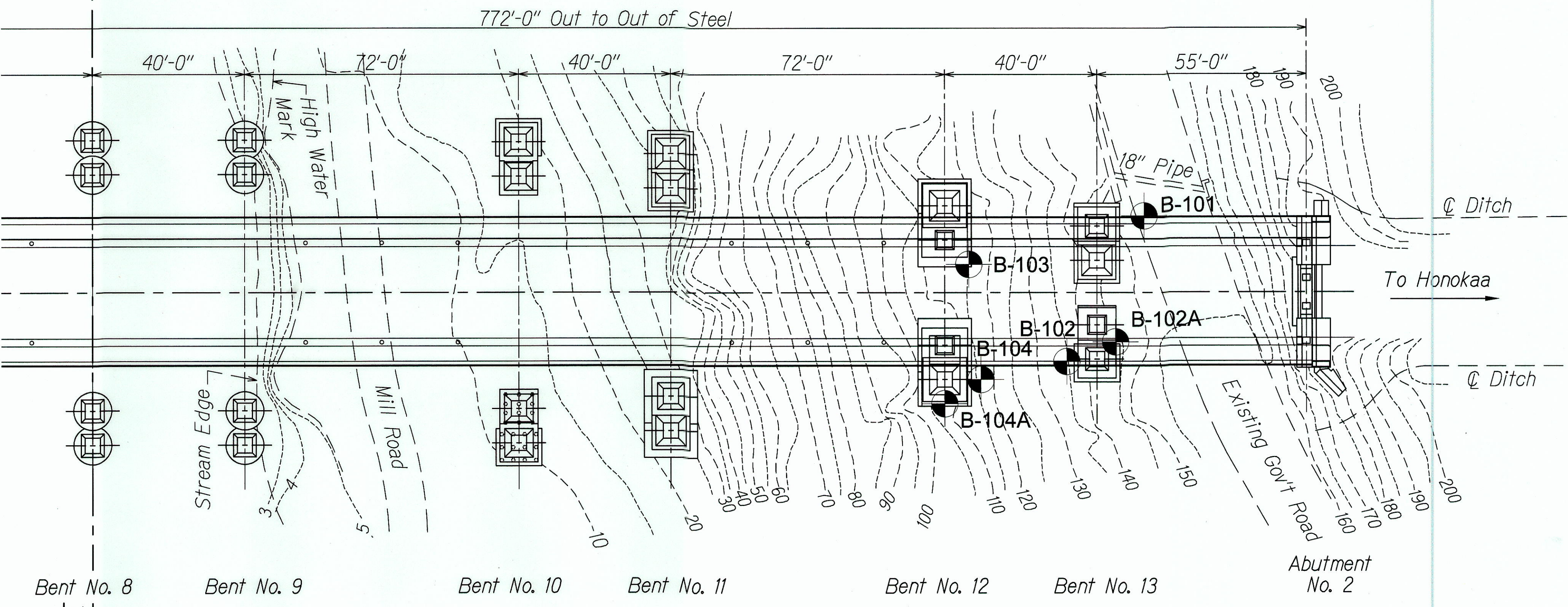
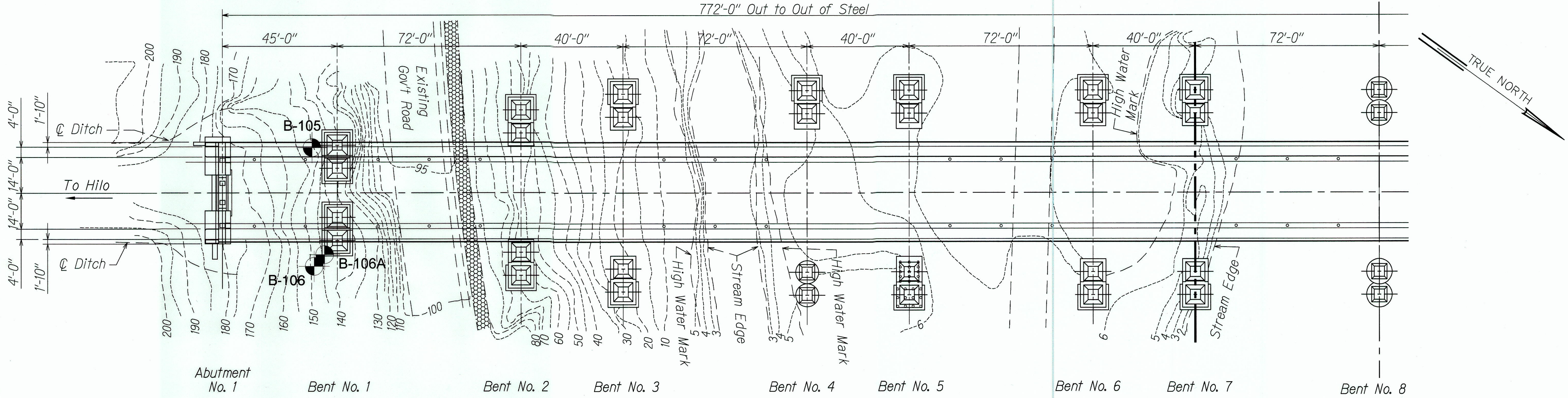


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	18	26



**LEGEND:**

Approximate Boring Location

0 20 40 60 80 Ft.  
Graphic Scale

**LEGEND FOR AS-BUILT POSTINGS**

Squiggly line for as-built deletion

Double line for as-built deletion

Roadway Text for as-built posting

- GENERAL NOTES:**
1. Location of micropiles as shown as approved Schnabel Foundation Company shop drawing sheet-4 with 32 each vertical micropile and 8 each battered or diagonal micropiles.
  2. Nine (9) vertical micropiles relocated to avoid existing obstructions. Diameter of piles not changed. Depth of piles adjusted to go deeper for integrity.

ROBIN M. LIM  
LICENSED PROFESSIONAL ENGINEER  
No. 8436-C  
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

4-30-10  
SIGNATURE EXPIRATION DATE OF THE LICENSE  
GEOLABS, INC.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**SITE PLAN**

HAWAII BELT ROAD  
SEISMIC RETROFIT OF VARIOUS BRIDGES  
Vicinity Of Papaikou, Phase 2  
Federal-aid Project No. Br-019-2(58)  
Scale: AS NOTED Date: Mar. 2007

SHEET No. G1.1 OF 9 SHEETS

DATE: \_\_\_\_\_

SURVEY PLOTTED BY: \_\_\_\_\_

ORIGINAL PLAN: \_\_\_\_\_

DESIGNED BY: \_\_\_\_\_

NOTE BOOK: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_

No. \_\_\_\_\_



Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS		TYPICAL DESCRIPTIONS			
COARSE-GRAINED SOILS	GRAVELS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES			
		LESS THAN 5% FINES		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES			
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES			
		MORE THAN 12% FINES		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES			
	SANDS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES			
		LESS THAN 5% FINES		SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES			
		SANDS WITH FINES		SM	SILTY SANDS, SAND-SILT MIXTURES			
		MORE THAN 12% FINES		SC	CLAYEY SANDS, SAND-CLAY MIXTURES			
FINE-GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY			
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS			
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY			
	50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
					CH	INORGANIC CLAYS OF HIGH PLASTICITY		
					OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
				HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

- 2-inch O.d. Standard Penetration Test
- 3-inch O.d. Modified California Sample
- Shelby Tube Sample
- Grab Sample
- Core Sample
- Liquid Limit
- Plasticity Index
- Torvane Shear (tsf)
- Pocket Penetrometer (tsf)
- Unconfined Compression (psi)
- Water Level Observed In Boring

GEOTECHNICAL NOTES

1. A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Seismic Retrofit of Various Bridges, Hakalau Bridge, Project No. BR-019-2 (58), District of Hilo, Island of Hawaii" dated October 31, 2006 as been prepared by Geolabs, Inc. A copy of the report is on file at the office of the Engineer for review by the Contractor.
2. For boring locations, see Sheet G1.1.
3. The information presented in the logs of borings depict the subsurface conditions encountered at that specified location and at the time of the field exploration only. Variations of subsoil conditions from those depicted in the logs of borings may occur between and beyond the borings.
4. The penetration resistance shown on the logs of borings indicate the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.
5. The data given is for general information only. Bidders shall examine the site and the boring data and draw their own conclusions therefrom as to the character of materials to be encountered. The Engineer will not assume responsibility for variations of subsoil quality or conditions other than at the boring locations shown and at the time the borings were taken.

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE \_\_\_\_\_ EXPIRATION DATE OF THE LICENSE 4-30-10

GEOLABS, INC.


STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**LOGS LEGEND & NOTES**

HAWAII BELT ROAD  
SEISMIC RETROFIT OF VARIOUS BRIDGES  
Vicinity Of Papaikou, Phase 2  
Federal-aid Project No. Br-019-2(58)  
Scale: NONE Date: Mar. 2007

SHEET No. G1.2 OF 9 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	20	26

		GEOLABS, INC.					SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII					Log of Boring 101
Geotechnical Engineering												
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 160 *		
										Description		
					29				GM	CONCRETE		
	37	76			11					Grayish brown SILTY BASALTIC GRAVEL AND COBBLES, loose to medium dense, damp (fill) grades to loose, moist		
	38				6		5		SM	Reddish brown SILTY BASALTIC AND CORALLINE SAND with traces of basaltic gravel, loose, moist (fill)		
	24				16				SM	grades to moist to very moist		
	17	85			15		10			Grayish brown SILTY BASALTIC SAND with traces of basaltic gravel, loose, moist (cinder)		
	8				19					Gray vesicular BASALT, highly weathered, soft, breaks down to silty sand and gravel		
	14	103			19					grades with some moderately weathered seams		
	13				29		15					
	12				15/.0' Ref.				SM	Grayish brown SILTY BASALTIC SAND with some gravel, loose, moist (cinder)		
	21				8					grades with multi-colored mottling		
	24				22		20			Gray vesicular BASALT, moderately to highly weathered, soft, breaks down to gravel and sand grades to soft to medium hard		
	11	95	80	44	54/.5' Ref.					Grayish brown vesicular BASALT, closely to moderately fractured, moderately weathered, medium hard (basalt formation)		
	26				50/.4' Ref.		25			grades to closely fractured with some highly weathered seams		
			94	73			30			Yellowish red and gray BASALT FRAGMENTS, moderately to extremely weathered, soft to medium hard (clinker)		
			60	18			35					
	63				35/.5' +15/.1' Ref.					Grayish brown vesicular BASALT, closely fractured, moderately weathered, medium hard (basalt formation)		
							40			grades with some moderately to highly weathered seams		
	19		100	92	15/.1' Ref.		45			grades to slightly to moderately weathered		
										Grayish brown vesicular BASALT, closely to moderately fractured, moderately to highly weathered, soft (basalt formation)		
			68	38			50			grades with some reddish gray, highly to extremely weathered seams		
										Gray vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)		
					15/.0' Ref.		55			Reddish brown and gray BASALTIC FRAGMENTS, moderately weathered, soft to medium hard (clinker)		
			100	92			60					
Date Started: March 20, 2001										Water Level: $\nabla$ Not Encountered		
Date Completed: March 22, 2001												
Logged By: E. Shinsato										Drill Rig: MOBILE B-53		
Total Depth: 97 feet										Drilling Method: 4" Auger, 4" casing & HQ Coring		
Work Order: 3819-10										Driving Energy: 140 lb. wt., 30 in. drop		

GEOLABS, INC. Geotechnical Engineering							SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII				Log of Boring 101	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	(Continued from previous plate)	
											Description	
			73	65							Gray vesicular BASALT, slightly fractured to massive, slightly weathered, hard (basalt formation)	
							65				grades to massive	
			55	33	15/.0'	Ref.					Reddish gray vesicular BASALT, severely fractured, moderately to highly weathered, medium hard (basalt formation)	
							70				Gray vesicular BASALT, closely fractured, slightly weathered, hard (basalt formation)	
	25		33	11							grades to reddish gray	
							75				Grayish brown with yellow and orange mottling BASALT, severely to closely fractured, moderately weathered, medium hard (basalt formation)	
	42		93	36	32		80				Grayish brown and red BASALT, severely fractured, moderately to highly weathered, soft to medium hard (basalt formation)	
	23										Gray vesicular BASALT, severely to closely fractured, moderately weathered, medium hard, interbedded with highly weathered basalt, soft (basalt formation)	
			100	36	71.5'	+30/.3'	85					
			100	73							Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (basalt formation)	
			100	82			90					
							95				Reddish gray vugular BASALT, moderately to slightly fractured, moderately weathered, medium hard to hard (basalt formation)	
											Boring terminated at 97 feet	
							100				* Elevations estimated from The Deck and Elevation Plan prepared by KSF, Inc. on August 12, 1999.	
							105					
							110					
							115					
							120					
Date Started: March 20, 2001											Water Level: $\nabla$ Not Encountered	
Date Completed: March 22, 2001												
Logged By: E. Shinsato											Drill Rig: MOBILE B-53	
Total Depth: 97 feet											Drilling Method: 4" Auger, 4" casing & HQ Coring	
Work Order: 3819-10											Driving Energy: 140 lb. wt., 30 in. drop	

SURVEY PLOTTED BY _____ DATE _____	
DRAWN BY _____	
CHECKED BY _____	
NOTED BY _____	
QUANTITIES BY _____	
CHECKED BY _____	
No. _____	

ROBIN M. LIM  
LICENSED PROFESSIONAL ENGINEER  
No. 8436-C  
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE: *[Signature]* EXPIRATION DATE OF THE LICENSE: 4-30-10  
GEOLABS, INC.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION



**BORING LOGS**



HAWAII BELT ROAD  
SEISMIC RETROFIT OF VARIOUS BRIDGES  
Vicinity Of Papaikou, Phase 2  
Federal-aid Project No. Br-019-2(58)  
Scale: NONE Date: Mar. 2007

SHEET No. 613 OF 9 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	21	26

		GEO LABS, INC. Geotechnical Engineering						SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII					Log of Boring 102
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)		USCS	Approximate Ground Surface Elevation (feet MSL): 134 *			
										Description			
	32	66			8				SM	Brown SILTY BASALTIC SAND with traces of highly weathered basaltic gravel and roots. very loose, damp (fill)			
	38	71			8					grades to dark brown, with traces of grass fragments			
	24		21	17	50/.2' Ref.		5		SC	BOULDER			
										Brown with white and yellow mottling CLAYEY BASALTIC SAND, loose			
	51				6		10						
	23		10	0	10		15			Brown vesicular BASALT, extremely weathered, soft (saprolite)			
	53				10				SM	Brown with multi-colored mottling SILTY BASALTIC SAND with traces of moderately weathered basaltic gravel, loose			
	27		35	0	30/.2' Ref.		20			grades to dense			
	67				67		25		SM	Brownish gray vesicular BASALT, slightly fractured, moderately weathered, medium hard (basalt formation)			
			79	43						Orangish brown with multi-colored mottling SILTY BASALTIC SAND, loose to medium dense (saprolite)			
			37	25	25/.0' Ref.		30			Gray vugular BASALT, severely to closely fractured, moderately to slightly weathered, medium hard, with extremely to highly weathered zones (basalt formation)			
	43		94	84	50/.3' Ref.		35			Gray vugular BASALT, closely to moderately fractured, slightly weathered, hard (basalt formation)			
			48	35			40						
	35				40		45			Brownish gray vesicular BASALT, severely fractured, moderately weathered, medium hard (basalt formation)			
			83	38						grades to grayish brown with white mottling, highly weathered, soft			
			75	48			50			Brownish gray vugular BASALT, severely to closely fractured, slightly to moderately weathered, medium hard to hard (basalt formation)			
			83	70	1-/.0' Ref.		55			grades to gray, slightly weathered, hard			
			37	7			60						
Date Started: April 2, 2001								Water Level: $\nabla$ Not Encountered					
Date Completed: April 2, 2001													
Logged By: E. Shinsato								Drill Rig: CONCORE					
Total Depth: 64 feet								Drilling Method: 4" Auger, 3" casing & NX Coring					
Work Order: 3819-10								Driving Energy: 140 lb. wt. 30 in. drop					

		GEO LABS, INC.							SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII					Log of Boring 102	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	(Continued from previous plate)				
											Description				
											Grayish brown BASALT FRAGMENTS, moderately weathered, medium hard (clinker)				
							65				Boring terminated at 64 feet				
							70								
							75								
							80								
							85								
							90								
							95								
							100								
							105								
							110								
							115								
							120								
Date Started: April 2, 2001								Water Level: $\nabla$ Not Encountered							
Date Completed: April 2, 2001															
Logged By: E. Shinsato								Drill Rig: CONCORE							
Total Depth: 64 feet								Drilling Method: 4" Auger, 3" casing & NX Coring							
Work Order: 3819-10								Driving Energy: 140 lb. wt. 30 in. drop							

SURVEY PLOTTED BY _____	DATE _____
DRAWN BY _____	
TRACED BY _____	
NOTED BY _____	
CHECKED BY _____	
ORIGINAL PLAN	
NOTE BOOK	
No. _____	

ROBIN M. LIM  
LICENSED PROFESSIONAL ENGINEER  
No. 8436-C  
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE \_\_\_\_\_ EXPIRATION DATE OF THE LICENSE 4-30-10  
GEO LABS, INC.


STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION


**BORING LOGS**

HAWAII BELT ROAD  
SEISMIC RETROFIT OF VARIOUS BRIDGES  
Vicinity Of Papaikou, Phase 2  
Federal-aid Project No. Br-019-2(58)  
Scale: NONE Date: Mar. 2007

SHEET No. 61.4 OF 9 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	22	26

		GEOLABS, INC.						SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII						Log of Boring	
		Geotechnical Engineering												103	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 109 *					
										Description					
	32	66			16				SM	Reddish brown with orange mottling SILTY SAND with some gravel, loose, moist (fill)					
	46				9										
	39				12				SM	Grayish brown with yellow mottling SILTY SAND with some gravel, loose, moist (saprolite)					
	52	66			25		5								
	35				32					Gray BASALT, highly weathered, soft, breaks down to silty sand with some gravel					
	19	100			60/.3' Ref.					grades to reddish gray					
	25		57	48	23		10			Gray vesicular BASALT, closely fractured, slightly weathered, medium hard to hard (basalt formation)					
										grades to severely to closely fractured					
			42	8	10/.0' Ref.		15			Grayish brown vesicular BASALT, severely fractured, moderately weathered, soft to medium hard (basalt formation)					
	40		46	24	50/.3' Ref.		20			Gray vesicular BASALT, closely fractured, moderately weathered, medium hard (basalt formation)					
									CL	Grayish brown with multi-colored mottling SANDY CLAY with some gravel, medium stiff (saprolite)					
	43		33	0	38		25			Brownish gray vesicular BASALT, severely fractured, moderately to highly weathered, soft to medium hard (basalt formation)					
			54	29	14		30			Gray vugular BASALT, severely to closely fractured, moderately weathered, medium hard (basalt formation)					
	23		38	27	37		35			grades to soft to medium hard grades to vesicular basalt					
			69	42	30/.1' Ref.		40			Gray vesicular BASALT, closely to moderately fractured, slightly weathered, hard (basalt formation)					
			100	83	10/.0' Ref.		45			grades to severely fractured, moderately weathered grades to closely to moderately fractured, slightly weathered					
							50			Boring terminated at 49.5 feet					
							55								
							60								
Date Started: March 28, 2001									Water Level: $\nabla$ Not Encountered						
Date Completed: March 29, 2001															
Logged By: E. Shinsato									Drill Rig: CONCORE						
Total Depth: 49.5 feet									Drilling Method: 4" Auger, 3" casing & NX Coring						
Work Order: 3819-10									Driving Energy: 140 lb. wt., 30 in. drop						

		GEOLABS, INC.		SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII										Log of Boring	
Geotechnical Engineering														104	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 107.5 *					
										Description					
	37	53			5				ML	Brown SANDY SILT with some basaltic gravel, very soft, damp (fill)					
	39				4					grades to moist					
	53	56			3/.5' +20/.3' Ref.		5			CONCRETE					
			77	11					ML	Brown SANDY SILT, stiff, moist					
										Gray vesicular BASALT, severely to closely fractured, moderately weathered, medium hard (basalt formation)					
			33	7			10								
										grades to vugular, slightly weathered with some moderately weathered seams, medium hard to hard					
	22		60	33	40/.3' Ref.		15			Gray vugular BASALT, severely to closely fractured, slightly weathered with moderately weathered seams, medium hard to hard (basalt formation)					
			56	32	10/.0' Ref.		20			Grayish brown with white mottling BASALT, highly to extremely weathered, breaks down to silty sand (saprolite)					
										Gray vugular BASALT, closely fractured, slightly weathered, medium hard to hard (basalt formation)					
	58		90	59	50/.3' Ref.		25			grades to severely fractured, slightly weathered					
										Grayish brown BASALT, severely fractured, highly weathered, soft to medium hard (basalt formation)					
										Grayish brown vugular BASALT, closely to moderately fractured, slightly weathered, medium hard to hard (basalt formation)					
			81	67			35			grades to gray, moderately to slightly fractured, hard					
			84	56	50/.4' Ref.		40			Gray vesicular BASALT, closely fractured, slightly to moderately weathered, hard (basalt formation)					
										grades to grayish brown, severely to closely fractured, moderately weathered, medium hard					
										Boring terminated at 41 feet					
							50								
							55								
							60								
Date Started: March 23, 2001										Water Level: $\nabla$ Not Encountered					
Date Completed: March 27, 2001															
Logged By: E. Shinsato										Drill Rig: CONCORE					
Total Depth: 41 feet										Drilling Method: 4" Auger, 3" casing & NQ Coring					
Work Order: 3819-10										Driving Energy: 140 lb. wt., 30 in. drop					

SURVEY PLANNED BY	DATE
DRAWN BY	
TRACED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	

ORIGINAL PLAN	No.
NOTE BOOK	

ROBIN M. LIM  
LICENSED PROFESSIONAL ENGINEER  
No. 8436-C  
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

*Robinson Lim*  
SIGNATURE












4-30-10  
EXPIRATION DATE OF THE LICENSE


GEOLABS, INC.

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
<b>BORING LOGS</b>
HAWAII BELT ROAD SEISMIC RETROFIT OF VARIOUS BRIDGES Vicinity Of Papaikou, Phase 2 Federal-aid Project No. Br-019-2(58) Scale: NONE Date: Mar. 2007
SHEET No. 61.5 OF 9 SHEETS

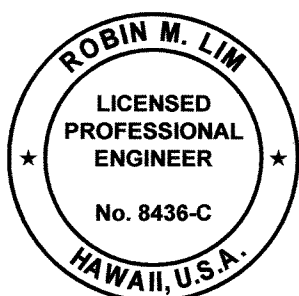


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	23	26

		GEOLABS, INC. Geotechnical Engineering						SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII					Log of Boring 105
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 139.5 *			
										Description			
	34	70			8				SM	Brown SILTY BASALTIC SAND with some roots, very loose, moist (fill)			
	41	69			11				SP	Brownish gray with white mottling SAND with some gravel, loose, moist (saprolite)			
	32				12					grades to grayish brown			
	24	66			11		5		GW				
	45	64			9				GM	Grayish brown SILTY BASALTIC GRAVEL AND SAND, loose, moist to very moist (clinker)			
	25	94			20					grades to yellow and grayish brown, loose to medium dense, very moist			
	22		62	52	30/.0' Ref.		10			grades to very dense			
										Gray BASALT, severely to closely fractured, slightly weathered, hard (basalt formation)			
				85	52	10/.0' Ref.		15		grades to closely to moderately fractured with severely fractured seams			
				83	65			20		grades to moderately fractured			
		60				24/.5' +50/.3' Ref.		25			grades to yellowish gray, severely fractured, moderately to slightly weathered, medium hard to hard		
			31	0							Reddish gray BASALT FRAGMENTS, moderately to highly weathered, soft to medium hard (clinker)		
						20/.0' Ref.		30			Gray BASALT, severely fractured, slightly weathered, medium hard to hard (basalt formation)		
			54	23							Reddish gray BASALT FRAGMENTS (clinker)		
						15/.0' Ref.		35			Gray BASALT, severely to closely fractured, moderately weathered, medium hard to hard (basalt formation)		
			100	90						Gray BASALT, closely to moderately fractured, slightly weathered, hard (basalt formation)			
			88	73			40			grades to moderately fractured, with closely fractured seams			
			50	27			45			Brownish gray BASALT FRAGMENTS, moderately weathered, soft to medium hard (clinker)			
			52	48	20/.0' Ref.		50			Gray vugular BASALT, closely fractured, slightly weathered, hard (basalt formation)			
										grades to severely fractured			
							55			Boring terminated at 54.5 feet			
							60						
Date Started: April 4, 2001									Water Level: $\nabla$ Not Encountered				
Date Completed: April 9, 2001													
Logged By: E. Shinsato									Drill Rig: CONCORE				
Total Depth: 54.5 feet									Drilling Method: 4" Auger, 3" casing & NQ Coring				
Work Order: 3819-10									Driving Energy: 140 lb. wt., 30 in. drop				

		GEOLABS, INC. Geotechnical Engineering						SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII					Log of Boring 106
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 139.5 *			
										Description			
	45	57			4				SM	Brown SILTY BASALTIC SAND with some moderately to highly weathered basaltic gravel, very loose, very moist (fill)			
	34				13					grades to reddish brown, loose			
	27	74			9					grades to brown			
	34				10		5						
	26	86			10					grades to very loose			
	38				5								
	38		50	25	20/.0' Ref.		10		SM	CONCRETE			
										Grayish brown SILTY SAND with some gravel, loose, moist (saprolite)			
			80	47			15			Gray BASALT, severely fractured, slightly weathered, hard (basalt formation)			
										grades to severely to closely fractured			
			100	100			20			Gray BASALT, moderately to slightly fractured, slightly weathered, hard (basalt formation)			
			92	88			25			grades to closely to moderately fractured			
			1	0			30			Reddish gray BASALT FRAGMENTS, moderately weathered, medium hard (clinker)			
	42				33		35			Brownish gray with purple and yellow mottling BASALT, severely fractured, moderately to highly weathered, soft, breaks down to sand, gravel and silt (basalt formation)			
			21	0									
	30		30	0	50/.3' Ref.		40						
			89	49	50/.3' Ref.		45			Gray BASALT, severely to closely fractured, slightly weathered, hard (basalt formation)			
							50			Reddish brown BASALT FRAGMENTS, moderately weathered, medium hard (clinker)			
										Boring terminated at 50 feet			
							55						
							60						
Date Started: April 9, 2001									Water Level: $\nabla$ Not Encountered				
Date Completed: April 12, 2001													
Logged By: E. Shinsato									Drill Rig: CONCORE				
Total Depth: 50 feet									Drilling Method: 4" Auger, 3" casing & NQ Coring				
Work Order: 3819-10									Driving Energy: 140 lb. wt., 30 in. drop				

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





THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION

SIGNATURE *[Signature]* 4-30-10  
EXPIRATION DATE OF THE LICENSE  
GEOLABS, INC.

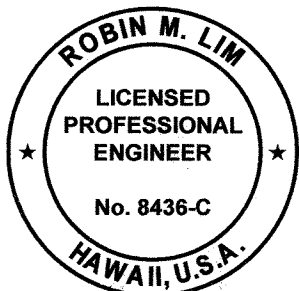
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
<b>BORING LOGS</b>
HAWAII BELT ROAD SEISMIC RETROFIT OF VARIOUS BRIDGES Vicinity Of Papaikou, Phase 2 Federal-aid Project No. Br-019-2(58) Scale: NONE Date: Mar. 2007
SHEET No. 61.6 OF 9 SHEETS


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	24	26

		GEOLABS, INC. Geotechnical Engineering		SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII										Log of Boring 102A	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 142.5 *					
										Description					
			100						SM	Brown SILTY SAND AND GRAVEL (fill)					
							5			CONCRETE					
	44		0		8 12		10		SC	Grayish brown with white mottling CLAYEY SAND with some gravel, loose, very moist (saprolite)					
			37	30	40/.3' Ref.		15			Brownish gray vesicular BASALT, severely to closely fractured, moderately weathered, medium hard (basalt formation)					
			45	18	15/.0' Ref.		20								
	34				60		25			Reddish brown and gray BASALT, extremely weathered, soft (saprolite)					
							30			Boring terminated at 27.5 feet					
							35								
							40								
							45								
							50								
							55								
							60								
Date Started: April 18, 2001										Water Level: $\nabla$ Not Encountered					
Date Completed: April 18, 2001															
Logged By: E. Shinsato										Drill Rig: CONCORE					
Total Depth: 27.5 feet										Drilling Method: 4" Auger, 4" HQ casing & NX Coring					
Work Order: 3819-10										Driving Energy: 140 lb. wt., 30 in. drop					

		GEOLABS, INC. Geotechnical Engineering		SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII										Log of Boring 104A	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 105.5 *					
										Description					
			100							CONCRETE					
							5								
	76 53		98	82	8 50/.3' Ref.		10		SC	Grayish brown CLAYEY SAND with some gravel, loose, very moist (saprolite)					
							15			Gray vugular BASALT, closely to moderately fractured, slightly weathered, hard (basalt formation)					
							20			Boring terminated at 16 feet					
							25								
							30								
							35								
							40								
							45								
							50								
							55								
							60								
Date Started: April 17, 2001										Water Level: $\nabla$ Not Encountered					
Date Completed: April 17, 2001															
Logged By: E. Shinsato										Drill Rig: CONCORE					
Total Depth: 16 feet										Drilling Method: 4" Auger, 4" casing & NX Coring					
Work Order: 3819-10										Driving Energy: 140 lb. wt., 30 in. drop					

ORIGINAL PLAN	DATE	SURVEY PLOTTED BY	DRAWN BY	CHECKED BY	DATE
NOTE BOOK	DATE	SURVEY PLOTTED BY	DRAWN BY	CHECKED BY	DATE




THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION  
  
SIGNATURE EXPIRATION DATE OF THE LICENSE  
GEOLABS, INC. 4-30-10

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>BORING LOGS</b>	
HAWAII BELT ROAD SEISMIC RETROFIT OF VARIOUS BRIDGES Vicinity Of Papaikou, Phase 2 Federal-aid Project No. Br-019-2(58) Scale: NONE Date: Mar. 2007	
SHEET No. 617 OF 9 SHEETS	

21/09/2008 4:44 PM \\HAWAII\SEISMIC RETROFIT\08-20-08\HAWAII\G102.dwg, 5/20/2008 1:55:11 PM, C:\WIN\PT10\VELLUM\HWY5802.dwg


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	25	26

		GEOLABS, INC. Geotechnical Engineering		SEISMIC RETROFIT OF VARIOUS BRIDGES HAKALAU BRIDGE, PROJECT NO. BR-019-2 (43) DISTRICT OF HILO, ISLAND OF HAWAII				Log of Boring 106A		
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 139.5 *
			100		93				SM	Brown SILTY SAND (fill)
							5			
							10			CONCRETE
							13.0			started probing from 13.0 feet
							14.0			Boring terminated at 14 feet
							15			
							20			
							25			
							30			
							35			
							40			
							45			
							50			
							55			
							60			
Date Started:							Water Level: $\nabla$ Not Encountered			
Date Completed:										
Logged By:							Drill Rig: CONCORE			
Total Depth: 14 feet							Drilling Method: 4" Auger, 4" casing & NX Coring			
Work Order: 3819-10							Driving Energy: 140 lb. wt., 30 in. drop			

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

ROBIN M. LIM  
LICENSED PROFESSIONAL ENGINEER  
No. 8436-C  
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

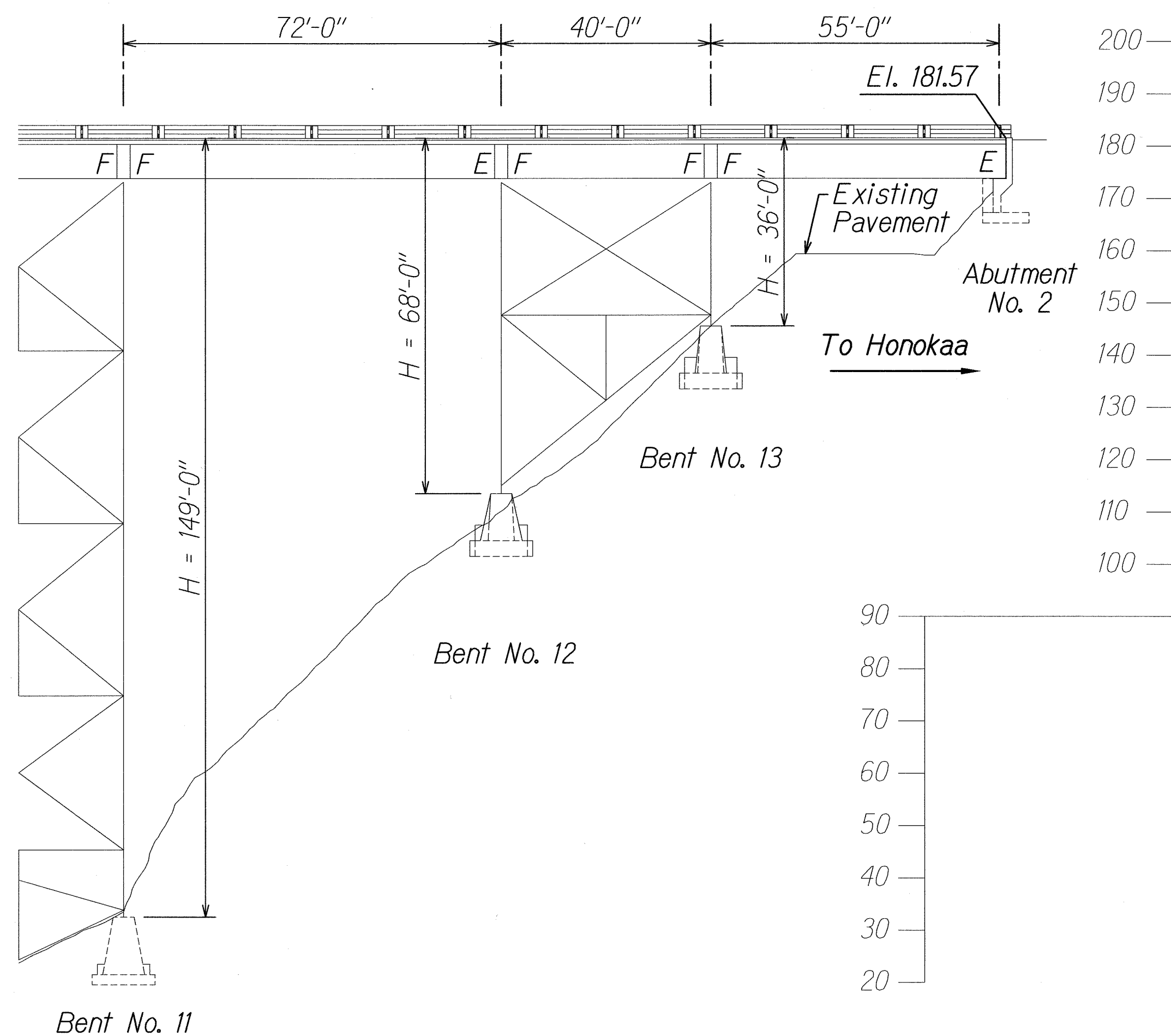
  
SIGNATURE

4-30-10  
EXPIRATION DATE OF THE LICENSE  
GEOLABS, INC.

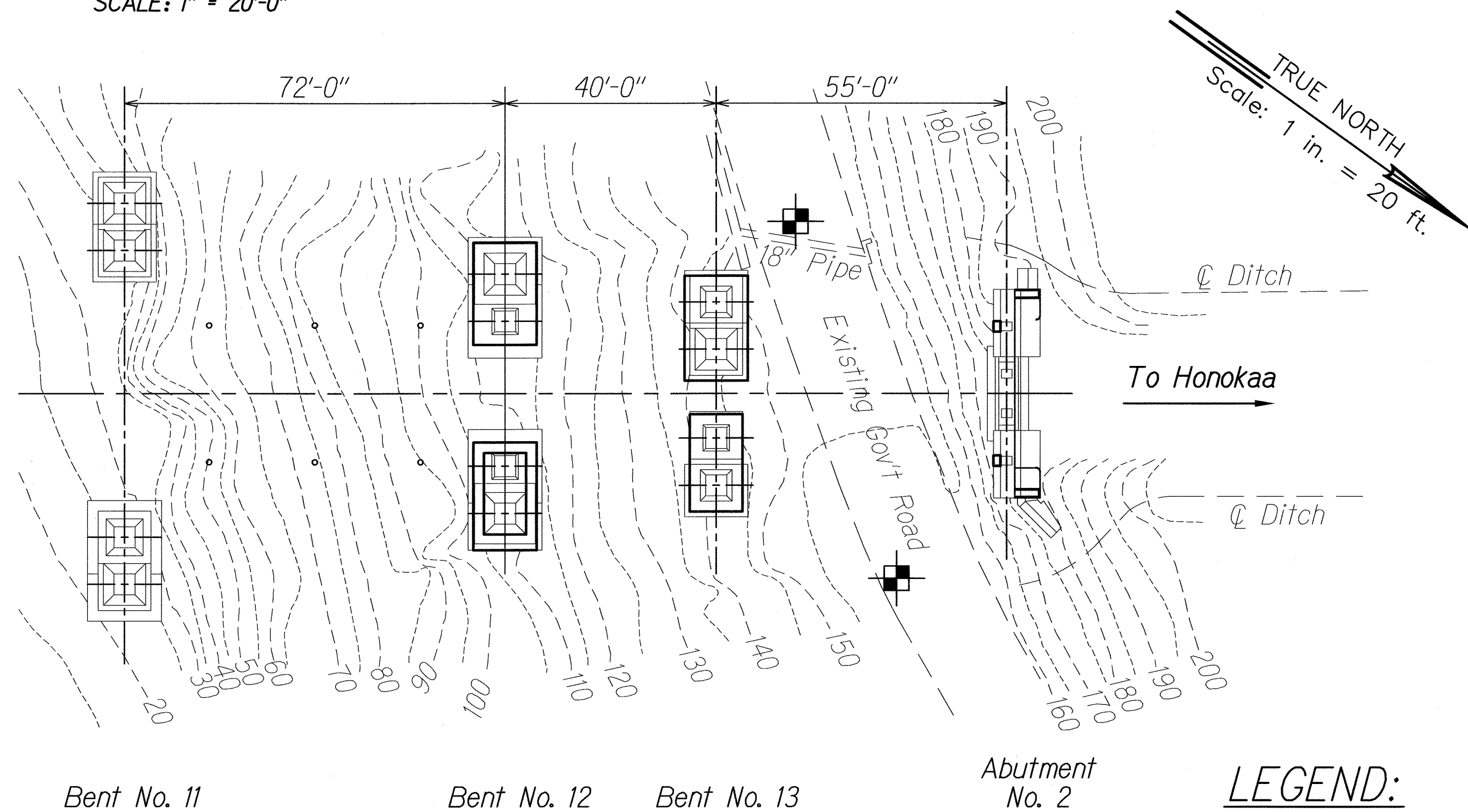
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>BORING LOG</u>	
HAWAII BELT ROAD SEISMIC RETROFIT OF VARIOUS BRIDGES Vicinity Of Papaikou, Phase 2 Federal-aid Project No. Br-019-2(58) Scale: NONE Date: Mar. 2007	
SHEET No. G1.8 OF 9 SHEETS	



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(58)	2008	26	26



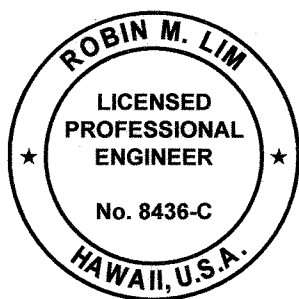
**PRE-PRODUCTION PILE LOCATION ELEVATION**  
SCALE: 1" = 20'-0"



**PRE-PRODUCTION PILE LOCATION PLAN**  
SCALE: 1" = 20'-0"

**NOTES:**

- Pressure grout pipe.
- Centering devices (centralizers) shall be fabricated from plastic or material non-detrimental to the reinforcing steel.
- Micropiles shall be defined as small diameter high capacity drilled and grouted piles. Each pile shall consist of permanent steel casing (unbonded zone), inner steel reinforcement (central reinforcing bar), centralizers, and neat cement grout that is tremied into the drilled holes as the steel drill casing is withdrawn and/or injected during post grouting.
- The micropiles shall be of Type A or Type B classifications as defined in FHWA-SA-97-070 (June 2000).
- Contractor shall provide a micropile system capable of achieving an ultimate load capacity for tension and compression of at least 120 kips per pile. See Specifications for test methods.
- Permanent steel casing shall conform to the physical properties of ASTM A-252, grade 3, except the minimum yield strength shall be 80 ksi.
- Steel casings shall have a minimum outside diameter of 5 1/2 inches and a minimum wall thickness of 0.415". Casings shall have machined flush jointed threads. Casing shall be hot-dipped galvanized.
- The central reinforcing bar shall be grade 150 conforming to ASTM A722 and be galvanized per ASTM A153. Lap splices shall not be allowed for the central bar.
- Grout shall consist of neat cement with a fluid consistency, water cement ratio of 0.45 to 0.50, and a minimum unconfined compressive strength (from cubes) of 4000 psi at 28 days. Grout shall be produced by using only high-speed, high-shear mixers.
- Centralizers shall be placed at spacings not exceeding 10 feet. In addition, the centralizer directly above the bond zone shall be located within 5 feet of the top of the bond zone, and the lower centralizer shall be located not more than one foot above the bottom of the central reinforcing bar.
- Before the installation of the production micropiles, at least two (2) pre-production piles shall be installed using the equipment and methods proposed by the contractor. Perform load test on the pre-production piles. See specifications for load test requirements.
- Perform proof test of all production micropiles. (See specifications for proof test requirements.)



THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION  
  
SIGNATURE  
EXPIRATION DATE OF THE LICENSE  
GEO LABS, INC.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**PRE-PRODUCTION PILE  
LOCATION PLAN AND NOTES**  
HAWAII BELT ROAD  
SEISMIC RETROFIT OF VARIOUS BRIDGES  
Vicinity Of Papaikou, Phase 2  
Federal-aid Project No. Br-019-2(58)  
Scale: AS NOTED  
Date: Mar. 2007

4-30-10  
SHEET No. 619 OF 9 SHEETS