

FED. ROAD	STATE	FED. AID	FISCAL	SHEET	TOTAL
DIST. NO.		PROJ. NO.	YEAR	NO.	SHEETS
HAWAII	HAW.	ER-12(2)	2001	139	145

BORING LOG LEGEND

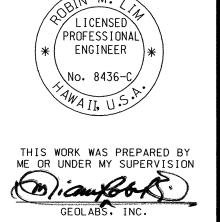
UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

	MAJOR DIVISIONS		USO	CS	TYPICAL DESCRIPTIONS
	GRAVELS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
COARSE- GRAINED	GNAVLLS	LESS THAN 5% FINES		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
SOILS	MORE THAN 50% OF COARSE FRACTION	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	RETAINED ON NO. 4 SIEVE	MORE THAN 12% FINES		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS	CLEAN SANDS	0	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL	SANDS	LESS THAN 5% FINES		SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
RETAINED ON NO. 200 SIEVE	50% OR MORE OF COARSE FRACTION PASSING	SANDS WITH FINES		SM	SILTY SANDS, SAND-SILT MIXTURES
	THROUGH NO. 4 SIEVE	MORE THAN 12% FINES		SC	CLAYEY SANDS, SAND-CLAY MIXTURES
	CUTC	,		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
FINE- GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		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
500/ 05 ::05 = 5 =				MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
50% OR MORE OF MATERIAL PASSING THROUGH NO. 200	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE		СН	INORGANIC CLAYS OF HIGH PLASTICITY
SIEVE				ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	HIGHLY ORGANIC SOIL	.S		PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

GEOTECHNICAL NOTES:

- A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Mamalahoa Highway, Emergency Replacement of Kaalaala Stream Bridge, District of Kau, Island of Hawaii" dated February 2001 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.
- For boring locations, see Sheet BG1.
- 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.
- 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.
- 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.



LEGEND:



2-INCH O.D. STANDARD PENETRATION TEST 3-INCH O.D. MODIFIED CALIFORNIA SAMPLE



GRAB SAMPLE

SHELBY TUBE SAMPLE



CORE SAMPLE

LL LIQUID LIMIT

PI PLASTICITY INDEX

TORVANE SHEAR (tsf)

PEN POCKET PENETROMETER (tsf)

WATER LEVEL OBSERVED IN BORING

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

LEGEND **♦** NOTES

MAMALAHOA HIGHWAY, EMERGENCY REPLACEMENT OF KAALAALA STREAM BRIDGE

FEDERAL-AID PROJECT NO. ER-12(2), PAHALA, HAWAI

SHEET No. BG2

Scale: None

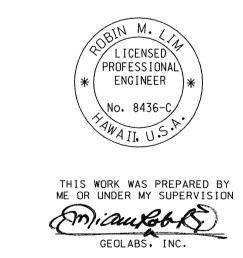
OF 8 SHEETS

Date: FEBRUARY 20, 2001

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(2)	2001	140	145

Approximate Ground Surface Elevation (feet MSL): 176.5 * Description Description Description Description Description Description General Concrete Dark gray SILTY BASALT GRAVEL (fill) 4-inch ASPHALT CONCRETE Gray BASALT, medium hard in hard from the har			Geot			S, INC. Engineel	ring				MAMALAHOA HIGHWAY LAALA STREAM BRIDGE REPLACEMENT ISTRICT OF KAU, ISLAND OF HAWAII 1
50 20 Solution State St	er Tests	1 (%) tie	ct	ॐ	%	ation ance /foot	Pen.	th (feet_	nple ohic	,	Approximate Ground Surface
4-Inch CONCRETE Gray BASALT, medium hard to hard (rock fill) 5 Grown and gray scorlaceous BASALT, severely fractured, slightly weathered, medium hard (pahoshoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) Brown and gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoshoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) grades to slightly fractured, very hard 20 97 37 Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoshoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoshoe basalt formation) 6 Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoshoe basalt formation) 8 Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoshoe basalt formation) 90 100 47 35- 100 42 Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, hard (pahoshoe basalt formation) 6 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) 6 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) 8 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) 8 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) 8 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) 9 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) 9 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation) 9 Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoshoe basalt formation)	Othe	Con				Pen Res (blo	Poc (†sf	Dep	San Gra		4-inch ASPHALT CONCRETE
fractured, slightly weathered, medium hard (pehochoc basalt formation) Fray vesicular BASALT, moderately fractured, slightly weathered, nard (pehochoc basalt formation) Frow and gray vesicular BASALT, closely fractured, slightly weathered, medium hard to hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, medium hard to hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, medium hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, medium hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation) Fray vesicular BASALT, closely fractured, slightly weathered, hard (pehochoc basalt formation)				50	20			-			4-inch CONCRETE
Silghtly weathered, hard (pahoehoe basalt formation) Brown and gray vesicular BASALT, closely Fractured, slightly weathered, medium hard to hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, and (pahoehoe basalt formation) G				100	<i>55</i>			5- -		encentración de protecto de como en co	fractured, slightly weathered, medium hard (pahoehoe basalt formation)
100 55 100 55 100 55 100 90								10-			slightly weathered, hard (pahoehoe basalt formation)
formation) grades to slightly fractured, very hard 20 97 37 80 18 100 47 100 47 100 42 Freddish brown strongly vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Boring terminated at 41.5 feet Water Level: 2 Water Level: 3 Not Encountered				100	55					,	fractured, slightly weathered, medium hard to hard (pahoehoe basalt formation)
Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) 30- 100 47 Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Boring terminated at 41.5 feet Water Level: x Not Encountered				100	90			15- -			formation)
Gray vesicular BASALT, closely fractured, slightly weathered, hard (pahoehoe basalt formation) Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (pahoehoe basalt formation) 100 47 Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt Iformation) Boring terminated at 41.5 feet Water Level: Water Level: Not Encountered								20-			
Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (pahcehoe basalt formation) 30- 100 47 40- Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahcehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahcehoe basalt formation) Boring terminated at 41.5 feet Water Level: \$\frac{1}{2}\$ Water Level: \$\frac{1}{2}\$ Not Encountered				97	37						
100 42 Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation) Boring terminated at 41.5 feet Date Started: January 8, 2001 Water Level: ₹ Not Encountered				80	18			25- -			Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (pahoehoe
Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation) Boring terminated at 41.5 feet Date Started: January 8, 2001 Water Level: ** Water Level: ** Not Encountered		,			.			<i>30</i> -			
Reddish brown strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation) Boring terminated at 41.5 feet Date Started: January 8, 2001 Water Level: Not Encountered				100	47			25.	・ハンシン		
fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation) Boring terminated at 41.5 feet Date Started: January 8, 2001 Water Level: Not Encountered				100	42						Doddich brown strongly vesicular DACALT sleeply
formation Boring terminated at 41.5 feet								40- -	シンシン		fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured,
Date Started: January 8, 2001 Water Level: ♀ Date Completed: January 8, 2001 Not Encountered			. '					45-	-		formation)
Date Completed: January 8, 2001 Not Encountered						0000		50-	-		
JUYGU DY: N. GIUNGCIII I I I I I I I I I I I I I I I I I	Date Comp	oleted:	Jä	anua	ry 8,	2001					Not Encountered
Total Depth: 41.5 feet Drilling Method: 4" Solid-Stem Auger & HQ Coring Nork Order: 4629-00 Driving Energy: 140 lb. wt., 30 in. drop											Drilling Method: 4" Solid-Stem Auger \$ HQ Coring

- 81	1	<u>) </u>	<i>J,</i> 60	1104.	Engineer				נט	DISTRICT OF KAU, ISLAND OF HAWAII	2
er Tests	sture tent (%	Unit ght (pc)	Core Recovery ((%)	etratior istance ws/foo	ket Pen	th (feet.		S,	Approximate Ground Surface Elevation (feet MSL): 1176.5 *	
Other	Mois	Dry Weig	Sore	RQD	Penetr Resista (blows,	Pocket (†sf)	Depth	Sam	SJSNG	Description	
								000	$rac{GP}{rac}{GP}{rac{GP}{rac}{GP}{rac{GP}{rac}{GP}{r$	Dark gray BASALT GRAVEL with silt, medium	
	42				8				GM	dense, moist (fill)	
									ML	Orange-brown SANDY SILT, medium stiff, moist (pahala ash)	
	10				30/.2'		5) × × × × × × × × × × × × × × × × × × ×	GP- GM_	·	
	,	'	100	67				1		dense, damp to slightly moist (clinker) Gray vesicular BASALT, moderately fractured,	
	,	'						\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		slightly weathered, hard (pahoehoe basalt	
	,	'								formation)	
	,						10-			Reddish brown scoriaceous BASALT, severely	
	,	'	100	50			10	H		fractured, slightly weathered, medium hard	
UC=3.1	,	'	100					1	1	(pahoehoe basalt formation)	
ksi	,	'	1					-		Gray vesicular BASALT, closely to moderately	
	,	'				1		- 1		fractured, slightly weathered, hard (pahoehoe	
	,						15-	·- ·- ·- ·- ·- ·- ·- ·- ·- ·- ·- ·- ·- ·		basalt formation) grades to slightly fractured, hard to very hard	
	,	'	100	100		1		1		grades to stigitity tradiciou, hard to vory hard	
	,	1	1			1					
	,	'									
	,	,				1	200				
	,		100	72			20-			TACLET TO A STATE OF THE STATE	
	,	1	100	73						Gray vugular BASALT, moderately fractured,	
	,									slightly weathered, very hard (pahoehoe basalt formation)	4
	,	'				1				Tormation	
	,					'	25-			· · · · · · · · · · · · · · · · · · ·	
	,	'	100	30		'		+(-)		Gray vesicular BASALT, closely fractured, slightly	
	,		1			'		-		weathered, hard (pahoehoe basalt formation)	
	,							1	1	Gray vesicular BASALT, moderately fractured,	
	,	1				'		-	1	slightly weathered, hard to very hard (pahoehoe	
	,	1				'	30-	1-12	1	basalt formation)	
	,	'	100	50					1		
	,					'			•		
	,					1			1		
	,	'				1	35	- 1	-	Draws and grow cooringeous RASALT closely	anatomic and an anatomic anatomic and an anatomic anatomic and an anatomic anatomic anatomic and an anatomic ana
	,	+	100	90			35	1 (-)		Brown and gray scoriaceous BASALT, closely fractured, slightly weathered, medium hard	
	,	,	100	30		'		1		(pahoehoe basalt formation)	
	,	,				1		1/-1		Gray vugular BASALT, slightly fractured,	
	,	ļ				,		1		unweathered, very hard (pahoehoe basalt	
	,	,					40-)-		formation)	
	,	,	100	8				H		Red and gray vesicular BASALT, severely	
	,	T.				1		1	1	fractured, moderately weathered, medium hard	
	,	,	1			1		- 1	1	(pahoehoe basalt formation)	
	,					1		1	1		
	,	,				!	45	八十	1		
	,	1	55	23		1		一十二十	1	Gray vugular BASALT, moderately fractured,	
		-	1			,		1	•	unweathered, very hard (pahoehoe basalt	
		,						1	\	formation)	
							50			Boring terminated at 49.5 feet	
Date Sta					20, 2000					Water Level: ▼	
Date Co.			Decen K. Gre		20, 2000 eth	<u></u>		, and a second control of the second control		Not Encountered Drill Rig: MOBILE B-53	
Logged .	$\Box v_{\lambda}$	-	<u>/\. \. \.</u> .	UIIUU.					Andreas	Drilling Method: 4" Solid-Stem Auger \$ HQ Col	rina



STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

BORING LOGS

<u>MAMALAHOA HIGHWAY, EMERGENCY</u> <u>REPLACEMENT OF KAALAALA STREAM BRIDGE</u>

FEDERAL-AID PROJECT NO. ER-12(2), PAHALA, HAWAII
Scale: None Date: FEBRUARY 20, 2001

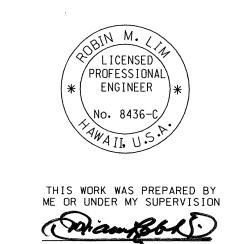
SHEET No. BG3 OF 8 SHEETS

		Geo			RS, INC. Enginee	ring				MAMALAHOA HIGHWAY ALAALA STREAM BRIDGE REPLACEMENT DISTRICT OF KAU, ISLAND OF HAWAII	Log of Boring 3
Other Tests	sture ntent (%)	Dry Unit Weight (pcf.	Core Recovery (%)	(%) 0	Penetration Resistance (blows/foot)	Pocket Pen. (†sf)	Depth (feet	Sample Graphic	nscs	Approximate Ground Surface Elevation (feet MSL): 1164 *	*
140	Ø Ø	ØC,	S.Co.	SRAD	Pe (b/	Po (ts	De,	Sa	NS	Description Oran vasioular DASALT elightly fractured	
UC=2.4 ksi			100 100	100 60			-			Gray vesicular BASALT, slightly fractured, unweathered, hard to very hard (pahoehoe basalt formation) grades to moderately fractured, moderately	
			100	87			5- -			weathered Reddish brown scoriaceous BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation)	
			100	61			10-			Gray vesicular BASALT, slightly fractured, slightly weathered, hard to very hard (pahoehoe basalt formation) Gray to reddish gray vesicular BASALT, closely to	
				.			- - 15-			moderately fractured, slightly weathered, hard to very hard (pahoehoe basalt formation))
			91	0			1 <i>J</i> - - -			Gray to reddish gray vesicular BASALT, closely	
			100	43			20- - -			fractured, slightly weathered, medium hard (pahoehoe basalt formation)	
			100	80			25- -			Gray vesicular BASALT, moderately fractured, slightly weathered, hard to very hard (pahoehoe basalt formation)	
							30-	シングラン		Gray BASALT, slightly fractured, unweathered, very hard (pahoehoe basalt formation)	
			100	88			35-			Gray vesicular BASALT, slightly to moderately fractured, unweathered, very hard (pahoehoe basalt formation)	
							-			Boring terminated at 36 feet	
							40- -				
							- - 45-				
							-				
Date Star Date Com Logged B	plete	ed: i		nber	21, 2000 21, 2000		50-			Water Level: Not Encountered Drill Rig: CONCORE	
Total Dep			36 fe	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						Drilling Method: NQ Coring	
	oth:			et							

		Geo			S, INC. Enginee	ring				MAMALAHOA HIGHWAY LAALA STREAM BRIDGE REPLACEMENT ISTRICT OF KAU, ISLAND OF HAWAII	Boring 4
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (†sf)	Depth (feet)	Sample	USCS	Approximate Ground Surface Elevation (feet MSL): 1176 * Description 5-inch ASPHALT CONCRETE 20-inch CONCRETE SPACE BELOW BRIDGE (AIR)	
							5- - -				
			100	87			10- 10-			Gray vesicular BASALT, slightly to moderately	
			100	80			-			fractured, slightly weathered, hard (pahoehoe basalt formation)	
			100	100			15- - -			Gray vesicular BASALT, slightly fractured, slight weathered, hard to very hard (pahoehoe basalt formation)	ntly
			80	50			20-				
			50	40			25- - - - - - 30-			Reddish brown vesicular BASALT, severely fractured, moderately weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation)	
			100	48			35-			Gray vugular BASALT, moderately fractured, slightly weathered, hard to very hard (pahoehoe basalt formation))
			100	28			- - - - 40-			Reddish gray scoriaceous BASALT, closely fractured, slightly weathered, medium hard	
							- - - - 45-			(pahoehoe basalt formation) Boring terminated at 40.6 feet	
Pata Star	rtod		Janua	nrv 11	2001		50-			Water Levels V	
Date Star Date Comp ogged By	plete	d:		ry 11,	, 2001 , 2001					Water Level: ♀ Not Encountered Drill Rig: MOBILE B-53	
otal Dep Vork Ord	oth:		40.6 1 4629-	feet	11					Drilling Method: HQ Coring Driving Energy: 140 lb. wt., 30 in. drop	

FED. ROAD DIST. NO. STATE FED. AID PROJ. NO. FISCAL SHEET NO. SHEETS

HAWAII HAW. ER-12(2) 2001 141 145



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY, EMERGENCY REPLACEMENT OF KAALAALA STREAM BRIDGE FEDERAL-AID PROJECT NO. ER-12(2), PAHALA, HAWAII

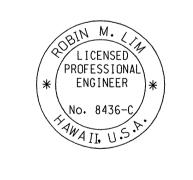
Scale: None
SHEET No. BG4

Date: FEBRUARY 20, 2001

OF 8 SHEETS

					SS, INC.				KAA	MAMALAHOA HIGHWAY ALAALA STREAM BRIDGE REPLACEMENT	Log of Boring
		Geo	$\overline{}$	nical	Engineer	ring				ISTRICT OF KAU, ISLAND OF HAWAII	5
r Tests	ture ent (%)	Unit ht (pcf)	Core Recovery (%)	(%)	stration stance vs/foot)	et Pen.	h (feet)	Sample Graphic	S	Approximate Ground Surface Elevation (feet MSL): 1175 *	
Other	Moistur Conten	Dry Weig	Sore Reco	RQD	Peneti Resisi (blows	Pocket (†sf)	Depth	Sam	nscs	Description	
) \				7	000	GM	5-inch ASPHALT CONCRETE	
			60	0				000		Gray SILTY BASALT GRAVEL (fill)	
							_	-		Gray BASALT, hard (rock fill)	
			80	20			5			Gray and brown vesicular BASALT, severely fractured, slightly weathered, medium hard (pahoehoe basalt formation)	
			100	55			10			Gray vesicular BASALT, slightly fractured, slightly weathered, hard (pahoehoe basalt formation)	htly
			100	93			15			Brownish gray strongly vesicular BASALT, close fractured, slightly weathered, medium hard (pahoehoe basalt formation)	ely
							20			Gray vesicular BASALT, slightly fractured, slightly weathered, hard (pahoehoe basalt formation)	htly
			100	17						Gray vesicular BASALT, closely fractured, sligh weathered, hard (pahoehoe basalt formation)	tly
			70	30			25			grades to vugular grades to vesicular, moderately fractured, moderately weathered	
							30			Reddish gray to gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation)	/
			100	20							
			100	65			35			Ones various DACALT alightly to made mately	
							40			Gray vesicular BASALT, slightly to moderately fractured, unweathered, hard (pahoehoe basalt formation)	
										Boring terminated at 41.5 feet	
							45	5 			
Data Ct	arto-		lanus	ru C	2001		50	<u> </u>		Water Lovels 9	
<u>Date St</u> Date Co					, 2001 , 2001					Water Level: ¥ Not Encountered	
Logged	By:		K. Gra	onset	······································					Drill Rig: MOBILE B-53	
Total De	epth:		41 . 5 f	eet			-		-	Drilling Method: HQ Coring	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(2)	2001	142	145



STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY, EMERGENCY REPLACEMENT OF KAALAALA STREAM BRIDGE

FEDERAL-AID PROJECT NO. ER-12(2), PAHALA, HAWAII
Scale: None Date: FEBRUARY 20, 2001

SHEET No. BG5

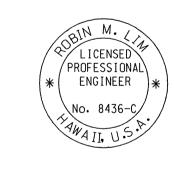
5 OF 8 SHEETS

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	Ge			S, INC. Enginee	ring				MAMALAHOA HIGHWAY LAALA STREAM BRIDGE REPLACEMENT ISTRICT OF KAU, ISLAND OF HAWAII	Log of Boring 6
Other Tests	Moisture Content (%) Dry Unit Weight (pcf.	Core Recovery (%	RQD (%)	Penetration Resistance (blows/foot	Pocket Pen. (tsf)	Depth (feet,	Sample Graphic	SOSO	Approximate Ground Surface Elevation (feet MSL): 1174 * Description	
UC=2.9 ksi	11	100 80 100	0 33 50	20		J 10-		ML GP- GM	Brown SANDY SILT with gravel, soft to medium stiff, dry to damp (fill) Gray BASALT GRAVEL with silt, medium dense, damp to moist (fill) Gray BASALT ROCK, medium hard to hard (cobble/boulder fill) CONCRETE at 7 and 8 feet Brownish gray strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, moderately fractured, slightly weathered, medium hard (pahoehoe basalt formation) Brownish gray vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation)	
		100	53			20- 25-			Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation)	
		100	48		·	30-			Gray vesicular BASALT, closely fractured, slightly weathered, medium hard to hard (pahoehoe basalt formation)	
		100	10			35- 40-			Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation) Brown and gray scoriaceous BASALT, severely fractured, slightly weathered, medium hard (pahoehoe basalt formation)	
		<i>100 54</i>	52			45-			Gray vesicular BASALT, closely to moderately fractured, moderately weathered, medium hard to hard (pahoehoe basalt formation)	
Date Sta Date Com Logged E Total Dep Work Ord	npleted: By: oth:		mber onset et	19, 2000 19, 2000 th		50-			Water Level: Not Encountered Drill Rig: MOBILE B-53 Drilling Method: 4" Solid-Stem Auger \$\pm\$ HQ Conditions Energy: 140 lb. wt., 30 in. drop	ing

				BS, INC.	rina				MAMALAHOA HIGHWAY LAALA STREAM BRIDGE REPLACEMENT LOG of Boring
ا رون			ııcal	Engineer			 	<i>D</i> .	ISTRICT OF KAU, ISLAND OF HAWAII 6
Tests	; 6 5 5 5 7		C.	ration tance s/foot	Pen.	(feet,			
7 76	Moisture Content (Dry Unit Weicht (c	Core Recovery	(%)	etra ista ws/	ket	th (Sample Graphic	S	(Continued from previous plate)
Other	Moistul Conteni Dry Un	Rec	RQD	Penetr Resist (blows,	Pocket (†sf)	Depth	San Gra	NSCS	Description
						-			grades to severely fractured, medium hard
						-			grades to vugular, very hard
						-			Boring terminated at 51 feet
						-			
						55-	1		
						-			
						60-			
							-		
						CE.	-		
						<i>65</i> -			
				,		70-	-		
						•			
						75-			
						, 0	_		
							-		
						80-	-		
					,				
					,				
						85-			
						90-			
						<i>30°</i>			
						95-			
						•			
						100-			
ate Stal		Decei	mber	19, 2000		,00			Water Level: ₹
ate Com		Decei K. Gr		19, 2000 th					Not Encountered Drill Rig: MOBILE B-53
ogged B otal Dep	oth:	51 fe	orisei et	111	and an artist and a second				Drilling Method: 4" Solid-Stem Auger \$ HQ Coring
ork Ord		4629-							Driving Energy: 140 lb. wt., 30 in. drop

FED. AID PROJ. NO. FED. ROAD STATE DIST. NO. FISCAL SHEET TOTAL YEAR NO. SHEETS 143 ER-12(2) 2001 HAW. HAWAII



THIS WORK WAS PREPARED BYME OR UNDER MY SUPERVISION

GEOLABS, INC.

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY, EMERGENCY REPLACEMENT OF KAALAALA STREAM BRIDGE

FEDERAL-AID PROJECT NO. ER-12(2), PAHALA, HAWAII Scale: None Date: FEBRUARY 20, 2001

SHEET No. BG6

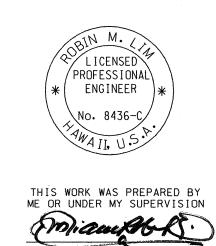
OF 8 SHEETS

143

		Geot			S, INC. Engineel	ring				MAMALAHOA HIGHWAY LAALA STREAM BRIDGE REPLACEMENT ISTRICT OF KAU, ISLAND OF HAWAII	Log of Boring 7
Other Tests Moisture	Content (%)	Weight (pcf	Core Recovery (%	RQD (%)	Penetration Resistance (blows/foot	Pocket Pen. (†sf)	Depth (feet,	Sample Graphic	SOSN	Approximate Ground Surface Elevation (feet MSL): 1173.5 * Description	
			40	0			<i>5</i> -		GM	5-inch ASPHALT CONCRETE Gray SILTY BASALT GRAVEL (base material) Dark gray vesicular BASALT, severely fractured, moderately weathered, medium hard (cobble/boulder embankment fill) Dark gray fine SANDY SILT (pahala ash)	
			100	57	39		10 ⁻	000000000000000000000000000000000000000	GP- GM	BASALT GRAVEL with silt, dense, damp (alluvium) Gray vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe basalt formation)	
			100	88			15-			Brown and gray vesicular BASALT, severely fractured, slightly weathered, medium hard (pahoehoe basalt formation)	
			100	47						Gray vesicular BASALT, slightly to moderately fractured, slightly weathered, hard (pahoehoe basalt formation) grades to closely fractured grades to slightly fractured	
			100	53			20 ⁻			Brown and gray strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation) Gray vugular BASALT, closely to moderately fractured, slightly weathered, hard (pahoehoe	
			80	50			25 [.]			grades to vesicular, slightly fractured, very hard grades to closely to moderately fractured,	
			100	52			<i>30</i> -			moderately weathered Brown and gray strongly vesicular BASALT, closely fractured, slightly weathered, medium hard (pahoehoe basalt formation)	1
			100	57			<i>35</i> -			Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (pahoehoe basalt formation)	
							40		,	Boring terminated at 41.5 feet	
							45			-	
Date Stari					. 2001 . 2001		50			Water Level: Not Encountered	
Logged By Total Dept	/:	Κ	. Gra 1.5 fe	onset					4404	Drill Rig: MOBILE B-53 Drilling Method: HQ Coring	

		Ger			RS, INC. Engineer	ing		KAALAALA STREAM BRIDGE REPLACEMENT DISTRICT OF KAU, ISLAND OF HAWAII		
ests	18	Cf	ख			Pen.	36t	<i>D</i> .	Approximate Ground Surface	8
_	ture	Unit ht (p	very	(%)	m m	1	th (feet. ple phic	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Elevation (feet MSL): 1173 *	
Other	Mois. Jonte	Dry Veigi	Core Recovery	RQD	Pene Resi. Dlow	Pocket (†sf)	Depth (f Sample Graphic	nscs	Description	
	14				66		3	ML	Dark brown SANDY SILT with some clay and	
								GM	gravel (fill) Dark gray SILTY BASALT GRAVEL, medium	
									dense, moist to very moist (fill)	
			100	0			5			
									Gray vesicular BASALT, slightly to moderately	
			100	100		1		The state of the s	fractured, slightly weathered, hard to very hard	1
							10	**************************************	(pahoehoe basalt formation)	
							10-	1		
			100	80		1				
								1		
							15		Brown and gray scoriaceous BASALT, closely	
						1			fractured, slightly weathered, medium hard	
			100	80			- '/-	1	(pahoehoe basalt formation) Gray vugular BASALT, slightly fractured, slightly	/
							20		weathered, very hard (pahoehoe basalt formation	
							20-		Brown and gray vesicular BASALT, severely fractured, slightly weathered, medium hard	
			100	70					(pahoehoe basalt formation)	
								:	Gray vugular BASALT, slightly to moderately fractured, unweathered, very hard (pahoehoe	
							25-		basalt formation)	
				FC				1		
			97	50						
							30-		Brown and gray vesicular BASALT, closely	
		- manufacture and the second							fractured, slightly weathered, hard (pahoehoe basalt formation)	
			100	50			1			
				- The state of the			-		Gray strongly vacioular DACALT 1	
							35-		Gray strongly vesicular BASALT, moderately fractured, slightly weathered, hard (pahoehoe	
			100	48					basalt formation)	
	į	· · · · · · · · · · · · · · · · · · ·	,50			1				
							40-			
							-	1	grades to closely fractured	
			95	17						Tv.
									Gray vesicular BASALT, closely fractured, slightly weathered, very hard (pahoehoe basalt formation)	-
							45-			
			67	14				1	grades to strongly vesicular, medium hard to ha	
									grades to vugular, moderately fractured, very ha	ard
					10. 0		50	<u></u>	Boring terminated at 50 feet	
	tarted: omplete				<i>18, 2000 18, 2000</i>				Water Level: ♥ Not Encountered	-
ogged	By:		K. Gro	onseti					Drill Rig: MOBILE B-53 Drilling Method: 4" Solid-Stem Auger \$ HQ C	`orina
otal D	epth: rder:	·····	<u>50 fee</u> 4629-0	······································			·		Drilling Method: 4" Solid-Stem Auger ♥ HQ C Driving Energy: 140 lb. wt., 30 in. drop	or HY

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(2)	2001	144	145



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY, EMERGENCY REPLACEMENT OF KAALAALA STREAM BRIDGE

FEDERAL-AID PROJECT NO. ER-12(2), PAHALA, HAWAII

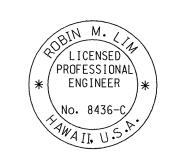
Scale: None Date: FEBRUARY 20, 2001
SHEET No. BG7 OF 8 SHEETS

0. 201 01 0

	Geo			S, INC. Enginee	~ 1	1	MAMALAHOA HIGHWAY KAALAALA STREAM BRIDGE REPLACEMENT DISTRICT OF KAU, ISLAND OF HAWAII				
Other Tests	Moistule Content (%. Dry Unit Weight (pci	Core Recovery ()	RQD (%)	Penetratior Resistance (blows/fooi	Pocket Per (†sf)	Depth (feet,	Sample Graphic	SOSA	Approximate Ground Surface Elevation (feet MSL): 1176.5 *		
0 1	ŽÕÕŽ	100	77	P. R. C.	<u>q</u>	Ŏ	S 10/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2	<u>``</u>	Description Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (pahoehoe basalt formation)		
UC=4.4 ksi		100	73			5-			Reddish brown vesicular BASALT, severely fractured, moderately weathered, medium hard (pahoehoe basalt formation) Gray vesicular BASALT, slightly to moderately		
		80	55			10-			fractured, slightly weathered, hard to very hard (pahoehoe basalt formation)		
		80	25			15			Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (pahoehoe basalt formation)		
						20 ⁻	-		Boring terminated at 20 feet		
						25 ⁻					
						<i>30-</i>	-				
						<i>35</i> -	-				
						40-	-				
						<i>45</i> -					
Date Star				22, 2000		<u>50</u> -			Water Level: ₹		
Date Comp Logged By Total Depi	/: th:	Decen K. Gr 20 fe 4629-	onset et	22, 2000 h					Not Encountered Drill Rig: CONCORE Drilling Method: NQ Coring Driving Energy: 140 lb. wt., 30 in. drop		

	GEOLABS, INC. Geotechnical Engineering						MAMALAHOA HIGHWAY KAALAALA STREAM BRIDGE REPLACEMENT DISTRICT OF KAU, ISLAND OF HAWAII					
Tests	%	G S		ation ance /foot/	ering ie e	(feet			ISTRICT OF KAU, ISLAND OF HAWAII Approximate Ground Surface			
Other Te	Content (Dry Unit	Weight (p Core Recovery	RQD (%)	Penetrat Resistan (blows/f	Pocket F (tsf)	Depth (f	Sample Graphic	SOS	Elevation (feet MSL): 1177 *			
70		<u>%</u>	R		25	Ğ	S	SOSU = S	Brown SANDY SILT with gravel			
		75	12	23				SP	Gray GRAVELLY BASALT SAND with silt, medium dense, very damp to slightly moist			
			/ _						Brown and gray strongly vesicular BASALT, closely fractured, slightly weathered, medium hard			
						5			(pahoehoe basalt formation)			
		100	23									
						10						
		00	20			10						
		80	32									
						15			Gray vesicular BASALT, moderately fractured,			
		83	48						slightly weathered, hard (pahoehoe basalt formation)			
							-		Brown and gray vesicular BASALT, closely to moderately fractured, slightly weathered, medium			
						20			hard to hard (pahoehoe basalt formation)			
							-		Boring terminated at 21.5 feet			
						25	_					
							7					
						30						
						0.5						
						35						
							+					
						40						
			Table of the Control									
			the control of the co			45						
			terror production de services									
			No. the second second of the second s									
Date Star	ted:	Janua	arv 10), 2001		50			Water Level: ₹			
Date Comp Logged By	pleted:	Janua		, 2001					Not Encountered Drill Rig: MOBILE B-53			
Total Dep	th.	21 . 5		11					Drilling Method: 4" Solid-Stem Auger \$ HQ Cori	ing		

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(2)	2001	145	145



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION GEOLABS, INC.

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY, EMERGENCY REPLACEMENT OF KAALAALA STREAM BRIDGE

FEDERAL-AID PROJECT NO. ER-12(2), PAHALA, HAWAII Date: FEBRUARY 20, 2001 Scale: None

SHEET No. BG8

OF 8 SHEETS