FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0270(18)	2006	8	31

GEOLABS, INC.
Geotechnical Engineering

SEISMIC RETROFIT OF AKONI PULE HIGHWAY
WALAOHIA BRIDGE AND AAMAKAO BRIDGE
NORTH KOHALA, ISLAND OF HAWAII

Log of Boring 1

Approximate Ground Surface Elevation (feet MSL): 441.90 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
							0	CH	Dark brown SILTY CLAY with some gravel and cobbles, medium stiff, moist (fill)
	28	69			15/.3' Ref.	0.5			
			61						Gray with orange and brown mottling BASALTIC BOULDERS AND COBBLES in a brown clayey silt matrix, very dense (fill)
	3				34		5		
			67						
			50		20/.0' Ref.		10		
			60		10/.0' Ref.		15		
								MH	Dark reddish brown with multi-color mottling CLAYEY SILT, medium stiff, moist to very moist (saprolite)
			28				20		
	63				14		25		
			67						
	43				45		30		
			21						
	64				10		35		
			14			2.5			
									grades to gray with yellow and brown mottling, stiff to very stiff
	66				12		40		
									grades to brown and gray with yellow mottling
			71						
	71				14		45		
			93	71					Gray with yellow and brown mottling vesicular BASALT, slightly fractured, moderately weathered (weathered basalt formation)
							50		

Date Started:	November 5, 2002	Water Level:	Not Encountered
Date Completed:	November 7, 2002		
Logged By:	Y. Chiba	Drill Rig:	MOBILE B-53
Total Depth:	65 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	4959-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
Geotechnical Engineering

SEISMIC RETROFIT OF AKONI PULE HIGHWAY
WALAOHIA BRIDGE AND AAMAKAO BRIDGE
NORTH KOHALA, ISLAND OF HAWAII

Log of Boring 1

(Continued from previous plate)

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
			100	33	15/.0' Ref.		50		grades to closely to moderately fractured, moderately to highly weathered, hard to medium hard
			67	23	20/.0' Ref.		55		
									Gray with yellow and brown mottling vesicular BASALT, closely fractured, highly weathered, soft (weathered basalt formation)
	56				49	3.5	60		grades to extremely weathered, breaks down to silty clay with sand, very stiff
			90	90					Gray with yellow mottling vesicular BASALT, slightly fractured, moderately to slightly weathered, hard (basalt formation)
					10/.0' Ref.		65		Boring terminated at 65 feet
							70–100		* Elevations estimated from Elevation Plan provided by Sato & Associates, Inc. on August 20, 2002.

Date Started:	November 5, 2002	Water Level:	Not Encountered
Date Completed:	November 7, 2002		
Logged By:	Y. Chiba	Drill Rig:	MOBILE B-53
Total Depth:	65 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	4959-00	Driving Energy:	140 lb. wt., 30 in. drop

Note:

For Boring Locations See Sheet 13.

JASON Y. KAGE, LICENSED PROFESSIONAL ENGINEER No. 9930-C, HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/08
EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS – 1

WALAOHIA & AAMAKAO BRIDGES

AKONI PULE HIGHWAY, SEISMIC RETROFIT OF WALAOHIA AND AAMAKAO BRIDGES
FAIP No. BR-0270(18)
Date: May 2006

SHEET No. 1 OF 3 SHEETS

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

PROJ. NO.: 02022-00

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0270(18)	2006	9	31

GEOLABS, INC. — Geotechnical Engineering

SEISMIC RETROFIT OF AKONI PULE HIGHWAY
WALAOHIA BRIDGE AND AAMAKAO BRIDGE
NORTH KOHALA, ISLAND OF HAWAII

Log of Boring 2

Approximate Ground Surface Elevation (feet MSL): 441.80 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)
	41	73			14	
	46				6	
					12	
	28				30/.3' Ref.	
			100			
			67			
			10			
	47				25	
			48			
	47				26	
			50	38		
			58	0		
	56				27	
			100			
	69				19	
			52	14		

Depth (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

USCS	Description
CH	Tannish brown with multi-color mottling SILTY CLAY with some gravel and root/rootlets, very stiff, moist (fill)
MH	Yellowish tan with multi-color mottling CLAYEY SILT with highly weathered gravel, very stiff, damp (fill)
	Yellowish tan highly weathered BASALTIC BOULDERS AND COBBLES in a clayey silt matrix, very dense (fill)
	Gray dense BASALTIC BOULDERS AND COBBLES in a clayey silt matrix (fill)
GC	Grayish brown with multi-color mottling CLAYEY GRAVEL AND SAND, medium dense, very moist (saprolite)
	Gray vesicular BASALT, slightly fractured, moderately weathered, hard (basalt formation)
	Brown with multi-color mottling BASALT, highly to extremely weathered, medium hard (saprolite)
	grades to extremely weathered, friable, breaks down to silty friable sand, medium dense

Date Started:	November 5, 2002	Water Level:	Not Encountered
Date Completed:	November 5, 2002		
Logged By:	Y. Chiba	Drill Rig:	MOBILE B-53
Total Depth:	66 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	4959-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC. — Geotechnical Engineering

SEISMIC RETROFIT OF AKONI PULE HIGHWAY
WALAOHIA BRIDGE AND AAMAKAO BRIDGE
NORTH KOHALA, ISLAND OF HAWAII

Log of Boring 2

(Continued from previous plate)

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)
			60	22	15/.0' Ref.	
	50				65	
			95	55		
			90	52	15/.0' Ref.	

Depth (feet): 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

USCS	Description
	Gray with brown and black mottling vesicular to dense BASALT, closely fractured, highly to moderately weathered, hard to medium hard (basalt formation)
SM	Brown and gray with multi-color mottling SILTY SAND AND GRAVEL, dense, very moist (saprolite)
	Gray with white and brown mottling vesicular to dense BASALT, closely fractured, highly to moderately weathered, hard to medium hard (basalt formation)
	Boring terminated at 66 feet

Date Started:	November 5, 2002	Water Level:	Not Encountered
Date Completed:	November 5, 2002		
Logged By:	Y. Chiba	Drill Rig:	MOBILE B-53
Total Depth:	66 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	4959-00	Driving Energy:	140 lb. wt., 30 in. drop

Note:

For Boring Locations See Sheet 13.

JASON Y. KAGE — LICENSED PROFESSIONAL ENGINEER No. 9930-C — HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/08

EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS - 2

WALAOHIA & AAMAKAO BRIDGES

AKONI PULE HIGHWAY, SEISMIC RETROFIT OF WALAOHIA AND AAMAKAO BRIDGES

FAIP No. BR-0270(18)

Scale: NONE — Date: May 2006

SHEET No. 2 OF 3 SHEETS

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

FILE: XREF: R:\AkoniPuleHwy\SHT.dwg PROJ. NO.: 02022-00

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0270(18)	2006	10	31

GEOLABS, INC.
Geotechnical Engineering

SEISMIC RETROFIT OF AKONI PULE HIGHWAY
WALAOHIA BRIDGE AND AAMAKAO BRIDGE
NORTH KOHALA, ISLAND OF HAWAII

Log of Boring 3

Approximate Ground Surface Elevation (feet MSL): 394 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	22	74			37	>4.5				MH	Brown with orange mottling CLAYEY SILT with sand, cobbles and root/rootlets, hard, damp (colluvium)
	36				9	1.5					grades to tannish brown with organics
	52	62			36	>4.5	5			MH	Dark gray with yellow and brown mottling CLAYEY SILT with root/rootlets, very hard, damp (saprolite)
					38		10				Reddish brown with black and dark brown mottling vesicular BASALT, highly to extremely weathered, friable, breaks down to clayey silt, stiff (weathered basalt formation)
			35	30	10/.0' Ref.		15				Gray vesicular BASALT, closely fractured, moderately weathered, hard (basalt formation) CLINKER
			70	63			20				grades with orange and white mottling vesicular, closely to moderately fractured, moderately weathered, hard
			100	100			25				grades with white mottling, slightly fractured, moderately to slightly weathered
											Boring terminated at 27 feet
							30				
							35				
							40				
							45				
							50				

Date Started:	November 6, 2002	Water Level: ▽	Not Encountered
Date Completed:	November 7, 2002		
Logged By:	Y. Chiba	Drill Rig:	CONCORE
Total Depth:	27 feet	Drilling Method:	4" Auger & NX Coring
Work Order:	4959-00	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG DOT 4959-00 2002 GEOLABS.GDT 6/5/08

Boring Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS: MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	GRAVELS: MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS: LESS THAN 5% FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES: MORE THAN 12% FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS: 50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	CLEAN SANDS: LESS THAN 5% FINES	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES: MORE THAN 12% FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS: 50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS: LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS: LIQUID LIMIT 50 OR MORE		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

	2-INCH O.D. STANDARD PENETRATION TEST	LL	LIQUID LIMIT
	3-INCH O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX
S	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)
G	GRAB SAMPLE	PEN	POCKET PENETROMETER (tsf)
	CORE SAMPLE	UC	UNCONFINED COMPRESSION (psi)
		▽	WATER LEVEL OBSERVED IN BORING

GEOTECHNICAL NOTES

1. A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Seismic Retrofit of Akoni Pule Highway, Walaohia Bridge and Aamakao Bridge, North Kohala, Island of Hawaii" dated October 2003 has been prepared by Geolabs, Inc. A copy of the report is on file at the office of the Engineer for review by the Contractor.

2. For boring locations, see Sheet 13 .

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.

Note:

For Boring Locations See Sheet 13.

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

FILE: \AKONIPULEHWY\BORINGLOGS.DNG
XREF: \AKONIPULEHWY\BORDER.dwg
PROJ. NO.: 0202-00

JASON Y. KAGE
LICENSED PROFESSIONAL ENGINEER
No. 9930-C
HAWAII U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

04/30/08
EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS – 3
WALAOHIA & AAMAKAO BRIDGES
AKONI PULE HIGHWAY, SEISMIC RETROFIT
OF WALAOHIA AND AAMAKAO BRIDGES
FAIP No. BR-0270(18)

Scale: NONE Date: May 2006

SHEET No. 3 OF 3 SHEETS