
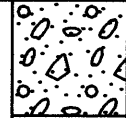
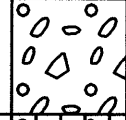
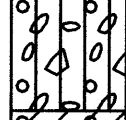
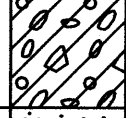
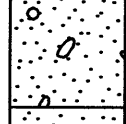

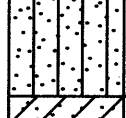
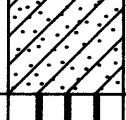
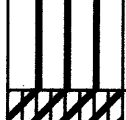
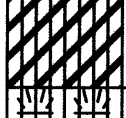
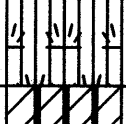
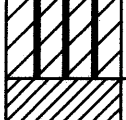
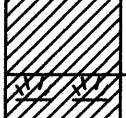
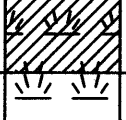









FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H1E-01-11M	2012	47	49

		GEOLABS, INC. Geotechnical Engineering		Soil Log Legend		
UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)						
MAJOR DIVISIONS			USCS		TYPICAL DESCRIPTIONS	
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	GRAVELS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS LESS THAN 5% FINES		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES MORE THAN 12% FINES		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	
	SANDS 50R MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	CLEAN SANDS LESS THAN 5% FINES		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		FINES MORE THAN 12% FINES		SM	SILTY SANDS, SAND-SILT MIXTURES	
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES	
		FINE-GRAINED SOILS 50R MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL			ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
SILTS AND CLAYS LIQUID LIMIT 50 OR MORE			MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
			CH	INORGANIC CLAYS OF HIGH PLASTICITY		
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS		
NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS						
LEGEND						
	(2-INCH) O.D. STANDARD PENETRATION TEST	LL	LIQUID LIMIT (NP=NON-PLASTIC)			
	(3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX (NP=NON-PLASTIC)			
	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)			
	GRAB SAMPLE	PEN	POCKET PENETROMETER (tsf)			
	CORE SAMPLE	UC	UNCONFINED COMPRESSION (psi)			
	WATER LEVEL OBSERVED IN BORING	UU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)			
			Plate A-0.1			

GEOLABS, INC.

Geotechnical Engineering

Rock Log Legend

ROCK DESCRIPTIONS

	BASALT		FINGER CORAL
	BOULDERS		LIMESTONE
	BRECCIA		SANDSTONE
	CLINKER		SILTSTONE
	COBBLES		TUFF
	CORAL		VOID/CAVITY

ROCK DESCRIPTION SYSTEM

ROCK FRACTURE CHARACTERISTICS

The following terms describe general fracture spacing of a rock:

Massive:	Greater than 24 inches apart
Slightly Fractured:	12 to 24 inches apart
Moderately Fractured:	6 to 12 inches apart
Closely Fractured:	3 to 6 inches apart
Severely Fractured:	Less than 3 inches apart

DEGREE OF WEATHERING

The following terms describe the chemical weathering of a rock:

Unweathered:	Rock shows no sign of discoloration or loss of strength.
Slightly Weathered:	Slight discoloration inwards from open fractures.
Moderately Weathered:	Discoloration throughout and noticeably weakened though not able to break by hand.
Highly Weathered:	Most minerals decomposed with some corestones present in residual soil mass. Can be broken by hand.
Extremely Weathered:	Saprolite. Mineral residue completely decomposed to soil but fabric and structure preserved.

HARDNESS

The following terms describe the resistance of a rock to indentation or scratching:

Very Hard:	Specimen breaks with difficulty after several "pinging" hammer blows. Example: Dense, fine grain volcanic rock
Hard:	Specimen breaks with some difficulty after several hammer blows. Example: Vesicular, vugular, coarse-grained rock
Medium Hard:	Specimen can be broked by one hammer blow. Cannot be scraped by knife. SPT may penetrate by ~25 blows per inch with bounce. Example: Porous rock such as clinker, cinder, and coral reef
Soft:	Can be indented by one hammer blow. Can be scraped or peeled by knife. SPT can penetrate by ~100 blows per foot. Example: Weathered rock, chalk-like coral reef
Very Soft:	Crumbles under hammer blow. Can be peeled and carved by knife. Can be indented by finger pressure. Example: Saprolite

Plate

A-0.2

LOG LEGEND FOR ROCK 5395-00(D).GP1 GEOLABS.GDT 6/26/10

GEOTECHNICAL NOTES

1. A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Aiea Stream Bank Erosion, Aiea, Oahu, Hawaii" dated June 30, 2010 has been prepared by Geolabs, Inc. A copy of the report is on file at the office of the Engineer for review by the Contractor.

2. For boring locations, see Sheet BL-1.

3. The information presented in the logs of borings depict the subsurface conditions encountered at that specified location and at the time of the field exploration only. Variations of subsoil conditions from those depicted in the logs of borings may occur between and beyond the borings.

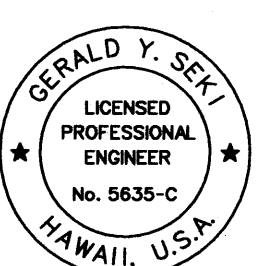
4. The penetration resistance shown on the logs of borings indicate the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.

5. The data given is for general information only. Bidders shall examine the site and the boring data and draw their own conclusions therefrom as to the character of materials to be encountered. The Engineer will not assume responsibility for variations of subsoil quality or conditions other than at the boring locations shown and at the time the borings were taken.

SURVEY PLOTTED BY	DATE
DRAWN BY	
CHECKED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

LOG LEGEND FOR SOIL 5395-00(D) G.P.J. GEOLABS GDT 6/26/10

LOG LEGEND FOR ROCK 5395-00(D) G.P.J. GEOLABS GDT 6/26/10



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Gerald Y. Seki 04/30/12
SIGNATURE EXPIRATION DATE OF THE LICENSE


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION









BORING LOG LEGEND & NOTES

INTERSTATE ROUTE H-1
AIEA STREAM EROSION CONTROL
Project No. H1E-01-11M

Scale: NTS Date: September 2011


SHEET No. BL-2 OF 4 SHEETS

		GEOLABS, INC.				AIEA STREAM BANK EROSION					Log of Boring
		Geotechnical Engineering				AIEA, OAHU, HAWAII					1
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 58 *	
LL=60 PI=26 Direct Shear	41	72			34	>4.5			GP	3-inch ASPHALTIC CONCRETE	
	45				15	2.0			SW	Gray GRAVEL (fill)	
	30	90			43	>4.5	5		MH	Grayish tan GRAVELLY SAND (CORALLINE), medium dense, damp (fill)	
										Brown CLAYEY SILT with some fine sand, very stiff, moist (alluvium)	
	29				50	>4.5	10		CH	grades to stiff at 2.5 feet	
										grades with some gravel, hard at 5 feet	
	21	104			94	>4.2	15		CH	Brown with gray CLAY with some sand and cobbles, very hard, moist (alluvium)	
										Brown and gray SILTY CLAY with gravel, cobbles, and boulders, very hard, moist (alluvium)	
	33				54	>4.5	20				
UC=9322 psi UC=5889 psi UC=6021 psi					10/0" Ref.		25				
	31				52		30				
			100	48	10/0" Ref.		35			Gray vesicular BASALT, severely to moderately fractured, moderately weathered, very hard	
			77	27			40				
							45			Tannish gray CLINKER, severely fractured, highly weathered, medium hard	
										Reddish gray vesicular BASALT, closely fractured, moderately to highly weathered, medium hard to hard	
							50			Boring terminated at 46 feet	
							55			* Elevations estimated from Topographic Survey Map transmitted by PB Americas on 2/18/10.	
							60				
							65				
							70				
							75				
Date Started: February 19, 2010							Water Level: ∇ Not Encountered				
Date Completed: February 19, 2010											
Logged By: D. Gremminger							Drill Rig: CME-45				
Total Depth: 46 feet							Drilling Method: 4" Auger & HQ Coring				
Work Order: 5395-00(D)							Driving Energy: 140 lb. wt., 30 in. drop				

		GEOLABS, INC. Geotechnical Engineering				AIEA STREAM BANK EROSION AIEA, OAHU, HAWAII				Log of Boring 2	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 62 *	
										Description	
Direct Shear	28	91			76	>4.5			MH	2-inch ASPHALTIC CONCRETE	
	50				49		CH		Brown GRAVELLY SILT with clay and sand, very stiff, damp (fill)		
Direct Shear	32	76			42	>4.5	5		ML	Brown SILTY CLAY with some weathered gravel, very hard, damp (alluvium)	
									CH-CL	Light brown SANDY SILT with clay, hard, dry (alluvium)	
LL=50 PI=24	29				43	3.0	10			Brown SILTY CLAY with some gravel, cobbles, and boulders, hard, damp (alluvium)	
Direct Shear	31	88			64	>4.5	15			grades to very hard	
LL=53 PI=22	20				53	>4.5	20		MH	Orangish brown GRAVELLY SILT with clay and some sand and cobbles, very hard, moist (alluvium)	
	18	92			26/3"	>4.5	25			COBBLES AND BOULDERS (BASALTIC) (alluvium)	
LL=55 PI=21	32				71	>4.5	30		MH	Brown with gray mottling SILTY CLAY with sand and some weathered gravel, very hard, damp (alluvium)	
	32	88			44/6" +28/3"	>4.5	35				
	32				26	3.5	40			grades to very stiff, wet	
Direct Shear	50	72			53	4.0	45			grades to hard	
	46				37/4"		50			grades to very hard	
										Boring terminated at 50.8 feet	
							55				
							60				
							65				
							70				
							75				
Date Started: February 17, 2010								Water Level: ∇ 43.0 ft. 02/18/2010 1218 HRS			
Date Completed: February 18, 2010											
Logged By: D. Gremminger								Drill Rig: CME-45			
Total Depth: 50.8 feet								Drilling Method: 4" Auger			
Work Order: 5395-00(D)								Driving Energy: 140 lb. wt., 30 in. drop			

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H1E-01-11M	2012	48	49

SURVEY PLotted BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
DATE	



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Signature: *Gerald Y. Sky*
EXPIRATION DATE OF THE LICENSE: 04/30/12


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS - 1

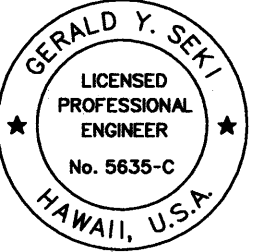
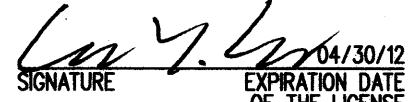
INTERSTATE ROUTE H-1
AIEA STREAM EROSION CONTROL
Project No. H1E-01-11M
Scale: NTS Date: September 2011

SHEET No. BL-3 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	H1E-01-11M	2012	49	49

	GEOLABS, INC. Geotechnical Engineering		AIEA STREAM BANK EROSION AIEA, OAHU, HAWAII		Log of Boring 3	
	Other Tests	Moisture Content (%) Dry Unit Weight (pcf) Core Recovery (%) RQD (%) Penetration Resistance (blows/foot) Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 62 * Description
LL=55 PI=24 Direct Shear	30	76			MH	2-inch ASPHALTIC CONCRETE
	12		32	3.0	MH	Orangish brown CLAYEY SILT with some sand and gravel, medium stiff to stiff, damp (fill)
	37	69	47	2.5		Brown CLAYEY SILT, very stiff, damp (alluvium) grades to hard at 2.5 feet
			43	>4.5		grades with fine sand and some gravel at 5 feet
	29		37	4.0	MH	Grayish brown CLAYEY SILT with sand, gravel, cobbles, and some boulders, very stiff, moist (alluvium)
	21	80	36/5"		CH	Gray-brown CLAY with sand, gravel, and cobbles, very hard, moist (alluvium)
	21		41/6" +10/1"	3.5		BOULDERS (BASALTIC)
	23	92	90	>4.5	CH	Brown with gray mottling CLAY, very hard, moist (alluvium)
	34		27	2.5		grades to very stiff
	Direct Shear	31	88	87	>4.5	CH
36			21	1.5	MH	Brown CLAYEY SILT with sand, very stiff, moist (alluvium)
38		83	41	3.0		grades with weathered gravel, hard
36			43	4.0		Boring terminated at 51.5 feet
						55
						60
						65
						70
						75
Date Started: February 17, 2010		Water Level: 49.0 ft. 02/17/2010 1329 HRS				
Date Completed: February 17, 2010		Drill Rig: CME-45				
Logged By: D. Gremminger		Drilling Method: 4" Auger				
Total Depth: 51.5 feet		Driving Energy: 140 lb. wt., 30 in. drop				
Work Order: 5395-00(D)						

ORIGINAL PLAN	SURVEY PLATTED BY	DATE
NOTE BOOK	DRAWN BY	
	PLACED BY	
	QUANTITIES BY	
	CHECKED BY	

 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.  SIGNATURE EXPIRATION DATE OF THE LICENSE: 04/30/12	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION BORING LOGS - 2 INTERSTATE ROUTE H-1 AIEA STREAM EROSION CONTROL Project No. H1E-01-11M Scale: NTS Date: September 2011
	SHEET No. BL-4 OF 4 SHEETS