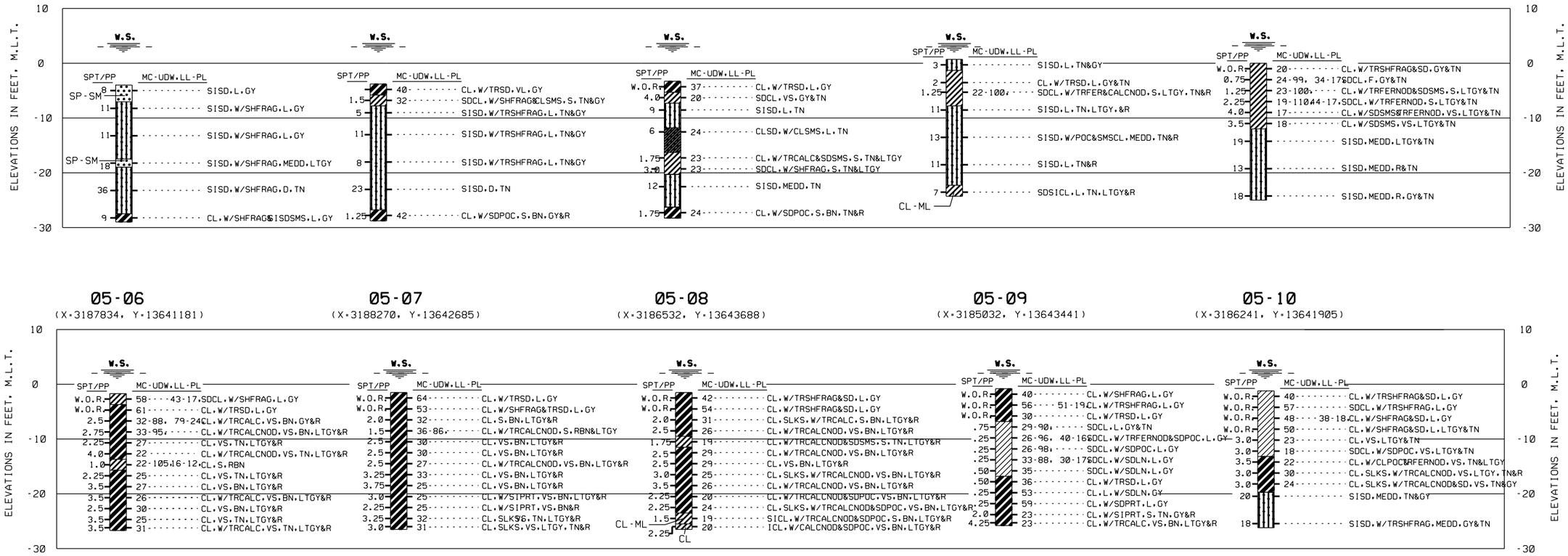


NOTES:

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, FIRM, STIFF, LOOSE, DENSE, ETC., ARERELATIVE TERMS BASED ON ESTIMATED UNDISTURBED SHEAR STRENGTH OF THE MATERIAL AS DETERMINED BY VISUAL CLASSIFICATIONS, POCKET PENETROMETER TESTS AND PENETRATION RESISTANCE DURING SAMPLING.

2. NUMBERS TO THE RIGHT OF BORING LOGS ARE WATER CONTENTS IN PERCENT OF THE DRY UNIT WEIGHT, LIQUID LIMIT AND PLASTIC LIMIT (MC-UDW AND LL-PL). FIGURES TO THE LEFT OF BORING LOGS EXPRESSED IN WHOLE NUMBERS REPRESENT THE STANDARD PENETRATION TESTING (SPT) IN BLOWS PER FOOT. FIGURES TO THE LEFT OF BORING LOGS EXPRESSED IN NUMBERS CONTAINING A DECIMAL POINT REPRESENT POCKET PENTROMETER (PP) READINGS TAKEN IN UNITS OF TONS PER SQUARE FOOT.

3. 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. WHERE COHESIONLESS MATERIALS WERE ENCOUNTERED, DISTURBED SAMPLES WERE TAKEN WITH A SPLIT SPOON SAMPLER DURING PERFORMANCE OF STANDARD PENETRATION TESTING.

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

5. SOIL BORING ELEVATIONS ARE AS SHOWN ABOVE. SOIL BORING COORDINATES ARE REFERENCED TO THE TEXAS STATE PLANE, SOUTH CENTRAL ZONE, NAD 83, IN FEET.

VISUAL CLASSIFICATIONS:

BL BLACK	NOD NODULES
BN BROWN(ISH)	OL OLIVE
CALC CALCAREOUS	POC POCKET(S)
CL CLAY(EY)	PRT PARTING(S)
D-ODR DISTINCT ODOR	R RED(DISH)
D DENSE	RTS ROOT(S)
DB DEBRIS	S STIFF
DK DARK	SD SAND(Y)
FER FERROUS	SH SHELL(Y)
FL FILL	SI SILT(Y)
FRAG FRAGMENT(S)	SLKS SLICKEN SIDES
F FIRM	SMS SEAMS
GY GRAY(ISH)	SO SOFT
H HARD	TN TAN(NISH)
L LOOSE	TR TRACE(S)
LN LENSE(S)	V VERY
LY LAYER(S)	W WITH
LT LIGHT	W.O.H. WEIGHT OF HAMMER
MAT MATERIAL	W.O.P. WEIGHT OF PIPE
MED MEDIUM	W.O.R. WEIGHT OF ROD
N.REC NO RECOVERY	W.S. WATER SURFACE
	W.T. WATER TABLE

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.

SM SILTY SANDS, SAND-SILT MIXTURES.

SP POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.

INVITATION NO. W912HY-05-B-00

US Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

BY:$USER$ DATE:$DATE$ TIME:$TIME$

Drawn by: D.L.V. Date: AUGUST 2005 Rev. —
Designed by: C.D.T. Scale: AS SHOWN
Checked by: C.D.T.
Submitted by: MOHAMED M. MOUSSA, P.E. Coast. Geotech/Studies Section
Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch
Approved by: JERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
STEVEN P. HAUSTEN, COL, C.E.,
DISTRICT ENGINEER

GULF INTRACOASTAL WATERWAY, TEXAS
CHOCOLATE BAY
CONSTRUCTION OF BENEFICIAL USE SITES

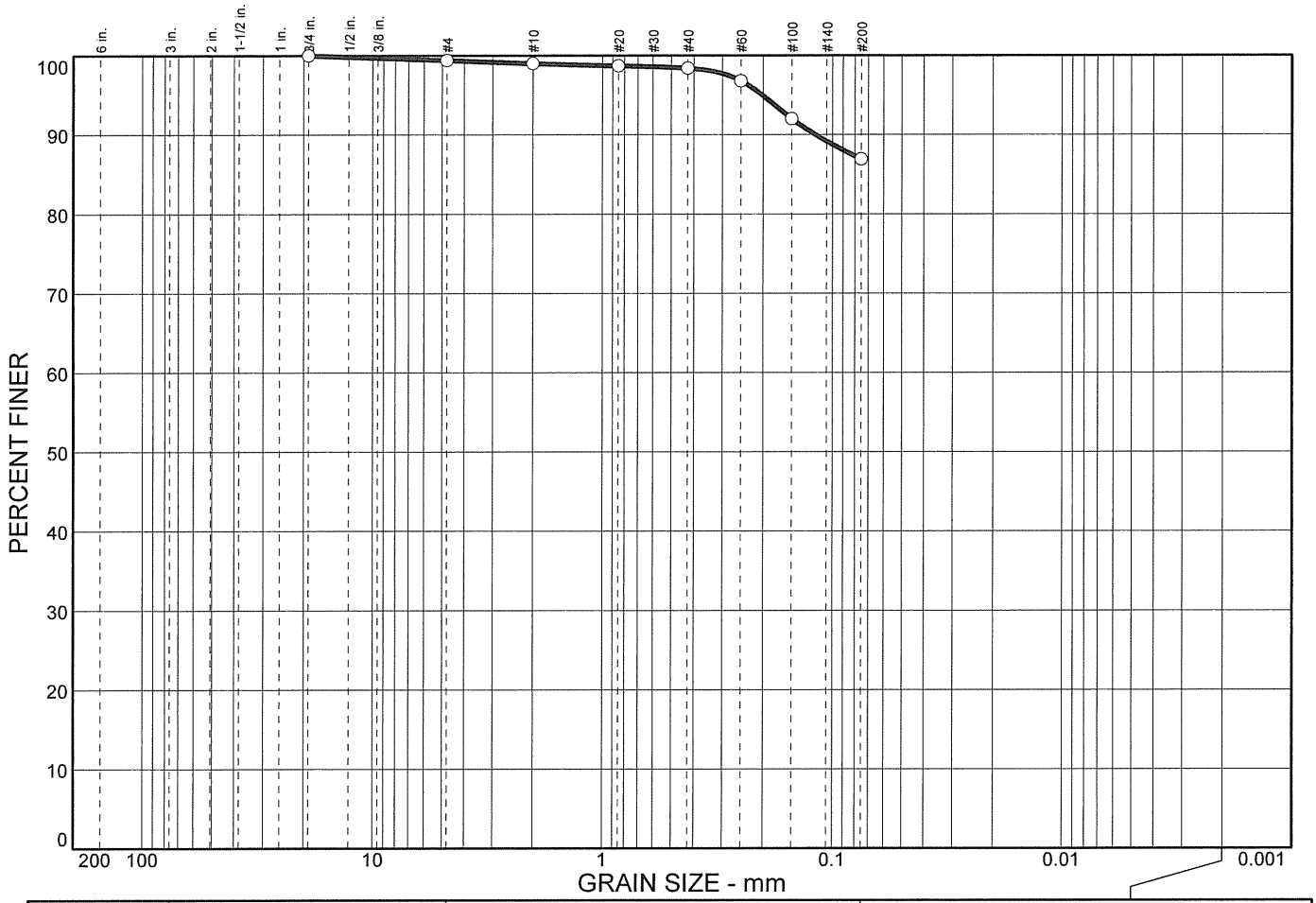
LOGS OF BORINGS

Drawing No.:
F-6
Sheet 7 of 7

File: $FILE$

File No. IWW 1125-127

Particle size Analysis (ASTM D 422)



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.6	0.4	0.6	11.5	86.9	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	05-09	2	2.5-4	Gray FAT CLAY; traces of shells	CH

Particle size Analysis (ASTM D 422)

Tolunay-Wong Engineers, Inc.

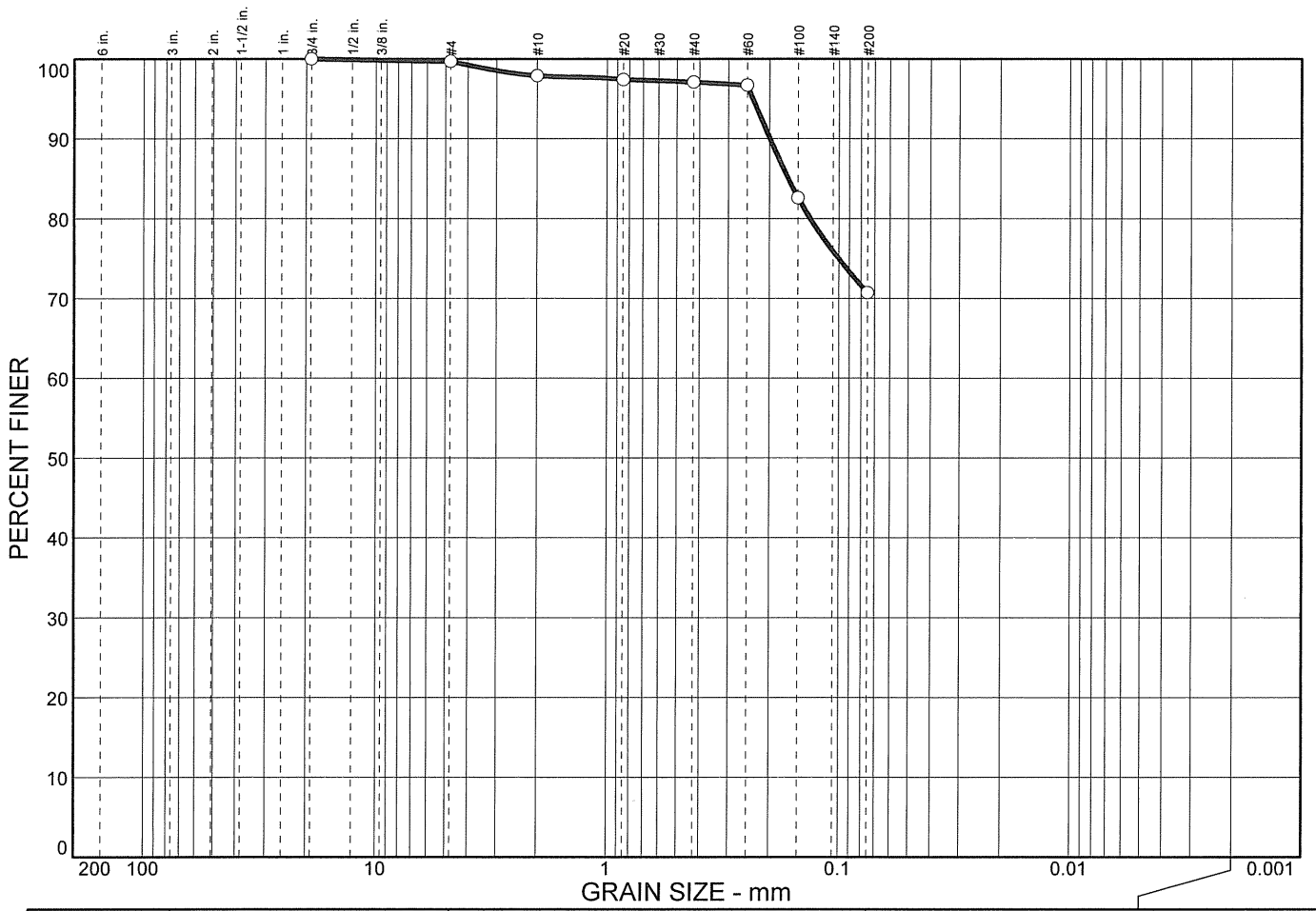
Client: United States Army Corps of Engineers

Project: Chocolate Bayou, Texas
Contract No: DACW64-03-D-0008; Delivery Order No: 0031

Project No.: 03-859-031

Figure B-7

Particle size Analysis (ASTM D 422)



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.3	1.8	0.8	26.4	70.7	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	05-09	5	8-10	Gray LEAN CLAY with SAND; traces of ferrous nodules and	CL
				biturbation	

Particle size Analysis (ASTM D 422)

Tolunay-Wong Engineers, Inc.

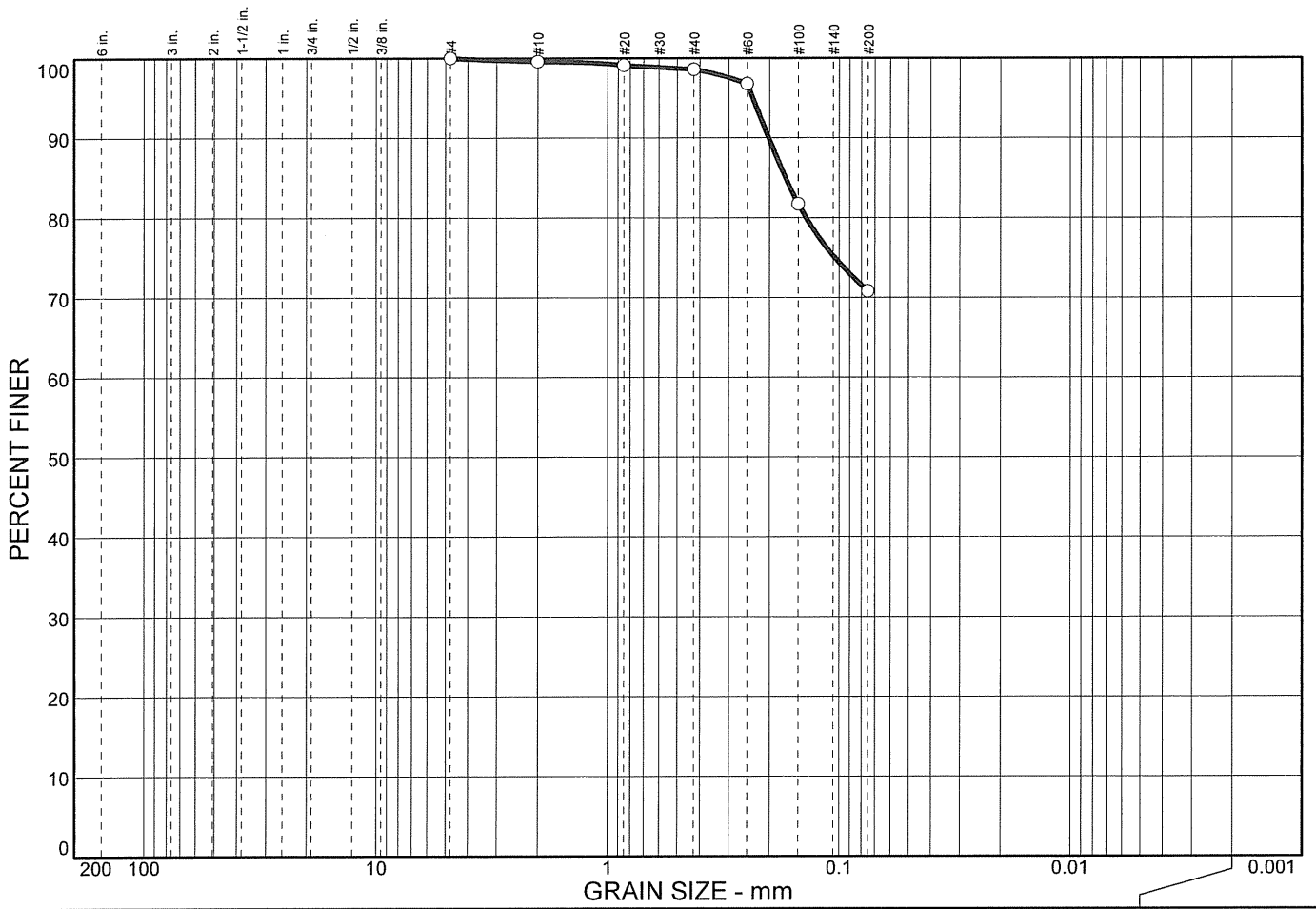
Client: United States Army Corps of Engineers

Project: Chocolate Bayou, Texas
Contract No: DACW64-03-D-0008; Delivery Order No: 0031

Project No.: 03-859-031

Figure B-8

Particle size Analysis (ASTM D 422)



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	0.4	1.0	27.8	70.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	05-09	7	12-14	Gray LEAN CLAY with SAND	CL

Particle size Analysis (ASTM D 422)

Tolunay-Wong Engineers, Inc.

Client: United States Army Corps of Engineers

Project: Chocolate Bayou, Texas
Contract No: DACW64-03-D-0008; Delivery Order No: 0031

Project No.: 03-859-031

Figure B-9

Project No. 03-859-031 Client: United States Army Corps of Engineers

Project: Chocolate Bayou, Texas; Contract No: DACW64-03-D-0008; Delivery Order No: 0031

Boring No.	Sample No.	Depth (feet)	Soil Description	USCS	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plast. Index	Finer than #200 Sieve (%)	Uc/UU. Compr. (tsf)	Cell Press. (psi)	Failure Strain (%)	Failure Type
			nodules											
	6	10-12	Brown and light gray FAT CLAY; traces of calcareous nodules	CH	28.5									
	7	12-14	Brown and light gray FAT CLAY	CH	28.6									
	8	14-16	Brown and light gray FAT CLAY, slickensides; traces of calcareous nodules	CH	24.6									
	9	16-18	Brown and light gray FAT CLAY; traces of calcareous nodules	CH	25.7									
	10	18-20	Brown and light gray FAT CLAY; traces of calcareous nodules	CH	19.8									
	11	20-22	Brown and light gray FAT CLAY; slickensides	CH	23.7									
	12	22-24	Brown and light gray SANDY SILTY CLAY; traces of calcareous nodules	CL-ML	18.7									
	13	24-25	Brown and light gray LEAN CLAY; few calcareous nodules	CL	19.5									
05-09														
	1	0-1.5	Gray FAT CLAY; few shells	CH	40.1									
	2	2.5-4	Gray FAT CLAY; traces of shells	CH	56.1		51	19	32	86.9				
	3	4.5-6	Gray FAT CLAY with SAND	CH	29.8									
	4	6-8	Gray and tan LEAN CLAY with SAND	CL	29.3	89.8					0.20		4.2	Bulge
	5	8-10	Gray LEAN CLAY with SAND; traces of ferrous nodules and biturbation	CL	26.1	96.3	40	16	24	70.7	0.34	7	4.1	slickenside
	6	10-12	Gray LEAN CLAY with SAND; sand pockets	CL	25.9	98.0					0.50		14.9	Bulge
	7	12-14	Gray LEAN CLAY with SAND	CL	33.1	87.5	30	17	13	70.8	0.12	10	5.1	Bulge
	8	14-16	Gray LEAN CLAY with SAND; fat clay seams	CL	34.7									
	9	16-18	Gray FAT CLAY with SAND	CH	35.9									
	10	18-20	Gray FAT CLAY	CH	53.3									
	11	20-22	Gray FAT CLAY; sand partings	CH	59.4									
	12	22-24	Tan and gray FAT CLAY; silt partings	CH	23.4									
	13	24-25	Brown and light gray FAT CLAY; trace of calcareous	CH	23.2									
05-10														
	1	0-1.5		CL	40.3									
	2	2.5-4	Gray LEAN CLAY; traces of shell	CL	57.1									
	3	4.5-6	Gray LEAN CLAY with SAND; traces of shell	CL	48.4		38	18	20	70.1				
	4	6.5-8	Gray LEAN CLAY; few shells	CL	49.9									
	5	8-10	Light gray and tan LEAN CLAY; lean clay pockets	CL	22.5									
	6	10-12	Light gray and tan LEAN CLAY; sand and fat clay pockets	CL	18.2									
	7	12-14	Tan and light gray FAT CLAY; lean clay pockets and traces of ferrous nodules	CH	22.4									
	8	14-16	Light gray and tan FAT CLAY, slickensides; traces of calcareous nodules	CH	29.9									
	9	16-18	Tan and gray FAT CLAY; slickensides; traces of calcareous nodules	CH	24.1									
	10	18.5-20	Tan and gray SILTY SAND	SM										

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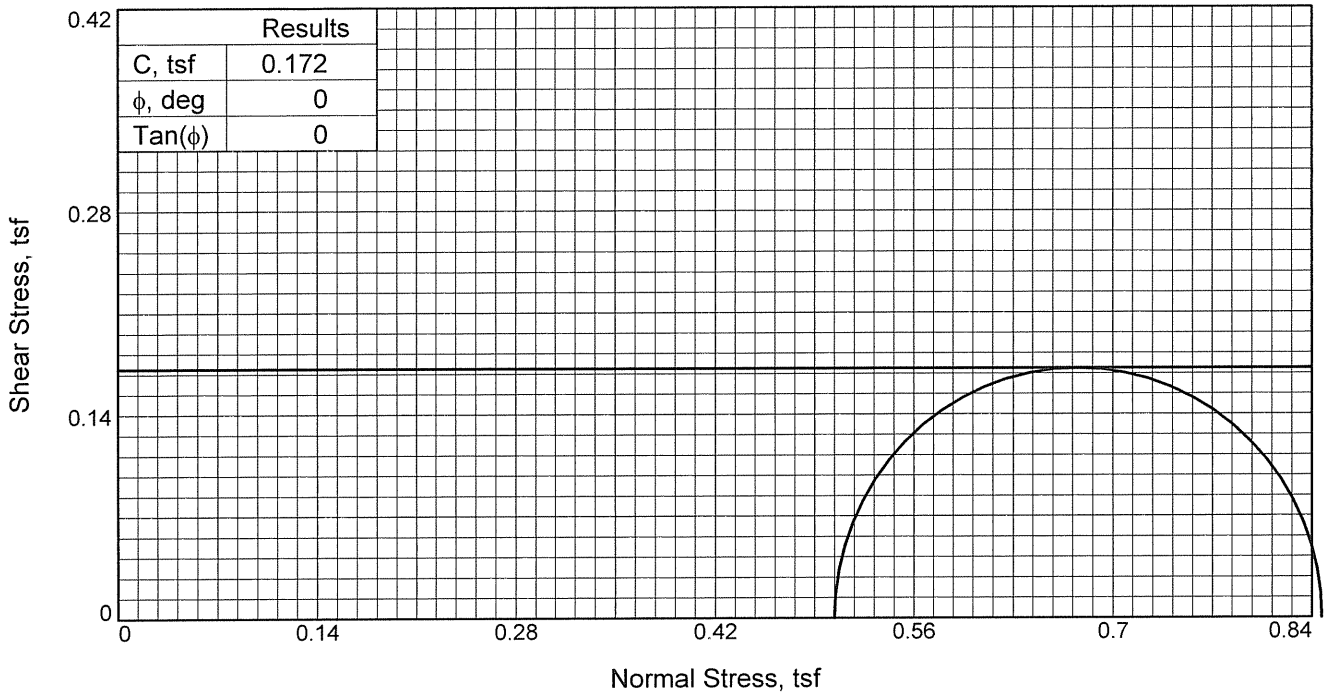
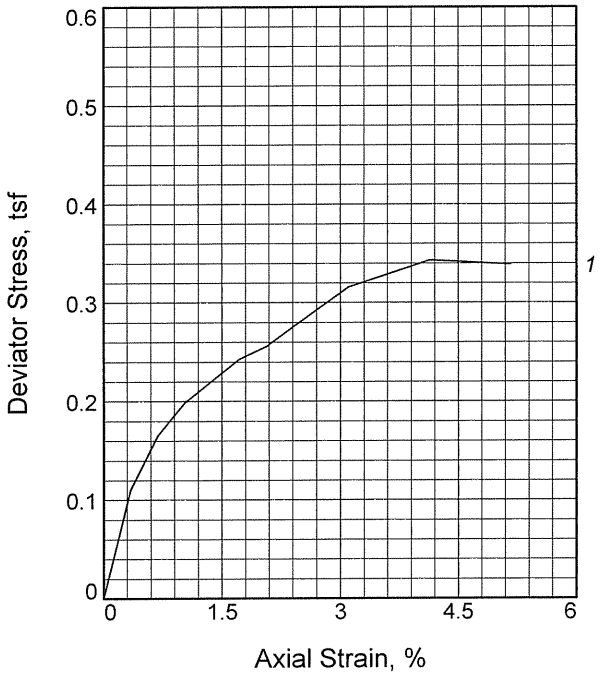




Sample No.		1
Initial	Water Content,	26.1
	Dry Density, pcf	96.3
	Saturation,	93.9
	Void Ratio	0.7495
	Diameter, in.	2.90
	Height, in.	5.80
At Test	Water Content,	26.1
	Dry Density, pcf	96.3
	Saturation,	93.9
	Void Ratio	0.7495
	Diameter, in.	2.90
	Height, in.	5.80
Strain rate, %/min.		1.30
Back Pressure, tsf		0.00
Cell Pressure, tsf		0.50
Fail. Stress, tsf		0.34
Strain, %		4.1
Ult. Stress, tsf		0.34
Strain, %		
σ_1 Failure, tsf		0.85
σ_3 Failure, tsf		0.50

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray LEAN CLAY with SAND; traces of ferrous nodules and biturbation

LL= 40 **PL=** 16 **PI=** 24

Assumed Specific Gravity= 2.70

Remarks:
Failure Type:
Test Method: ASTM D 2850

Client: United States Army Corps of Engineers

Project: Chocolate Bayou, Texas
Contract No: DACW64-03-D-0008; Delivery Order No: 0031

Source of Sample: 05-09 **Depth:** 8-10

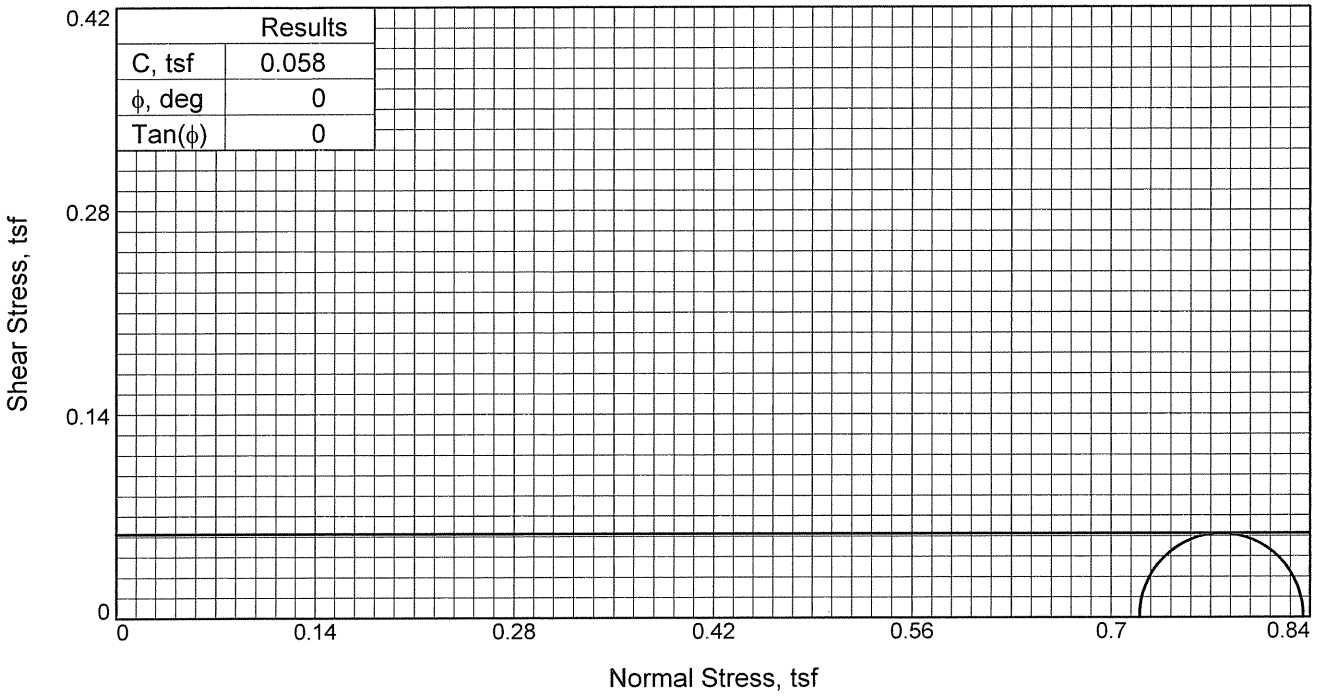
Sample Number: 5

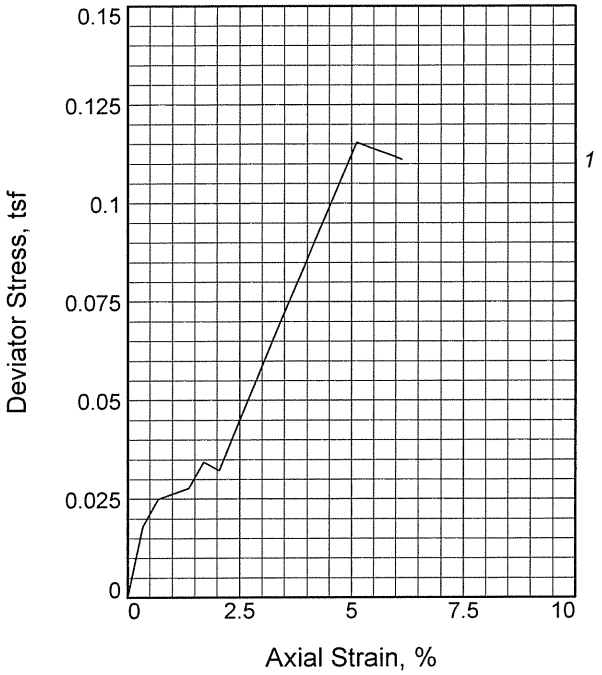
Proj. No.: 03-859-031 **Date:** 4-6-05

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure C-5





Sample No.		1
Initial	Water Content,	33.1
	Dry Density, pcf	87.5
	Saturation,	96.4
	Void Ratio	0.9266
	Diameter, in.	2.90
	Height, in.	5.86
At Test	Water Content,	33.1
	Dry Density, pcf	87.5
	Saturation,	96.4
	Void Ratio	0.9266
	Diameter, in.	2.90
	Height, in.	5.86
Strain rate, %/min.		1.10
Back Pressure, tsf		0.00
Cell Pressure, tsf		0.72
Fail. Stress, tsf		0.12
Strain, %		5.1
Ult. Stress, tsf		0.12
Strain, %		
σ_1 Failure, tsf		0.84
σ_3 Failure, tsf		0.72

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray LEAN CLAY with SAND

LL= 30 **PL=** 17 **PI=** 13

Assumed Specific Gravity= 2.70

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

Client: United States Army Corps of Engineers

Project: Chocolate Bayou, Texas
Contract No: DACW64-03-D-0008; Delivery Order No: 0031

Source of Sample: 05-09 **Depth:** 12-14

Sample Number: 7

Proj. No.: 03-859-031 **Date:** 4-6-05

TRIAXIAL SHEAR TEST REPORT

Tolunay-Wong Engineers, Inc.

Figure C-6