

Work Order:

8063-00

#### GEOLABS, INC.

Geotechnical Engineering

SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

1

L	Labo	ratory			F	ield							
	Other Tests	Moisture Content (%)	Density f)	Core Recovery (%)	(%)	Penetration Resistance	Pocket Pen. (tsf)	Depth (feet)	le	ic		Approximate Ground Surface Elevation (feet ): 737 *	
	Other	Moistu Conte	Dry D (pcf)	Core Reco	RQD (%)	Penet Resis	Pocke (tsf)	Depth	Sample	Graphic	nscs	Description	
ı												8-inch ASPHALTIC CONCRETE	
		52				14		- - -		°h _	ML	Gray with some brown SILTY GRAVEL (BASALTIC), medium dense, moist (fill) Orangish brown with gray mottling CLAYEY	/ SILT
	LL=43					85	3.5	5 <del>-</del>	\			with some sand (basaltic) and a little decomposed gravel, stiff to very stiff, moi (saprolite)	st -
	PI=10							-				grades with cobble sized basalt corestones	locally =
ţ	TXUU S <sub>u</sub> =1.7 ksf	54	68			41	1.0	10 - - -	X			grades to medium stiff and very moist local	ly - -
	Direct Shear	65	62			17	0.8	- 15 - -	X				- - - -
	Sieve - #200 = 31.2%	32	77	29		51		20 - - - -	X	000000000000000000000000000000000000000	GM	Gray and brown SILTY GRAVEL (BASALTI with some sand, medium dense, moist (weathered basalt)	C)
		44				23		- 25 - -			ML	Brown with gray mottling <b>CLAYEY SILT</b> witl	- -
				33	0			-				some sand (basaltic) and traces of gravel stiff, moist (saprolite)  Brownish gray to gray vesicular BASALT,	
DRING_LOG_8063-00.GPJ_GEOLABS.GDT_12/13/23		39		47	0	15/6" +25/3		30 -				severely fractured, moderately to highly weathered, soft to medium hard (pahoehobasalt)	pe -
GEOI								35-		Ш	ML		
9.GPJ	Date Star	ted.	May	13, 20	21		Water L	6//6	· 7	7 1	Vot F	incountered	
)63-0 )63-0	Date Com						••ator L	_0 v 0		- '	101 L		late
გ   	Logged B	•		atronic			Drill Rig	a:		-	MOB	ILE B-53.1 (Energy Transfer Ratio = 42.9%)	
ᆰ	Total Dep		80.5			-+	Drilling		าดต				. 1.1
┋┠	Work Ord		9063									a set 20 in drop	1.1

Driving Energy:

140 lb. wt., 30 in. drop



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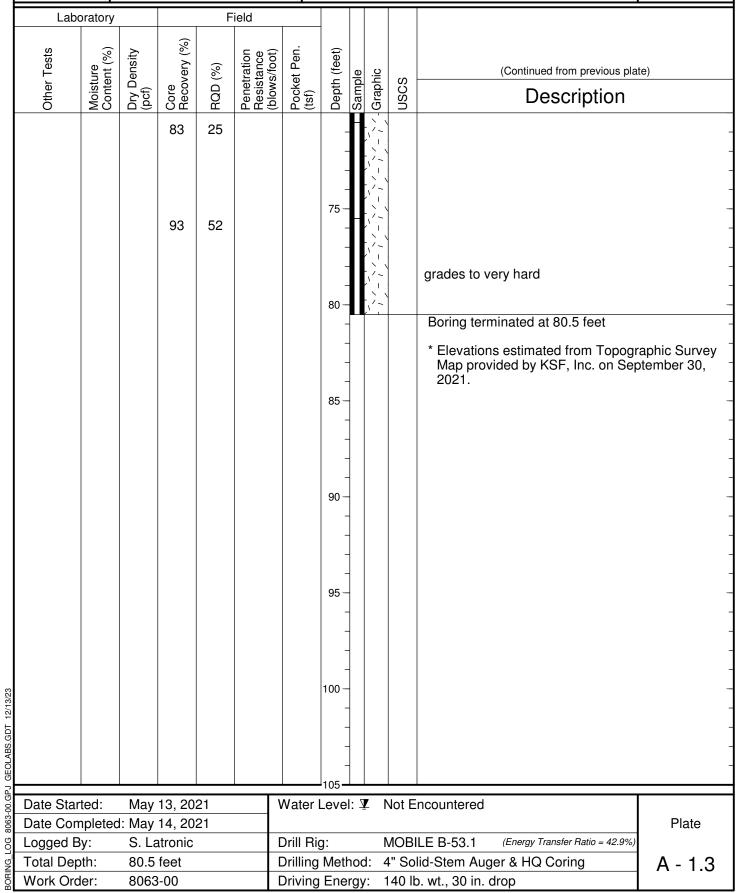
SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

Labo	oratory			F	ield							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	nscs	(Continued from previous pla	te)
	35		14		42		- - - - 40 -			ML	Brown with gray mottling <b>CLAYEY S</b> some sand (basaltic) and traces of moist (saprolite)	ILT with f gravel, hard, - - - -
UC= 660 psi	30		72	10	25/2"		- - -				Brownish gray to gray vesicular <b>BAS</b> fractured, moderately to highly we medium hard (pahoehoe basalt)	
			55	13			45 - - -	-			grades to hard locally	- - - -
			57	0			50 - -	- - -	- \ - \ - \ - \ - \ - \ - \ - \ - \ - \		grades to fland locally  grades with small voids  Brownish gray to gray vugular BASA to severely fractured, moderately with the severely fractured.	
			35	0			55 - -	-		GW	medium hard to hard (a'a basalt)  Brownish gray subangular SANDY ( (BASALTIC) with a little silt and co medium dense, moist (clinker)	RAVEL
			92	10			60 -	-	0.00		Gray vugular <b>BASALT</b> , closely to se fractured, slightly weathered, hard  Brownish gray to gray vesicular <b>BAS</b> moderately to closely fractured, sli moderately weathered, medium ha (pahoehoe basalt)	(a'a basalt)  SALT, ghtly to
UC= 4300 psi  Date Star  Date Com  Logged B  Total Dep			100	50 60			65 - - - - -	-			grades with highly weathered soft zo	ones locally _ - - - -
Date Star	ted:	May	13, 20	21		Water I	Leve	l: <u>Z</u>	<u> </u>	Not E	ncountered	
Date Con	•			21								Plate
Logged B	<u> </u>		tronic			Drill Rig		ha-			LE B-53.1 (Energy Transfer Ratio = 42.9%)	, , ,
Total Dep		80.5 8063				Drilling Driving					lid-Stem Auger & HQ Coring  b. wt., 30 in. drop	A - 1.2
<u> </u>						9		<b>3</b>			,	



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ı	Labo	ratory			F	ield							
		-		(9)								Approximate Ground Surface Elevation (feet ): 737 *	
	ests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	(0	Penetration Resistance (blows/foot)	Pen.	eet)				Elevation (leet ). 737	
	Other Tests	sture	Den )	e tovel	RQD (%)	etra iistai ws/f	Pocket   (tsf)	Depth (feet)	Sample	Graphic	SS		
	<del>[</del>	Roi	Dry (pcf	Cor Rec	RQI	Per Res (blo	Poc (tsf)	Dep	San	Gra	nscs	Description	
										0	GP	9-inch ASPHALTIC CONCRETE	
		18	100			24		-	M	00	GP	Brownish gray <b>GRAVEL (BASALTIC)</b> with some sand, medium dense, moist (fill)	A
		43				8		-				Dark gray <b>GRAVELLY SAND</b> with some silt,	{}
								-	I	W	МН	medium dense to loose, moist (fill)  Brown <b>CLAYEY SILT</b> with some sand, medium	/
	TXUU	55	66			11		5 -	M			stiff, wet (residual soil)	
	$S_u=1.3 \text{ ksf}$							_		$\mathscr{U}$			]
								-					4
								-	-				-
		66				6		10 -				grades with white mottling	Ⅎ
								_					1
								_		W			]
								-					4
	Direct	71	60			13		15 -					-
	Shear			0				-	$\Lambda$				1
								-					]
								_	┨╠	W			4
								20 -	łŀ				$\dashv$
								-	┨┠				- 1
		18				31		-	U			grades with some gravel, hard	1
		10				31		_	N			grades with some graver, hard	]
				0				25 -	┨╠				4
								-	┨┠				-
		0.4				45		-	╽	W			1
		21				45		-	1			Gray with orangish mottling vesicular <b>BASALT</b> ,	
_				43	0			30 -	П	`\'		severely fractured, highly to moderately	]
2/13/2								-	H	,',		weathered, medium hard to hard (basalt formation)	4
SDT 1.								-	╽			,	+
ABS.(				0	0	30/1"		-	$\Pi$	`\			+
BORING_LOG 8063-00.GPJ GEOLABS.GDT 12/13/23								35-		\ <u>'</u>			
0.GPJ	Date Star	ted:	May	4, 202	1	<u> </u>	Water L	eve	l: ∑	<u> </u>	lot E	ncountered	$\dashv$
3-6908	Date Com									_		Plate	
LOG	Logged B			remmii	nger		Drill Rig					LE B-53.1 (Energy Transfer Ratio = 42.9%)	
RING	Total Dep			5 feet			Drilling Driving					lid-Stem Auger & HQ Coring A - 2.	1
8	Work Ord	er:	8063	-00			Driving	⊏ne	ıgy	. 1	4U II	o. wt., 30 in. drop	



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Labo	oratory			F	ield							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	nscs	(Continued from previous plate)  Description	
Sieve - #200 = 52.5%	28		14	0	31					ML	breaks down to a sandy gravel (basalt Brownish gray <b>GRAVELLY SILT</b> with s hard, wet (saprolite)	
	26		26	0	77 45/2"		50 -				Gray vesicular <b>BASALT</b> , severely fractinghly to moderately weathered, mediatric hard (basalt formation)	tured, dium hard to - - -
			7	0	25/1"		55		1-/1-/1-/1-/1-/1-			- - - - -
v GEOLABS.GDT 12/13/23			88 80	64 42	50/4"		65 - - - - - - -				Gray <b>BASALT</b> , severely to moderately moderately weathered, hard (basalt	r fractured, - formation) - - - - -
Date Star	pleted	: May	4, 202 6, 202 remmii	1		Water I		I:	N	/IOBI	ILE B-53.1 (Energy Transfer Ratio = 42.9%)	Plate
Logged B Total Dep Work Ord		102.5 8063	5 feet -00			Drilling Driving					lid-Stem Auger & HQ Coring b. wt., 30 in. drop	A - 2.2



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SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

Labo	oratory			F	ield							╗
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	nscs	(Continued from previous plate)  Description	
UC= 1230 psi			100	62 85			- - - 75 - - -				grades to closely to slightly fractured	
			62 52	22			80 - - - 85				grades to severely to closely fractured	
			70	33			90			GM	Reddish brown <b>SANDY GRAVEL (BASALTIC)</b> , dense, wet (clinker)  Gray <b>BASALT</b> , severely to moderately fractured,	
UC= 9080 psi			62	22			95 - - - 100 -				highly to moderately weathered, medium hard to hard (basalt formation)	C
Date Star Date Com Logged B Total Dep Work Ord							- - 105		/_		Boring terminated at 102.5 feet	-
Date Star			4, 202			Water I	eve	l: Ş	Z <b>N</b>	lot E	ncountered	
Date Com						Drill Rig	۸.		N	<b>/</b> ∩D!	LE B-53.1 (Energy Transfer Ratio = 42.9%)	
Logged B Total Dep Work Ord	th:		remmir 5 feet -00	iger		Drilling Driving	Meth		d: 4	" So	lid-Stem Auger & HQ Coring b. wt., 30 in. drop  A - 2.3	



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SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

Labo	ratory				eld						
Labo	паюту				eiu						Approximate Ground Surface
<u>s</u>	(°)	≥	(%)		⊑ o <del>⊊</del>	<u>.</u>	ĵ£)				Elevation (feet ): 758 *
Tes	re nt (9	ensi	ery	(%)	ratic anc s/foc	t Pe	(fee	Ф	<u>ن</u>		
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	nscs	Description
			01				_				8-inch ASPHALTIC CONCRETE
							-			GM MH	Gray and brown SILTY GRAVEL (BASALTIC),
	46				57		-		W		medium dense, moist (fill)  Dark brown <b>CLAYEY SILT</b> with a little gravel
							_		$\mathcal{H}$	MH	(basaltic), hard, moist (fill)
							5-		$\mathcal{U}$		Orangish brown with gray mottling CLAYEY SILT
	37	74			41	2.0	_	M	W		with some sand (basaltic) and a little decomposed gravel, very stiff, moist (saprolite)
							_	H	W		decomposed graver, very sun, moist (supreme)
							_		W		
							_				
LL=77	29	80			35	3.0	10 -				grades with gravel
PI=27	29	00			33	3.0	-	M	<b>//</b>		grades with gravel
TXUU							-		<b>//</b>		
S <sub>u</sub> =2.1 ksf Sieve							-		W		
- #200 =							-	1	W		
9.0% TXUU	67	56			13	0.8	15 –		W		grades to medium stiff and very moist locally
S <sub>u</sub> =2.2 ksf							-	$\Delta$	W		, ,
							-		W		
							-		W		
							20		<b>//</b>		
Direct	68	57			31	2.5	20 -	M	W		grades with a little sand, very stiff
Shear Sieve			43				_	H	W		
- #200 =							_		W		
93.9%							_		W		
							25 -		W		-
LL=60	83				20		-		<b>//</b>		
PI=12	00				20		-		<b>//</b>		grades to reddish brown locally
			36				-	H	W		g. 2230 to rodaton brown todaily
							-		W		
3/23							30 –	1	W		-
12/1	43				7		-	V	W		grades to medium stiff
105:							-		W		
LABS			0				-		$/\!\!/$		
Date Star Date Com Logged B Total Dep Work Ord							35-		W		
Date Star	ted:	May	12, 20	21	T	Water L	eve	: <b>V</b>		Not F	ncountered
Date Com									1	.o. L	Plate
Logged B	•		atronic		<del>-  </del>	Drill Rig	<b>j</b> :		N	ИОВІ	LE B-53.1 (Energy Transfer Ratio = 42.9%)
Total Dep		91 fe				Drilling		nod			lid-Stem Auger & HQ Coring A - 3.1
Work Ord	er:	8063	3-00		ı	Driving	Ene	rgy:	: 1	40 lk	o. wt., 30 in. drop



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SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

Laho	oratory			F	ield							
Labo	latory				leiu							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	nscs	(Continued from previous plate)  Description	
	64		0	ш.	23			Ĭ		MH	grades to very stiff	
	40		14		52		- 40 - -				grades to brownish gray, hard	
	72		42	0	16		- - 45 –			ML	Gray vugular <b>BASALT</b> , closely to severely fractured, slightly to moderately weathered, medium hard to hard (a'a basalt)  Brownish gray <b>CLAYEY SILT</b> with some sand	
			72	28			- -				(basaltic), very stiff, moist (saprolite)  Gray vesicular <b>BASALT</b> , moderately fractured,	
UC= 600 psi			92	12			50 - -	-	/ - / / - /		slightly to moderately weathered, medium har to hard (pahoehoe basalt)	d
			93	37			- 55 - -	-	-////		Brownish gray vesicular <b>BASALT</b> , closely to severely fractured, highly weathered, soft (pahoehoe basalt)  Gray vugular <b>BASALT</b> , closely fractured, slightly to moderately weathered, medium hard to hai (a'a basalt)	
							-			ML	Brownish gray <b>SANDY SILT</b> with some decomposed gravel, stiff, moist (saprolite) Brownish gray vesicular <b>BASALT</b> , moderately	
UC= 3040 psi			88	35			60 -				fractured, slightly to moderately weathered, medium hard to hard (pahoehoe basalt)	
			57	23			65 - - - -				grades with severely fractured, highly weathere soft zones locally	·d
<u> </u>							70		\'			
Date Star			12, 20 13, 20			Water I	Leve	l: <u>Z</u>	<u> </u>	Not E	ncountered	
Logged B	•		atronic			Drill Rig	g:		N	ИОВІ	LE B-53.1 (Energy Transfer Ratio = 42.9%)	
Total Dep		91 fe				Drilling					lid-Stem Auger & HQ Coring A - 3.	2
Work Ord	ler:	8063	-00			Driving	Ene	rgy	/:    1	40 lk	o. wt., 30 in. drop	



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SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

Ì	Labo	ratory			F	ield							
	Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	nscs	(Continued from previous plate)  Description	
	0	∑O.	a)	72 75 72	28 42 33	g R 3)	(t)	75		5 / / - / / / / - 8 - 8 / / - / / - 8 - 8	GM	Gray vugular BASALT, moderately fracture slightly weathered, hard to very hard (a'a Grayish brown SILTY GRAVEL (BASALTI medium dense, moist (clinker)  Gray vugular BASALT, moderately fracture slightly weathered, very hard (a'a basalt medium dense, moist (clinker)  Gray vugular BASALT, moderately fracture medium dense, moist (clinker)  Gray vugular BASALT, moderately fracture slightly weathered, very hard (a'a basalt grades to vesicular locally	a basalt) -  C), -  ed, -  C), -  ed, -  ed, -
								90 <del>-</del>		( - ( ) - (		Boring terminated at 91 feet	-
3.GDT 12/13/23								- - 95 - - - - 100 - -					- - - - - -
J GEOLAB								- 105 <b>-</b>					_
8063-00.GP.	Date Start			12, 20 13, 20		\	Water I		l: <u>Z</u>	<u> </u>	Not E	ncountered	Plate
BORING_LOG 8063-00.GPJ GEOLABS.GDT 12/13/23	Logged B Total Dep Work Ord	th:	S. La 91 fe 8063				Orill Rig Orilling Oriving	Meth		d: 4	" So	LE B-53.1 (Energy Transfer Ratio = 42.9%) lid-Stem Auger & HQ Coring b. wt., 30 in. drop	- 3.3



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SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

Labo	ratory			F	ield							
			(9)								Approximate Ground Surface	
ests	(%)	sity	у (%		tion Sot)	Pen.	eet)				Elevation (feet ): 758 *	
Other Tests	sture tent	Den )	e over	RQD (%)	etra istar ws/fe	ket F	Depth (feet)	ple	Graphic	S		
Ö	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQI	Penetration Resistance (blows/foot)	Pocket (tsf)	Dep	Sample	Gra	nscs	Description	
							_		000	GM	4-inch ASPHALTIC CONCRETE	
										MH	Gray and brown <b>SILTY GRAVEL (BASALTIC)</b> , medium dense, moist (fill)	
	25				15				$\mathcal{U}$		Dark brown <b>CLAYEY SILT</b> with a little gravel	/_
							-	1			(basaltic), stiff to very stiff, moist (fill)	-
LL=176	76	48			26	1.8	5-			МН	Brown with orange mottling <b>CLAYEY SILT</b> with	1 -
PI=91	70	10			20	1.0	-	X			some sand (basaltic) and traces of decompo	sed -
							-	1			gravel, stiff, moist (saprolite)	-
							-	1	$\mathcal{M}$			-
							10		W			-
TXUU	69	56			11	0.8	10 -	M	$\mathcal{W}$		grades to medium stiff and very moist locally	
$S_u=1.3 \text{ ksf}$							-	$\vdash$			grades to mediam can and very moleculedary	_
							-	-				-
							-	-	$\mathcal{M}$			_
LL=32	40				46		15-		44	ML	Brown with orange mottling CLAYEY SILT with	<u> </u>
PI=NP							-	$\perp$			some sand and decomposed cobble coresto	nes -
							-				locally, hard, very moist	-
							-	1				-
							20 -					
Direct Shear	46	83			50/5"			X			grades with gravel	_
Sileai			8				-	П				-
							-	Н				-
							-	Н				_
							25 -	Н				-
Sieve	39				58		-	H	°po	GM	Brown with orange mottling SILTY GRAVEL wi	
- #200 = 41.4%							-	1			some sand, very dense to dense, very moist (basalt formation)	-
71.770			25								(basait ioimation)	
,   ,,							30 -		00			_
2/1/3/2	0.6				04			Ц	000			-
<u>-</u>	36				31		-	-\				-
4 B S . C			0	0			-	H				-
E C				-			-					-
Date Star Date Com Logged B Total Dep Work Ord	tod:	Mari	10.00	01	<u> </u>	\\/oto::!	35-	. 7	Ψ P	lot C	nacuntared	
Date Star			10, 20			Water I	_eve	1. Y	ַ וֹ	NOI E	ncountered Plate	,
Logged B	•		atronic	<u>- I</u>		Drill Rig	1:		N	MORI	LE B-53.1 (Energy Transfer Ratio = 42.9%)	<i>'</i>
Total Dep		76 fe				Drilling		hoc			id-Stem Auger & HQ Coring A - 4	1
Work Ord		8063				 Driving					o. wt., 30 in. drop	• •



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	Labo	ratory			F	ield						
	Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	nscs	(Continued from previous plate)  Description
	0	20		OH	Щ	шш		Ш.		°b b	GM	grades to highly weathered basalt
		15		57 52	7	50/2"		- - - 40 -		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	GM	Brownish gray vesicular BASALT, severely fractured, moderately to highly weathered, soft to medium hard (pahoehoe basalt)  Gray dense BASALT, moderately fractured, slightly to moderately weathered, hard to very hard (a'a basalt)  Brownish gray SILTY GRAVEL (BASALTIC),
								- - - 45 -				medium dense, moist (clinker) Grayish brown vesicular BASALT, severely fractured, moderately to highly weathered, soft to medium hard (pahoehoe basalt) Brownish gray vugular BASALT, closely
	JC= 20 psi	29		76	33	50/2"		- -		- \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		fractured, slightly to moderately weathered, medium hard to hard (a'a basalt)  Grayish brown vesicular BASALT, moderately fractured, moderately to highly weathered, medium hard (pahoehoe basalt)
				95	20			50 - - -	-			Gray vugular <b>BASALT</b> , moderately fractured, slightly weathered, hard (a'a basalt)
				95	50			55 - - -	-		ML	Reddish brown with gray mottling <b>SANDY SILT</b> with a little gravel (basaltic), stiff, moist (saprolite)
	JC= 30 psi			95	58			- - 60 - - -	-			Gray vugular <b>BASALT</b> , moderately fractured, slightly weathered, hard (a'a basalt)  Brownish gray vesicular <b>BASALT</b> , moderately fractured, slightly to moderately weathered, medium hard to hard (pahoehoe basalt)
BOHNG LOG 8063-00.GPJ GEOLABS.GDT 12/13/23  DO TO  MO  MO TO  MO  MO TO  MO  MO TO  MO				57	35			65 - - -				grades to dense
OLABS								-				VOID
<u> </u>								70-		\'.		
Da Da	ate Stari ate Com			10, 20		\	Water I	_eve	l: \\\\	<u> </u>	Not E	ncountered Plate
E Lo	gged B	•		tronic	<u>_ 1</u>		Drill Rig	g:		N	ИОВІ	LE B-53.1 (Energy Transfer Ratio = 42.9%)
To	tal Dep	th:	76 fe	et		ı	Orilling	Metl		d: 4	l" So	lid-Stem Auger & HQ Coring A - 4.2
<u> </u>	ork Ord	er:	8063	-00			Driving	Ene	rgy	/: 1	40 lk	o. wt., 30 in. drop



Geotechnical Engineering

SEISMIC RETROFIT OF KAHOLO BRIDGE HAWAII BELT ROAD, PROJECT NO. BR-019-2(072) DISTRICT OF HAMAKUA, ISLAND OF HAWAII Log of Boring

