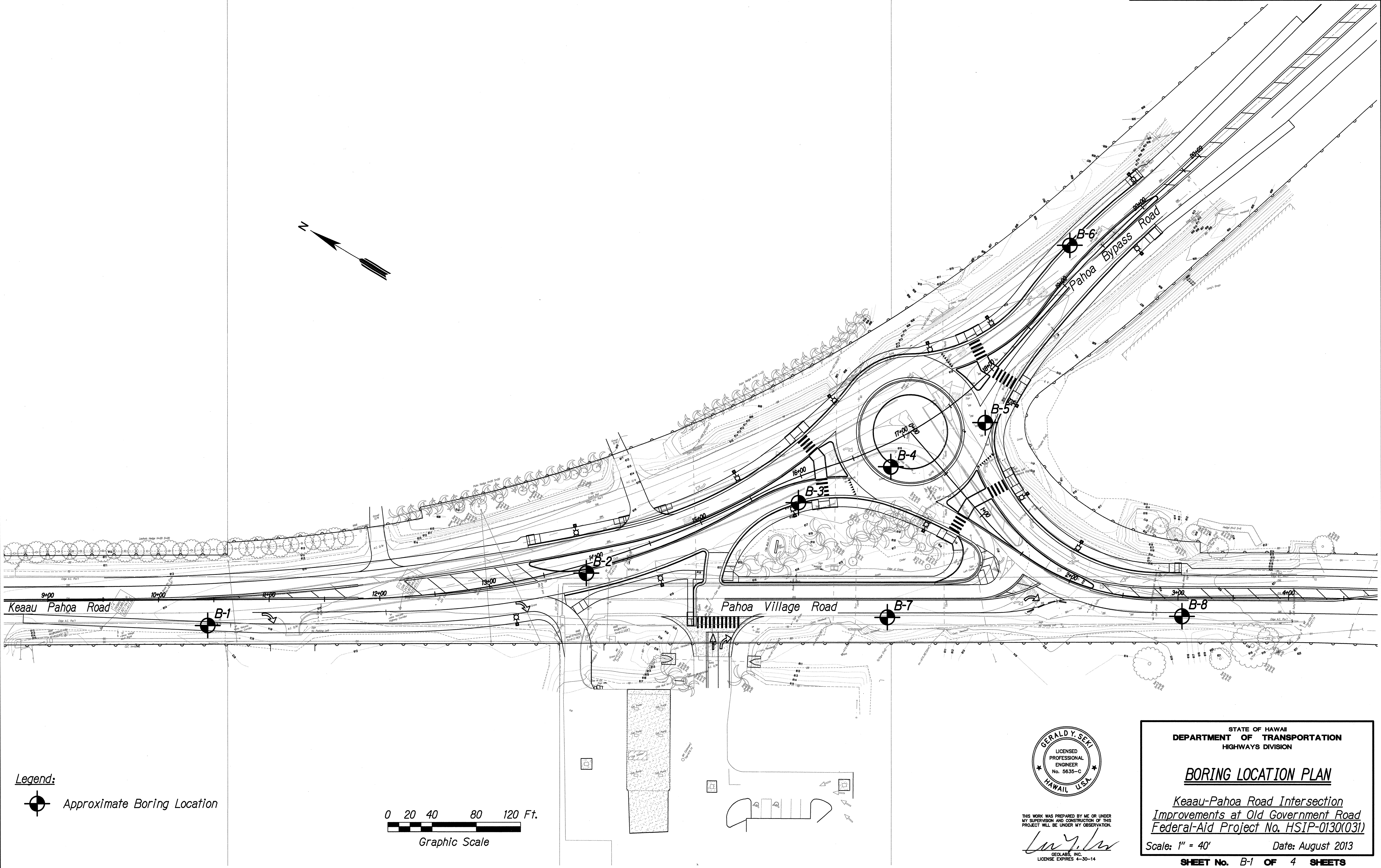


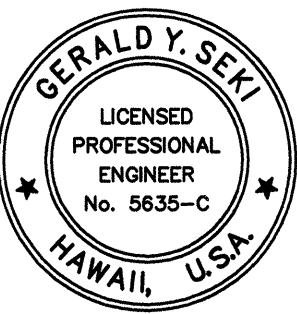
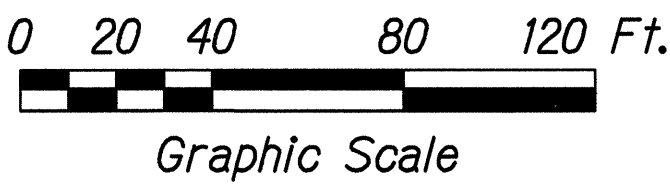
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-0130(031)	2014	81	108



Legend:



Approximate Boring Location



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Gerald Y. Seki
GEOLABS, INC.
LICENSE EXPIRES 4-30-14

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOCATION PLAN

Keaau-Pahoa Road Intersection
Improvements at Old Government Road
Federal-Aid Project No. HSIP-0130(031)

Scale: 1" = 40' Date: August 2013

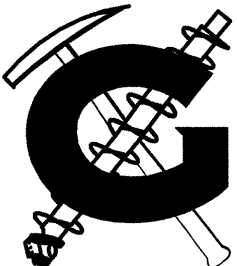
SHEET No. B-1 OF 4 SHEETS

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

PLOT DATE: August 30, 2013 @ 09:46:45 am

LAST UPDATE: August 30, 2013 @ 09:30:58 pm


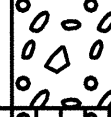
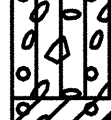


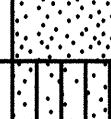
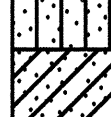
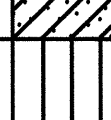
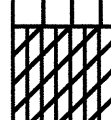

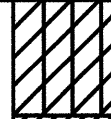
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GEOLABS, INC.


Geotechnical Engineering


Soil 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							
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
- 

WATER LEVEL OBSERVED IN BORING AT TIME OF DRILLING
- 

WATER LEVEL OBSERVED IN BORING AFTER DRILLING

- LL

LIQUID LIMIT (NP=NON-PLASTIC)
- PI

PLASTICITY INDEX (NP=NON-PLASTIC)
- TV

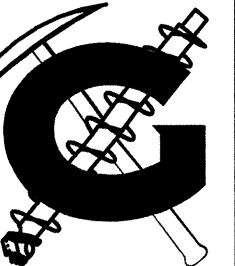
TORVANE SHEAR (tsf)
- PEN

POCKET PENETROMETER (tsf)
- UC

UNCONFINED COMPRESSION (psi)
- UU

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)


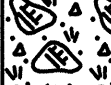


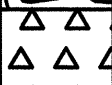
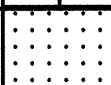
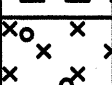
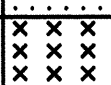
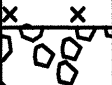



Plate
A-0.1



GEOLABS, INC.

Geotechnical Engineering

Rock Log Legend

ROCK DESCRIPTIONS			
	BASALT		FINGER CORAL
	BOULDERS		LIMESTONE
	BRECCIA		SANDSTONE
	CLINKER		SILTSTONE
	COBBLES		TUFF
	CORAL		VOID/CAVITY

ROCK DESCRIPTION SYSTEM

ROCK FRACTURE CHARACTERISTICS

The following terms describe general fracture spacing of a rock:

- Massive:

Greater than 24 inches apart
- Slightly Fractured:

12 to 24 inches apart
- Moderately Fractured:

6 to 12 inches apart
- Closely Fractured:

3 to 6 inches apart
- Severely Fractured:

Less than 3 inches apart

DEGREE OF WEATHERING

The following terms describe the chemical weathering of a rock:

- Unweathered:

Rock shows no sign of discoloration or loss of strength.
- Slightly Weathered:

Slight discoloration inwards from open fractures.
- Moderately Weathered:

Discoloration throughout and noticeably weakened though not able to break by hand.
- Highly Weathered:

Most minerals decomposed with some corestones present in residual soil mass. Can be broken by hand.
- Extremely Weathered:

Saprolite. Mineral residue completely decomposed to soil but fabric and structure preserved.

HARDNESS

The following terms describe the resistance of a rock to indentation or scratching:

- Very Hard:

Specimen breaks with difficulty after several "pinging" hammer blows.
Example: Dense, fine grain volcanic rock
- Hard:

Specimen breaks with some difficulty after several hammer blows.
Example: Vesicular, vugular, coarse-grained rock
- Medium Hard:

Specimen can be broken by one hammer blow. Cannot be scraped by knife. SPT may penetrate by ~25 blows per inch with bounce.
Example: Porous rock such as clinker, cinder, and coral reef
- Soft:

Can be indented by one hammer blow. Can be scraped or peeled by knife. SPT can penetrate by ~100 blows per foot.
Example: Weathered rock, chalk-like coral reef
- Very Soft:

Crumbles under hammer blow. Can be peeled and carved by knife. Can be indented by finger pressure.
Example: Saprolite

Plate
A-0.2

GEOTECHNICAL NOTES

- A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Keaau-Pahoa Road Intersection, Improvements at Old Government Road, District of Puna, Island of Hawaii" dated June 24, 2013 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 B-1.
- 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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Gerald Y. Seki
GEOLABS, INC.
LICENSE EXPIRES 4-30-14

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION





BORING LOG LEGENDS & NOTES




Keaau-Pahoa Road Intersection
Improvements at Old Government Road
Federal-Aid Project No. HSIP-0130(031)



Scale: No Scale Date: August 2013



SHEET No. B-2 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-0130(031)	2014	83	108

 GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD INTERSECTION IMPROVEMENTS AT OLD GOVERNMENT ROAD DISTRICT OF PUNA, ISLAND OF HAWAII								Log of Boring 1
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): 614 *
										Description
UC			27	7			5		GP	Gray GRAVEL with traces of sand, loose, dry (fill)
			85	77						Gray vesicular BASALT, severely fractured, unweathered, hard grades to massive to slightly fractured
UC			100	73			10			
			90	42						grades to moderately to closely fractured, slightly weathered grades with small voids
							20			Boring terminated at 20 feet
							25			* Elevations estimated from Topographic Survey downloaded from AECOM website on April 25, 2012.
							30			
							35			
Date Started: April 3, 2012									Water Level: ∇ Not Encountered	
Date Completed: April 3, 2012										
Logged By: M. Gruver									Drill Rig: MOBILE B-53	
Total Depth: 20 feet									Drilling Method: HQ Coring	
Work Order: 6629-00									Driving Energy: 140 lb. wt., 30 in. drop	

		GEOLABS, INC.										Log of Boring
		Geotechnical Engineering										3
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): 616 *		
										Description		
UC	19	56			32				SP	Reddish brown SAND with some gravel, medium dense, dry (fill)		
	17		13	0	26		5		GP	Reddish brown and gray vesicular BASALT with traces of sand, dense (fill)		
							10			Gray vesicular BASALT, closely fractured, unweathered, hard grades to massive		
			100	95			15					
			88	83			20			grades to closely fractured, slightly weathered		
							25			Boring terminated at 20 feet		
							30					
							35					
Date Started: April 3, 2012										Water Level: ∇ Not Encountered		
Date Completed: April 3, 2012												
Logged By: M. Gruver										Drill Rig: MOBILE B-53		
Total Depth: 20 feet										Drilling Method: 4" Auger & HQ Coring		
Work Order: 6629-00										Driving Energy: 140 lb. wt., 30 in. drop		

 GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD INTERSECTION IMPROVEMENTS AT OLD GOVERNMENT ROAD DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 2
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): 616 *		
										Description		
UC UC	7	99	65	14	50/3"		0		GW	Brown GRAVEL with some sand, very dense, dry (fill)		
			95	90		5	Gray vesicular BASALT, closely fractured, slightly weathered, hard grades to slightly fractured					
			100	58		10	grades to brown-gray, moderately fractured					
			68	37		15	grades to slightly to closely fractured					
							20			Boring terminated at 20 feet		
							25					
							30					
							35					
Date Started: April 4, 2012									Water Level: ∇ Not Encountered			
Date Completed: April 4, 2012												
Logged By: M. Gruver									Drill Rig: MOBILE B-53			
Total Depth: 20 feet									Drilling Method: 4" Auger & HQ Coring			
Work Order: 6629-00									Driving Energy: 140 lb. wt., 30 in. drop			

		GEOLABS, INC.		KEAAU-PAHOA ROAD INTERSECTION IMPROVEMENTS AT OLD GOVERNMENT ROAD DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring	
		Geotechnical Engineering												4	
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): 616 *					
										Description					
UC	20	74	46	0	38		5		GP	Reddish brown and gray GRAVEL with sand and cobbles, medium dense, dry (fill)					
	15		47	28	35					Gray vesicular BASALT, closely to slightly fractured, slightly weathered, hard					
UC			95	62			10			grades to moderately fractured					
			87	62			15								
							20			Boring terminated at 20 feet					
							25								
							30								
							35								
Date Started: April 3, 2012										Water Level: ▽ Not Encountered					
Date Completed: April 3, 2012															
Logged By: M. Gruver										Drill Rig: MOBILE B-53					
Total Depth: 20 feet										Drilling Method: 4" Auger & HQ Coring					
Work Order: 6629-00										Driving Energy: 140 lb. wt., 30 in. drop					

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



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GEOLABS, INC.
LICENSE EXPIRES 4-30-14

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION


BORING LOGS


Keaau-Pahoa Road Intersection
Improvements at Old Government Road
Federal-Aid Project No. HSIP-0130(031)


Scale: No Scale Date: August 2013


SHEET No. B-3 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HSIP-0130(031)	2014	84	108

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD INTERSECTION IMPROVEMENTS AT OLD GOVERNMENT ROAD DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 5	
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): 616 *					
										Description					
UC UC			28	0					GW	4-inch ASPHALTIC CONCRETE					
			80	27			5			Gray SANDY GRAVEL with some silt, dense (fill)					
			72	22			10			Gray vesicular BASALT, severely fractured, slightly weathered, hard grades to closely fractured					
			70	70			15			grades to massive, unweathered					
							20			Boring terminated at 20 feet					
										Date Started: April 4, 2012		Water Level: ∇ Not Encountered			
										Date Completed: April 4, 2012					
										Logged By: M. Gruver		Drill Rig: MOBILE B-53			
										Total Depth: 20 feet		Drilling Method: HQ Coring			
										Work Order: 6629-00		Driving Energy: 140 lb. wt., 30 in. drop			

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD INTERSECTION IMPROVEMENTS AT OLD GOVERNMENT ROAD DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 7	
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): 616.5 *					
										Description					
UC UC			47	42					GW	Gray GRAVEL with sand, dense (fill)					
			100	30			5			Gray vesicular BASALT, massive to moderately fractured, slightly weathered, hard grades to severely to moderately fractured					
			100	35			10								
			100	27			15			grades to closely fractured to massive					
							20			Boring terminated at 20 feet					
										Date Started: April 3, 2012		Water Level: ∇ Not Encountered			
										Date Completed: April 3, 2012					
										Logged By: M. Gruver		Drill Rig: MOBILE B-53			
										Total Depth: 20 feet		Drilling Method: HQ Coring			
										Work Order: 6629-00		Driving Energy: 140 lb. wt., 30 in. drop			

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD INTERSECTION IMPROVEMENTS AT OLD GOVERNMENT ROAD DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 6	
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 614 *					
										Description					
UC UC			20	0					GW	3-inch ASPHALTIC CONCRETE					
			60	25			5			Brown and gray SANDY GRAVEL with traces of silt, dense (fill)					
			93	43			10			Gray vesicular BASALT, severely to moderately fractured, unweathered, hard					
			90	27			15			Brown-gray vugular BASALT, severely fractured, slightly weathered, hard					
							20			Gray vesicular BASALT, moderately to severely fractured, slightly weathered, hard grades with small voids					
							25			Brown-gray vugular BASALT, severely fractured, slightly weathered, hard					
							30			Gray vesicular BASALT, moderately to slightly fractured, slightly weathered, hard					
							35			Boring terminated at 20 feet					
										Date Started: April 2, 2012		Water Level: ∇ Not Encountered			
										Date Completed: April 2, 2012					
										Logged By: M. Gruver		Drill Rig: MOBILE B-53			
										Total Depth: 20 feet		Drilling Method: HQ Coring			
										Work Order: 6629-00		Driving Energy: 140 lb. wt., 30 in. drop			

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD INTERSECTION IMPROVEMENTS AT OLD GOVERNMENT ROAD DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 8	
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): 618.5 *					
										Description					
UC UC	8	117			90/6"				SW	12-inch ASPHALTIC CONCRETE					
	7		95	50	+25/0"		5			Black SAND with gravel, very dense, dry (fill)					
			100	48	90/6"		10			Gray vesicular BASALT, slightly to closely fractured, unweathered to slightly weathered, hard					
			100	58	+50/0"		15								
					30/6"		20			Boring terminated at 20 feet					
										Date Started: April 2, 2012		Water Level: ∇ Not Encountered			
										Date Completed: April 2, 2012					
										Logged By: M. Gruver		Drill Rig: MOBILE B-53			
										Total Depth: 20 feet		Drilling Method: 4" Auger & HQ Coring			
										Work Order: 6629-00		Driving Energy: 140 lb. wt., 30 in. drop			



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Gerald Y. Seki
GEOLABS, INC.
LICENSE EXPIRES 4-30-14

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

*Keaau-Pahoa Road Intersection
Improvements at Old Government Road
Federal-Aid Project No. HSIP-0130(031)*

Scale: No Scale Date: August 2013

SHEET No. B-4 OF 4 SHEETS