

Boring Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

	MAJOR DIVISIONS	S	US	CS	TYPICAL DESCRIPTIONS
	GRAVELS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
COARSE- GRAINED	OIVAVELO	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	9 6 6 9 8 9 9 8 9	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
- - -	CII TC			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
FINE- GRAINED SOILS		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/ 00 1100 - 0-				МН	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
H	IIGHLY ORGANIC SOII	LS		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 3-INCH O.D. MODIFIED CALIFORNIA SAMPLE

SHELBY TUBE SAMPLE **GRAB SAMPLE**

CORE SAMPLE

LIQUID LIMIT

PLASTICITY INDEX

TORVANE SHEAR (tsf)

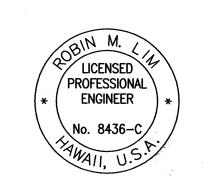
POCKET PENETROMETER (tsf)

WATER LEVEL OBSERVED IN BORING

ED. ROAD	STATE	FED. AID	FISCAL	SHEET	TOTAL
DIST. NO.		PROJ. NO.	YEAR	NO.	SHEETS
HAWAII	HAW.	ER-12(3)	2002	93	107

GEOTECHNICAL NOTES

- A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Mamalahoa Highway, Emergency Replacement of Paauau Stream Bridge, Federal Aid Project No. ER-12(3), District of Kau, Island of Hawaii" dated April 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 G1.
- 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.



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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

LEGEND AND NOTES

MAMALAHOA HIGHWAY

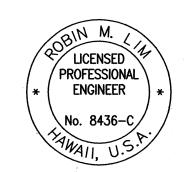
REHABILITATION OF VARIOUS BRIDGES FEDERAL AID PROJECT NO. ER-12(3) Scale: As shown

Jan. 2002 SHEET NO. 2 OF 10 SHEETS

					BS, IN Engine		1		(EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE TOLE OF KALLISLAND OF HAWAII 1
ests	t (%)	t (pcf)								Approximate Ground Surface
Other Tests	Moistur Content	Dry Uni Weight	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen (tsf)	Depth (feet)	Sample	USCS	Elevation: 784* Description
	6		OH	ш_	33	ш 🔾			ML- GM	4-inch ASPHALT CONCRETE Dark gray SANDY SILT AND BASALT GRAVEL, dense, dry to slightly damp (fill)
			75	21			5			Dark gray vugular BASALT, closely fractured, slightly weathered, hard (basalt formation)
·			100	80			-			Dark gray vugular BASALT, slightly to moderately fractured, slightly weathered, very hard (basalt formation)
		·	77	20			10			
			83	20			15			Gray vugular BASALT, closely to severely fractured, slightly weathered, medium hard to hard (basalt formation) Gray to reddish brown BASALT, severely fractured, slightly to moderately weathered,
			80	35			20	×		medium hard (clinker) Gray vugular BASALT, closely fractured, slightly weathered, very hard (basalt formation) grades to vesicular Reddish brown BASALT FRAGMENTS, severely
		·	50	13			25	- × × / / / - / / / / / / / / / / / / /		fractured, slightly weathered, medium hard (clinker) Gray vugular BASALT, moderately fractured, slightly weathered, very hard (basalt formation) Reddish brown BASALT FRAGMENTS, severely
			80	40			30	-		fractured, slightly weathered, medium hard (clinker) Gray vesicular BASALT, closely fractured, moderately weathered, medium hard (basalt formation)
JC=2.8 ksi	<i>y</i>	-	60	48			35	/		Reddish brown BASALT FRAGMENTS, severely fractured, slightly weathered, medium hard (clinker) Gray vugular BASALT, slightly to moderately fractured, slightly weathered, very hard (basalt formation)
							40			CLINKER SEAM
							45			* Elevations estimated from Project Plans by KAI Hawaii, Inc. dated January 2001.
							50·	-		
Date Sta Date Cor			Janua Janua	Z						Water Level: ♀ Not Encountered
Logged E Total De	Зу:		K. Gre 41.5 f	onset						Drill Rig: MOBILE B-53 Drilling Method: 4" Auger & HQ Coring
Work Or			4628-							Driving Energy: 140 lb. wt., 30 in. drop

					BS, IN				(EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE	Log of Boring
sts	 	_							ואוט	RICT OF KAU, ISLAND OF HAWAII Approximate Ground Surface	
Other Tests	Moisture Content (Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	SC	Elevation: 784*	
Oth	Moi Cor	Me.	Core	RQ	Pen Res (blo	Poc (tsf)	Dep	San Gra	nscs	Description	
										4-inch ASPHALT CONCRETE	
			50	20				· 次· 次-次-		Gray vugular BASALT, closely fractured, weathered, very hard (basalt formation)	slightly
			100	85			5	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		Gray vugular BASALT, slightly to modera fractured, slightly weathered, very hard (
					·		10	· 次次次		formation)	
			100	83				10000000000000000000000000000000000000			
			60	0			15	× × × × × × × × × × × × × × × × × × ×		Reddish gray vesicular BASALT, severely fractured, slightly weathered, medium hat (clinker)	
			60	40			20	- x° - x° - x° - x° - x°			
			60	18				×××		VOID	
								公公		Gray vesicular BASALT, moderately fract moderately weathered, hard (basalt form	•
			60	0	·		25	-		Gray and reddish gray vesicular BASALT FRAGMENTS, severely fractured, model weathered, medium hard (clinker)	
			50	19			30	- x^° x° x x - x° - x°			
			,	-			35	× × // -// -// -// -// -// -// -// -// -		Gray vesicular BASALT, moderately fract slightly weathered, hard (basalt formation	
		·	50	30				- × · × · × · × · × · × · × · × · × · ×		Brown and gray BASALT FRAGMENTS, fractured, moderately weathered, mediur (clinker)	
							40	**	-	Gray vugular BASALT, slightly fractured, weathered, very hard (basalt formation) Boring terminated at 41 feet	slightly
							45				
							50-				
Date Sta			Janua							Water Level: ♀	
<u> Date Cor</u> ∟ogged l			Janua K. Gr		·····					Not Encountered Drill Rig: MOBILE B-53	
Total De			41 fee							Drilling Method: HQ Coring	
Work Or	der:		4628-	00						Driving Energy: 140 lb. wt., 30 in. drop	

FED. ROAD	STATE	FED. AID	FISCAL	SHEET	TOTAL
DIST. NO.		PROJ. NO.	YEAR	NO.	SHEETS
HAWAII	HAW.	ER-12(3)	2002	94	107



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GEOLABS, INC.

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE,
IMPROVEMENTS AT KAMANI STREET, AND
REHABILITATION OF VARIOUS BRIDGES

FEDERAL AID PROJECT NO. ER-12(3) Scale: As shown

Jan. 2002

SHEET NO. 3 OF 10 SHEETS

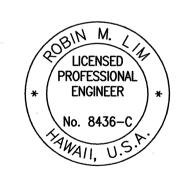
LAST SAVED BY: LAST MODIFIED: Tue, 22 Jan 2002 — 6:18pm

SURVEY PLOTTE
DRAWN BY ____
TRACED BY ___
DESIGNED BY __
QUANTITIES BY ___
CHECKED BY __

Log of Boring **EMERGENCY REPLACEMENT** GEOLABS, INC. OF PAAUAU STREAM BRIDGE Geotechnical Engineering DISTRICT OF KAU, ISLAND OF HAWAII **Approximate Ground Surface** Elevation: 783* Description 5-inch ASPHALT CONCRETE 20-inch CONCRETE SPACE BELOW BRIDGE (AIR) 100 100 15 20 × × × × × 25 Gray vugular BASALT, slightly fractured, slightly to 100 100 unweathered, very hard (basalt formation) 100 43 grades to closely fractured (vertically), slightly weathered grades to slightly fractured 50 20 Reddish brown BASALT FRAGMENTS, severely fractured, moderately weathered, medium hard (clinker) VOIDSat 24.1 and 25.1 feet Gray vugular BASALT, moderately fractured, slightly weathered, hard (basalt formation) 90 8 Gray and brown vesicular BASALT, closely to severely fractured, slightly weathered, medium hard (clinker) Gray vugular BASALT, closely to moderately fractured, slightly weathered, hard to very hard 80 16 (basalt formation) 35-40-Gray to reddish gray vesicular BASALT, severely fractured, moderately weathered, medium hard to hard (basalt formation with clinker seams) 60 6 **VOID** Gray vugular BASALT, closely fractured, slightly weathered, very hard (basalt formation) Boring terminated at 43.1 feet January 12, 2001 Date Started: Water Level: ♀ Date Completed: January 12, 2001 Not Encountered K. Gronseth MOBILE B-53 Logged By: Drill Rig: 43.1 feet **Total Depth: HQ** Coring **Drilling Method:** 4628-00 Work Order: **Driving Energy:** 140 lb. wt., 30 in. drop

	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				BS, IN Engine		,	, 'n		EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE TRICT OF KAU, ISLAND OF HAWAII Log of Boring 4
Other Tests	sture tent (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	ket Pen.	Depth (feet)	Sample	S	Approximate Ground Surface Elevation: 783*
Othe	Mois	Dry	Core	RQ	Pen Res (blo	Pocket I (tsf)	Dep	Sar	SOSO	Description
									i i	5-inch ASPHALT CONCRETE
										20-inch CONCRETE
						1		1		SPACE BELOW BRIDGE (AIR)
								4		
							5	;-		
								4		
								1		
		·	100	80					1	Gray vugular BASALT, slightly fractured,
							10			unweathered, very hard (basalt formation)
							10			
								- 12		
			400	00				412		
		·	100	80				- 3		
							15			
			80	23						
				ı	·		20	- ×o,		Reddish brown BASALT FRAGMENTS, severely
								- × ,	,	fractured, moderately weathered, medium hard
								- ×, ×,		(clinker)
			83	0				- × , × ,	<u>د ا</u>	Gray vesicular BASALT, closely fractured, slightly
	,		03	U				- × , × ,		weathered, hard (clinker)
							25	- × , × ,		Gray vesicular BASALT, severely fractured,
		,						× ,	;d	moderately weathered, medium hard (clinker)
								- X	,	
			80	8			,	- 7		Gray vesicular BASALT, closely to severely
							30		_	fractured, moderately weathered, medium hard
								1 (>	-	(basalt formation with many clinker seams)
								7	-	
			90	8	`				-	
				, .			35	_ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	-	
								- K	-]	
•				·				- K		
										Paring terminated at 39.2 feet
				,			4.0	1	,	Boring terminated at 38.2 feet
							40]		
						3				
							*.			
				,	News					
							45	4		
						,		1		
						,		11		
				, .]		
						`	50			
Date Star					, 2001		JU			Water Level: ♀
Date Con					s, 2001					Not Encountered
Logged B Total Dep			8. Gr 38.2 f	onset eet						Drill Rig: MOBILE B-53 Drilling Method: HQ Coring
Work Ord			4628-							Driving Energy: 140 lb. wt., 30 in. drop

FED. ROAD	STATE	FED. AID	FISCAL	SHEET	TOTAL
DIST. NO.		PROJ. NO.	YEAR	NO.	SHEETS
HAWAII	HAW.	ER-12(3)	2002	95	107



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STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY

EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE,
IMPROVEMENTS AT KAMANI STREET, AND
REHABILITATION OF VARIOUS BRIDGES
FEDERAL AID PROJECT NO. ER-12(3)

Scale: As shown

Jan. 2002

SHEET NO. 4 OF 10 SHEETS

Log of **EMERGENCY REPLACEMENT** GEOLABS, INC. Boring OF PAAUAU STREAM BRIDGE Geotechnical Engineering 5 DISTRICT OF KAU, ISLAND OF HAWAII Approximate Ground Surface Elevation: 783* Description 4-inch ASPHALT CONCRETE Gray and brown vugular BASALT, closely to severely fractured, slightly weathered, hard (basalt formation with clinker seams) 60 13 93 | 52 Gray vugular BASALT, slightly fractured, unweathered, very hard (basalt formation) UC=4.0 ksi 100 90 60 30 Reddish brown BASALT FRAGMENTS, severely fractured, moderately weathered, medium hard (clinker) Gray vesicular BASALT, closely to moderately 68 25 fractured, slightly weathered, hard (basalt formation with thin clinker seams) 70 18 Reddish gray to gray vesicular BASALT, severely fractured, moderately weathered, medium hard (clinker) 60 8 Gray vugular BASALT, closely fractured, slightly weathered, hard (basalt formation) Gray vugular BASALT, moderately fractured, slightly weathered, hard to very hard (basalt 40 | 17 formation) Reddish brown BASALT FRAGMENTS, severely fractured, moderately weathered, medium hard (clinker) Boring terminated at 41 feet January 3, 2001 Date Started: Not Encountered Date Completed: January 3, 2001 MOBILE B-53 Logged By: K. Gronseth Drill Rig: Drilling Method: 4" Auger & HQ Coring Total Depth: 41 feet 4628-00 Driving Energy: 140 lb. wt., 30 in. drop Work Order:

					3S, IN			(EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE RICT OF KAU, ISLAND OF HAWAII	Log of Boring	
Other Tests	isture ntent (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic USCS	Approximate Ground Surface Elevation: 783*		
\$	<u>\$∂</u>	2 ⊗ S	Rec	RQ	Per Re (blc	Po (tsf	De	Sal Gre US	Description		
	4				29			ML	\ 4-inch ASPHALT CONCRETE Dark gray GRAVELLY SANDY SILT, very very damp to slightly moist (fill)	y stiff,	
			100 60	0 10	·		5		Gray strongly vesicular BASALT, severely fractured, moderately weathered, medium (clinker) Gray vugular BASALT, closely fractured,	n hard	
			100	80			10	-	weathered, hard (basalt formation) Gray massive, vugular BASALT, moderation		
							15	1 (六/八/六 -	slightly fractured, slightly weathered, very (basalt formation)		
			100	95			15				
·			80	13			20	-	Red and gray vesicular BASALT, severel		
			80	0			25	- x x x x x x x x x x x x x x x x x x x	fractured, moderately weathered, medium (clinker) Brownish gray vesicular BASALT, closely fractured, moderately weathered, hard (beformation)	, pasalt	
			100	81			30	- x x x x x x x x x x x x x x x x x x x	Brown and gray vesicular BASALT, seventhered, moderately weathered, medium (clinker) Gray vugular BASALT, moderately fractustions slightly weathered, very hard (basalt form	n hard red,	
				,			35	- (-), (-), (-), (-), (-), (-), (-), (-)			
			70	33			,	- - - - - - - - - - - - - -	Gray vugular BASALT, closely to modera fractured, slightly weathered, very hard (formation)	•	
							40		Boring terminated at 41 feet		
				:			45				
								1			
Data Sta	rtad.	<u> </u>	lonus	an, 9	2001		50		Water Level: 7		
Date Sta Date Cor			Janua Janua	R	2001 2001			·	_ Water Level: ♀ Not Encountered		
Logged E	Зу:		K. Gr	onset		3			Drill Rig: MOBILE B-53		
Total De Work Ord			41 fee		-		······		Drilling Method: 4" Auger & HQ Coring Driving Energy: 140 lb. wt., 30 in. drop		

				1		_
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS	
HAWAII	HAW.	ER-12(3)	2002	96	107	



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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY

EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE, IMPROVEMENTS AT KAMANI STREET, AND REHABILITATION OF VARIOUS BRIDGES

FEDERAL AID PROJECT NO. ER-12(3) Jan. 2002 Scale: As shown

SHEET NO. 5 OF 10 SHEETS

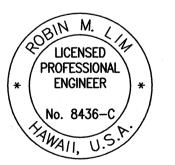
Log of **EMERGENCY REPLACEMENT** GEOLABS, INC. Boring OF PAAUAU STREAM BRIDGE Geotechnical Engineering DISTRICT OF KAU, ISLAND OF HAWAII Approximate Ground Surface Elevation: 782*

Description

ML 4-inch ASPHALT CONCRETE Elevation: 782* Dark gray SANDY SILT with gravel, stiff to very stiff, damp to slightly moist (fill) 17 13 Gray vugular BASALT, slightly fractured, slightly weathered, very hard (basalt formation) 93 | 93 100 55 53 28 Reddish gray vesicular BASALT, severely fractured, moderately weathered, medium hard (clinker) Gray vugular BASALT, moderately fractured, 100 48 slightly weathered, hard (basalt formation) Reddish gray vesicular BASALT, severely fractured, moderately weathered, medium hard 100 53 Gray vugular BASALT, moderately fractured, slightly weathered, very hard (basalt formation) Gray vugular BASALT, closely fractured, slightly weathered, hard (basalt formation) 70 8 Gray vesicular BASALT, closely to severely fractured, slightly weathered, medium hard to hard (clinker) UC=1.6 100 60 ksi Gray vugular BASALT, slightly fractured, slightly weathered, very hard (basalt formation) grades to moderately weathered at 39 feet Boring terminated at 41.5 feet January 4, 2001 Date Started: Water Level: ♀ Date Completed: January 4, 2001 Not Encountered MOBILE B-53 K. Gronseth Drill Rig: Logged By: 41.5 feet 4" Auger & HQ Coring Total Depth: **Drilling Method:** 4628-00 Driving Energy: 140 lb. wt., 30 in. drop Work Order:

				BS, IN Engine			(EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE RICT OF KAU, ISLAND OF HAWAII	Log of Boring
Other Tests	Content (%) Dry Unit	Vveigin (pci) Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic USCS	Approximate Ground Surface Elevation: 782*	
	20	\$ \(\frac{\pi}{\pi} \)	<u> </u>	18	P. (ts	Δ	ML	Description 7-inch ASPHALT CONCRETE Orange-brown SANDY SILT with basalt of very stiff, damp to very damp (fill)	gravel,
	. * · · · · · · · · · · · · · · · · · ·	100 100				5		Gray vugular BASALT, closely fractured, weathered, very hard (basalt formation)	slightly
		100	95			10		Gray vugular BASALT, slightly fractured, weathered, very hard (basalt formation)	slightly
							· · · · · · · · · · · · · · · · · · ·	VOID	
		30	0			15	- ×o - ×o - ×o - ×o - ×o - ×o - ×o	VOID Reddish gray vesicular BASALT, severel fractured, moderately weathered, mediu (clinker)	
		47	0	50/.3'		20	-		
		93	0			25	- X X X X X X X X X X X X X X X X X X X	Gray and brown vugular BASALT, closely fractured, slightly to moderately weather (basalt formation with thin clinker seams	ed, hard
		22	13			30			
						35	· 次 次 · 次		
		100	57	50/.4'		40	→	Gray vugular BASALT, moderately fractuslightly weathered, very hard (basalt form	
						45	<u>-</u>	Boring terminated at 42 feet	
Date Start	,			2001		50)	Water Level: ♀	
Date Com Logged By	y:	K. Gr	onset	2001 th				Not Encountered Drill Rig: MOBILE B-53 Drilling Method: 4" Auger & HO Coring	
Total Dep		42 fe 4628						Drilling Method: 4" Auger & HQ Coring Driving Energy: 140 lb. wt., 30 in. drop	

,	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	HAWAII	HAW.	ER-12(3)	2002	97	107



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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY

EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE, IMPROVEMENTS AT KAMANI STREET, AND REHABILITATION OF VARIOUS BRIDGES FEDERAL AID PROJECT NO. ER-12(3)

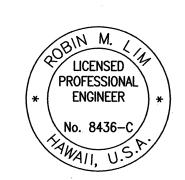
Scale: As shown

Jan. 2002 SHEET NO. 6 OF 10 SHEETS

			techi	nical	BS, IN Engine		1			EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE TRICT OF KAU, ISLAND OF HAWAII 9
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	nscs	Approximate Ground Surface Elevation: 781*
0	<u>≥ŏ</u>	≥۵	<u>0 %</u>	Ä	<u> </u>	9 1	ă	ις III		Description A-inch ASPHALT CONCRETE
	16				14				ML	Dark gray to orange-brown SANDY SILT with basalt gravel, stiff, damp to slightly moist (fill)
	33		100	66	50/.4'		5	■		Gray vugular BASALT, moderately fractured, slightly weathered, very hard (basalt formation)
	,		100	73			10	リカラカラカラカ		
							15	ーノハーノハーン		
UC=2.3 ksi			96	70				× × × × × × × × × × × × × × × × × × ×		Reddish brown vesicular BASALT FRAGMENTS severely fractured, moderately weathered, medium hard (clinker) Gray vugular BASALT, massive, slightly
			80	60			20	ハーハーハー		weathered, very hard (basalt formation) grades to slightly to moderately fractured
	,		90	28			25	× × × × × × × × × × × × × × × × × × ×		Reddish brown vesicular BASALT FRAGMENTS severely fractured, moderately weathered, medium hard (clinker)
			CO	40			30	-\(\frac{1}{2}\)-\(\frac{1}\)-\(\frac{1}{2}\)-\(\frac{1}{2}\)-\(\frac{1}{2}\)-\(\frac{1}{2}\)-\(\frac{1}{2}\)-		Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (basalt formation with thin clinker seams)
			60	10		·		× × × × × × × × × × × × × × × × × × ×		Reddish brown vesicular BASALT, closely fractured, moderately weathered, medium hard (clinker)
			91	8			35	×0×		Gray vugular BASALT, closely fractured, slightly weathered, hard (basalt formation) Gray and brown vesicular BASALT, closely to
				·			40	× × × × × × × × × × × × × × × × × × ×	:	severely fractured, moderately weathered, medium hard (clinker) grades to moderately fractured, hard Boring terminated at 41 feet
				\$						
							45			
							<u>50</u> -			
Date Star Date Con			Janua Janua		······		· ·			Water Level: ♀ Not Encountered
Logged E	y:		K. Gro	onseth						Drill Rig: MOBILE B-53
Total Dep	oth:		41 fee	et	,					Drilling Method: 4" Auger & HQ Coring

GEOLABS, INC. Geotechnical Engineering									OF PAAUAU STREAM BRIDGE						
**	ـِــــــ	$\overline{}$								IST	RICT OF KAU, ISLAND OF HAWAII 10	U			
Other Tests		ment (%	Dry Unit Weight (pcf	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	SS	Approximate Ground Surface Elevation: 781*				
O t	So.	5	We	Core	RO	Res (blo	Poc (tsf)	Dep	San	nscs	Description				
										SP	4-inch ASPHALT CONCRETE	destrumbinado la			
	7					35					Gray mottled orange GRAVELLY SILTY BASA	LT			
				75	35					· · · · · · · · · · · · · · · · · · ·	SAND, dense, damp to very damp (fill)				
									- ;;		Gray vugular BASALT, closely to moderately fractured, slightly weathered, very hard (basalt				
								5	- (> <u>-</u>		formation)				
				00	20						grades to moderately fractured				
				60	28										
				·	· '			10							
								. •							
				70	10										
					·				× × ×		Reddish brown vesicular BASALT FRAGMENT	S.			
							·	15	- ×°		severely fractured, moderately weathered,	-,			
·								15	×°×	,	medium hard (clinker)				
	-			80	48				_ x° x						
							•		1 77		Gray vugular BASALT, slightly fractured, slightly	У			
			į						- (2)		weathered, hard to very hard (basalt formation				
								20	- , , , ,						
				70	30				××		Brownish gray with red vesicular BASALT, clos	ely			
				70	30				×°x ×°x		fractured, moderately weathered, medium hard	1			
					,				× ^ \		(clinker)				
								25	-12		Brown and gray vugular BASALT, closely to moderately fractured, slightly weathered, hard				
					-			î.			(basalt formation with thin clinker seams)				
Ų.				90	53										
		ľ						30	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		Gray vugular BASALT, slightly fractured, slightl				
					-			00	- 1		weathered, hard to very hard (basalt formation				
				60	38							•			
									×o×		Brown and gray vugular BASALT, closely to				
								0.5	×°×°		severely fractured, slightly weathered, medium				
								35	~ × ¢ × °× - × °×		hard to hard (clinker)				
				40	13				- x° x ×						
					-				- × × × × ×						
						·			- x x x						
								40	- × × × × × × × × × × × × × × × × × × ×						
									- x × d		Paring terminated at 11 E fact				
]		Boring terminated at 41.5 feet				
								45							
				i .											
									-						
								50	1	r					
Date Sta						2001					Water Level: The state of th				
<u>Date Cor</u> ₋ogged E		ete			ary 6, onsetl	2001 h					Not Encountered Drill Rig: MOBILE B-53	***************************************			
rotal Dep			····	41.5 f		• •					Drilling Method: 4" Auger & HQ Coring				
Nork Ord				1628-	00						Driving Energy: 140 lb. wt., 30 in. drop				

							ı
,	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS	
	HAWAII	HAW.	ER-12(3)	2002	98	107	



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY

EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE,
IMPROVEMENTS AT KAMANI STREET, AND
REHABILITATION OF VARIOUS BRIDGES
FEDERAL AID PROJECT NO. ER-12(3)
Ile: As shown Jan. 2002

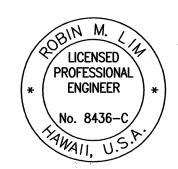
Scale: As shown

SHEET NO. 7 OF 10 SHEETS

											Log of
					BS, IN					EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE	Boring
	1				Engine	ering		T	DIST	RICT OF KAU, ISLAND OF HAWAII	11
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen (tsf)	Depth (feet)	Sample Graphic	nscs	Approximate Ground Surface Elevation: 789* Description	·
			20	0			5	**************************************	-ML-	Brown GRAVELLY SILT, loose, damp (file) Gray BASALT FRAGMENTS, severely from slightly weathered, medium hard (clinker)	actured,
		,	100		50/.2'		10	***バルバルバーバーバーバーバーバーバーバーバーバーバーバーバーバーバーバーバ		Gray vugular BASALT, slightly to modera fractured, slightly weathered, hard to ver (basalt formation)	
			100			-	15	× × × × × × × × × × × × × × × × × × ×		VOID Grayish red vesicular BASALT, moderate fractured, slightly to moderately weather medium hard (clinker)	ed,
							20	介分次次之	`	Gray vugular BASALT, slightly to moderal fractured, slightly weathered, hard (basa formation) grades to very hard Boring terminated at 21 feet	
							25				- -
							30-				-
				·	•		35		·		-
							40		·		- - -
·							45				
								1			1
Date Sta	rted:		Febru	ary 6	6, 2001		50-			Water Level: ♀	
Date Cor	nplet	ed:	Febru	ary 6	, 2001					Not Encountered Drill Rig: MOBILE B-53	
Logged E Total De			K. Great							Drill Rig: MOBILE B-53 Drilling Method: 4" Auger & HQ Coring	
	der:		4628-							Driving Energy: 140 lb. wt., 30 in. drop	

					BS, IN Engine				EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE RICT OF KAU, ISLAND OF HAWAII Log of Boring 12	
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: 804*
	<u>နိပိ</u>	민 교	Se S	RC	ag ag	Po (tst	De	Sa		Description
	4 1	04		,	24				ML	1.5-inch ASPHALT CONCRETE
	14	84	·		34	·		M	,	Brown mottled black and orange GRAVELLY SILT, very stiff, damp (fill)
	2		,		10			- × × ×	GP-	Gray-brown SILTY BASALT GRAVEL with sand
								×°×	GM	loose, damp (clinker)
	13	114	400	70	30/.1'	3	5	×°×		
			100							Gray vesicular BASALT, slightly fractured, slightly
			83	20				上位		weathered, hard (basalt formation)
								1 2	` `	Crovery and ar DACALT alightly to moderately
							10	一次		Gray vugular BASALT, slightly to moderately fractured, slightly weathered, hard to very hard
										(basalt formation)
			80	68				十分		
							15	×0 ××		Grayish red vesicular BASALT, closely to severely
			,				,	- ×°		fractured with multiple small voids, slightly to
			78	40				×°×		moderately weathered, medium hard (clinker)
			'	10		-		- 2		Crov with rad vacioular DACALT alocaly to
							20			Gray with red vesicular BASALT, closely to moderately fractured with small voids, slightly
							20			weathered, medium hard (basalt formation)
										Boring terminated at 22 feet
			,							
							25			
							20			
								4		
								1	,	-
							20			
							30			
										-
								4		
								4		
							35	j-		
								1		
							40)-		· -
								4		
								-		
			-					-		
							45			
							40	'	·	
										-
								4		
								-		-
Date Sta	rted:		Febru	uarv 7	7, 2001		50) —————————————————————————————————————		Water Level: ♀
Date Cor	nplet	ed:	Febru	uary 7	7, 2001		•.			Not Encountered
Logged E Total Dep			K. Gr 22 fe		th					Drill Rig: MOBILE B-53 Drilling Method: 4" Auger & HQ Coring
Work Ord			4628					······································		Driving Energy: 140 lb. wt., 30 in. drop

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(3)	2002	99	107



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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY

EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE,
IMPROVEMENTS AT KAMANI STREET, AND
REHABILITATION OF VARIOUS BRIDGES

Scale: As shown

FEDERAL AID PROJECT NO. ER-12(3)
shown Jan. 2002 SHEET NO. 8 OF 10 SHEETS

99

Log of Boring GEOLABS, INC. OF PAAUAU STREAM BRIDGE 13 Geotechnical Engineering DISTRICT OF KAU, ISLAND OF HAWAII Approximate Ground Surface Elevation (feet MSL): 793 * Description SM- Brown SILTY SAND with basalt rock fragments, GM | medium dense, dry (fill) 41 15 21 SM Orangish brown SILTY SAND with some basalt gravel, medium dense, damp (volcanic ash) 20/.0' Ref. 79 79 Gray vesicular BASALT, slightly fractured, slightly weathered, hard to very hard (basalt formation) UC=13.0 100 78 grades to vugular, closely to moderately fractured UC=13.2 Reddish gray scoriaceous BASALT, severely to closely fractured, moderately weathered, soft to 82 40 medium hard (clinker)
VOID/CAVITY Gray vugular BASALT, closely fractured, slightly weathered, medium hard (basalt formation) grades to vesicular, severely fractured Boring terminated at 20 feet April 2, 2001 Date Started: Not Encountered Date Completed: April 2, 2001 CONCORE G. Barut Drill Rig:

Logged By:

Total Depth:

Work Order:

20 feet

4628-00

EMERGENCY REPLACEMENT

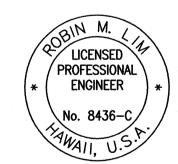
Drilling Method: 4" Auger & NX Coring

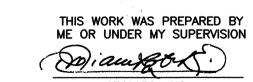
Driving Energy:

140 lb. wt., 30 in. drop

					3S, IN Engine				`u (EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE RICT OF KAU, ISLAND OF HAWAII Log of Boring 14
Other Tests	Moisture Content (%)	G Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)-	Sample Graphic	SOSU	Approximate Ground Surface Elevation (feet MSL): 792 * Description Dark brown SANDY SILT with traces of gravel and roots, medium stiff, damp to moist (alluvium/fill)
UC=3.2 ksi UC=3.3	7		95	80	27 60/.9' Ref. 25/.0' Ref.		5 10	X X X X X X X X X X X X X X X X X X X	ML	Orangish brown SANDY SILT with traces of gravel, stiff, moist (volcanic ash) Gray vugular BASALT, closely to moderately fractured, slightly weathered, hard to very hard (basalt formation)
ksi			100 71	67 35			15			grades to severely fractured grades to closely fractured
			100	83		,	20	- × × × × × × × × × × × × × × × × × × ×		Reddish brown BASALT FRAGMENTS, moderately weathered, soft to medium hard (clinker with small voids) Gray vugular BASALT, slightly fractured, unweathered, very hard (basalt formation) Boring terminated at 21.9 feet
							25			
			:			,	30			
							35			
							40			
						,	45			
Date Star Date Con Logged B	nplet	ed:	April April G. Ba	4, 20			50-			Water Level: Not Encountered Drill Rig: CONCORE
Total Dep			21.9							Drilling Method: 4" Auger & NX Coring

			i,	<u> </u>		
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS	
HAWAII	HAW.	ER-12(3)	2002	100	107	56





STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY

EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE, IMPROVEMENTS AT KAMANI STREET, AND REHABILITATION OF VARIOUS BRIDGES FEDERAL AID PROJECT NO. ER-12(3)

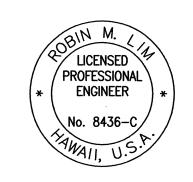
Scale: As shown

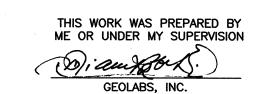
Jan. 2002

SHEET NO. 9 OF 10 SHEETS

						3S, IN Engine					EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE TRICT OF KAU, ISLAND OF HAWAII Log of Boring 15
	Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)-	Sample Graphic	nscs	Approximate Ground Surface Elevation (feet MSL): 803 * Description
		27 17	64	94	65	21 21		5		ML SM	basalt rock fragments, loose to medium dense, moist (alluvium) Gray vesicular BASALT, closely fractured, slightly weathered, medium hard (clinker) Dark gray vesicular BASALT, slightly fractured,
	UC=3.0 ksi			100	96	; c		10			unweathered, very hard (basalt formation) small void at 8 feet Dark gray vugular BASALT, slightly fractured, unweathered, very hard (basalt formation)
	UC=1.8 ksi			80 87	6081			15	- \(\) - \(\		Grayish red strongly vesicular BASALT, severely fractured, slightly weathered, hard (clinker)
								20	各次公		Dark gray with some red coloration vugular BASALT, slightly fractured, unweathered, hard to very hard (basalt formation) Boring terminated at 20 feet
			,					25			
								30-			
								35-			
								40			
. 4/13/01								45			
4628-00.GPJ GEOLABS.GDT	Date Sta			March March				50-			Water Level: ♀ Not Encountered
ING LOG DOT	Logged E Total Dep	By: oth:		K. Gro 20 fee	onset et						Drill Rig: CONCORE Drilling Method: 4" Auger & NX Coring
BOR	Work Ord	ler:		4628-	00						Driving Energy: 140 lb. wt., 30 in. drop

FED. ROAD	STATE	FED. AID	FISCAL	SHEET	TOTAL
DIST. NO.		PROJ. NO.	YEAR	NO.	SHEETS
HAWAII	HAW.	ER-12(3)	2002	101	107





STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

BORING LOGS

MAMALAHOA HIGHWAY

EMERGENCY REPLACEMENT OF PAAUAU STREAM BRIDGE,
IMPROVEMENTS AT KAMANI STREET, AND
REHABILITATION OF VARIOUS BRIDGES
FEDERAL AID PROJECT NO. ER-12(3)
Ile: As shown Jan. 2002

Scale: As shown

SHEET NO. 10 OF 10 SHEETS

SURVEY PLOTTE
DRAWN BY
TRACED BY
DESIGNED BY ...
QUANITHES BY
CHECKED BY ...