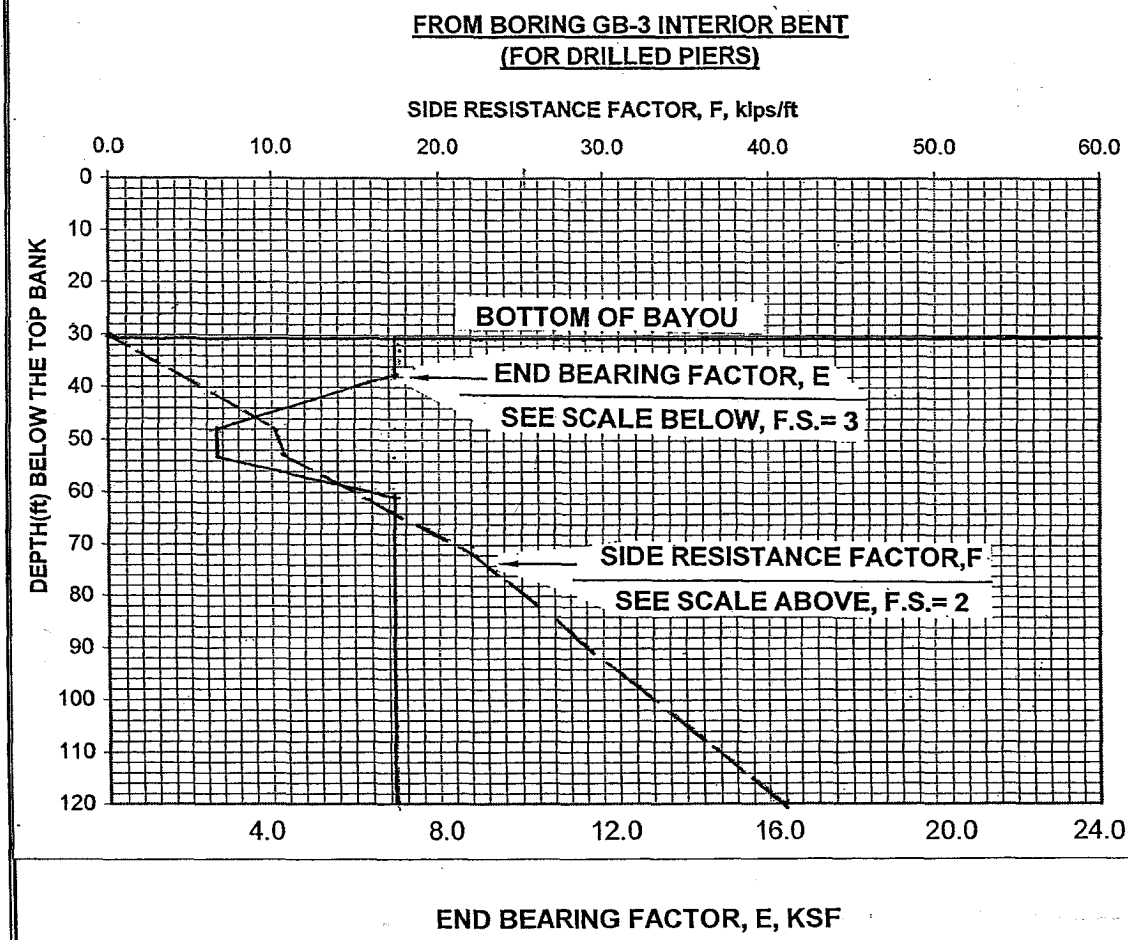


DESIGN EXAMPLE (FROM BORING GB-3)

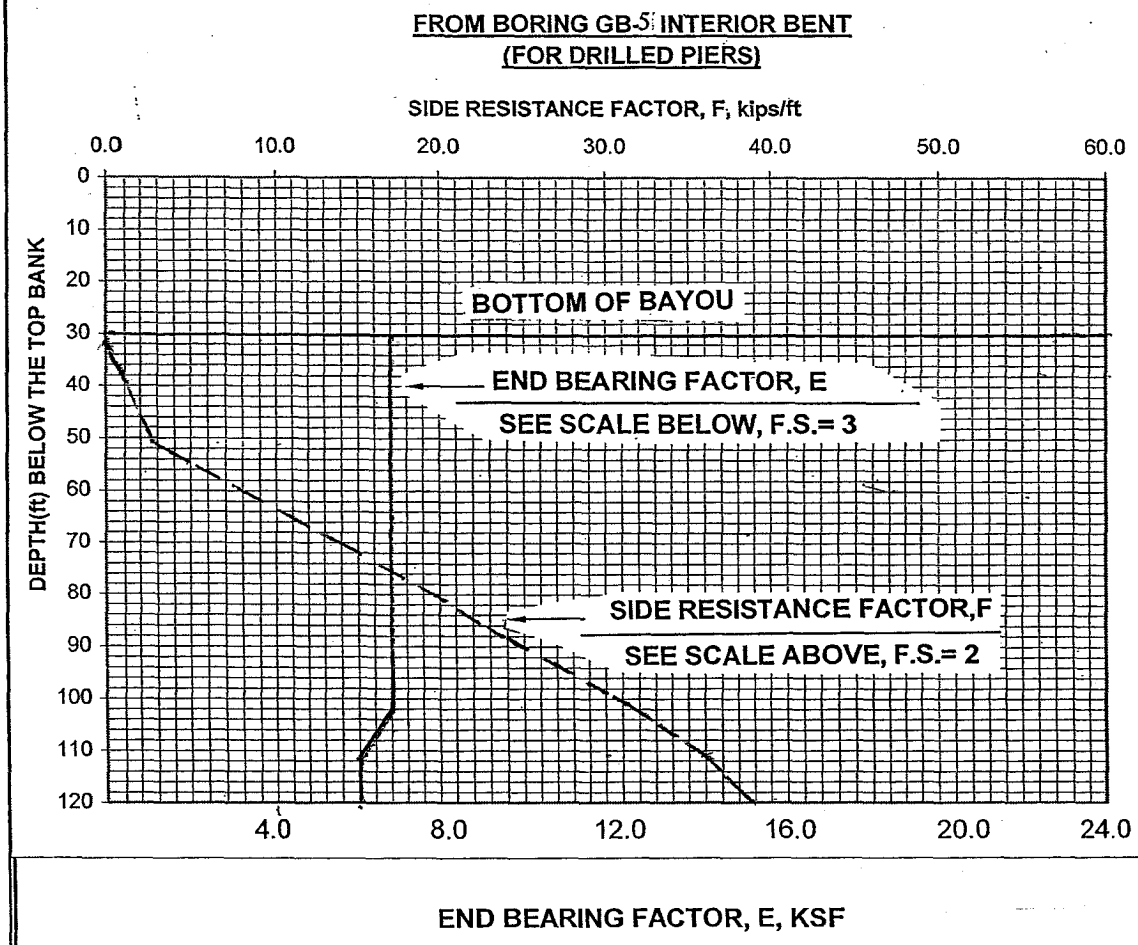
AT INTERIOR BENT

Say 48-inch diameter Drilled Pier
Area of 48-inch diameter pier = 12.56 sq. ft
Perimeter of 48-inch diameter Pier = 12.56 ft

COMPRESSIVE CAPACITY
(for drilled piers at 80-feet depth from high bank/50-feet below Bayou Bottom)
Qc = 12.56 (E) +12.56 (F)
= 12.56 (7.0) + 12.56 (25.5)
= 408.2 kips

TENSILE CAPACITY:
Qt = 0.7 * 12.56 (F)
= 0.7 * 12.56 (25.5)
= 224.2 kips

Project No. G04-504



DESIGN EXAMPLE (FROM BORING GB-5)

AT INTERIOR BENT

Say 48-inch diameter Drilled Pier
Area of 48-inch diameter pier = 12.56 sq. ft
Perimeter of 48-inch diameter Pier = 12.56 ft

COMPRESSIVE CAPACITY
(for drilled piers at 80-feet depth from high bank/50-feet from Bayou Bottom)
Qc = 12.56 (E) +12.56 (F)
= 12.56 (7.6) + 12.56 (19.5)
= 340.38 kips

TENSILE CAPACITY:
Qt = 0.7 * 12.56 (F)
= 0.7 * 12.56 (19.5)
= 171.45 kips

Project No. G04-504

TABLES

TABLE 1

SUMMARY OF GROUND WATER LEVEL MEASUREMENTS

PROPOSED CAMBRIDGE STREET

BETWEEN HOLCOMBE AND SOUTH MACGREGOR

ASSOCIATED TESTING LABORATORIES, INC., JOB NUMBER G04-504

Boring Number	Location	Gw during Drilling	Gw upon Completion of Drilling	Gw in Piezometers (11/9/04)	Gw in Piezometers (12/15/04)
GB-1/PZ-1	See Figure 2	21'	15'	17.5'	16.5'
GB-2	"	--	--	--	--
GB-3	"	22.5'	--	--	--
GB-4	"	20'	--	--	--
GB-5	"	21'	--	--	--
GB-6	"	23'	--	--	--
GB-7/PZ-2	"	--	--	--	--

TABLE 2

SUMMARY OF CBR AND PROCTOR TEST RESULTS

PROPOSED CAMBRIDGE STREET

BETWEEN HOLCOMBE AND SOUTH MACGREGOR

ATL, INC. JOB NUMBER G04-504

Sample Number	Location	Maximum Dry Density, pcf	Optimum Moisture Content, %	California Bearing Ratio
S-1	See Figure 2	105	15.8	4
S-2	See Figure 2	107.2	14.1	5

APPENDIX 1

PHOTOGRAPHS OF THE PROJECT SITE

APPENDIX 2

DEFINITION OF TERMS AND KEY TO SYMBOLS

KEY TO LOG TERMS AND SYMBOLS

SOIL TYPE

ROCK | GRAVEL | SAND | SILT | CLAY | PEAT

SAMPLER TYPE

NO SAMPLE | AUGER SAMPLE | SHELBY TUBE | SPLIT SPOON

MODIFIER

STONE | GRAVELY | SANDY | SILTY | CLAYEY | FILL

NO RECOVERY | ROCK CORE | 2" SHELBY TUBE | TXDOT CONE

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING No. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING No.4 SIEVE	CLEAN GRAVELS LITTLE OR NO FINES	GW	WELL GRADEED GRAVELS,GRAVELSAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS,GRAVEL SAND MIXTURES WITH LITTLE OR NO FINES
		W/ APPRECIATEBLE FINES	GM	SILTY GRAVELS,GRAVEL SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS,GRAVEL SAND-CLAY MIXTURES
	SANDS MORE THAN 50% PASSING No.4 SIEVE	CLEAN SANDS LITTLE FINES	SW	WELL GRADED SAND,GRAVELY SAND (LITTLE FINES)
			SP	POORLY GRADED SANDS,GRAVELY SAND(L. FINES)
		SANDS WITH APPREA. FINES	SM	SILTY SANDS,SAND-SILT MIXTURES
			SC	CLAYEY SANDS,SAND-CLAY MIXTURES
FINE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS,ROCK FLOUR SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI LEAN CLAY, GRAVELY CLAYS,SANDY CLAYS,SILTY CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS,MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT
HIGHLY ORGANIC SOIL			FT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS			ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS FILL MATERIALS	

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMP. STRENGTH IN TSF
VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.5
FIRM	0.5 TO 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	GREATER THAN 4.0

CONSISTENCY	UNCORRECTED PEN PENTROMETER READ.
VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.5
FIRM	> 0.50 TO 1.50
STIFF	> 1.50 TO 3.00
VERY STIFF	> 3.0 TO 4.50
HARD	4.5+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	THD-VALUE (BLOWS PER FT)
VERY LOOSE	0-8
LOOSE	8-20
SLIGHTLY COMPACT	20-40
COMPACT	40-80
DENSE	80- 5"/100
VERY DENSE	5"/100 - 0"/100

CLASSIFICATION OF GRANULAR SOILS

U.S.STANDARD SIEVE SIZE(S)

6"	3"	3/4"	4	10	40	200

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

152	76.2	19.1	4.76	2.0	0.42	0.074	0.002

GRAIN SIZE IN MM

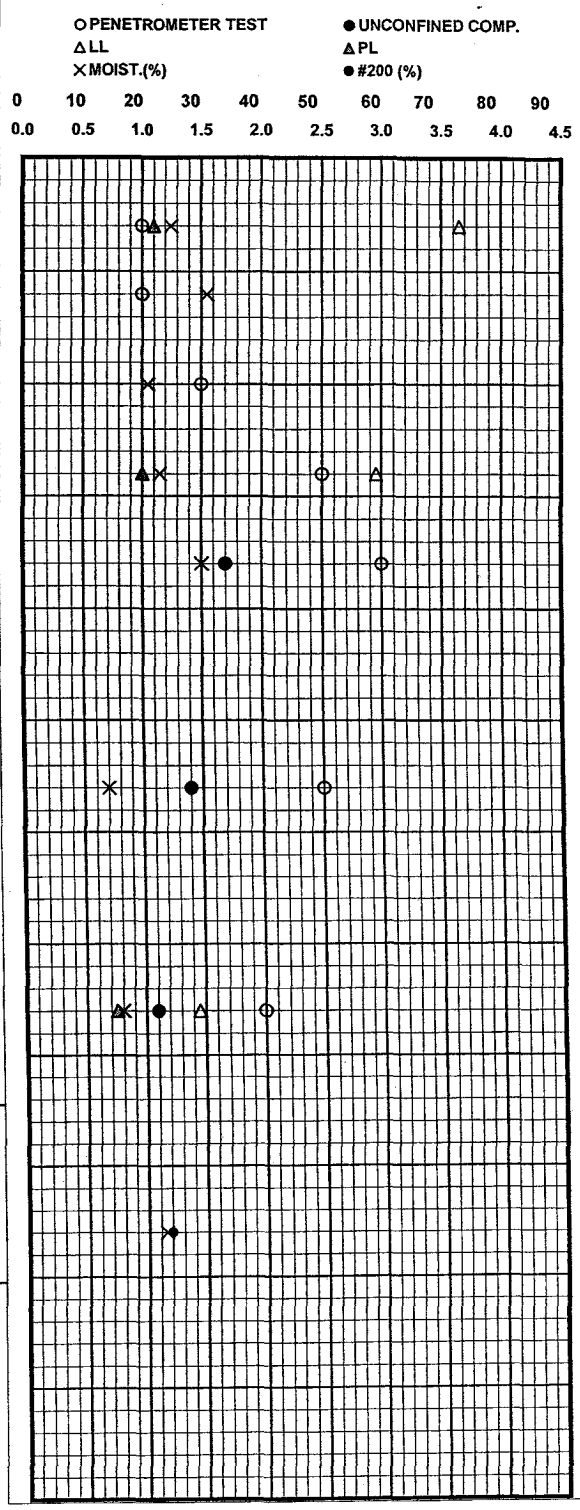
APPENDIX 3

BORING LOGS

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-1 (pz-1)
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
2.0		1			Firm, dark gray **Clay (CH)**
4.0		2			.. gray & tan below 2'
6.0		3			.. light gray & tan below 4'
8.0		4			.. stiff with calcareous nodules below 6'
10.0		5			.. with ferrous nodules below 8'
15.0		6			Stiff, light gray & tan **Sandy Clay (CL)** with ferrous nodules
20.0		7			..
25.0	X	8	22		Medium dense, light gray & tan **Silty Sand (SM)** .. wet below 23'
30.0					Boring terminated at 25 feet

TEST RESULTS

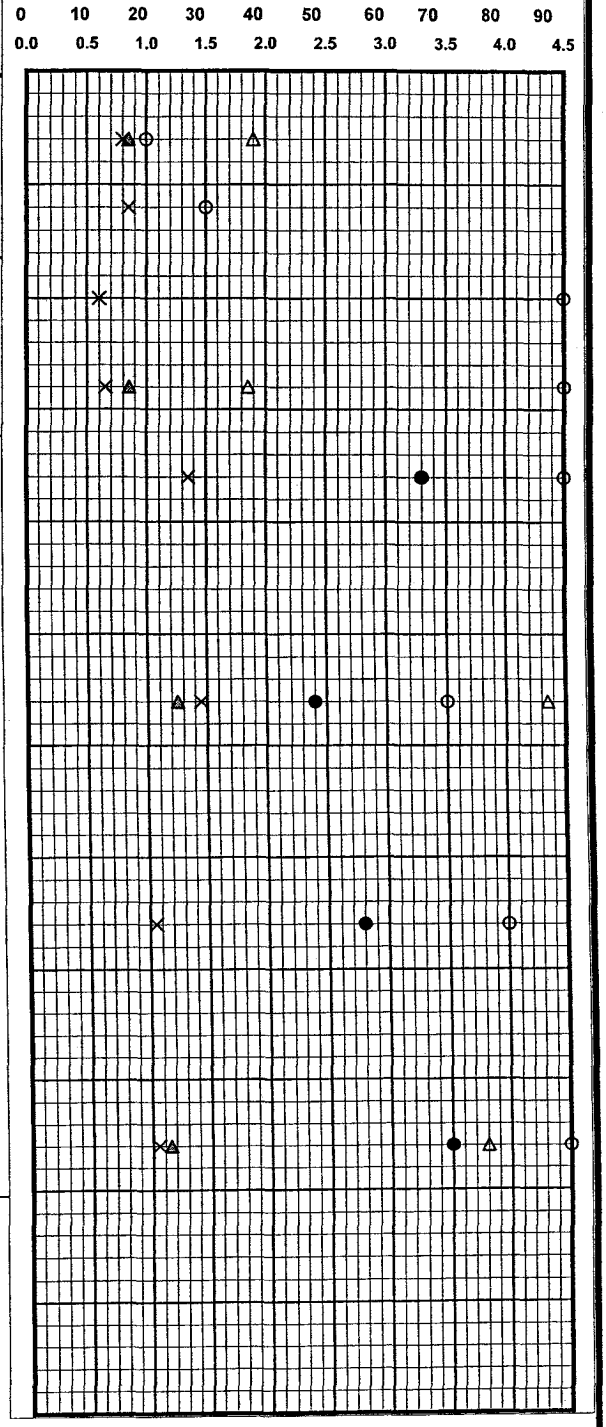


Water First Noticed: 21' Water at Completion: 15'	DRILLED & LOGGED BY: H.G.	STARTED: 11/08/04	STATION OFFSET GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: 17.5' (11/9/04) PZ WATER LEVEL: 16.4' (12/15/04)	PREPARED BY: REDDY	COMPLETED: 11/08/04	COORDINATES N:
COMPLETION DEPTH: 25' GROUT:	CHECKED BY: Jitu	APPROVED BY: JAY	E: SHEET 1 OF 1

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-2
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		1			Firm, gray & tan **Sandy Clay (CL)** (FILL)
2.0					
		2			..
4.0					
		3			Very stiff, light gray & tan **Sandy Clay (CL)**
6.0					
		4			..
8.0					
		5			Very stiff, light gray & tan **Clay (CH)**
10.0					
		6			.. with ferrous nodules below 13'
15.0					
		7			..
20.0					
		8			..
25.0					
					Boring terminated at 25 feet
					Note: This Boring is done using Portable Rig
30.0					

TEST RESULTS



Water First Noticed: No	DRILLED & LOGGED BY: Texas Soil	STARTED: 11/03/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 11/03/04	COORDINATES N:
HOLE CAVED AT: No			E:
COMPLETION DEPTH: 25'	CHECKED BY: Jitu	APPROVED BY: JAY	SHEET 1 OF 1
GROUT:			

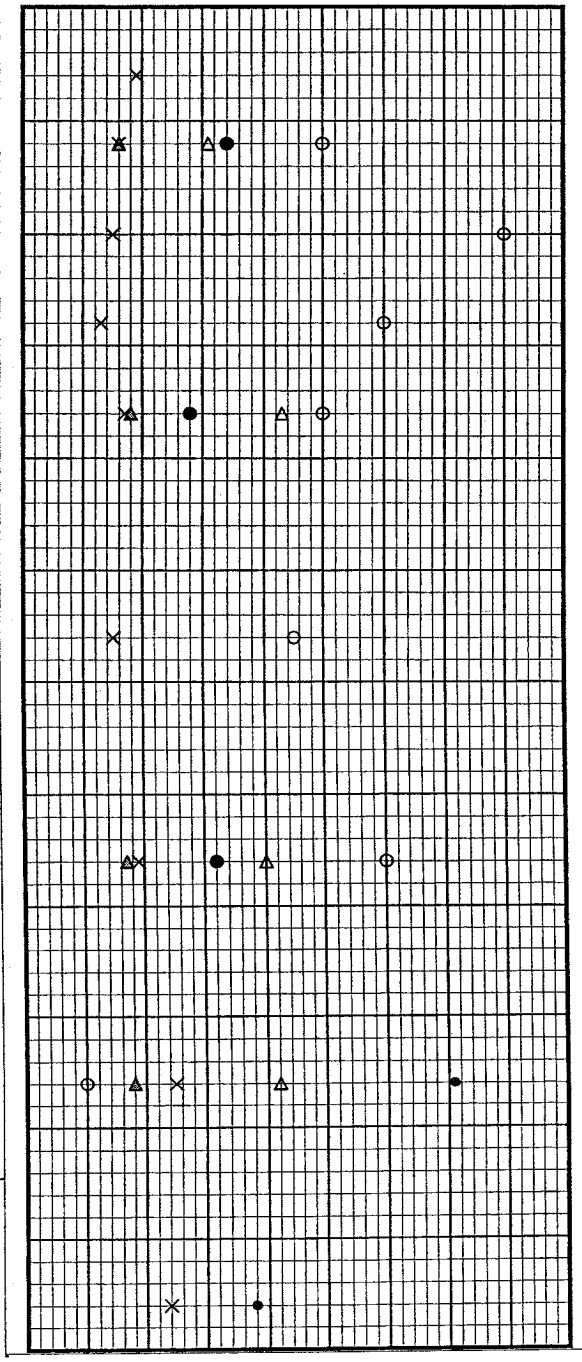
ASSOCIATED TESTING LABORATORIES, INC.

PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-3
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		1			Gray & tan **Sandy Clay (CL)** (FILL)
2.0					
		2			.. stiff, light gray & tan below 2'
4.0					
		3			.. very stiff below 4'
6.0					
		4			.. stiff, with ferrous nodules below 6'
8.0					
		5			.. with calcareous nodules below 8'
10.0					
		6			..
15.0					
		7			.. gray & tan below 18'
20.0					
		8			.. soft, light gray & tan with silty sand layers below 23'
25.0					
		9	28		Medium dense, light gray & tan **Silty Sand (SM)**
30.0					

Continued

TEST RESULTS



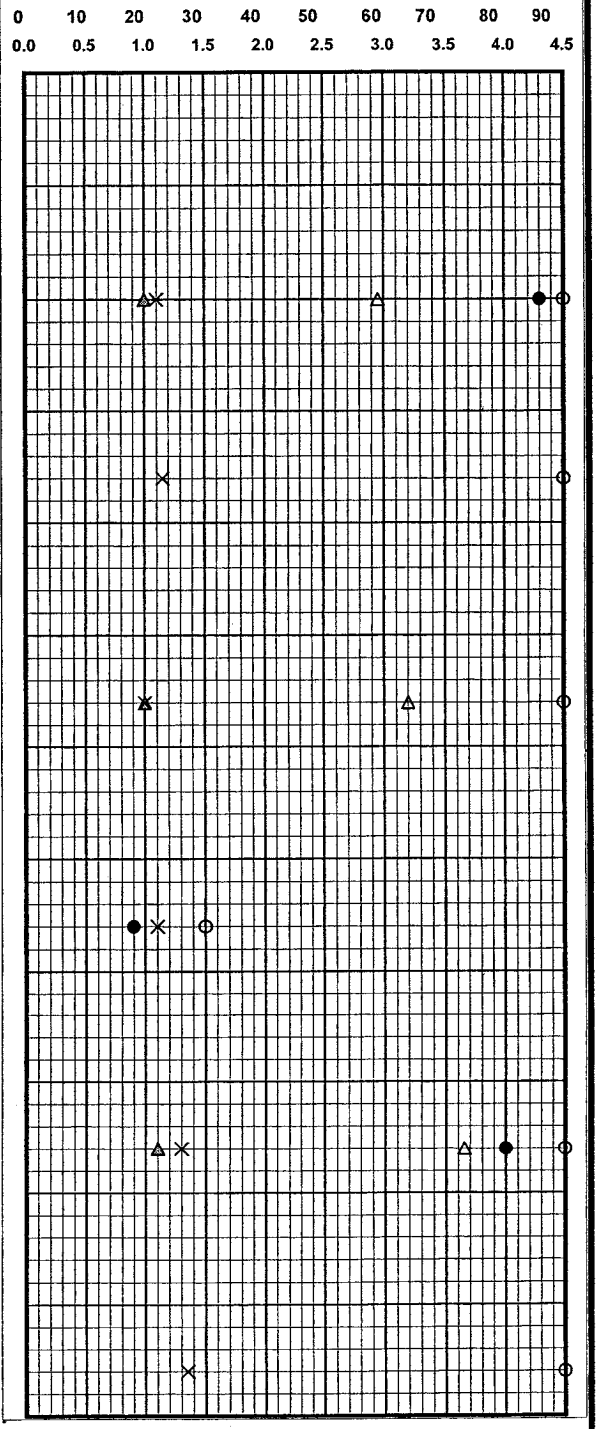
Water First Noticed: 22.5'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/22/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/22/04	COORDINATES N:
HOLE CAVED AT: 22.5'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 1 OF 4

PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-3
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
					Hard , tan & light gray **Clay (CH)**
		10			
35.0					
					.. sand layers from 36.5' to 37.5'
		11			..
40.0					
		12			.. reddish brown below 43'
45.0					
		13			.. firm, with sandy clay layers from 48' to 50'
50.0					
		14			.. hard below 53'
55.0					
		15			..
60.0					

Continued

TEST RESULTS



Water First Noticed: 22.5'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/22/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/22/04	COORDINATES N:
HOLE CAVED AT: 22.5'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 2 OF 4

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-3
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

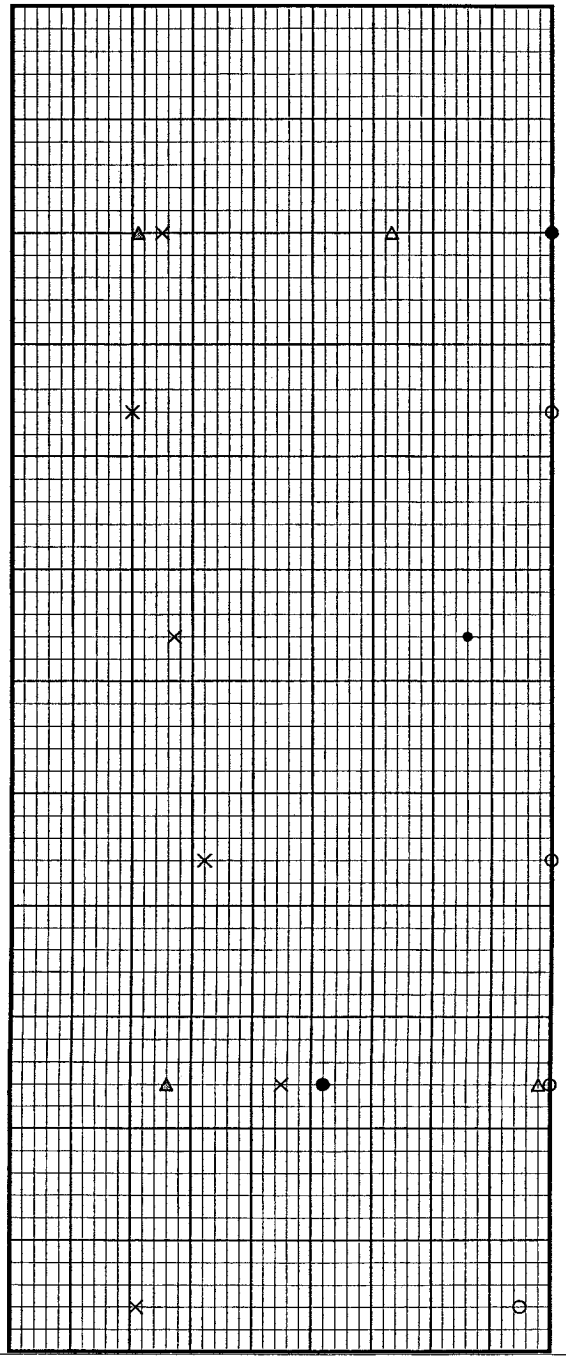
DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		16			..
65.0					
		17			..
70.0					
		18	38		Dense, reddish brown **Silty Sand (SM)**
75.0					
					Very stiff, reddish brown **Clay (CH)**
		19			
80.0					
		20			.. tan & light gray below 83'
85.0					
		21			.. light gray & tan below 88'
90.0					

Continued

TEST RESULTS

○ PENETROMETER TEST ● UNCONFINED COMP.
△ LL ▲ PL
× MOIST.(%) ● #200 (%)

0 10 20 30 40 50 60 70 80 90
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5



Water First Noticed: 22.5'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/22/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/22/04	COORDINATES N:
HOLE CAVED AT: 22.5'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 3 OF 4

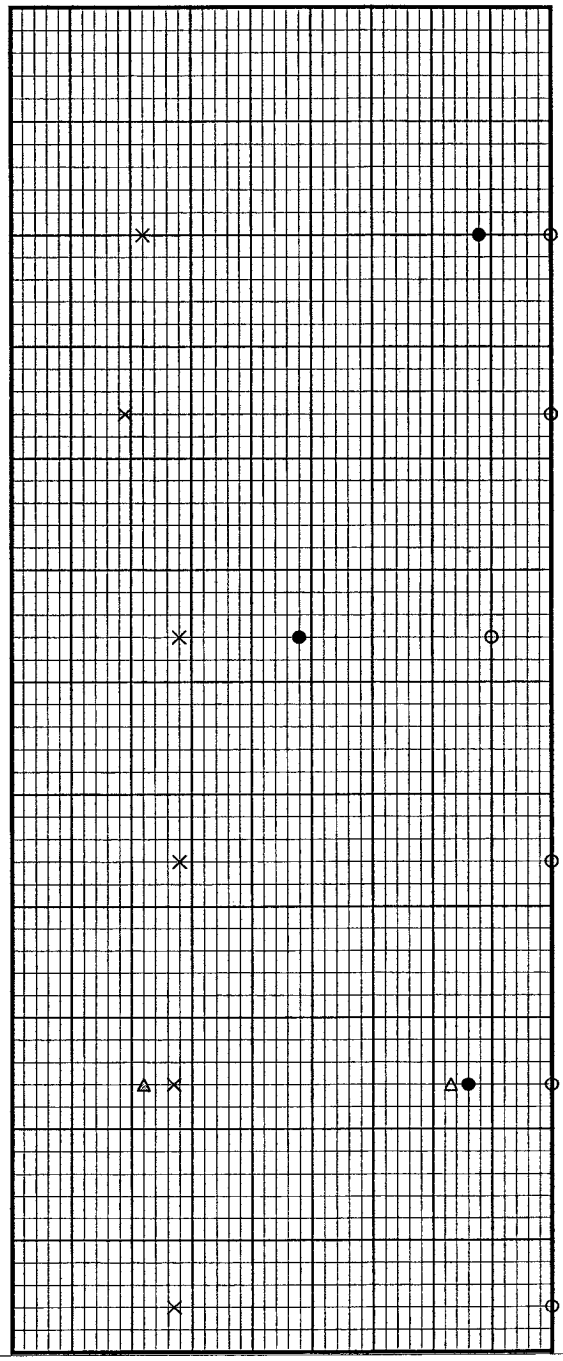
PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-3
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		22			..
95.0					
		23			.. with calcareous nodules below 98'
100.0					
		24			.. reddish brown below 103'
105.0					
		25			..
110.0					
		26			.. with slickenside layers below 113'
115.0					
		27			..
120.0					
					Boring Terminated at 120 feet

TEST RESULTS

O PENETROMETER TEST ● UNCONFINED COMP.
Δ LL ▲ PL
× MOIST.(%) ● #200 (%)

0 10 20 30 40 50 60 70 80 90
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5



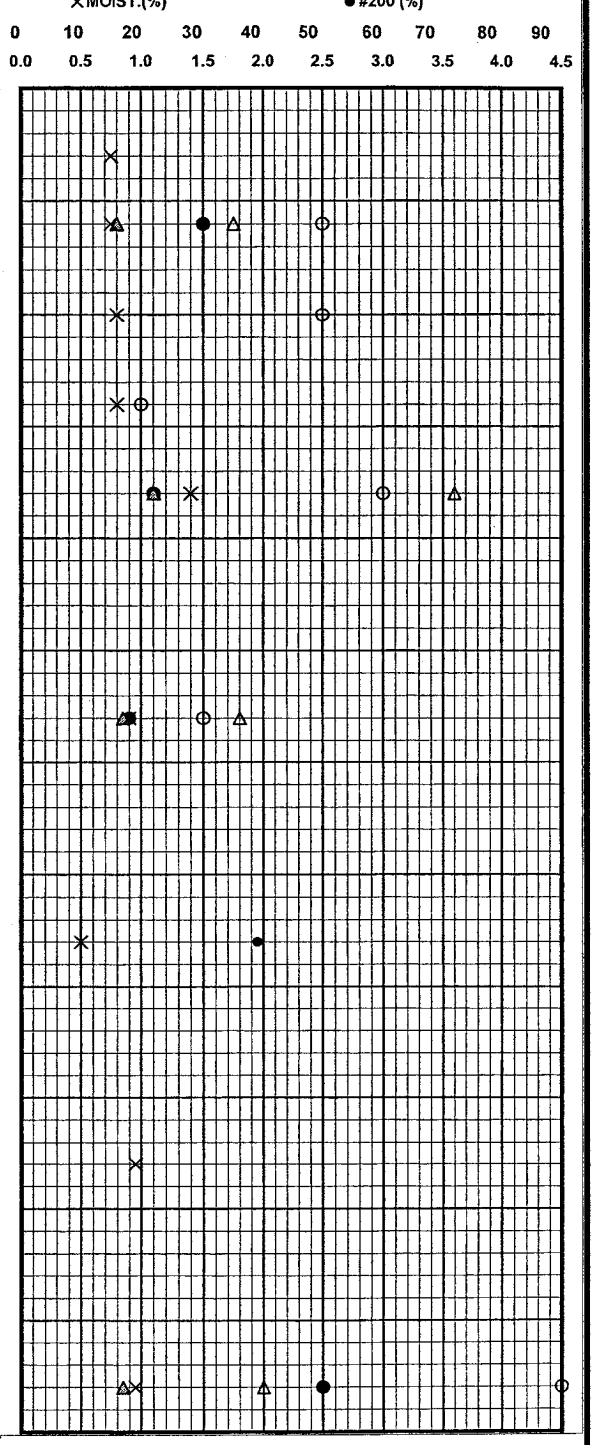
Water First Noticed: 22.5'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/22/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/22/04	COORDINATES N:
HOLE CAVED AT: 22.5'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 4 OF 4

PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-4
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		1			Tan & gray **Sandy Clay (CL)** (FILL)
2.0					
		2			.. stiff, light gray & tan below 2'
4.0					
		3			..
6.0					
		4			.. firm below 6'
8.0					
		5			.. stiff, with clay layers from 8' to 10'
10.0					
		6			.. firm below 15'
15.0					
		7	24		Medium dense, light gray & tan **Silty Sand (SM)**
20.0					
		8	20		..
25.0					
		9			Very stiff, light gray & tan **Sandy Clay (CL)**
30.0					

Continued

TEST RESULTS



Water First Noticed: 20'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/26/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/26/04	COORDINATES N:
HOLE CAVED AT: 20'			
COMPLETION DEPTH: 80'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 1 OF 3

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-4
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

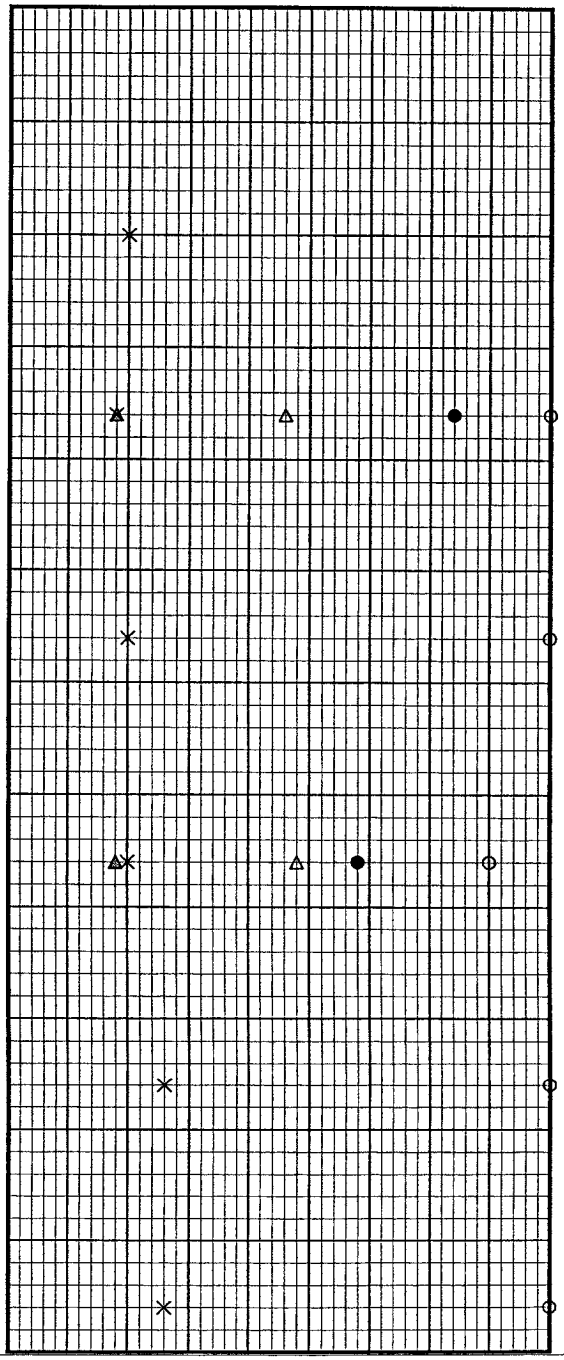
DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		10			..
35.0					
		11			..
40.0					
		12			Very stiff, reddish brown **Clay (CH)** with calcareous nodules
45.0					
		13			..
50.0					
		14			.. with ferrous nodules below 53'
55.0					
		15			..
60.0					

Continued

TEST RESULTS

○ PENETROMETER TEST ● UNCONFINED COMP.
△ LL ▲ PL
× MOIST.(%) ● #200 (%)

0 10 20 30 40 50 60 70 80 90
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5



Water First Noticed: 20'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/26/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/26/04	COORDINATES N:
HOLE CAVED AT: 20'			
COMPLETION DEPTH: 80'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 2 OF 3

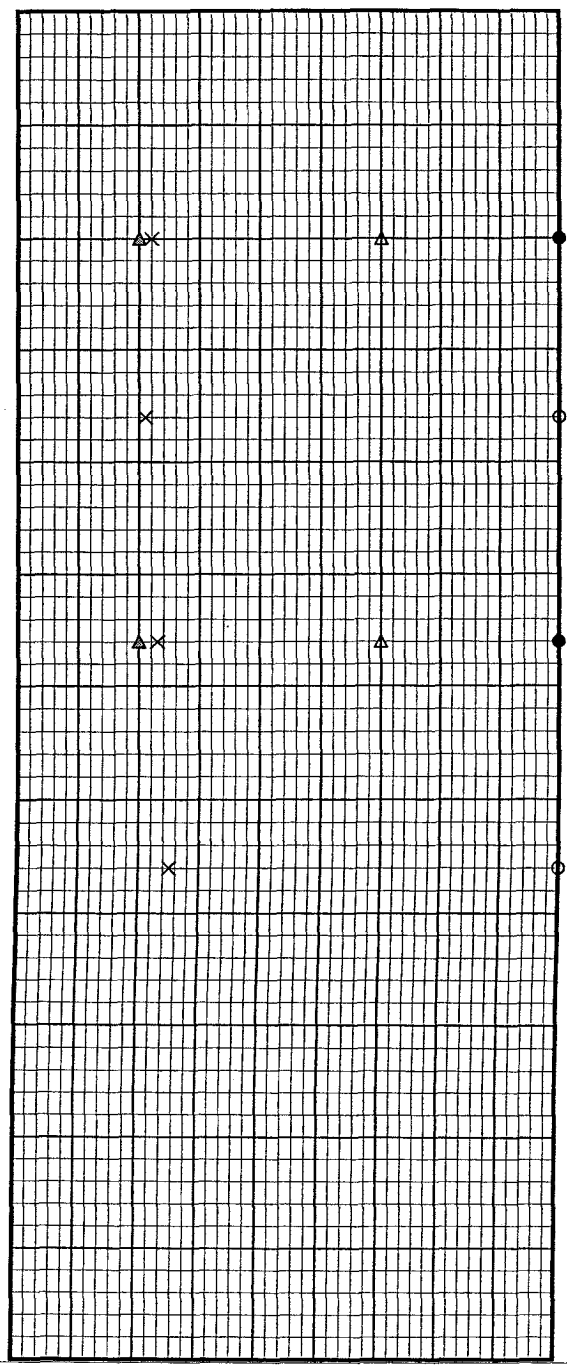
PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-4
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		16			.. hard below 63'
65.0					
		17			..
70.0					
		18			..
75.0					
		19			..
80.0					
					Boring Terminated at 80 feet
85.0					
90.0					

TEST RESULTS

○ PENETROMETER TEST ● UNCONFINED COMP.
△ LL ▲ PL
× MOIST.(%) ● #200 (%)

0 10 20 30 40 50 60 70 80 90
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5



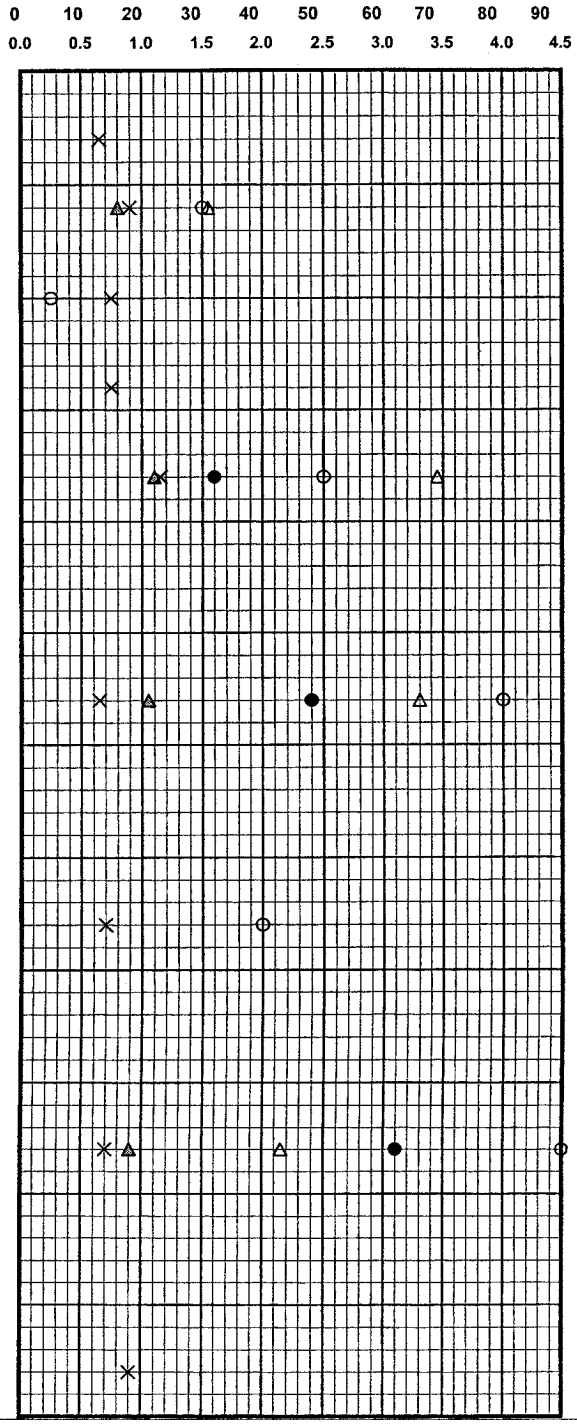
Water First Noticed: 20'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/26/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/26/04	COORDINATES N:
HOLE CAVED AT: 20'			
COMPLETION DEPTH: 80'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 3 OF 3

PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-5
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
2.0		1			Gray & tan **Sandy Clay (CL)** with shells **(FILL)**
4.0		2			.. firm below 2'
6.0		3			.. very soft below 4'
8.0		4	18		Medium dense, gray & tan **Silty Sand (SM)** **(FILL)**
10.0		5			Stiff, light gray & tan **Clay (CH)**
15.0		6			.. very stiff, with calcareous nodules below 13'
20.0		7			Stiff, light gray & tan **Sandy Clay (CL)**
25.0		8			.. very stiff below 23'
30.0		9	32		Dense tan **Silty Sand (SM)**

Continued

TEST RESULTS



Water First Noticed: 21'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/25/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/25/04	COORDINATES N:
HOLE CAVED AT: 21'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 1 OF 4

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	PROJECT NUMBER: G04-504	BORING NUMBER: GB-5
	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

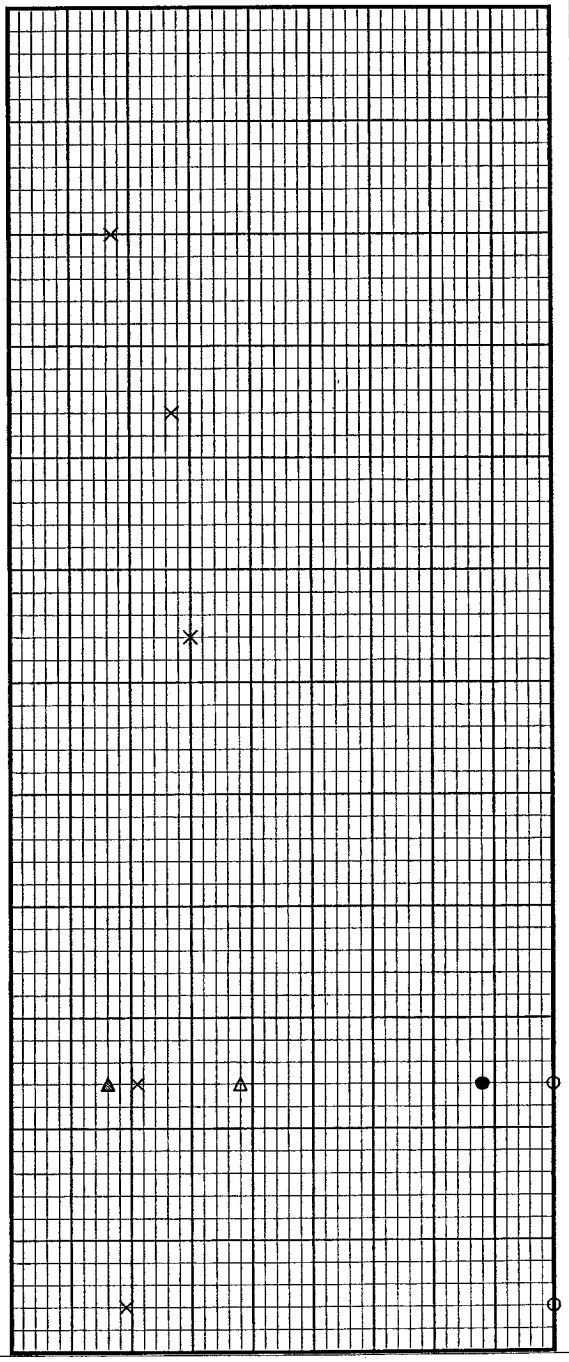
DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		10	36		..
35.0					
		11	43		..
40.0					
		12	46		..
45.0					
		13	50/0"		.. very dense below 48'
50.0					
		14			Very stiff, reddish brown **Sandy Clay (CL)**
55.0					
		15			..
60.0					

Continued

TEST RESULTS

O PENETROMETER TEST ● UNCONFINED COMP.
Δ LL ▲ PL
× MOIST.(%) ● #200 (%)

0 10 20 30 40 50 60 70 80 90
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5



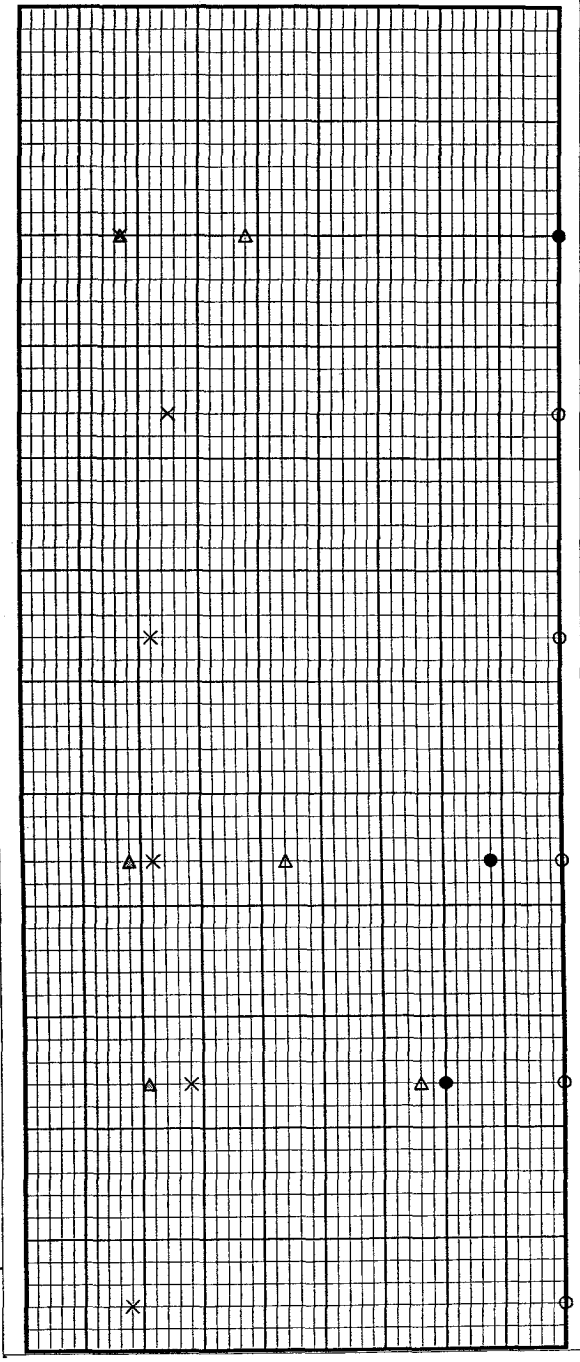
Water First Noticed: 21'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/25/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/25/04	COORDINATES N:
HOLE CAVED AT: 21'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 2 OF 4

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-5
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		16			.. hard below 63'
65.0					
		17			.. with calcareous nodules below 68'
70.0					
		18			..
75.0					.. sand layers from 75' to 77.5'
		19			..
80.0					
		20			Very stiff, reddish brown **Clay (CH)**
85.0					
		21			Very stiff, light gray & tan **Sandy Clay (CL)**
90.0					

Continued

TEST RESULTS



Water First Noticed: 21'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/25/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/25/04	COORDINATES N:
HOLE CAVED AT: 21'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 3 OF 4

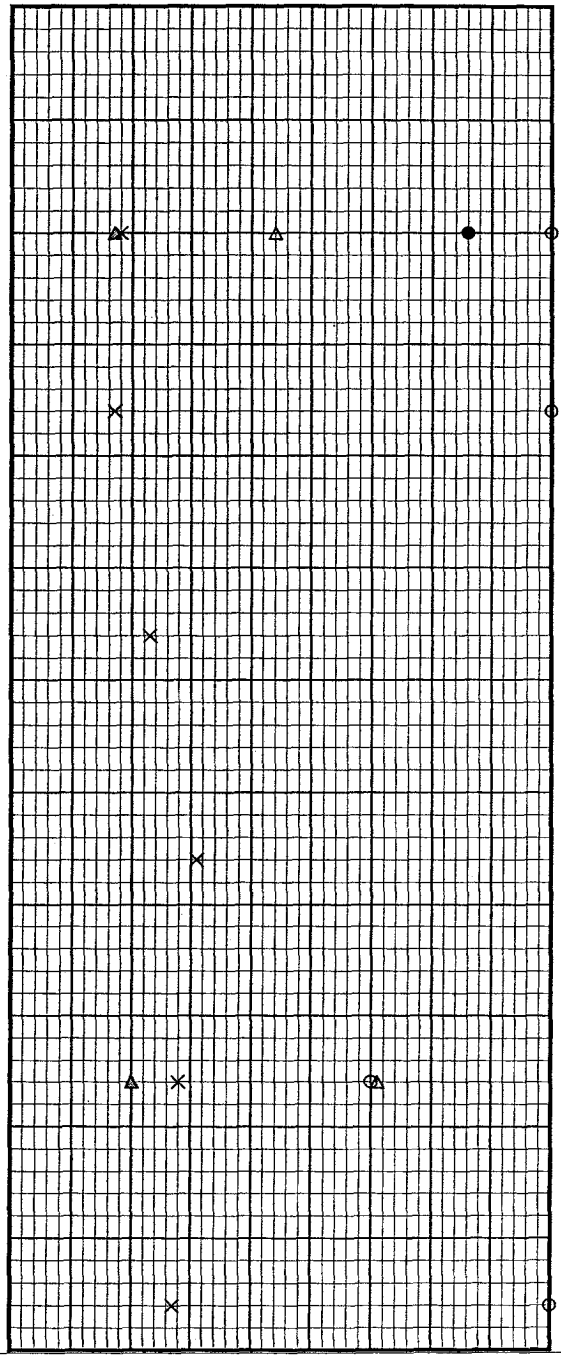
PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-5
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		22			..
95.0					
		23			.. reddish brown & light gray below 98'
100.0					
		24	3		Very loose, light gray & tan **Silty Sand (SM)**
105.0					
		25	50/6"		.. very dense, reddish brown below 108'
110.0					
		26			Stiff, reddish brown **Clay (CH)**
115.0					
		27			.. very stiff below 118'
120.0					
					Boring Terminated at 120 feet

TEST RESULTS

○ PENETROMETER TEST ● UNCONFINED COMP.
△ LL ▲ PL
× MOIST.(%) ● #200 (%)

0 10 20 30 40 50 60 70 80 90
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5



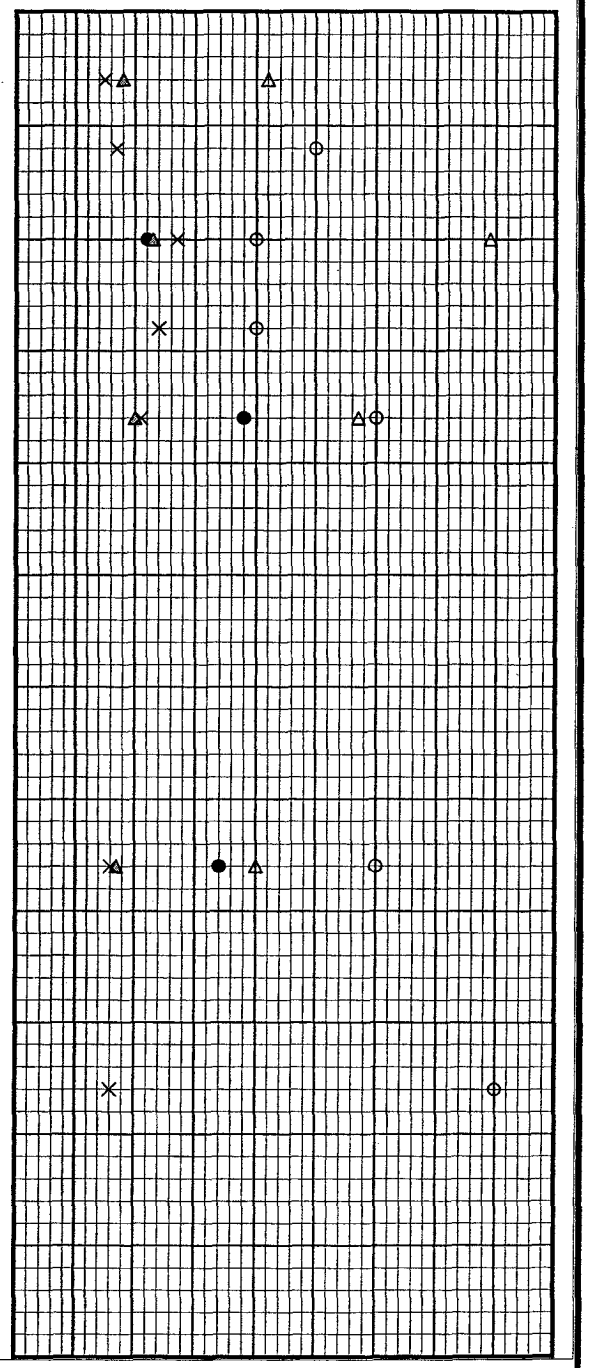
Water First Noticed: 21'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/25/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/25/04	COORDINATES N:
HOLE CAVED AT: 21'			
COMPLETION DEPTH: 120'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 4 OF 4

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-6
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		1			Gray & tan **Sandy Clay (CL)** **(FILL)**
2.0					
		2			.. stiff, light gray & tan below 2'
4.0					
		3			Stiff, gray & tan **Clay (CH)**
6.0					
		4			..
8.0					
		5			.. light gray & tan, with ferrous nodules below 6'
10.0					
		6			..
15.0					
		7			Stiff, light gray & tan **Sandy Clay (CL)**
20.0					
		8			.. very stiff, with calcareous nodules below 23'
25.0					
		9			..
30.0					

Continued

TEST RESULTS



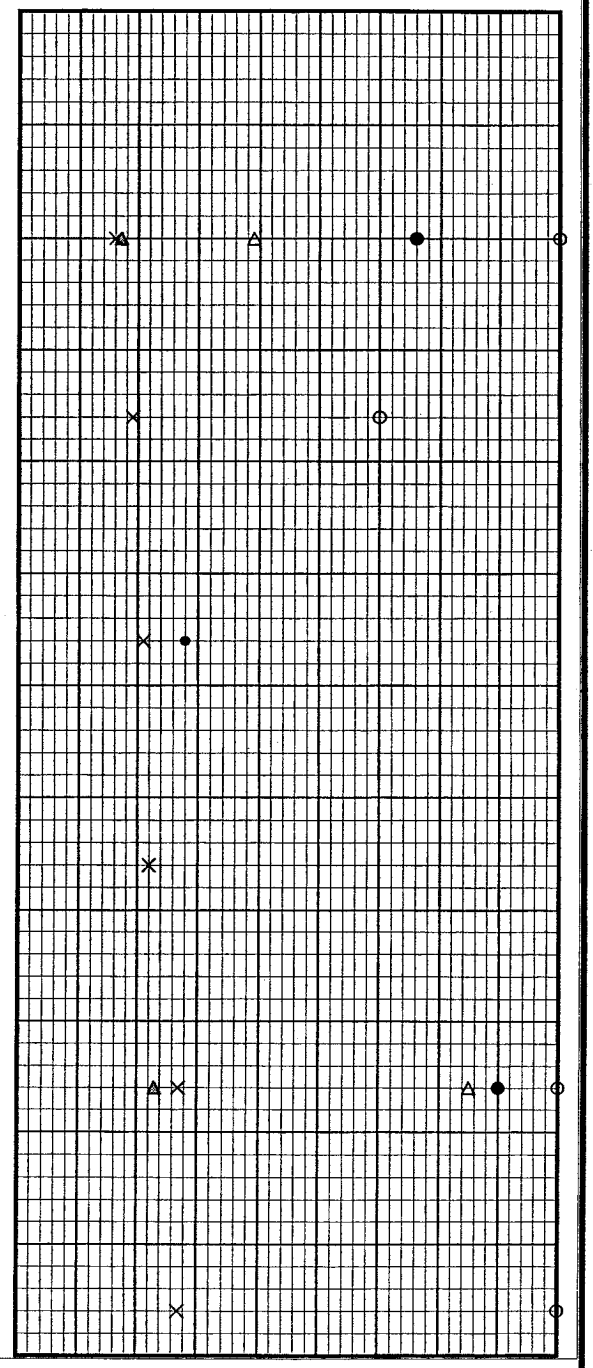
Water First Noticed: 23'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/26/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/26/04	COORDINATES N:
HOLE CAVED AT: 23'			
COMPLETION DEPTH: 80'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 1 OF 3

PROJECT NAME: CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. MACGREGOR	BORING LOG	
	PROJECT NUMBER: G04-504	BORING NUMBER: GB-6
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		10			.. with ferrous nodules below 33'
35.0					
		11			.. stiff, reddish brown, with calcareous nodules below 38'
40.0					
		12	29		Medium dense, reddish brown **Silty Sand (SM)**
45.0					
		13	27		..
50.0					
		14			Hard, reddish brown **Clay (CH)**
55.0					
		15			..
60.0					

Continued

TEST RESULTS



Water First Noticed: 23'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/26/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/26/04	COORDINATES N:
HOLE CAVED AT: 23'			
COMPLETION DEPTH: 80'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 2 OF 3

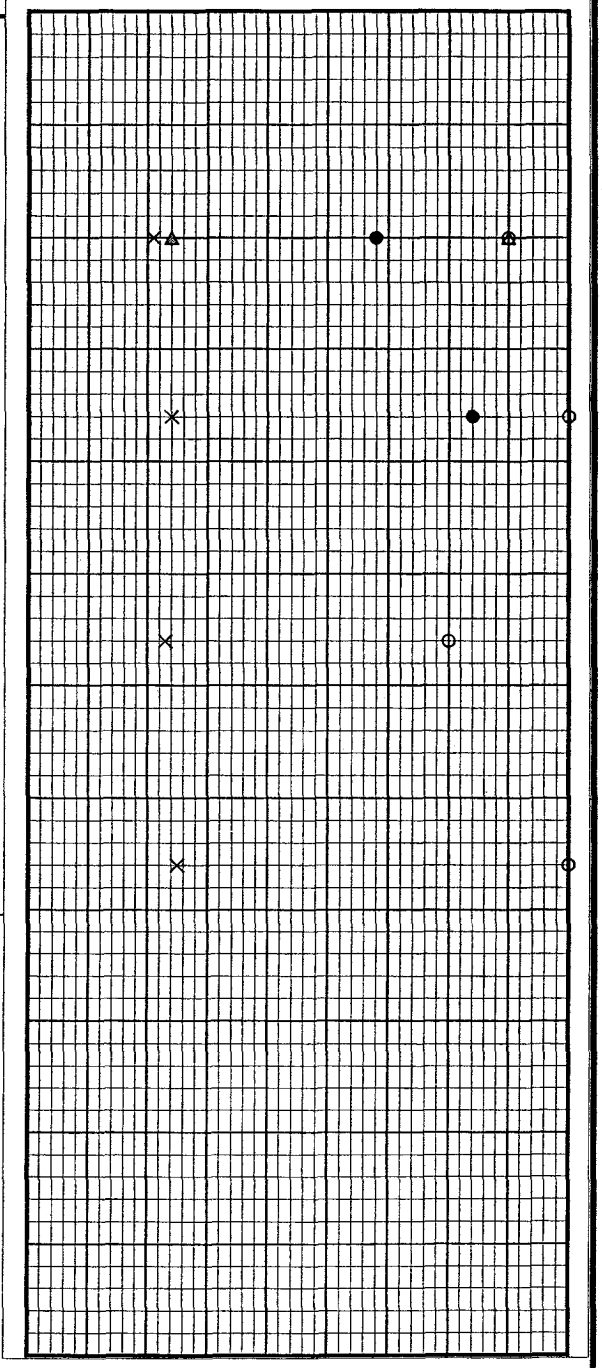
PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-6
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		16			.. very stiff below 63'
65.0					
		17			..
70.0					
		18			.. with calcareous nodules below 73'
75.0					
		19			..
80.0					
					Boring Terminated at 80 feet
85.0					
90.0					

TEST RESULTS

O PENETROMETER TEST ● UNCONFINED COMP.
Δ LL ▲ PL
X MOIST.(%) ● #200 (%)

0 10 20 30 40 50 60 70 80 90
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

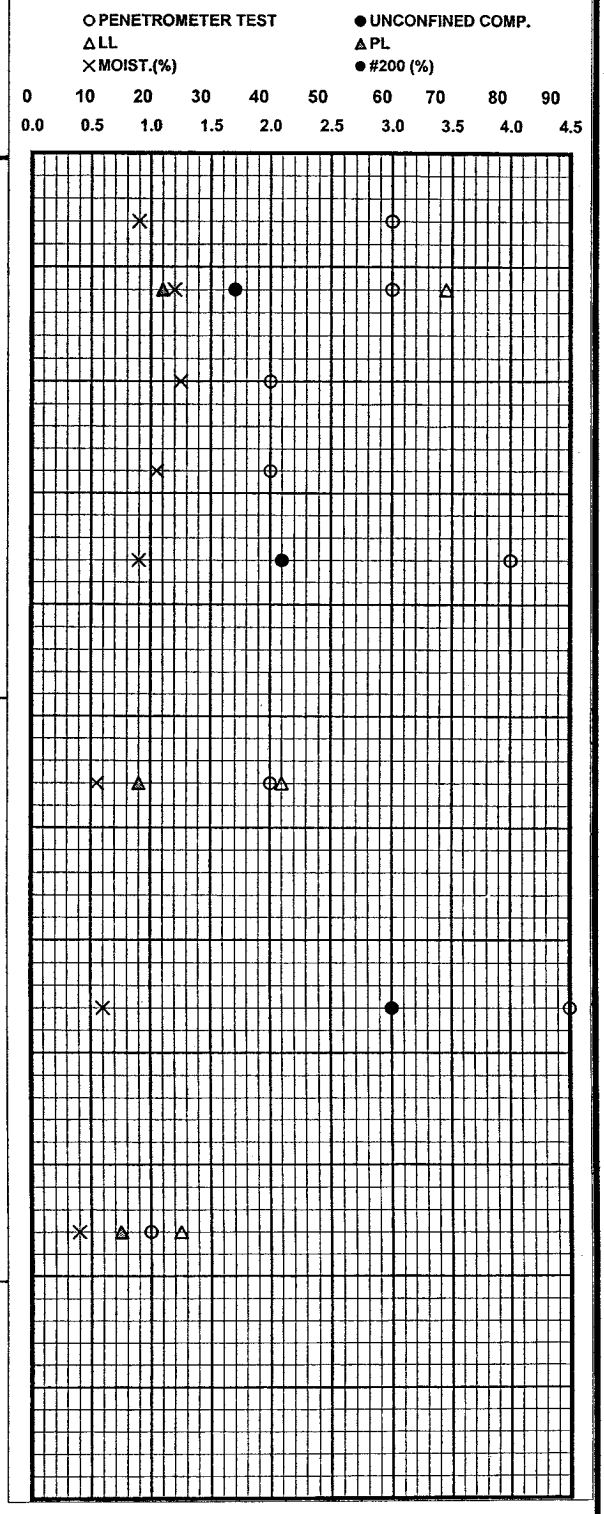


Water First Noticed: 23'	DRILLED & LOGGED BY: Van & Sons	STARTED: 10/26/04	STATION OFFSET
PZ WATER LEVEL: N/A			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: N/A	PREPARED BY: REDDY	COMPLETED: 10/26/04	COORDINATES N:
HOLE CAVED AT: 23'			
COMPLETION DEPTH: 80'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 3 OF 3

PROJECT NAME: CAMBRIDGE STREET	BORING LOG	
BETWEEN HOLCOMBE AND S. MACGREGOR	PROJECT NUMBER: G04-504	BORING NUMBER: GB-7 (pz-2)
GEOTECHNICIAL CONSULTANT: ASSOCIATED TESTING LABORATORIES, INC.	DESIGN CONSULTANT: SCIENTECH ENGINEERS	

DEPTH, FEET	SAMPLE TYPE	SAMPLE NUMBER	SPT	LEGEND	MATERIAL DESCRIPTION
		1			Stiff, dark gray **Clay (CH)**
2.0					
		2			.. gray & tan below 2'
4.0					
		3			.. with ferrous nodules below 4'
6.0					
		4			.. light gray & tan below 6'
8.0					
		5			.. very stiff below 8'
10.0					
					Stiff, light gray & tan **Sandy Clay (CL)**
		6			
15.0					
		7			.. very stiff with calcareous nodules below 18'
20.0					
		8			.. firm with very sandy clay layer below 23'
25.0					
					Boring terminated at 25 feet
30.0					

TEST RESULTS



Water First Noticed: No	DRILLED & LOGGED BY: H.G.	STARTED: 11/08/04	STATION OFFSET
Water at Completion: No			GROUP LEVEL(MSL): Existing
PZ WATER LEVEL: No Water (11/9/04)	PREPARED BY: REDDY	COMPLETED: 11/08/04	COORDINATES N:
PZ WATER LEVEL: No Water (12/15/04)			
COMPLETION DEPTH: 25'	CHECKED BY: Jitu	APPROVED BY: JAY	E:
GROUT:			SHEET 1 OF 1

APPENDIX 4A

SUMMARY OF TEST RESULTS

ASSOCIATED TESTING LABORATORIES, INC.
3143 YELLOWSTONE BLVD., HOUSTON, TEXAS 77052
TEL: (713) 748-3717 FAX: (713) 748-3748

PROJECT NAME : CAMBRIDGE STREET
BETWEEN HOLCOMBE AND S. BRAESWOOD
PROJECT NUMBER: G04-504

Boring No.	Sample			Water Content (%)	Dry Density (pcf)	Atterberg Limits			Particle Size					Unconfined Comp. (TSF)	Triaxial Comp. Strength			Consolidation	Corrosion			
	No.	Depth (ft)	Type			LL	PL	PI	Grv. (%)	Sand (%)	Silt (%)	Clay (%)	#200 (%)		Figure No.	Max. Deviator Stress (ksf)	Conf. Press PSI		pH	R (ohm-cm)	SO4 (%)	Cl (%)
GB-1	1	0-2	UD	25		73	22	51														
	2	2-4	UD	31																		
	3	4-6	UD	21																		
	4	6-8	UD	23		59	20	39														
	5	8-10	UD	30	95									1.7								
	6	13-15	UD	14	115									1.4								
	7	18-20	UD	16	113	29	15	14						1.1								
	8	23-25	SS	23									24									
GB-2	1	0-2	UD	16		38	17	21														
	2	2-4	UD	17																		
	3	4-6	UD	12																		
	4	6-8	UD	13		37	17	20														
	5	8-10	UD	27	105									3.3								
	6	13-15	UD	29	102	87	25	62						2.4								
	7	18-20	UD	21	115									2.8								
	8	23-25	UD	21	116	76	23	53						3.5								

Legend:
UD - Undisturbed Sample Extruded in Field
UL - Undisturbed Sample Extruded in Lab
Designates consolidation test Performed
AU - Auger Cutting in Field
SS - Split Spoon Sample

ASSOCIATED TESTING LABORATORIES, INC.
3143 YELLOWSTONE BLVD., HOUSTON, TEXAS 77052
TEL: (713) 748-3717 FAX: (713) 748-3748

PROJECT NAME : CAMBRIDGE STREET
BETWEEN HOLCOMBE AND S. BRAESWOOD
PROJECT NUMBER: G04-504

Boring No.	Sample			Water Content (%)	Dry Density (pcf)	Atterberg Limits			Particle Size					Unconfined Comp. (TSF)	Triaxial Comp. Strength			Consolidation	Corrosion			
	No.	Depth (ft)	Type			LL	PL	PI	Grv. (%)	Sand (%)	Silt (%)	Clay (%)	#200 (%)		Figure No.	Max. Deviator Stress (ksf)	Conf. Press PSI		pH	R (ohm-cm)	SO4 (%)	Cl (%)
GB-3	1	0-2	AU	19																		
	2	2-4	UD	16	112	31	16	15						1.7								
	3	4-6	UD	15																		
	4	6-8	UD	13																		
	5	8-10	UD	17	112	43	18	25						1.4								
	6	13-15	UD	15																		
	7	18-20	UD	19	102	40	17	23						1.6								
	8	23-25	UD	25		42	18	24					71									
	9	28-30	SS	24									38									
	10	33-35	UD	22	105	59	20	39						4.3								
	11	38-40	UD	23																		
	12	43-45	UD	20		64	20	44														
	13	48-50	UD	22	102									0.9								
	14	53-55	UD	26	99	73	22	51						4.0								
	15	58-60	UD	27																		
	16	63-65	UD	25	101	63	21	42						4.5								
	17	68-70	UD	20																		
	18	73-75	SS	27									76									
	19	78-80	UD	32																		
	20	83-85	UD	45	80	88	26	62						2.6								
	21	88-90	UD	21																		
	22	93-95	UD	22	112									3.9								
	23	98-100	UD	19																		
	24	103-105	UD	28	95									2.4								
	25	108-110	UD	28																		
	26	113-115	UD	27	97	73	22	51						3.8								
	27	118-120	UD	27																		

Legend:
UD - Undisturbed Sample Extruded in Field
UL - Undisturbed Sample Extruded in Lab
Designates consolidation test Performed
AU - Auger Cutting in Field
SS - Split Spoon Sample

ASSOCIATED TESTING LABORATORIES, INC.
3143 YELLOWSTONE BLVD., HOUSTON, TEXAS 77052
TEL: (713) 748-3717 FAX: (713) 748-3748

PROJECT NAME : CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. BRAESWOOD

PROJECT NUMBER: G04-504

Boring No.	Sample			Water Content (%)	Dry Density (pcf)	Atterberg Limits			Particle Size					Unconfined Comp. (TSF)	Triaxial Comp. Strength			Consolidation	Corrosion			
	No.	Depth (ft)	Type			LL	PL	PI	Grv. (%)	Sand (%)	Silt (%)	Clay (%)	#200 (%)		Figure No.	Max. Deviator Stress (ksf)	Conf. Press PSI		pH	R (ohm-cm)	SO4 (%)	Cl (%)
GB-4	1	0-2	AU	15																		
	2	2-4	UD	15	114	35	16	19						1.5								
	3	4-6	UD	16																		
	4	6-8	UD	16																		
	5	8-10	UD	28	95	72	22	50						1.1								
	6	13-15	UD	18	109	36	17	19						0.9								
	7	18-20	SS	10									39									
	8	23-25	SS	19																		
	9	28-30	UD	19	111	40	17	23						2.5								
	10	33-35	AU	20																		
	11	38-40	UD	18	110	46	18	28						3.7								
	12	43-45	UD	20																		
	13	48-50	UD	20	105	48	18	30						2.9								
	14	53-55	UD	26																		
	15	58-60	UD	26																		
	16	63-65	UD	22	107	60	20	40						4.5								
	17	68-70	UD	21																		
	18	73-75	UD	23	104	60	20	40						4.5								
	19	78-80	UD	25																		

Legend:
UD - Undisturbed Sample Extruded in Field
UL - Undisturbed Sample Extruded in Lab
Designates consolidation test Performed
AU - Auger Cutting in Field
SS - Split Spoon Sample

ASSOCIATED TESTING LABORATORIES, INC.
3143 YELLOWSTONE BLVD., HOUSTON, TEXAS 77052
TEL: (713) 748-3717 FAX: (713) 748-3748

PROJECT NAME : CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. BRAESWOOD

PROJECT NUMBER: G04-504

Boring No.	Sample			Water Content (%)	Dry Density (pcf)	Atterberg Limits			Particle Size					Unconfined Comp. (TSF)	Triaxial Comp. Strength			Consolidation	Corrosion			
	No.	Depth (ft)	Type			LL	PL	PI	Grv. (%)	Sand (%)	Silt (%)	Clay (%)	#200 (%)		Figure No.	Max. Deviator Stress (ksf)	Conf. Press PSI		pH	R (ohm-cm)	SO4 (%)	Cl (%)
GB-5	1	0-2	AU	13																		
	2	2-4	UD	18		31	16	15														
	3	4-6	UD	15																		
	4	6-8	SS	15																		
	5	8-10	UD	23	100	69	22	47						1.6								
	6	13-15	UD	13	113	66	21	45						2.4								
	7	18-20	UD	14																		
	8	23-25	UD	14	117	43	18	25						3.1								
	9	28-30	SS	18																		
	10	33-35	SS	17																		
	11	38-40	SS	27																		
	12	43-45	SS	30																		
	13	48-50	SS																			
	14	53-55	UD	21	104	38	16	22						3.9								
	15	58-60	UD	19																		
	16	63-65	UD	17	113	38	17	21						4.5								
	17	68-70	UD	25																		
	18	73-75	UD	22																		
	19	78-80	UD	22	102	44	18	26						3.9								
	20	83-85	UD	28	95	66	21	45						3.5								
	21	88-90	UD	18																		
	22	93-95	UD	18	113	44	17	27						3.8								
	23	98-100	UD	17																		
	24	103-105	UD	23																		
	25	108-110	UD	31																		
	26	113-115	UD	28		61	20	41														
	27	118-120	UD	27																		

Legend:
UD - Undisturbed Sample Extruded in Field
UL - Undisturbed Sample Extruded in Lab
Designates consolidation test Performed
AU - Auger Cutting in Field
SS - Split Spoon Sample

ASSOCIATED TESTING LABORATORIES, INC.
3143 YELLOWSTONE BLVD., HOUSTON, TEXAS 77052
TEL: (713) 748-3717 FAX: (713) 748-3748

PROJECT NAME : CAMBRIDGE STREET
BETWEEN HOLCOMBE AND S. BRAESWOOD
PROJECT NUMBER: G04-504

Boring No.	Sample			Water Content (%)	Dry Density (pcf)	Atterberg Limits			Particle Size					Unconfined Comp. (TSF)	Triaxial Comp. Strength			Consolidation	Corrosion			
	No.	Depth (ft)	Type			LL	PL	PI	Grv. (%)	Sand (%)	Silt (%)	Clay (%)	#200 (%)		Figure No.	Max. Deviator Stress (ksf)	Conf. Press PSI		pH	R (ohm-cm)	SO4 (%)	Cl (%)
GB-6	1	0-2	AU	15		42	18	24														
	2	2-4	UD	17																		
	3	4-6	UD	27	91	79	23	56						1.1								
	4	6-8	UD	24																		
	5	8-10	UD	21	103	57	20	37						1.9								
	6	13-15	UD																			
	7	18-20	UD	16	113	40	17	23						1.7								
	8	23-25	UD	16																		
	9	28-30	UD																			
	10	33-35	UD	16	114	39	17	22						3.3								
	11	38-40	UD	19																		
	12	43-45	SS	21									28									
	13	48-50	SS	22																		
	14	53-55	UD	27	96	75	23	52						4.0								
	15	58-60	UD	27																		
	16	63-65	UD	21	101	80	24	56						2.9								
	17	68-70	UD	24	100									3.7								
	18	73-75	UD	23																		
	19	78-80	UD	25																		

Legend:
UD - Undisturbed Sample Extruded in Field
UL - Undisturbed Sample Extruded in Lab
Designates consolidation test Performed
AU - Auger Cutting in Field
SS - Split Spoon Sample

ASSOCIATED TESTING LABORATORIES, INC.
3143 YELLOWSTONE BLVD., HOUSTON, TEXAS 77052
TEL: (713) 748-3717 FAX: (713) 748-3748

PROJECT NAME : CAMBRIDGE STREET BETWEEN HOLCOMBE AND S. BRAESWOOD

PROJECT NUMBER: G04-504

Boring No.	Sample			Water Content (%)	Dry Density (pcf)	Atterberg Limits			Particle Size					Unconfined Comp. (TSF)	Triaxial Comp. Strength			Consolidation	Corrosion			
	No.	Depth (ft)	Type			LL	PL	PI	Grv. (%)	Sand (%)	Silt (%)	Clay (%)	#200 (%)		Figure No.	Max. Deviator Stress (ksf)	Conf. Press PSI		pH	R (ohm-cm)	SO4 (%)	Cl (%)
GB-7	1	0-2	UD	18																		
	2	2-4	UD	24	99	69	22	47						1.7								
	3	4-6	UD	25																		
	4	6-8	UD	21																		
	5	8-10	UD	18	109									2.1								
	6	13-15	UD	11		42	18	25														
	7	18-20	UD	12	114									3.0								
	8	23-25	UD	8		25	15	10														

Legend:
UD - Undisturbed Sample Extruded in Field
UL - Undisturbed Sample Extruded in Lab
Designates consolidation test Performed
AU - Auger Cutting in Field
SS - Split Spoon Sample

APPENDIX 4B

CONSOLIDATED UNDRAINED TEST RESULTS FROM HTS, INC.

HTS, Inc. Consultants
416 Pickering Street, Houston, TX 77091
www.htshouston.com

Phone 713-692-8373
Fax 713-692-8502
Toll Free 1-800-692-TEST

Excellence in Engineering, Consulting, Testing and Inspection

HTS, INC. Consultants

December 20, 2004

Mr. Jay Vaghela, P.E.
Associated Testing Laboratories, Inc.
3143 Yellowstone Boulevard
Houston, Texas 77054

Re: Results of Consolidated Undrained Triaxial Compression Tests on 4 Samples

HTS Project No. 04-S-280

Dear Mr. Vaghela:

HTS, Inc. Consultants (HTS) has completed the laboratory testing of 4 soil samples that were identified as GB-4, 6' – 8' and 43'- 45'and GB-6, 13' - 15' and 28'- 30'. The samples were obtained by a representative of Associated Testing Laboratories, Inc. and delivered to HTS' laboratory on November 8, 2004. Associated Testing Laboratories, Inc. requested that the following test be conducted on the soil samples:

- **Consolidated Undrained Triaxial Compression Test With Pore Pressure Measurements (ASTM D 4767).**

The results of the laboratory tests are shown in the attached Figures 1 through 4.

Should you have any questions concerning the test results, please contact me at your convenience.

Very truly yours,
HTS, Inc. Consultants

Hossein Zandi, EIT
Project Manager

HZ/cg

Attachments: Figures 1 through 4

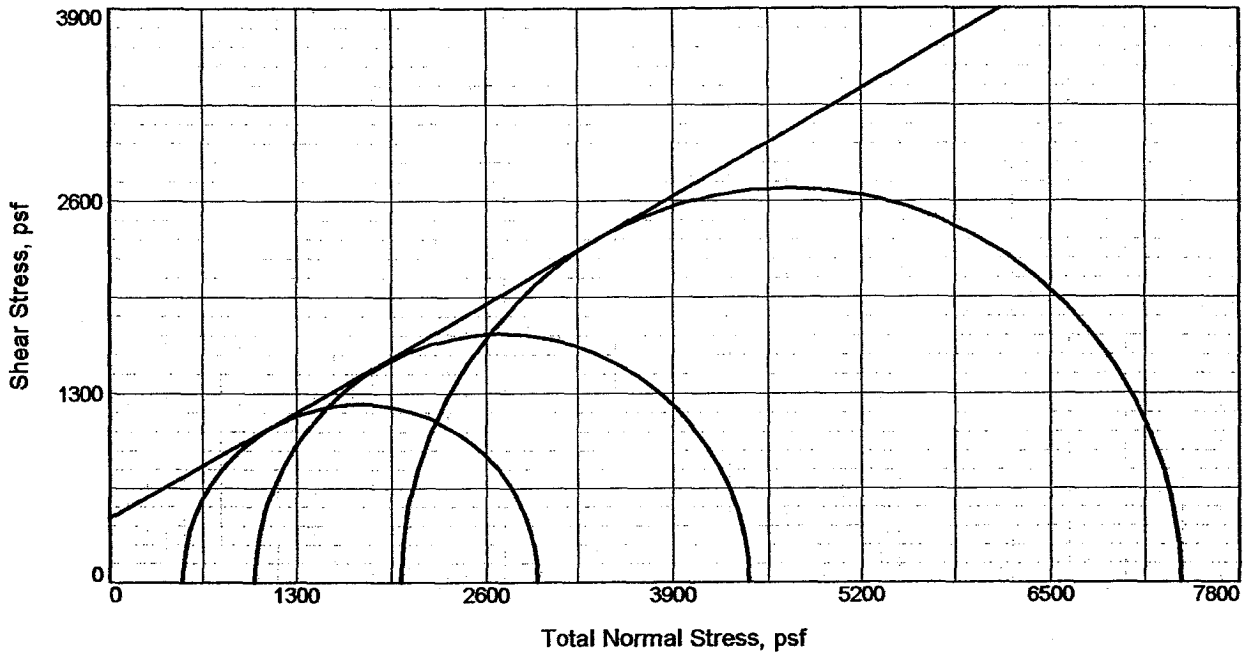
h:word/250-299/04-280L

ATTACHMENT

(Figures 1 through 4)

HTS, INC.
Consultants

TRIAXIAL SHEAR TEST REPORT



Type of Test: CU with Pore Pressures **Sample Type:** Shelby Tube

No.	Fluid Press. psi		Failure Stress, psf		Ultimate Stress, psf		Principal Stresses at Failure psf	
	Cell	Back	Deviator	Total Pore Pressure	Deviator	Total Pore Pressure	$\bar{\sigma}_1$	$\bar{\sigma}_3$
1	29.00	25.50	2462	3778	2462	3778	2860	398
2	39.00	32.00	3409	4769	3742	4576	4256	847
3	43.10	29.10	5379	4530	5383	4548	7056	1677

No.	Consolidated Sample Parameters						
	% Water Content	Dry Dens. pcf	Satur-ation	Void Ratio	Diameter in.	Height in.	Strain Rate %/min.
1	17.6	113.7	98.8%	0.4823	2.82	5.52	160.00
2	16.7	116.1	100.0%	0.4515	2.86	5.29	150.00
3	15.4	119.1	100.0%	0.4147	3.00	4.73	225.00

Mohr-Columb Strength Parameters		Material Description
	Total	SANDY LEAN CLAY (CL)
Strength intercept, c=	444 psf	
Friction angle, ϕ =	29.3 deg	PI= 19
Tangent, ϕ =	0.56	

Client: Associated Testing Laboratories, Inc.

Project: CU Laboratory Testing

Sample Number: GB-4 **Depth:** 6'-8'

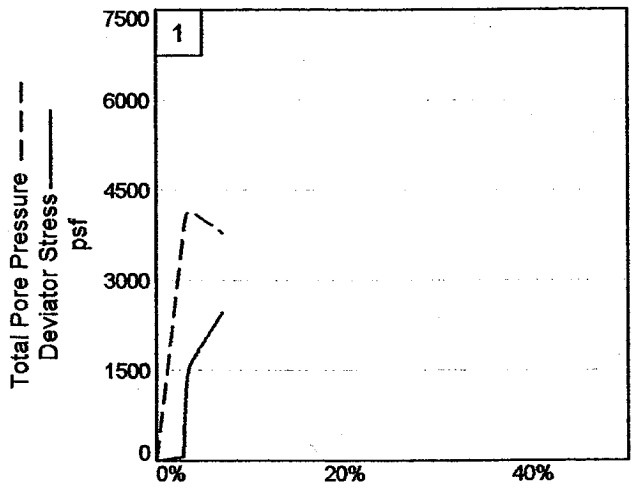
Date: December 14, 2004
File: 04-280$_2$
Remarks:

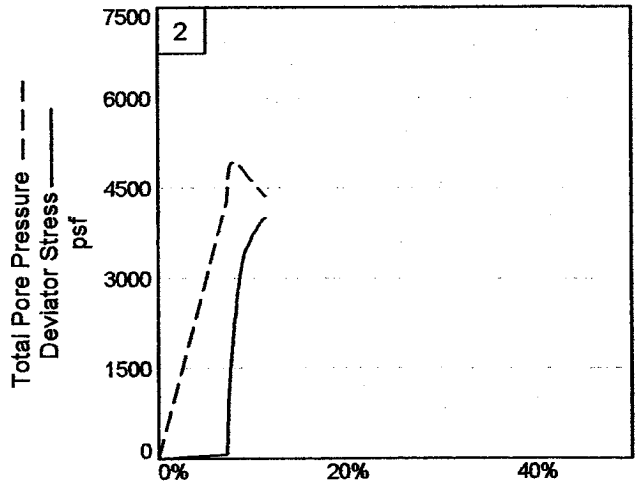
Tested by: DL Checked by: GEV/HZ
Date: 12-6-04 Date: 12-9-04

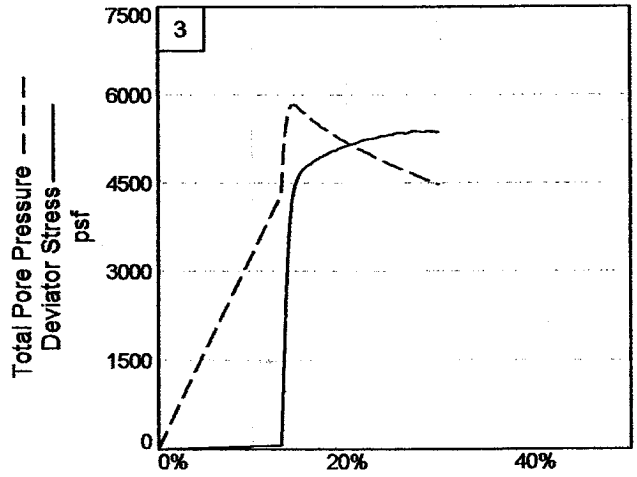
Proj. No.: 04-280
Figure No.: 1

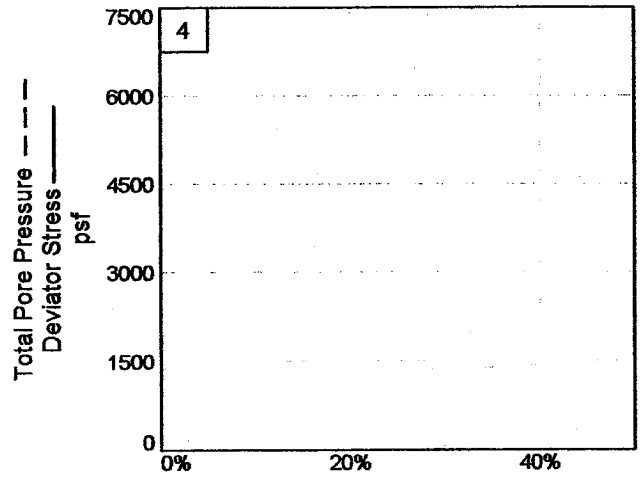
TRIAXIAL SHEAR TEST REPORT

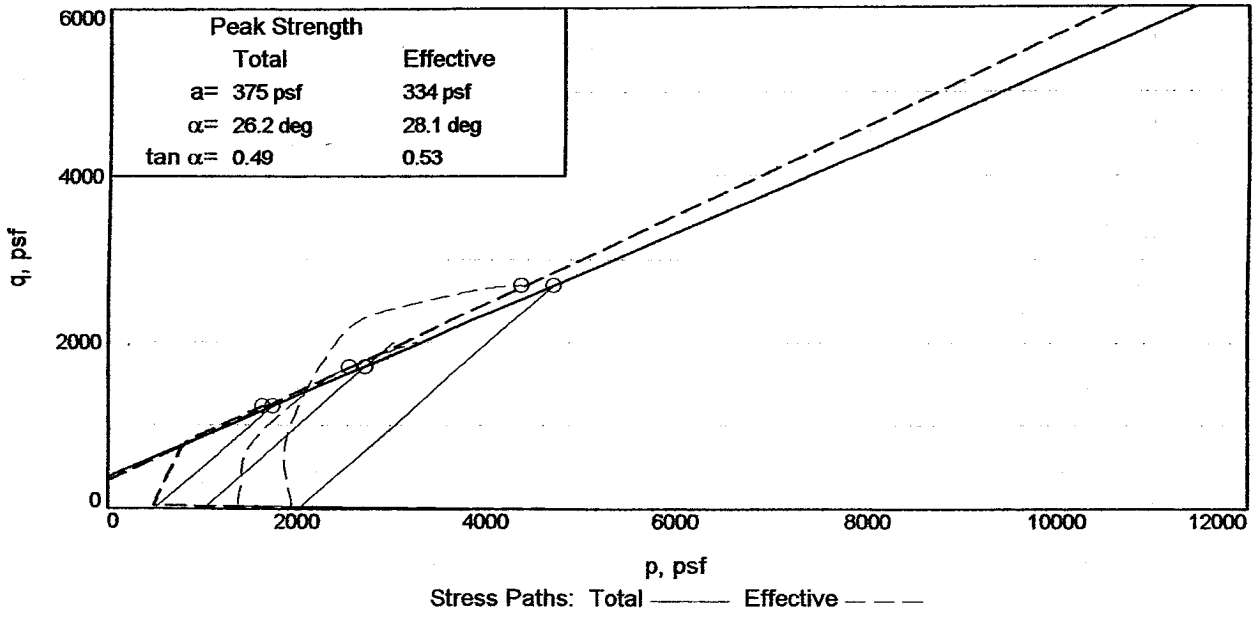
HTS, Inc.









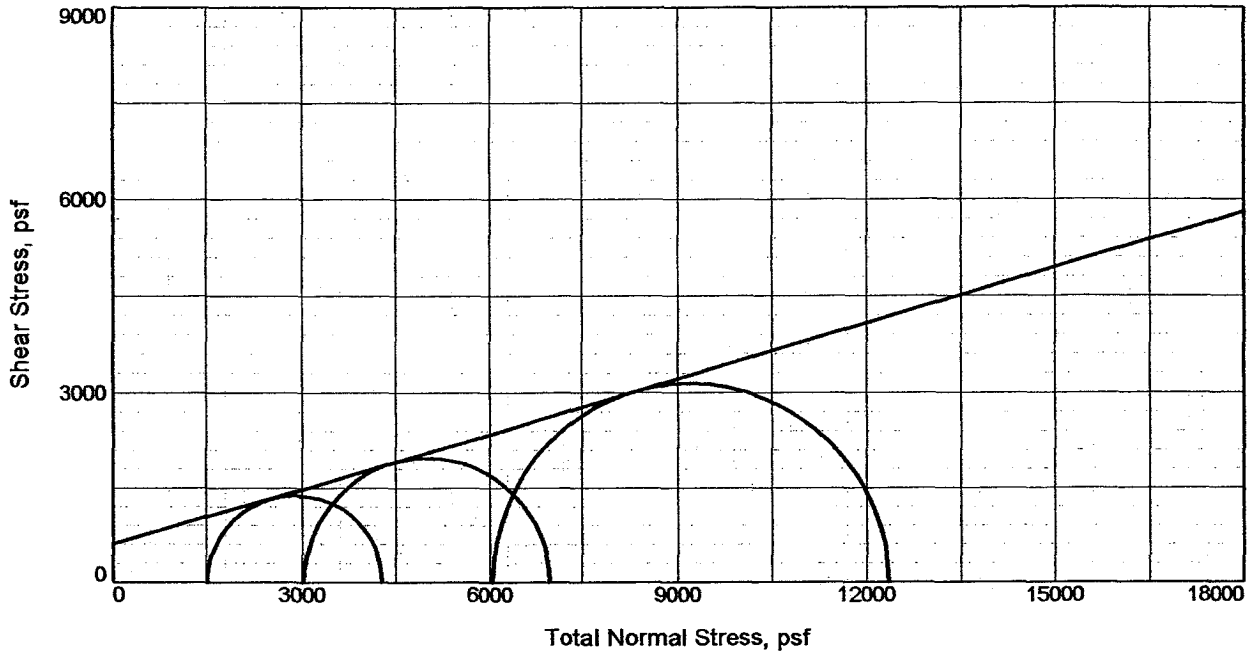


Client: Associated Testing Laboratories, Inc.
Project: CU Laboratory Testing
Sample Number: GB-4
Project No.: 04-280

Figure No.: 1A

HTS, Inc.

TRIAXIAL SHEAR TEST REPORT



Type of Test: CU with Pore Pressures **Sample Type:** Shelby Tube

No.	Fluid Press. psi		Failure Stress, psf		Ultimate Stress, psf		Principal Stresses at Failure psf	
	Cell	Back	Deviator	Total Pore Pressure	Deviator	Total Pore Pressure	$\bar{\sigma}_1$	$\bar{\sigma}_3$
1	59.50	49.00	2765	7868	2765	7868	3465	700
2	56.60	35.60	3950	5881	3084	5755	6220	2269
3	62.32	20.32	6291	4729	6291	4729	10536	4245

No.	Consolidated Sample Parameters						
	% Water Content	Dry Dens. pcf	Satur-ation	Void Ratio	Diameter in.	Height in.	Strain Rate %/min.
1	25.1	98.0	96.5%	0.6883	3.08	5.68	160.00
2	24.6	100.1	100.0%	0.6519	3.27	5.22	150.00
3	23.9	101.4	100.0%	0.6321	3.36	4.79	225.00

Mohr-Columb Strength Parameters		Material Description
	Total	FAT CLAY (CH)
Strength intercept, c=	618 psf	
Friction angle, ϕ =	16.1 deg	**PI=** 35
Tangent, ϕ =	0.29	

Client: Associated Testing Laboratories, Inc.

Project: CU Laboratory Testing

Sample Number: GB-4 **Depth:** 43'-45'

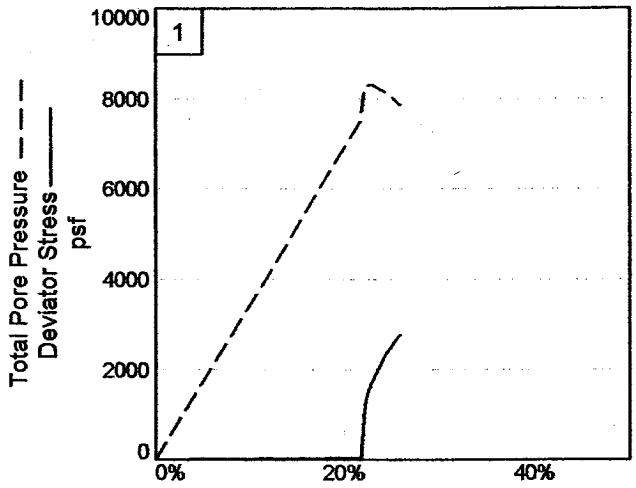
Date: December 16, 2004
File: 04-280$_3$
Remarks:

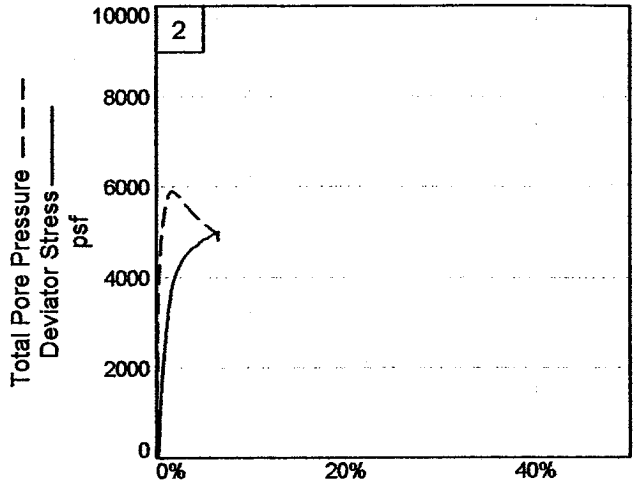
Tested by: DL Checked by: GEV/HZ
Date: 11-29-04 Date: 12-07-04

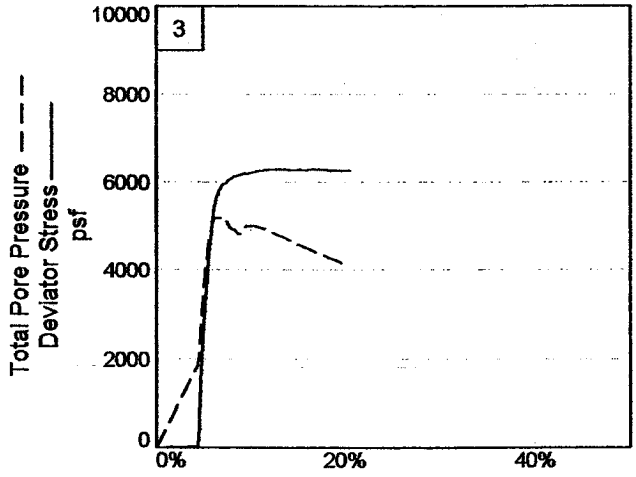
TRIAXIAL SHEAR TEST REPORT

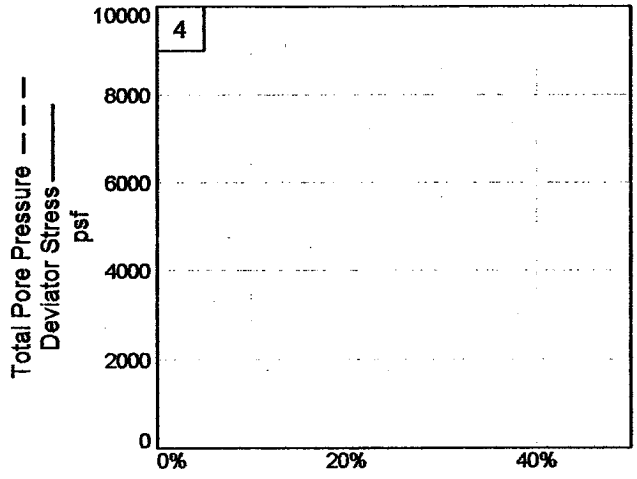
HTS, Inc.

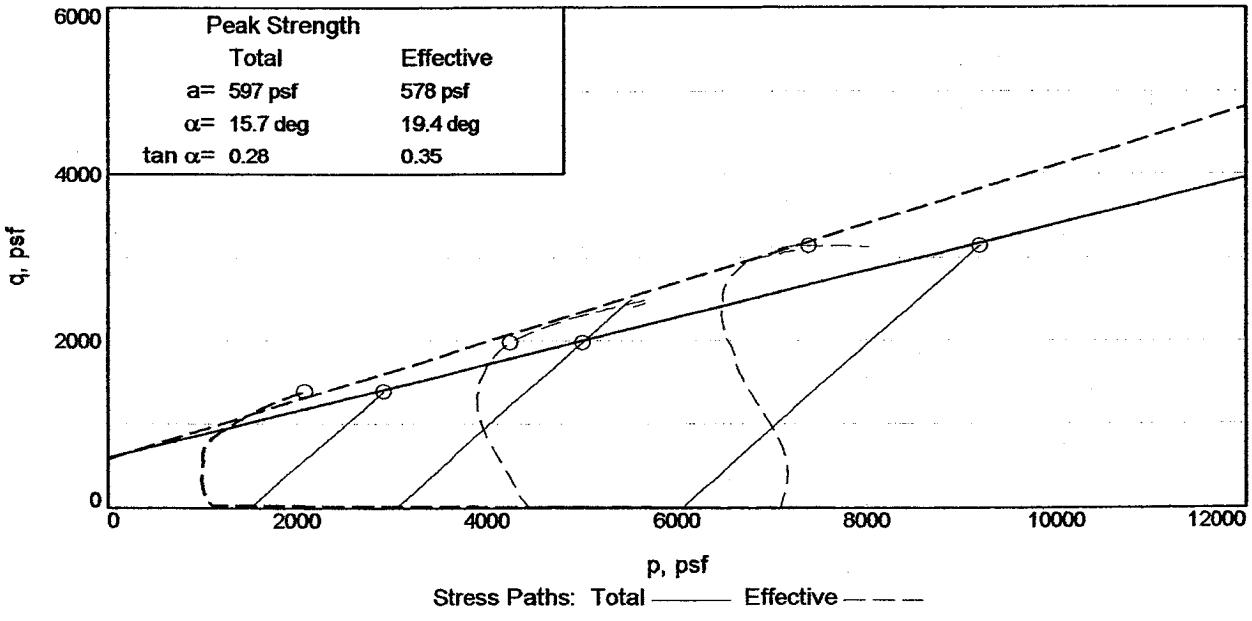
Proj. No.: 04-280
Figure No.: 2









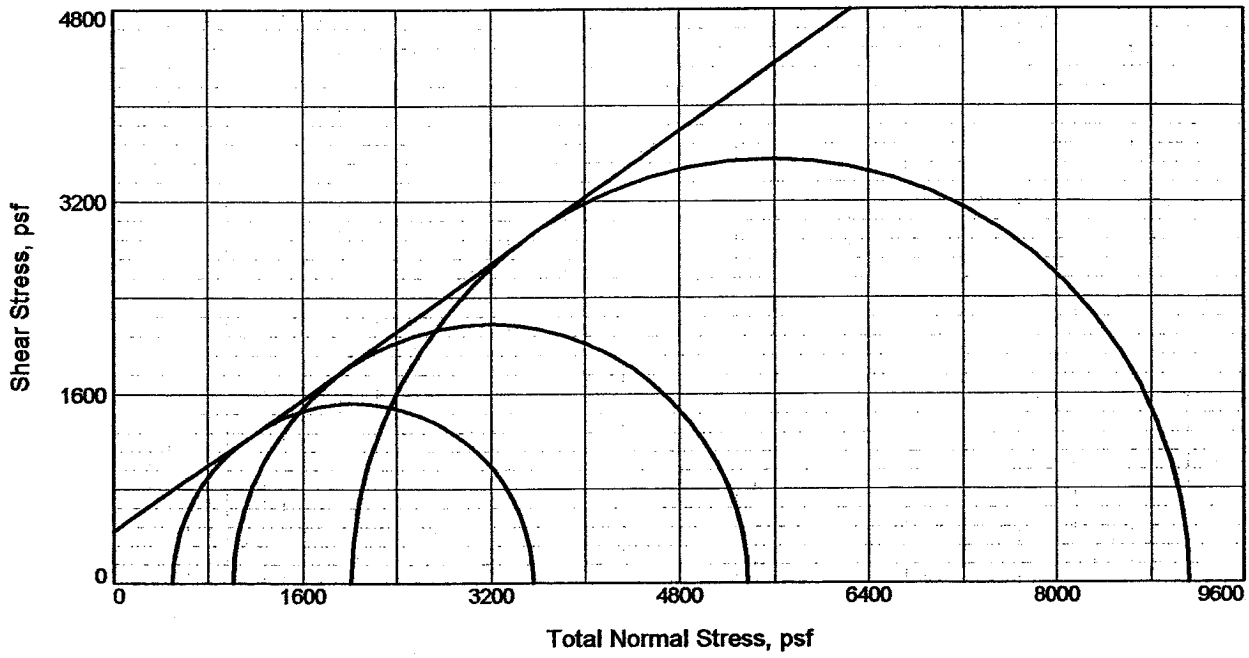


Client: Associated Testing Laboratories, Inc.
Project: CU Laboratory Testing
Sample Number: GB-4
Project No.: 04-280

Figure No.: 2A

HTS, Inc.

TRIAXIAL SHEAR TEST REPORT



Type of Test: CU with Pore Pressures **Sample Type:** Shelby Tube

No.	Fluid Press. psi		Failure Stress, psf		Ultimate Stress, psf		Principal Stresses at Failure psf	
	Cell	Back	Deviator	Total Pore Pressure	Deviator	Total Pore Pressure	$\bar{\sigma}_1$	$\bar{\sigma}_3$
1	57.20	53.70	3061	7868	3061	7868	3430	369
2	46.30	39.30	4362	5889	3472	5755	5140	778
3	44.20	30.20	7108	4729	7108	4729	8744	1636

No.	Consolidated Sample Parameters						
	% Water Content	Dry Dens. pcf	Satur-ation	Void Ratio	Diameter in.	Height in.	Strain Rate %/min.
1	22.7	102.4	97.5%	0.6157	2.93	5.68	160.00
2	21.4	105.5	100.0%	0.5676	3.08	5.22	150.00
3	20.5	107.3	100.0%	0.5425	3.16	4.79	225.00

Mohr-Columb Strength Parameters		Material Description
	Total	FAT CLAY (CH)
Strength intercept, c=	445 psf	
Friction angle, ϕ =	34.9 deg	PI= 37
Tangent, ϕ =	0.70	

Client: Associated Testing Laboratories, Inc.

Project: CU Laboratory Testing

Sample Number: GB-6 **Depth:** 13'-15'

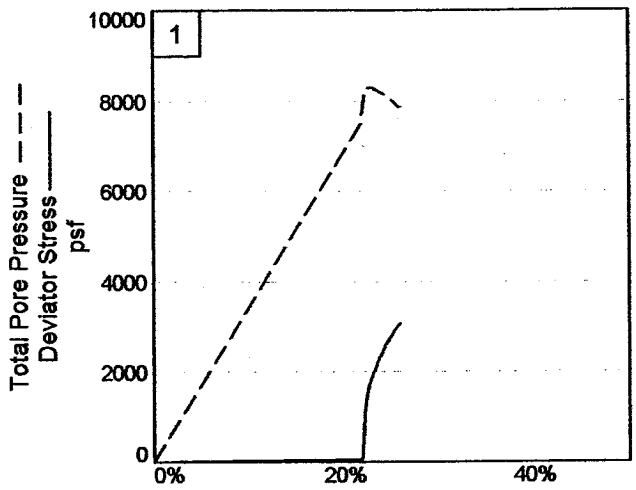
Date: December 14, 2004
File: 04-280$_4$
Remarks:

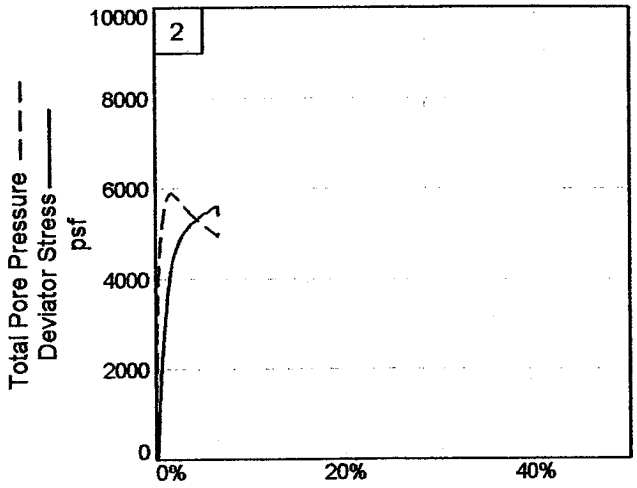
Tested by: DL Checked by: GEV/HZ
Date: 11-29-04 Date: 12-07-04

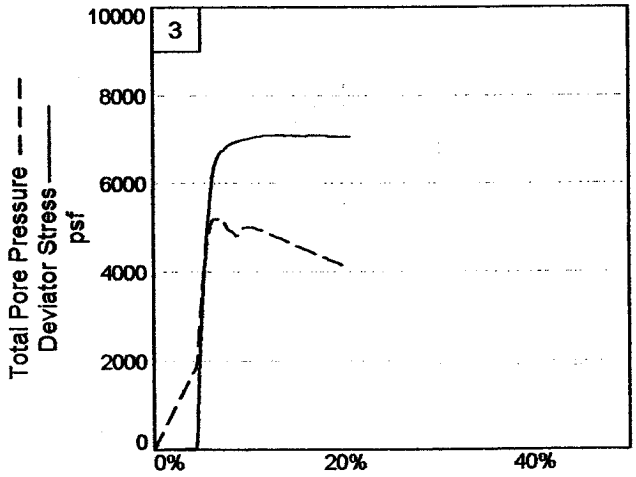
TRIAXIAL SHEAR TEST REPORT

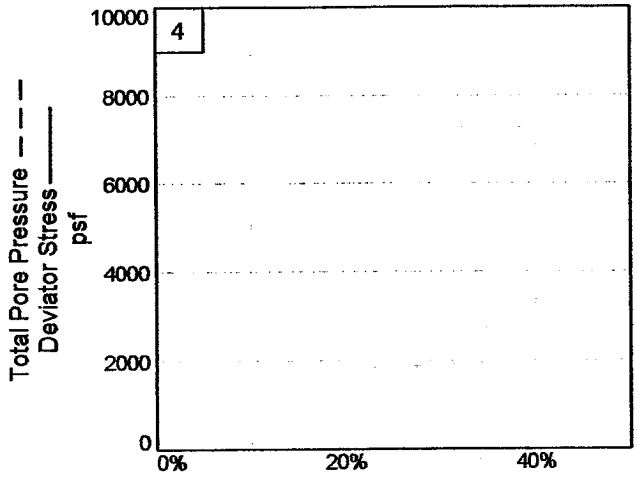
HTS, Inc.

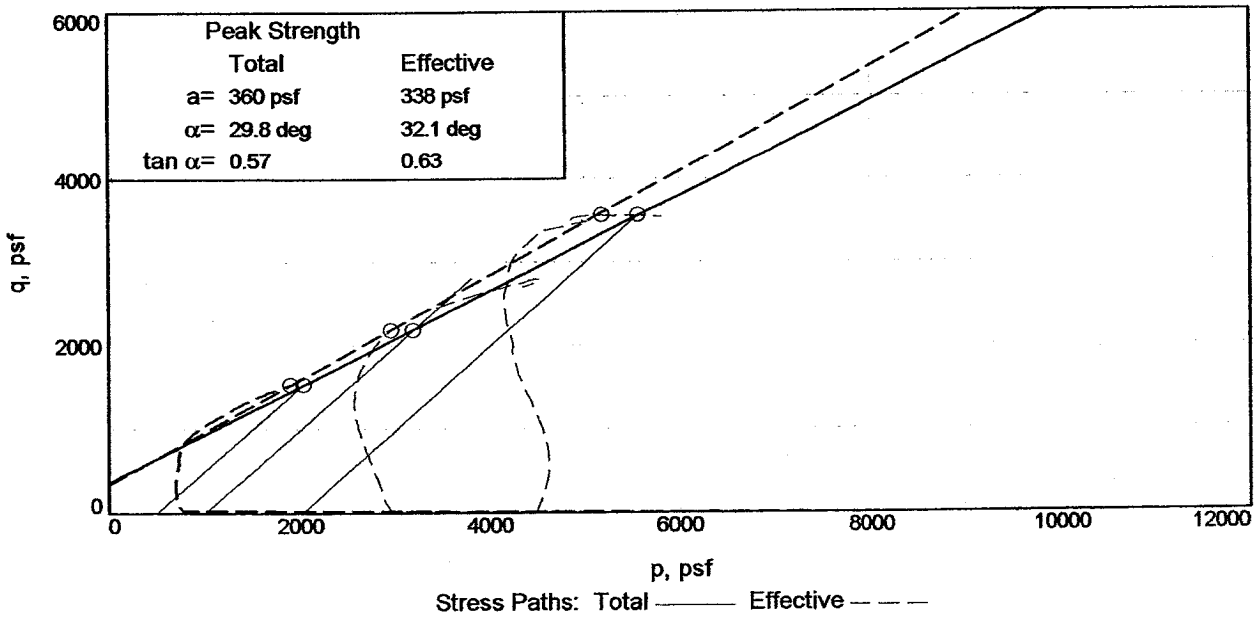
Proj. No.: 04-280
Figure No.: 3









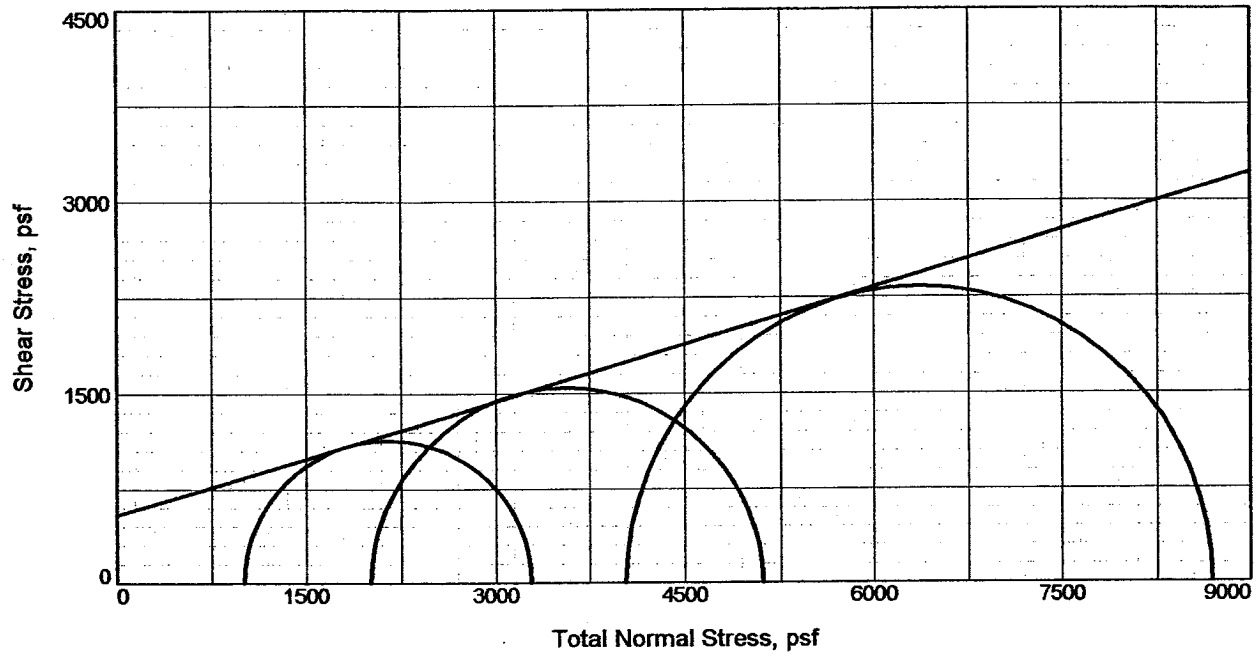


Client: Associated Testing Laboratories, Inc.
Project: CU Laboratory Testing
Sample Number: GB-6
Project No.: 04-280

Figure No.: 3A

HTS, Inc.

TRIAXIAL SHEAR TEST REPORT



Type of Test: CU with Pore Pressures **Sample Type:** Shelby Tube

No.	Fluid Press. psi		Failure Stress, psf		Ultimate Stress, psf		Principal Stresses at Failure psf	
	Cell	Back	Deviator	Total Pore Pressure	Deviator	Total Pore Pressure	$\bar{\sigma}_1$	$\bar{\sigma}_3$
1	32.40	25.40	2276	3778	2276	3778	3164	887
2	46.00	32.00	3095	4769	2755	4874	4950	1855
3	56.50	28.50	4662	4530	4665	4548	8268	3606

No.	Consolidated Sample Parameters						
	% Water Content	Dry Dens. pcf	Satur-ation	Void Ratio	Diameter in.	Height in.	Strain Rate %/min.
1	19.1	110.5	98.0%	0.5259	2.93	5.52	160.00
2	20.3	108.9	100.0%	0.5480	3.00	5.29	150.00
3	21.5	106.6	100.0%	0.5806	3.22	4.73	225.00

Mohr-Columb Strength Parameters		Material Description
	Total	SANDY LEAN CLAY (CL)
Strength intercept, c=	548 psf	
Friction angle, ϕ =	16.5 deg	PI= 25
Tangent, ϕ =	0.30	

Client: Associated Testing Laboratories, Inc.

Project: CU Laboratory Testing

Sample Number: GB-6 **Depth:** 28'-30'

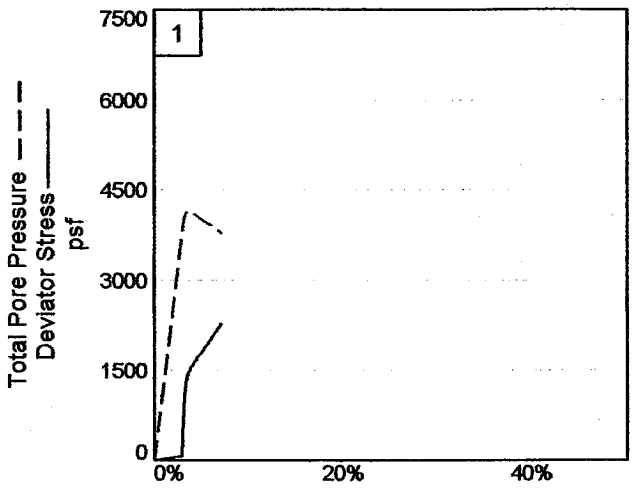
Date: December 14, 2004
File: 04-280$_1$
Remarks:

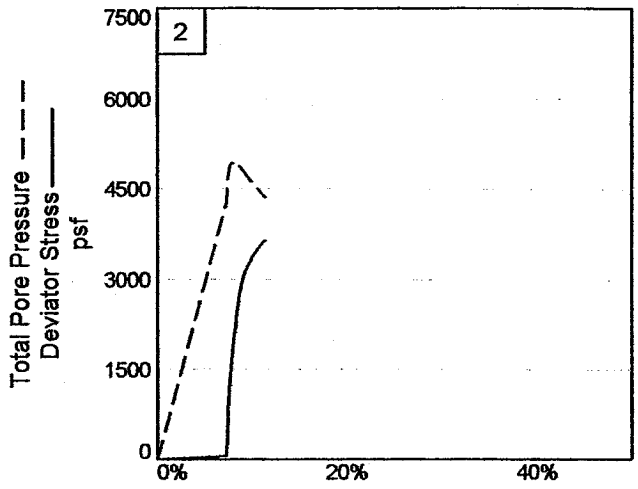
Tested by: DL Checked by: GEV/HZ
Date: 12-7-04 Date: 12-10-04

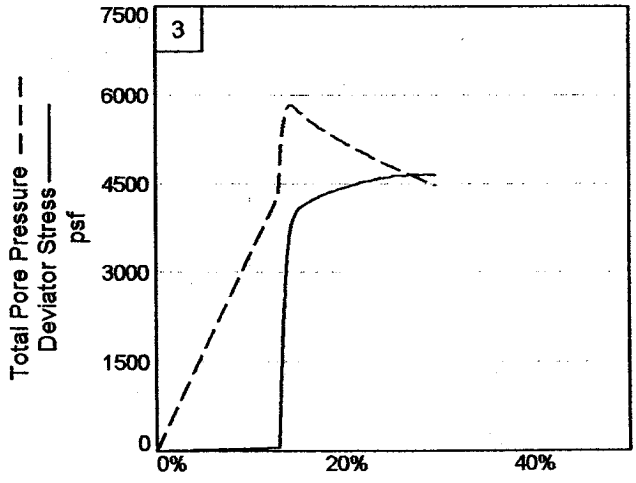
TRIAXIAL SHEAR TEST REPORT

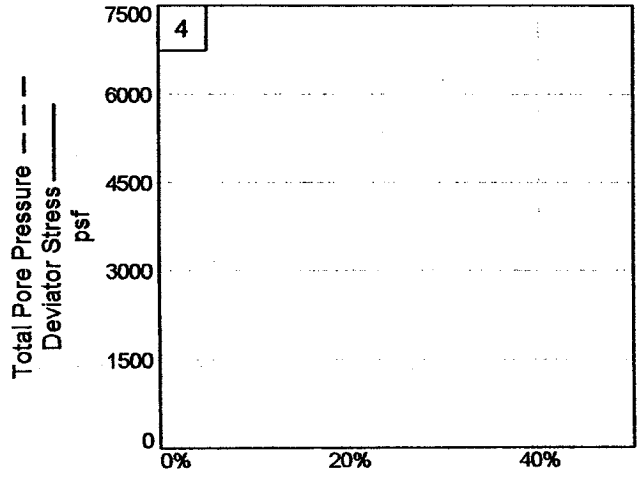
HTS, Inc.

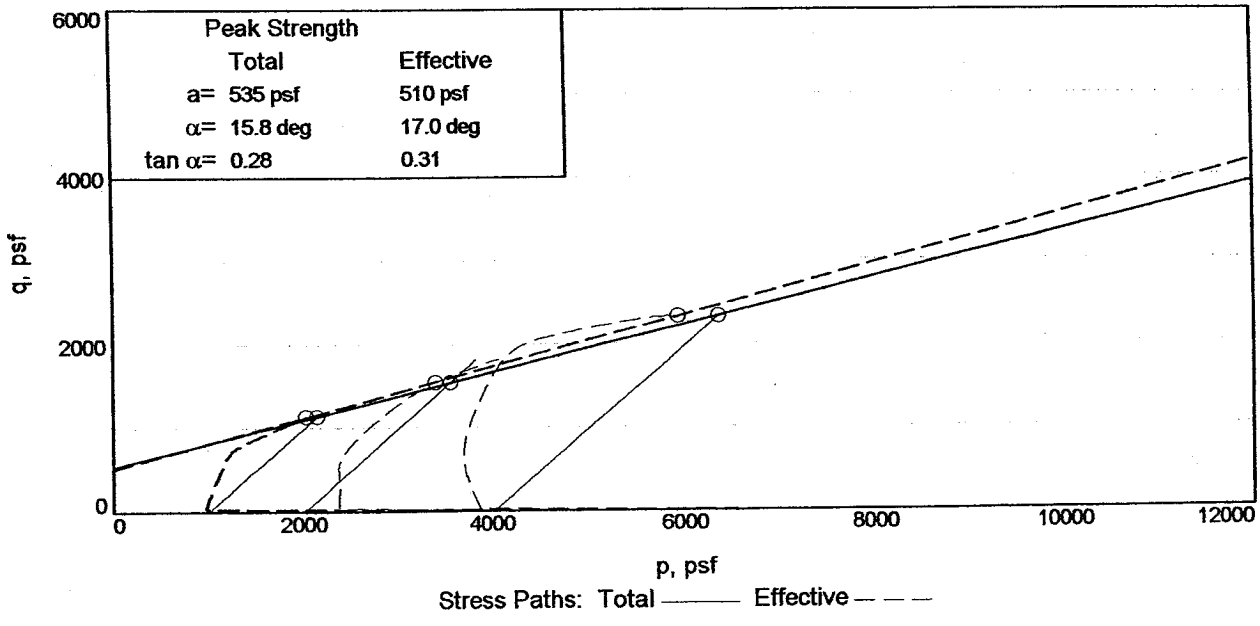
Proj. No.: 04-280
Figure No.: 4











Client: Associated Testing Laboratories, Inc.
Project: CU Laboratory Testing
Sample Number: GB-6
Project No.: 04-280

Figure No.: 4A

HTS, Inc.

APPENDIX 5

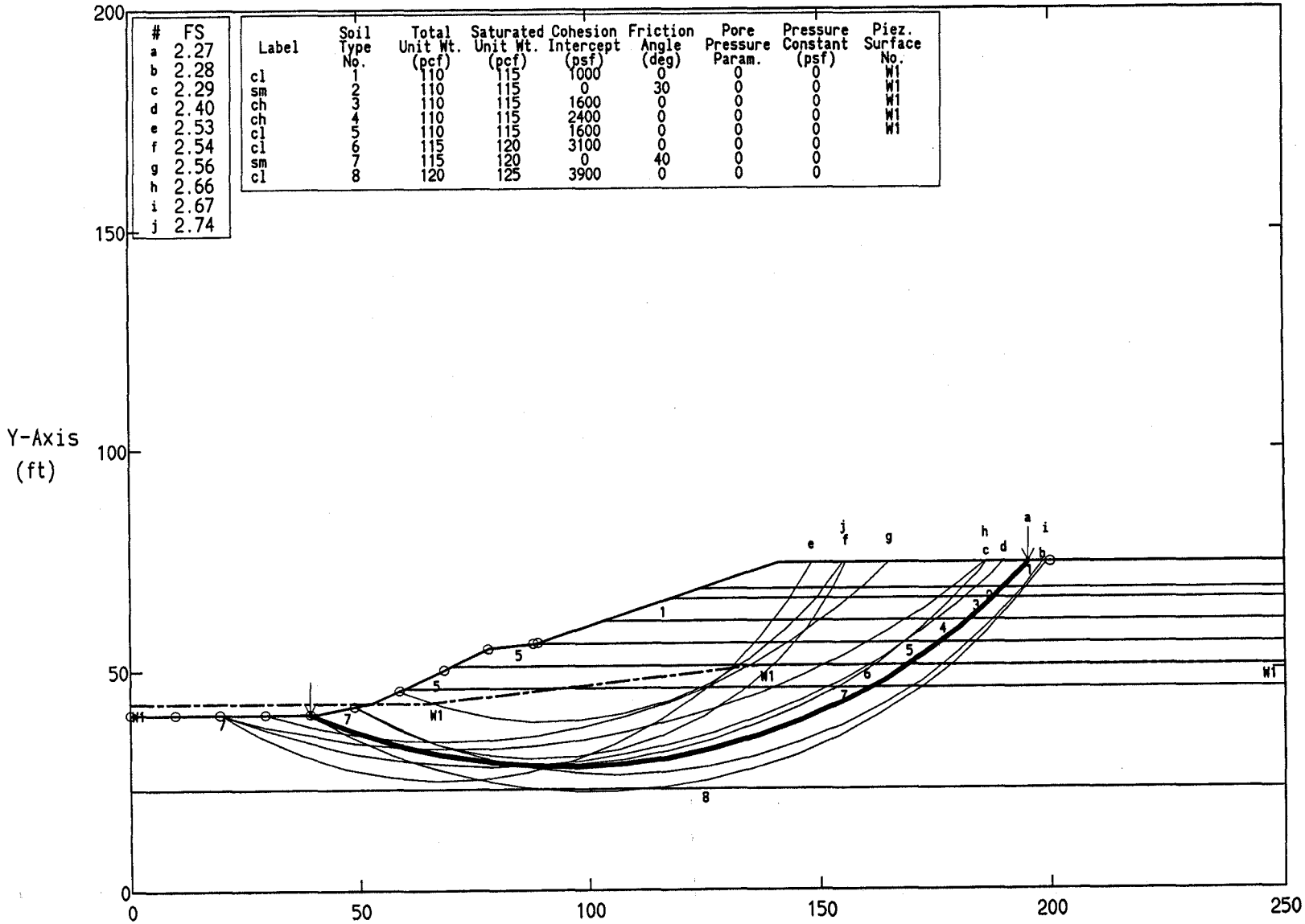
SLOPE STABILITY ANALYSIS RESULTS

brays bayou at cambridge-north side G04-504 - boring gb-5 short term

Ten Most Critical. C:504CB5S.PLT By: jay 11/10/2004 11:47am

#	FS
a	2.27
b	2.28
c	2.29
d	2.40
e	2.53
f	2.54
g	2.56
h	2.66
i	2.67
j	2.74

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
cl	1	110	115	1000	0	0	0	W1
sm	2	110	115	0	30	0	0	W1
ch	3	110	115	1600	0	0	0	W1
ch	4	110	115	2400	0	0	0	W1
cl	5	110	115	1600	0	0	0	W1
cl	6	115	120	3100	0	0	0	
sm	7	115	120	0	40	0	0	
cl	8	120	125	3900	0	0	0	



PCSTABL5M/SI FSmin=2.27 X-Axis (ft)

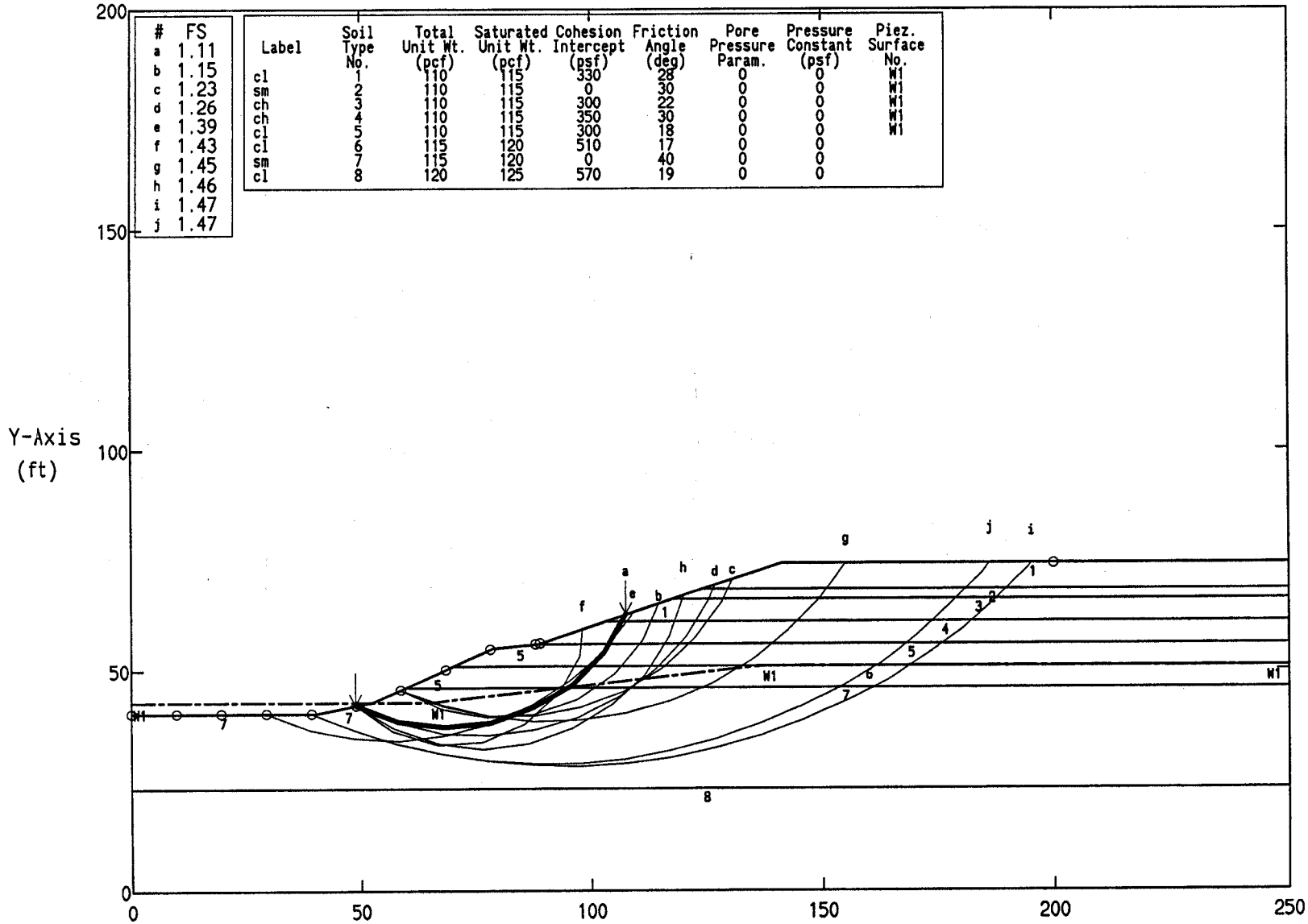
Factors Of Safety Calculated By The Modified Bishop Method

brays bayou at cambridge-north side G04-504 - boring gb-5 long term

Ten Most Critical. C:504NB5L.PLT By: jay 1/24/2005 10:42am

#	FS
a	1.11
b	1.15
c	1.23
d	1.26
e	1.39
f	1.43
g	1.45
h	1.46
i	1.47
j	1.47

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
cl	1	110	115	330	28	0	0	W1
sm	2	110	115	0	30	0	0	W1
ch	3	110	115	300	22	0	0	W1
ch	4	110	115	350	30	0	0	W1
cl	5	110	115	300	18	0	0	W1
cl	6	115	120	510	17	0	0	
sm	7	115	120	0	40	0	0	
cl	8	120	125	570	19	0	0	



PCSTABL5M/SI FSmin=1.11 X-Axis (ft)

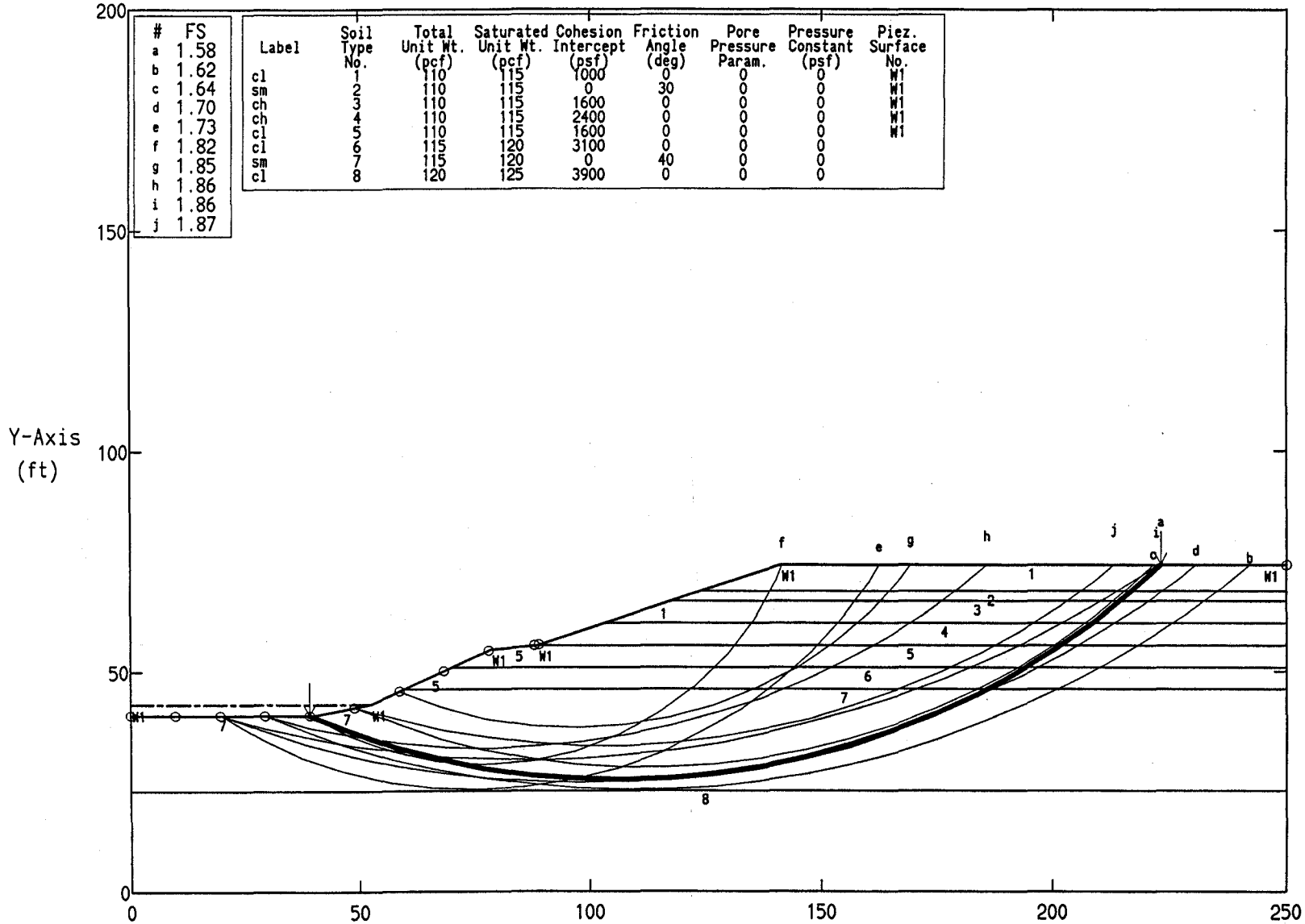
Factors Of Safety Calculated By The Modified Bishop Method

brays bayou at cambridge-north side G04-504 - boring gb-5 rapid drawdown

Ten Most Critical. C:504CB5R.PLT By: jay 11/10/2004 11:49am

#	FS
a	1.58
b	1.62
c	1.64
d	1.70
e	1.73
f	1.82
g	1.85
h	1.86
i	1.86
j	1.87

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
cl	1	110	115	1000	0	0	0	W1
sm	2	110	115	0	30	0	0	W1
ch	3	110	115	1600	0	0	0	W1
ch	4	110	115	2400	0	0	0	W1
cl	5	110	115	1600	0	0	0	W1
cl	6	115	120	3100	0	0	0	
sm	7	115	120	0	40	0	0	
cl	8	120	125	3900	0	0	0	

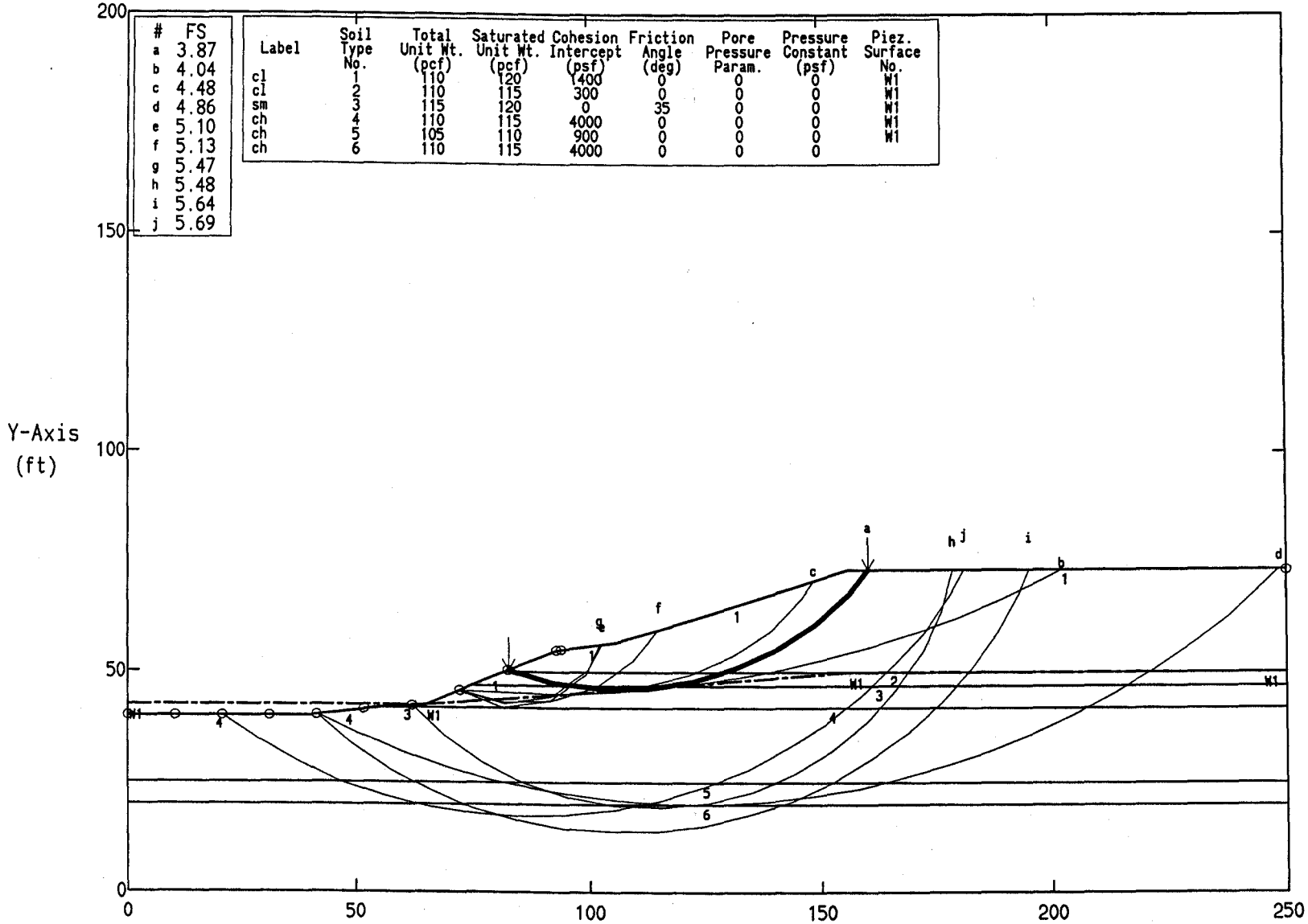


PCSTABL5M/SI FSmin=1.58 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

brays bayou at cambridge-south side G04-504 - boring gb-3 short term

Ten Most Critical. C:504B3S.PLT By: jay 11/12/2004 10:37am



#	FS
a	3.87
b	4.04
c	4.48
d	4.86
e	5.10
f	5.13
g	5.47
h	5.48
i	5.64
j	5.69

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
cl	1	110	120	1400	0	0	0	W1
cl	2	110	115	300	0	0	0	W1
sm	3	115	120	0	35	0	0	W1
ch	4	110	115	4000	0	0	0	W1
ch	5	105	110	900	0	0	0	W1
ch	6	110	115	4000	0	0	0	

PCSTABL5M/SI FSmin=3.87 X-Axis (ft)

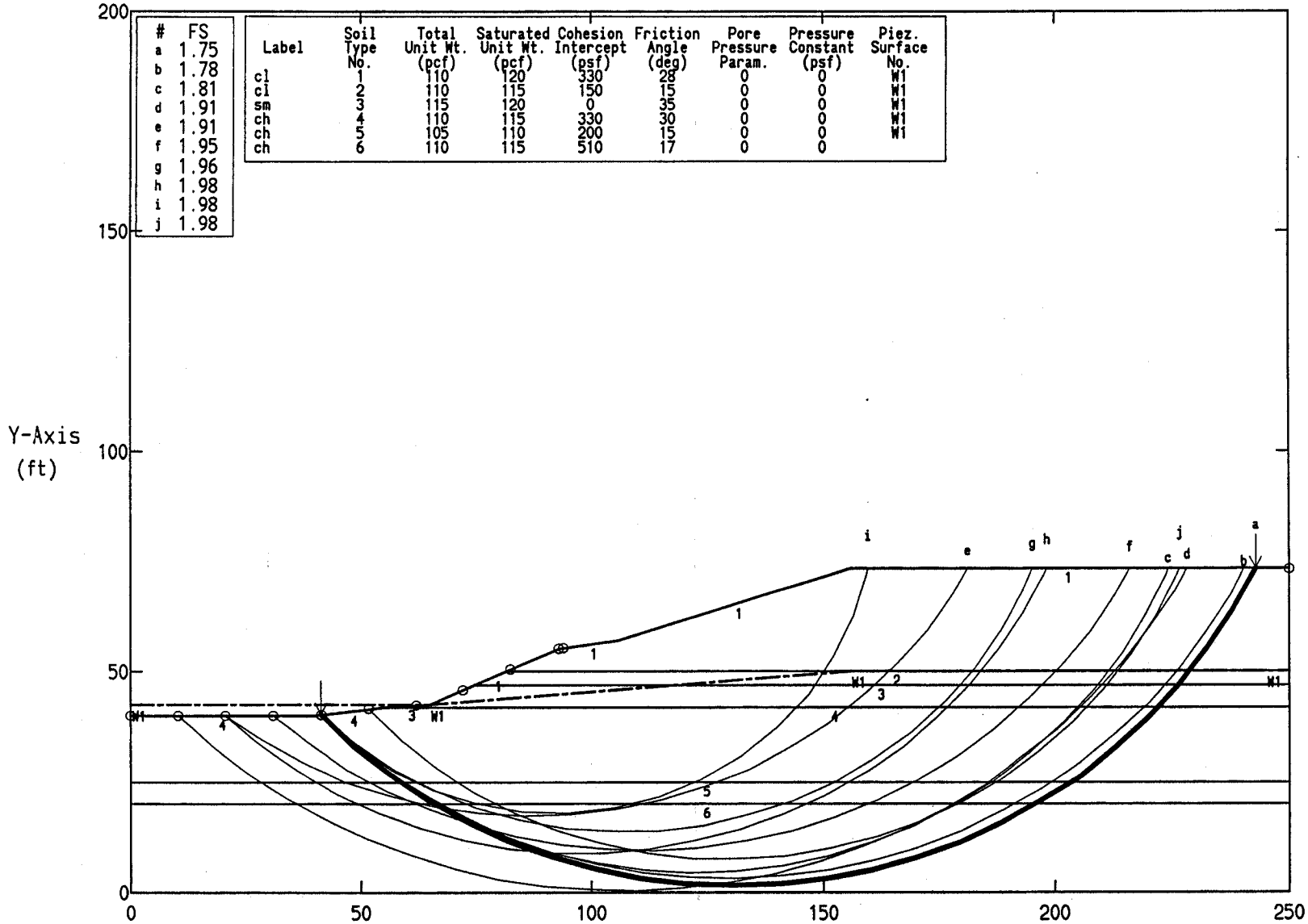
Factors Of Safety Calculated By The Modified Bishop Method

brays bayou at cambridge-south side G04-504 - boring gb-3 long term

Ten Most Critical. C:504NB3L.PLT By: jay 1/24/2005 10:48am

#	FS
a	1.75
b	1.78
c	1.81
d	1.91
e	1.91
f	1.95
g	1.96
h	1.98
i	1.98
j	1.98

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
cl	1	110	120	330	28	0	0	W1
cl	2	110	115	150	15	0	0	W1
sm	3	115	120	0	35	0	0	W1
ch	4	110	115	330	30	0	0	W1
ch	5	105	110	200	15	0	0	W1
ch	6	110	115	510	17	0	0	



PCSTABL5M/SI FSmin=1.75 X-Axis (ft)

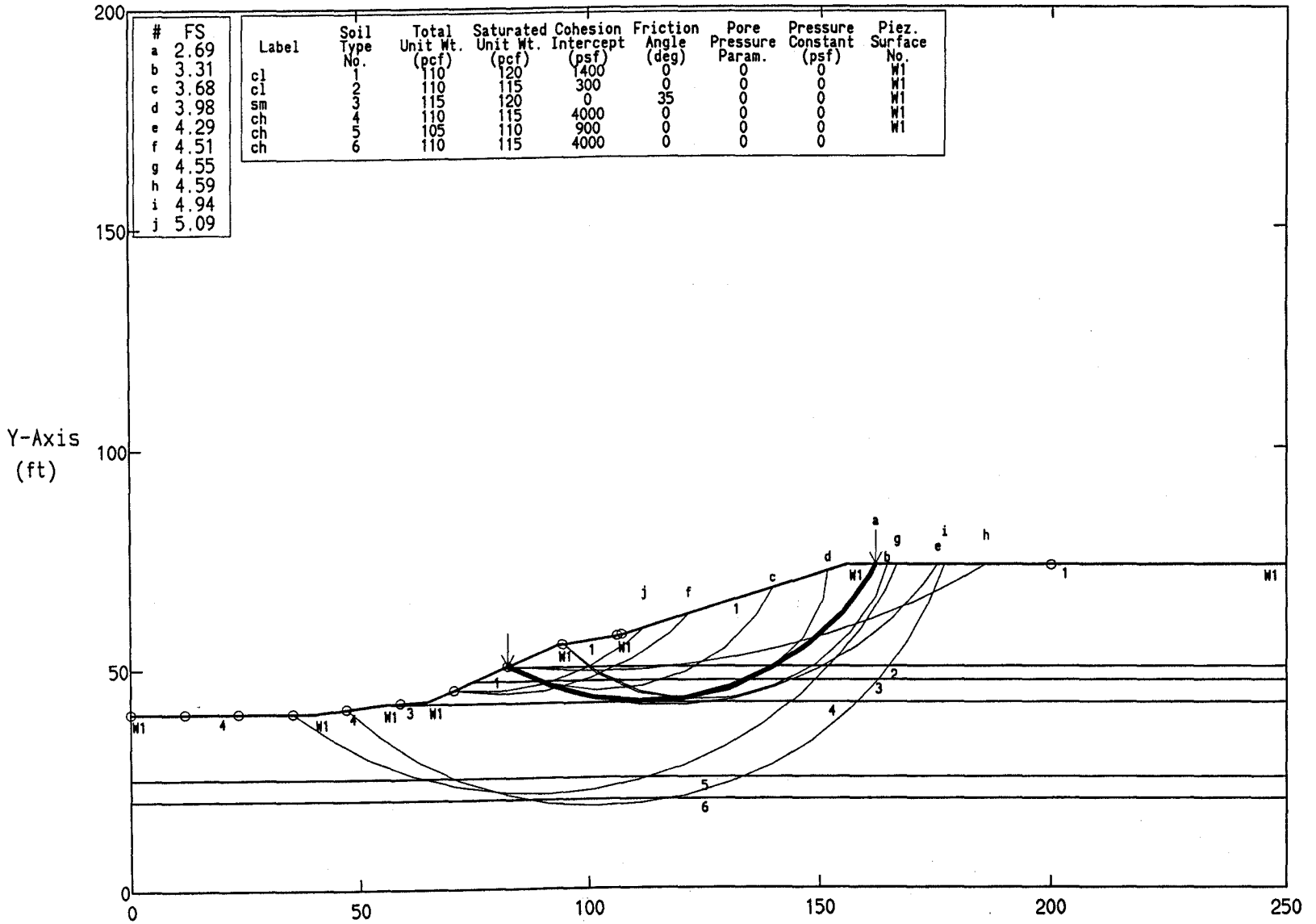
Factors Of Safety Calculated By The Modified Bishop Method

brays bayou at cambridge-south side G04-504 - boring gb-3 rapid dd

Ten Most Critical. C:504B3R.PLT By: jay 11/09/2004 2:52pm

#	FS
a	2.69
b	3.31
c	3.68
d	3.98
e	4.29
f	4.51
g	4.55
h	4.59
i	4.94
j	5.09

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
cl	1	110	120	1400	0	0	0	W1
cl	2	110	115	300	0	0	0	W1
sm	3	115	120	0	35	0	0	W1
ch	4	110	115	4000	0	0	0	W1
ch	5	105	110	900	0	0	0	W1
ch	6	110	115	4000	0	0	0	

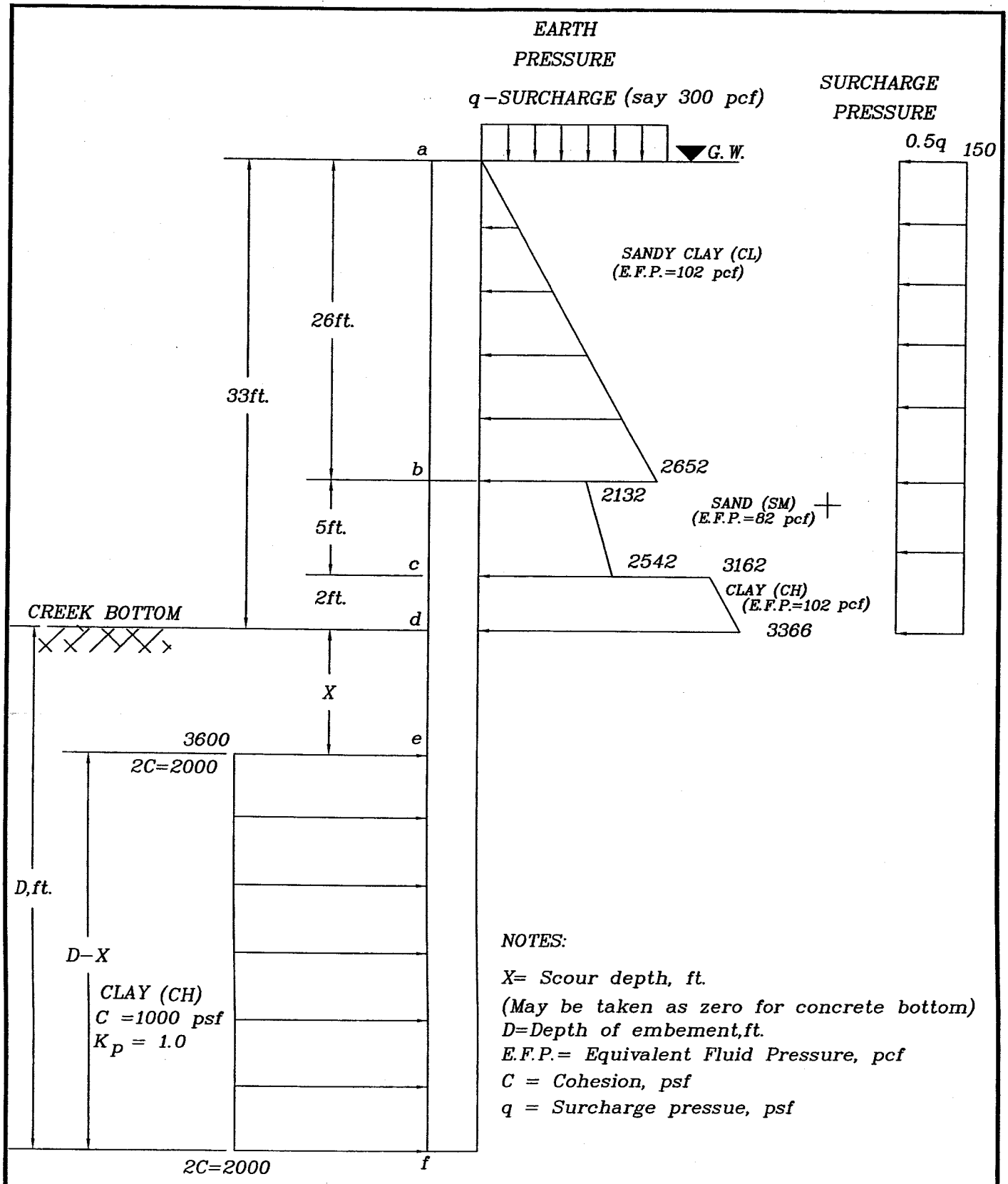


PCSTABL5M/SI FSmin=2.69 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

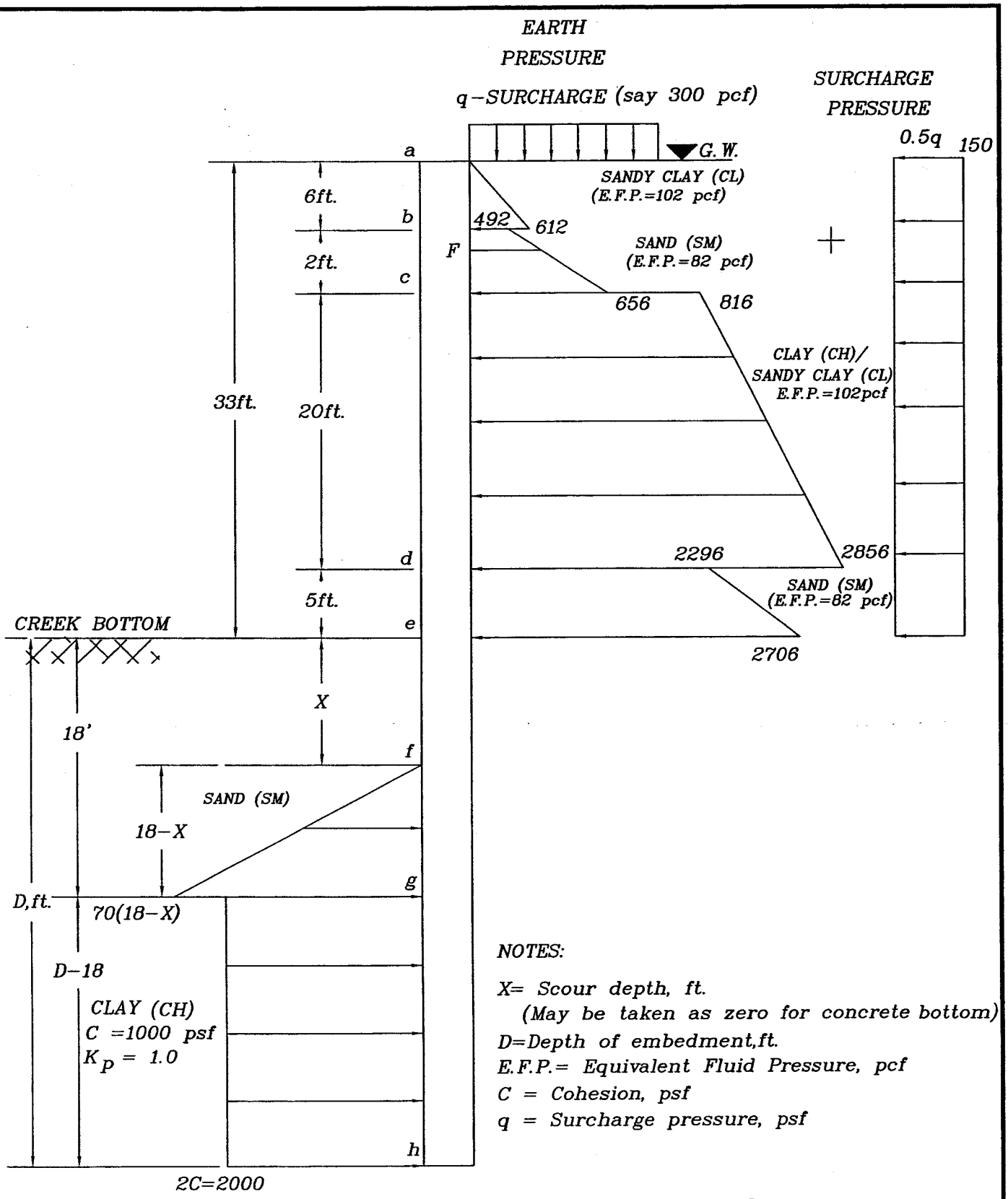
APPENDIX 6

EARTH PRESSURE DIAGRAMS



[AT SOUTH BANK–FROM BORING GB–3]

TYPICAL EARTH PRESSURE DIAGRAM FOR CANILEVER WALL	Associated Testing Laboratories, Inc. 3143 Yellowstone Blvd. Houston, Texas Tel: (713) 748–3717 Fax: (713) 748–3748	
GEOTECHNICAL INVESTIGATION AT CAMBRIGE STREET BETWEEN HOLCOMBE AND SOUTH MCGREGOR HOUSTON, TEXAS	DRAWN BY: EZ	CHECKED BY: JAY
	PROJECT NO. G04–504	FIGURE. 1

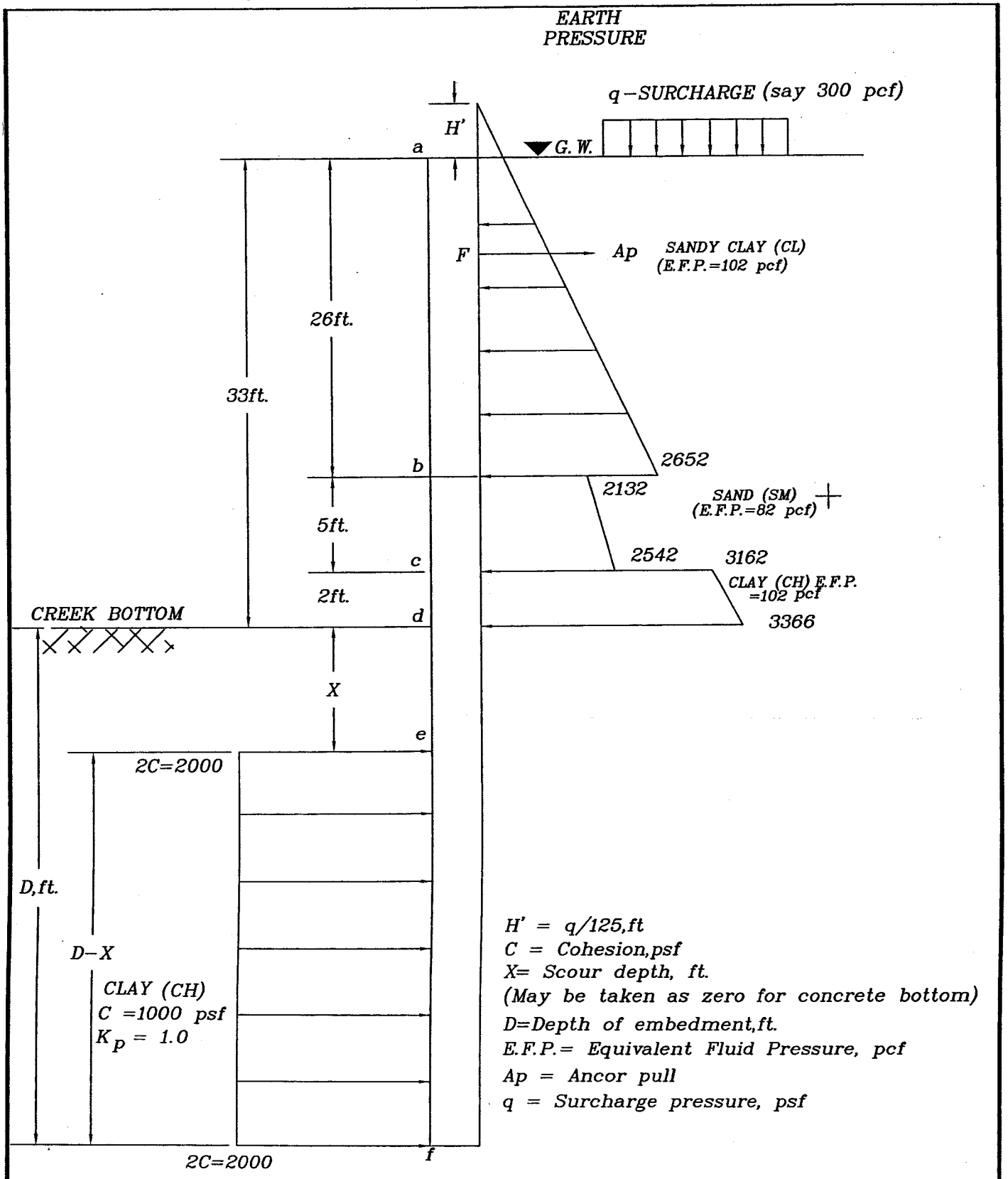


NOTES:

X= Scour depth, ft.
(May be taken as zero for concrete bottom)
D=Depth of embedment,ft.
E.F.P.= Equivalent Fluid Pressure, pcf
C = Cohesion, psf
q = Surcharge pressure, psf

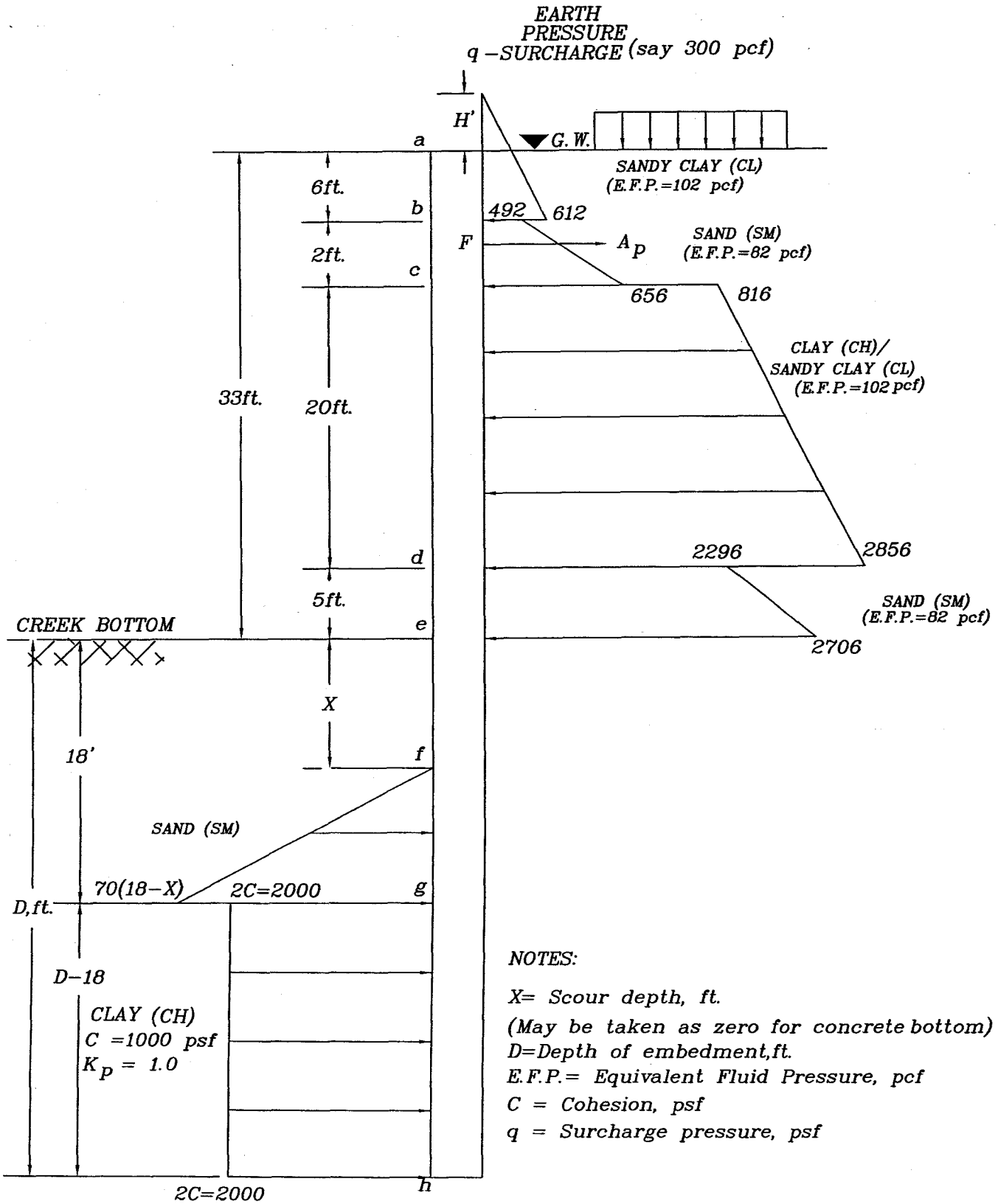
[AT NORTH BANK–FROM BORING GB–5]

TYPICAL EARTH PRESSURE DIAGRAM FOR CANILEVER WALL	Associated Testing Laboratories, Inc. 3143 Yellowstone Blvd. Houston, Texas Tel: (713) 748–3717 Fax: (713) 748–3748
GEOTECHNICAL INVESTIGATION AT CAMBRIGE STREET BETWEEN HOLCOMBE AND SOUTH MCGREGOR HOUSTON, TEXAS	DRAWN BY: EZ / CHECKED BY: JAY PROJECT NO. G04–504 / FIGURE. 2



[AT SOUTH BANK–FROM BORING GB–3]

TYPICAL EARTH PRESSURE DIAGRAM FOR CANILEVER WALL	Associated Testing Laboratories, Inc. 3143 Yellowstone Blvd. Houston, Texas Tel: (713) 748–3717 Fax: (713) 748–3748
GEOTECHNICAL INVESTIGATION AT CAMBRIGE STREET BETWEEN HOLCOMBE AND SOUTH MCGREGOR HOUSTON, TEXAS	DRAWN BY: EZ / CHECKED BY: JAY PROJECT NO. G04–504 / FIGURE. 3



NOTES:

X= Scour depth, ft.
(May be taken as zero for concrete bottom)
D=Depth of embedment,ft.
E.F.P.= Equivalent Fluid Pressure, pcf
C = Cohesion, psf
q = Surcharge pressure, psf

[AT NORTH BANK–FROM BORING GB–5]

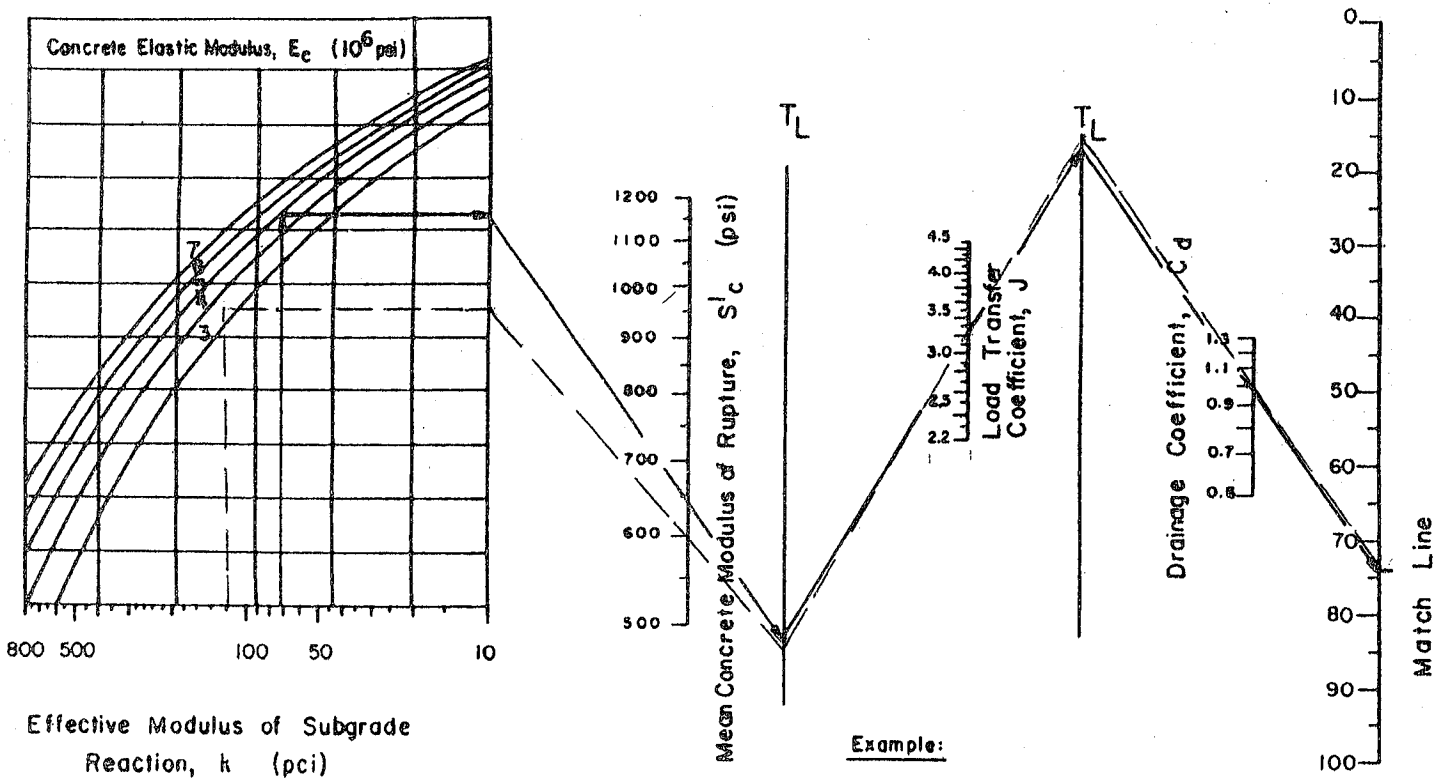
TYPICAL EARTH PRESSURE DIAGRAM FOR ANCHORED WALL	Associated Testing Laboratories, Inc. 3143 Yellowstone Blvd. Houston, Texas Tel: (713) 748–3717 Fax: (713) 748–3748
GEOTECHNICAL INVESTIGATION AT CAMBRIGE STREET BETWEEN HOLCOMBE AND SOUTH MCGREGOR HOUSTON, TEXAS	DRAWN BY: EZ / CHECKED BY: JAY PROJECT NO. G04–504 / FIGURE. 4

APPENDIX 7

DESIGN CHARTS FOR RIGID PAVEMENT

GRAPH SOLVES:

$$\log_{10} W_{18} = Z_R * S_o + 7.35 * \log_{10}(D+1) - 0.06 + \frac{\log_{10}\left[\frac{\Delta PSI}{4.5 - 1.5}\right]}{1 + \frac{1.624 * 10^7}{(D+1)^{8.46}}} + (4.22 - 0.32 p_t) * \log_{10}\left[\frac{S_c' * C_d \left[D^{0.75} - 1.132\right]}{215.63 * J \left[D^{0.75} - \frac{18.42}{(E_c/k)^{0.25}}\right]}\right]$$



Example:

K = 120 pci	So = 0.30
Ec = 3.6 x 10^6 psi	R = 95 %
S'c = 600 psi	∇ PSI = 4.5 – 2.0 = 2.5
J = 3.2	W_{18} = 10 x 10^6
Cd = 1.0	Solution : D = 10.0 inches

Figure 3.7. Design Chart for Rigid Pavement Based on Using Mean Values for Each Input Variable (Segment 1)

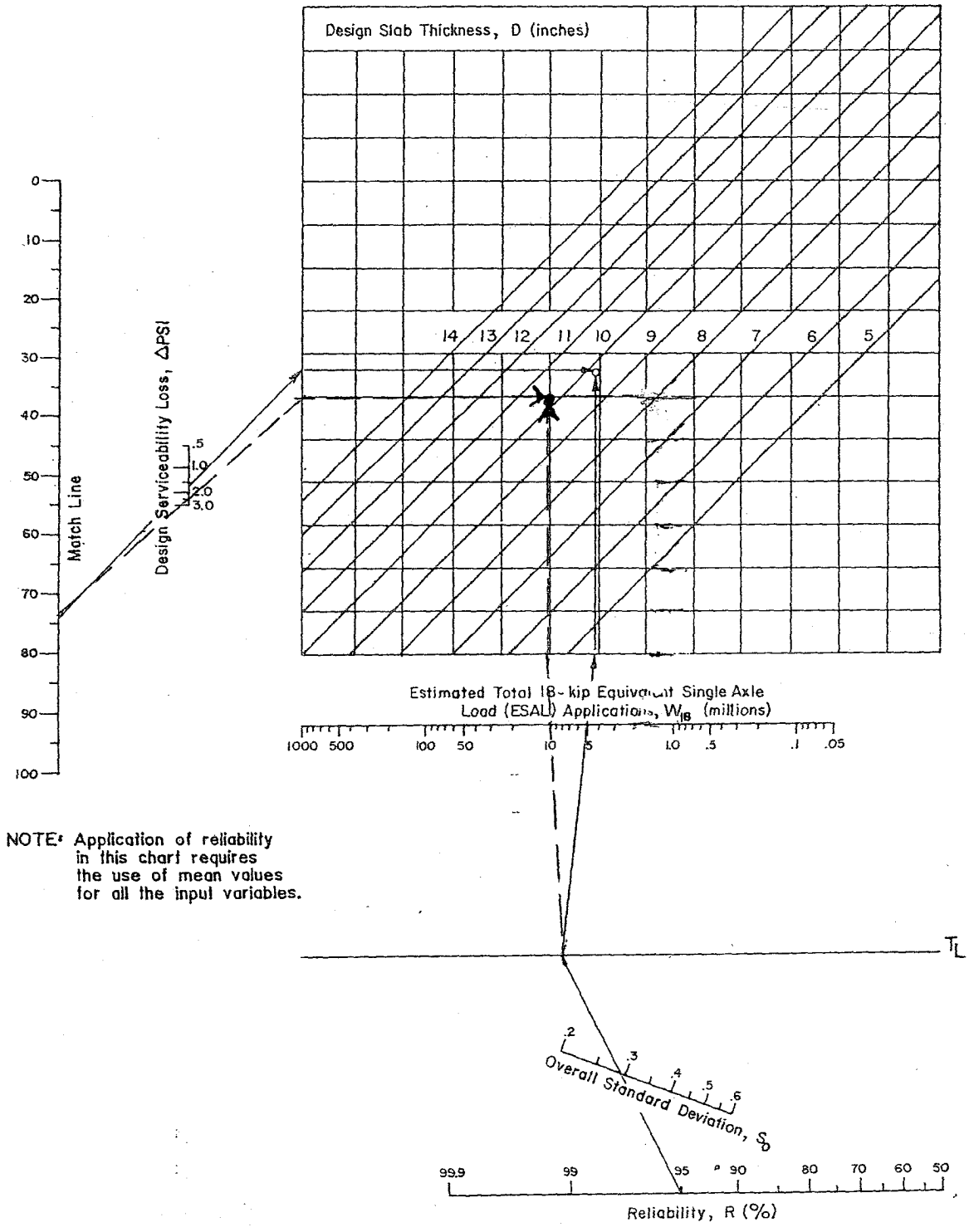


Figure 3.7. Continued—Design Chart for Rigid Pavements Based on Using Mean Values for Each Input Variable (Segment 2)