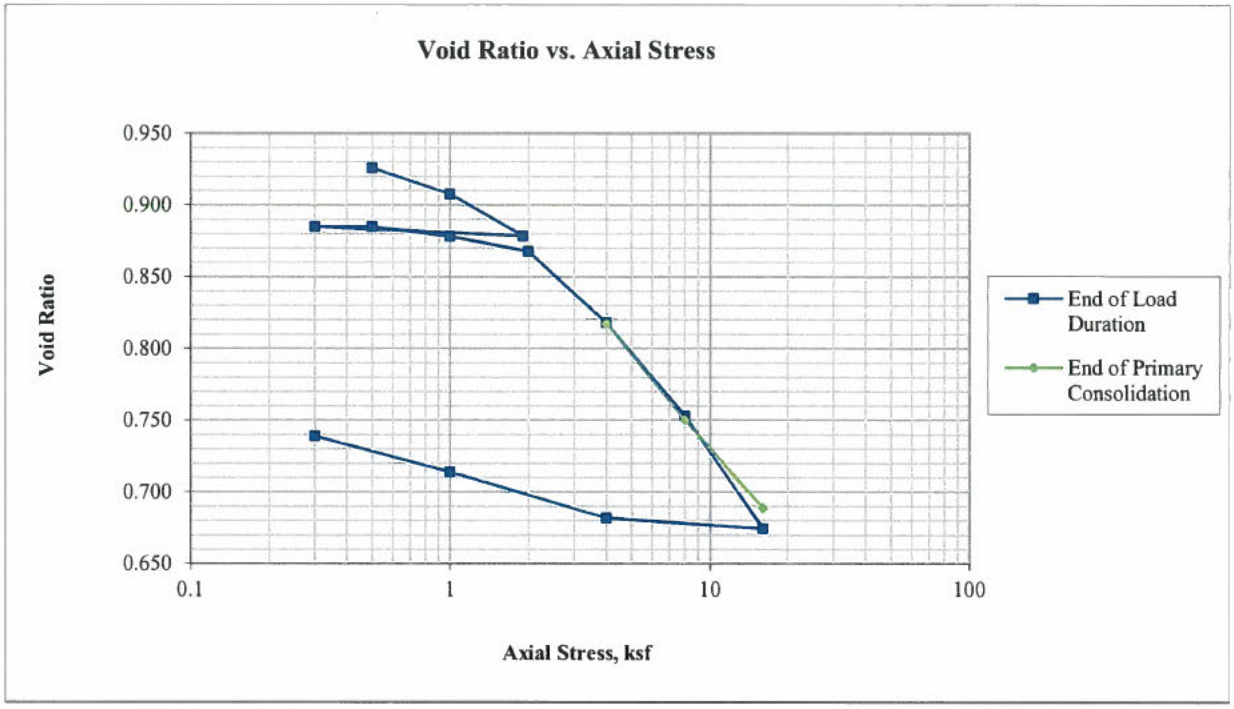
			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	60					0.0000	0.9985	0.00	0.930				
1	0.5	60					0.0022	0.9962	0.22	0.926				
2	1.0	60					0.0115	0.9870	1.15	0.908				
3	1.9	60					0.0266	0.9718	2.66	0.879				
4	0.3	60					0.0233	0.9751	2.33	0.885				
5	0.5	60					0.0234	0.9751	2.34	0.885				
6	1.0	60					0.0269	0.9716	2.69	0.878				
7	2.0	60					0.0324	0.9661	3.24	0.868				
8	4.0	120	0.0582	0.9403	5.82	0.818	0.0581	0.9404	5.81	0.818	2 (Root time)	0.839	0.022	20.3
9	8.0	120	0.0930	0.9055	9.30	0.750	0.0916	0.9068	9.16	0.753	2 (Root time)	0.780	0.020	21.2
10	16.0	120	0.1248	0.8737	12.48	0.689	0.1323	0.8662	13.23	0.674	2 (Root time)	0.721	0.040	9.0
11	4.0	120					0.1285	0.8700	12.85	0.682				
12	1.0	120					0.1119	0.8866	11.19	0.714				
13	0.3	120					0.0989	0.8996	9.89	0.739				

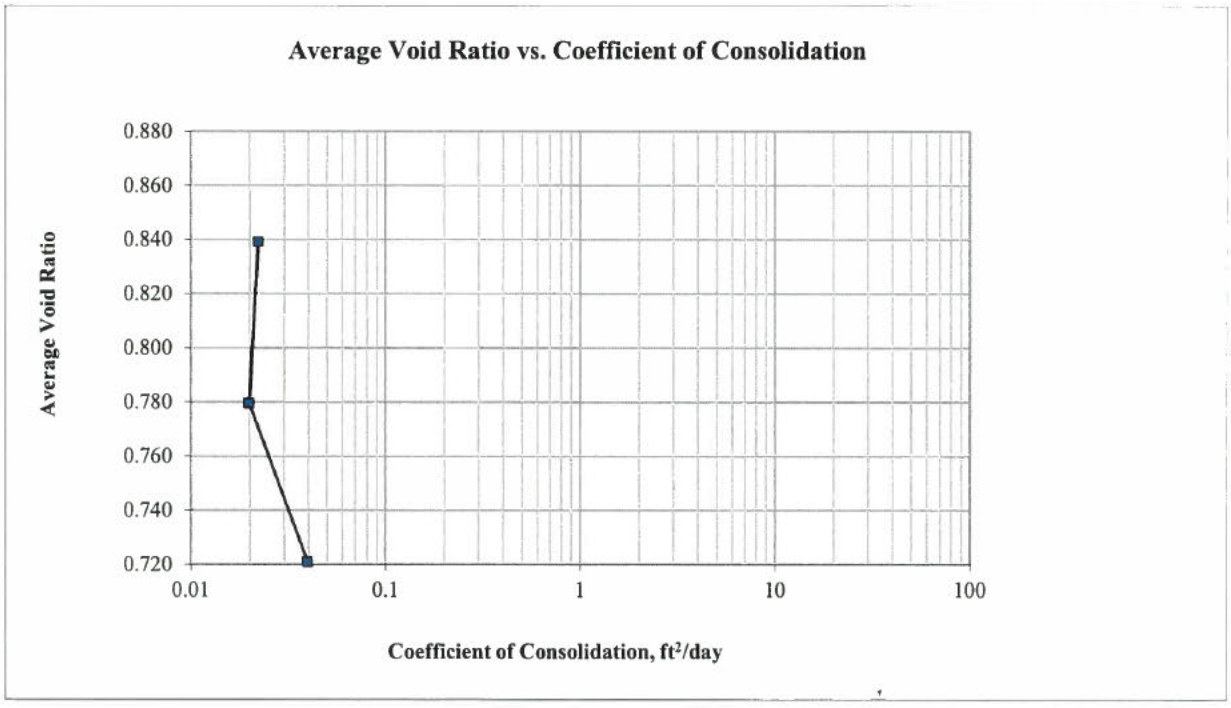
Golder Associates Inc.
Atlanta, Georgia

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

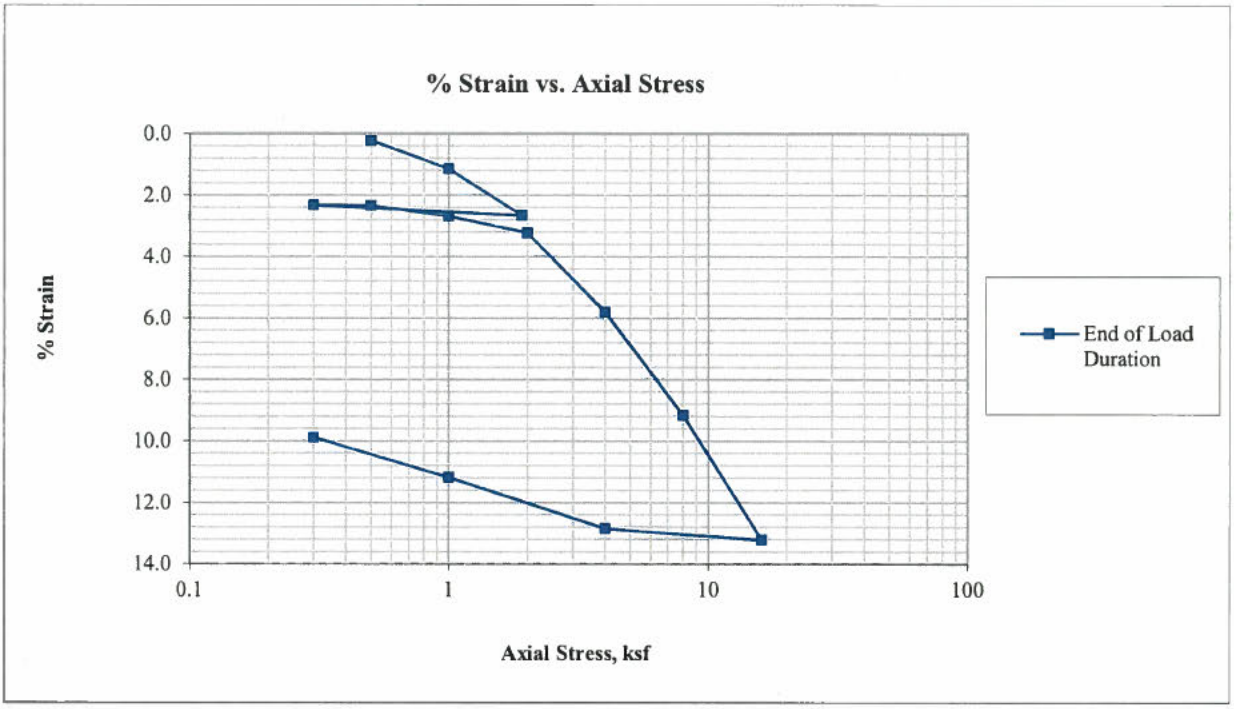
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR

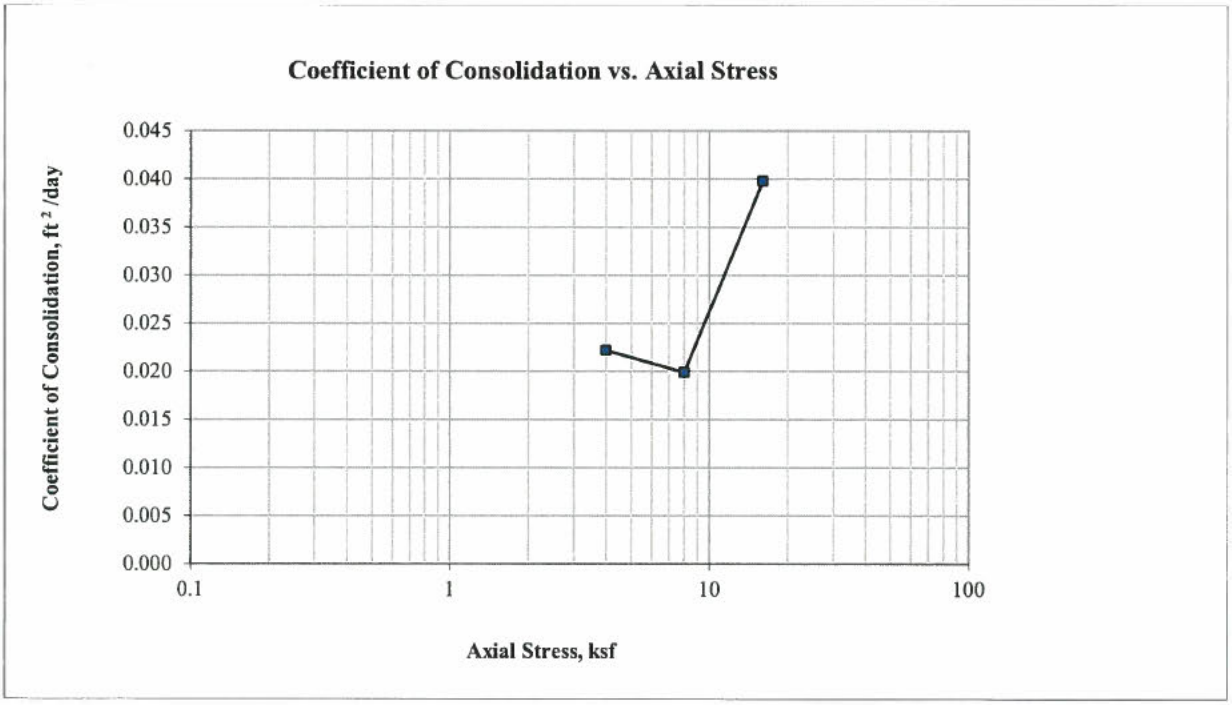
Sample:	Technician:	Checked:	Reviewed:	Approved:	Start Date:	Job Number:	Figure:
B-4 UD 15.0-17.0'	PWM/FT		DP		9/4/2018	18103172	1





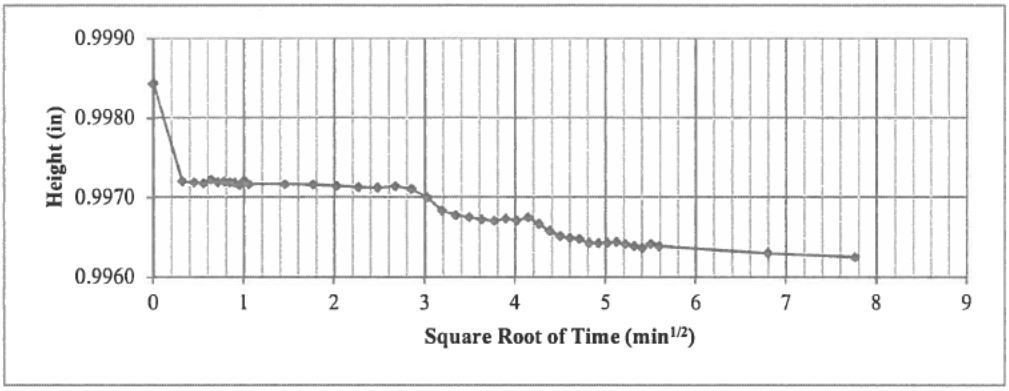
Golder Associates Inc. Atlanta, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-4 UD 15.0-17.0'	Technician: PWM/FT	Reviewed: JA	Start Date: 9/4/2018	Job Number: 18103172	Figure: 2



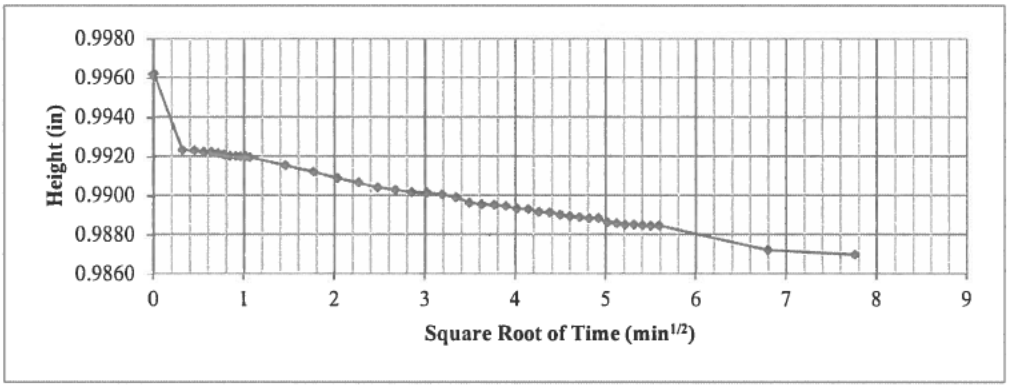


Golder Associates Inc. **Atlanta, Georgia**	Title: **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**					
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**						
Sample: **B-4 UD 15.0-17.0'**	**Technician:** **PWM/FT**	**Reviewed:** JA	**Start Date:** **9/4/2018**	**Job Number:** **18103172**	**Figure:** **2A**	

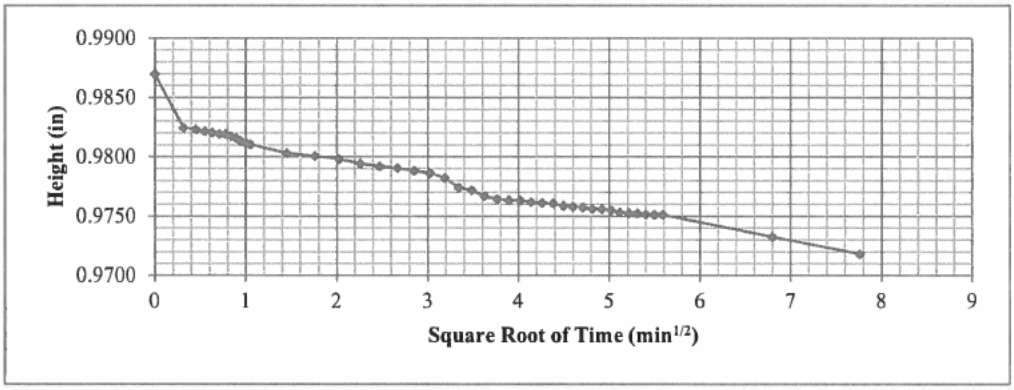
0.5 ksf



1.0 ksf

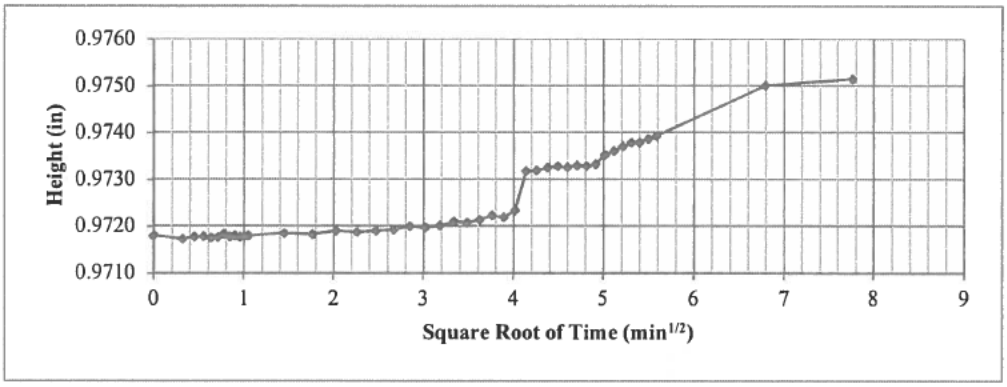


1.9 ksf

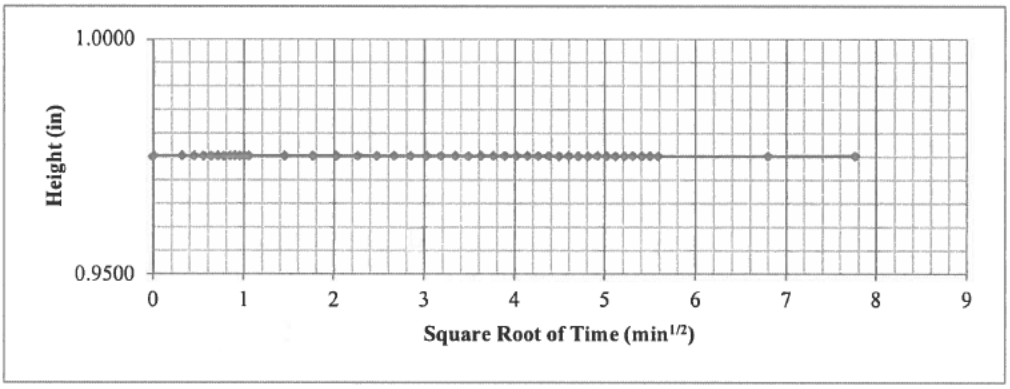


Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (1)**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-4 UD 15.0-17.0'**	**Technician:** **PWM/FT**	**Reviewed:**	**Start Date:** **9/4/2018**	**Job Number:** **18103172**	**Figure:** **3**

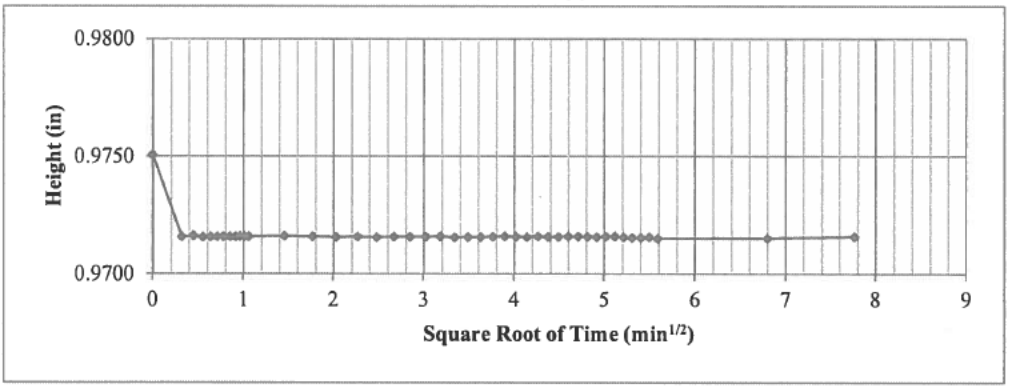
0.3 ksf



0.5 ksf

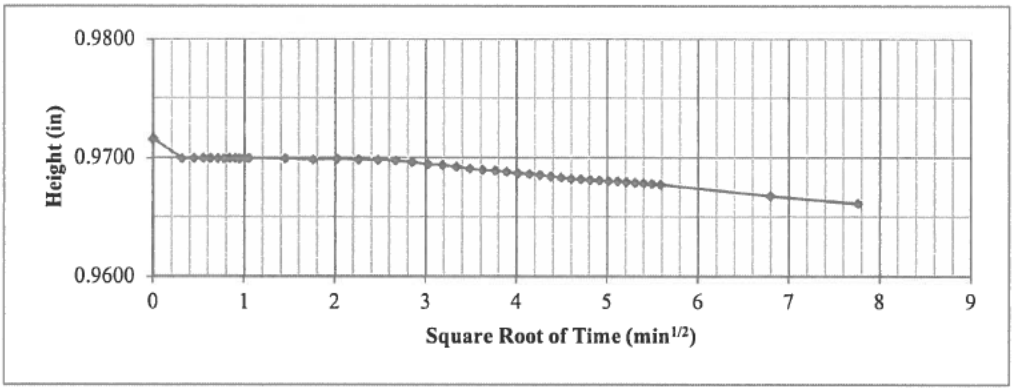


1.0 ksf

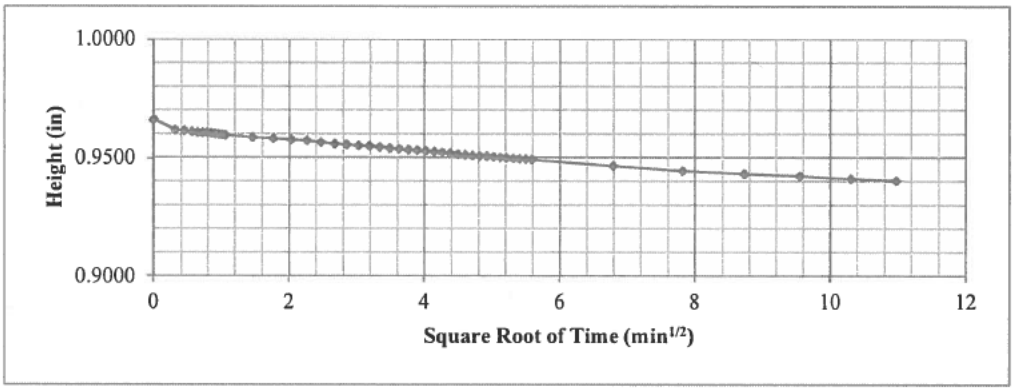


Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (2)**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-4 UD 15.0-17.0'**	**Technician:** **PWM/FT**	**Reviewed:** JP	**Start Date:** **9/4/2018**	**Job Number:** **18103172**	**Figure:** **4**

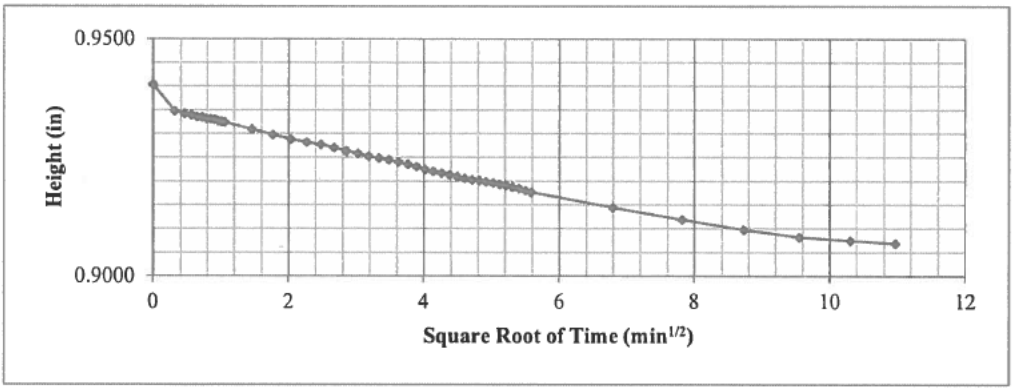
2.0 ksf



4.0 ksf

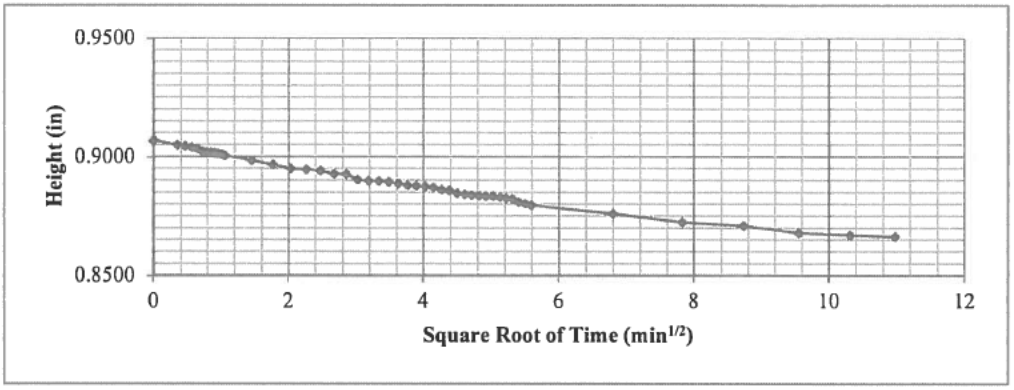


8.0 ksf

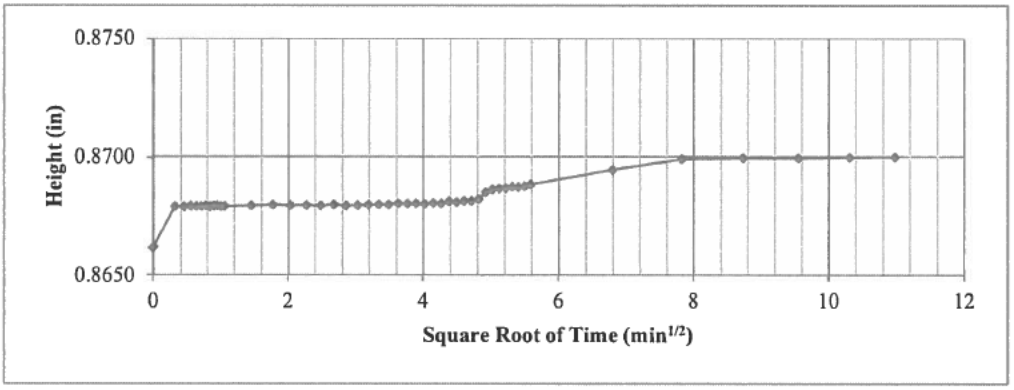


Golder Associates Inc. Atlanta, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS (3)				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-4 UD 15.0-17.0'	Technician: PWM/FT	Reviewed: JB	Start Date: 9/4/2018	Job Number: 18103172	Figure: 5

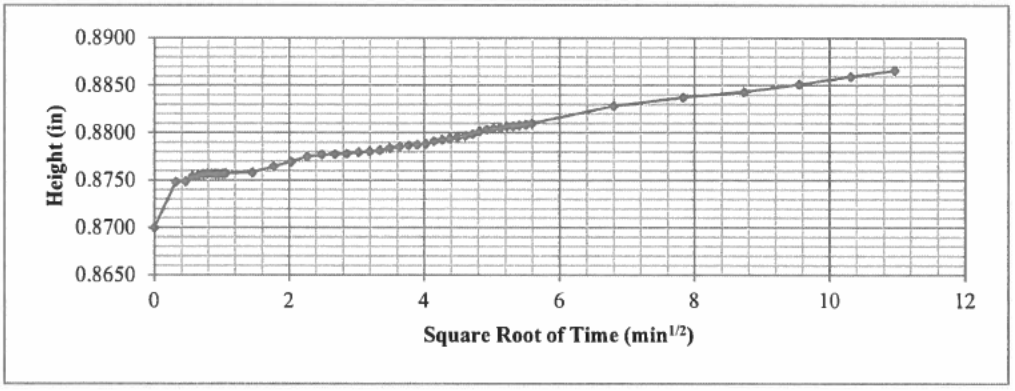
16.0 ksf



4.0 ksf

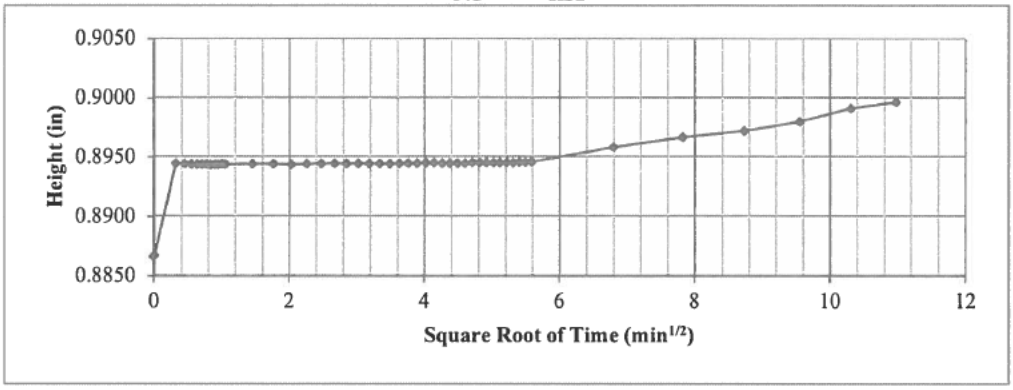


1.0 ksf



Golder Associates Inc. Atlanta, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS (4)				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-4 UD 15.0-17.0'	Technician: PWM/FT	Reviewed:	Start Date: 9/4/2018	Job Number: 18103172	Figure: 6

0.3 ksf



Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (5)**					
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**						
Sample: **B-4 UD 15.0-17.0'**	**Technician:** **PWM/FT**	**Reviewed:**	**Start Date:** **9/4/2018**	**Job Number:** **18103172**	**Figure:** **7**	

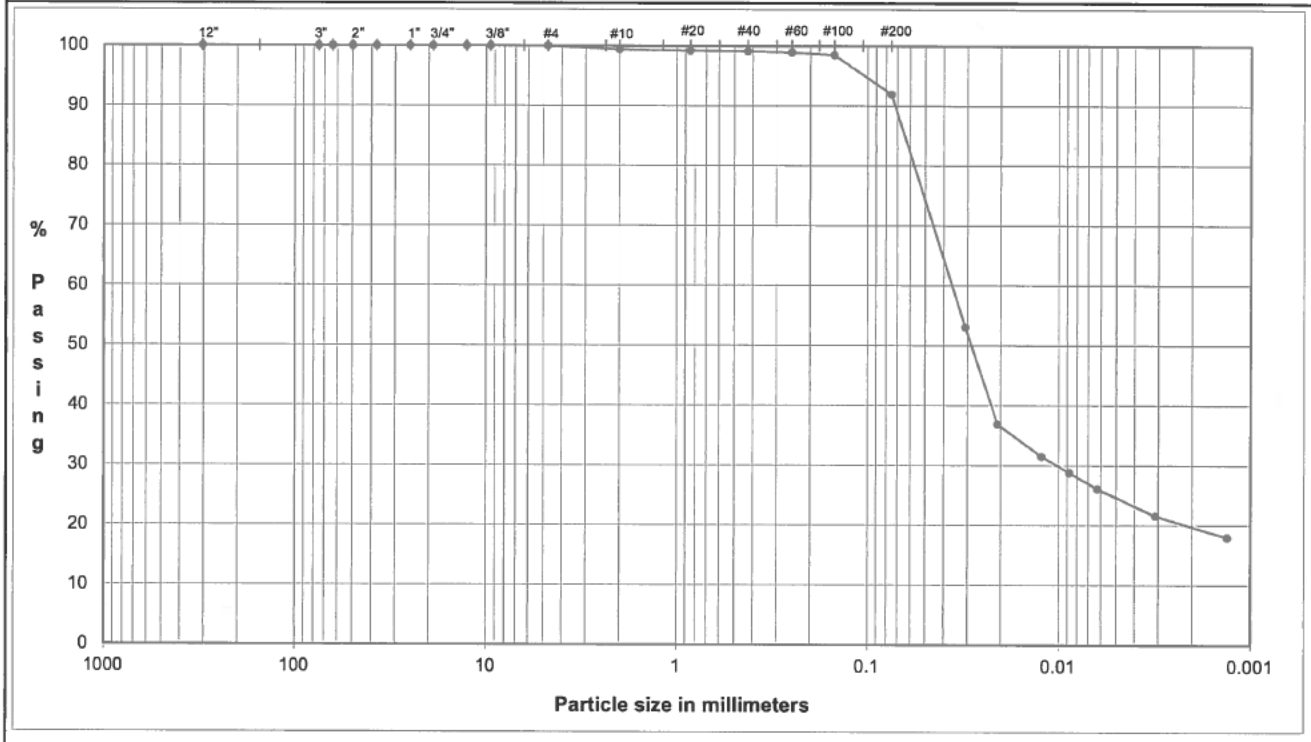
JULY 2018

18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **B-4** - Depth: **20.0-22.0'**
TYPE: **UD**



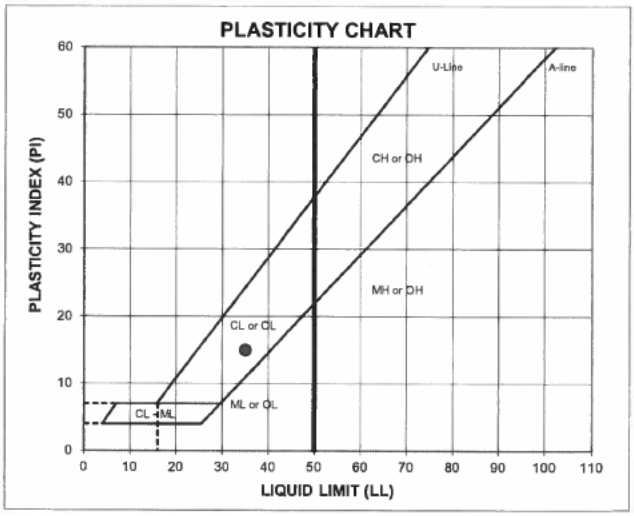
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

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	99.4	Coarse Sand	0.6
#20	0.85	99.2		
#40	0.43	99.1	Medium Sand	0.3
#60	0.25	98.9		
#100	0.15	98.5		
#200	0.075	91.9	Fine Sand	7.2

Hydrometer Analysis

(mm)	%Finer		
0.031	53.1		
0.021	36.9		
0.012	31.5	Fines	
0.0088	28.8	Silt or Clay	91.9
0.0063	26.1		
0.0031	21.6		
0.0013	18.0		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
27.4	35	20	15	0.51

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

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

USCS: CL

TECH	TB/HH
DATE	7/10/18
CHECK	
REVIEW	
APPROVE	

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

PROJECT TITLE	FTN/ENTERGY INDEPENDENCE/AR		Board #	11	COMMENTS
PROJECT NUMBER	18103172		Flow Pump	2	
SAMPLE ID	B-4	20.0-22.0'	Flow Pump Speed	6	
SAMPLE TYPE	UD		Technician	FT/PWM	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.133	B-Value, f	0.99	Height, inches	3.114
Diameter, inches	2.818	Cell Pres.	88.0	Diameter, inches	2.787
Area, cm²	40.24	Bot. Pres.	80.0	Area, cm²	39.36
Volume, cm³	320.21	Top Pres.	80.0	Volume, cm³	311.30
Mass, g	620.34	Tot. B.P.	80.0	Mass, g	622.49
Moisture Content, %	27.4	Head, max.	77.37	Moisture Content, %	27.87
Dry Density, pcf	94.9	Head, min.	77.37	Dry Density, pcf	97.58
Spec. Gravity(assumed)	2.750	Max. Grad.	9.78	Volume Solids, cm³	177.02
Volume Solids, cm³	177.02	Min. Grad.	9.78	Volume Voids, cm³	134.28
Volume Voids, cm³	143.18			Void Ratio	0.76
Void Ratio	0.81			Saturation, %	100.0%
Saturation, %	93.3%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	620.34	735.96
Wt Soil & Tare, f	g	486.82	600.38
Wt Tare	g	0.00	113.89
Wt Moisture Lost	g	133.52	135.58
Wt Dry Soil	g	486.82	486.49
Water Content	%	27.43%	27.87%

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

Flow Pump Rate: 4.70E-04 cm³/sec USCS: CL

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)
07/11/18	43292	12	0	22.6	0	0	0	0	1.10	77.37	9.78	1.1E-06
07/11/18	43292	12	5	22.6	5	5	300	300	1.10	77.37	9.78	1.1E-06
07/11/18	43292	12	10	22.6	5	10	300	600	1.10	77.37	9.78	1.1E-06
07/11/18	43292	12	15	22.6	5	15	300	900	1.10	77.37	9.78	1.1E-06 *
07/11/18	43292	12	20	22.6	5	20	300	1200	1.10	77.37	9.78	1.1E-06 *
07/11/18	43292	12	25	22.6	5	25	300	1500	1.10	77.37	9.78	1.1E-06 *
07/11/18	43292	12	30	22.6	5	30	300	1800	1.10	77.37	9.78	1.1E-06 *

TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.1E-06 cm/sec **

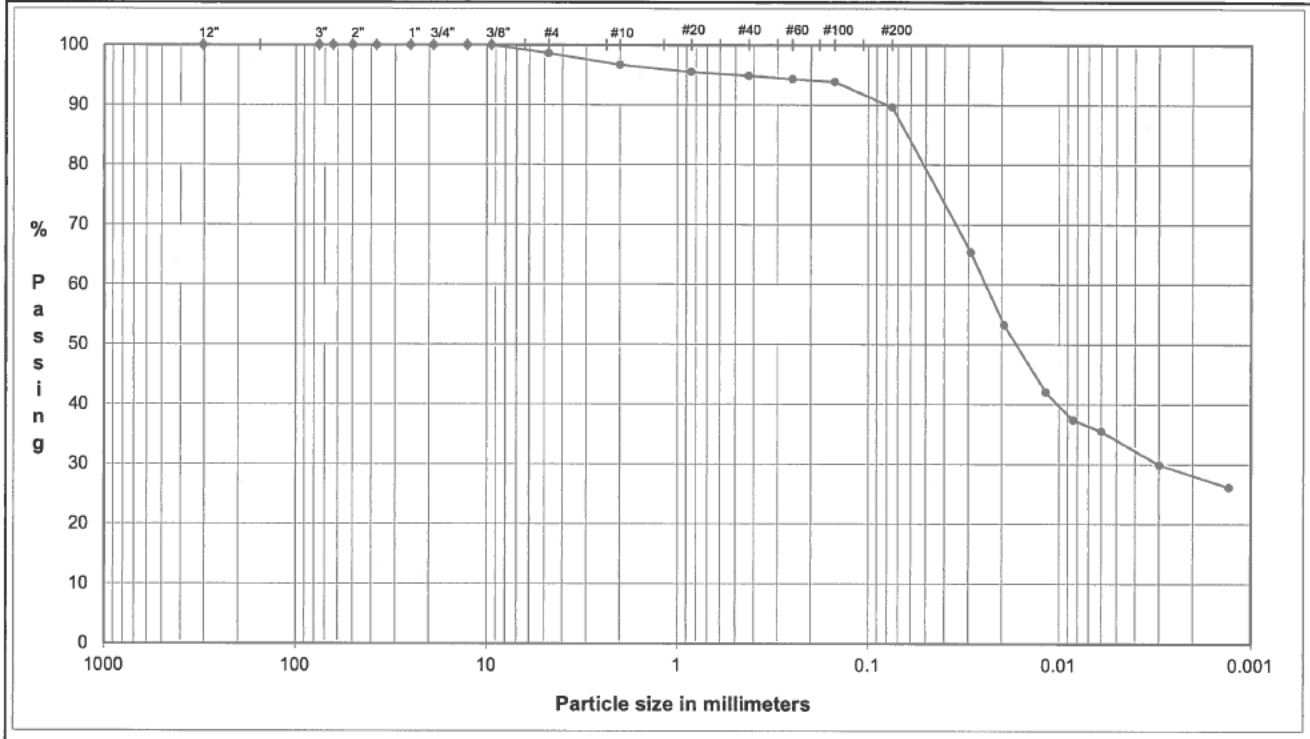
DATE	7/11/18
CHECK	
REVIEW	
APPROVE	

JUNE 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **B-5** Depth: **3.0-5.0'**
TYPE: **UD**



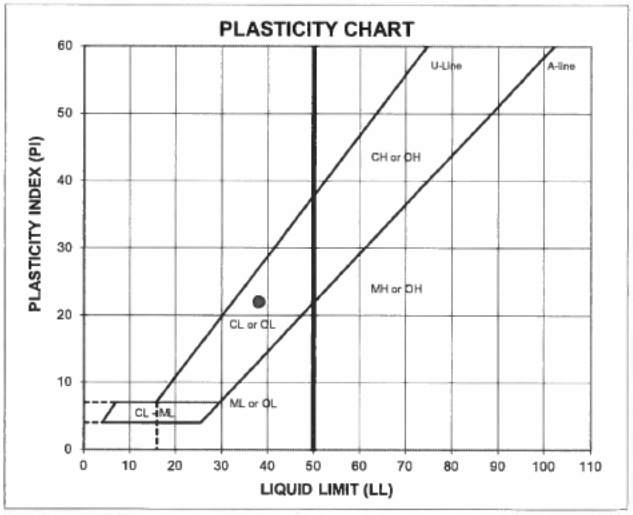
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	100.0		
#4	4.8	98.6	Fine Gravel	1.4
#10	2.00	96.7	Coarse Sand	1.9
#20	0.85	95.5		
#40	0.43	94.9	Medium Sand	1.8
#60	0.25	94.3		
#100	0.15	93.9		
#200	0.075	89.6	Fine Sand	5.3

Hydrometer Analysis

(mm)	%Finer		
0.029	65.4		
0.019	53.3		
0.012	42.1	Fines	
0.0084	37.4	Silt or Clay	89.6
0.0060	35.5		
0.0030	29.9		
0.0013	26.2		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
19.0	38	16	22	0.13

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

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

USCS: CL

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

Boring or Test Pit:	B-5		Boring or Test Pit:			Boring or Test Pit:	B-5	
Sample:	UD		Sample:			Sample:	UD	
Depth:	3.0-5.0	ft	Depth:			Depth:	3.0-5.0	ft
Point No.:	1		Point No.:			Point No.:		
Initial								
Length =	6.067	in	Length =	6.048		Length =	5.989	
Diameter =	2.859	in	Diameter =	2.878		Diameter =	2.869	
Wet Mass =	2.898	lb	Wet Mass =			Wet Mass =	2.914	
Area =	6.420	in^2	Area =			Area =	6.465	
Volume =	38.949	in^3	Volume =			Volume =	38.717	
Specific Gravity =	2.69	(ASTM D854)	Specific Gravity =			Specific Gravity =	2.69	
Dry Mass of Solids =	2.426	lb	Dry Mass of Solids =			Dry Mass of Solids =	2.460	
Moisture Content =	19.5%		Moisture Content =			Moisture Content =	18.5%	
Wet Unit Weight =	128.6	pcf	Wet Unit Weight =			Wet Unit Weight =	130.1	
Dry Unit Weight =	107.6	pcf	Dry Unit Weight =			Dry Unit Weight =	109.8	
Void Ratio =	0.56		Void Ratio =			Void Ratio =	0.53	
Percent Saturation =	94%		Percent Saturation =			Percent Saturation =	94%	
After Consolidation			**After Consolidation**			**After Consolidation**		
Length =	6.048	in	Length =	5.912	in	Length =	5.970	in
Diameter =	2.878	in	Diameter =	2.911	in	Diameter =	2.875	in
Area =	6.505		Area =	6.655		Area =	6.491	in^2 (Method B)
Volume =	39.345		Volume =	39.345		Volume =	38.753	in^3
Moisture Content =			Moisture Content =	21.3%		Moisture Content =	19.6%	
Wet Unit Weight =			Wet Unit Weight =	129.3		Wet Unit Weight =	131.3	pcf
Dry Unit Weight =			Dry Unit Weight =	106.5		Dry Unit Weight =	109.7	pcf
Void Ratio =			Void Ratio =	0.57		Void Ratio =	0.53	
Percent Saturation =			Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.99		B Parameter =	--		B Parameter =	0.98	
Shear Rate =	0.090%	/min.	Shear Rate =	0.024%	/min.	Shear Rate =	0.015%	/min.
t_{50} =	0.5	min.	t_{50} =	15.3	min.	t_{50} =	5.8	min.
Strain at Failure =	1.8%		Strain at Failure =	3.4%		Strain at Failure =	2.4%	
Cell Pressure =	74.0	psi	Cell Pressure =	78.0	psi	Cell Pressure =	82.0	psi
Back Pressure =	70.0	psi	Back Pressure =	70.0	psi	Back Pressure =	70.0	psi
Confining Pressure =	4.0	psi	Confining Pressure =	8.0	psi	Confining Pressure =	12.0	psi

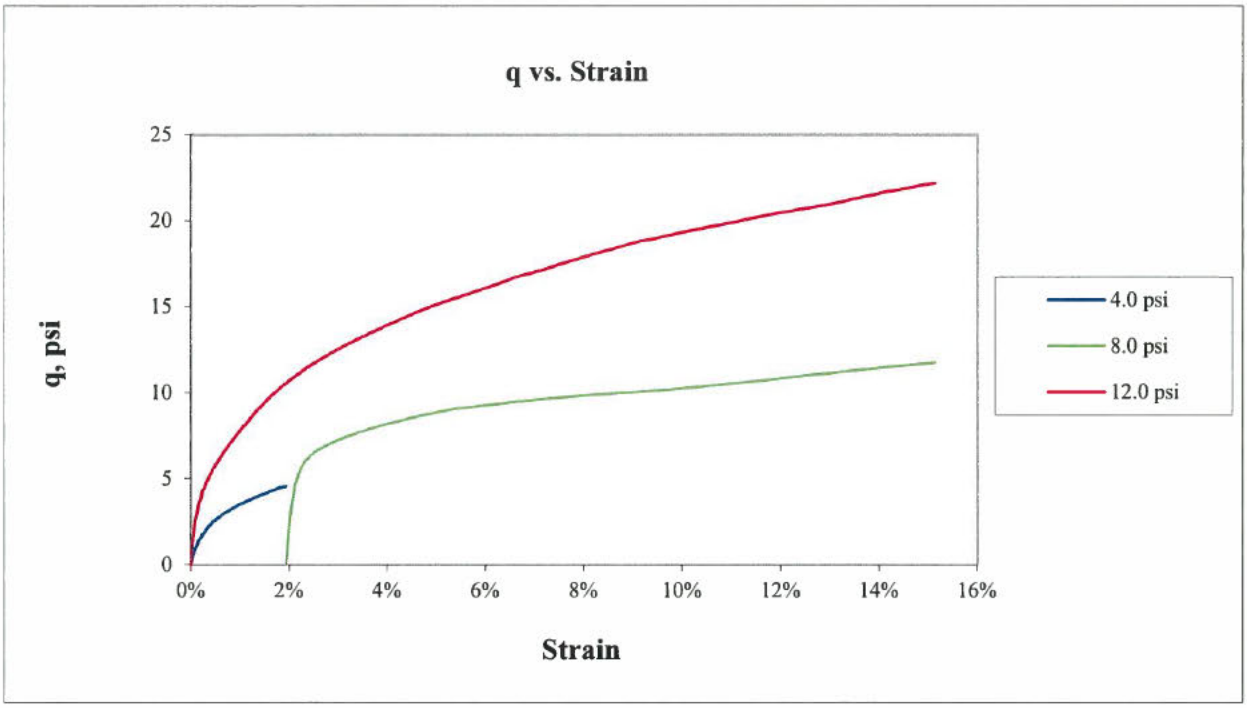
Notes: Sample description: (CL) SILTY CLAY, some fine to coarse sand, trace fine gravel; dark grayish brown.

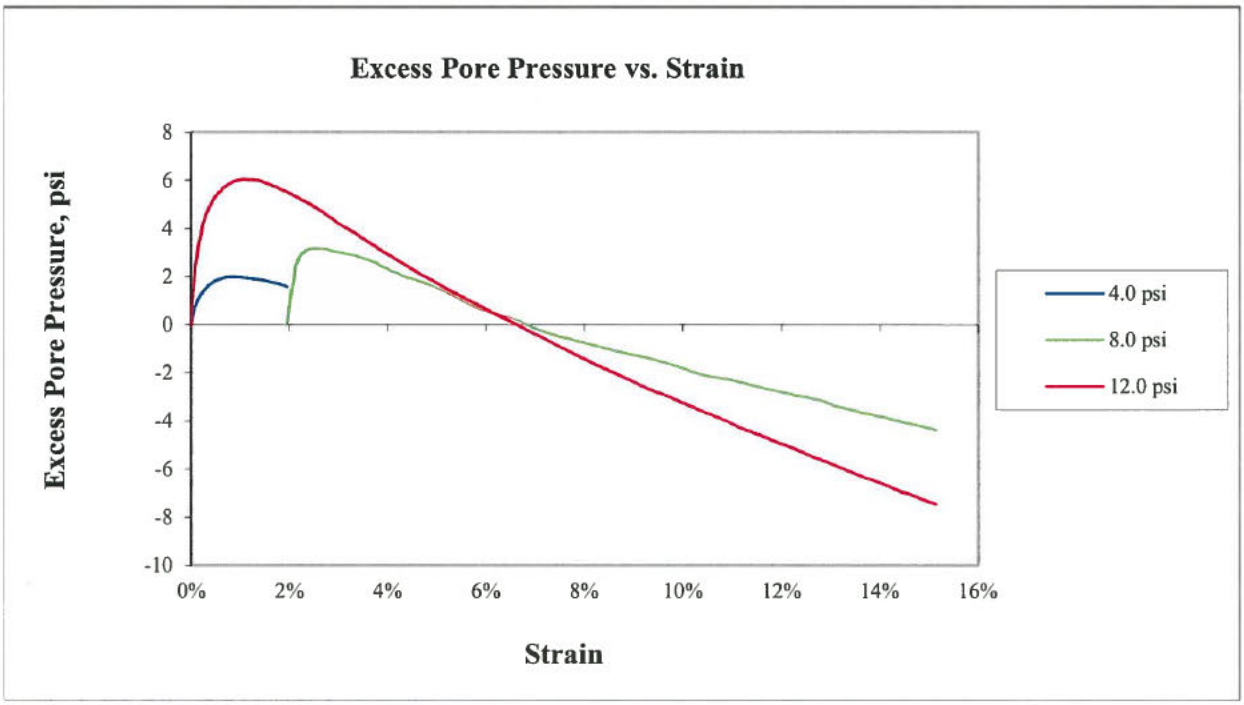
Atterberg limits: LL = 38 PL = 16 PI = 22 (ASTM D4318)

Percent finer: 3/4 in. = 100.0% No. 4 = 99% No. 200 = 90% (ASTM D422, refer to separate report for gradation curve)

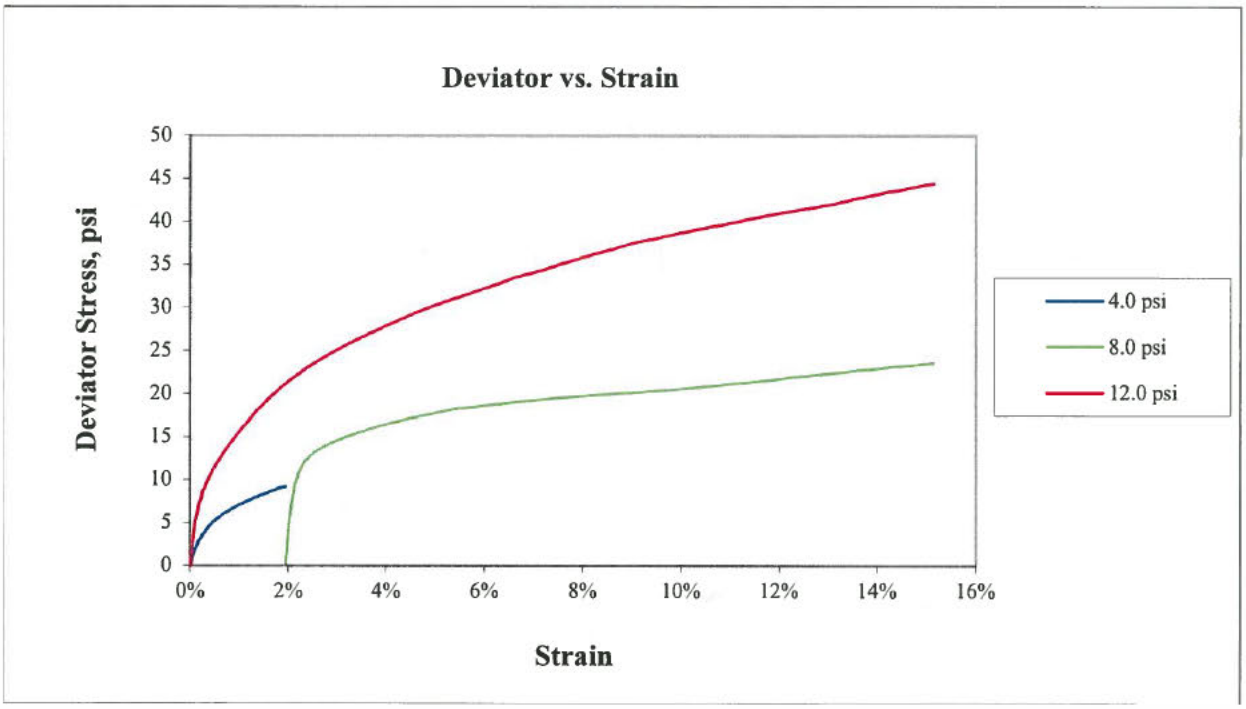
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ % strain
Membrane effect:	X	Corrected		Not Corrected

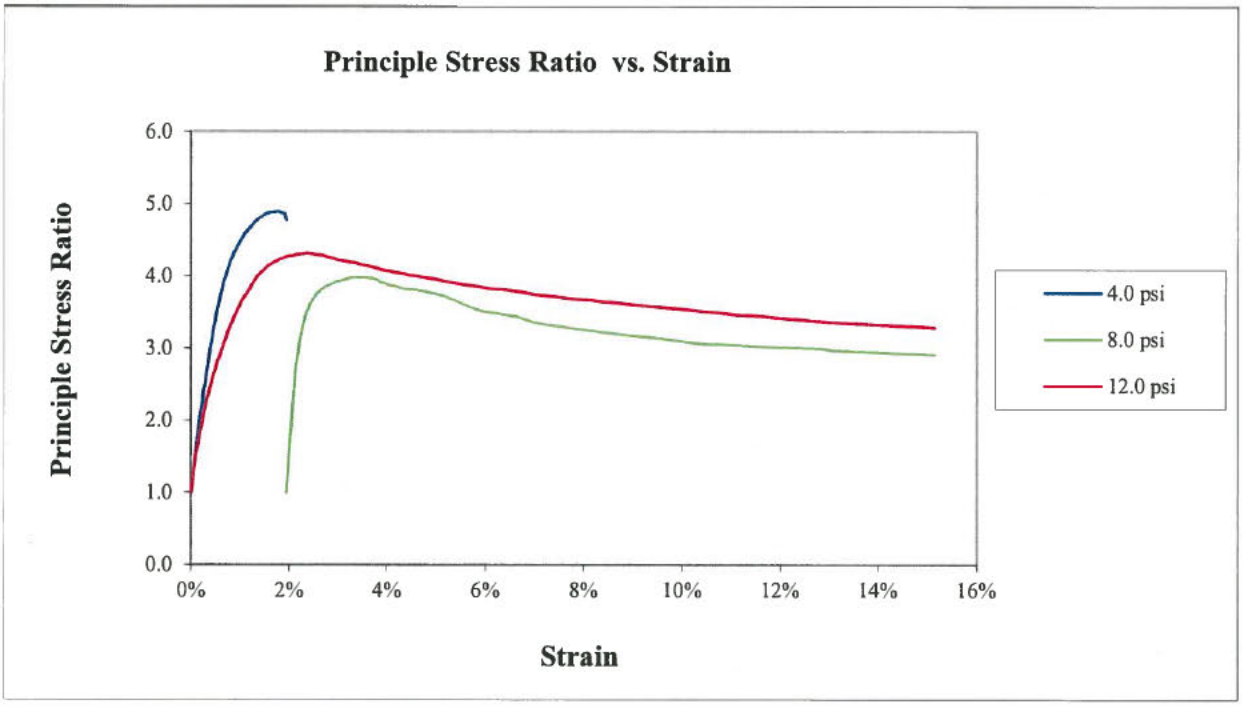
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-5 UD 3.0-5.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/22/2018**	**Job Number:** **18103172**	**Figure:** **1**





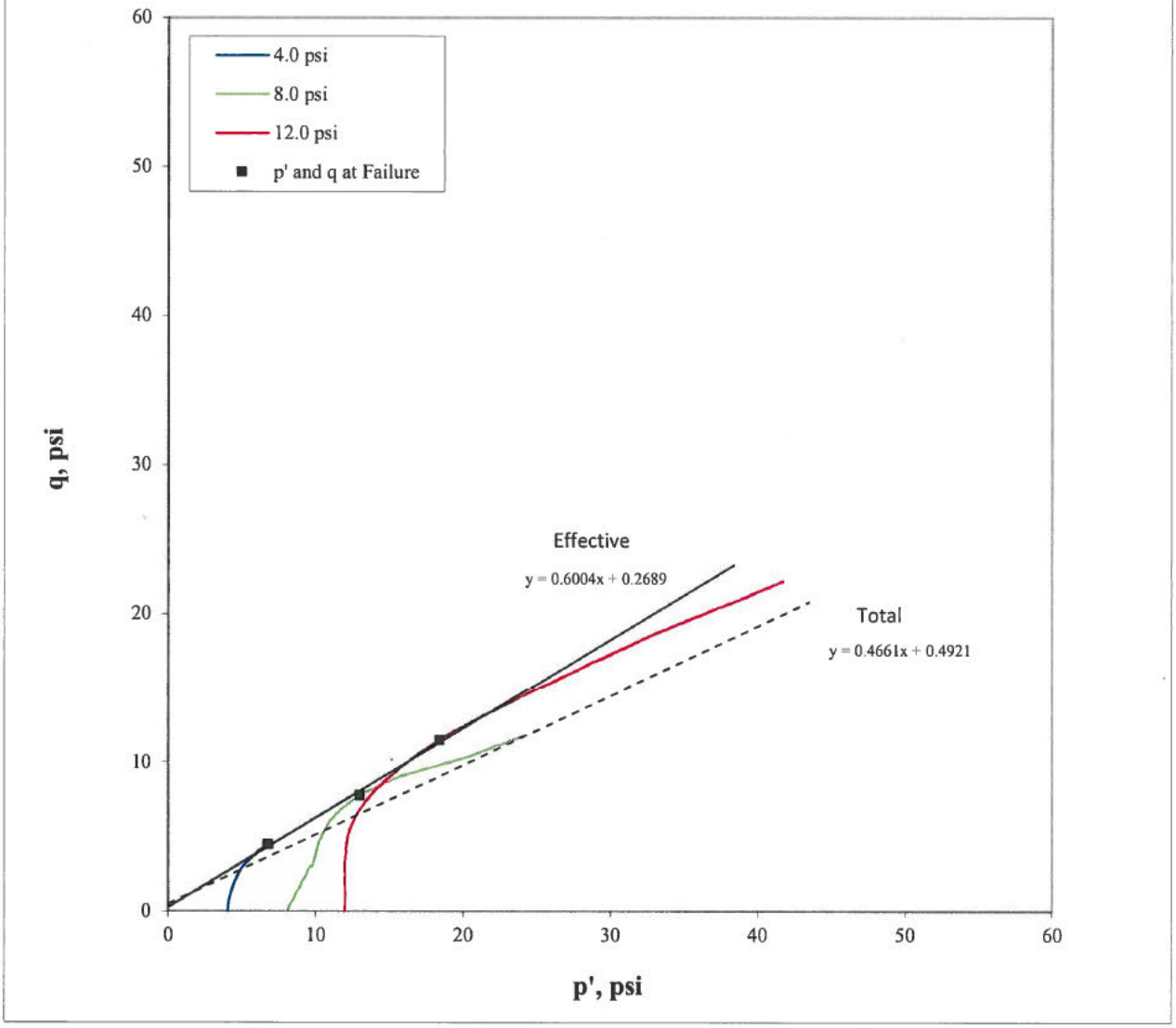
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **B-5 UD 3.0-5.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/22/2018**	**Job Number:** **18103172**	**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 INDEPENDENCE/AR					
Sample: B-5 UD 3.0-5.0'	Technician: FT/PWM Check:	Reviewed: Approved:	Start Date: 6/22/2018	Job Number: 18103172	Figure: 3

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
4.0	8.5	6.8	4.5
8.0	15.8	13.0	7.8
12.0	23.5	18.4	11.5

Effective

α ' =	31.0	degree
a' =	0.3	psi

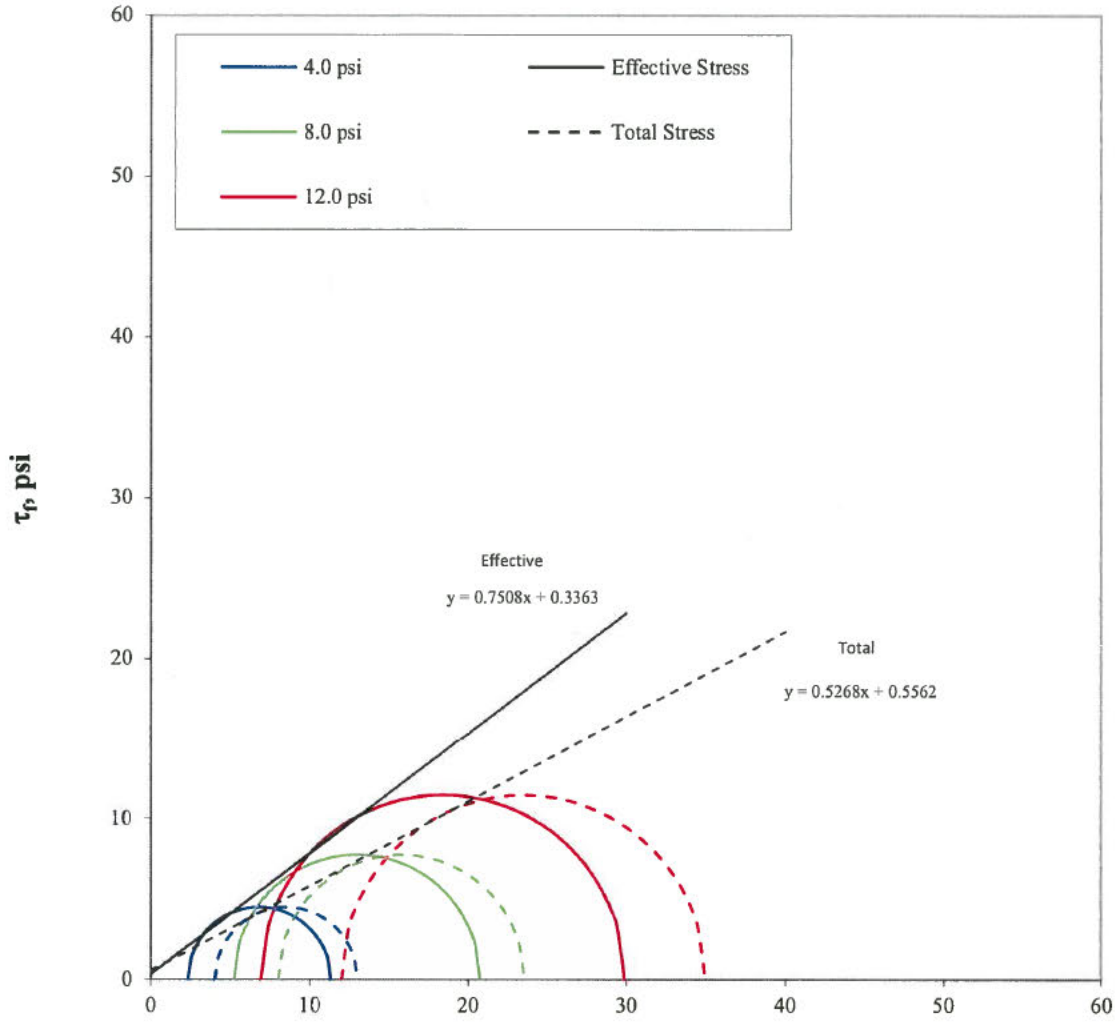
Total

α =	25.0	degree
a =	0.5	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 STRESS PATH PLOT				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-5 UD 3.0-5.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 6/22/2018	**Job Number:** 18103172	**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	11.3	2.3	13.0	4.0
8.0	20.7	5.2	23.5	8.0
12.0	29.9	6.9	34.9	12.0

Effective

ϕ' = 36.9 degree

c' = 0.3 psi

Total

ϕ = 27.8 degree

c = 0.6 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:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
B-5 UD 3.0-5.0'	FT/PWM Check:	Approved:	6/22/2018	18103172	5

4 & 8 psi

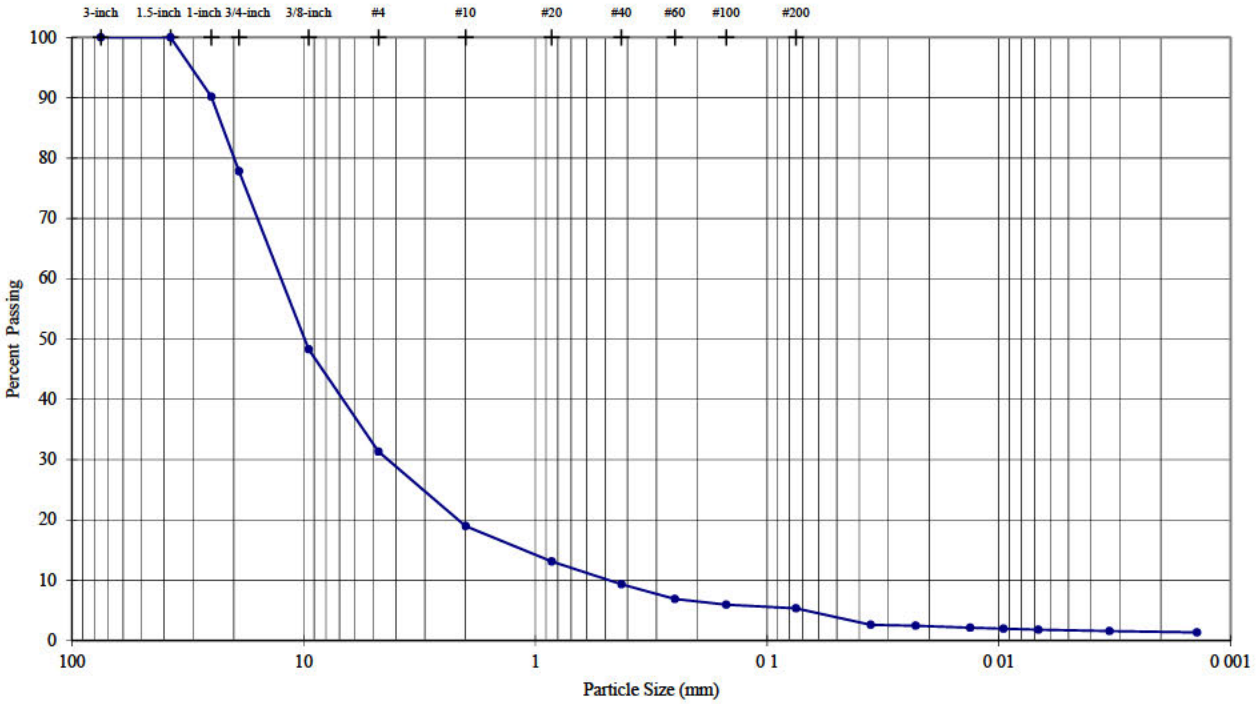
12 psi

Golder Associates Inc. **Atlanta, Georgia**	Title: MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - Two Specimen				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: B-5 UD 3.0-5.0'	Technician: FT/PWM Check:	Reviewed: Approved:	Start Date: 6/22/2018	Job Number: 18103172	Figure: 6

August-18 18103172

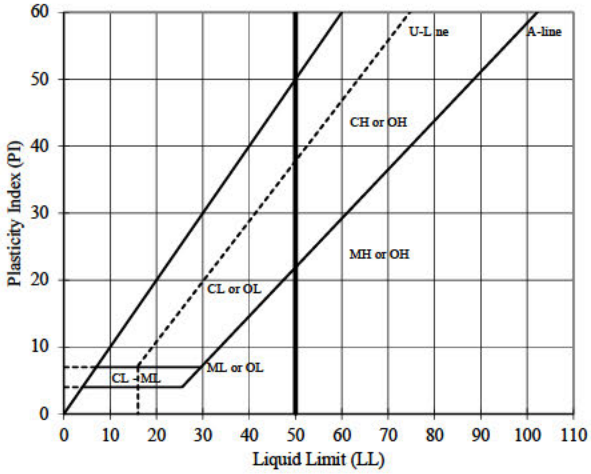
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **FTN/Entergy Independence/AR**
SAMPLE ID: **RP-4D** DEPTH (ft): **38-39**
TYPE: **Bag**



Sieve	Particle Size (mm)	% Passing	Description	Percentage
3-inch	75 0	100.0		
1 5-inch	37 5	100.0	Coarse Gravel	22.17
1-inch	25 0	90.2		
3/4-inch	19 0	77.8		
3/8-inch	9 5	48.3	Fine Gravel	46.50
#4	4 75	31.3		
#10	2 00	19.0	Coarse Sand	12.34
#20	0 850	13.1	Medium Sand	9.66
#40	0 425	9.3		
#60	0 250	6.9	Fine Sand	3.98
#100	0 150	6.0		
#200	0 075	5.4		
	0 036	2.6	Silt or Clay Fines	5.36
	0 023	2.5		
	0 013	2.1		
	0 010	2.0		
	0 007	1.8		
	0 003	1.6		
	0 001	1.4		

Sieve Analysis (Initial Separation on No 4 Sieve)
Hydrometer Analysis



USCS Description (ASTM D 2487):
Poorly graded gravel with silt and sand, brown, moist

LL	PL	PI	SpG
NP	NP	NP	--

As-Received Moisture Content (%): --

USCS Group Symbol: GP-GM

Notes: 0 g of particles up to 37 5 mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling Method A Liquid Limit test performed using mechanical device

TECH	MB/AR
DATE	31-Jul-2018
REVIEW	MB

GOLDER

Boring or Test Pit: --	Boring or Test Pit: --	Boring or Test Pit: --
Sample: RP-4D	Sample: RP-4D	Sample: RP-4D
Depth: 38-39 ft.	Depth: 38-39 ft.	Depth: 38-39 ft.
Point No.: 1	Point No.: 2	Point No.: 3

Initial			**Initial**			**Initial**		
Thickness =	1.188	in	Thickness =	1.183	in	Thickness =	1.189	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Wet Mass =	0.423	lb	Wet Mass =	0.423	lb	Wet Mass =	0.424	lb
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.83	in^3	Volume =	5.81	in^3	Volume =	5.84	in^3
Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)
Dry Mass of Solids =	0.404	lb	Dry Mass of Solids =	0.402	lb	Dry Mass of Solids =	0.403	lb
Moisture Content =	4.7%		Moisture Content =	5.2%		Moisture Content =	5.0%	
Wet Unit Weight =	125.4	pcf	Wet Unit Weight =	125.9	pcf	Wet Unit Weight =	125.4	pcf
Dry Unit Weight =	119.7	pcf	Dry Unit Weight =	119.7	pcf	Dry Unit Weight =	119.4	pcf
Void Ratio =	0.41		Void Ratio =	0.41		Void Ratio =	0.41	
Percent Saturation =	31%		Percent Saturation =	35%		Percent Saturation =	33%	

Pre-Shear			**Pre-Shear**			**Pre-Shear**		
Thickness =	1.174	in	Thickness =	1.163	in	Thickness =	1.170	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.76	in^3	Volume =	5.71	in^3	Volume =	5.74	in^3
Moisture Content =	11.1%		Moisture Content =	11.2%		Moisture Content =	11.4%	
Wet Unit Weight =	134.7	pcf	Wet Unit Weight =	135.4	pcf	Wet Unit Weight =	135.2	pcf
Dry Unit Weight =	121.2	pcf	Dry Unit Weight =	121.8	pcf	Dry Unit Weight =	121.4	pcf
Void Ratio =	0.39		Void Ratio =	0.38		Void Ratio =	0.39	
Percent Saturation =	77%		Percent Saturation =	79%		Percent Saturation =	80%	

Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min
Normal Stress =	4,752	psf	Normal Stress =	9,504	psf	Normal Stress =	14,256	psf

Notes:

USCS description (ASTM D2487): Poorly graded gravel with silt and sand, brown, moist

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

Percent finer: 3/4 in. = 78% No. 4 = 31% No. 200 = 5% (ASTM D422, refer to separate report)

Specimen type: [ ] Intact [X] Reconstituted

Inundation: At seating load

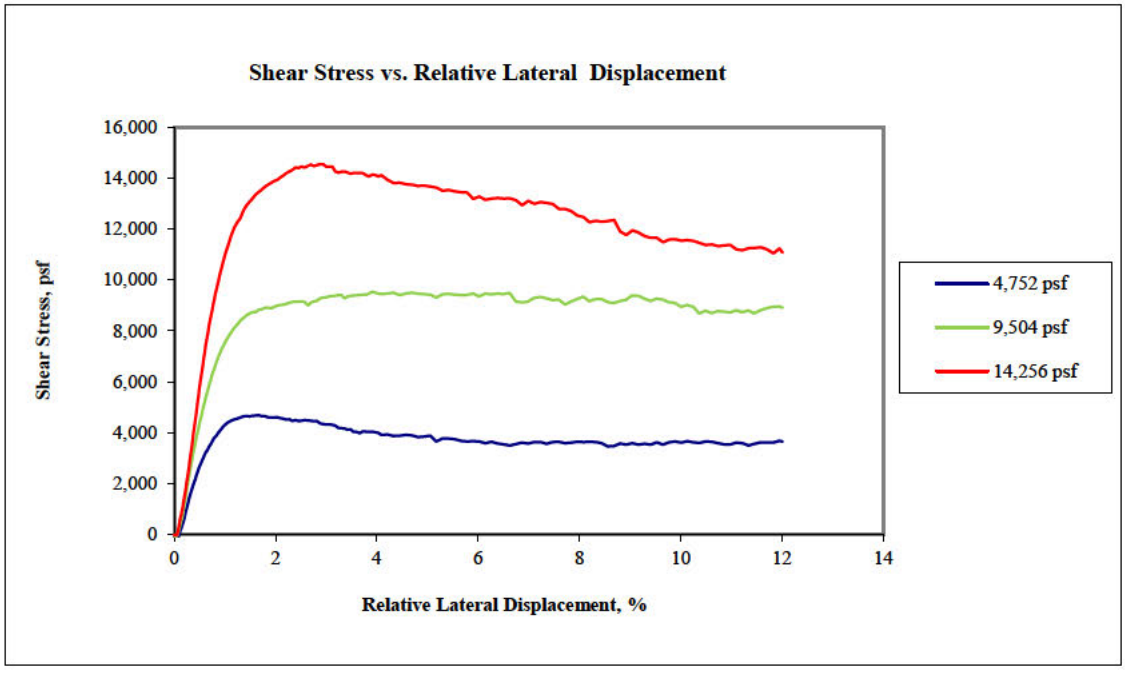
Apparatus: 2.5 -inch nominal diameter box, GeoTac automated test system, GeoJac loading system

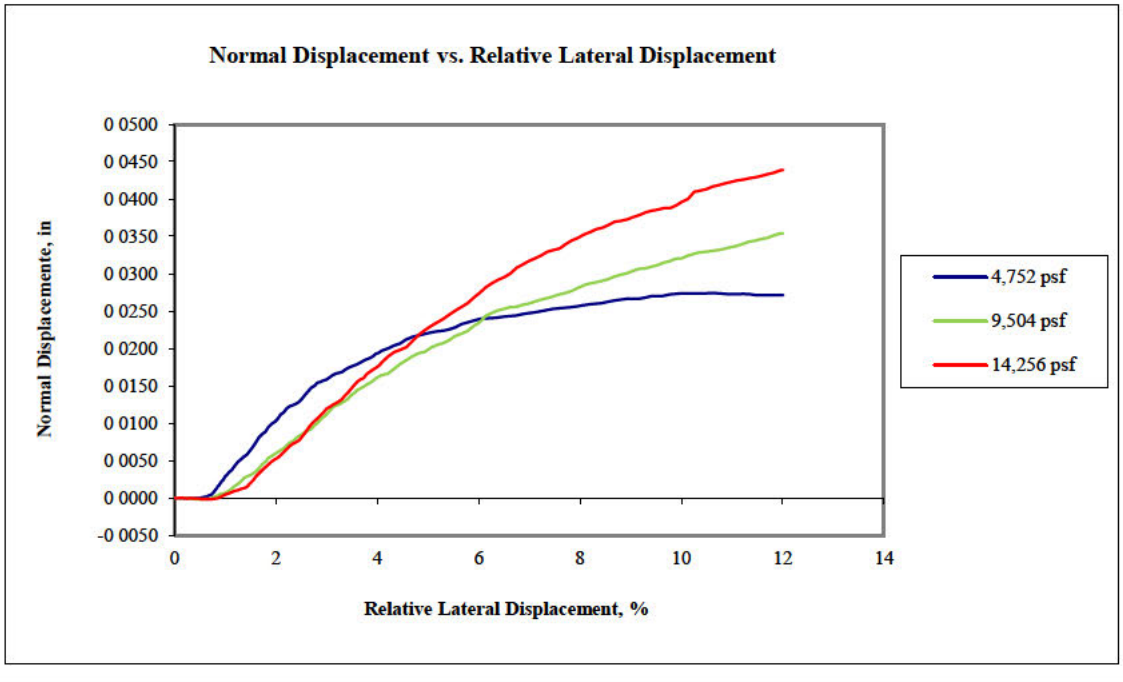
Gravel retained on the #4 sieve removed from sample prior to testing

Specimens were reconstituted at near estimated optimum moisture content using heavy compactive effort

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SAMPLE AND TEST DATA				
Project Number: 18103172.01					
Sample ID: RP-4D @ 38 - 39 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 1

GOLDER

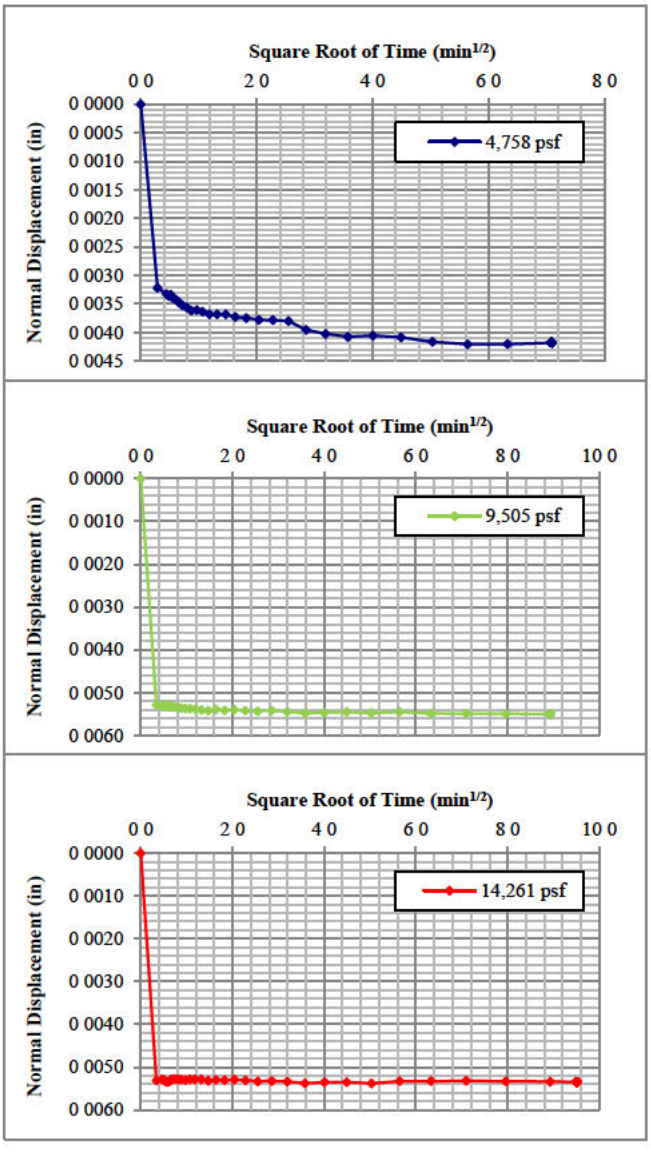




Project Name: FTN/Entergy Independence/AR	ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SHEAR STRESS AND NORMAL DISPLACEMENT PLOTS				
Project Number: 18103172.01					
Sample ID: RP-4D @ 38 - 39 ft.	Technician: MAB	Checked: PRH	Reviewed: MK	Date: 15-Aug-2018	Figure: 2

GOLDER

Consolidation Data Used to Determine Shear Rate



Normal Stress, psf	Normal Displacement, in	Load Duration, min
Point No 1		
137	0 0000	1
2,381	0 0103	15
4,758	0 0042	50
Point No 2		
134	0 0000	1
4,753	0 0146	41
9,505	0 0055	80
Point No 3		
106	0 0000	1
7,137	0 0136	6
14,261	0 0053	90

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT CONSOLIDATION DATA				
Project Number: 18103172.01					
Sample ID: RP-4D @ 38 - 39 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 3

GOLDER

Point No :	1	
Normal Stress =	4,752	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
-109	0 1	0 0000
528	0 2	0 0000
1,362	0 3	0 0000
2,054	0 4	0 0000
2,659	0 5	0 0000
3,053	0 6	0 0001
3,438	0 7	0 0003
3,790	0 8	0 0009
4,060	0 9	0 0020
4,261	1 0	0 0026
4,647	1 5	0 0063
4,596	2 0	0 0101
4,457	2 5	0 0129
4,331	3 0	0 0158
4,137	3 5	0 0176
4,019	4 0	0 0193
3,887	4 5	0 0206
3,854	4 9	0 0219
3,767	5 4	0 0225
3,665	5 9	0 0237
3,585	6 4	0 0241
3,581	7 0	0 0247
3,637	7 5	0 0253
3,650	8 0	0 0256
3,587	8 4	0 0261
3,538	8 9	0 0266
3,536	9 4	0 0270
3,659	9 9	0 0273

Point No :	2	
Normal Stress =	9,504	psf
Shear Rate =	0 0033	in/min

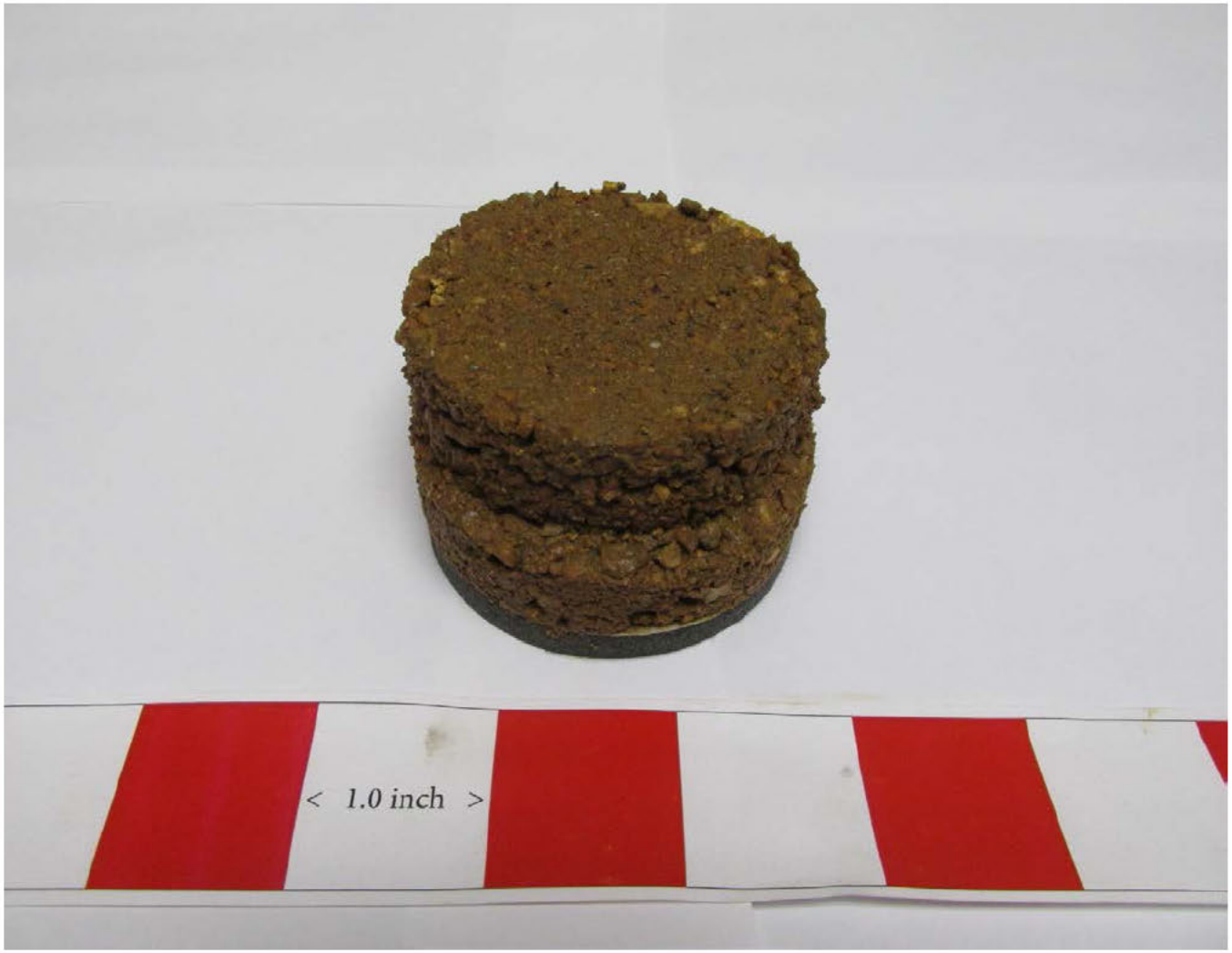
Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
109	0 1	0 0000
1,011	0 2	0 0000
2,262	0 3	-0 0001
3,378	0 4	-0 0001
4,347	0 5	-0 0002
5,048	0 6	-0 0002
5,839	0 7	-0 0002
6,503	0 8	0 0002
7,088	0 9	0 0005
7,440	1 0	0 0006
8,687	1 5	0 0030
8,928	2 0	0 0059
9,150	2 5	0 0083
9,302	2 9	0 0109
9,371	3 5	0 0137
9,501	4 0	0 0160
9,400	4 5	0 0179
9,442	4 9	0 0195
9,451	5 4	0 0211
9,463	5 9	0 0230
9,465	6 4	0 0251
9,147	7 0	0 0260
9,205	7 5	0 0269
9,244	8 0	0 0281
9,245	8 4	0 0290
9,220	8 9	0 0301
9,173	9 4	0 0309
9,096	9 9	0 0320

Point No :	3	
Normal Stress =	14,256	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
213	0 1	0 0000
1,282	0 2	0 0000
2,623	0 3	0 0000
4,184	0 4	-0 0001
5,432	0 5	-0 0001
6,907	0 6	-0 0001
8,174	0 7	-0 0002
9,234	0 8	-0 0001
10,161	0 9	0 0001
10,809	1 0	0 0004
13,066	1 5	0 0019
13,883	2 0	0 0051
14,392	2 5	0 0077
14,532	2 9	0 0115
14,159	3 5	0 0146
14,114	4 0	0 0174
13,813	4 5	0 0198
13,693	4 9	0 0224
13,522	5 4	0 0245
13,180	5 9	0 0268
13,213	6 4	0 0292
13,091	7 0	0 0317
12,969	7 5	0 0331
12,517	8 0	0 0348
12,284	8 4	0 0361
11,758	8 9	0 0372
11,647	9 4	0 0384
11,595	9 9	0 0391

Project Name:	ASTM D3080				
FTN/Entergy Independence/AR	CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number:	SHEAR DATA				
18103172.01					
Sample ID:	**Technician:**	**Checked:**	**Reviewed:**	**Date:**	**Figure:**
RP-4D @ 38 - 39 ft.	MAB	PRH	MK	15-Aug-2018	4

GOLDER



Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 4,752 psf				
Sample ID: RP-4D @ 38 - 39 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 5

GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 9,504 psf				
Sample ID: RP-4D @ 38 - 39 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 6

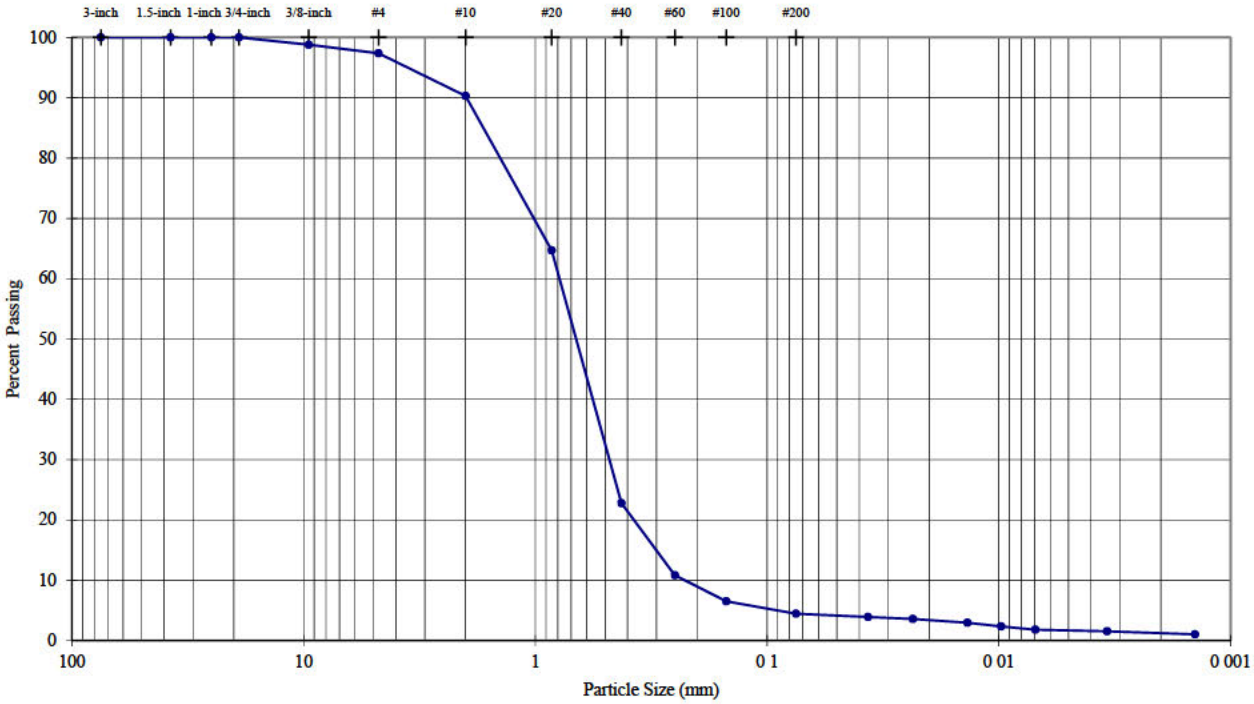
GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 14,256 psf				
Sample ID: RP-4D @ 38 - 39 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 7

August-18 18103172

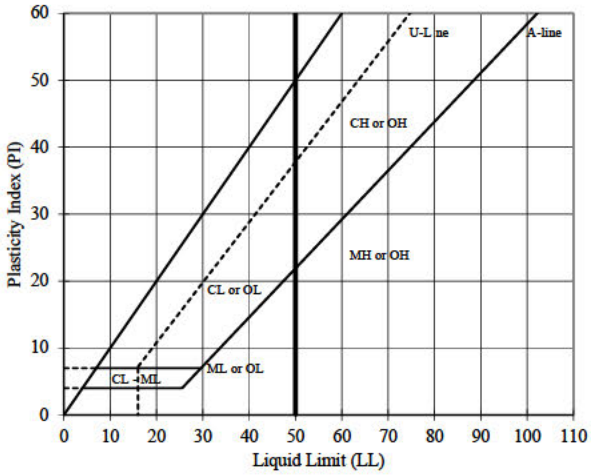
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **FTN/Entergy Independence/AR**
SAMPLE ID: **RP-4D** DEPTH (ft): **64.5-67.4**
TYPE: **Bag**



Sieve Analysis (Initial Separation on No 4 Sieve)

Sieve	Particle Size (mm)	% Passing	Description	Percentage
3-inch	75 0	100.0		
1 5-inch	37 5	100.0	Coarse Gravel	0.00
1-inch	25 0	100.0		
3/4-inch	19 0	100.0		
3/8-inch	9 5	98.8	Fine Gravel	2.62
#4	4 75	97.4		
#10	2 00	90.3	Coarse Sand	7.07
#20	0 850	64.7	Medium Sand	67.51
#40	0 425	22.8		
#60	0 250	10.8	Fine Sand	18.33
#100	0 150	6.5		
#200	0 075	4.5		
Hydrometer Analysis	0 037	3.9	Silt or Clay Fines	4.47
	0 023	3.6		
	0 014	3.0		
	0 010	2.4		
	0 007	1.8		
	0 003	1.6		
	0 001	1.0		



USCS Description (ASTM D 2487):
Poorly graded sand, reddish yellow, moist

LL	PL	PI	SpG
NP	NP	NP	--

As-Received Moisture Content (%): --

USCS Group Symbol: SP

Notes: 0 g of particles up to 19 0 mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling Method A Liquid Limit test performed using mechanical device

TECH	AR
DATE	31-Jul-2018
REVIEW	MB

GOLDER

Boring or Test Pit:	--	Boring or Test Pit:	--	Boring or Test Pit:	--
Sample:	RP-4D	Sample:	RP-4D	Sample:	RP-4D
Depth:	64.5-67.4 ft.	Depth:	64.5-67.4 ft.	Depth:	64.5-67.4 ft.
Point No.:	1	Point No.:	2	Point No.:	3

Initial			**Initial**			**Initial**		
Thickness =	1.187	in	Thickness =	1.193	in	Thickness =	1.189	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Wet Mass =	0.394	lb	Wet Mass =	0.396	lb	Wet Mass =	0.395	lb
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.83	in^3	Volume =	5.86	in^3	Volume =	5.84	in^3
Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)
Dry Mass of Solids =	0.379	lb	Dry Mass of Solids =	0.381	lb	Dry Mass of Solids =	0.381	lb
Moisture Content =	3.8%		Moisture Content =	3.8%		Moisture Content =	3.8%	
Wet Unit Weight =	116.8	pcf	Wet Unit Weight =	116.7	pcf	Wet Unit Weight =	117.0	pcf
Dry Unit Weight =	112.5	pcf	Dry Unit Weight =	112.5	pcf	Dry Unit Weight =	112.7	pcf
Void Ratio =	0.50		Void Ratio =	0.50		Void Ratio =	0.49	
Percent Saturation =	21%		Percent Saturation =	21%		Percent Saturation =	21%	

Pre-Shear			**Pre-Shear**			**Pre-Shear**		
Thickness =	1.165	in	Thickness =	1.168	in	Thickness =	1.161	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.72	in^3	Volume =	5.73	in^3	Volume =	5.70	in^3
Moisture Content =	13.4%		Moisture Content =	13.9%		Moisture Content =	13.0%	
Wet Unit Weight =	130.0	pcf	Wet Unit Weight =	130.8	pcf	Wet Unit Weight =	130.5	pcf
Dry Unit Weight =	114.6	pcf	Dry Unit Weight =	114.9	pcf	Dry Unit Weight =	115.5	pcf
Void Ratio =	0.47		Void Ratio =	0.46		Void Ratio =	0.46	
Percent Saturation =	77%		Percent Saturation =	81%		Percent Saturation =	77%	

Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min
Normal Stress =	8,208	psf	Normal Stress =	16,416	psf	Normal Stress =	24,624	psf

Notes:

USCS description (ASTM D2487): Poorly graded sand, reddish yellow, moist

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

Percent finer: 3/4 in. = 100% No. 4 = 97% No. 200 = 5% (ASTM D422, refer to separate report)

Specimen type: [ ] Intact [X] Reconstituted

Inundation: At seating load

Apparatus: 2.5 -inch nominal diameter box, GeoTac automated test system, GeoJac loading system

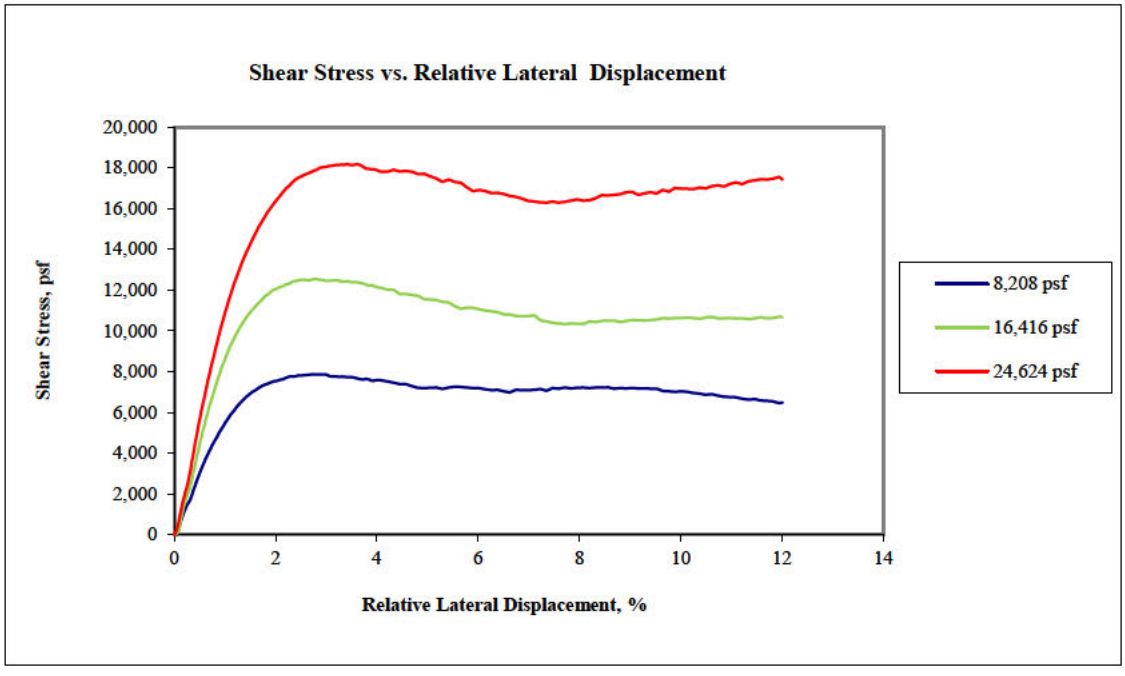
Gravel retained on the #4 sieve removed from sample prior to testing

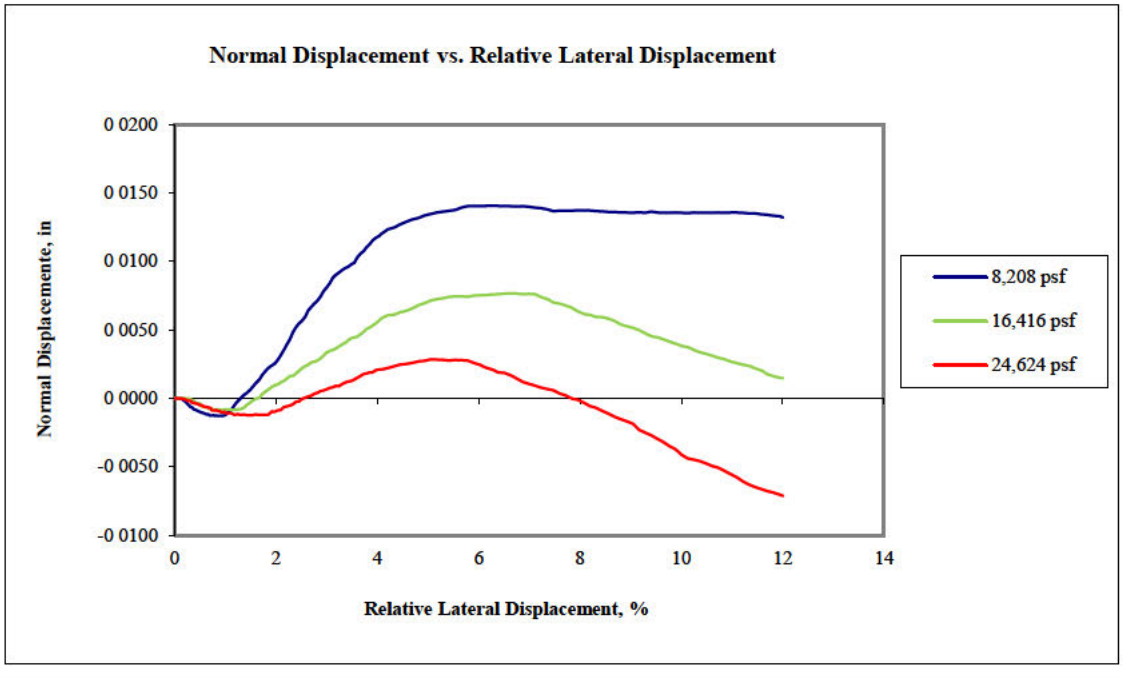
Specimens were reconstituted at near estimated optimum moisture content using heavy compactive effort

No photo available for Point 3 specimen

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SAMPLE AND TEST DATA				
Project Number: 18103172.01					
Sample ID: RP-4D @ 64.5 - 67.4 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 1

GOLDER

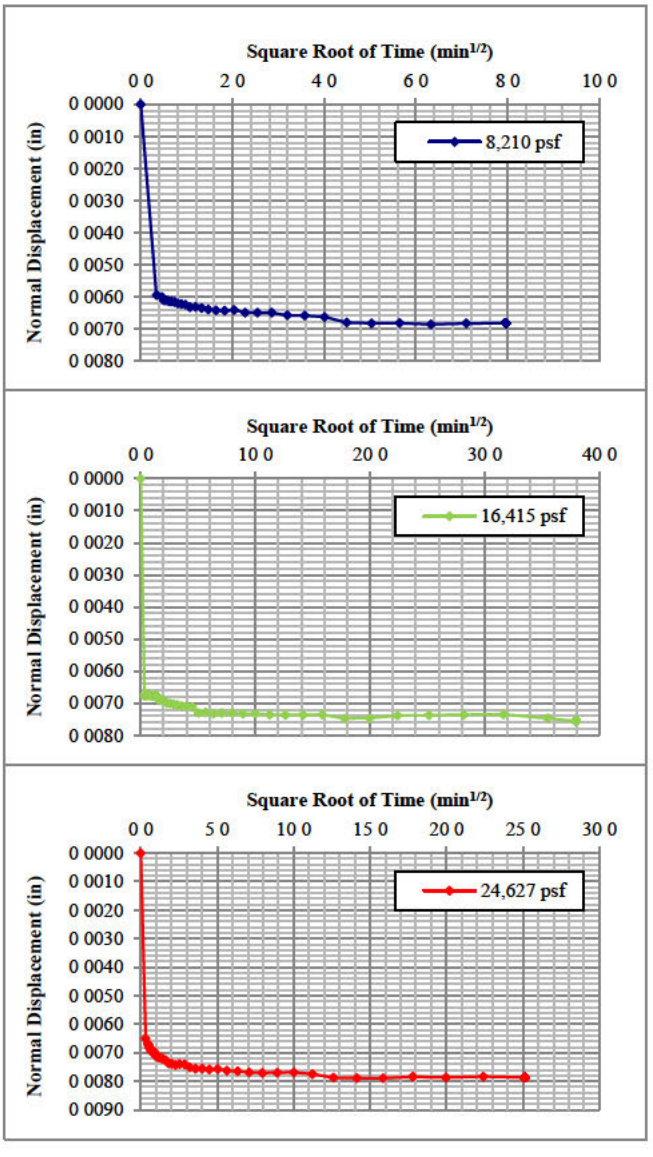




Project Name: FTN/Entergy Independence/AR	ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SHEAR STRESS AND NORMAL DISPLACEMENT PLOTS				
Project Number: 18103172.01					
Sample ID: RP-4D @ 64.5 - 67.4 ft.	Technician: MAB	Checked: PRH	Reviewed: MK	Date: 15-Aug-2018	Figure: 2

GOLDER

Consolidation Data Used to Determine Shear Rate



Normal Stress, psf	Normal Displacement, in	Load Duration, min
Point No 1		
103	0 0001	4
4,114	0 0152	15
8,210	0 0068	63
Point No 2		
118	0 0001	2
8,206	0 0173	90
16,415	0 0075	1,440
Point No 3		
97	0 0000	9
12,313	0 0206	90
24,627	0 0079	631

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT CONSOLIDATION DATA				
Project Number: 18103172.01					
Sample ID: RP-4D @ 64.5 - 67.4 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 3

GOLDER

Point No :	1	
Normal Stress =	8,208	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
235	0 1	0 0000
1,048	0 2	-0 0002
1,596	0 3	-0 0006
2,277	0 4	-0 0008
2,995	0 5	-0 0010
3,504	0 6	-0 0011
4,059	0 7	-0 0012
4,568	0 8	-0 0013
5,034	0 9	-0 0013
5,372	1 0	-0 0012
6,891	1 5	0 0006
7,534	2 0	0 0025
7,808	2 5	0 0055
7,856	2 9	0 0078
7,727	3 5	0 0098
7,577	4 0	0 0117
7,389	4 5	0 0127
7,195	4 9	0 0133
7,225	5 4	0 0137
7,193	5 9	0 0140
7,107	6 4	0 0140
7,095	7 0	0 0140
7,194	7 5	0 0137
7,205	8 0	0 0137
7,221	8 4	0 0136
7,177	8 9	0 0136
7,164	9 4	0 0136
7,012	9 9	0 0136

Point No :	2	
Normal Stress =	16,416	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
120	0 1	0 0000
1,364	0 2	0 0000
2,154	0 3	0 0000
3,224	0 4	-0 0002
4,151	0 5	-0 0004
5,243	0 6	-0 0006
6,229	0 7	-0 0008
7,078	0 8	-0 0008
7,890	0 9	-0 0009
8,468	1 0	-0 0009
10,865	1 5	-0 0003
12,034	2 0	0 0009
12,460	2 5	0 0020
12,481	2 9	0 0031
12,401	3 5	0 0044
12,165	4 0	0 0054
11,796	4 5	0 0063
11,553	4 9	0 0069
11,397	5 4	0 0074
11,123	5 9	0 0075
10,912	6 4	0 0076
10,722	7 0	0 0076
10,392	7 5	0 0070
10,349	8 0	0 0063
10,486	8 4	0 0059
10,486	8 9	0 0053
10,526	9 4	0 0045
10,627	9 9	0 0040

Point No :	3	
Normal Stress =	24,624	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
528	0 1	0 0000
1,739	0 2	-0 0001
2,741	0 3	-0 0002
4,173	0 4	-0 0004
5,576	0 5	-0 0005
6,576	0 6	-0 0006
7,756	0 7	-0 0007
8,859	0 8	-0 0009
9,893	0 9	-0 0010
10,663	1 0	-0 0010
14,181	1 5	-0 0012
16,255	2 0	-0 0010
17,511	2 5	-0 0002
18,047	3 0	0 0006
18,120	3 5	0 0013
17,917	4 0	0 0020
17,815	4 5	0 0025
17,699	4 9	0 0027
17,421	5 4	0 0028
16,854	5 9	0 0026
16,772	6 4	0 0019
16,376	7 0	0 0010
16,339	7 5	0 0006
16,436	8 0	-0 0001
16,652	8 4	-0 0009
16,792	8 9	-0 0017
16,796	9 4	-0 0027
17,001	9 9	-0 0037

Project Name:	ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SHEAR DATA				
FTN/Entergy Independence/AR					
Project Number: 18103172.01					
Sample ID:	Technician:	Checked:	Reviewed:	Date:	Figure:
RP-4D @ 64.5 - 67.4 ft.	MAB	PRH	MK	15-Aug-2018	4

GOLDER

Project Name: FTN/Entergy Independence/AR	ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SPECIMEN PHOTOGRAPH - 8,208 psf				
Project Number: 18103172.01					
Sample ID: RP-4D @ 64.5 - 67.4 ft.	Technician: MAB	Checked: PRH	Reviewed: MK	Date: 15-Aug-2018	Figure: 5

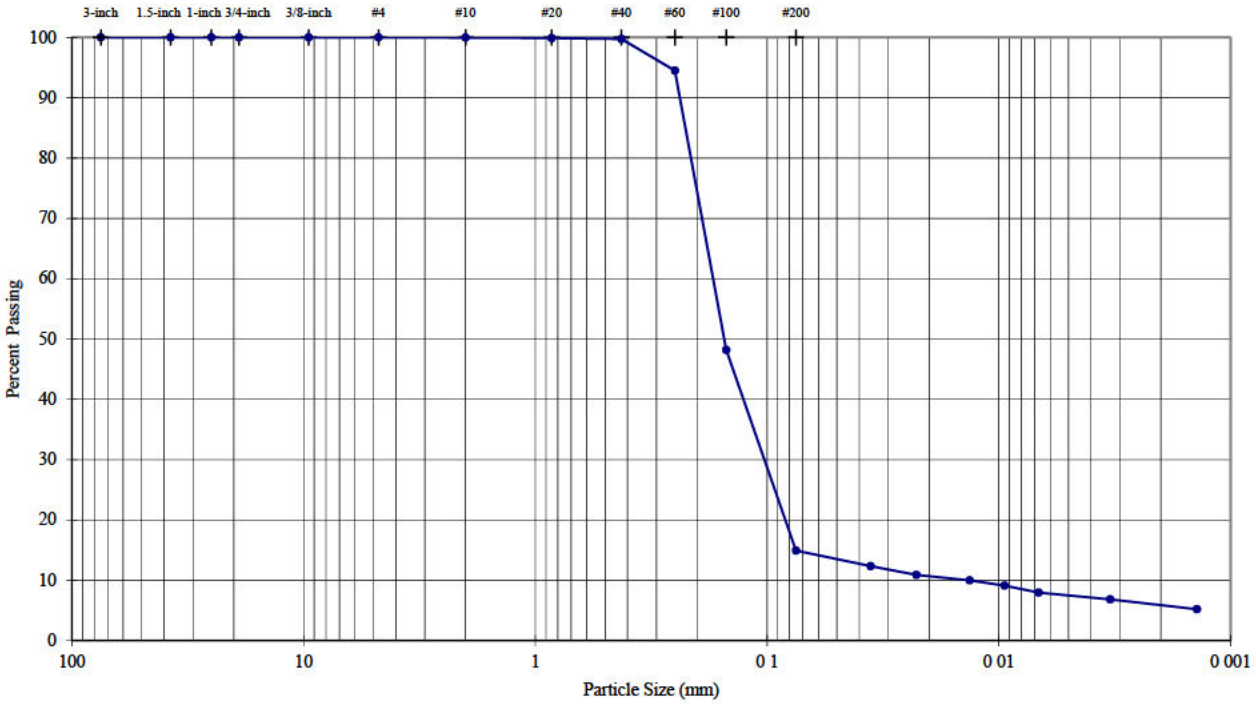
GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 16,416 psf				
Sample ID: RP-4D @ 64.5 - 67.4 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 6

August-18 18103172

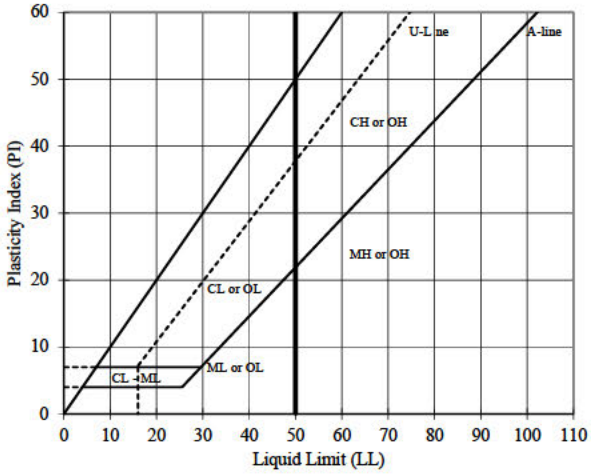
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **FTN/Entergy Independence/AR**
SAMPLE ID: **RP-4D** DEPTH (ft): **76.2-78**
TYPE: **Bag**



Sieve	Particle Size (mm)	% Passing	Description	Percentage
3-inch	75 0	100.0		
1 5-inch	37 5	100.0		
1-inch	25 0	100.0	Coarse Gravel	0.00
3/4-inch	19 0	100.0		
3/8-inch	9 5	100.0	Fine Gravel	0.00
#4	4 75	100.0		
#10	2 00	100.0	Coarse Sand	0.02
#20	0 850	99.9	Medium Sand	0.24
#40	0 425	99.7		
#60	0 250	94.5	Fine Sand	84.82
#100	0 150	48.2		
#200	0 075	14.9		
	0 036	12.3	Silt or Clay Fines	14.92
	0 023	10.9		
	0 013	10.0		
	0 009	9.1		
	0 007	8.0		
	0 003	6.8		
	0 001	5.2		

Sieve Analysis (Initial Separation on No 4 Sieve)
Hydrometer Analysis



USCS Description (ASTM D 2487):
Silty sand, dark grayish brown, moist

LL	PL	PI	SpG
NP	NP	NP	--

As-Received Moisture Content (%): --

USCS Group Symbol: SM

Notes: 0 g of particles up to 4 75 mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling Method A Liquid Limit test performed using mechanical device

TECH	AR
DATE	31-Jul-2018
REVIEW	MB

GOLDER

Boring or Test Pit:	--	Boring or Test Pit:	--	Boring or Test Pit:	--
Sample:	RP-4D	Sample:	RP-4D	Sample:	RP-4D
Depth:	76.2-78 ft.	Depth:	76.2-78 ft.	Depth:	76.2-78 ft.
Point No.:	1	Point No.:	2	Point No.:	3

Initial			**Initial**			**Initial**		
Thickness =	1.187	in	Thickness =	1.191	in	Thickness =	1.188	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Wet Mass =	0.394	lb	Wet Mass =	0.393	lb	Wet Mass =	0.394	lb
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.83	in^3	Volume =	5.85	in^3	Volume =	5.83	in^3
Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)
Dry Mass of Solids =	0.362	lb	Dry Mass of Solids =	0.361	lb	Dry Mass of Solids =	0.362	lb
Moisture Content =	8.7%		Moisture Content =	8.9%		Moisture Content =	9.1%	
Wet Unit Weight =	116.7	pcf	Wet Unit Weight =	116.2	pcf	Wet Unit Weight =	116.9	pcf
Dry Unit Weight =	107.4	pcf	Dry Unit Weight =	106.7	pcf	Dry Unit Weight =	107.1	pcf
Void Ratio =	0.57		Void Ratio =	0.58		Void Ratio =	0.57	
Percent Saturation =	41%		Percent Saturation =	42%		Percent Saturation =	43%	

Pre-Shear			**Pre-Shear**			**Pre-Shear**		
Thickness =	1.168	in	Thickness =	1.158	in	Thickness =	1.162	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.73	in^3	Volume =	5.68	in^3	Volume =	5.71	in^3
Moisture Content =	19.9%		Moisture Content =	20.3%		Moisture Content =	19.6%	
Wet Unit Weight =	130.8	pcf	Wet Unit Weight =	132.1	pcf	Wet Unit Weight =	131.0	pcf
Dry Unit Weight =	109.1	pcf	Dry Unit Weight =	109.8	pcf	Dry Unit Weight =	109.5	pcf
Void Ratio =	0.54		Void Ratio =	0.53		Void Ratio =	0.54	
Percent Saturation =	99%		Percent Saturation =	103%		Percent Saturation =	99%	

Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min
Normal Stress =	9,360	psf	Normal Stress =	18,720	psf	Normal Stress =	28,080	psf

Notes:

USCS description (ASTM D2487): Silty sand, dark grayish brown, moist

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

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 15% (ASTM D422, refer to separate report)

Specimen type: [ ] Intact [X] Reconstituted

Inundation: At seating load

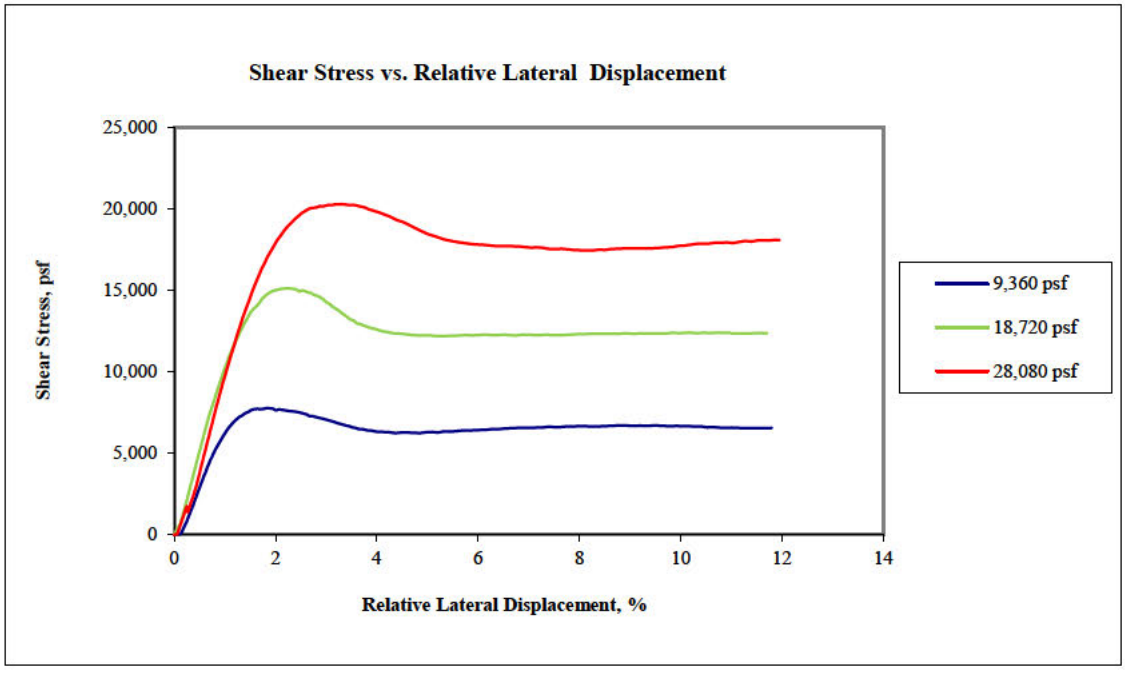
Apparatus: 2.5 -inch nominal diameter box, GeoTac automated test system, GeoJac loading system

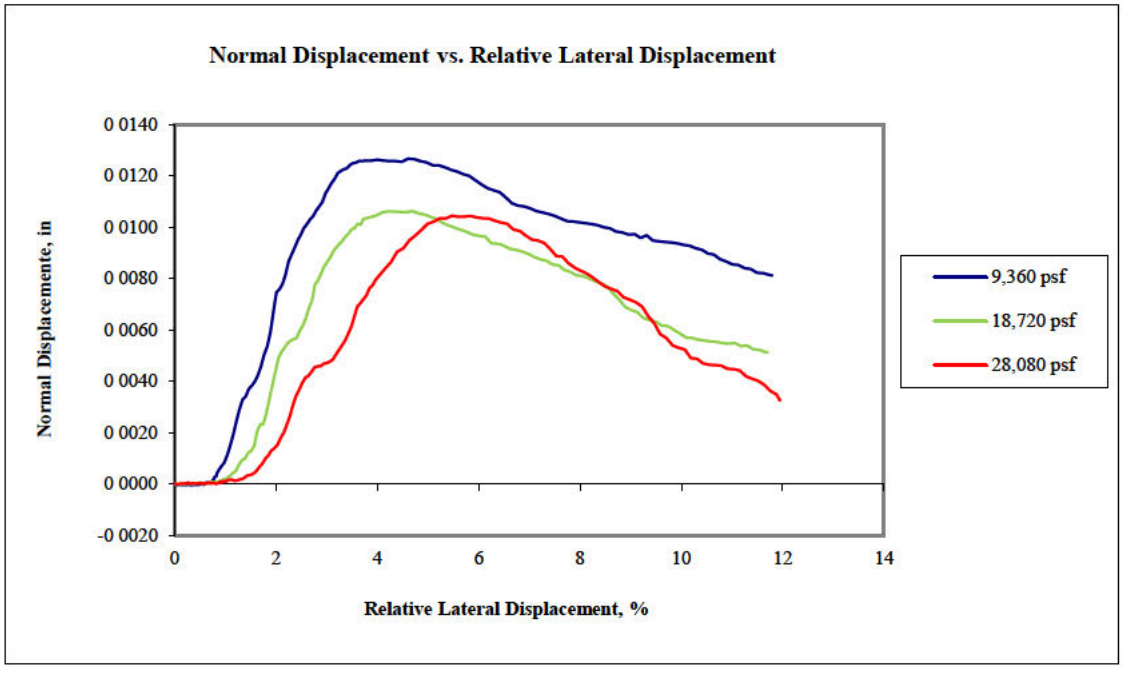
Gravel retained on the #4 sieve removed from sample prior to testing

Specimens were reconstituted at near estimated optimum moisture content using heavy compactive effort

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SAMPLE AND TEST DATA				
Project Number: 18103172.01					
Sample ID: RP-4D @ 76.2 - 78 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 1

GOLDER

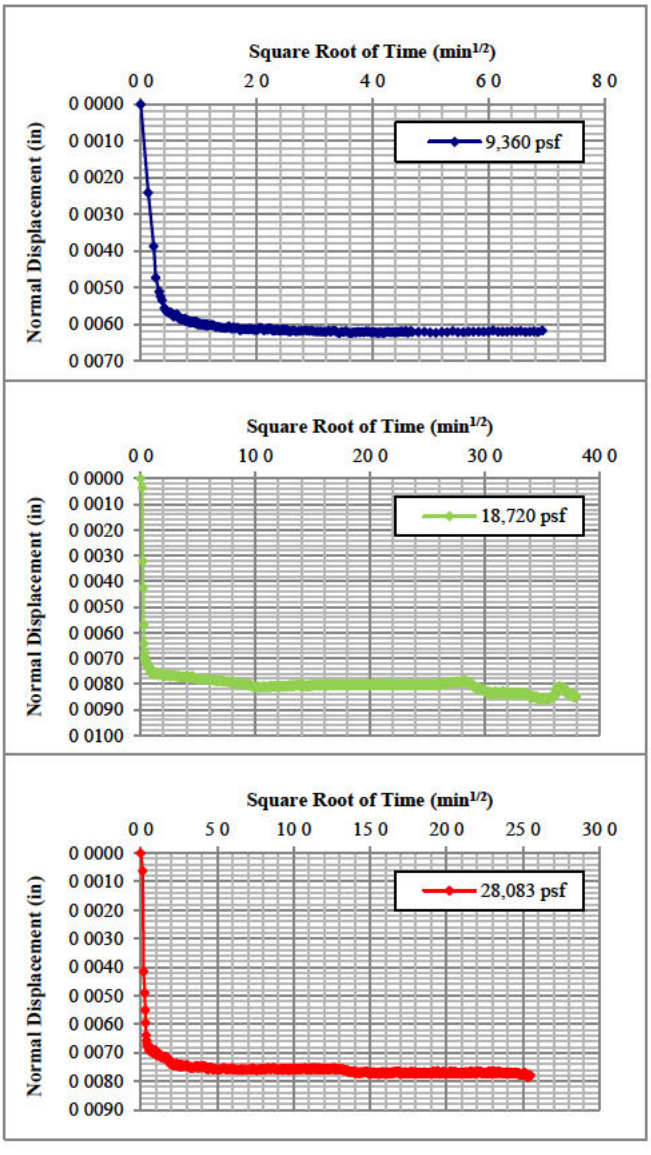




Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SHEAR STRESS AND NORMAL DISPLACEMENT PLOTS					
Project Number: 18103172.01						
Sample ID: RP-4D @ 76.2 - 78 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 2	

GOLDER

Consolidation Data Used to Determine Shear Rate



Normal Stress, psf	Normal Displacement, in	Load Duration, min
Point No 1		
101	-0 0001	5
2,161	0 0092	3
4,322	0 0037	3
9,360	0 0062	48
Point No 2		
112	0 0001	3
4,325	0 0195	90
8,640	0 0052	90
18,720	0 0085	1,440
Point No 3		
99	-0 0006	38
3,598	0 0088	90
7,202	0 0041	90
14,394	0 0056	90
28,083	0 0078	649

Project Name:	ASTM D3080				
FTN/Entergy Independence/AR	CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number:	CONSOLIDATION DATA				
18103172.01					
Sample ID:	**Technician:**	**Checked:**	**Reviewed:**	**Date:**	**Figure:**
RP-4D @ 76.2 - 78 ft.	MAB	PRH	MK	15-Aug-2018	3

GOLDER

Point No :	1	
Normal Stress =	9,360	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
30	0 1	0 0000
423	0 2	0 0000
1,164	0 3	0 0000
2,012	0 4	0 0000
2,707	0 5	0 0000
3,574	0 6	0 0000
4,388	0 7	0 0000
5,083	0 8	0 0003
5,448	0 9	0 0005
6,087	1 0	0 0008
7,523	1 5	0 0037
7,726	1 9	0 0067
7,490	2 5	0 0097
7,070	3 0	0 0113
6,649	3 5	0 0124
6,383	3 9	0 0126
6,260	4 5	0 0125
6,275	5 0	0 0125
6,324	5 5	0 0122
6,407	5 9	0 0118
6,478	6 4	0 0113
6,547	6 9	0 0108
6,617	7 4	0 0105
6,649	8 0	0 0102
6,653	8 5	0 0100
6,691	9 0	0 0097
6,695	9 4	0 0095
6,667	9 9	0 0094

Point No :	2	
Normal Stress =	18,720	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
491	0 1	0 0000
1,303	0 2	0 0000
2,502	0 3	0 0000
3,695	0 4	0 0000
4,892	0 5	0 0000
6,098	0 6	0 0000
7,215	0 7	0 0000
8,222	0 8	0 0001
8,796	0 8	0 0001
9,913	1 0	0 0002
13,285	1 4	0 0012
14,980	2 0	0 0043
14,916	2 5	0 0060
14,419	2 9	0 0084
13,177	3 5	0 0099
12,604	4 0	0 0104
12,336	4 4	0 0106
12,226	4 9	0 0105
12,189	5 4	0 0101
12,222	5 9	0 0097
12,252	6 5	0 0093
12,266	7 0	0 0090
12,240	7 5	0 0085
12,287	7 9	0 0081
12,330	8 4	0 0078
12,349	8 9	0 0069
12,347	9 5	0 0063
12,353	10 0	0 0058

Point No :	3	
Normal Stress =	28,080	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
223	0 1	0 0000
1,186	0 2	0 0000
1,584	0 3	0 0000
2,554	0 4	0 0000
3,507	0 5	0 0000
4,809	0 6	0 0000
6,072	0 7	0 0001
7,358	0 8	0 0000
8,582	0 9	0 0001
9,512	1 0	0 0001
14,438	1 5	0 0003
17,731	2 0	0 0014
19,548	2 5	0 0037
20,126	2 9	0 0047
20,217	3 5	0 0061
19,831	4 0	0 0080
19,296	4 4	0 0090
18,451	5 0	0 0101
18,006	5 5	0 0104
17,791	6 0	0 0104
17,711	6 4	0 0102
17,640	6 9	0 0097
17,504	7 4	0 0091
17,453	7 9	0 0084
17,463	8 5	0 0077
17,546	9 0	0 0072
17,570	9 5	0 0063
17,701	9 9	0 0053

Project Name:	ASTM D3080				
FTN/Entergy Independence/AR	CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number:	SHEAR DATA				
18103172.01					
Sample ID:	**Technician:**	**Checked:**	**Reviewed:**	**Date:**	**Figure:**
RP-4D @ 76.2 - 78 ft.	MAB	PRH	MK	15-Aug-2018	4

GOLDER

Project Name: FTN/Entergy Independence/AR	ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SPECIMEN PHOTOGRAPH - 9,360 psf				
Project Number: 18103172.01					
Sample ID: RP-4D @ 76.2 - 78 ft.	Technician: MAB	Checked: PRH	Reviewed: MK	Date: 15-Aug-2018	Figure: 5

GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 18,720 psf				
Sample ID: RP-4D @ 76.2 - 78 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 6

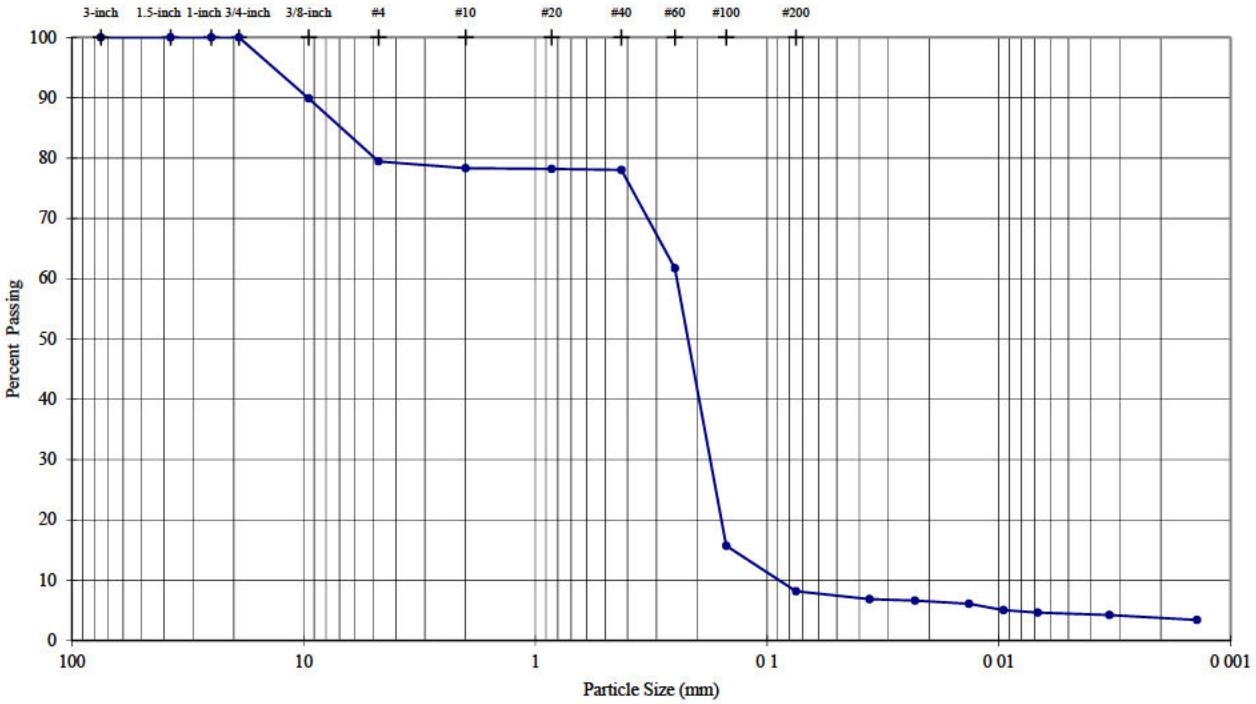
GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 28,080 psf				
Sample ID: RP-4D @ 76.2 - 78 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 7

August-18 18103172

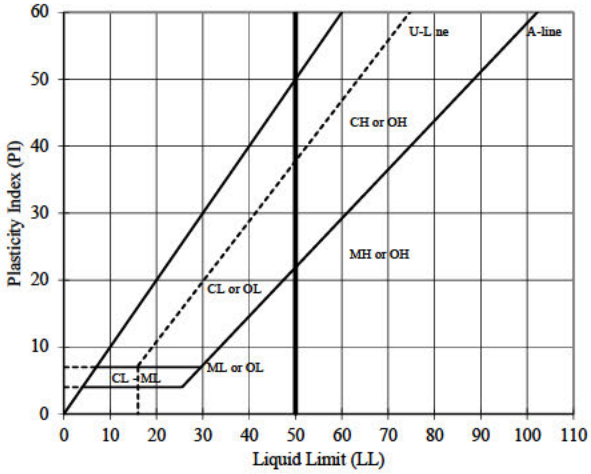
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **FTN/Entergy Independence/AR**
SAMPLE ID: **RP-5** DEPTH (ft): **27-28**
TYPE: **Bag**



Sieve Analysis (Initial Separation on No 4 Sieve)

Sieve	Particle Size (mm)	% Passing	Description	Percentage
3-inch	75 0	100.0		
1 5-inch	37 5	100.0	Coarse Gravel	0.00
1-inch	25 0	100.0		
3/4-inch	19 0	100.0		
3/8-inch	9 5	89.9	Fine Gravel	20.56
#4	4 75	79.4		
#10	2 00	78.3	Coarse Sand	1.12
#20	0 850	78.2	Medium Sand	0.29
#40	0 425	78.0		
#60	0 250	61.7	Fine Sand	69.84
#100	0 150	15.7		
#200	0 075	8.2		
Hydrometer Analysis	0 036	6.9	Silt or Clay Fines	8.20
	0 023	6.6		
	0 013	6.1		
	0 010	5.1		
	0 007	4.7		
	0 003	4.2		
	0 001	3.4		



USCS Description (ASTM D 2487):

Poorly graded sand with silt and gravel, dark yellowish brown, moist

LL	PL	PI	SpG
NP	NP	NP	--

As-Received Moisture Content (%): --

USCS Group Symbol: SP-SM

Notes: 0 g of particles up to 19 0 mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling Method A Liquid Limit test performed using mechanical device

TECH	TE/AR
DATE	1-Aug-2018
REVIEW	MB

GOLDER

Boring or Test Pit: --	Boring or Test Pit: --	Boring or Test Pit: --
Sample: RP-5	Sample: RP-5	Sample: RP-5
Depth: 27-28 ft.	Depth: 27-28 ft.	Depth: 27-28 ft.
Point No.: 1	Point No.: 2	Point No.: 3

Initial			**Initial**			**Initial**		
Thickness =	1.169	in	Thickness =	1.170	in	Thickness =	1.185	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Wet Mass =	0.390	lb	Wet Mass =	0.390	lb	Wet Mass =	0.395	lb
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.74	in^3	Volume =	5.74	in^3	Volume =	5.82	in^3
Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)
Dry Mass of Solids =	0.369	lb	Dry Mass of Solids =	0.369	lb	Dry Mass of Solids =	0.373	lb
Moisture Content =	5.6%		Moisture Content =	5.7%		Moisture Content =	5.7%	
Wet Unit Weight =	117.4	pcf	Wet Unit Weight =	117.3	pcf	Wet Unit Weight =	117.2	pcf
Dry Unit Weight =	111.1	pcf	Dry Unit Weight =	111.0	pcf	Dry Unit Weight =	110.9	pcf
Void Ratio =	0.51		Void Ratio =	0.52		Void Ratio =	0.52	
Percent Saturation =	29%		Percent Saturation =	30%		Percent Saturation =	30%	

Pre-Shear			**Pre-Shear**			**Pre-Shear**		
Thickness =	1.156	in	Thickness =	1.155	in	Thickness =	1.172	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.68	in^3	Volume =	5.67	in^3	Volume =	5.75	in^3
Moisture Content =	16.7%		Moisture Content =	17.9%		Moisture Content =	16.9%	
Wet Unit Weight =	131.1	pcf	Wet Unit Weight =	132.5	pcf	Wet Unit Weight =	131.1	pcf
Dry Unit Weight =	112.4	pcf	Dry Unit Weight =	112.4	pcf	Dry Unit Weight =	112.2	pcf
Void Ratio =	0.50		Void Ratio =	0.50		Void Ratio =	0.50	
Percent Saturation =	91%		Percent Saturation =	97%		Percent Saturation =	91%	

Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min
Normal Stress =	3,312	psf	Normal Stress =	6,624	psf	Normal Stress =	9,936	psf

Notes:

USCS description (ASTM D2487): Poorly graded sand with silt and gravel, dark yellowish brown, moist

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

Percent finer: 3/4 in. = 100% No. 4 = 79% No. 200 = 8% (ASTM D422, refer to separate report)

Specimen type: [ ] Intact [X] Reconstituted

Inundation: At seating load

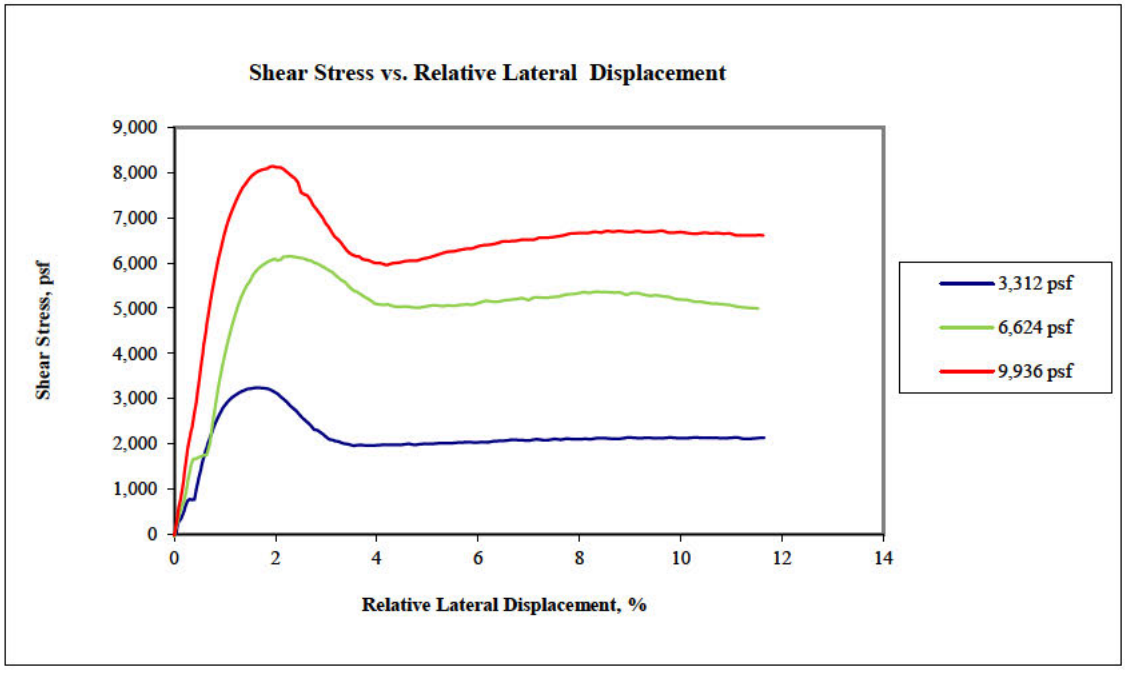
Apparatus: 2.5 -inch nominal diameter box, GeoTac automated test system, GeoJac loading system

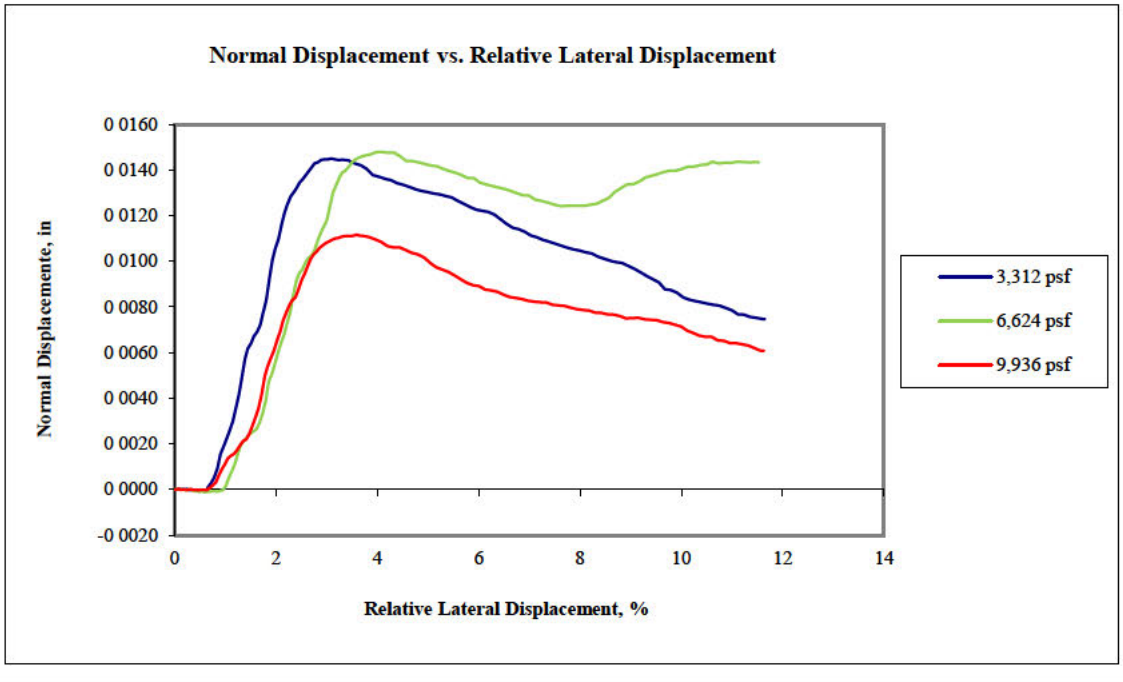
Gravel retained on the #4 sieve removed from sample prior to testing

Specimens were reconstituted at near estimated optimum moisture content using heavy compactive effort

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SAMPLE AND TEST DATA				
Project Number: 18103172.01					
Sample ID: RP-5 @ 27 - 28 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 1

GOLDER

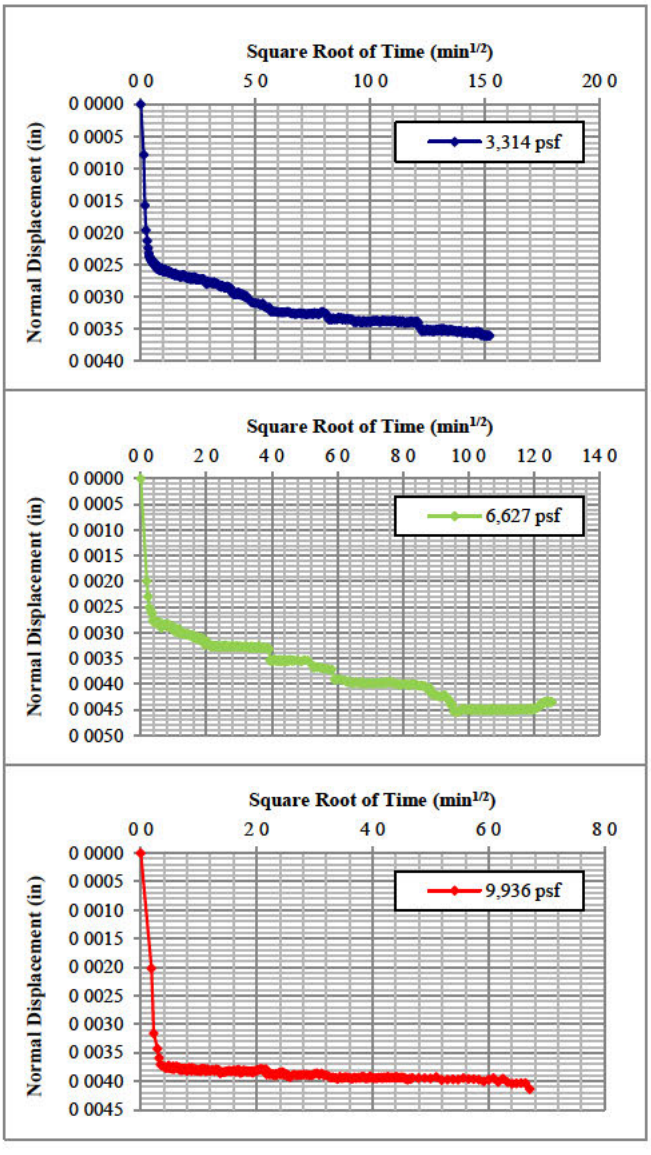




Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SHEAR STRESS AND NORMAL DISPLACEMENT PLOTS				
Project Number: 18103172.01					
Sample ID: RP-5 @ 27 - 28 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 2

GOLDER

Consolidation Data Used to Determine Shear Rate



Normal Stress, psf	Normal Displacement, in	Load Duration, min
Point No 1		
124	0 0000	2
1,653	0 0091	7
3,314	0 0036	231
Point No 2		
103	0 0002	1
3,311	0 0102	5
6,627	0 0043	158
Point No 3		
97	0 0001	2
4,969	0 0089	8
9,936	0 0041	45

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT CONSOLIDATION DATA				
Project Number: 18103172.01					
Sample ID: RP-5 @ 27 - 28 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 3

GOLDER

Point No :	1	
Normal Stress =	3,312	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
275	0 1	0 0000
468	0 2	0 0000
762	0 3	0 0000
777	0 4	0 0000
1,226	0 5	-0 0001
1,704	0 6	-0 0001
2,007	0 7	0 0001
2,381	0 8	0 0005
2,541	0 8	0 0009
2,803	1 0	0 0019
3,216	1 4	0 0062
3,144	2 0	0 0106
2,654	2 5	0 0135
2,211	2 9	0 0145
1,981	3 5	0 0143
1,969	3 9	0 0138
1,983	4 4	0 0134
2,007	5 0	0 0130
2,022	5 5	0 0128
2,035	6 0	0 0123
2,073	6 4	0 0118
2,083	6 9	0 0113
2,090	7 4	0 0109
2,111	8 0	0 0105
2,137	8 5	0 0101
2,144	9 0	0 0098
2,134	9 4	0 0092
2,137	9 9	0 0086

Point No :	2	
Normal Stress =	6,624	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
364	0 1	0 0000
729	0 2	0 0000
1,303	0 3	0 0000
1,676	0 4	-0 0001
1,699	0 5	-0 0001
1,752	0 6	-0 0001
1,768	0 6	-0 0001
2,501	0 8	-0 0001
3,335	0 9	-0 0001
3,701	0 9	0 0000
5,593	1 5	0 0025
6,086	2 0	0 0055
6,113	2 5	0 0095
5,907	2 9	0 0115
5,435	3 5	0 0143
5,093	4 0	0 0148
5,028	4 5	0 0146
5,033	4 9	0 0143
5,062	5 4	0 0140
5,074	5 9	0 0136
5,141	6 4	0 0132
5,178	7 0	0 0129
5,244	7 5	0 0125
5,322	8 0	0 0124
5,356	8 4	0 0126
5,293	8 9	0 0134
5,272	9 4	0 0137
5,202	9 9	0 0140

Point No :	3	
Normal Stress =	9,936	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
540	0 1	0 0000
1,224	0 2	0 0000
2,053	0 3	0 0000
2,658	0 4	0 0000
3,286	0 5	0 0000
4,183	0 6	0 0000
4,971	0 7	0 0001
5,360	0 8	0 0002
6,084	0 9	0 0006
6,641	1 0	0 0011
7,848	1 5	0 0025
8,131	2 0	0 0061
7,772	2 4	0 0088
6,877	3 0	0 0108
6,206	3 5	0 0111
5,996	4 0	0 0110
6,001	4 4	0 0106
6,094	4 9	0 0102
6,243	5 4	0 0095
6,317	5 9	0 0089
6,472	6 5	0 0085
6,513	7 0	0 0083
6,563	7 5	0 0081
6,652	7 9	0 0079
6,668	8 4	0 0077
6,685	8 9	0 0075
6,677	9 4	0 0074
6,677	10 0	0 0071

Project Name:	ASTM D3080				
FTN/Entergy Independence/AR	CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number:	SHEAR DATA				
18103172.01					
Sample ID:	**Technician:**	**Checked:**	**Reviewed:**	**Date:**	**Figure:**
RP-5 @ 27 - 28 ft.	MAB	PRH	MK	15-Aug-2018	4

GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SPECIMEN PHOTOGRAPH - 3,312 psf				
Project Number: 18103172.01					
Sample ID: RP-5 @ 27 - 28 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 5

GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 6,624 psf				
Sample ID: RP-5 @ 27 - 28 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 6

GOLDER

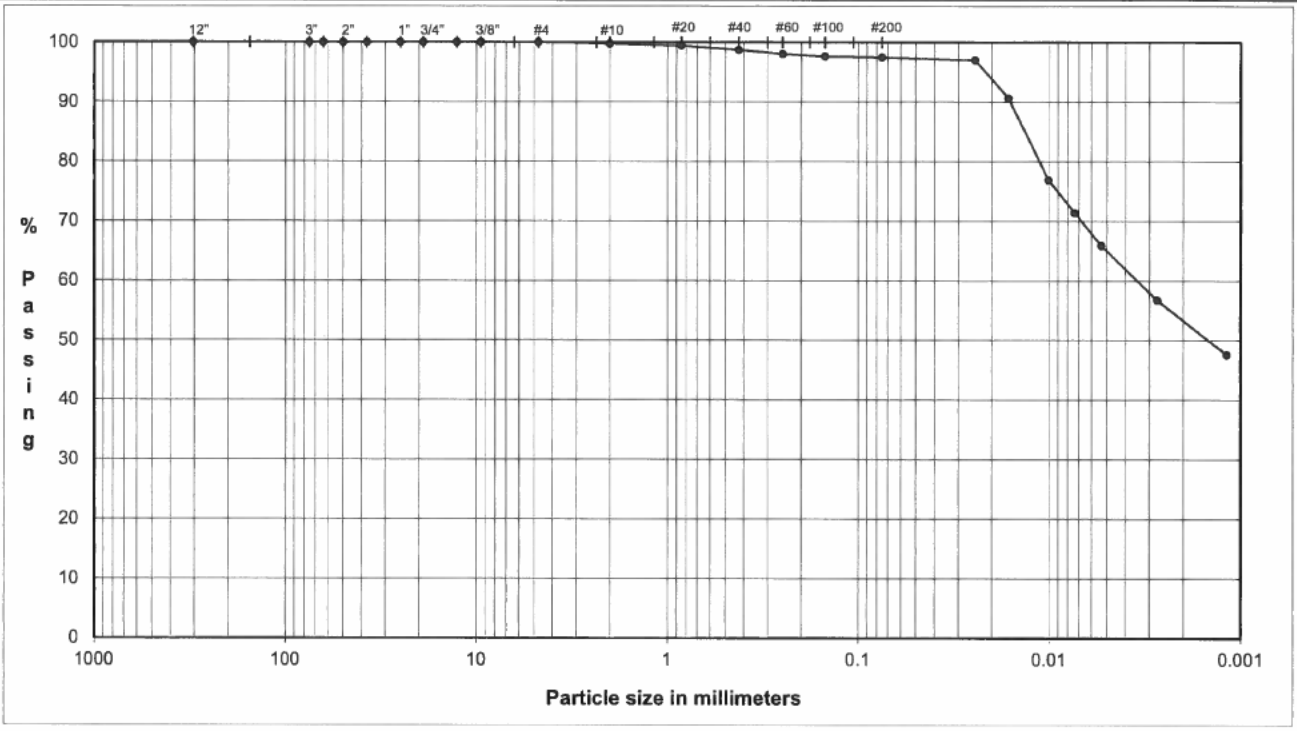
Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 9,936 psf				
Sample ID: RP-5 @ 27 - 28 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 7

JULY 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **RP-6** - Depth: **30.0-33.0'**
TYPE: **Bag**



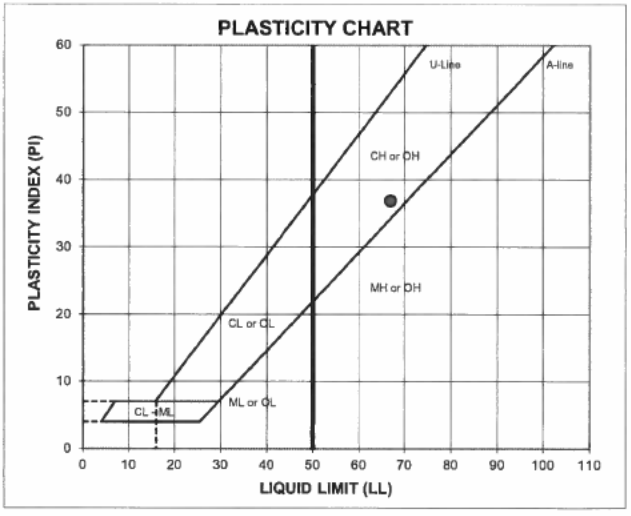
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	**99.7**	Coarse Sand	**0.3**
#20	0.85	**99.5**		
#40	0.43	**98.7**	Medium Sand	**1.0**
#60	0.25	**98.0**		
#100	0.15	**97.7**		
#200	0.075	**97.5**	Fine Sand	**1.3**

Hydrometer Analysis

(mm)	%Finer		
0.025	**97.0**		
0.016	**90.6**		
0.010	**76.9**	Fines	
0.0074	**71.4**	Silt or Clay	**97.5**
0.0053	**65.9**		
0.0027	**56.7**		
0.0012	**47.6**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
46.5	**67**	**30**	**37**	**0.45**

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

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

USCS: CH

TECH	TJ/HH/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

JULY 2018

18103172

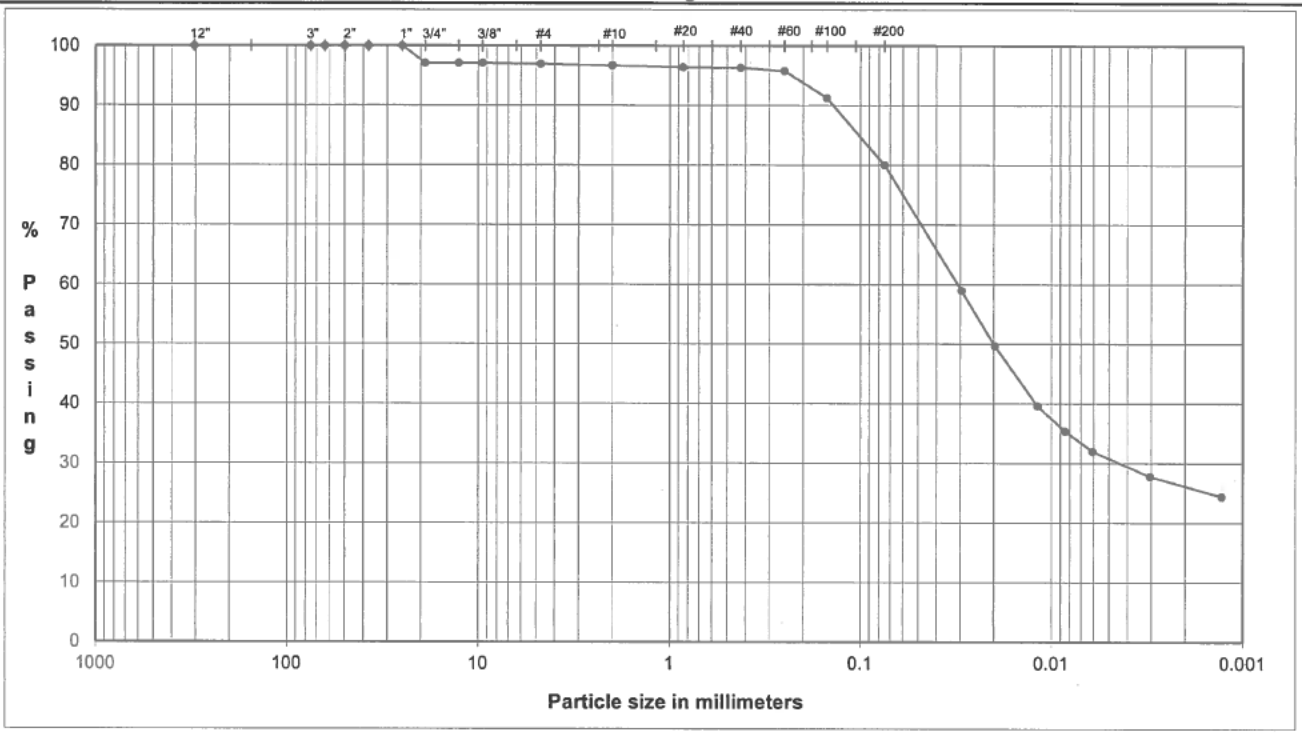
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **RP-7** - Depth: **36.0-38.0'**

TYPE: **Bag**



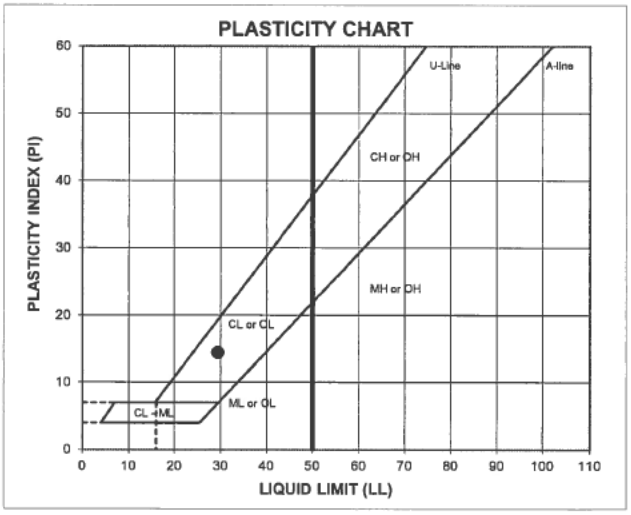
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

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	97.1	Coarse Gravel	2.9
0.50"	12.7	97.1		
0.375"	9.5	97.1		
#4	4.8	96.9	Fine Gravel	0.2
#10	2.00	96.7	Coarse Sand	0.2
#20	0.85	96.4		
#40	0.43	96.3	Medium Sand	0.4
#60	0.25	95.8		
#100	0.15	91.3		
#200	0.075	80.0	Fine Sand	16.3

Hydrometer Analysis

(mm)	%Finer		
0.030	58.9		
0.020	49.7		
0.012	39.6	Fines	
0.0085	35.4	Silt or Clay	80.0
0.0061	32.0		
0.0030	27.8		
0.0013	24.4		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
23.2	29	15	14	0.56

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

DESCRIPTION: sandy SILTY CLAY, fine to coarse, trace fine to coarse gravel; grayish brown.

USCS: CL

TECH	TJ/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

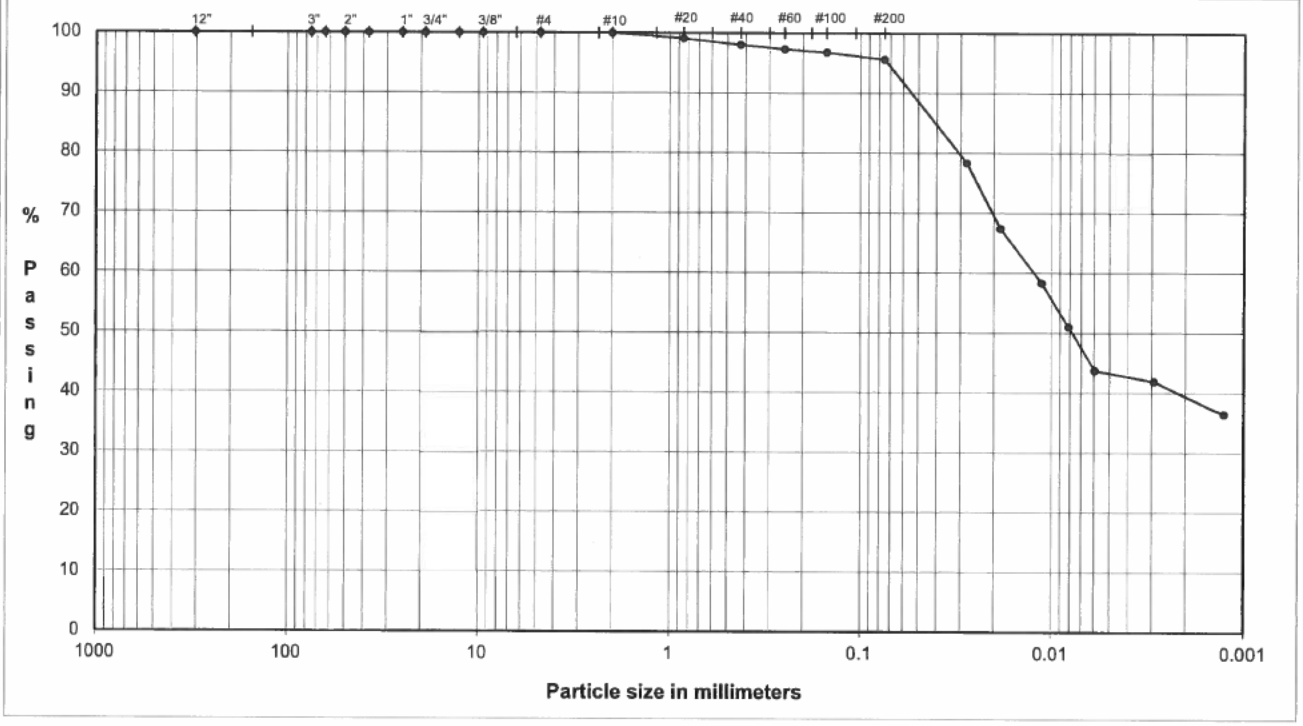
JUNE 2018

18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **RP-8** - Depth: **8.0-10.0'**
TYPE: **UD**



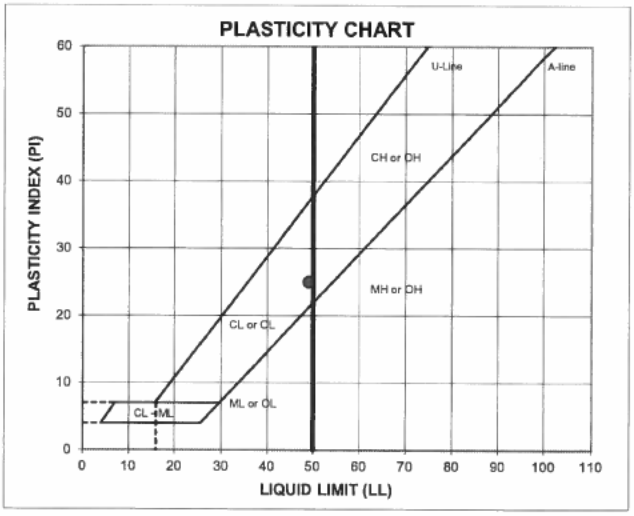
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

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	**100.0**	Coarse Sand	**0.0**
#20	0.85	**99.1**		
#40	0.43	**98.0**	Medium Sand	**2.0**
#60	0.25	**97.3**		
#100	0.15	**96.8**		
#200	0.075	**95.6**	Fine Sand	**2.4**

Hydrometer Analysis

(mm)	%Finer		
0.028	**78.3**		
0.019	**67.4**		
0.011	**58.3**	Fines	
0.0082	**51.0**	Silt or Clay	**95.6**
0.0059	**43.7**		
0.0029	**41.9**		
0.0013	**36.4**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.6	**49**	**24**	**25**	**0.04**

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

DESCRIPTION: SILTY CLAY, trace fine to coarse sand; dark yellowish brown.

USCS: CL

TECH	TJ/HEH
DATE	6/6/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

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

PROJECT TITLE	FTN/ENTERGY INDEPENDENCE/AR		Board #	5	COMMENTS
PROJECT NUMBER	18103172		Flow Pump	2	
SAMPLE ID	RP-8	8.0-10.0'	Flow Pump Speed	10	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.000	B-Value, f	0.99	Height, inches	3.001
Diameter, inches	2.877	Cell Pres.	88.0	Diameter, inches	2.885
Area, cm^2	41.94	Bot. Pres.	80.0	Area, cm^2	42.17
Volume, cm^3	319.59	Top Pres.	80.0	Volume, cm^3	321.48
Mass, g	628.15	Tot. B.P.	80.0	Mass, g	639.30
Moisture Content, %	24.58	Head, max.	116.06	Moisture Content, %	26.79
Dry Density, pcf	98.45	Head, min.	116.06	Dry Density, pcf	97.87
Spec. Gravity (assumed)	2.750	Max. Grad.	15.23	Volume Solids, cm^3	183.36
Volume Solids, cm^3	183.36	Min. Grad.	15.23	Volume Voids, cm^3	138.12
Volume Voids, cm^3	136.23			Void Ratio	0.75
Void Ratio	0.74			Saturation, %	97.8%
Saturation, %	91.0%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	628.15	721.53
Wt Soil & Tare, f	g	504.23	586.48
Wt Tare	g	0.00	82.33
Wt Moisture Lost	g	123.92	135.05
Wt Dry Soil	g	504.23	504.15
Water Content	%	24.58%	26.79%

DESCRIPTION: SILTY CLAY, trace fine to coarse sand; dark yellowish brown.

Flow Pump Rate: 2.25E-05 cm^3/sec

USCS: CL

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	0	21.4	0	0	0	0	1.65	116.06	15.23	3.4E-08
06/08/18	43259	14	5	21.4	5	5	300	300	1.65	116.06	15.23	3.4E-08
06/08/18	43259	14	10	21.4	5	10	300	600	1.65	116.06	15.23	3.4E-08
06/08/18	43259	14	15	21.4	5	15	300	900	1.65	116.06	15.23	3.4E-08 *
06/08/18	43259	14	20	21.4	5	20	300	1200	1.65	116.06	15.23	3.4E-08 *
06/08/18	43259	14	25	21.4	5	25	300	1500	1.65	116.06	15.23	3.4E-08 *
06/08/18	43259	14	30	21.4	5	30	300	1800	1.65	116.06	15.23	3.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.4E-08 cm/sec **

DATE	6/8/18
CHECK	
REVIEW	
APPROVE	

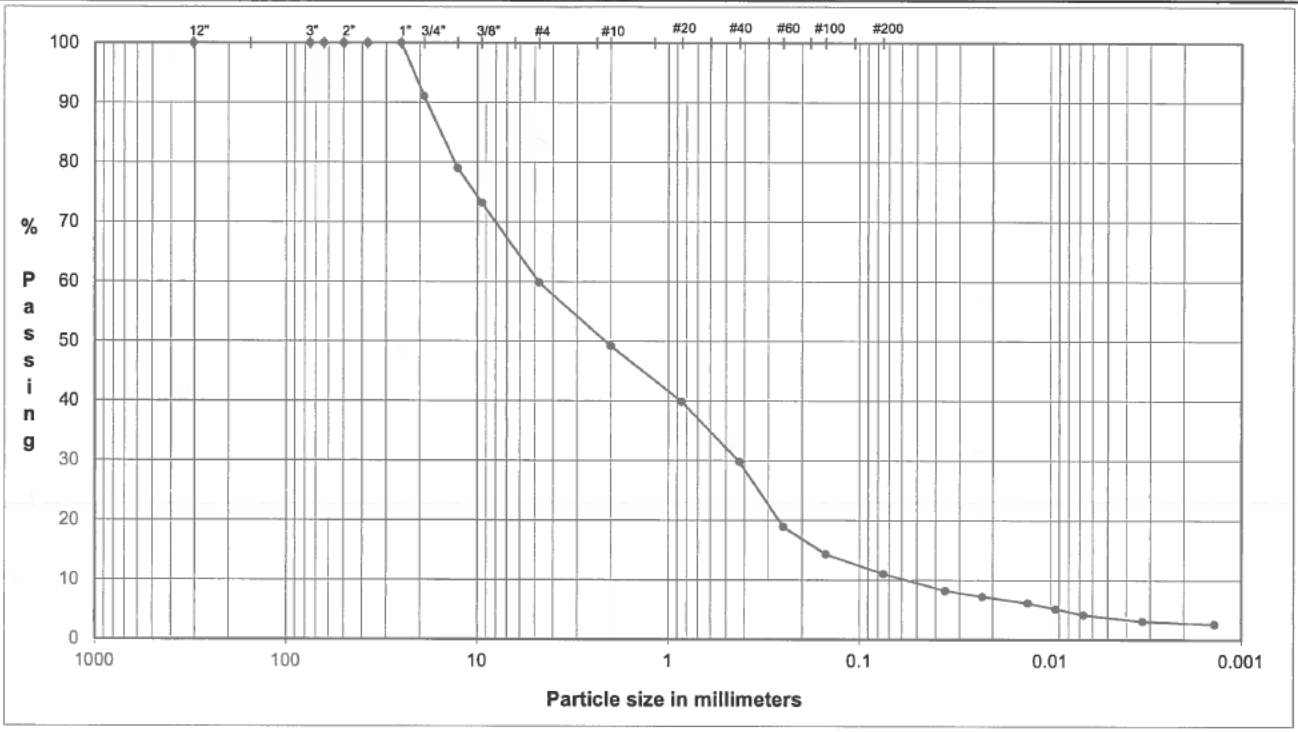
JULY 2018

18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **RP-8D** - Depth: **27.0-30.0'**
TYPE: **Bag**



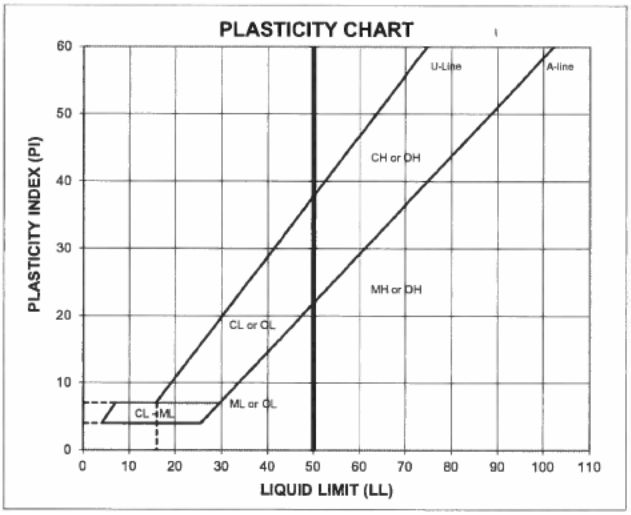
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	91.0	Coarse Gravel	9.0
0.50"	12.7	79.0		
0.375"	9.5	73.2		
#4	4.8	59.8	Fine Gravel	31.2
#10	2.00	49.2	Coarse Sand	10.6
#20	0.85	39.8		
#40	0.43	29.7	Medium Sand	19.4
#60	0.25	18.9		
#100	0.15	14.3		
#200	0.075	11.0	Fine Sand	18.8

Hydrometer Analysis

(mm)	%Finer		
0.036	8.2		
0.023	7.2		
0.013	6.2	Fines	
0.0094	5.1	Silt or Clay	11.0
0.0067	4.1		
0.0033	3.1		
0.0014	2.6		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
10.2	NP	NP	NP	NP

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

DESCRIPTION: SAND and GRAVEL, fine to coarse, fine to coarse gravel; yellowish brown.

USCS: SP-SM

TECH	TJ/BA/HH
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

JULY 2018

18103172

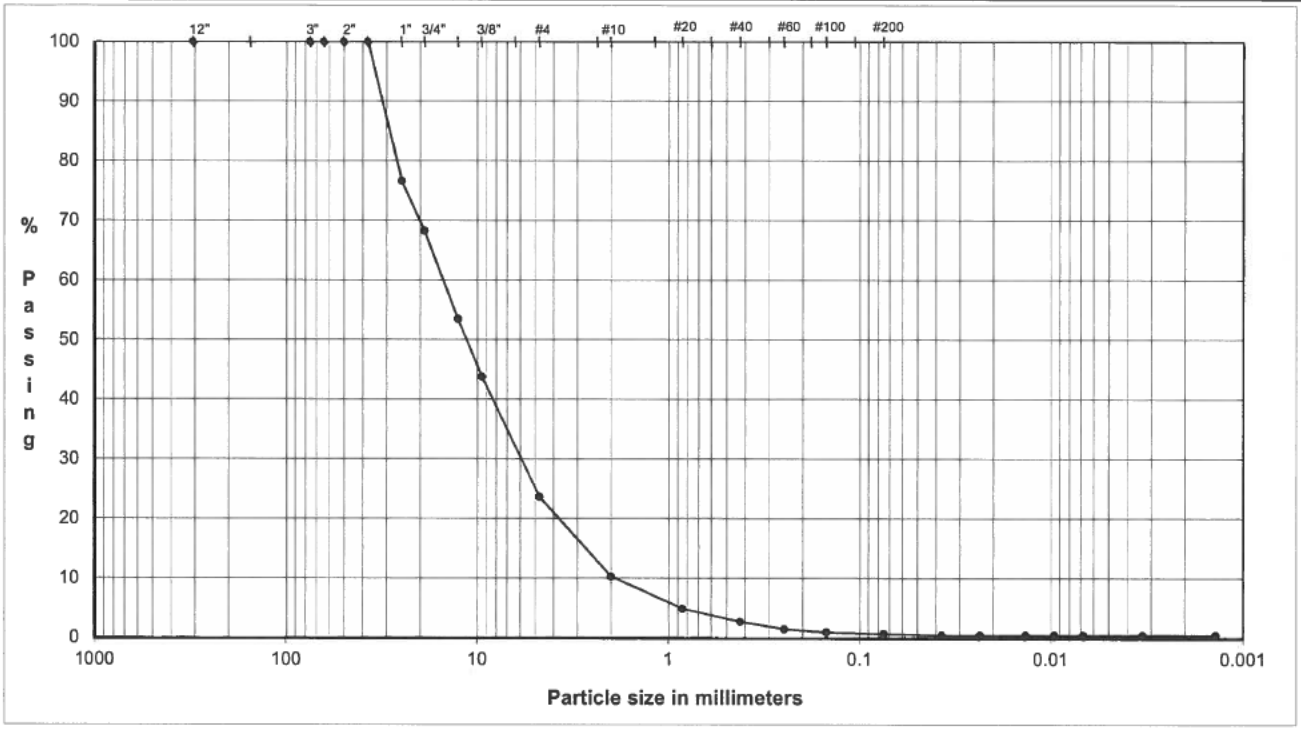
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **RP-8D** - Depth: **42.0-50.0'**

TYPE: **Bag**



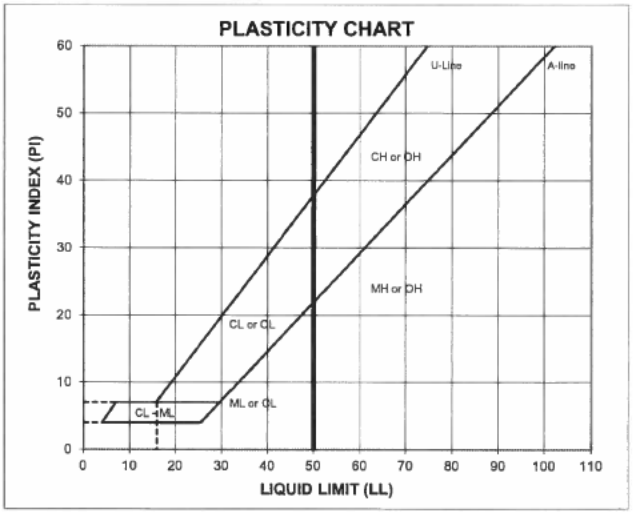
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	**76.6**		
0.75"	19.0	**68.2**	Coarse Gravel	**31.8**
0.50"	12.7	**53.5**		
0.375"	9.5	**43.8**		
#4	4.8	**23.6**	Fine Gravel	**44.6**
#10	2.00	**10.3**	Coarse Sand	**13.4**
#20	0.85	**4.8**		
#40	0.43	**2.6**	Medium Sand	**7.6**
#60	0.25	**1.5**		
#100	0.15	**0.9**		
#200	0.075	**0.6**	Fine Sand	**2.0**

Hydrometer Analysis

(mm)	%Finer		
0.037	**0.4**		
0.024	**0.4**		
0.014	**0.4**	Fines	
0.0096	**0.4**	Silt or Clay	**0.6**
0.0068	**0.4**		
0.0033	**0.4**		
0.0014	**0.4**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_f	LL	PL	PI	LI
3.9	NP	NP	NP	NP

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

DESCRIPTION: sandy GRAVEL, fine to coarse, fine to coarse sand, trace fines; dark yellowish brown.

USCS: GW

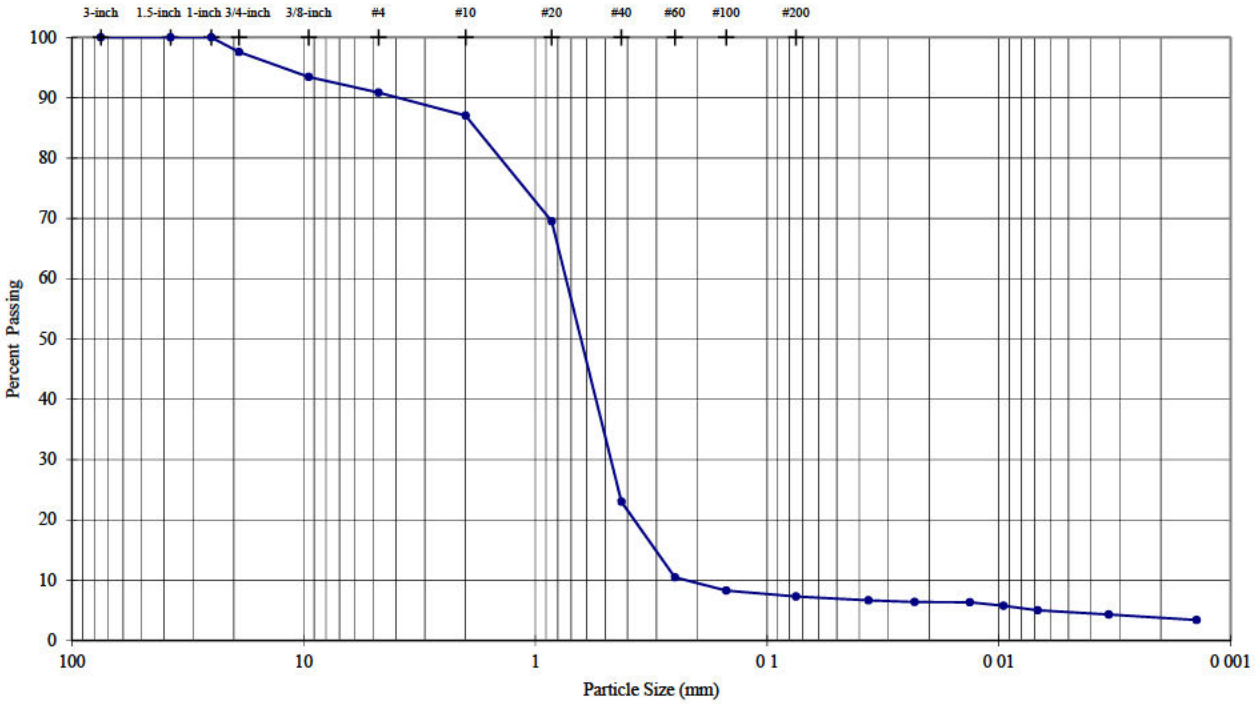
TECH	TJ/HH/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

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

August-18 18103172

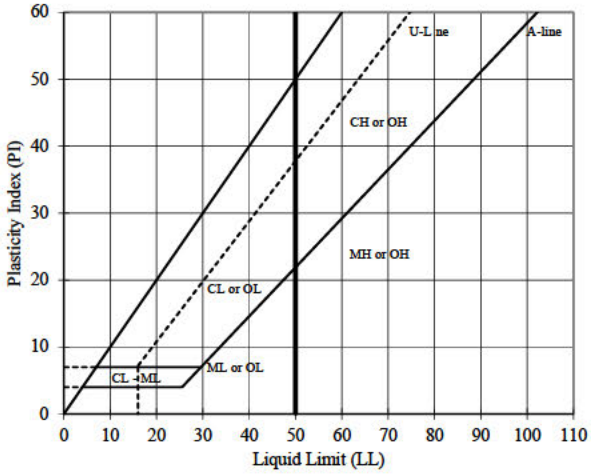
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **FTN/Entergy Independence/AR**
SAMPLE ID: **RP-8D** DEPTH (ft): **53-60**
TYPE: **Bag**



Sieve Analysis (Initial Separation on No 4 Sieve)

Sieve	Particle Size (mm)	% Passing	Description	Percentage
3-inch	75 0	100.0		
1 5-inch	37 5	100.0	Coarse Gravel	2.42
1-inch	25 0	100.0		
3/4-inch	19 0	97.6		
3/8-inch	9 5	93.5	Fine Gravel	6.74
#4	4 75	90.8		
#10	2 00	87.0	Coarse Sand	3.80
#20	0 850	69.5	Medium Sand	64.02
#40	0 425	23.0		
#60	0 250	10.5	Fine Sand	15.71
#100	0 150	8.3		
#200	0 075	7.3		
Hydrometer Analysis	0 037	6.7	Silt or Clay Fines	7.31
	0 023	6.4		
	0 013	6.4		
	0 010	5.8		
	0 007	5.0		
	0 003	4.3		
	0 001	3.4		



USCS Description (ASTM D 2487):
Poorly graded sand with silt, brownish yellow, moist

LL	PL	PI	SpG
NP	NP	NP	--

As-Received Moisture Content (%): --

USCS Group Symbol: SP-SM

Notes: 0 g of particles up to 25 0 mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling Method A Liquid Limit test performed using mechanical device

TECH	AR
DATE	1-Aug-2018
REVIEW	MB

GOLDER

Boring or Test Pit:	--	Boring or Test Pit:	--	Boring or Test Pit:	--
Sample:	RP-8D	Sample:	RP-8D	Sample:	RP-8D
Depth:	53-60 ft.	Depth:	53-60 ft.	Depth:	53-60 ft.
Point No.:	1	Point No.:	2	Point No.:	3

Initial			**Initial**			**Initial**		
Thickness =	1.191	in	Thickness =	1.189	in	Thickness =	1.186	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Wet Mass =	0.410	lb	Wet Mass =	0.409	lb	Wet Mass =	0.409	lb
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.85	in^3	Volume =	5.84	in^3	Volume =	5.82	in^3
Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)	Specific Gravity =	2.70	(Assumed)
Dry Mass of Solids =	0.395	lb	Dry Mass of Solids =	0.394	lb	Dry Mass of Solids =	0.394	lb
Moisture Content =	3.7%		Moisture Content =	3.9%		Moisture Content =	3.8%	
Wet Unit Weight =	121.2	pcf	Wet Unit Weight =	121.2	pcf	Wet Unit Weight =	121.3	pcf
Dry Unit Weight =	116.9	pcf	Dry Unit Weight =	116.6	pcf	Dry Unit Weight =	116.9	pcf
Void Ratio =	0.44		Void Ratio =	0.44		Void Ratio =	0.44	
Percent Saturation =	23%		Percent Saturation =	24%		Percent Saturation =	23%	

Pre-Shear			**Pre-Shear**			**Pre-Shear**		
Thickness =	1.173	in	Thickness =	1.170	in	Thickness =	1.162	in
Diameter =	2.50	in	Diameter =	2.50	in	Diameter =	2.50	in
Area =	4.91	in^2	Area =	4.91	in^2	Area =	4.91	in^2
Volume =	5.76	in^3	Volume =	5.74	in^3	Volume =	5.71	in^3
Moisture Content =	12.9%		Moisture Content =	12.0%		Moisture Content =	12.9%	
Wet Unit Weight =	134.0	pcf	Wet Unit Weight =	132.8	pcf	Wet Unit Weight =	134.6	pcf
Dry Unit Weight =	118.7	pcf	Dry Unit Weight =	118.5	pcf	Dry Unit Weight =	119.3	pcf
Void Ratio =	0.42		Void Ratio =	0.42		Void Ratio =	0.41	
Percent Saturation =	83%		Percent Saturation =	77%		Percent Saturation =	85%	

Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min	Shear Rate =	0.0033	in/min
Normal Stress =	7,200	psf	Normal Stress =	14,400	psf	Normal Stress =	21,600	psf

Notes:

USCS description (ASTM D2487): Poorly graded sand with silt, brownish yellow, moist

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

Percent finer: 3/4 in. = 98% No. 4 = 91% No. 200 = 7% (ASTM D422, refer to separate report)

Specimen type: [ ] Intact [X] Reconstituted

Inundation: At seating load

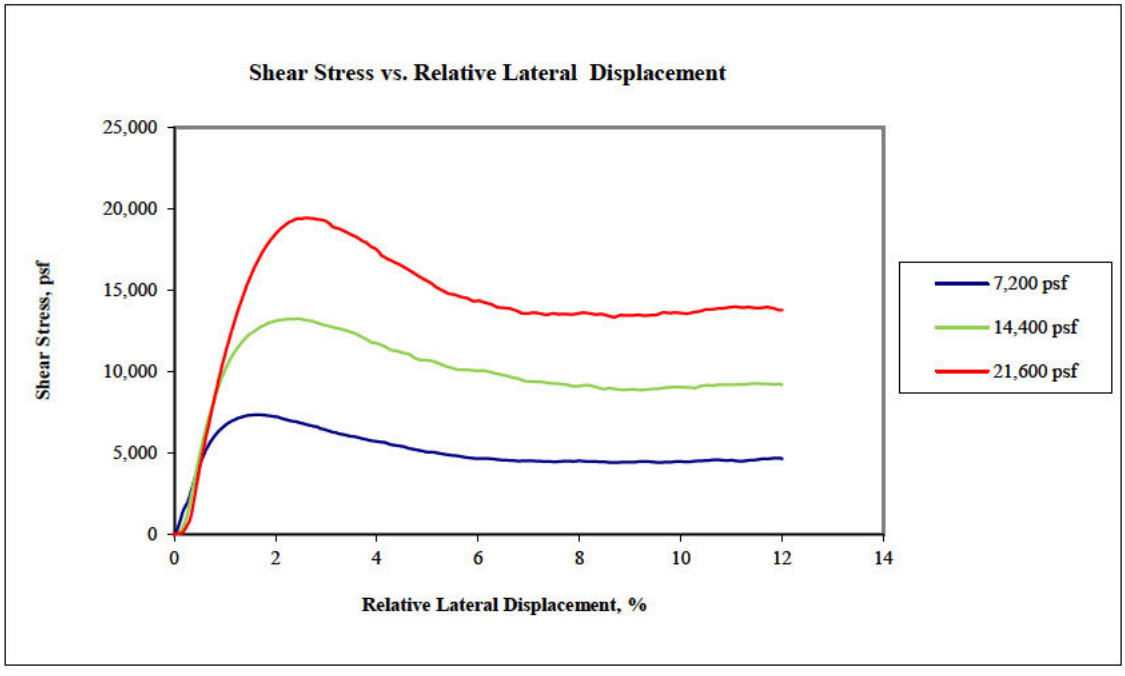
Apparatus: 2.5 -inch nominal diameter box, GeoTac automated test system, GeoJac loading system

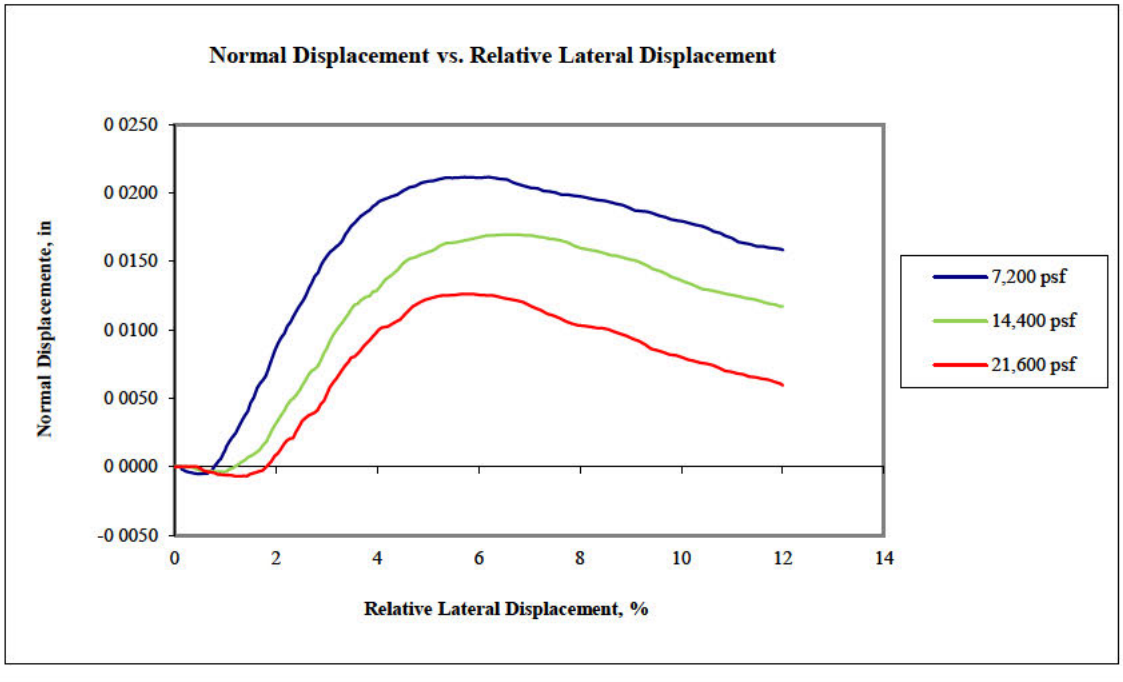
Gravel retained on the #4 sieve removed from sample prior to testing

Specimens were reconstituted at near estimated optimum moisture content using heavy compactive effort

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SAMPLE AND TEST DATA				
Project Number: 18103172.01					
Sample ID: RP-8D @ 53 - 60 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 1

GOLDER

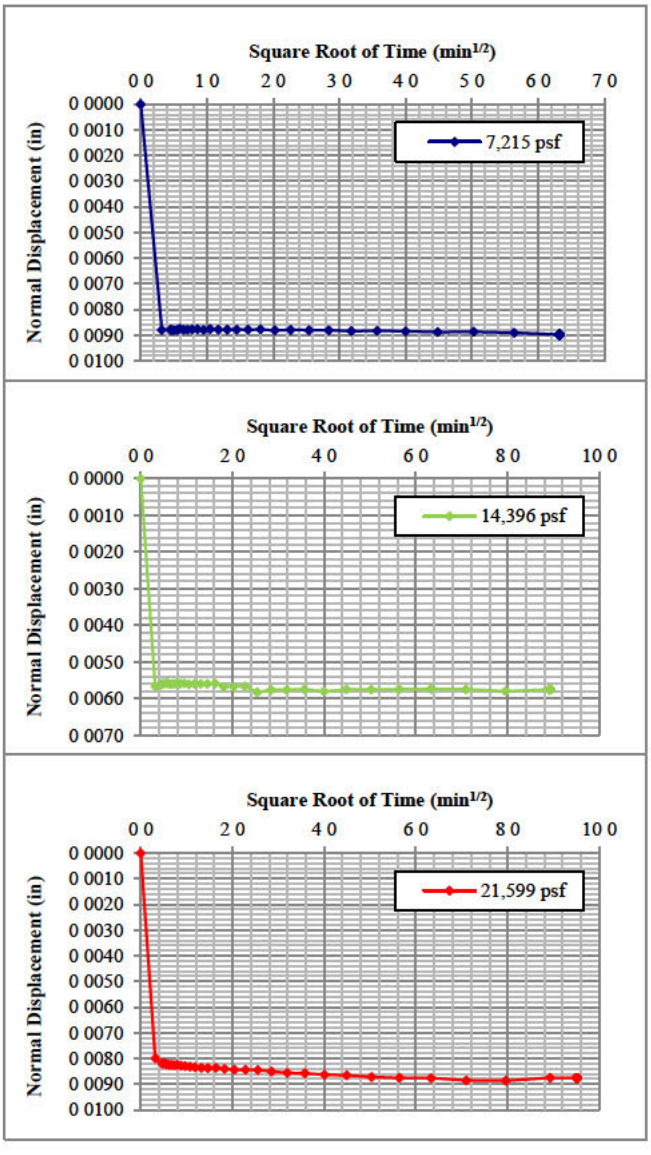




Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SHEAR STRESS AND NORMAL DISPLACEMENT PLOTS				
Project Number: 18103172.01					
Sample ID: RP-8D @ 53 - 60 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 2

GOLDER

Consolidation Data Used to Determine Shear Rate



Normal Stress, psf	Normal Displacement, in	Load Duration, min
Point No 1		
108	0 0003	4
1,447	0 0090	15
7,215	0 0090	40
Point No 2		
116	0 0000	1
1,439	0 0046	2
7,197	0 0086	15
14,396	0 0057	80
Point No 3		
105	0 0000	1
10,805	0 0148	2
21,599	0 0088	90

Project Name:	ASTM D3080
FTN/Entergy Independence/AR	CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT
Project Number:	CONSOLIDATION DATA
18103172.01	

Sample ID:	Technician:	Checked:	Reviewed:	Date:	Figure:
RP-8D @ 53 - 60 ft.	MAB	PRH	MK	15-Aug-2018	3

GOLDER

Point No :	1	
Normal Stress =	7,200	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
638	0 1	0 0000
1,592	0 2	-0 0003
2,291	0 3	-0 0004
3,332	0 4	-0 0005
4,079	0 5	-0 0005
4,860	0 6	-0 0005
5,505	0 7	-0 0004
5,980	0 8	0 0000
6,346	0 9	0 0005
6,636	1 0	0 0011
7,316	1 4	0 0041
7,238	2 0	0 0086
6,871	2 5	0 0118
6,480	2 9	0 0151
6,037	3 5	0 0176
5,729	4 0	0 0192
5,469	4 4	0 0199
5,059	5 0	0 0208
4,870	5 5	0 0211
4,666	6 0	0 0211
4,589	6 4	0 0210
4,538	6 9	0 0205
4,493	7 4	0 0201
4,530	8 0	0 0197
4,477	8 5	0 0194
4,438	9 0	0 0189
4,470	9 4	0 0185
4,491	9 9	0 0180

Point No :	2	
Normal Stress =	14,400	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
60	0 1	0 0000
683	0 2	0 0000
1,540	0 3	0 0000
3,330	0 4	-0 0001
4,533	0 5	-0 0002
5,943	0 6	-0 0003
7,154	0 7	-0 0004
8,196	0 8	-0 0004
9,104	0 9	-0 0003
9,939	1 0	-0 0004
12,176	1 4	0 0007
13,085	2 0	0 0031
13,247	2 5	0 0056
12,865	2 9	0 0083
12,418	3 5	0 0115
11,763	4 0	0 0128
11,264	4 4	0 0143
10,710	5 0	0 0156
10,229	5 5	0 0163
10,043	6 0	0 0167
9,819	6 4	0 0169
9,417	6 9	0 0169
9,284	7 4	0 0166
9,115	8 0	0 0160
8,924	8 5	0 0156
8,893	9 0	0 0151
8,929	9 4	0 0144
9,053	9 9	0 0137

Point No :	3	
Normal Stress =	21,600	psf
Shear Rate =	0 0033	in/min

Shear Stress	Relative Lateral Displacement	Normal Displacement
psf	%	in
100	0 1	0 0000
177	0 2	0 0000
771	0 3	0 0000
2,172	0 4	0 0000
3,625	0 5	-0 0001
5,295	0 6	-0 0003
6,825	0 7	-0 0004
8,301	0 8	-0 0005
9,731	0 9	-0 0005
10,784	1 0	-0 0006
15,681	1 5	-0 0005
18,319	2 0	0 0008
19,377	2 5	0 0029
19,284	2 9	0 0048
18,414	3 5	0 0080
17,547	4 0	0 0097
16,563	4 5	0 0107
15,651	4 9	0 0122
14,773	5 4	0 0125
14,313	5 9	0 0126
13,941	6 4	0 0124
13,567	7 0	0 0118
13,561	7 5	0 0110
13,548	8 0	0 0103
13,536	8 4	0 0101
13,451	8 9	0 0095
13,462	9 4	0 0086
13,618	9 9	0 0081

Project Name:	ASTM D3080				
FTN/Entergy Independence/AR	CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number:	SHEAR DATA				
18103172.01					
Sample ID:	**Technician:**	**Checked:**	**Reviewed:**	**Date:**	**Figure:**
RP-8D @ 53 - 60 ft.	MAB	PRH	MK	15-Aug-2018	4

GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 7,200 psf				
Sample ID: RP-8D @ 53 - 60 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 5

GOLDER

Project Name: FTN/Entergy Independence/AR	**ASTM D3080** CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT				
Project Number: 18103172.01	SPECIMEN PHOTOGRAPH - 14,400 psf				
Sample ID: RP-8D @ 53 - 60 ft.	**Technician:** MAB	**Checked:** PRH	**Reviewed:** MK	**Date:** 15-Aug-2018	**Figure:** 6

GOLDER

Project Name: FTN/Entergy Independence/AR	ASTM D3080 CONSOLIDATED DRAINED DIRECT SHEAR TEST REPORT SPECIMEN PHOTOGRAPH - 21,600 psf				
Project Number: 18103172.01					
Sample ID: RP-8D @ 53 - 60 ft.	Technician: MAB	Checked: PRH	Reviewed: MK	Date: 15-Aug-2018	Figure: 7

JULY 2018

18103172

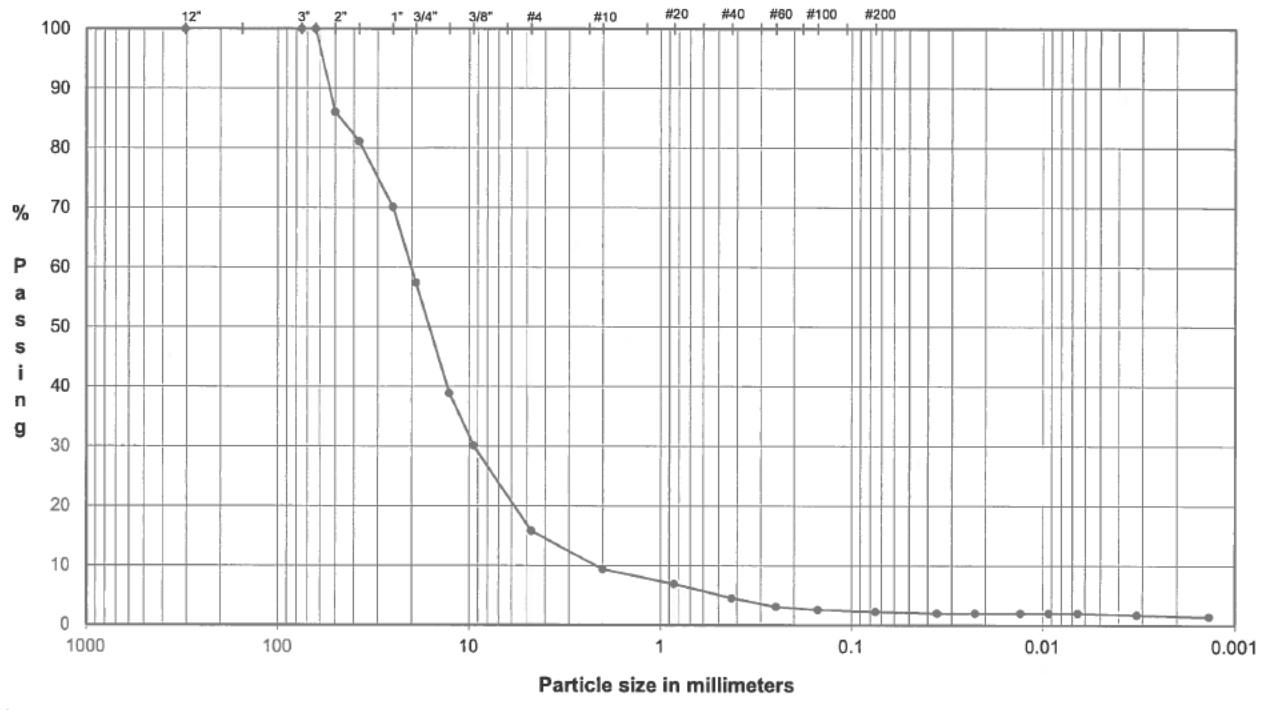
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **RP-8D** - Depth: **68.0-70.0'**

TYPE: **Bag**



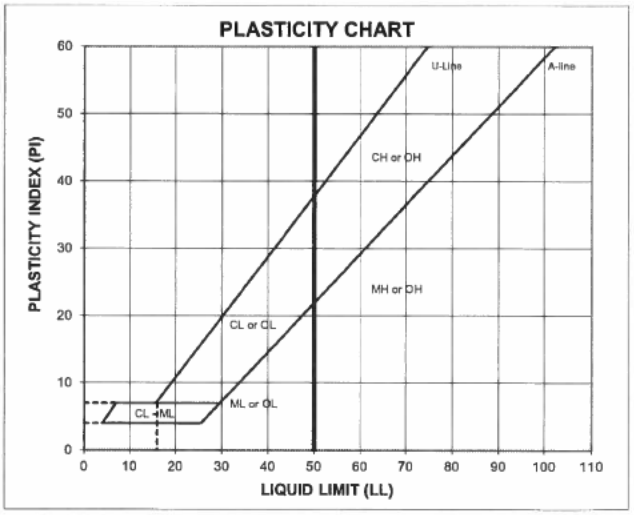
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	86.0		
1.5"	37.5	81.1		
1.0"	25.0	70.1		
0.75"	19.0	57.4	Coarse Gravel	42.6
0.50"	12.7	38.9		
0.375"	9.5	30.1		
#4	4.8	15.8	Fine Gravel	41.6
#10	2.00	9.4	Coarse Sand	6.4
#20	0.85	6.9		
#40	0.43	4.5	Medium Sand	4.9
#60	0.25	3.1		
#100	0.15	2.6		
#200	0.075	2.3	Fine Sand	2.2

Hydrometer Analysis

(mm)	%Finer		
0.036	2.0		
0.023	2.0		
0.013	2.0	Fines	
0.0093	2.0	Silt or Clay	2.3
0.0066	2.0		
0.0032	1.7		
0.0014	1.4		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
7.2	-	-	-	-

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

DESCRIPTION: sandy GRAVEL, fine to coarse, fine to coarse sand, trace fines; brown.

USCS: GW

TECH	TJ/HH/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

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

JULY 2018

18103172

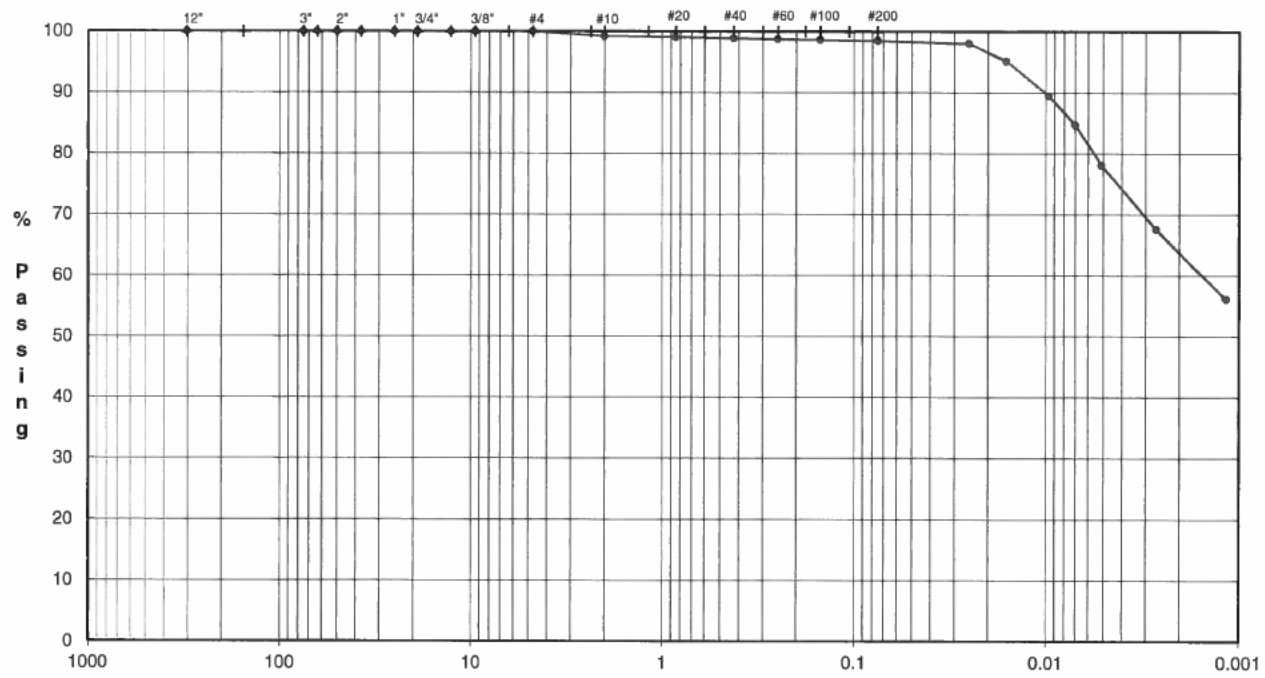
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **RP-9** - Depth: **24.0-26.0'**

TYPE: **Bag**



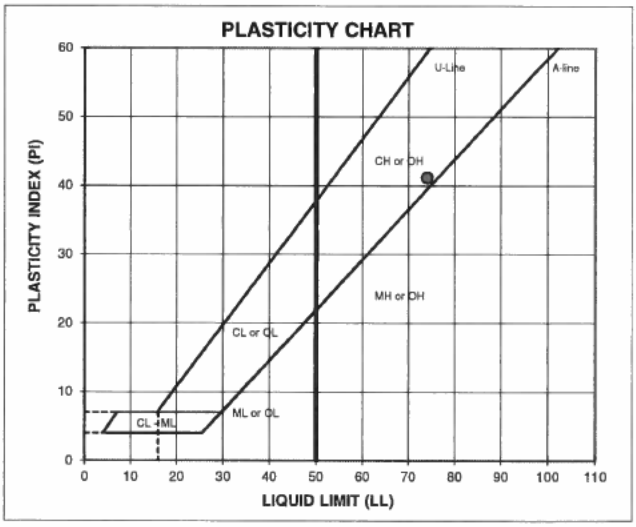
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

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	**99.2**	Coarse Sand	**0.8**
#20	0.85	**99.1**		
#40	0.43	**98.9**	Medium Sand	**0.4**
#60	0.25	**98.7**		
#100	0.15	**98.6**		
#200	0.075	**98.4**	Fine Sand	**0.4**

Hydrometer Analysis

(mm)	%Finer		
0.025	**98.0**		
0.016	**95.2**		
0.010	**89.5**	Fines	
0.0070	**84.7**	Silt or Clay	**98.4**
0.0051	**78.0**		
0.0026	**67.6**		
0.0012	**56.1**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
37.5	**74**	**33**	**41**	**0.10**

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

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

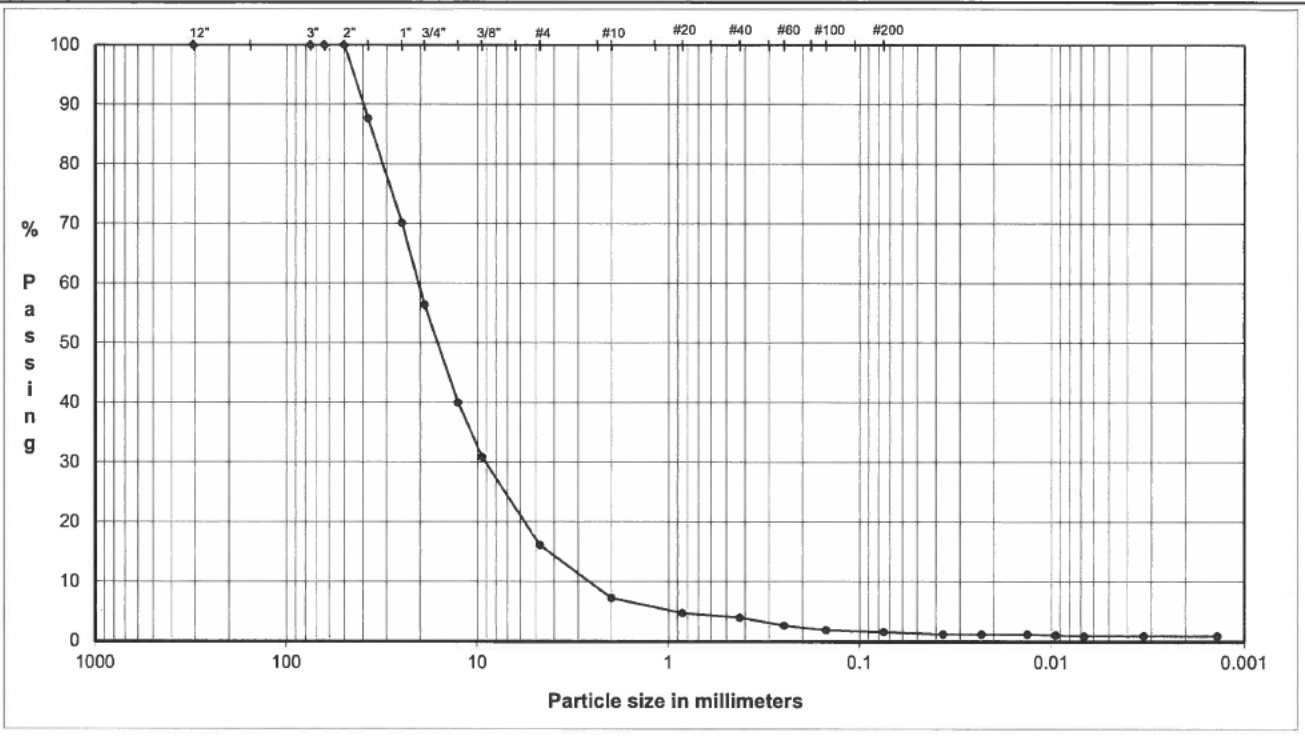
USCS: CH

TECH	TJ/HH/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **RP-9** - Depth: **45.0-46.0'**
TYPE: **Bag**



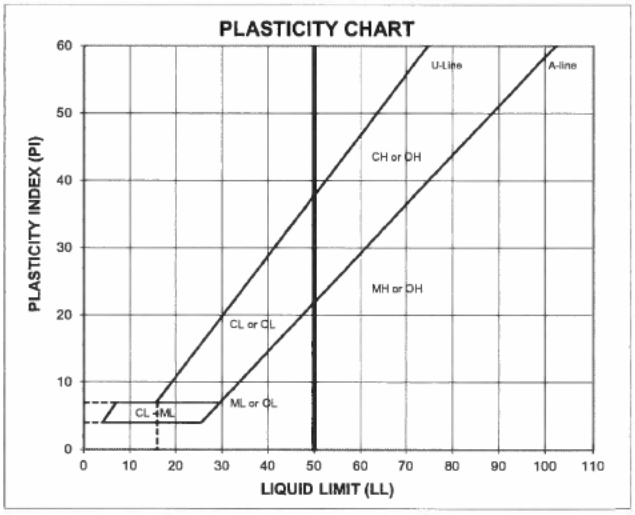
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	87.6		
1.0"	25.0	70.1		
0.75"	19.0	56.4	Coarse Gravel	43.6
0.50"	12.7	39.9		
0.375"	9.5	30.8		
#4	4.8	16.0	Fine Gravel	40.4
#10	2.00	7.2	Coarse Sand	8.8
#20	0.85	4.7		
#40	0.43	3.9	Medium Sand	3.3
#60	0.25	2.6		
#100	0.15	1.8		
#200	0.075	1.5	Fine Sand	2.4

Hydrometer Analysis

(mm)	%Finer		
0.037	1.1		
0.023	1.1		
0.013	1.1	Fines	
0.0095	1.0	Silt or Clay	1.5
0.0067	0.8		
0.0033	0.8		
0.0014	0.8		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
7.8	NP	NP	NP	NP

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

DESCRIPTION: sandy GRAVEL; fine to coarse, fine to coarse sand, trace fines; dark yellowish brown.

USCS: GW

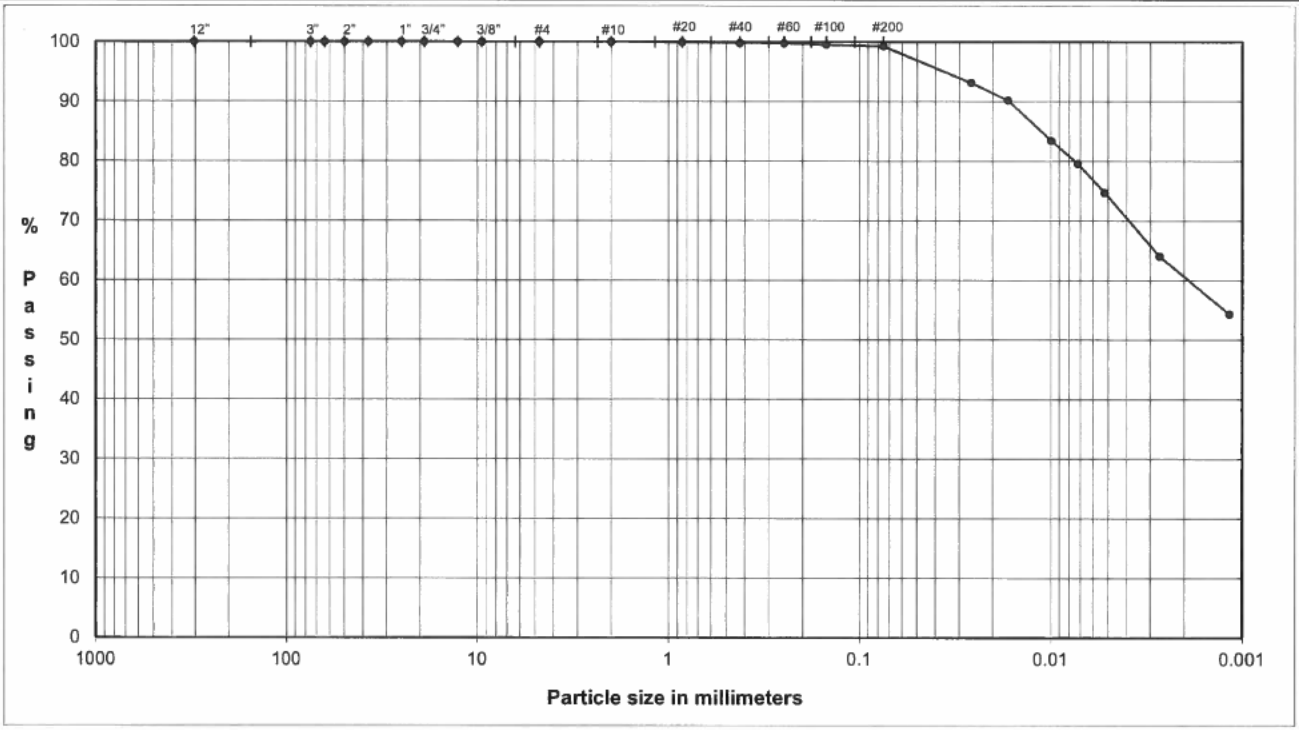
TECH	TJ/HH/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

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

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **RP-10** - Depth: **24.0-25.0'**
TYPE: **Bag**



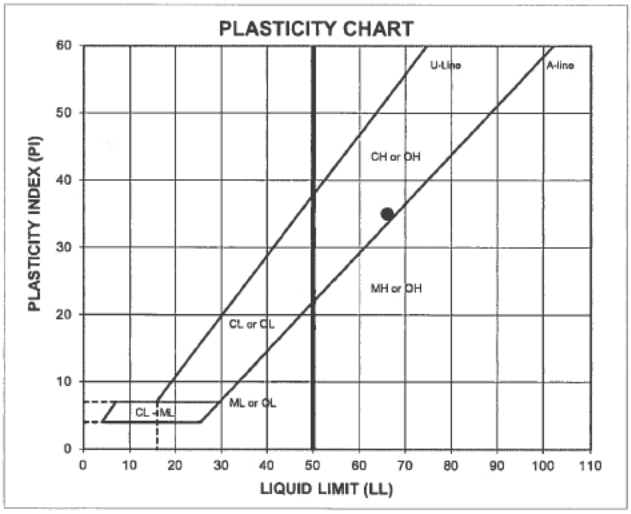
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	**99.9**		
#40	0.43	**99.8**	Medium Sand	**0.2**
#60	0.25	**99.7**		
#100	0.15	**99.5**		
#200	0.075	**99.2**	Fine Sand	**0.6**

Hydrometer Analysis

(mm)	%Finer		
0.026	**93.1**		
0.017	**90.2**		
0.010	**83.4**	Fines	
0.0072	**79.5**	Silt or Clay	**99.2**
0.0052	**74.7**		
0.0027	**64.0**		
0.0012	**54.3**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
32.9	**66**	**31**	**35**	**0.06**

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

DESCRIPTION: CLAY, trace fine to medium sand; grayish brown.

USCS: CH

TECH	TJ/BA/HH
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

AUGUST 2018

18103172

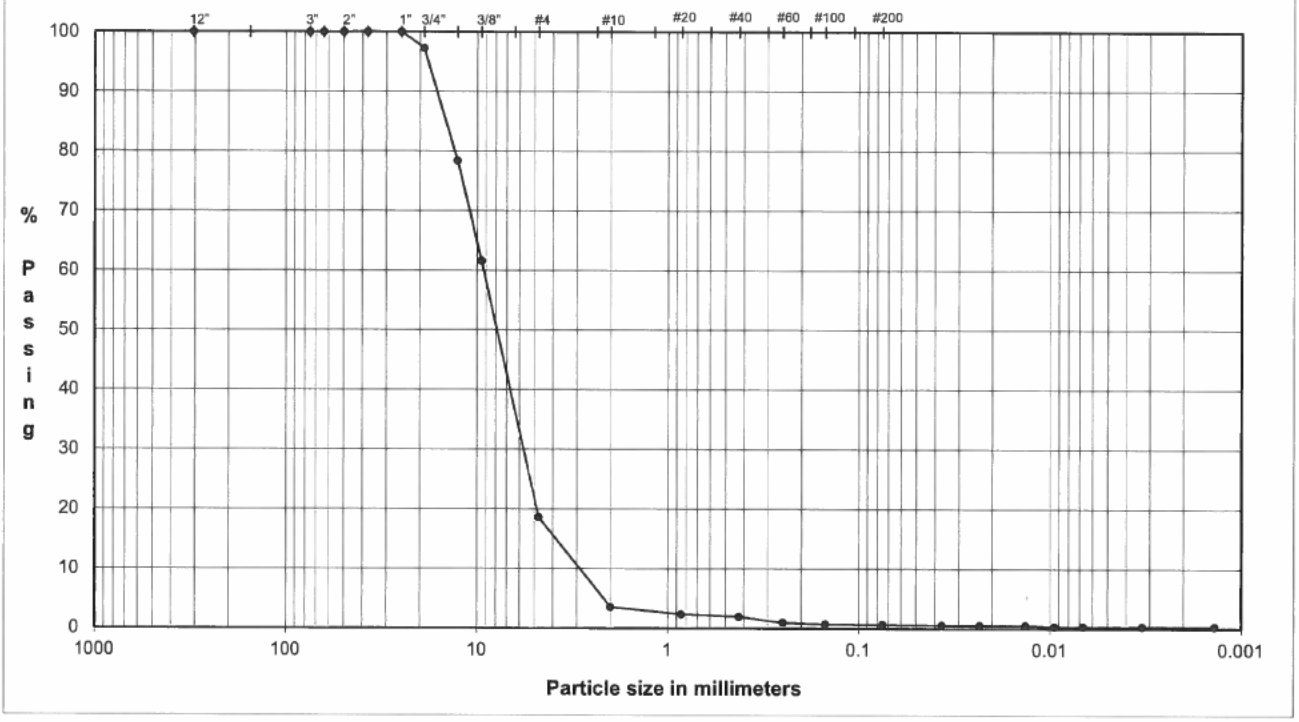
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **RP-10** - Depth: **33.0-35.0'**

TYPE: **Bag**



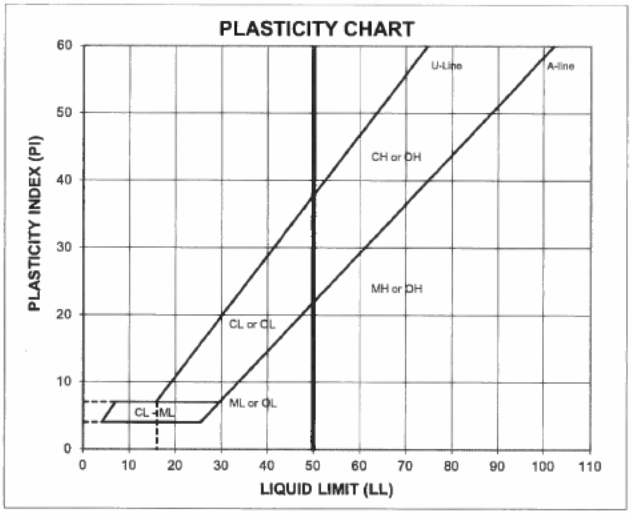
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

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	**97.2**	Coarse Gravel	**2.8**
0.50"	12.7	**78.4**		
0.375"	9.5	**61.6**		
#4	4.8	**18.6**	Fine Gravel	**78.7**
#10	2.00	**3.5**	Coarse Sand	**15.0**
#20	0.85	**2.3**		
#40	0.43	**1.9**	Medium Sand	**1.6**
#60	0.25	**1.0**		
#100	0.15	**0.7**		
#200	0.075	**0.6**	Fine Sand	**1.3**

Hydrometer Analysis

(mm)	%Finer		
0.037	**0.5**		
0.023	**0.5**		
0.013	**0.5**	Fines	
0.0095	**0.3**	Silt or Clay	**0.6**
0.0067	**0.3**		
0.0033	**0.3**		
0.0014	**0.3**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
6.6	**NP**	**NP**	**NP**	**NP**

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

DESCRIPTION: sandy GRAVEL, fine to coarse, fine to coarse sand, trace fines; reddish brown.

USCS: GP

TECH	TJ/HH/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

JUNE 2018

18103172

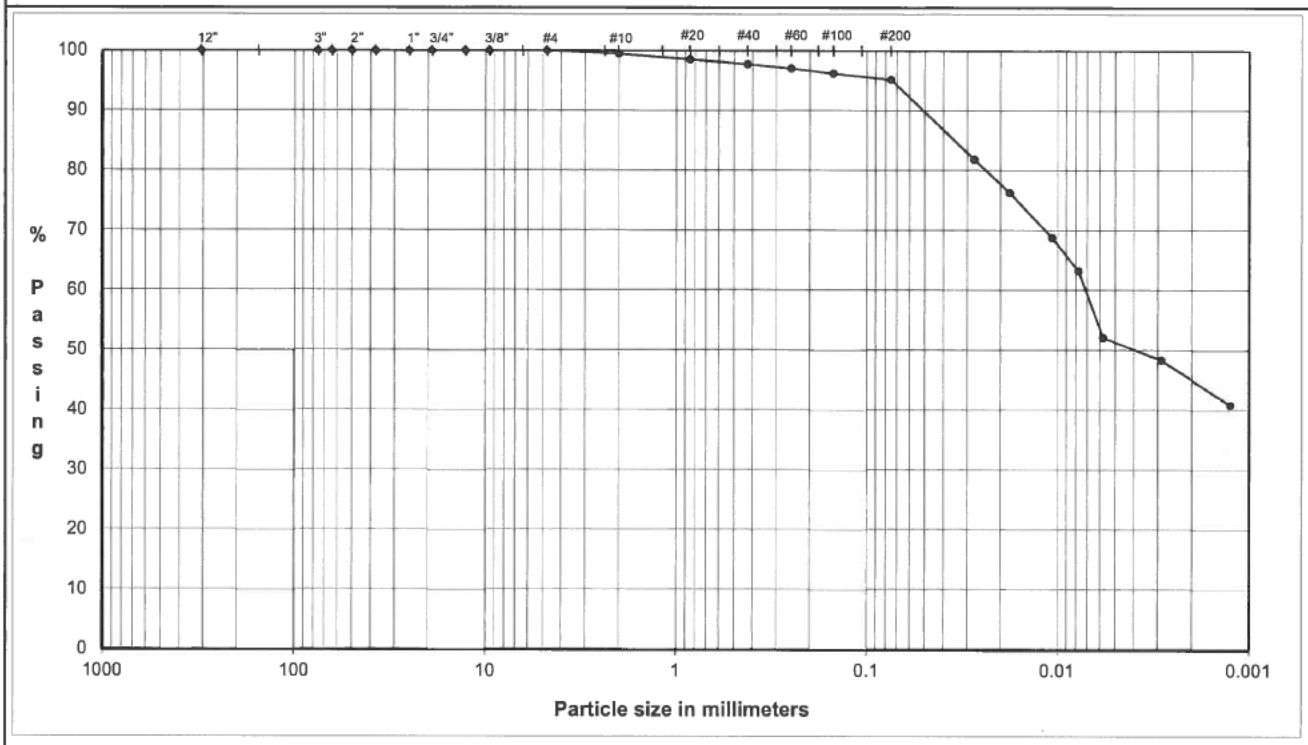
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **PZ-1** - Depth: **5.0-7.0'**

TYPE: **UD**



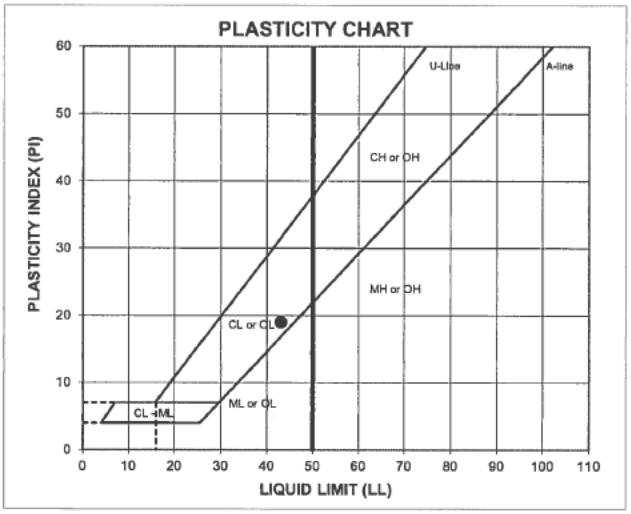
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.5	Coarse Sand	0.5
#20	0.85	98.5		
#40	0.43	97.7	Medium Sand	1.8
#60	0.25	97.0		
#100	0.15	96.2		
#200	0.075	95.1	Fine Sand	2.5

Hydrometer Analysis

(mm)	%Finer		
0.027	81.8		
0.018	76.2		
0.011	68.8	Fines	
0.0078	63.2	Silt or Clay	95.1
0.0058	52.0		
0.0029	48.3		
0.0012	40.9		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.8	43	24	19	-0.04

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

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

USCS: CL

TECH	TJ/HEH
DATE	6/5/18
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

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

PROJECT TITLE	FTN/ENTERGY INDEPENDENCE/AR		Board #	2	COMMENTS
PROJECT NUMBER	18103172		Flow Pump	2	
SAMPLE ID	PZ-1	5.0-7.0'	Flow Pump Speed	10	
SAMPLE TYPE	UD		Technician	FT	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.001	B-Value, f	0.98	Height, inches	3.002
Diameter, inches	2.865	Cell Pres.	88.0	Diameter, inches	2.872
Area, cm²	41.59	Bot. Pres.	80.0	Area, cm²	41.80
Volume, cm³	317.03	Top Pres.	80.0	Volume, cm³	318.69
Mass, g	642.10	Tot. B.P.	80.0	Mass, g	649.74
Moisture Content, %	22.79	Head, max.	132.24	Moisture Content, %	24.25
Dry Density, pcf	102.92	Head, min.	132.24	Dry Density, pcf	102.39
Spec. Gravity (assumed)	2.750	Max. Grad.	17.34	Volume Solids, cm³	190.16
Volume Solids, cm³	190.16	Min. Grad.	17.34	Volume Voids, cm³	128.54
Volume Voids, cm³	126.88			Void Ratio	0.68
Void Ratio	0.67			Saturation, %	98.7%
Saturation, %	93.9%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	642.10	732.03
Wt Soil & Tare, f	g	522.93	605.24
Wt Tare	g	0.00	82.40
Wt Moisture Lost	g	119.17	126.79
Wt Dry Soil	g	522.93	522.84
Water Content	%	22.79%	24.25%

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

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CL

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)
06/06/18	43257	13	0	20.8	0	0	0	0	1.88	132.24	17.34	3.0E-08
06/06/18	43257	13	5	20.8	5	5	300	300	1.88	132.24	17.34	3.0E-08
06/06/18	43257	13	10	20.8	5	10	300	600	1.88	132.24	17.34	3.0E-08
06/06/18	43257	13	15	20.8	5	15	300	900	1.88	132.24	17.34	3.0E-08 *
06/06/18	43257	13	20	20.8	5	20	300	1200	1.88	132.24	17.34	3.0E-08 *
06/06/18	43257	13	25	20.8	5	25	300	1500	1.88	132.24	17.34	3.0E-08 *
06/06/18	43257	13	30	20.8	5	30	300	1800	1.88	132.24	17.34	3.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.0E-08 cm/sec **

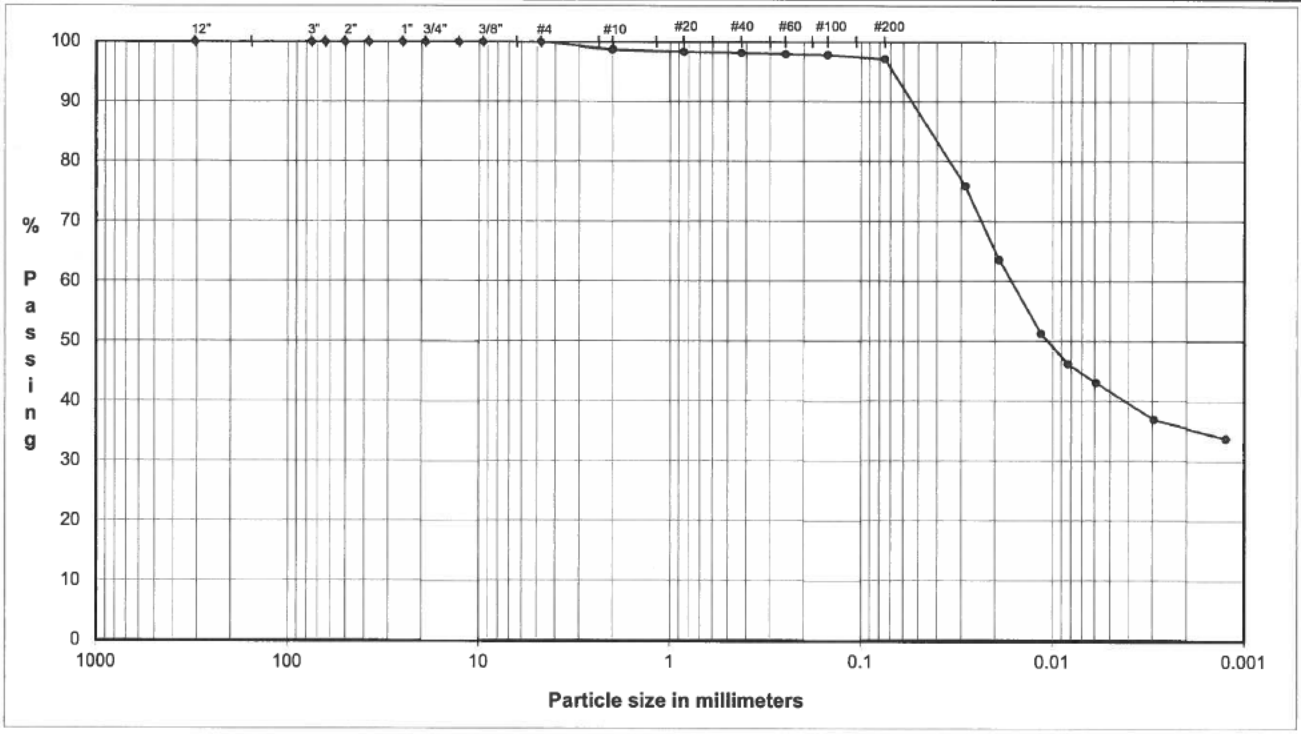
DATE	6/6/18
CHECK	
REVIEW	
APPROVE	

JUNE 2018 18103172

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **PZ-1** Depth: **10.0-12.0'**
TYPE: **UD**



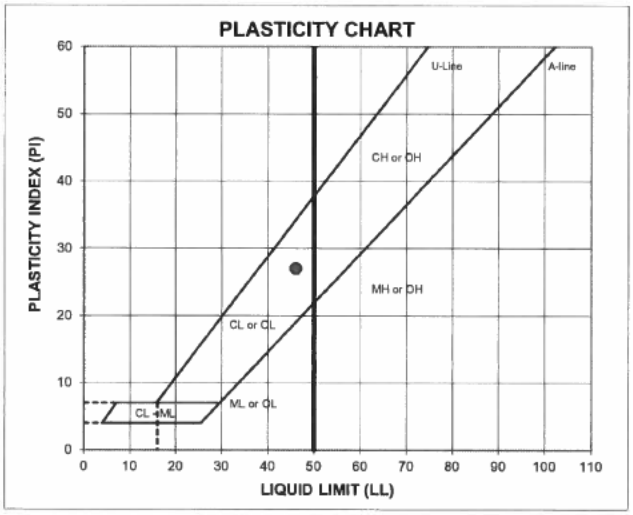
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

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	98.7	Coarse Sand	1.3
#20	0.85	98.3		
#40	0.43	98.1	Medium Sand	0.6
#60	0.25	97.9		
#100	0.15	97.7		
#200	0.075	97.1	Fine Sand	1.0

Hydrometer Analysis

(mm)	%Finer		
0.028	75.9		
0.019	63.6		
0.011	51.3	Fines Silt or Clay	97.1
0.0083	46.1		
0.0059	43.1		
0.0030	36.9		
0.0012	33.8		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
30.9	46	19	27	0.45

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

DESCRIPTION: SILTY CLAY, trace fine to coarse sand; dark olive and grayish brown.

USCS: CL

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

Boring or Test Pit:	PZ-1		Boring or Test Pit:	PZ-1		Boring or Test Pit:	PZ-1	
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 =	6.005	in	Length =	6.006	in	Length =	6.009	in
Diameter =	2.859	in	Diameter =	2.865	in	Diameter =	2.869	in
Wet Mass =	2.733	lb	Wet Mass =	2.617	lb	Wet Mass =	2.653	lb
Area =	6.420	in^2	Area =	6.447	in^2	Area =	6.465	in^2
Volume =	38.551	in^3	Volume =	38.719	in^3	Volume =	38.847	in^3
Specific Gravity =	2.72	(ASTM D854)	Specific Gravity =	2.72	(ASTM D854)	Specific Gravity =	2.72	(ASTM D854)
Dry Mass of Solids =	2.153	lb	Dry Mass of Solids =	1.964	lb	Dry Mass of Solids =	2.003	lb
Moisture Content =	26.9%		Moisture Content =	33.3%		Moisture Content =	32.5%	
Wet Unit Weight =	122.5	pcf	Wet Unit Weight =	116.8	pcf	Wet Unit Weight =	118.0	pcf
Dry Unit Weight =	96.5	pcf	Dry Unit Weight =	87.7	pcf	Dry Unit Weight =	89.1	pcf
Void Ratio =	0.75		Void Ratio =	0.93		Void Ratio =	0.90	
Percent Saturation =	97%		Percent Saturation =	97%		Percent Saturation =	98%	
After Consolidation			**After Consolidation**			**After Consolidation**		
Length =	5.981	in	Length =	5.958	in	Length =	5.950	in
Diameter =	2.887	in	Diameter =	2.873	in	Diameter =	2.869	in
Area =	6.546	in^2 (Method B)	Area =	6.482	in^2 (Method B)	Area =	6.463	in^2 (Method B)
Volume =	39.149	in^3	Volume =	38.622	in^3	Volume =	38.453	in^3
Moisture Content =	28.7%		Moisture Content =	34.1%		Moisture Content =	32.4%	
Wet Unit Weight =	122.4	pcf	Wet Unit Weight =	117.8	pcf	Wet Unit Weight =	119.2	pcf
Dry Unit Weight =	95.0	pcf	Dry Unit Weight =	87.9	pcf	Dry Unit Weight =	90.0	pcf
Void Ratio =	0.78		Void Ratio =	0.93		Void Ratio =	0.88	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.98		B Parameter =	0.98		B Parameter =	0.99	
Shear Rate =	0.090%	/min.	Shear Rate =	0.090%	/min.	Shear Rate =	0.051%	/min.
t_{50} =	1.46	min.	t_{50} =	3.03	min.	t_{50} =	7.07	min.
Strain at Failure =	3.5%		Strain at Failure =	2.2%		Strain at Failure =	3.1%	
Cell Pressure =	80.0	psi	Cell Pressure =	90.0	psi	Cell Pressure =	100.0	psi
Back Pressure =	70.0	psi	Back Pressure =	70.0	psi	Back Pressure =	70.0	psi
Confining Pressure =	10.0	psi	Confining Pressure =	20.0	psi	Confining Pressure =	30.0	psi

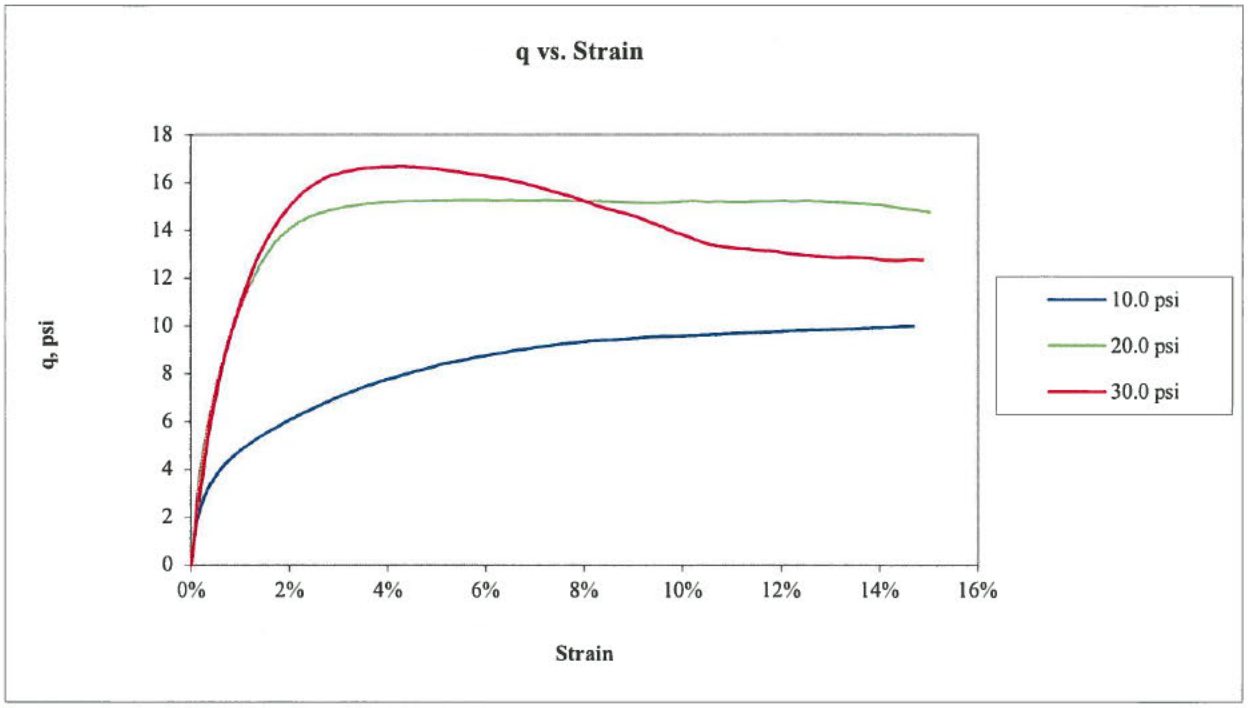
Notes: Sample description: (CL) SILTY CLAY, trace fine to coarse sand; dark olive and grayish brown.

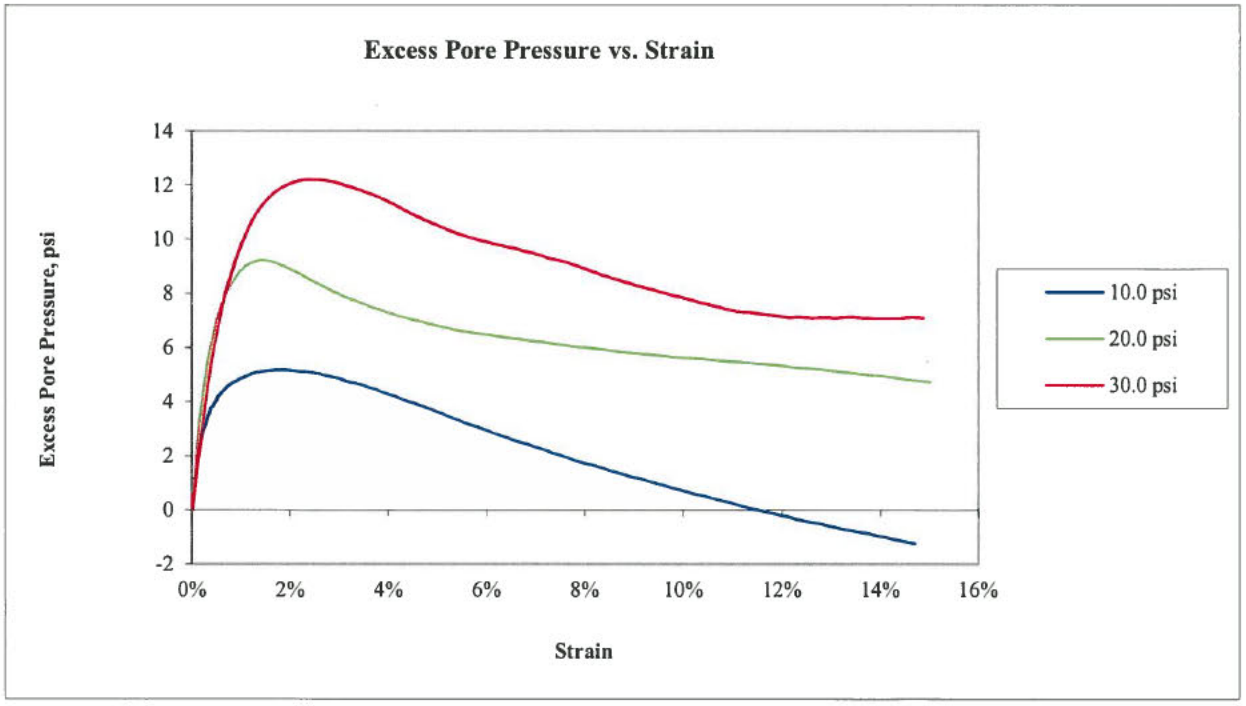
Atterberg limits: LL = 46 PL = 19 PI = 24 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 97% (ASTM D422, refer to separate report for gradation curve)

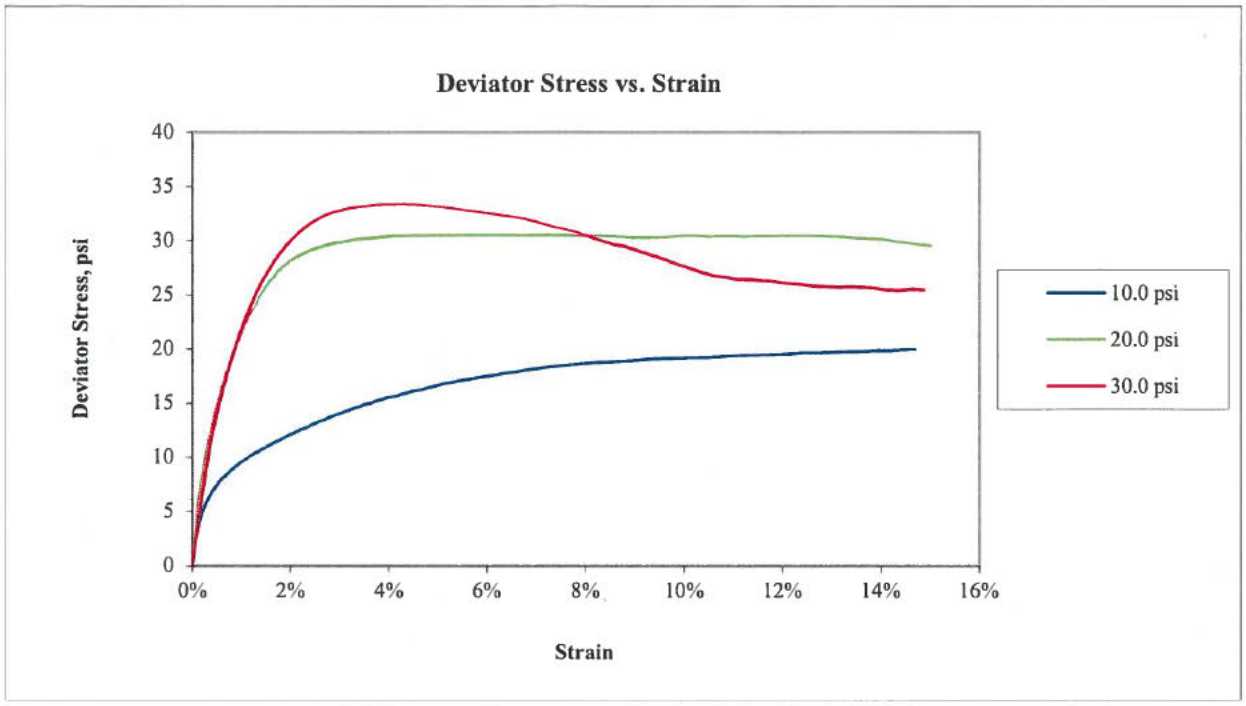
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

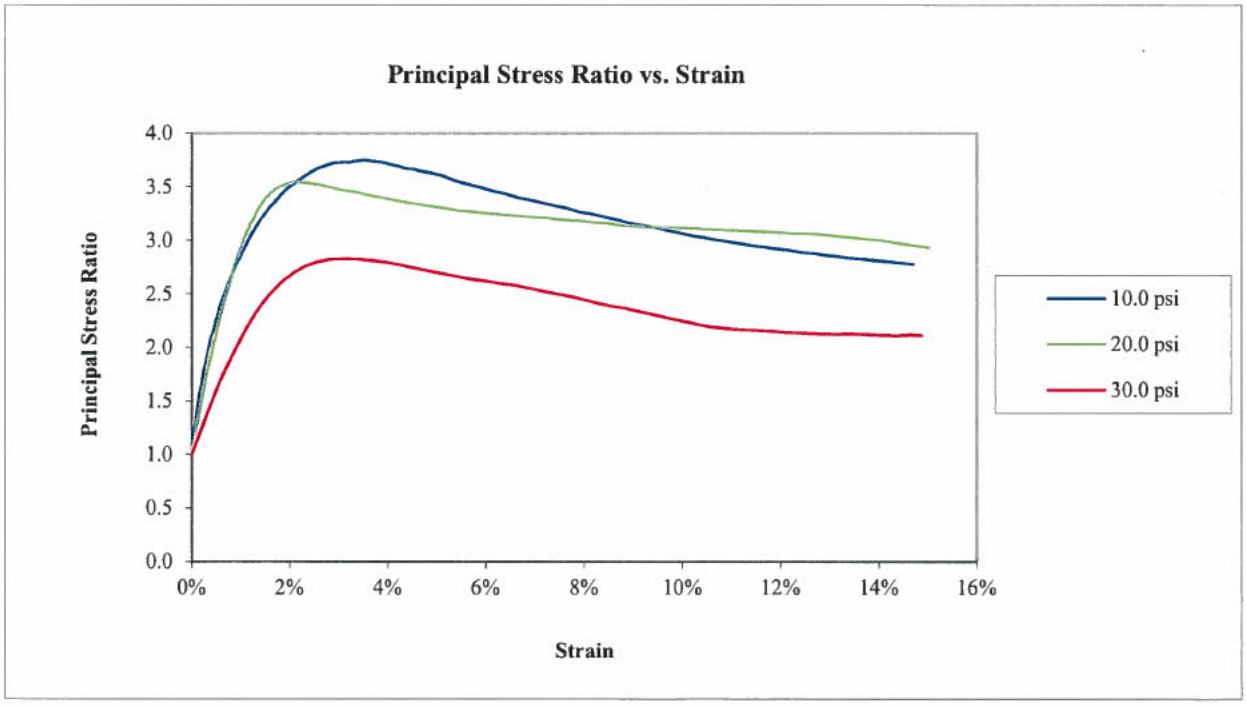
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **PZ-1 UD 10.0-12.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/25/2018**	**Job Number:** **18103172**	**Figure:** **1**





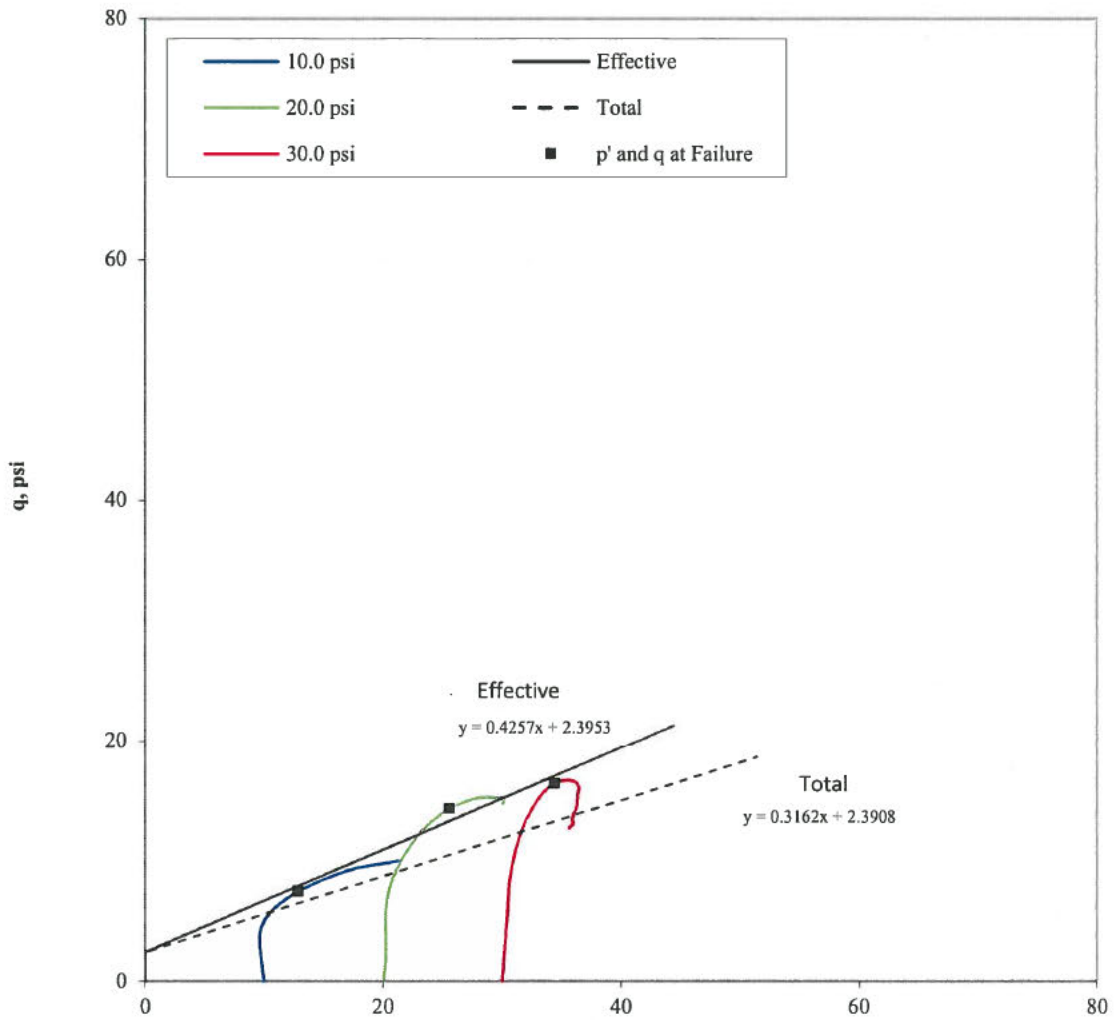
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **PZ-1 UD 10.0-12.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/25/2018**	**Job Number:** **18103172**	**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 INDEPENDENCE/AR**					
Sample:	**Technician:** **FT/PWM**	**Reviewed:**	**Start Date:**	**Job Number:**	**Figure:**
	Check:	**Approved:**			
PZ-1 UD 10.0-12.0'			**6/25/2018**	**18103172**	**3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
10.0	17.5	12.9	7.5
20.0	34.3	25.6	14.3
30.0	46.4	34.4	16.4

Effective

α ' =	23.1	degree
a' =	2.4	psi

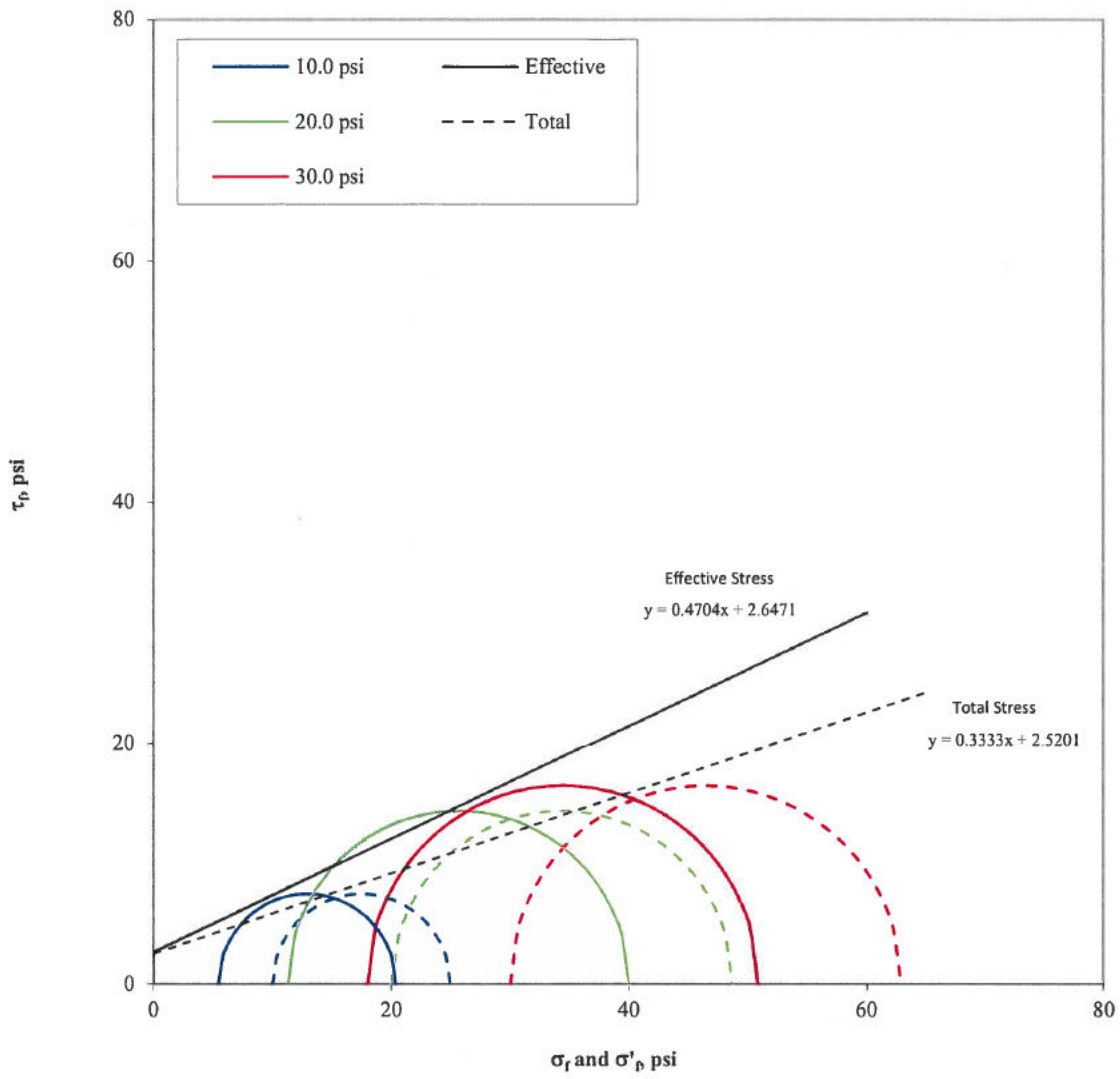
Total

α =	17.5	degree
a =	2.4	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:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT STRESS PATH PLOT				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: PZ-1 UD 10.0-12.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 6/25/2018	**Job Number:** 18103172	**Figure:** 4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'1 at failure (psi)	σ'3 at failure (psi)	σ1 at failure (psi)	σ3 at failure (psi)
10.0	20.3	5.4	24.9	10.0
20.0	40.0	11.3	48.7	20.0
30.0	50.9	18.0	62.9	30.0

Effective

ϕ' =	25.2	degree
c' =	2.6	psi

Total

ϕ =	18.4	degree
c =	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 MOHR'S CIRCLE DIAGRAM				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: PZ-1 UD 10.0-12.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 6/25/2018	**Job Number:** 18103172	**Figure:** 5

10.0 psi

20.0 psi

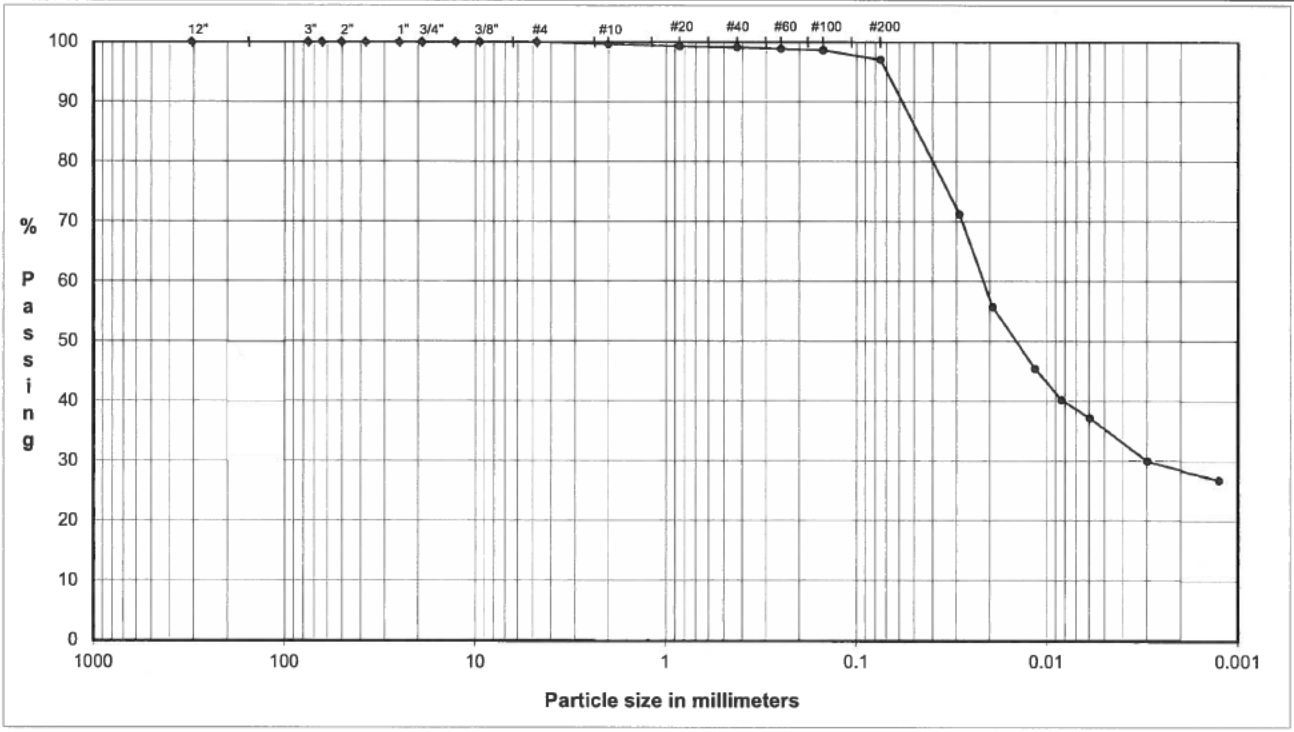
30.0 psi

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 INDEPENDENCE/AR**					
Sample: **PZ-1 UD 10.0-12.0'**	**Technician:** **FT/PWM** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **6/25/2018**	**Job Number:** **18103172**	**Figure:** **6**

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**
SAMPLE ID: **PZ-1** Depth: **15.0-17.0'**
TYPE: **UD**



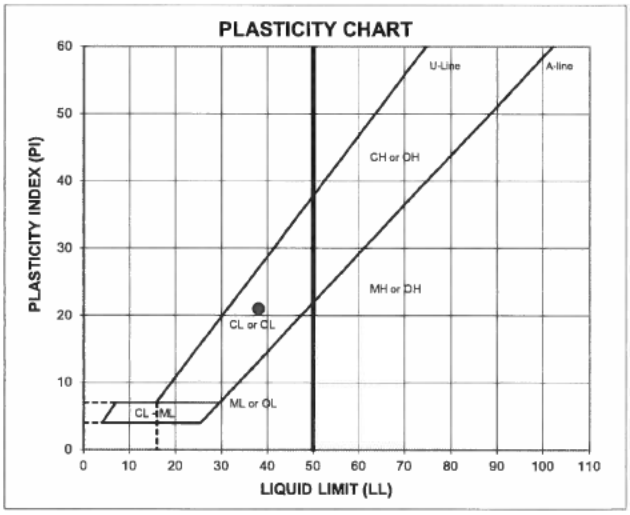
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

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	99.6	Coarse Sand	0.4
#20	0.85	99.2		
#40	0.43	99.1	Medium Sand	0.5
#60	0.25	98.8		
#100	0.15	98.6		
#200	0.075	97.0	Fine Sand	2.1

Hydrometer Analysis

(mm)	%Finer		
0.029	71.2		
0.019	55.7		
0.012	45.4	Fines	
0.0083	40.2	Silt or Clay	97.0
0.0060	37.1		
0.0030	29.9		
0.0013	26.8		



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
28.9	38	17	21	0.56

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

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

USCS: CL

TECH	TB/HH
DATE	6/28/18
CHECK	
REVIEW	
APPROVE	

Boring or Test Pit:	PZ-1		Boring or Test Pit:	PZ-1		Boring or Test Pit:	PZ-1	
Sample:	UD		Sample:	UD		Sample:	UD	
Depth:	15.0-17.0 ft		Depth:	15.0-17.0 ft		Depth:	15.0-17.0 ft	
Point No.:	1		Point No.:	2		Point No.:	3	
Initial			**Initial**			**Initial**		
Length =	6.052	in	Length =	6.088	in	Length =	6.055	in
Diameter =	2.835	in	Diameter =	2.765	in	Diameter =	2.808	in
Wet Mass =	2.738	lb	Wet Mass =	2.599	lb	Wet Mass =	2.632	lb
Area =	6.312	in^2	Area =	6.005	in^2	Area =	6.193	in^2
Volume =	38.203	in^3	Volume =	36.556	in^3	Volume =	37.497	in^3
Specific Gravity =	2.78	(ASTM D854)	Specific Gravity =	2.78	(ASTM D854)	Specific Gravity =	2.78	(ASTM D854)
Dry Mass of Solids =	2.168	lb	Dry Mass of Solids =	2.010	lb	Dry Mass of Solids =	2.007	lb
Moisture Content =	26.3%		Moisture Content =	29.3%		Moisture Content =	31.1%	
Wet Unit Weight =	123.8	pcf	Wet Unit Weight =	122.9	pcf	Wet Unit Weight =	121.3	pcf
Dry Unit Weight =	98.1	pcf	Dry Unit Weight =	95.0	pcf	Dry Unit Weight =	92.5	pcf
Void Ratio =	0.76		Void Ratio =	0.82		Void Ratio =	0.87	
Percent Saturation =	96%		Percent Saturation =	99%		Percent Saturation =	99%	
After Consolidation			**After Consolidation**			**After Consolidation**		
Length =	6.000	in	Length =	5.997	in	Length =	5.963	in
Diameter =	2.833	in	Diameter =	2.764	in	Diameter =	2.782	in
Area =	6.305	in^2 (Method B)	Area =	6.002	in^2 (Method B)	Area =	6.081	in^2 (Method B)
Volume =	37.830	in^3	Volume =	35.993	in^3	Volume =	36.259	in^3
Moisture Content =	26.9%		Moisture Content =	28.5%		Moisture Content =	29.1%	
Wet Unit Weight =	125.7	pcf	Wet Unit Weight =	124.0	pcf	Wet Unit Weight =	123.5	pcf
Dry Unit Weight =	99.0	pcf	Dry Unit Weight =	96.5	pcf	Dry Unit Weight =	95.7	pcf
Void Ratio =	0.75		Void Ratio =	0.79		Void Ratio =	0.81	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.99		B Parameter =	1.00		B Parameter =	0.98	
Shear Rate =	0.030%	/min.	Shear Rate =	0.091%	/min.	Shear Rate =	0.091%	/min.
t_{50} =	8.41	min.	t_{50} =	0.23	min.	t_{50} =	0.15	min.
Strain at Failure =	2.6%		Strain at Failure =	6.7%		Strain at Failure =	5.8%	
Cell Pressure =	94.0	psi	Cell Pressure =	108.0	psi	Cell Pressure =	122.0	psi
Back Pressure =	80.0	psi	Back Pressure =	80.0	psi	Back Pressure =	80.0	psi
Confining Pressure =	14.0	psi	Confining Pressure =	28.0	psi	Confining Pressure =	42.0	psi

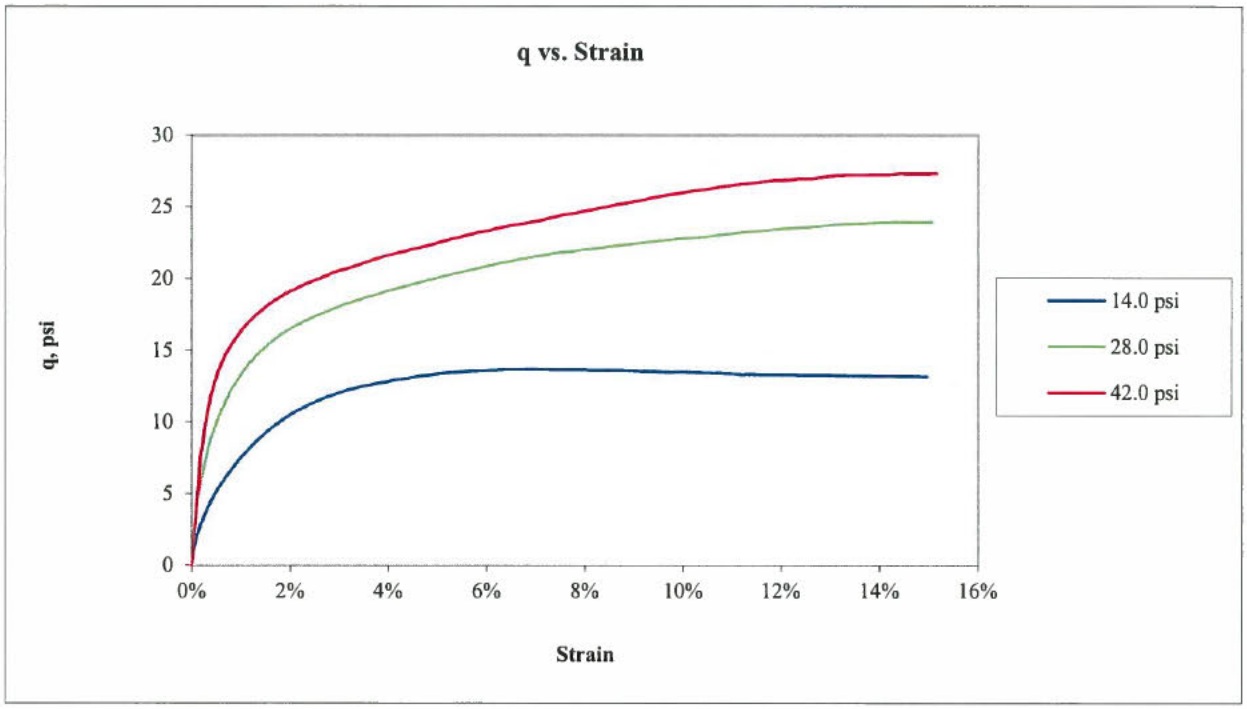
Notes: Sample description: (CL) SILTY CLAY, trace fine to coarse sand; yellowish gray.

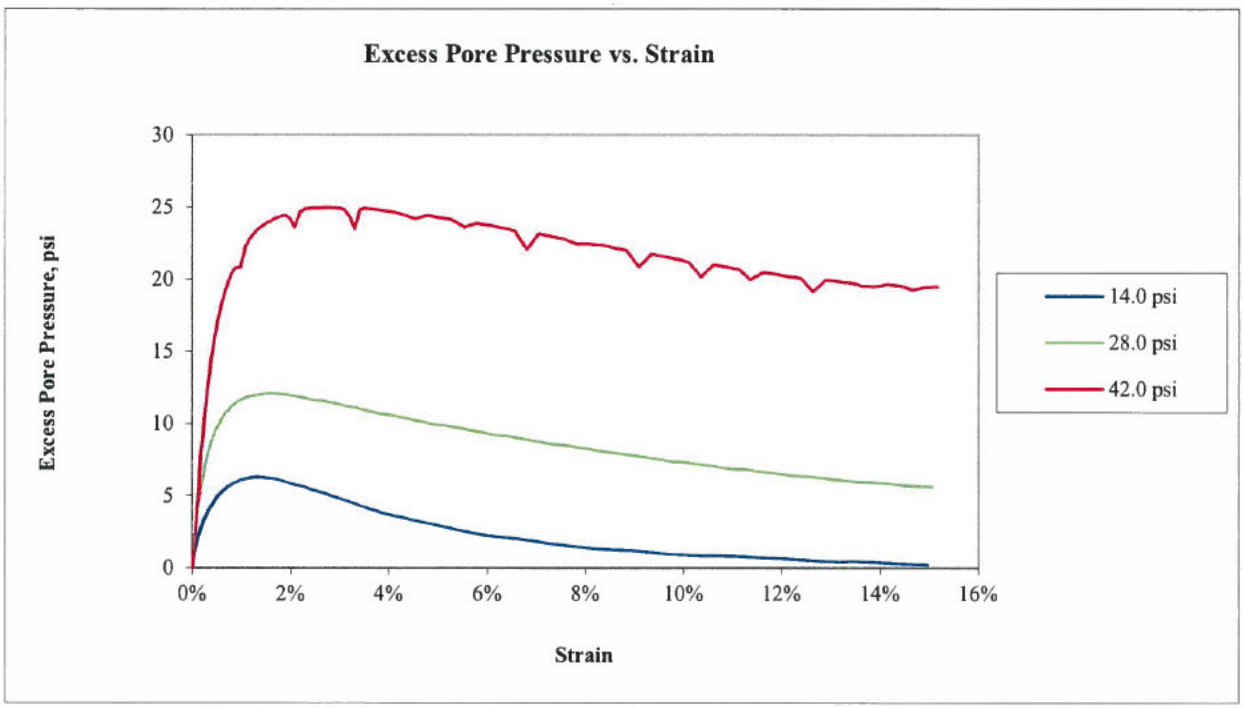
Atterberg limits: LL = 38 PL = 17 PI = 21 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 97% (ASTM D422, refer to separate report for gradation curve)

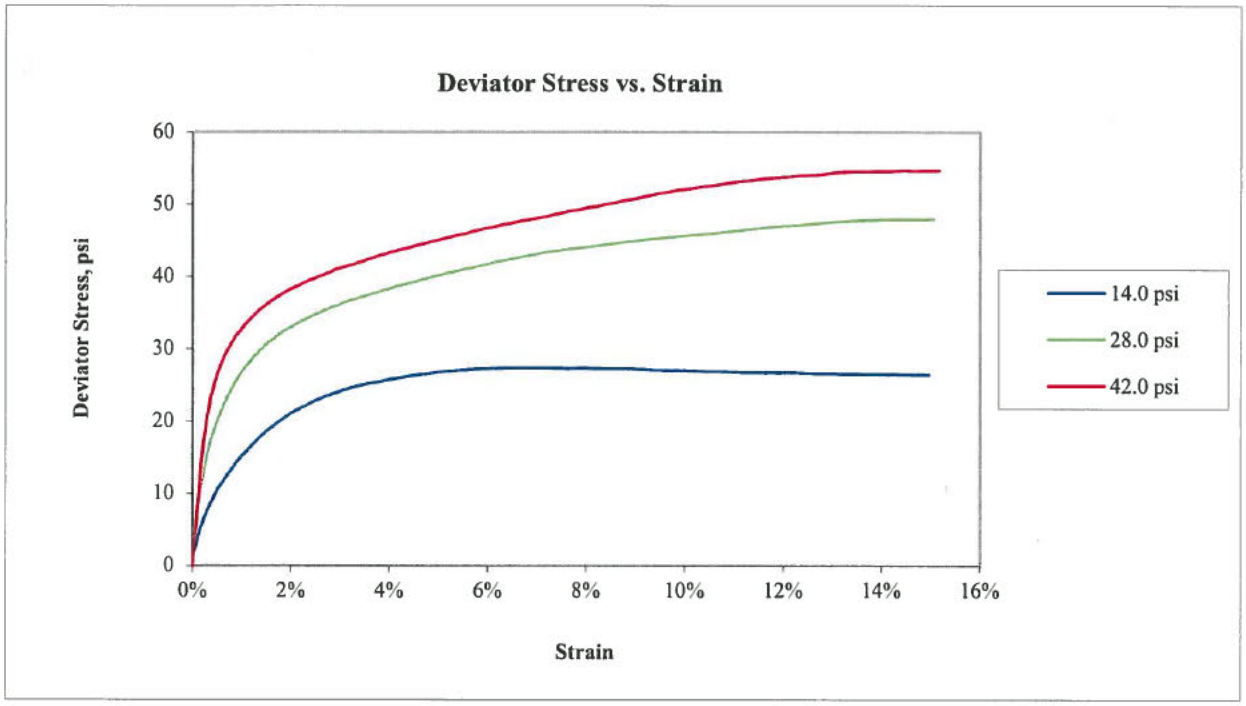
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ % strain
Membrane effect:	X	Corrected		Not Corrected

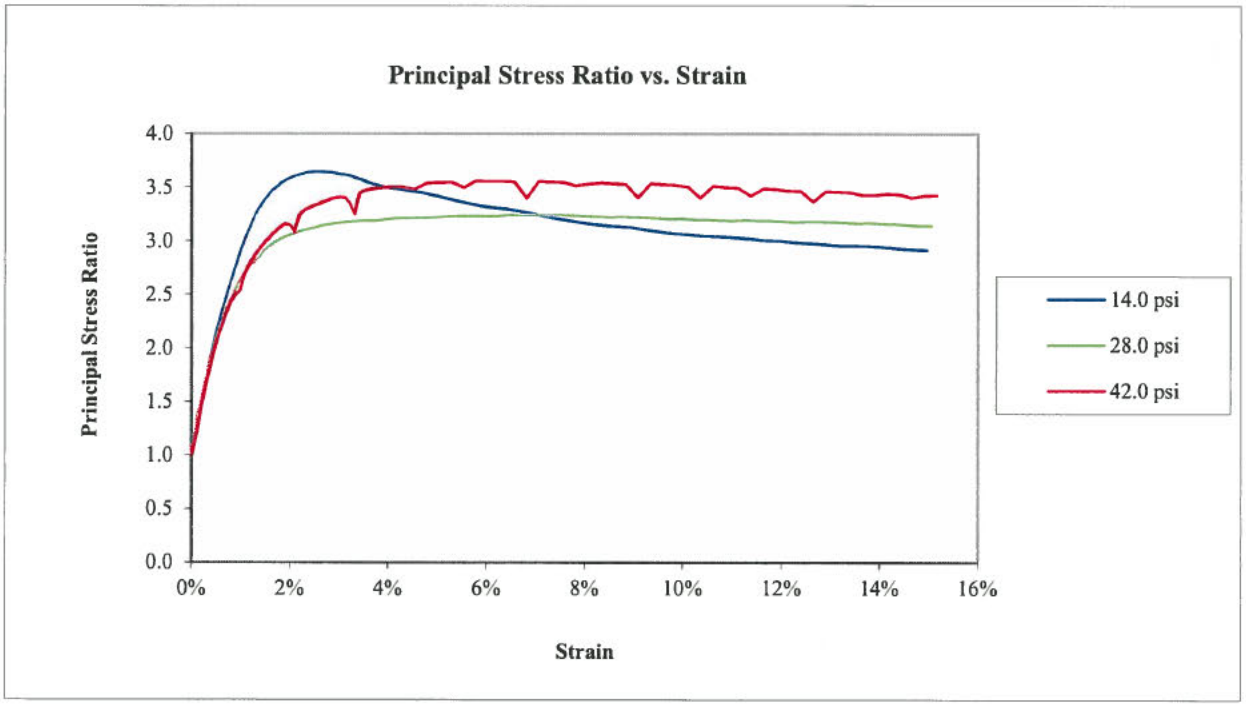
Golder Associates Inc. **Atlanta, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **FTN/ENTERGY INDEPENDENCE/AR**					
Sample: **PZ-1 UD 15.0-17.0'**	**Technician:** **FT/PWM** **Checked:**	**Reviewed:** **Approved:**	**Start Date:** **6/29/2018**	**Job Number:** **18103172**	**Figure:** **1**





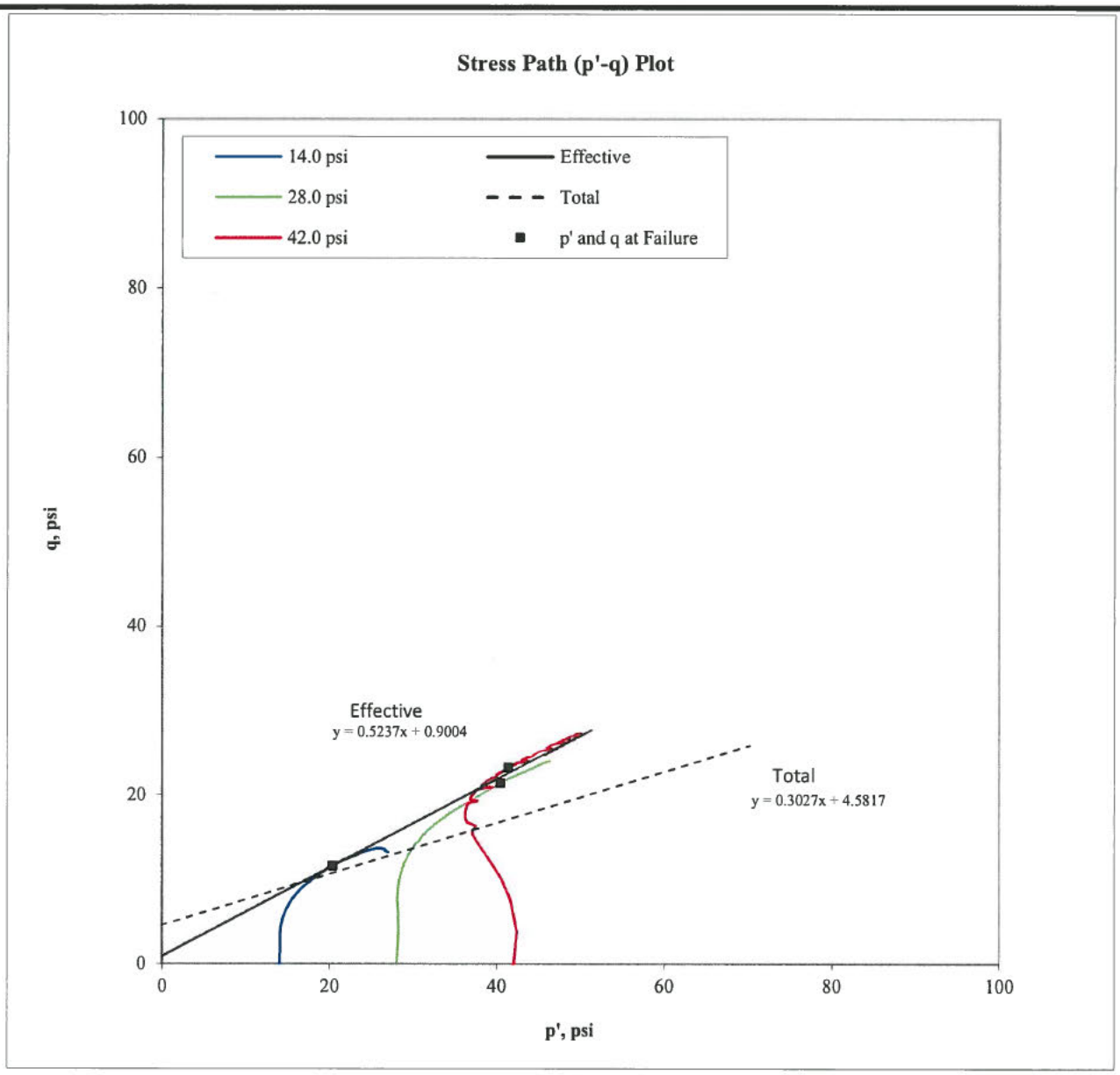
Golder Associates Inc. Atlanta, Georgia	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT q AND EXCESS PORE PRESSURE PLOTS				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: PZ-1 UD 15.0-17.0'	Technician: FT/PWM Check:	Reviewed: Approved:	Start Date: 6/29/2018	Job Number: 18103172	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 INDEPENDENCE/AR**					
Sample:	**Technician:** **FT/PWM**	**Reviewed:**	**Start Date:**	**Job Number:**	**Figure:**
	Check:	**Approved:**			
PZ-1 UD 15.0-17.0'			**6/29/2018**	**18103172**	**3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
14.0	25.6	20.4	11.6
28.0	49.4	40.4	21.4
42.0	65.2	41.3	23.2

Effective

α ' =	27.6	degree
a' =	0.9	psi

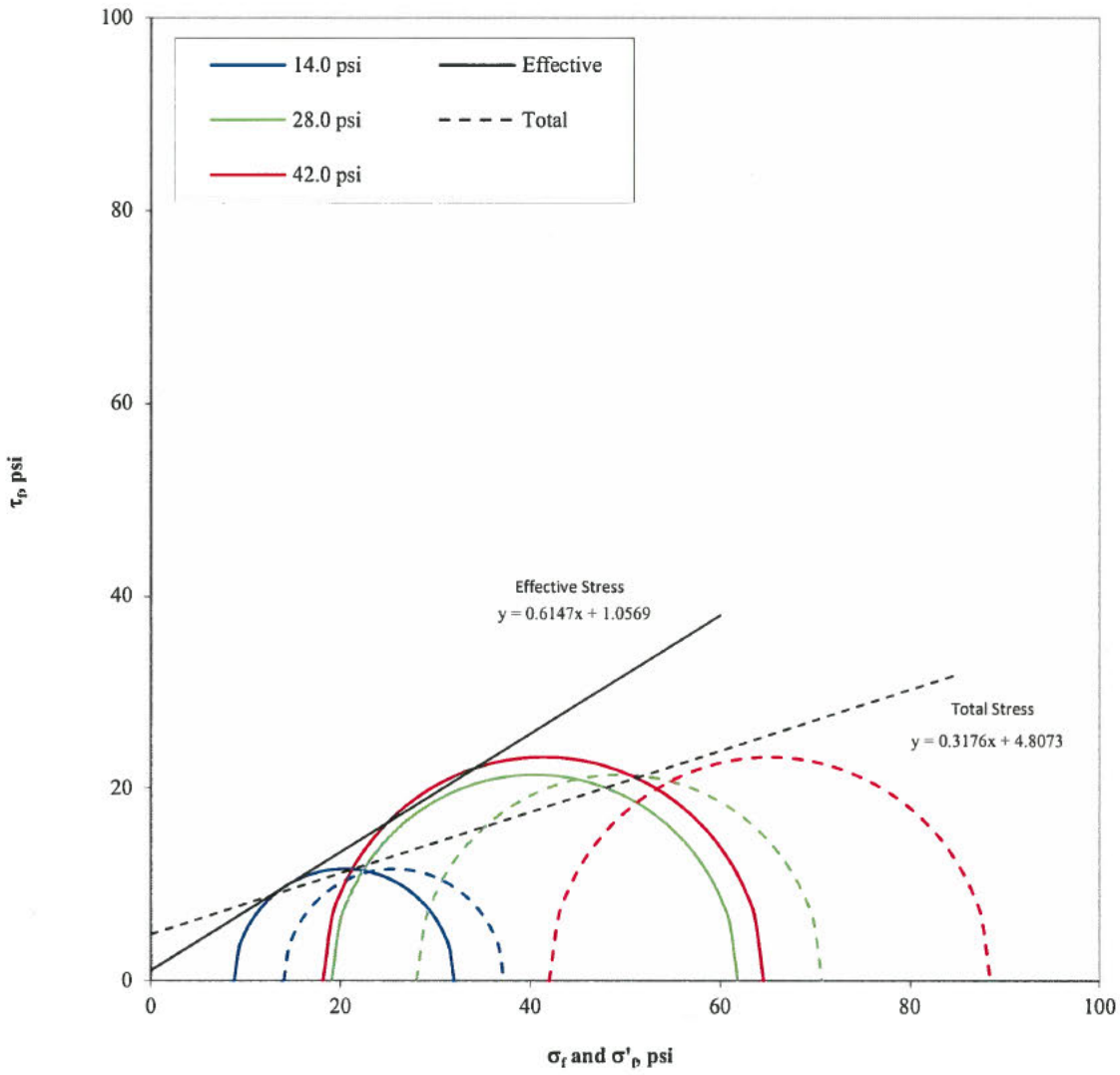
Total

α =	16.8	degree
a =	4.6	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 STRESS PATH PLOT				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: PZ-1 UD 15.0-17.0'	**Technician:** FT/PWM **Check:** AWM	**Reviewed:** **Approved:**	**Start Date:** 6/29/2018	**Job Number:** 18103172	**Figure:** 4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'1 at failure (psi)	σ'3 at failure (psi)	σ1 at failure (psi)	σ3 at failure (psi)
14.0	31.9	8.8	37.2	14.0
28.0	61.8	19.1	70.8	28.0
42.0	64.6	18.1	88.4	42.0

Effective

ϕ ' =	31.6	degree
c' =	1.1	psi

Total

ϕ =	17.6	degree
c =	4.8	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 INDEPENDENCE/AR**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
PZ-1 UD 15.0-17.0'	FT/PWM Check:	Approved:	6/29/2018	18103172	5

14.0 psi

28.0 psi

42.0 psi

Golder Associates Inc. **Atlanta, Georgia**	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMENS PHOTOGRAPH - 14.0 | 28.0 | 42.0 psi				
Job Short Title: FTN/ENTERGY INDEPENDENCE/AR					
Sample: PZ-1 UD 15.0-17.0'	**Technician:** FT/PWM **Check:**	**Reviewed:** **Approved:**	**Start Date:** 6/29/2018	**Job Number:** 18103172	**Figure:** 6

JULY 2018

18103172

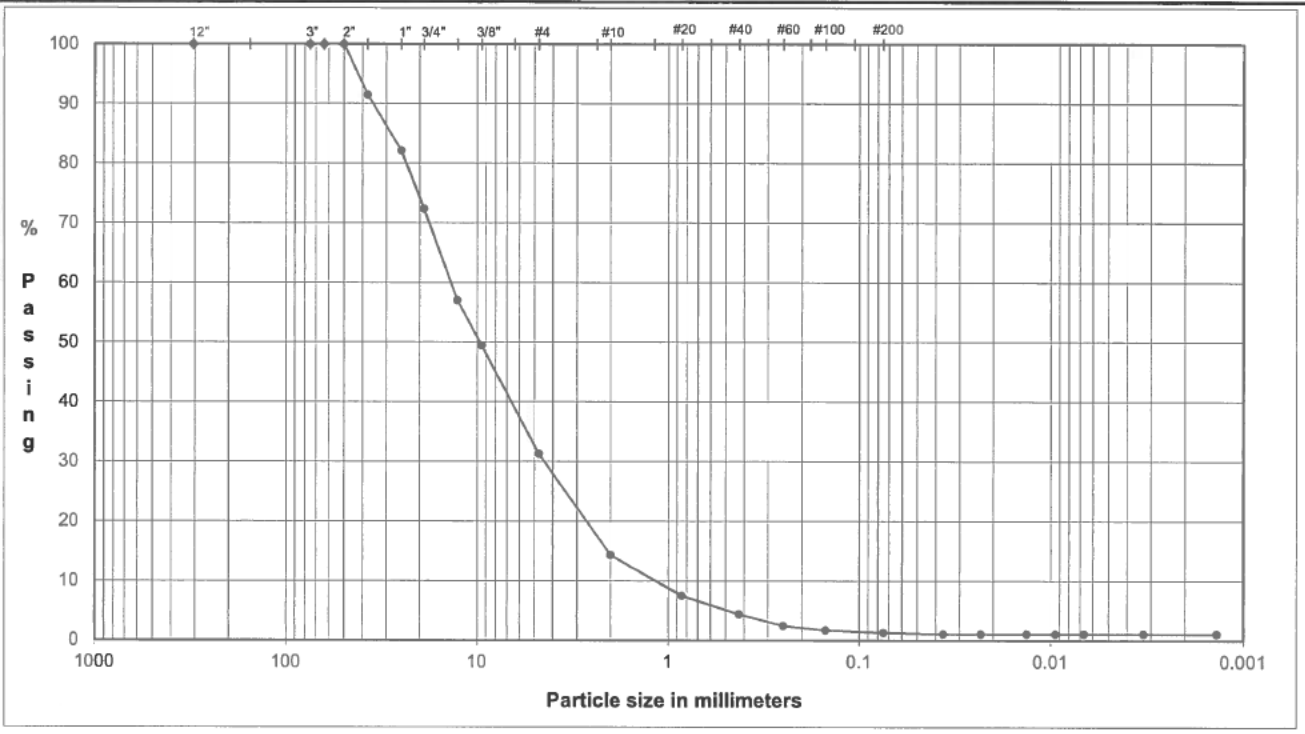
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **FTN/ENTERGY INDEPENDENCE/AR**

SAMPLE ID: **PZ-1** - Depth: **45.0-47.0'**

TYPE: **Bag**



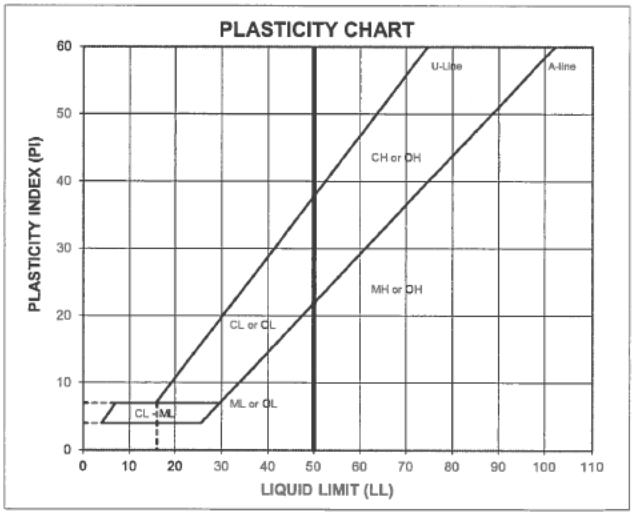
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

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	91.5		
1.0"	25.0	82.2		
0.75"	19.0	72.3	Coarse Gravel	27.7
0.50"	12.7	57.0		
0.375"	9.5	49.4		
#4	4.8	31.3	Fine Gravel	41.1
#10	2.00	14.3	Coarse Sand	17.0
#20	0.85	7.5		
#40	0.43	4.4	Medium Sand	9.9
#60	0.25	2.4		
#100	0.15	1.7		
#200	0.075	1.3	Fine Sand	3.0

Hydrometer Analysis

(mm)	%Finer		
0.037	1.1		
0.023	1.1		
0.013	1.1	Fines	
0.0095	1.1	Silt or Clay	1.3
0.0067	1.1		
0.0033	1.1		
0.0014	1.1		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
7.6	NP	NP	NP	NP

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

DESCRIPTION: sandy GRAVEL, fine to coarse, fine to coarse sand, trace fines; yellowish brown.

USCS: GW

TECH	TJ/HH/BA
DATE	7/30/18
CHECK	
REVIEW	
APPROVE	

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

Golder Associates Inc.

APPENDIX C

Geophysical Survey, East Recycle Pond Bottom

FINAL REPORT
RECYCLE POND SURVEY
INDEPENDENCE STEAM ELECTRIC STATION
INDEPENDENCE COUNTY, ARKANSAS

Prepared for FTN Associates, Ltd.
Little Rock, Arkansas

Prepared by GeoView, Inc.
St. Petersburg, Florida

September 24, 2018

Ms. Dana Derrington, PE, PG
FTN Associates, Ltd.
3 Innwood Circle, Suite 220
Little Rock, AR 72211

Subject: Transmittal of Final Report for Geophysical Survey
Independence Steam Electric Station – Recycle Pond Survey
Independence County, Arkansas
GeoView Project Number 26896 Rev. 2

Dear Ms. Derrington,

GeoView, Inc. (GeoView) is pleased to submit the final report which summarizes and presents the results of the geophysical survey conducted at the above referenced site. Sub-bottom profiling was used to map the bottom of the of the East Recycling Pond. GeoView appreciates the opportunity to have assisted you on this project. If you have any questions or comments about the report, please contact us.

Sincerely,
GEOVIEW, INC.

Chris Taylor, P.G.
Vice President
Florida Professional Geologist
Number 2256

Merritt McLean
Geophysicist

1.0 Introduction

A marine geophysical survey was conducted on the east recycle pond located at the Independence Steam Electric Station in Independence County, Arkansas. The purpose of the study was to map the bottom elevation eastern pond. The east recycle pond was approximately 720 by 350 feet in size. The western pond was not accessible at the time of the survey due to the pond being drained of water. The survey was conducted on June 12 and 13, 2018. The location of the geophysical survey area is provided on Figures 1 and 2.

2.0 Description of Geophysical Investigation

The geophysical survey was conducted using a sub-bottom profiling towfish. The sub-bottom data was collected using an Edgetech 3100 system with a 216 towfish. The Edgetech system is a full Spectrum CHIRP imaging system. A frequency range of 2-16 kHz was used. During the survey, the towfish was situated 1.0 feet below the surface of the water. The high-power, low-frequency system was chosen to map the original pond bottom. The equipment was mounted to an unmanned, portable pontoon boat. The boat was pulled using ropes along each transect line. Photographs showing the equipment configuration are provided in Appendix 2.

The data was collected on east/west oriented transects spaced approximately 50 feet apart. The positions of the geophysical transect lines were recorded using a differential Trimble Geo6000 Global Positioning System (GPS). Real time differential corrections were applied to the GPS positions.

The data was processed using Edgetech Discover software. The two way travel time distances to the pond bottom were digitized and depths/elevations were calculated using a velocity of 4,921 feet per second.

The digitized elevations were exported into an Excel spreadsheet and converted for use in Surfer. The coordinates were converted to Arkansas North State Plane, NAD2011 (US Survey feet) using Trimble Pathfinder and the elevations were converted to State Plane NAVD88 using a topographic site survey provided by FTN.

3.0 Survey Results

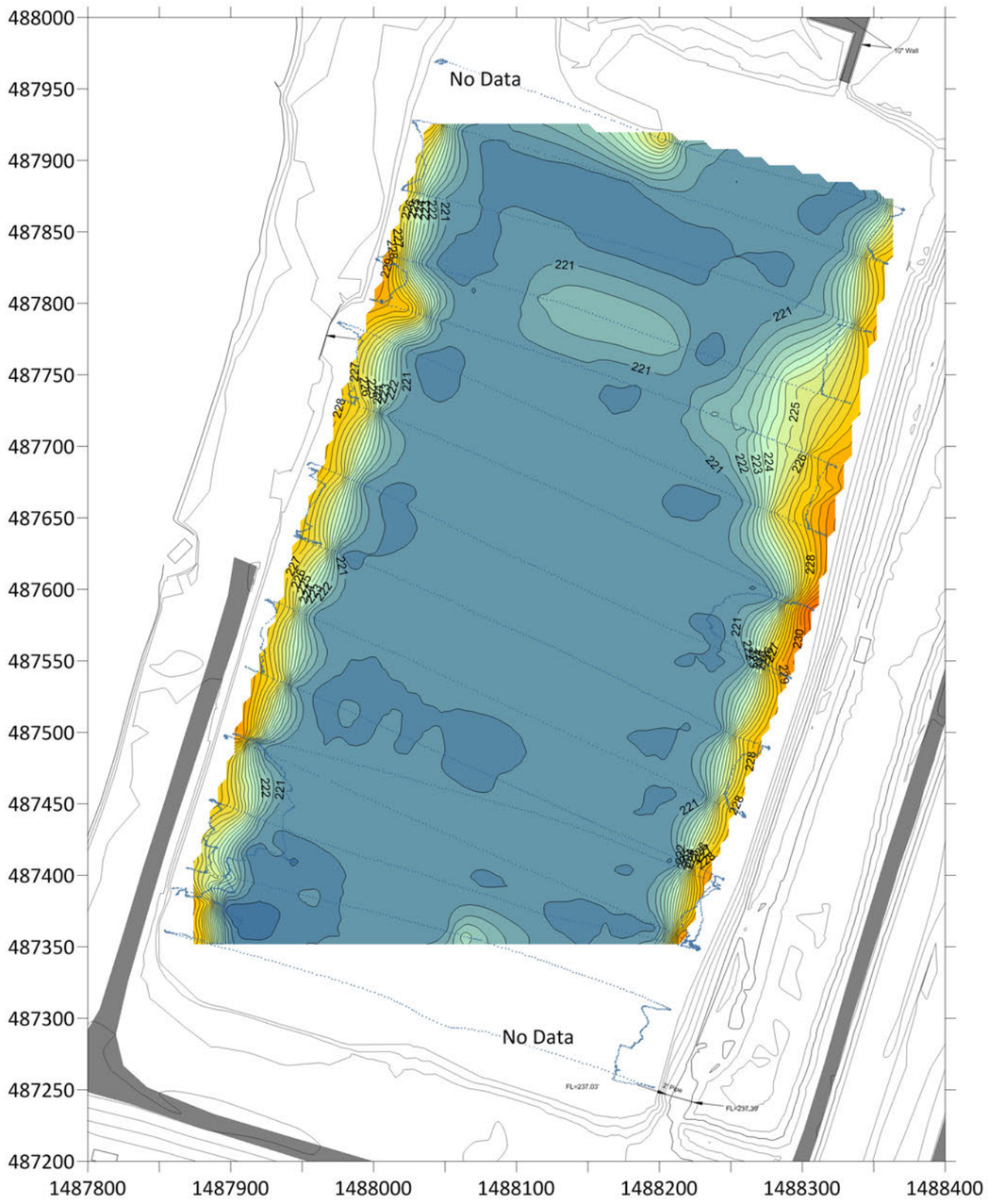
Results of the survey were able to provide accurate sub-bottom information for the elevation of the bottom of the east recycle pond. A contour map showing the elevation of the bottom of the pond is shown on Figure 1.

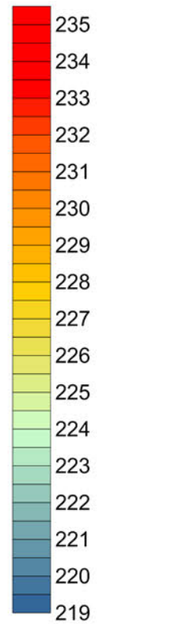
In general, the bottom elevation of the pond was approximately 220 to 221 feet. No valid data was able to be collected in the far southern or northwestern portion of the pond due to the shallow water.

A discussion of the limitations of the geophysical methods used in this investigation is provided in Appendix 3.

APPENDIX 1
FIGURES

1. Coordinates: US State Plane, Arkansas North, NAD 2011, Feet
2. Vertical Datum: NAVD88, Feet
3. Elevation of Water at Time of Survey: 236 Feet
4. Towfish Located 1 foot Below Water Surface





Elevation of Pond Bottom
(NAVD 88, Feet)

NORTH

0 50 100

SCALE: 1"= 100'

EXPLANATION

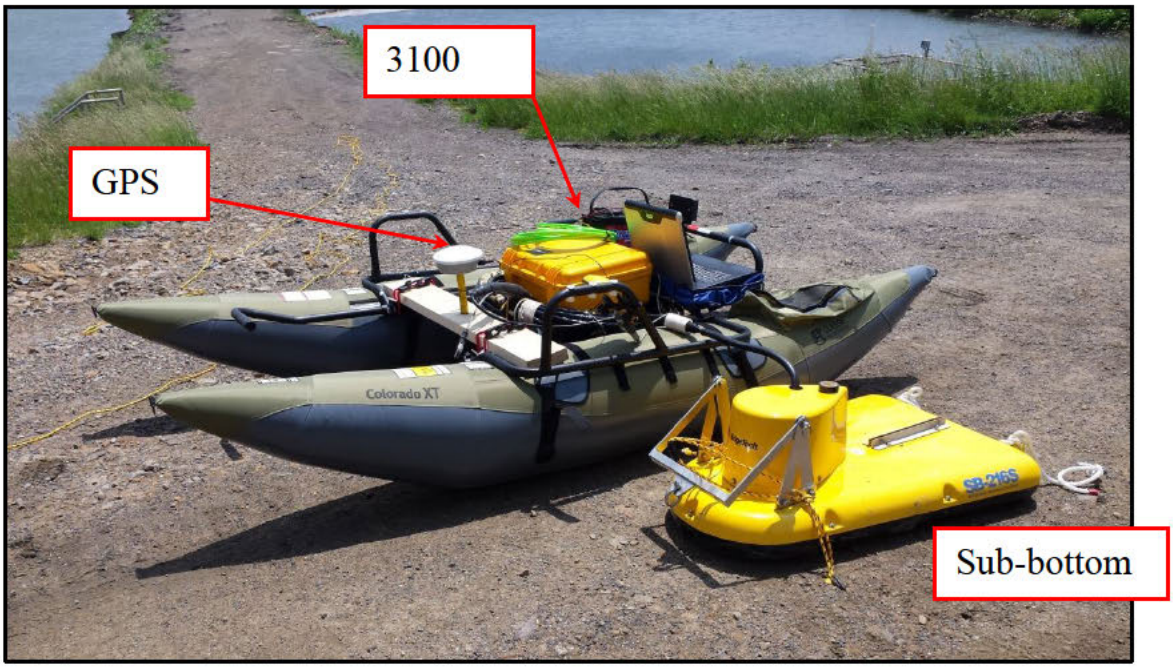
ELEVATION CONTOUR OF POND BOTTOM (FEET)

SUB-BOTTOM TRANECT LINES

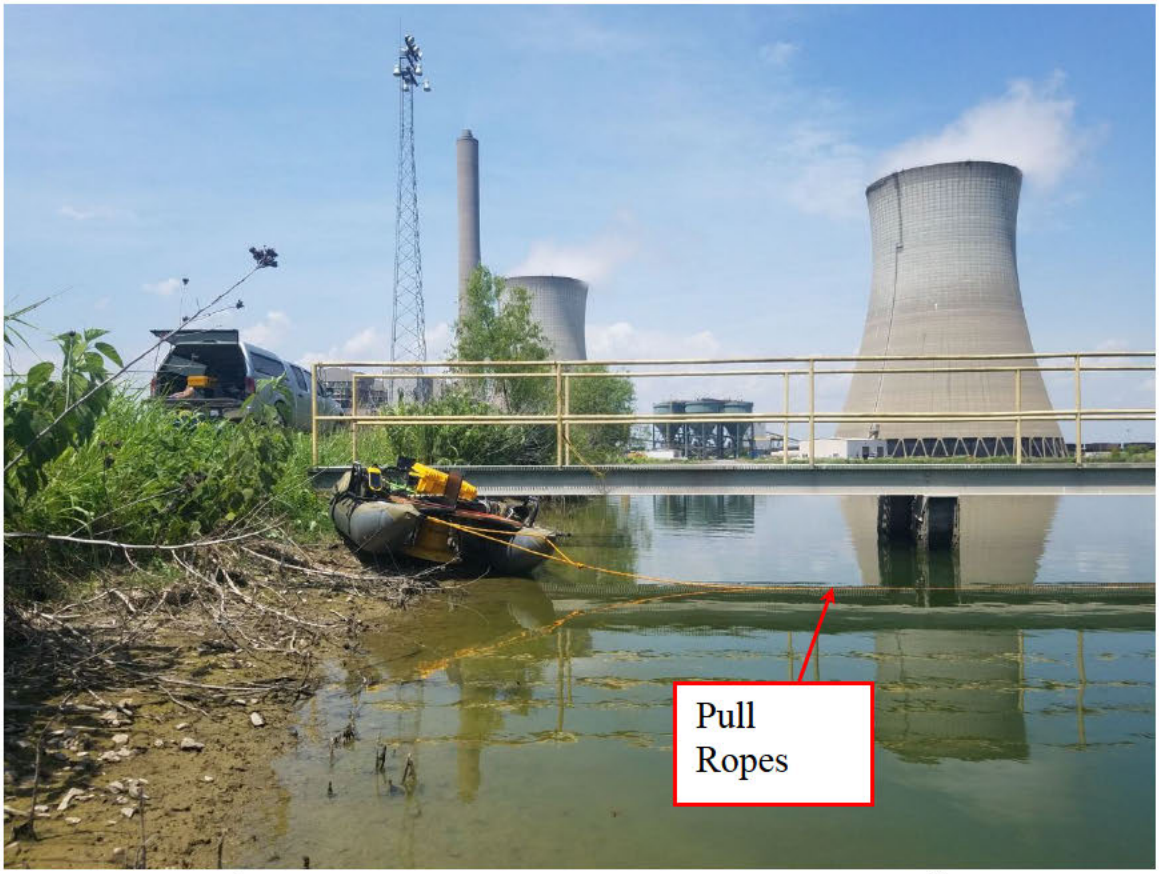
GeoView A geophysical services company

	FIGURE 1	**INDEPENDENCE STEAM ELECTRIC STATION** **INDEPENDENCE COUNTY, ARKANSAS**
	ELEVATION OF BOTTOM OF POND	**FTN ASSOCIATES, LTD** **LITTLE ROCK, ARKANSAS**
		PROJECT: 26896 **DATE: 09/24/18**

APPENDIX 2
PHOTOGRAPHS



Picture Showing the GPS, 3100 Topside Unit and 216 Sub-bottom Unit (towfish)



Data Collection

APPENDIX 3
LIMITATIONS

Edgetech 3100 XS system

The 3100- Sub-bottom Profiling System is a Full Spectrum CHIRP imaging system. It was used with a SB-216S towfish. The 3100- system uses specially designed transmitters with low Q wideband characteristics best suited for CHIRP transmissions. Two hydrophones are installed in the tow vehicle to reduce acoustic scattering from the sides. This results in a narrower across track beam pattern, enabling the 3100 to have both high resolution and ample depth of penetration. For this survey, GeoView mounted the fish directly under the center of the tow raft. A GPS antenna was mounted directly over the transducer.

Limitations of geophysical data

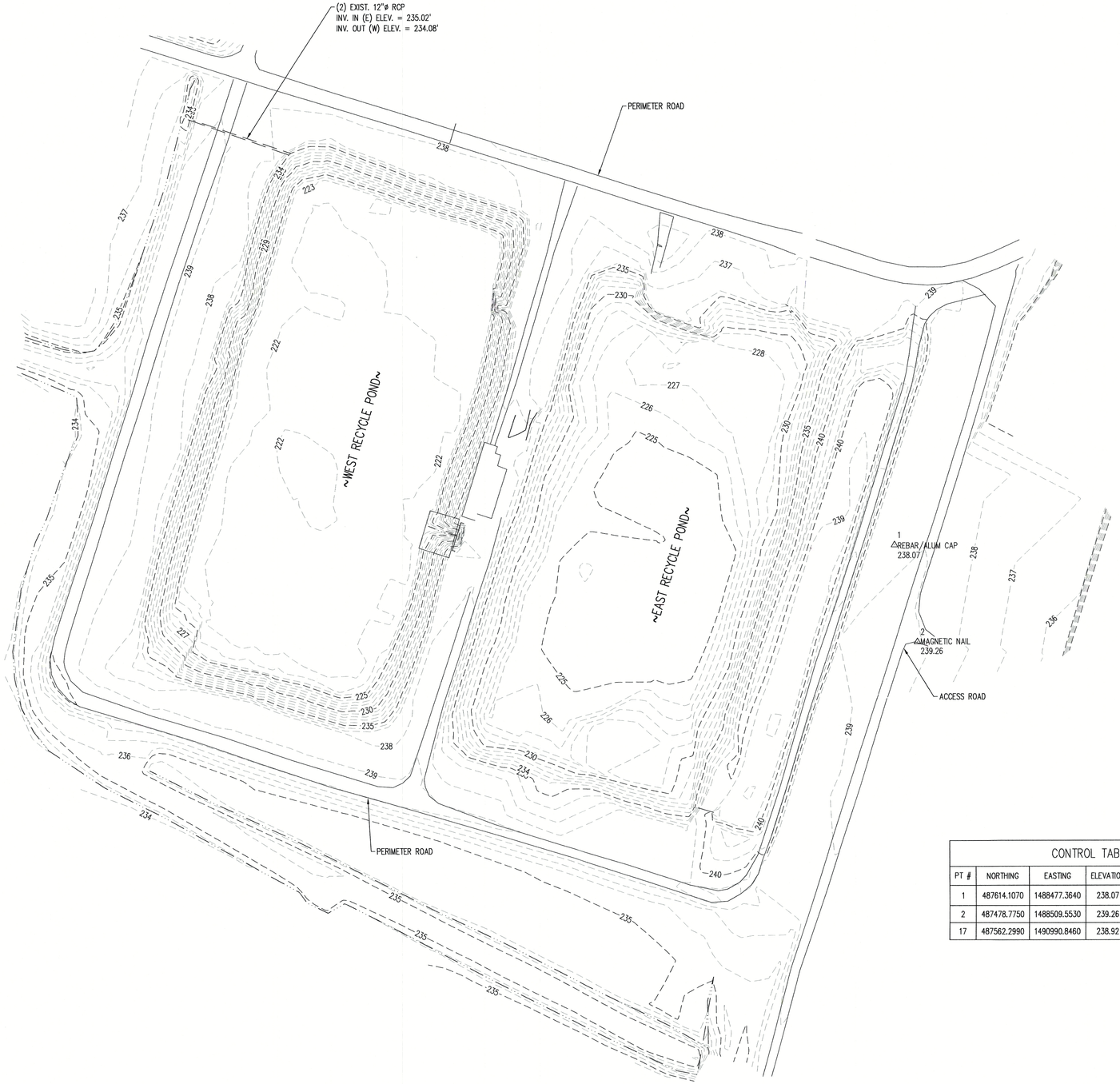
The marine environment, together with its boundaries, forms a remarkably complex medium for the propagation of sound. Both signal loss and interference result from interactions with boundaries and components within the water column, causing the source to be delayed, distorted and weakened. The main components affecting sound propagation are spreading loss and attenuation loss.

The ability of geophysical to collect interpretable information at a project site is limited by the attenuation (absorption) of the geophysical signal by underlying earth materials. Once the geophysical signal has been attenuated at a particular depth, information regarding deeper geological conditions will not be obtained. Geophysical data can only resolve subsurface features that have a sufficient density contrast between the feature in question and surrounding earth materials. If an insufficient contrast is present, the subsurface feature will not be identified.

GeoView can make no warranties or representations of geological conditions that may be present beyond the depth of investigation or resolving capability of the geophysical equipment or in areas that were not accessible to the geophysical investigation.

APPENDIX D

Ground Surface Survey, West Recycle Pond Bottom



SEE SURVEYOR'S NOTE #2

GENERAL NOTES:

1. THIS SURVEY REPRESENTS A TOPOGRAPHIC SURVEY OF THE INDEPENDENCE RECYCLE PONDS.
2. COORDINATES ARE NAD83(2011) ARKANSAS NORTH ZONE (0301 US SURVEY FEET) PROVIDED BY ENTERGY. ELEVATIONS ARE BASED ON FOUND MONUMENT SC-1 (LOCAL CONTROL).
3. FIELD SURVEY WAS PERFORMED ON JULY 9TH, 10TH, 11TH, AND AUGUST 9TH, 2018.

CONTROL TABLE

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	487614.1070	1488477.3640	238.07	REBAR/ALUM CAP
2	487478.7750	1488509.5530	239.26	MAGNETIC NAIL
17	487562.2990	1490990.8460	238.92	BRASS DISK IN CONC. SC-1

LEGEND

235 MAJOR CONTOUR INDEX

236 MINOR CONTOUR

80 80 60 20 0 40 80 160

SCALE: 1" = 80'

REV. #	REV. DATE	BY	REVISIONS

B&F
ENGINEERING, INC.
928 AIRPORT ROAD
HOT SPRINGS, AR 71913
(PH) 501-767-2366
(FAX) 501-767-6859
(EMAIL) info@bnfeng.com

CERTIFICATE OF AUTHORIZATION
B & F ENGINEERING, INC.
No. 110
ARKANSAS

LICENSED PROFESSIONAL SURVEYOR
STATE OF ARKANSAS
NO. 1120
SIGNATURE
10-01-18
JAMES W. MONTGOMERY

TOPOGRAPHIC SURVEY
555 POINT FERRY ROAD, NEWARK, AR
INDEPENDENCE RECYCLE PONDS
INDEPENDENCE COUNTY ARKANSAS

	BY	DATE
Design		
Drawn	RLS	7/18
Checked		
Survey	TAW	7/18
Fld.Bk. #	2177	
Rev. #		

B&F PROJ. 7-4183-0201
FILE NAME: 001-FINAL
ISSUE DATE: 10/01/18

SCALE: 1"=80'

1
1