



GEOLABS, INC.

Geotechnical Engineering

Soil Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

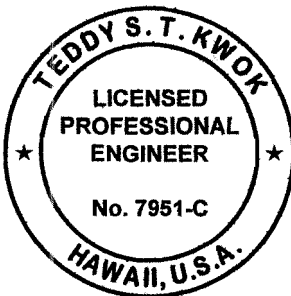
MAJOR DIVISIONS			USCS		TYPICAL DESCRIPTIONS			
COARSE-GRAINED SOILS	GRAVELS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES			
		LESS THAN 5% FINES		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES			
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL-SAND-SILT 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			
				MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS			
	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE		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 (NP=NON-PLASTIC) |
| | (3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE | PI | PLASTICITY INDEX (NP=NON-PLASTIC) |
| | SHELBY TUBE SAMPLE | TV | TORVANE SHEAR (tsf) |
| | GRAB SAMPLE | PEN | POCKET PENETROMETER (tsf) |
| | CORE SAMPLE | UC | UNCONFINED COMPRESSION (psi) |
| | WATER LEVEL OBSERVED IN BORING | UU | UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf) |

Plate
A-0.1



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GEOLABS, INC.


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOG LEGEND

KEAAU-PAHOA ROAD, SHOULDER
LANE CONVERSION PHASE 1
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28), Phase 1
Scale: As Noted Date: June 2012

DATE REVISION

SHEET No. 61 OF 18 SHEETS


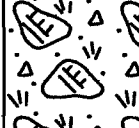

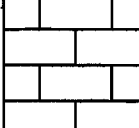
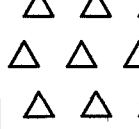

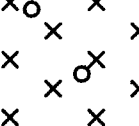
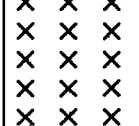


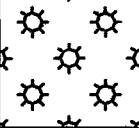



GEOLABS, INC.

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 broked 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

LOG LEGEND FOR ROCK 5189-20.GPJ GEOLABS.GDT 5/18/10

ORIGINAL PLAN

NOTE BOOK

No.

SURVEY PLOTTED BY

DRAWN BY

DESIGNED BY

QUANTITIES BY

CHECKED BY

DATE

GEOTECHNICAL NOTES

1. Geotechnical engineering reports entitled "Geotechnical Engineering Exploration, Keaau-Pahoa Road Shoulder Lane Conversion, Keaau Bypass Road to Shower Drive, Keaau, District of Puna, Hawaii" dated September 14, 2007 (W.O. 5189-00 & 10 (A)), "Pavement Justification Report, Keaau-Pahoa Road Shoulder Lane Conversion, Keaau, District of Puna, Hawaii" dated September 14, 2007 (W.O. 5189-00 & 10 (B)), and "Pavement Justification Report, Keaau-Pahoa Southbound Shoulder Lane, Keaau Bypass Road to Shower Drive, Keaau, District of Puna, Hawaii" dated May 1, 2009 (W.O. 5189-20) have been prepared by Geolabs, Inc. Copies of the reports are on file at the office of the Engineer for review by the Contractor.

2. For boring locations, see Sheet DP1 to DP7.

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.

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Teddy S. T. Kwok

SIGNATURE

04/30/14

EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

BORING LOG LEGEND & NOTES

KEAAU-PAHOA ROAD, SHOULDER

LANE CONVERSION PHASE 1

Keaau Bypass Road to Shower Drive

Fed. Aid Proj. No. STP-0130(28), Phase 1

Scale: As Noted

Date: June 2012

DATE

REVISION

SHEET No.

G2


OF


18


SHEETS


230

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH.1	2012	231	288

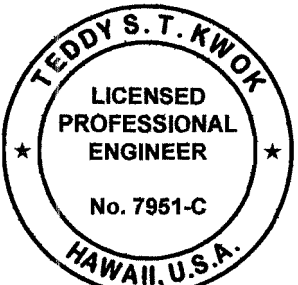
	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 1
	Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 331 *	
		11	104			41					ML	Dark brown SANDY SILT with gravel and cobbles, very stiff, damp (fill)	
		10				12/.5' +25/.3'						grades to moist	
		6				56		5				grades to damp	
												Boring terminated at 6.5 feet	
												* Elevations estimated from Roadway Plans dated June 2007 prepared by Wilson Okamoto Corporation.	
Date Started: August 26, 2004													Water Level: \nexists Not Encountered
Date Completed: August 26, 2004													
Logged By: B. Bachelder													Drill Rig: DIEDRICH D-25
Total Depth: 6.5 feet													Drilling Method: 4" Auger
Work Order: 5189-00 & 10 (A)													Driving Energy: 140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 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): 340 *	
		15	102			25/.2'					ML	Dark gray SANDY SILT with gravel, very stiff, damp (fill)	
				80	32							Gray moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)	
								5				Boring terminated at 7.3 feet	
Date Started: August 25, 2004													Water Level: \nexists Not Encountered
Date Completed: August 25, 2004													
Logged By: B. Bachelder													Drill Rig: DIEDRICH D-25
Total Depth: 7.3 feet													Drilling Method: 4" Auger & HQ Coring
Work Order: 5189-00 & 10 (A)													Driving Energy: 140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, 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): 345 *	
		4	117			69					GW	4-inch ASPHALTIC CONCRETE	
											GM	8-inch BASE COURSE	
											ML	Brown SILTY GRAVEL, dense, damp (fill)	
												Brown SANDY SILT with gravel and cobbles, very stiff, damp (fill)	
		8				90		5				Boring terminated at 6.5 feet	
Date Started: August 26, 2004													Water Level: \nexists Not Encountered
Date Completed: August 26, 2004													
Logged By: B. Bachelder													Drill Rig: DIEDRICH D-25
Total Depth: 6.5 feet													Drilling Method: 4" Auger
Work Order: 5189-00 & 10 (A)													Driving Energy: 140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 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): 334 *	
				100	75						ML	Dark gray SANDY SILT, stiff, damp (fill)	
												Gray moderately vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)	
								5				Boring terminated at 6.4 feet	
Date Started: August 25, 2004													Water Level: \nexists Not Encountered
Date Completed: August 25, 2004													
Logged By: B. Bachelder													Drill Rig: DIEDRICH D-25
Total Depth: 6.4 feet													Drilling Method: 4" Auger & HQ Coring
Work Order: 5189-00 & 10 (A)													Driving Energy: 140 lb. wt., 30 in. drop

SURVEY PLOTTED BY	DATE
PLANNED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
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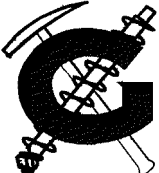



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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keeau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. G3 OF 18 SHEETS	

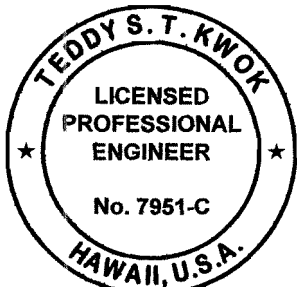
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH1	2012	232	288

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, 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): 319 *		
		9	107	100	57	40/4' +15/0'				ML	Description		
											Dark gray SANDY SILT with gravel, very stiff, damp (fill)		
											Gray moderately vesicular BASALT, moderately fractured, highly weathered, medium hard (basalt formation)		
											Boring terminated at 6.7 feet		
Date Started: August 25, 2004 Date Completed: August 25, 2004 Logged By: B. Bachelder Total Depth: 6.7 feet Work Order: 5189-00 & 10 (A)													Water Level: ∇ Not Encountered Drill Rig: DIEDRICH D-25 Drilling Method: 4" Auger & HQ Coring Driving Energy: 140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, 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): 310.5 *		
				79	79					GM	Description		
											Dark brown SILTY GRAVEL, medium dense, damp (fill)		
											Gray slightly to moderately vesicular BASALT, slightly fractured, slightly weathered, very hard (basalt formation)		
											Boring terminated at 6.5 feet		
Date Started: August 30, 2004 Date Completed: August 30, 2004 Logged By: B. Bachelder Total Depth: 6.5 feet Work Order: 5189-00 & 10 (A)													Water Level: ∇ Not Encountered Drill Rig: DIEDRICH D-25 Drilling Method: 4" Auger & HQ Coring Driving Energy: 140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, 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): 326 *		
										GM	Description		
											Dark brown SILTY GRAVEL with cobbles and sand, medium dense, damp (fill)		
											Gray GRAVEL AND COBBLES (BASALTIC), loose, damp (fill)		
											Gray moderately vesicular BASALT, closely to moderately fractured, moderately weathered, medium hard (basalt formation)		
											Boring terminated at 11.6 feet		
Date Started: August 26, 2004 Date Completed: August 26, 2004 Logged By: B. Bachelder Total Depth: 11.6 feet Work Order: 5189-00 & 10 (A)													Water Level: ∇ Not Encountered Drill Rig: DIEDRICH D-25 Drilling Method: 4" Auger & HQ Coring Driving Energy: 140 lb. wt., 30 in. drop

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DESIGNED BY	
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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keaau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. 64 OF 18 SHEETS	

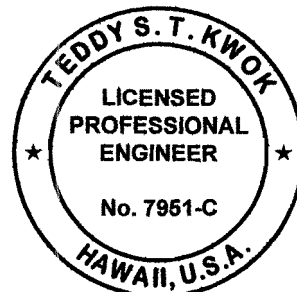
ORIGINAL PLAN	No.	SURVEY PLOTTED BY	DATE
			DRAWN BY
			DESIGNED BY
			CHECKED BY
NOTE BOOK	No.	SURVEY PLOTTED BY	DATE
			DRAWN BY
			DESIGNED BY
			CHECKED BY

	GEOLABS, INC. Geotechnical Engineering	KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 8	
		Approximate Ground Surface Elevation (feet MSL): 318 *											
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Description			
			92	65			5		SM	Dark brown SILTY SAND, medium dense, damp COBBLES (BASALTIC), dense (fill)			
										Gray moderately vesicular BASALT, slightly to moderately fractured, moderately weathered, hard (basalt formation)			
							10			Boring terminated at 6.2 feet			
Date Started: August 25, 2004												Water Level: ∇	Not Encountered
Date Completed: August 25, 2004													
Logged By: B. Bachelder												Drill Rig:	DIEDRICH D-25
Total Depth: 6.2 feet												Drilling Method:	4" Auger & HQ Coring
Work Order: 5189-00 & 10 (A)												Driving Energy:	140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering	KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 9	
		Approximate Ground Surface Elevation (feet MSL): 302 *											
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Description			
	12	111	77	17	35/.3' +20/.1'		5		SP- SM	Dark brown poorly graded SAND with silt and gravel, dense, moist (fill)			
										Gray moderately vesicular BASALT, severely fractured, moderately weathered, soft to medium hard (basalt formation)			
							10			Boring terminated at 5.9 feet			
Date Started: August 25, 2004												Water Level: ∇	Not Encountered
Date Completed: August 25, 2004													
Logged By: B. Bachelder												Drill Rig:	DIEDRICH D-25
Total Depth: 5.9 feet												Drilling Method:	4" Auger & HQ Coring
Work Order: 5189-00 & 10 (A)												Driving Energy:	140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering	KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 10	
		Approximate Ground Surface Elevation (feet MSL): 294 *											
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Description			
			71	71						Gray slightly vesicular BASALT, slightly fractured, moderately weathered, hard (basalt formation)			
							5			possible VOID			
			83	75									
							10		GW- GM	Reddish brown well-graded GRAVEL with silt and sand, loose, moist			
	39				16					grades with gray cobbles (basaltic)			
			26										
	10				6/.5' +25/.3' Ref.		15			Gray moderately vesicular BASALT, closely fractured, highly weathered, medium hard (basalt formation)			
			100	38						grades to slightly fractured, slightly weathered, hard			
							20						
			100	100						Reddish gray COBBLES AND BOULDERS (BASALTIC), dense			
			38	12			25			Boring terminated at 29.3 feet			
							30						
							35						
Date Started: September 7, 2004												Water Level: ∇	Not Encountered
Date Completed: September 7, 2004													
Logged By: B. Bachelder												Drill Rig:	CME-55
Total Depth: 29.3 feet												Drilling Method:	HQ Coring
Work Order: 5189-00 & 10 (A)												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.	STP-0130(28)PH.1	2012	233	288



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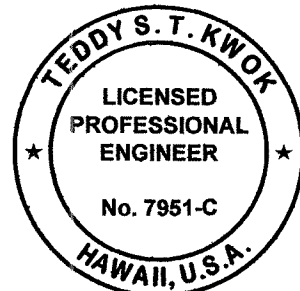
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keeau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. 65 OF 18 SHEETS	

ORIGINAL PLAN	DATE
TRACED BY	
NOTE BOOK	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
No.	

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 11	
	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): 292 *			
											Description			
			84	22		20/0' Ref.				CH	Reddish brown SILTY CLAY with cobbles and boulders (basaltic), stiff, damp (fill)			
											Gray moderately vesicular BASALT, closely to moderately fractured, highly weathered, soft (basalt formation)			
			87	48				5						
											Gray slightly vesicular BASALT, slightly fractured to massive, moderately weathered, hard (basalt formation)			
			37	0				10			Gray COBBLES (BASALTIC), very dense			
			97	88		20/0' Ref.		15			Gray slightly vesicular BASALT with olivine crystals, slightly fractured, slightly weathered, hard (basalt formation)			
								20			Boring terminated at 20.3 feet			
								25						
Date Started: August 31, 2004												Water Level: x Not Encountered		
Date Completed: August 31, 2004														
Logged By: B. Bachelder												Drill Rig: DIEDRICH D-25		
Total Depth: 20.3 feet												Drilling Method: 4" Auger & HQ Coring		
Work Order: 5189-00 & 10 (A)												Driving Energy: 140 lb. wt., 30 in. drop		

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, 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 (feet MSL): 288.5 *			
											Description			
											Gray moderately vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation) possible VOID			
								5						
											Brownish gray well-graded GRAVEL with sand, loose, moist			
								10		GW				
											Gray slightly vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)			
								15			Gray highly vesicular BASALT, moderately fractured, moderately weathered, medium hard to soft (basalt formation)			
								20			grades to severely fractured, highly weathered, soft			
								25			Gray moderately to highly vesicular BASALT, moderately fractured, moderately weathered, medium hard to soft (basalt formation)			
											grades to hard			
								30			grades to highly vesicular			
								35						
Date Started: September 7, 2004												Water Level: x Not Encountered		
Date Completed: September 7, 2004														
Logged By: B. Bachelder												Drill Rig: CME-55		
Total Depth: 49.5 feet												Drilling Method: HQ Coring		
Work Order: 5189-00 & 10 (A)												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.	STP-0130(28)PH.1	2012	234	288

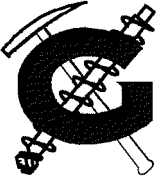



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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keaau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
SHEET No. G6 OF 18 SHEETS	

DATE	REVISION
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		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, 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	(Continued from previous plate)
										Description
			100	40						
			87	65			40			grades to moderately vesicular, slightly fractured, slightly weathered
										grades to highly vesicular, slightly to moderately fractured, highly weathered, medium hard
			100	70			45			grades to slightly vesicular, slightly fractured, slightly weathered, hard
							50			Boring terminated at 49.5 feet
							55			
Date Started: September 7, 2004										Water Level: ∇ Not Encountered
Date Completed: September 7, 2004										
Logged By: B. Bachelder										Drill Rig: CME-55
Total Depth: 49.5 feet										Drilling Method: HQ Coring
Work Order: 5189-00 & 10 (A)										Driving Energy: 140 lb. wt., 30 in. drop



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BORING LOGS

KEAAU-PAHOA ROAD, SHOULDER
LANE CONVERSION PHASE 1
Keauu Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28), Phase 1
Scale: As Noted Date: June 2012

SHEET No. 67 OF 18 SHEETS


235


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

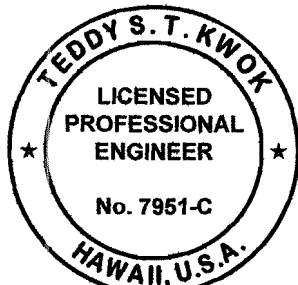
DATE _____

REVISION

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)/PH.1	2012	236	288

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII					Log of Boring 13			
	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
			78	15							Brown highly vesicular BASALT, closely fractured, moderately to slightly weathered, soft (basalt formation)
								40			Gray moderately vesicular BASALT, severely fractured, moderately weathered, medium hard (basalt formation)
			83	75							grades to slightly fractured, slightly weathered, hard
								45			grades to highly vesicular
			85	33							grades to slightly vesicular, moderately fractured
								50			grades to highly vesicular, highly weathered
								55			Boring terminated at 50 feet
Date Started: September 8, 2004											Water Level: ∇ Not Encountered
Date Completed: September 8, 2004											
Logged By: B. Bachelder											Drill Rig: CME-55
Total Depth: 50 feet											Drilling Method: HQ Coring
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII					Log of Boring 14			
	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): 288.5 * Description
			76	53							Gray moderately vesicular BASALT, moderately fractured, slightly weathered, hard (basalt formation)
								5			possible VOID
			98	73							grades to slightly fractured
								10			Gray highly vesicular BASALT, closely fractured, moderately weathered, soft (basalt formation)
			70	22							Gray moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)
								15			grades to hard
			97	83							
								20		GW	Reddish gray well-graded GRAVEL with sand, medium dense, moist (clinker)
			8								
								25			Gray moderately vesicular BASALT, moderately to closely fractured, moderately weathered, hard (basalt formation)
			100	30							grades to slightly to moderately fractured
								30			
			70	70							
								35			Reddish gray COBBLES (BASALTIC), dense (clinker)
			47	15							
Date Started: September 8, 2004											Water Level: ∇ Not Encountered
Date Completed: September 9, 2004											
Logged By: B. Bachelder											Drill Rig: CME-55
Total Depth: 49.3 feet											Drilling Method: HQ Coring
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop





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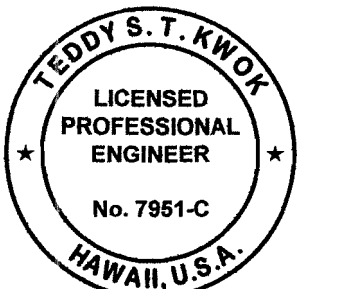
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keaau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. 08 OF 18 SHEETS	

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

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 14	
	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	(Continued from previous plate) Description			
			88	45			40				Gray moderately vesicular BASALT, moderately fractured, slightly weathered, hard (basalt formation)			
			97	58			45				grades to highly vesicular			
											grades to moderately vesicular			
											grades to highly vesicular, closely fractured			
							50				Boring terminated at 49.3 feet			
							55							
Date Started: September 8, 2004											Water Level: ∇ Not Encountered			
Date Completed: September 9, 2004														
Logged By: B. Bachelder											Drill Rig: CME-55			
Total Depth: 49.3 feet											Drilling Method: HQ Coring			
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop			

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 15	
	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): 288.5 * Description			
			78	67							Gray moderately vesicular BASALT, slightly to moderately fractured, slightly weathered, hard (basalt formation)			
				100	100		5				grades to massive			
			35	0			10				grades to highly vesicular, medium hard grades to soft, possible VOID			
				100	70	15/0' Ref.	15				Gray moderately vesicular BASALT, closely fractured, moderately weathered, hard (basalt formation) grades to slightly fractured, slightly weathered			
			37	27			20			GW	Reddish gray well-graded GRAVEL with sand, dense, moist			
11				100	79	48	25				Gray moderately vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)			
			100	100			30				grades to massive, moderately weathered			
							35							
Date Started: September 9, 2004											Water Level: ∇ Not Encountered			
Date Completed: September 9, 2004														
Logged By: B. Bachelder											Drill Rig: CME-55			
Total Depth: 50 feet											Drilling Method: HQ Coring			
Work Order: 5189-00 & 10 (A)											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.	STP-0130(28)PH.1	2012	237	288


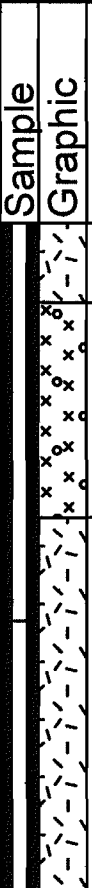



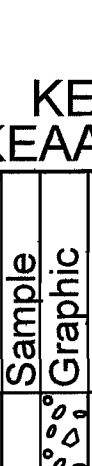
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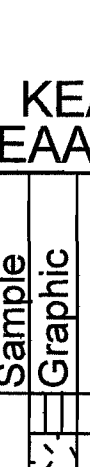
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keaau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. 09 OF 18 SHEETS	

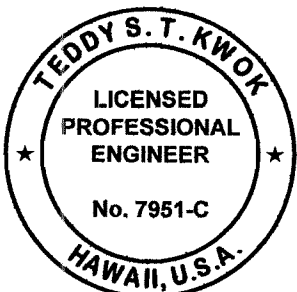
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH.1	2012	238	288

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 15
	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	(Continued from previous plate) Description			
	42		53	35			40			Reddish gray COBBLES (BASALTIC), dense (clinker)			
										Gray moderately vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)			
										MH Reddish brown CLAYEY SILT, soft, moist			
										Gray highly vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation) grades to severely fractured, soft grades to slightly fractured, hard			
			100	74	3/5' +17/4' Ref.		50			Boring terminated at 50 feet			
							55						
Date Started: September 9, 2004											Water Level: \nexists Not Encountered		
Date Completed: September 9, 2004													
Logged By: B. Bachelder											Drill Rig: CME-55		
Total Depth: 50 feet											Drilling Method: HQ Coring		
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop		

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 16
	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): 298.5 * Description			
	9	114			61		5			Brown well-graded GRAVEL with sand, dense, damp (fill)			
										Gray BASALT, very dense Boring terminated at 5 feet			
	7				40		10						
Date Started: August 30, 2004											Water Level: \nexists Not Encountered		
Date Completed: August 30, 2004													
Logged By: B. Bachelder											Drill Rig: DIEDRICH D-25		
Total Depth: 5 feet											Drilling Method: 4" Auger		
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop		

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 17
	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): 305.5 * Description			
	11	111			53/5' +50/3' Ref. 36/5' +30/2' Ref. 20/0' Ref.		5		SM	Dark grayish brown SILTY SAND with gravel, very dense, damp (fill)			
										grades with cobbles (basaltic)			
										Boring terminated at 5 feet			
	8						10						
Date Started: August 25, 2004											Water Level: \nexists Not Encountered		
Date Completed: August 25, 2004													
Logged By: B. Bachelder											Drill Rig: DIEDRICH D-25		
Total Depth: 5 feet											Drilling Method: 4" Auger		
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop		

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 18
	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): 321.5 * Description			
	14	100	98	17	31/4' Ref.		5		SM	Brown SILTY SAND, medium dense, damp (fill)			
										Gray slightly to moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)			
							10			Boring terminated at 5.4 feet			
Date Started: August 26, 2004											Water Level: \nexists Not Encountered		
Date Completed: August 26, 2004													
Logged By: B. Bachelder											Drill Rig: DIEDRICH D-25		
Total Depth: 5.4 feet											Drilling Method: 4" Auger & HQ Coring		
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop		




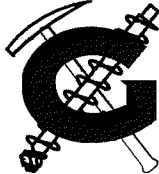
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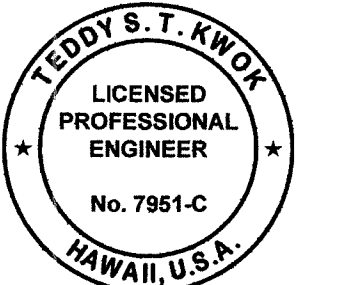
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. G10 OF 18 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH.1	2012	240	288

		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII						Log of Boring 21	
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): 325.5 *	
	Description										
	7	108			46				ML	7.5-inch ASPHALTIC CONCRETE	
	8				32				ML	5-inch BASE COURSE	
										Dark brown SANDY SILT with cobbles (basaltic), stiff, damp	
										Hit waterline at 3 feet	
										Boring terminated at 4 feet	
							5				
							10				
Date Started: August 30, 2004											
Date Completed: August 30, 2004											
Logged By: B. Bachelder											
Total Depth: 4 feet											
Work Order: 5189-00 & 10 (A)											
Water Level: ∇ Not Encountered											
Drill Rig: DIEDRICH D-25											
Drilling Method: 4" Auger											
Driving Energy: 140 lb. wt., 30 in. drop											

		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII						Log of Boring 21A	
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): 325.5 *	
	Description										
	15				33				ML	Dark brown SANDY SILT with gravel, stiff, damp (fill)	
		96	22				5			Gray moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)	
		82	15							grades to closely fractured, soft	
		82	13							grades to severely fractured	
							10				
							15				
							20			Boring terminated at 17.3 feet	
Date Started: August 30, 2004											
Date Completed: August 30, 2004											
Logged By: B. Bachelder											
Total Depth: 17.3 feet											
Work Order: 5189-00 & 10 (A)											
Water Level: ∇ Not Encountered											
Drill Rig: DIEDRICH D-25											
Drilling Method: 4" Auger & HQ Coring											
Driving Energy: 140 lb. wt., 30 in. drop											

		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, 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	Approximate Ground Surface Elevation (feet MSL): 295.5 *	
	Description										
			71	48						Gray COBBLES AND BOULDERS (BASALTIC), dense	
										Gray highly vesicular BASALT, moderately fractured, moderately weathered, medium hard to hard (basalt formation)	
			97	55							
			77	35						grades to slightly vugular	
			30	0						grades to vugular with olivine crystals, severely fractured possible VOID	
			100	58						Gray moderately vesicular to moderately vugular BASALT with olivine crystals, moderately to severely fractured, moderately weathered, medium hard to hard (basalt formation)	
			83	45						grades with cinder layers VOID VOID VOID	
			100	75						grades to massive to severely fractured, hard	
							35				
Date Started: May 9, 2007											
Date Completed: May 9, 2007											
Logged By: D. Gremminger											
Total Depth: 52 feet											
Work Order: 5189-00 & 10 (A)											
Water Level: ∇ Not Encountered											
Drill Rig: MOBILE B-53											
Drilling Method: 4" Solid-Stem Auger & HQ Coring											
Driving Energy: 140 lb. wt., 30 in. drop											




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BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keeau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
SHEET No. 612 OF 18 SHEETS	

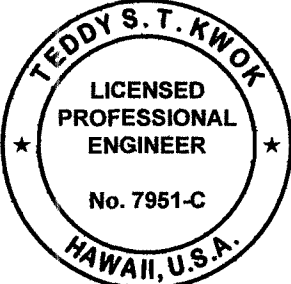
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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	NOTED BY	
	CHECKED BY	
NOTE BOOK	QUANTITIES BY	
	NO.	

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, 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	
			40	0				40			possible VOID	
			77	45				45			Reddish brown highly vesicular CINDER, medium hard to hard (clinker) VOID	
			92	73				45			Gray moderately vesicular to moderately vugular BASALT, slightly to severely fractured, moderately weathered, medium hard to hard (basalt formation)	
								50			possible VOID	
								52			Boring terminated at 52 feet	
Date Started: May 9, 2007 Date Completed: May 9, 2007 Logged By: D. Gremminger Total Depth: 52 feet Work Order: 5189-00 & 10 (A)											Water Level: \nexists Not Encountered Drill Rig: MOBILE B-53 Drilling Method: 4" Solid-Stem Auger & HQ Coring Driving Energy: 140 lb. wt., 30 in. drop	

	GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, 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	Approximate Ground Surface Elevation (feet MSL): 289 * Description	
			88	0				0			Gray highly vesicular BASALT, closely to severely fractured, moderately weathered, medium hard to hard (basalt formation)	
			83	25				5			grades to slightly to moderately fractured	
			78	73				10			possible VOID	
			82	78				15			possible VOID	
			75	65				20			Gray highly vesicular to moderately vugular BASALT with olivine crystals, moderately to severely fractured, moderately weathered, hard (basalt formation)	
			78	48				25			grades to vugular	
			83	42				30			Boring terminated at 34 feet	
			87	82				35				
Date Started: May 8, 2007 Date Completed: May 9, 2007 Logged By: D. Gremminger Total Depth: 34 feet Work Order: 5189-00 & 10 (A)											Water Level: \nexists Not Encountered Drill Rig: CONCORE Drilling Method: NQ 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.	STP-0130(28)PH.1	2012	241	288



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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

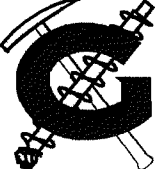
BORING LOGS
KEAAU-PAHOA ROAD, SHOULDER
LANE CONVERSION PHASE 1
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28), Phase 1
Scale: As Noted Date: June 2012

DATE REVISION

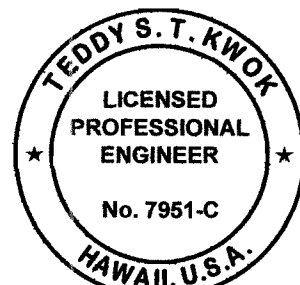
SHEET No. 613 OF 18 SHEETS

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

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 103	
	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): 288 *				
										Description				
			83	83						Gray moderately to highly vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)				
			89	78										
			98	97			5							
							10			grades to moderately to severely fractured				
			57	30										
			42	10			15			grades to closely to severely fractured				
			55	40			20			Gray moderately vesicular BASALT, slightly to severely fractured, moderately weathered, medium hard to hard (basalt formation)				
			92	78			25			grades to moderately vugular				
			97	82			30			grades to highly vesicular to slightly vugular				
							35		CH	Reddish brown CLAY seam				
										Boring terminated at 34 feet				
Date Started: May 7, 2007											Water Level: x Not Encountered			
Date Completed: May 8, 2007														
Logged By: D. Gremminger											Drill Rig: CONCORE			
Total Depth: 34 feet											Drilling Method: NQ Coring			
Work Order: 5189-00 & 10 (A)											Driving Energy: 140 lb. wt., 30 in. drop			

	GEOLABS, INC.		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 104	
	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): 297.5 *				
										Description				
	8				20				GW-GM	Dark gray well-graded GRAVEL (BASALTIC) with silt and sand, medium dense, damp (fill)				
			25							Dark gray COBBLES AND BOULDERS (BASALTIC), dense				
			92	42			5			Gray moderately vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)				
			97	73			10			grades to highly vesicular, massive to closely fractured VOID at 12.5 feet				
			60	27			15			VOID				
										grades to slightly to severely fractured				
			0				20			possible VOID				
										Gray GRAVEL AND COBBLES (BASALTIC), loose, damp				
			0				25		CH	Reddish brown SILTY CLAY, soft, damp				
	4		33	0	37.3' Ref.		35			Gray COBBLES AND BOULDERS (BASALTIC) with olivine crystals, dense				
Date Started: May 10, 2007											Water Level: x Not Encountered			
Date Completed: May 10, 2007														
Logged By: D. Gremminger											Drill Rig: MOBILE B-53			
Total Depth: 45 feet											Drilling Method: 4" Solid-Stem Auger & HQ Coring			
Work Order: 5189-00 & 10 (A)											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.	STP-0130(28)PH.1	2012	242	288






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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keeau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
SHEET No. G14 OF 18 SHEETS	



DATE	REVISION
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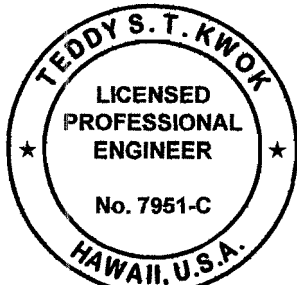
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH.1	2012	243	288

		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 104					
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									
55			88	35			40			Gray moderately vesicular BASALT with olivine crystals, moderately to severely fractured, moderately weathered, hard (basalt formation)									
										grades to highly vesicular to slightly vugular, slightly to closely fractured CLAY seam									
							45		CH	Boring terminated at 45 feet									
							50												
Date Started: May 10, 2007										Water Level: \nexists Not Encountered									
Date Completed: May 10, 2007																			
Logged By: D. Gremminger										Drill Rig: MOBILE B-53									
Total Depth: 45 feet										Drilling Method: 4" Solid-Stem Auger & HQ Coring									
Work Order: 5189-00 & 10 (A)										Driving Energy: 140 lb. wt., 30 in. drop									

		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, 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): 305 *									
										Description									
5	4				28		5		SW-SM	4-inch ASPHALTIC CONCRETE Dark gray well-graded SAND with silt and gravel, medium dense, damp (fill)									
										Gray BASALT, dense									
							10			Boring terminated at 5 feet									
Date Started: May 3, 2007										Water Level: \nexists Not Encountered									
Date Completed: May 3, 2007																			
Logged By: D. Gremminger										Drill Rig: MOBILE B-53									
Total Depth: 5 feet										Drilling Method: 4" Solid-Stem Auger									
Work Order: 5189-00 & 10 (A)										Driving Energy: 140 lb. wt., 30 in. drop									

		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, 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): 311.5 *									
										Description									
5	6				54		5		GW-GM	4.5-inch ASPHALTIC CONCRETE Dark gray well-graded GRAVEL with silt and sand, very dense, damp (fill)									
										Gray BASALT, dense									
							10			Boring terminated at 5 feet									
Date Started: May 3, 2007										Water Level: \nexists Not Encountered									
Date Completed: May 3, 2007																			
Logged By: D. Gremminger										Drill Rig: MOBILE B-53									
Total Depth: 5 feet										Drilling Method: 4" Solid-Stem Auger									
Work Order: 5189-00 & 10 (A)										Driving Energy: 140 lb. wt., 30 in. drop									

		GEOLABS, INC. Geotechnical Engineering		KEAAU - PAHOA ROAD SHOULDER LANE CONVERSION KEAAU BYPASS ROAD TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII										Log of Boring 107					
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): 321 *									
										Description									
7	4				56		5		GW-GM	4-inch ASPHALTIC CONCRETE Dark gray well-graded GRAVEL with silt and sand, very dense, damp (fill)									
										Gray BASALT, dense									
							10			Boring terminated at 5 feet									
Date Started: May 3, 2007										Water Level: \nexists Not Encountered									
Date Completed: May 3, 2007																			
Logged By: D. Gremminger										Drill Rig: MOBILE B-53									
Total Depth: 5 feet										Drilling Method: 4" Solid-Stem Auger									
Work Order: 5189-00 & 10 (A)										Driving Energy: 140 lb. wt., 30 in. drop									





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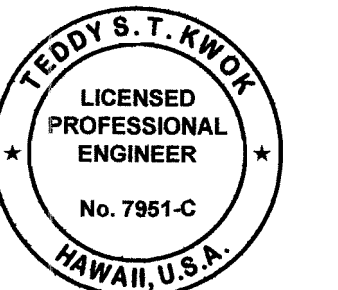
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keaau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
SHEET No. 015 OF 18 SHEETS	

ORIGINAL PLAN	No.	DESIGNED BY	CHECKED BY	DATE	SURVEY PLOTTED BY

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD SOUTHBOUND SHOULDER LANE KEAAU BYPASS TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, HAWAII										Log of Boring 201	
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): 325 *					
										Description					
										10-inch ASPHALTIC CONCRETE					
	25				35				GW	Dark gray SANDY GRAVEL (BASALTIC) with some silt, medium dense, damp (base course)					
	18				14				GW	Dark brown with multi-color mottling SANDY GRAVEL (BASALTIC) with traces of silt, medium dense, damp (fill)					
	5				11		5			grades with cobbles					
	17				15/3"		10		SM	Reddish brown with gray mottling SILTY SAND (BASALTIC) with some gravel, dense, moist (cinder)					
							15			Boring terminated at 10.75 feet					
* Elevations estimated from Roadway Plans transmitted by Wilson Okamoto Corporation on March 25 and April 9, 2009.															
Date Started:		February 18, 2009				Water Level: ∇		Not Encountered							
Date Completed:		February 18, 2009				Drill Rig:		MOBILE B-80							
Logged By:		Y. Chiba				Drilling Method:		4" Auger							
Total Depth:		10.75 feet				Driving Energy:		140 lb. wt., 30 in. drop							
Work Order:		5189-20													

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD SOUTHBOUND SHOULDER LANE KEAAU BYPASS TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, HAWAII										Log of Boring 202	
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): 342 *					
										Description					
	7				34					8-inch ASPHALTIC CONCRETE					
									GW	Dark gray SANDY GRAVEL (BASALTIC), dense, damp (base course)					
									SW	Dark grayish brown GRAVELLY SAND (BASALTIC) with some silt, medium dense, damp (fill)					
			98	89	8/1"				GP	Gray with multi-color mottling GRAVEL (BASALTIC) with cobbles and some sand, dense, damp (clinker)					
							5			Gray vesicular BASALT, slightly fractured, slightly weathered, very hard					
			100	100			10			Boring terminated at 10 feet					
							15								
Date Started:		February 19, 2009				Water Level: ∇		Not Encountered							
Date Completed:		February 19, 2009				Drill Rig:		MOBILE B-80							
Logged By:		Y. Chiba				Drilling Method:		4" Auger							
Total Depth:		10 feet				Driving Energy:		140 lb. wt., 30 in. drop							
Work Order:		5189-20													

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH1	2012	244	288




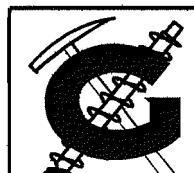
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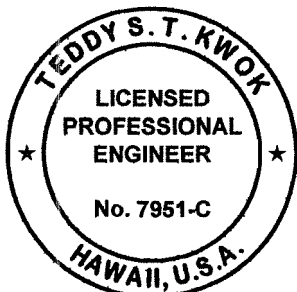
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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 KeaaU Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. 016 OF 18 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH.1	2012	245	288

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD SOUTHBOUND SHOULDER LANE KEAAU BYPASS TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, HAWAII										Log of Boring 203	
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): 315 *					
										Description					
	7				17/3"				SW-SM	4-inch ASPHALTIC CONCRETE					
										Dark grayish brown well-graded SAND (BASALTIC) with silt and gravel, dense, damp (base course)					
			98	95	5/1"					Gray vesicular BASALT, closely fractured, slightly weathered, very hard					
							5			grades to slightly fractured					
			100	100			10			Boring terminated at 10 feet					
							15								
Date Started: February 18, 2009										Water Level: \nexists Not Encountered					
Date Completed: February 18, 2009															
Logged By: Y. Chiba										Drill Rig: MOBILE B-80					
Total Depth: 10 feet										Drilling Method: 4" Auger					
Work Order: 5189-20										Driving Energy: 140 lb. wt., 30 in. drop					

		GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD SOUTHBOUND SHOULDER LANE KEAAU BYPASS TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, HAWAII										Log of Boring 204	
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): 321 *					
										Description					
	15				19/6" +5/0"				SW	4-inch ASPHALTIC CONCRETE					
										Dark gray GRAVELLY SAND (BASALTIC) with some silt, dense, damp (base course)					
			100	94					SC	Dark grayish brown CLAYEY SAND (BASALTIC) with some gravel, medium dense, moist (fill)					
										Gray vesicular BASALT, closely to moderately fractured, slightly weathered, very hard					
							5			grades to slightly fractured					
			100	92			10			Boring terminated at 10 feet					
							15								
Date Started: February 18, 2009										Water Level: \nexists Not Encountered					
Date Completed: February 18, 2009															
Logged By: Y. Chiba										Drill Rig: MOBILE B-80					
Total Depth: 10 feet										Drilling Method: 4" Auger					
Work Order: 5189-20										Driving Energy: 140 lb. wt., 30 in. drop					



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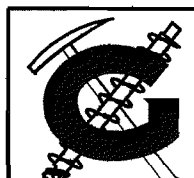
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keaau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
SHEET No. 617 OF 18 SHEETS	

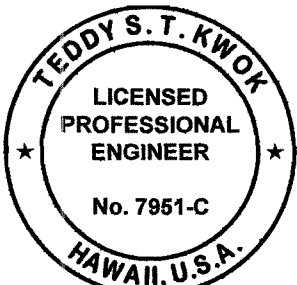
ORIGINAL PLAN NOTE BOOK No.	SURVEY PLOTTED BY	DATE
	DESIGNED BY	
	TRACED BY	
	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

DATE	REVISION
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PH.1	2012	246	288

	GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD SOUTHBOUND SHOULDER LANE KEAAU BYPASS TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, HAWAII		Log of Boring 205
	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) : 316 * Description 4-inch ASPHALTIC CONCRETE Dark gray GRAVELLY SAND (BASALTIC), dense, damp (base course) 20/3" Gray vesicular BASALT, closely fractured, slightly weathered, very hard 87 50 VOID grades to slightly fractured 100 100 Boring terminated at 10 feet		
Date Started: February 18, 2009		Water Level: \nexists Not Encountered			
Date Completed: February 18, 2009		Drill Rig: MOBILE B-80			
Logged By: Y. Chiba		Drilling Method: 4" Auger			
Total Depth: 10 feet		Driving Energy: 140 lb. wt., 30 in. drop			
Work Order: 5189-20					

	GEOLABS, INC. Geotechnical Engineering		KEAAU-PAHOA ROAD SOUTHBOUND SHOULDER LANE KEAAU BYPASS TO SHOWER DRIVE KEAAU, DISTRICT OF PUNA, HAWAII		Log of Boring 206
	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) : 330.5 * Description 5-inch ASPHALTIC CONCRETE Dark gray GRAVELLY SAND (BASALTIC), dense, damp (base course) Dark grayish brown well-graded SAND (BASALTIC) with silt and gravel, medium dense, damp (fill) 6/3" Gray COBBLES (BASALTIC) with gravel and sand, dense, damp (fill) Gray vesicular BASALT, slightly fractured, slightly weathered, very hard Boring terminated at 10 feet		
Date Started: February 19, 2009		Water Level: \nexists Not Encountered			
Date Completed: February 19, 2009		Drill Rig: MOBILE B-80			
Logged By: Y. Chiba		Drilling Method: 4" Auger			
Total Depth: 10 feet		Driving Energy: 140 lb. wt., 30 in. drop			
Work Order: 5189-20					



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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION PHASE 1 Keeau Bypass Road to Shower Drive Fed. Aid Proj. No. STP-0130(28), Phase 1 Scale: As Noted Date: June 2012	
DATE	REVISION
SHEET No. G18 OF 18 SHEETS	