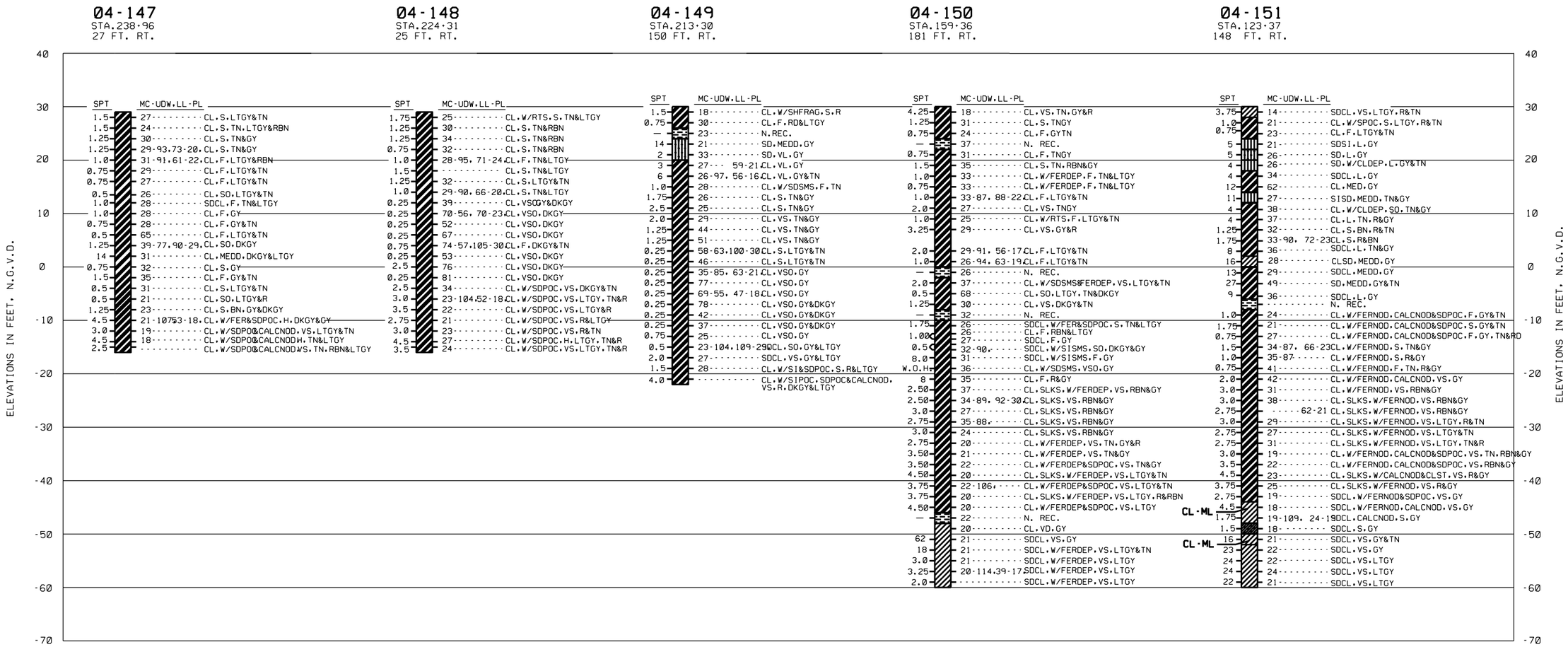


NOTES:

1. SOILS HAVE BEEN CLASSIFIED IN ACCORDANCE WITH ASTM 2487-93 "CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES (UNIFIED SOILS CLASSIFICATION SYSTEM). CONSISTENCY OF SOILS SUCH AS SOFT, MEDIUM, HARD, DENSE, DENSE, ETC., ARE RELATIVE TERMS BASED ON ESTIMATED UNDISTURBED SHEAR STRENGTH OF THE MATERIAL AS DETERMINED BY VISUAL CLASSIFICATION, POCKET PENETROMETER TESTING AND PENETRATION RESISTANCE DURING SAMPLING.

2. FIGURES TO THE RIGHT OF BORING LOGS ARE WATER CONTENTS IN PERCENT OF THE DRY WEIGHT, DRY DENSITY, LIQUID LIMIT, AND PLASTIC LIMIT (MC-UDW),(LL-PL).

3. VALUES TO THE LEFT OF BORING LOGS ARE BLOWS PER FOOT OF PENETRATION FROM STANDARD PENETRATION TESTING EXPRESSED IN WHOLE NUMBERS, OR POCKET PENETROMETER TEST RESULTS EXPRESSED IN TONS PER SQUARE FOOT. VALUES NOTED WITH A "T" INDICATE TORVANE READINGS (TSF) IN COHESIVE MATERIAL.

4. FIGURES TO THE RIGHT OF BORING LOGS ARE WATER CONTENTS IN PERCENT OF THE DRY WEIGHT, DRY DENSITY, LIQUID LIMIT, PLASTIC LIMIT, AND BAR LINEAR SHRINKAGE (MC-UDW),(LL-PL),(B.L.S.). FIGURES TO THE LEFT OF BORING LOGS ARE BLOWS PER FOOT OF PENETRATION FROM STANDARD PENETRATION TESTING.

5. BORINGS WERE DRILLED USING WET ROTARY DRILLING TECHNIQUES AND UNDISTURBED SAMPLES WERE RECOVERED WITH A 3-INCH DIAMETER THIN WALL SAMPLER WHERE COHESIVE MATERIALS WERE ENCOUNTERED AND WHERE COHESIONLESS MATERIALS WERE ENCOUNTERED. DISTURBED SAMPLES WERE TAKEN WITH A SPLIT SPOON SAMPLER DURING PERFORMANCE OF STANDARD PENETRATION TESTING.

6. WATER TABLE LEVELS SHOWN ON BORING LOGS WERE DETERMINED AFTER DRILLING BORINGS BY MEASURING THE TOP OF FLUID LEVELS ON THE BORINGS. INASMUCH AS WET ROTARY DRILLING TECHNIQUES AND DRILLING MUDS WERE USED TO DRILL THE HOLES, THE LEVEL OF DRILLING FLUIDS IN THE BORES MAY NOT HAVE STABLILIZED TO THE LEVEL OF THE ACTUAL WATER TABLE. ADDITIONALLY, WATER TABLES IN THE FIELD ARE LIKELY TO FLUCTUATE DEPENDING ON WEATHER CONDITIONS. THEREFORE, SOME VARIATION SHOULD BE ANTICIPATED BETWEEN WATER TABLES INDICATED AND WATER TABLES ENCOUNTERED IN THE FIELD.

VISUAL CLASSIFICATIONS:

BL BLACK	FER FERROUS	R RED(DISH)	SMS SEAMS
BN BROWN(ISH)	GY GRAY(ISH)	RTS ROOT(S)	SO SOFT
CALC CALCAREOUS	LT LIGHT	S STIFF	ST STONE(S)
CL CLAY(EY)	MED MEDIUM	SD SAND(Y)	TN TAN(NISH)
D DENSE	NOD NODULES	S STIFF	W WITH
DEP DEPOSIT(S)	N.REC NO RECOVERY	SD SAND(Y)	W.O.H. WEIGHT OF HAMMER
DK DARK	POC POCKET(S)	SI SILTY	
F FIRM	PT PEAT	SLKS SLICKEN SIDES	

LABORATORY CLASSIFICATIONS:

CH INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.

CL INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, LEAN CLAYS.

ML INORGANIC SILTS AND VERY FINE SANDS, WITH SLIGHT PLASTICITY.

SC CLAYEY SANDS, SAND-CLAY MIXTURES.

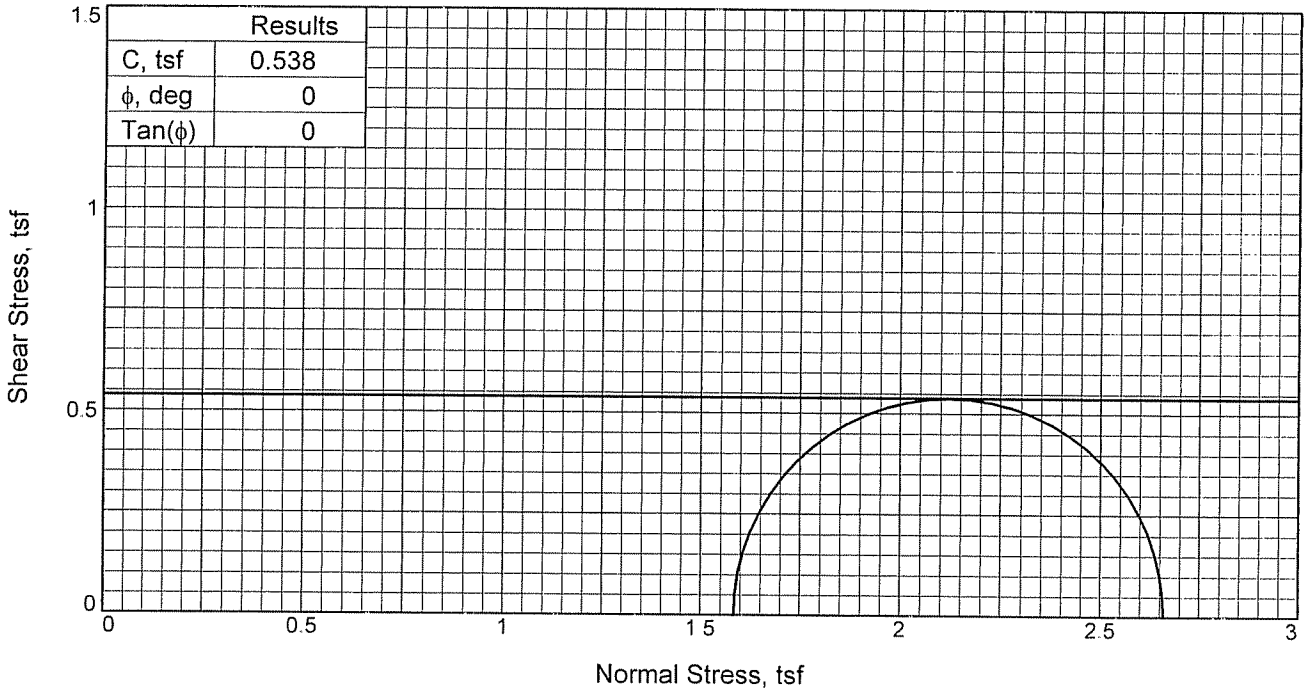
NO RECOVERY OF SAMPLE.

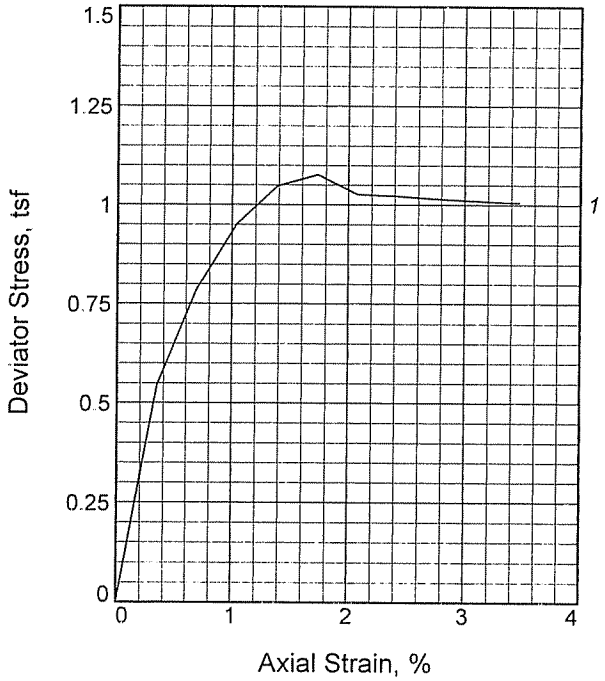
SM SILTY SANDS, SAND-SILT MIXTURES.

LOGS OF BORINGS

X-000

File No.





Sample No.		1
Initial	Water Content,	32.7
	Dry Density, pcf	89.9
	Saturation,	98.8
	Void Ratio	0.9089
	Diameter, in.	2.86
	Height, in.	5.77
At Test	Water Content,	32.7
	Dry Density, pcf	89.9
	Saturation,	98.8
	Void Ratio	0.9089
	Diameter, in.	2.86
	Height, in.	5.77
Strain at peak, %		1.7
Back Pressure, tsf		0.00
Cell Pressure, tsf		1.58
Fail. Stress, tsf		1.08
Strain, %		1.7
Ult. Stress, tsf		1.08
Strain, %		
σ_1 Failure, tsf		2.66
σ_3 Failure, tsf		1.58

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Tan and light gray FAT CLAY, slickensides

LL= 72 **PL=** 23 **PI=** 49

Assumed Specific Gravity= 2.75

Remarks:
Failure Type: Slickesides
Test Method: ASTM D 2850

Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151

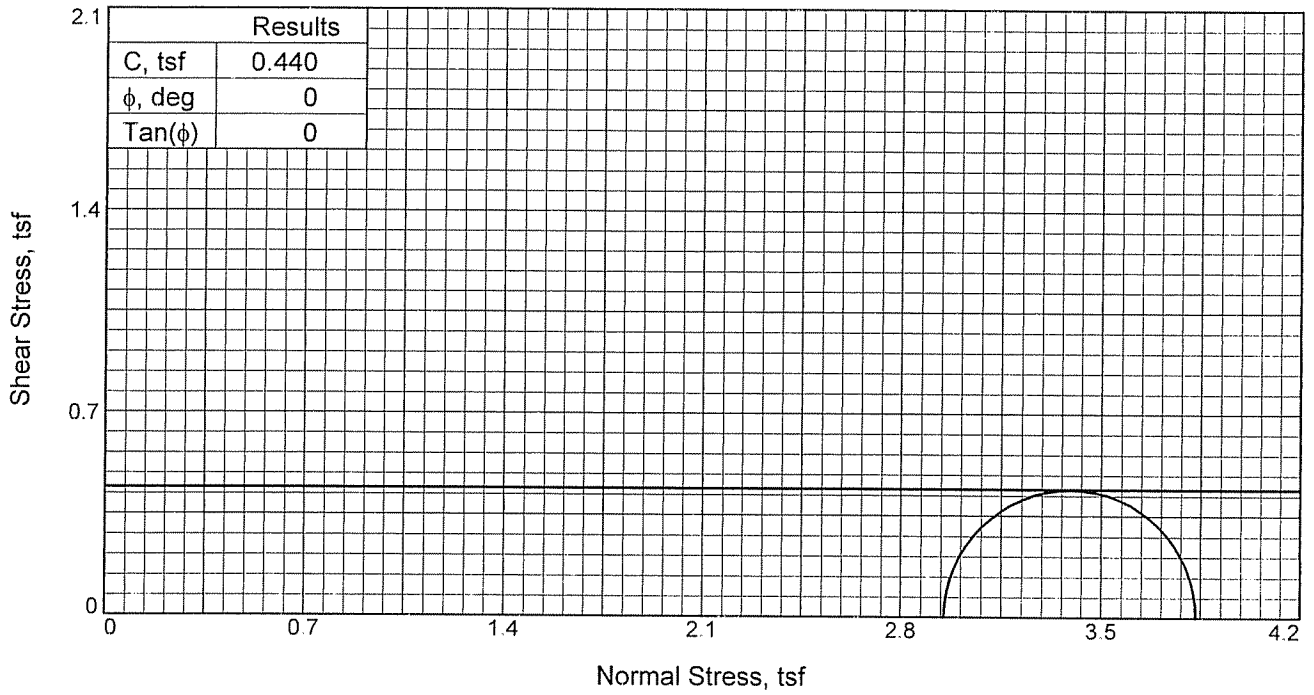
Sample Number: 13

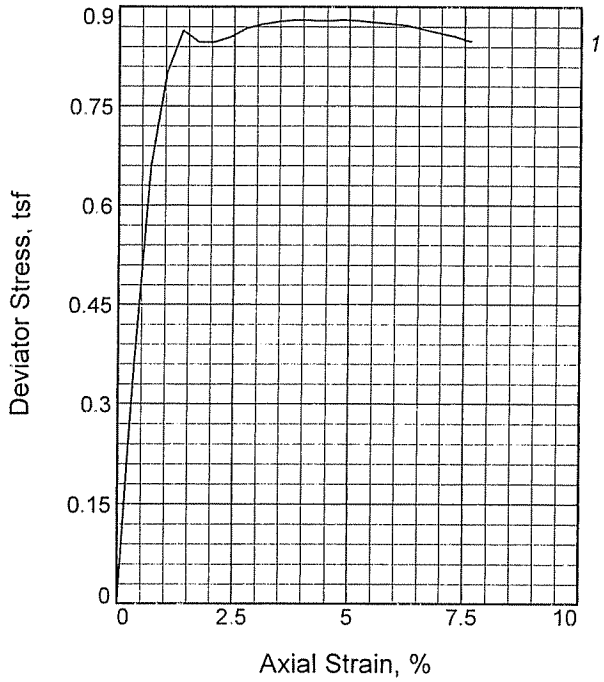
Proj. No.: 03-859-028 **Date:** 12/30/04

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure D-15





Sample No.		1
Initial	Water Content,	34.5
	Dry Density, pcf	86.5
	Saturation,	96.5
	Void Ratio	0.9847
	Diameter, in.	2.85
	Height, in.	5.77
At Test	Water Content,	34.5
	Dry Density, pcf	86.5
	Saturation,	96.5
	Void Ratio	0.9847
	Diameter, in.	2.85
	Height, in.	5.77
Strain at peak, %		4.9
Back Pressure, tsf		0.00
Cell Pressure, tsf		2.95
Fail. Stress, tsf		0.88
Strain, %		4.9
Ult. Stress, tsf		0.88
Strain, %		
σ_1 Failure, tsf		3.83
σ_3 Failure, tsf		2.95

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Tan and light gray FAT CLAY

Assumed Specific Gravity= 2.75

Remarks:
Failure Type: Bulge/65 degree shear
Test Method: ASTM D 2850

Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151

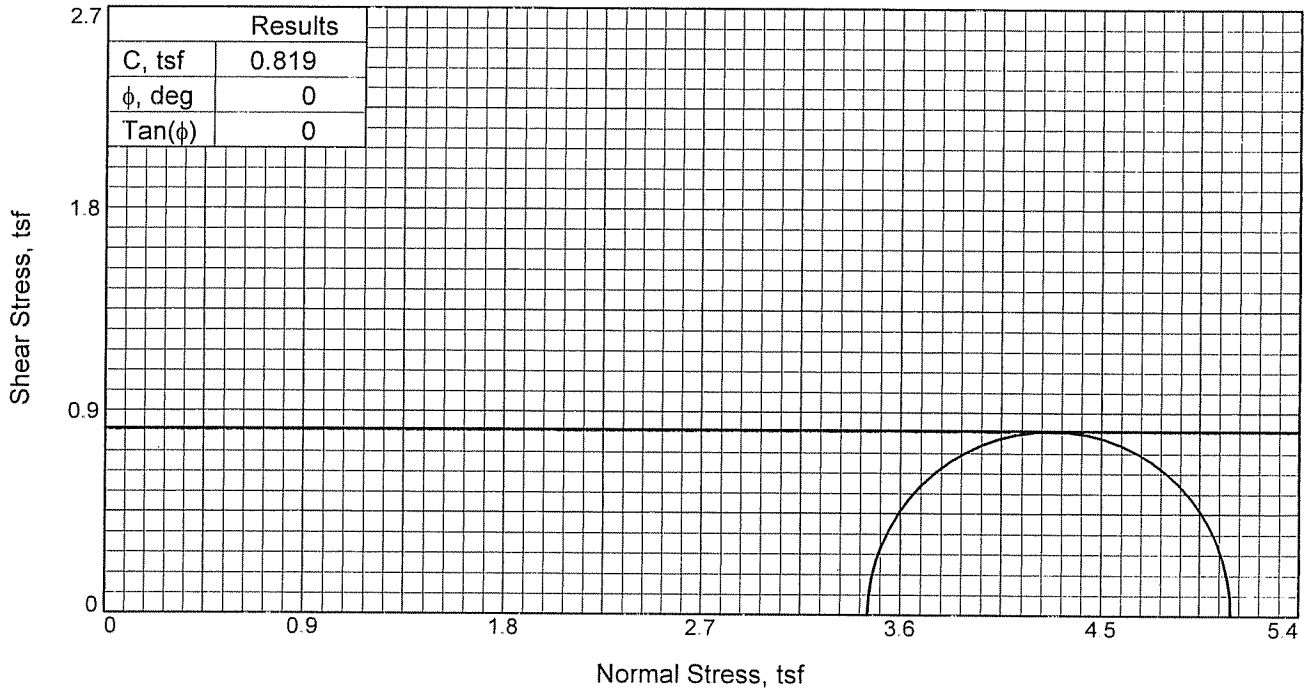
Sample Number: 23

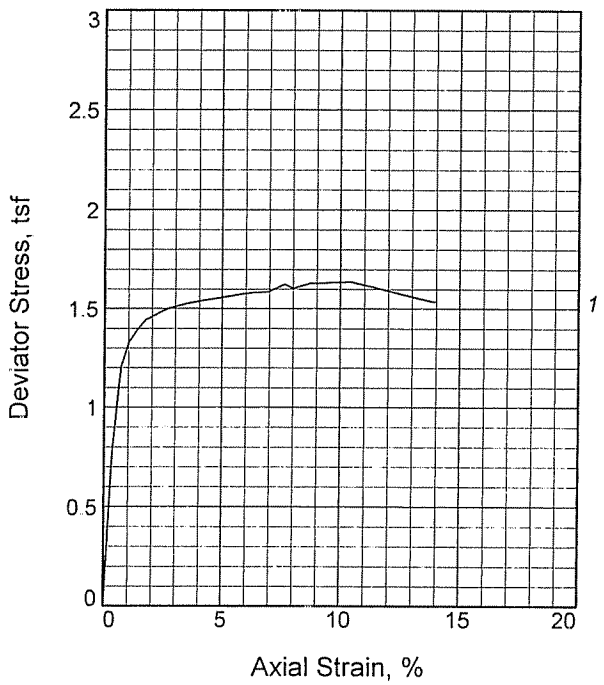
Proj. No.: 03-859-028 **Date:** 12-30-04

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure D-16





Sample No.		1
Initial	Water Content,	38.3
	Dry Density, pcf	84.2
	Saturation,	101.3
	Void Ratio	1.0396
	Diameter, in.	2.85
	Height, in.	5.74
At Test	Water Content,	38.3
	Dry Density, pcf	84.2
	Saturation,	101.3
	Void Ratio	1.0396
	Diameter, in.	2.85
	Height, in.	5.74
Strain at peak, %		10.5
Back Pressure, tsf		0.00
Cell Pressure, tsf		3.46
Fail. Stress, tsf		1.64
Strain, %		10.5
Ult. Stress, tsf		1.64
Strain, %		
σ_1 Failure, tsf		5.09
σ_3 Failure, tsf		3.46

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Tan and light gray FAT CLAY, slickensides

Assumed Specific Gravity= 2.75

Remarks:
Failure Type: Slickensides
Test Method: ASTM D 2850

Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151

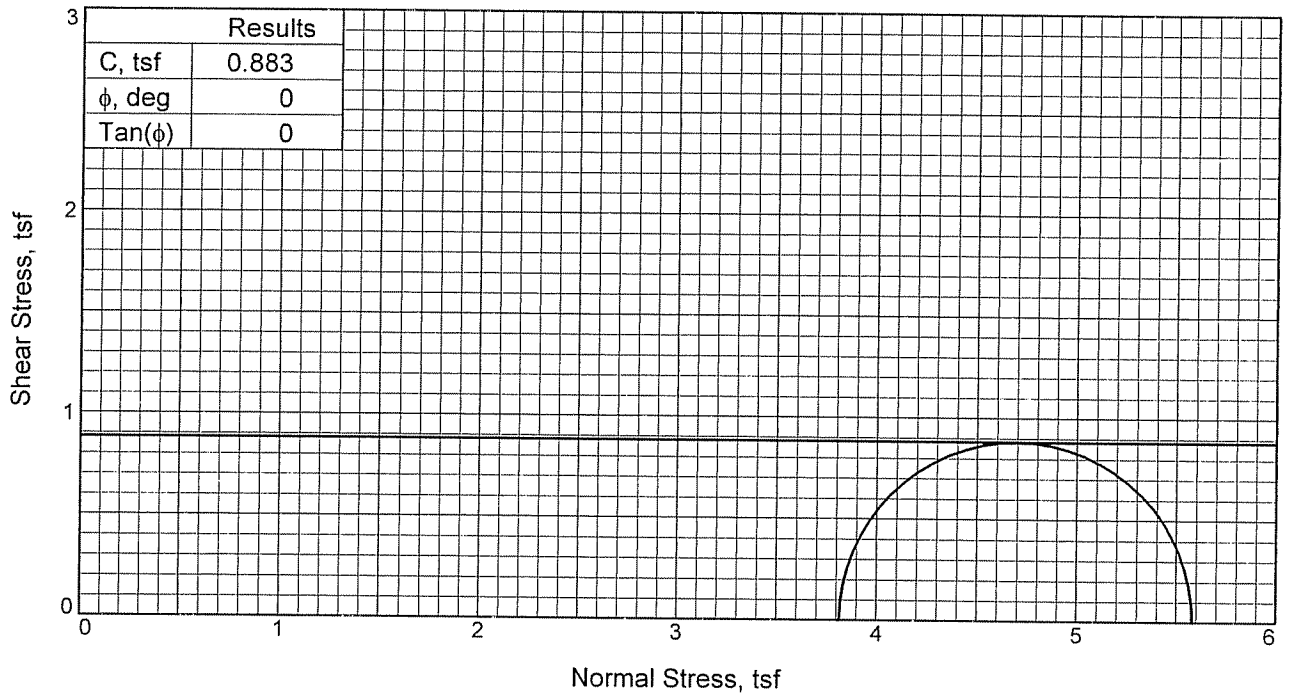
Sample Number: 27

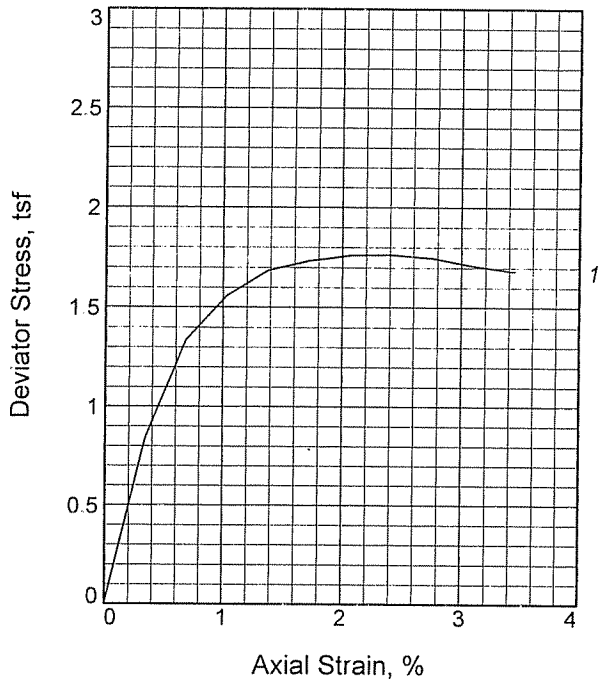
Proj. No.: 03-859-028 **Date:** 12/30/04

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure D-17





Sample No.		1
Initial	Water Content,	26.5
	Dry Density, pcf	91.7
	Saturation,	83.6
	Void Ratio	0.8724
	Diameter, in.	2.88
	Height, in.	5.79
At Test	Water Content,	26.5
	Dry Density, pcf	91.7
	Saturation,	83.6
	Void Ratio	0.8724
	Diameter, in.	2.88
	Height, in.	5.79
Strain at peak, %		2.4
Back Pressure, tsf		0.00
Cell Pressure, tsf		3.82
Fail. Stress, tsf		1.77
Strain, %		2.4
Ult. Stress, tsf		1.77
Strain, %		
σ_1 Failure, tsf		5.58
σ_3 Failure, tsf		3.82

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Tan and light gray FAT CLAY, slickensides

LL= 98 **PL=** 25 **PI=** 73

Assumed Specific Gravity= 2.75

Remarks:
Failure Type: Slickensides
Test Method: ASTM D 2850

Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151

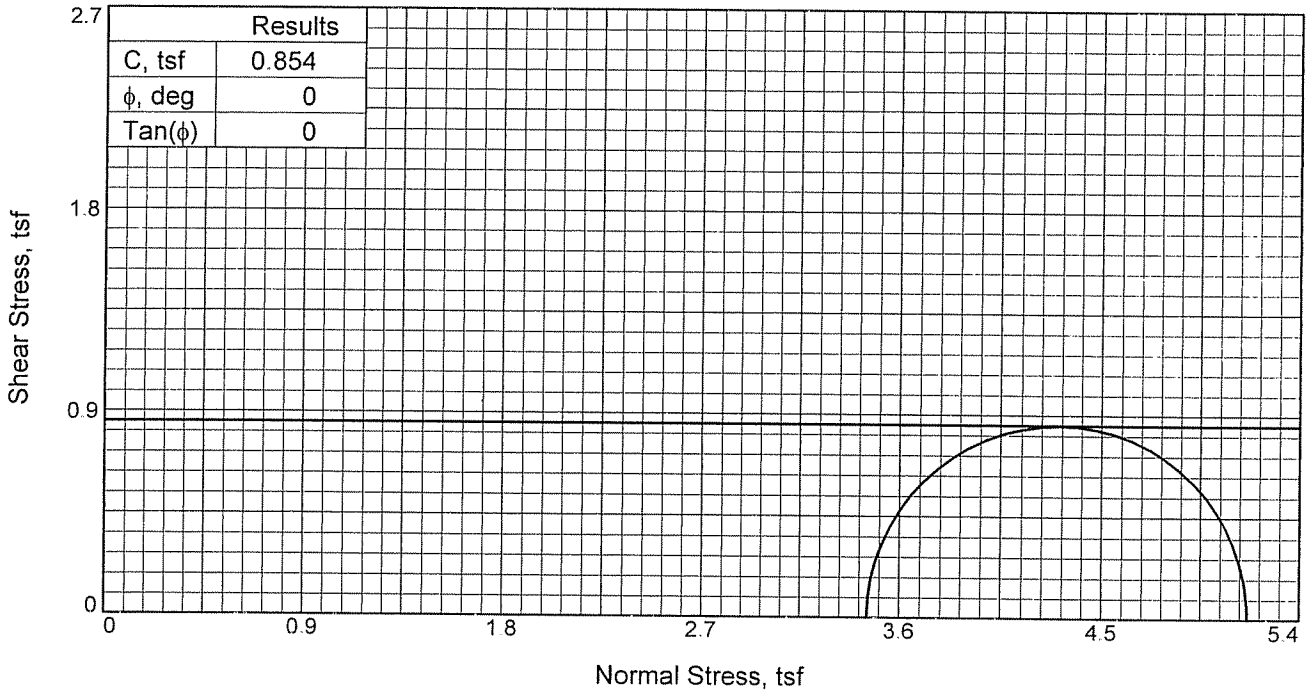
Sample Number: 30

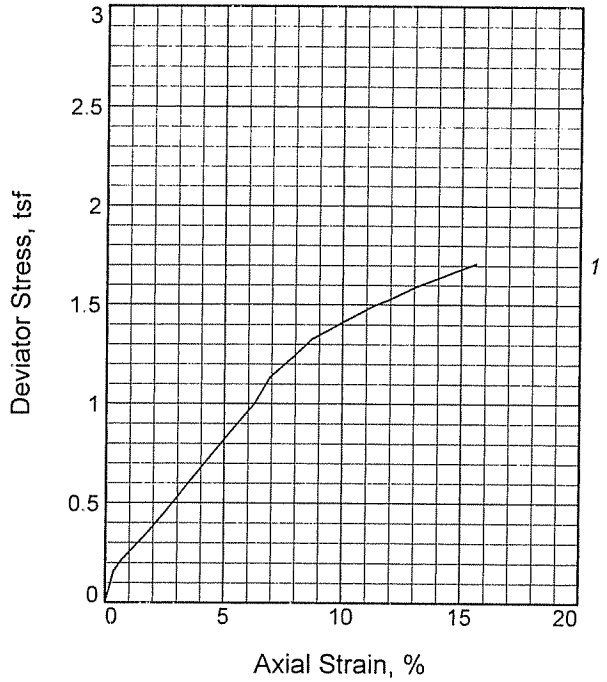
Proj. No.: 03-859-028 **Date:** 12/30/04

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure D-18





Sample No.		1
Initial	Water Content,	19.4
	Dry Density, pcf	109.1
	Saturation,	99.7
	Void Ratio	0.5163
	Diameter, in.	2.88
	Height, in.	5.76
At Test	Water Content,	19.4
	Dry Density, pcf	109.1
	Saturation,	99.7
	Void Ratio	0.5163
	Diameter, in.	2.88
	Height, in.	5.76
Strain at peak, %		15.6
Back Pressure, tsf		0.00
Cell Pressure, tsf		3.46
Fail. Stress, tsf		1.71
Strain, %		15.6
Ult. Stress, tsf		1.71
Strain, %		
σ_1 Failure, tsf		5.16
σ_3 Failure, tsf		3.46

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Tan and light gray SANDY SILTY CLAY

LL= 24 **PL=** 19 **PI=** 5

Assumed Specific Gravity= 2.65

Remarks:
Failure Type: Bulge
Test Method: ASTM D 2850

Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151

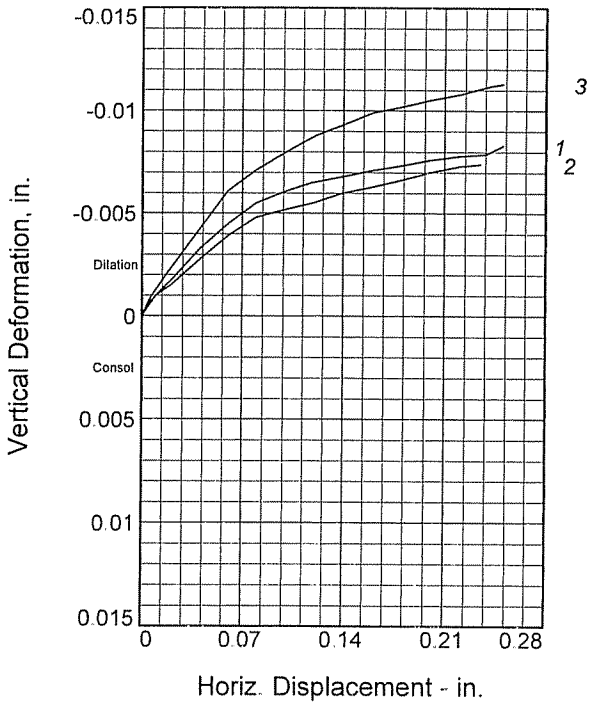
Sample Number: 38

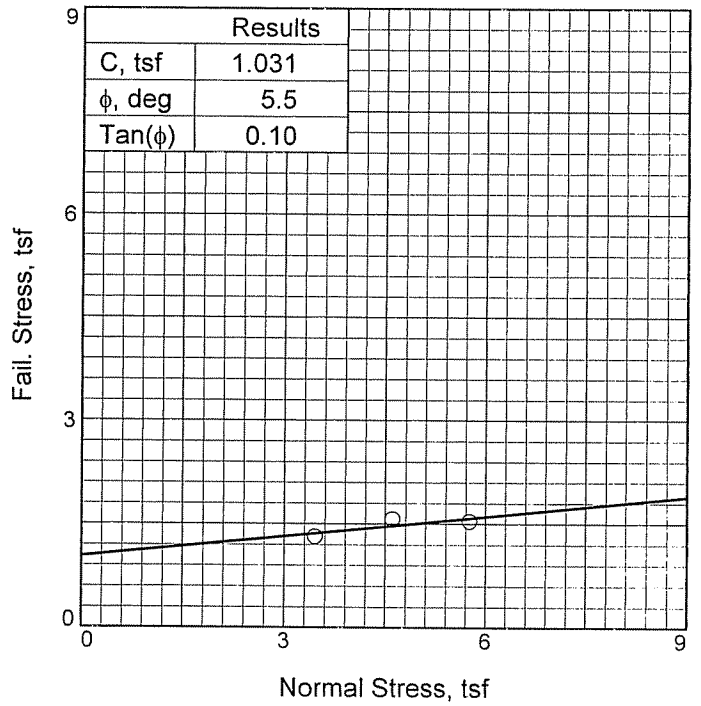
Proj. No.: 03-859-028 **Date:** 12/30/04

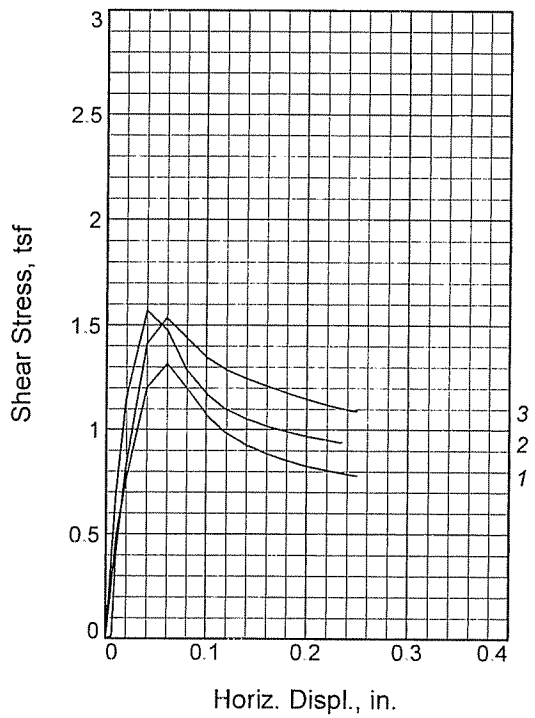
TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure D-19







Sample No.		1	2	3
Initial	Water Content, %	37.3	36.7	36.1
	Dry Density, pcf	83.0	83.2	82.8
	Saturation, %	96.0	94.7	92.4
	Void Ratio	1.0678	1.0646	1.0745
	Diameter, in.	2.49	2.49	2.49
	Height, in.	1.01	1.01	1.01
At Test	Water Content, %	37.4	35.6	38.7
	Dry Density, pcf	85.3	85.6	85.3
	Saturation, %	101.5	97.4	105.2
	Void Ratio	1.0126	1.0054	1.0129
	Diameter, in.	2.49	2.49	2.49
	Height, in.	0.98	0.98	0.98
Normal Stress, tsf		3.456	4.608	5.760
Fail. Stress, tsf		1.314	1.571	1.535
Displacement, in.		0.06	0.04	0.06
Ult. Stress, tsf				
Displacement, in.				
Strain at peak, %		2.4	1.6	2.4

Sample Type: Remolded

Description: Brown and light gray FAT CLAY; traces of calcareous nodules

LL= **PL=** **PI=**

Assumed Specific Gravity= 2.75

Remarks:

Test Method: ASTM D 3080

Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151

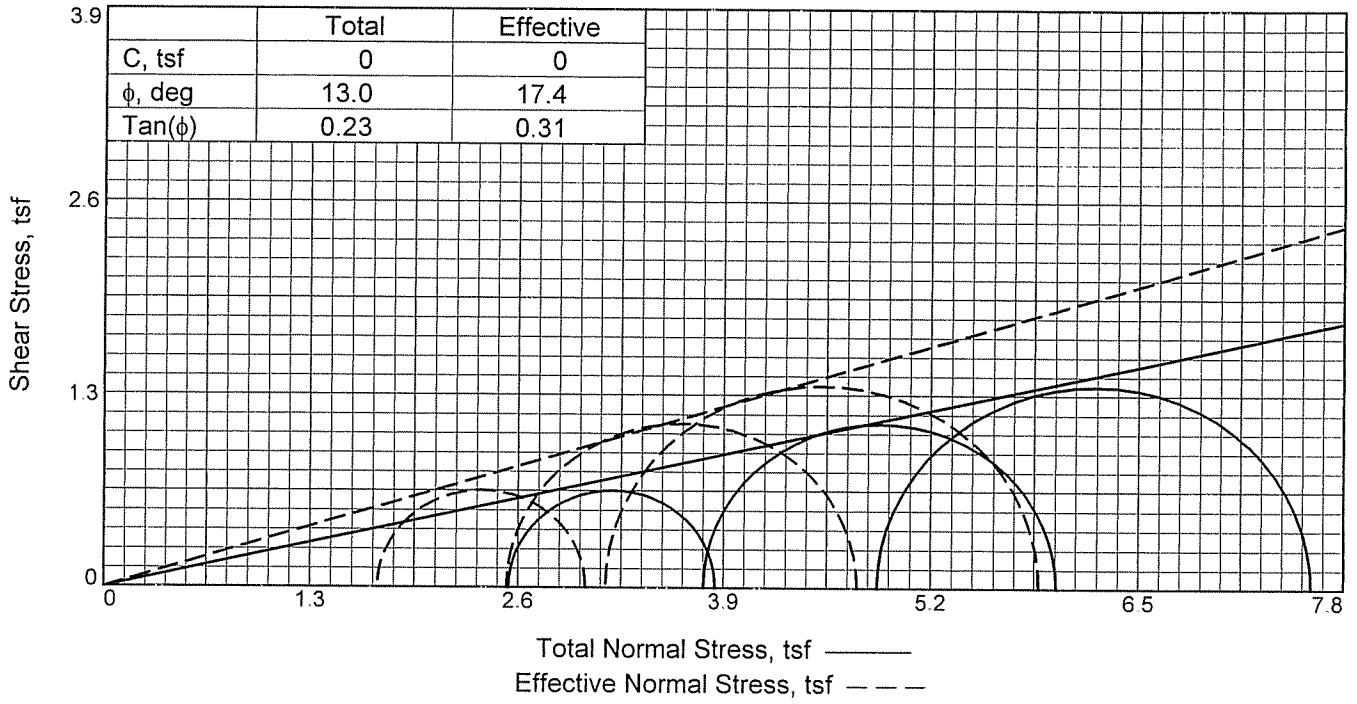
Sample Number: 29

Proj. No.: 03-859-028 **Date:** 1-31-05

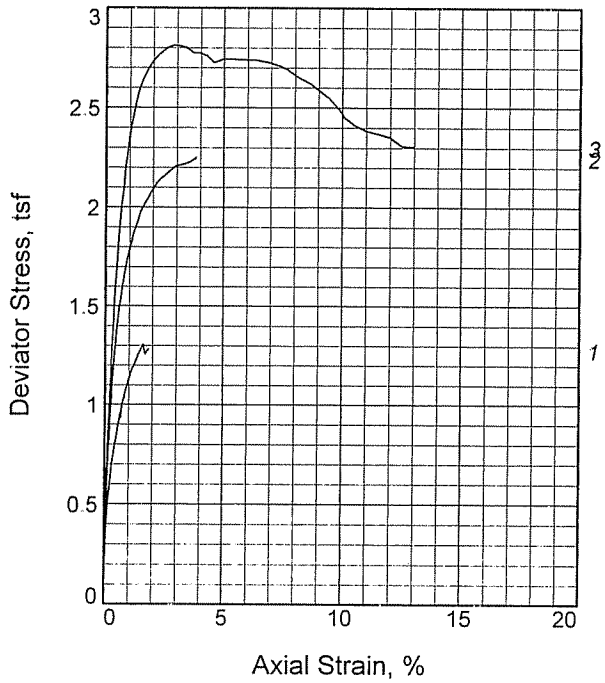
DIRECT SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure C-2



	Total	Effective
C, tsf	0	0
ϕ, deg	13.0	17.4
Tan(ϕ)	0.23	0.31



Sample No.		1	2	3
Initial	Water Content,	34.1	34.1	34.1
	Dry Density, pcf	87.1	87.1	87.1
	Saturation,	96.4	96.4	96.4
	Void Ratio	0.9719	0.9719	0.9719
	Diameter, in.	1.98	1.98	1.98
	Height, in.	4.24	4.24	4.24
At Test	Water Content,	24.7	24.7	24.7
	Dry Density, pcf	91.2	92.9	94.4
	Saturation,	76.8	80.1	82.8
	Void Ratio	0.8830	0.8471	0.8194
	Diameter, in.	1.95	1.95	1.97
	Height, in.	4.18	4.09	3.96
Strain at peak, %		1.6	3.2	6.9
Back Pressure, tsf		1.40	1.45	1.44
Cell Pressure, tsf		3.94	5.22	6.31
Fail. Stress, tsf		1.30	2.21	2.73
Excess Pore Pr., tsf		0.82	1.24	1.72
Ult. Stress, tsf		1.28	2.25	2.74
Excess Pore Pr., tsf		0.86	1.30	1.69
$\bar{\sigma}_1$ Failure, tsf		3.02	4.74	5.88
$\bar{\sigma}_3$ Failure, tsf		1.72	2.53	3.15

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Tan and brown FAT CLAY with traces of calcareous nodules

LL= 66 **PL=** 25 **PI=** 41

Assumed Specific Gravity= 2.75

Remarks:
Failure Type: Slickenside
Test Method: ASTM D 4767

Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151

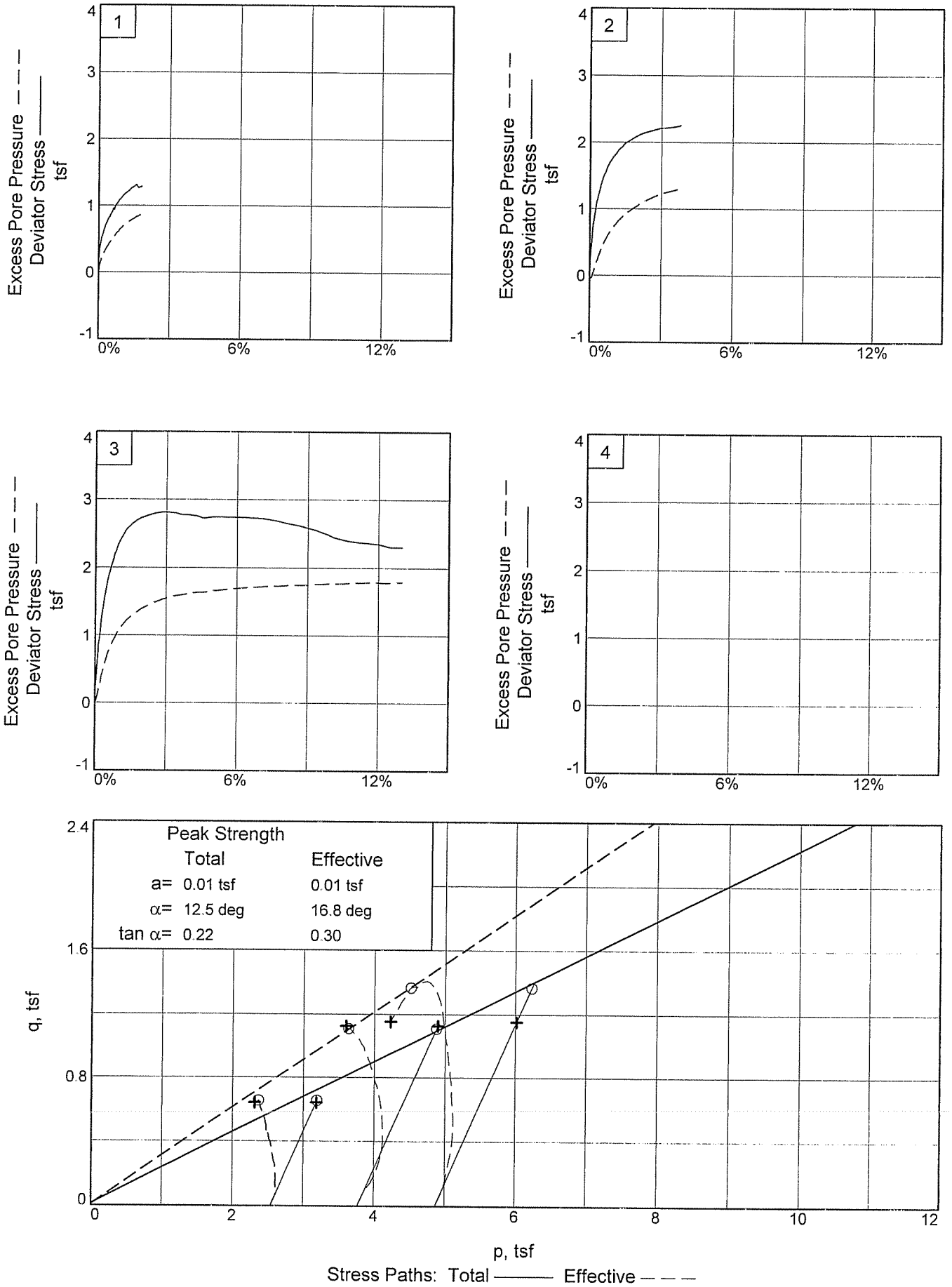
Sample Number: 22

Proj. No.: 03-859-028 **Date:** 1/4/05

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure B-8a



Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Source of Sample: 04-151 **Sample Number:** 22

Project No.: 03-859-028

Figure B-8b

Tolunay-Wong Engineers, Inc.

Project No. 03-859-028 Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Boring No.	Sample No.	Soil Description	USCS	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plast. Index	Finer than #200 Sieve (%)	Specific Gravity	Uc/UU. Compr. (tsf)	Cell Press. (psi)	Failure Strain (%)	Failure Type
	26	Tan and light gray FAT CLAY	CH	35.4										
	27	Tan and light gray FAT CLAY	CH	36.7	86.7									
	28	Tan and light gray FAT CLAY	CH	33.9		92	30	62	99.8					
	29	Brown and light gray FAT CLAY; traces of ferrous nodules	CH	26.6										
	30	Tan and light gray FAT CLAY, slickensides; few calcareous nodules	CH	35.0	88.2						2.06	53	8.7	bulge/sls
	31	Tan and light gray FAT CLAY; traces of ferrous nodules	CH	23.5										
	32	Tan and light gray FAT CLAY	CH	20.2										
	33	Light gray and tan FAT CLAY	CH	21.3										
	34	Light gray and tan FAT CLAY	CH	21.9										
	35	Light gray and tan FAT CLAY	CH	19.6										
	36	Light gray and tan FAT CLAY	CH	21.7	105.8						3.61	63	7.4	bulge/45 degree
	37	Light gray and tan FAT CLAY	CH	19.5										
	38	Light gray and tan SANDY SILTY CLAY	CL-ML	19.7										
	39	Light gray and tan LEAN CLAY	CL	21.5										
	40	Gray LEAN CLAY	CL	20.3										
	41	Light gray and tan SILTY CLAY with SAND	CL-ML	20.5										
	42	Light gray and tan LEAN CLAY	CL	20.5										
	43	Tan and light gray LEAN CLAY with SAND	CL	21.3										
	44	Light gray and tan LEAN CLAY with SAND	CL	19.9	114.3	39	17	22	84.3					
04-151														
	1	Light gray and tan LEAN CLAY: fat clay seams and traces of ferrous nodules	CL	14.4										
	2	Brown and light gray FAT CLAY; silty clay pocket	CH	20.6										
	3	Tan and light gray FAT CLAY; sand pocket	CH	23.4										
	4	Gray and tan SANDY SILT	ML	21.1										
	5	Gray SILTY SAND	SM	26.3										
	6	Gray SANDY SILT; clay pockets	ML	26.3										
	7	Gray FAT CLAY; silty clay pockets	CH	34.3										
	8	Gray FAT CLAY	CH	62.4										
	9	Brown and tan SANDY SILT	ML	26.5										
	10	Gray and tan FAT CLAY; sandy silt pockets	CH	38.2										
	11	Tan and light gray FAT CLAY	CH	37.4										
	12	Tan and light gray FAT CLAY; traces of ferrous nodules	CH	31.5										
	13	Tan and light gray FAT CLAY, slickensides	CH	32.7	89.9	72	23	49	94.5		1.08	22	1.7	sls
	14	Tan and light gray FAT CLAY; sand pockets	CH	35.8										
	15	Gray and tan LEAN CLAY; silty clay pockets	CL	27.5										
	16	Gray and tan FAT CLAY; sand pockets	CH	28.9										
	17	Dark gray FAT CLAY; sand seams	CH	48.5										
	18	Gray and tan FAT CLAY	CH	36.0										
	19	Tan and light gray FAT CLAY	CH	24.4										
	20	Light gray and tan FAT CLAY	CH	20.9										
	21	Tan and light gray FAT CLAY	CH	27.2										

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Project No. 03-859-028 Client: United States Army Corps of Engineers

Project: Spillman Island/Barbours Cut Channel; Contract DACW64-03-D-0008; Delivery Order 0028

Boring No.	Sample No.	Soil Description	USCS	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plast. Index	Finer than #200 Sieve (%)	Specific Gravity	Uc/UU. Compr. (tsf)	Cell Press. (psi)	Failure Strain (%)	Failure Type
	22	Tan and brown FAT CLAY; traces of calcareous nodules	CH	34.1	87.0	66	23	41	93.1					
	23	Tan and light gray FAT CLAY	CH	34.5	86.5						0.88	41	4.9	bulge/65 degree
	24	Tan and light gray FAT CLAY	CH	40.5										
	25	Gray FAT CLAY	CH	42.0										
	26	Brown and light gray FAT CLAY	CH	30.5										
	27	Tan and light gray FAT CLAY, slickensides	CH	38.3	84.2						1.64	48	10.5	sls
	28	Tan and light gray FAT CLAY, slickensides	CH			62	21	41	99.8					
	29	Brown and light gray FAT CLAY; traces of calcareous nodules	CH	28.6										
	30	Tan and light gray FAT CLAY, slickensides	CH	26.5	91.7	98	25	73	98.9		1.77	53	2.4	sls
	31	Light gray and brown FAT CLAY, slickensided	CH	30.9										
	32	Tan and light gray FAT CLAY; traces of calcareous nodules	CH	19.1										
	33	Reddish brown and light gray FAT CLAY; traces of ferrous and calcareous nodules	CH	22.2										
	34	Reddish brown and light gray FAT CLAY; few calcareous nodules	CH	22.6										
	35	Reddish brown and light gray FAT CLAY; few calcareous nodules	CH	24.5										
	36	Light gray FAT CLAY; traces of calcareous and ferrous nodules	CH	19.0										
	37	Light gray and tan SANDY SILTY CLAY	CL-ML	17.8										
	38	Tan and light gray SANDY SILTY CLAY	CL-ML	19.4	109.1	24	19	5	55.5		1.71	48	15.6	bulge
	39	Light gray and tan CLAYEY SAND	SC	18.3										
	40	Light gray and tan SILTY CLAY; sand pocket	CL-ML	20.6										
	41	Light gray and tan SANDY LEAN CLAY; silty sand pockets	CL	21.6										
	42	Light gray and tan SANDY LEAN CLAY; silty sand pockets	CL	22.3										
	43	Light gray and tan SANDY LEAN CLAY; silty sand pockets	CL	23.8										
	44	Light gray and tan LEAN CLAY; sandy silt pockets	CL	21.2										
04-152														
	2	Gray FAT CLAY	CH	168.9		109	30	79	98.2	2.71				
	4	Gray and tan SANDY LEAN CLAY	CL	20.3	108.4	49	16	33	66.8	2.71	2.62		15.5	bulge
	6	Gray and tan FAT CLAY with SAND; traces of ferrous nodules	CH	20.6										
	8	Light gray and brown LEAN CLAY with SAND; fat clay pockets	CL	22.3										
	12	Reddish brown and tan FAT CLAY	CH	27.3		69	24	45	98.6					
	13	Brown FAT CLAY	CH	23.6										
04-153														
	6	Light gray SANDY SILT	ML	23.7					60.3	2.66				
	7	Light gray SILTY CLAY with SAND	CL-ML	25.2					71.1					
04-154														
	2	Light gray and tan FAT CLAY	CH	39.2										
	3	Light gray and tan FAT CLAY	CH	30.0		68	25	43	99.7	2.72				

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