FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	229	288

GEOLABS, INC.

Geotechnical Engineering

Soil 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 (NP=NON-PLASTIC)
	(3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX (NP=NON-PLASTIC)
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	UU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)

Plate A-0.1

LOG LEGEND FOR SOIL 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

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

TEDDY S. T. KWOK LICENSED PROFESSIONAL ENGINEER No. 7951-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

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

SHEET No. G1 OF 18 SHEETS

DATE	REVISION

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	230	288

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 DATA
NOTE BOOK No.
SURVEY PLOTTED BY DATE
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY

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.

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Teddy S T Kwok 04/30/14
SIGNATURE 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

SHEET No. G2 OF 18 SHEETS

DATE	REVISION

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

Approximate Ground Surface Elevation (feet MSL): 331 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	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
							10				* Elevations estimated from Roadway Plans dated June 2007 prepared by Wilson Okamoto Corporation.

Date Started:	August 26, 2004	Water Level: ▽	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

BORING LOG_DOT_5189-00&10(A).GPJ GEOLABS.GDT 3/18/10

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

Approximate Ground Surface Elevation (feet MSL): 340 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	15	102			25/.2'					ML	Dark gray SANDY SILT with gravel, very stiff, damp (fill)
			80	32			5				Gray moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)
							10				Boring terminated at 7.3 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:	7.3 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG_DOT_5189-00&10(A).GPJ GEOLABS.GDT 3/18/10

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

Approximate Ground Surface Elevation (feet MSL): 345 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										GW	4-inch ASPHALTIC CONCRETE
										GM	8-inch BASE COURSE
	4	117			69					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
							10				

Date Started:	August 26, 2004	Water Level: ▽	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

BORING LOG_DOT_5189-00&10(A).GPJ GEOLABS.GDT 3/18/10

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

Approximate Ground Surface Elevation (feet MSL): 334 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										ML	Dark gray SANDY SILT, stiff, damp (fill)
			100	75			5				Gray moderately vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)
							10				Boring terminated at 6.4 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:	6.4 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG_DOT_5189-00&10(A).GPJ GEOLABS.GDT 3/18/10

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

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

DATE	REVISION

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. G3 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	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

Approximate Ground Surface Elevation (feet MSL): 319 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	9	107			40/.4' +15/.0'					ML	Dark gray SANDY SILT with gravel, very stiff, damp (fill)
			100	57			5				Gray moderately vesicular BASALT, moderately fractured, highly weathered, medium hard (basalt formation)
							10				Boring terminated at 6.7 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:	6.7 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG_DOT 5189-00A10A.GPJ GEOLABS.GDT 6/18/13

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

Approximate Ground Surface Elevation (feet MSL): 310.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
								2" H		GM	Dark brown SILTY GRAVEL, medium dense, damp (fill)
			79	79			5				Gray slightly to moderately vesicular BASALT, slightly fractured, slightly weathered, very hard (basalt formation)
							10				Boring terminated at 6.5 feet

Date Started:	August 30, 2004	Water Level: ⧖	Not Encountered
Date Completed:	August 30, 2004		
Logged By:	B. Bachelder	Drill Rig:	DIEDRICH D-25
Total Depth:	6.5 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG_DOT 5189-00A10A.GPJ GEOLABS.GDT 6/18/13

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

Approximate Ground Surface Elevation (feet MSL): 326 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										GM	Dark brown SILTY GRAVEL with cobbles and sand, medium dense, damp (fill)
			65				5				Gray GRAVEL AND COBBLES (BASALTIC), loose, damp (fill)
			94	31			10				Gray moderately vesicular BASALT, closely to moderately fractured, moderately weathered, medium hard (basalt formation)
							15				Boring terminated at 11.6 feet

Date Started:	August 26, 2004	Water Level: ⧖	Not Encountered
Date Completed:	August 26, 2004		
Logged By:	B. Bachelder	Drill Rig:	DIEDRICH D-25
Total Depth:	11.6 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG_DOT 5189-00A10A.GPJ GEOLABS.GDT 6/18/13

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

DATE | REVISION

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

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. G4 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	233	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 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
										SM	Dark brown SILTY SAND, medium dense, damp
											COBBLES (BASALTIC), dense (fill)
			92	65							Gray moderately vesicular BASALT, slightly to moderately fractured, moderately weathered, hard (basalt formation)
							5				
											Boring terminated at 6.2 feet
							10				

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

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

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			35/.3' +20/.1'					SP-SM	Dark brown poorly graded SAND with silt and gravel, dense, moist (fill)
			77	17			5				Gray moderately vesicular BASALT, severely fractured, moderately weathered, soft to medium hard (basalt formation)
											Boring terminated at 5.9 feet
							10				

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

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

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)
											possible VOID
			83	75			5				
	39				16					GW-GM	Reddish brown well-graded GRAVEL with silt and sand, loose, moist
			26				10				
											grades with gray cobbles (basaltic)
	10				6/.5' +25/.3' Ref.						
			100	38			15				Gray moderately vesicular BASALT, closely fractured, highly weathered, medium hard (basalt formation)
											grades to slightly fractured, slightly weathered, hard
			100	100			20				
			38	12			25				Reddish gray COBBLES AND BOULDERS (BASALTIC), dense
							30				Boring terminated at 29.3 feet
							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

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

SURVEY PLOTTED BY ____ DATE
DRAWN BY ____ * * * *
TRACED BY ____
DESIGNED BY ____
QUANTITIES BY ____
CHECKED BY ____

ORIGINAL PLAN
NOTE BOOK
No. ____

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE
GEOLABS, INC.

DATE | REVISION

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. G5 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	234	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 11

Approximate Ground Surface Elevation (feet MSL): 292 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										CH	Reddish brown SILTY CLAY with cobbles and boulders (basaltic), stiff, damp (fill)
			84	22	20/.0' Ref.						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: ▽	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

BORING LOG DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/15

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

Approximate Ground Surface Elevation (feet MSL): 288.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
			66	45							Gray moderately vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation) possible VOID
			57	20			5				
										GW	Brownish gray well-graded GRAVEL with sand, loose, moist
	18				4/.5' +25/.4' Ref.		10				
			88	88							Gray slightly vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)
			90	57			15				
											Gray highly vesicular BASALT, moderately fractured, moderately weathered, medium hard to soft (basalt formation)
			47	25			20				grades to severely fractured, highly weathered, soft
	16		100	67	3/.5' +25/.3' Ref.		25				Gray moderately to highly vesicular BASALT, moderately fractured, moderately weathered, medium hard to soft (basalt formation) grades to hard
			80	28			30				grades to highly vesicular
							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:	49.5 feet	Drilling Method:	HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/15

SURVEY PLOTTED BY ____ DATE ____
DRAWN BY ____
TRACED BY ____
DESIGNED BY ____
QUANTITIES BY ____
CHECKED BY ____

ORIGINAL PLAN
NOTE BOOK ____
No. ____

DATE | REVISION

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

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Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	235	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 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

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

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

Approximate Ground Surface Elevation (feet MSL): 288.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
			52	20							Gray moderately vesicular BASALT, moderately to closely fractured, slightly weathered, hard (basalt formation)
			100	67			5				grades to moderately fractured, medium hard
	21				20/.3' Ref.		10			GP	Reddish brown poorly graded GRAVEL with sand, loose, moist
			100	80							Gray moderately to slightly vesicular BASALT, slightly to moderately fractured, moderately weathered, hard (basalt formation)
			78	52			15				CLINKER layer
											grades to moderately vesicular, moderately fractured
			100				20				grades to closely to moderately fractured, moderately to slightly weathered highly vesicular pockets at 21 and 21.8 feet
			100	100			25				grades to slightly vesicular, slightly fractured, slightly weathered, very hard
			98	52			30				
							35				

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

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

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

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

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Teddy S T Kwok 04/30/14
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GEOLABS, INC.

DATE	REVISION

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. G7 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	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)
											Gray moderately vesicular BASALT, severely fractured, moderately weathered, medium hard (basalt formation)
			83	75			40				grades to slightly fractured, slightly weathered, hard
											grades to highly vesicular
			85	33			45				grades to slightly vesicular, moderately fractured
											grades to highly vesicular, highly weathered
							50				Boring terminated at 50 feet
							55				

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

BORING_LOG_DOT 5189-00&10A\GPJ GEOLABS.GDT 5/18/10

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

Approximate Ground Surface Elevation (feet MSL): 288.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
			76	53							Gray moderately vesicular BASALT, moderately fractured, slightly weathered, hard (basalt formation)
											possible VOID
			98	73			5				grades to slightly fractured
											Gray highly vesicular BASALT, closely fractured, moderately weathered, soft (basalt formation)
			70	22			10				
											Gray moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)
			97	83			15				grades to hard
										GW	Reddish gray well-graded GRAVEL with sand, medium dense, moist (clinker)
			8				20				
		12			11/.5' +20/.1' Ref.		25				Gray moderately vesicular BASALT, moderately to closely fractured, moderately weathered, hard (basalt formation)
			100	30							
											grades to slightly to moderately fractured
			70	70			30				
											Reddish gray COBBLES (BASALTIC), dense (clinker)
			47	15			35				

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

BORING_LOG_DOT 5189-00&10A.GPJ GEOLABS.GDT 5/18/10

SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

ORIGINAL PLAN
NOTE BOOK
No.

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

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Teddy S T Kwok 04/30/14
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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. G8 OF 18 SHEETS

DATE	REVISION

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	237	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 14

(Continued from previous plate)

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
			88	45			40				Gray moderately vesicular BASALT, moderately fractured, slightly weathered, hard (basalt formation)
											grades to highly vesicular
			97	58			45				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

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

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 15

Approximate Ground Surface Elevation (feet MSL): 288.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	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				48		25				
			100	79							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

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

ORIGINAL PLAN
NOTE BOOK
No.

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

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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. G9 OF 18 SHEETS

DATE	REVISION

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	238	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 15

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
			53	35							
											Reddish gray COBBLES (BASALTIC), dense (clinker)
			82	72			40				Gray moderately vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)
	42				3/.5' +17/.4' Ref.		45			MH	Reddish brown CLAYEY SILT, soft, moist
			100	74							Gray highly vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)
											grades to severely fractured, soft
											grades to slightly fractured, hard
							50				Boring terminated at 50 feet
							55				

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

BORING LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/19/15

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 16

Approximate Ground Surface Elevation (feet MSL): 298.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	9	114			61					GW	Brown well-graded GRAVEL with sand, dense, damp (fill)
	7				40						
							5				Gray BASALT, very dense
											Boring terminated at 5 feet
							10				

Date Started:	August 30, 2004	Water Level: ⧖	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

BORING LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/19/15

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 17

Approximate Ground Surface Elevation (feet MSL): 305.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	11	111			53/.5' +50/.3' Ref.					SM	Dark grayish brown SILTY SAND with gravel, very dense, damp (fill)
	8				36/.5' +30/.2' Ref.						grades with cobbles (basaltic)
					20/.0' Ref.		5				Boring terminated at 5 feet
							10				

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 feet	Drilling Method:	4" Auger
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/19/15

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 18

Approximate Ground Surface Elevation (feet MSL): 321.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										SM	Brown SILTY SAND, medium dense, damp (fill)
	14	100	98	17	31/.4' Ref.						Gray slightly to moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)
							5				Boring terminated at 5.4 feet
							10				

Date Started:	August 26, 2004	Water Level: ⧖	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

BORING LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/19/15

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

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

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Teddy S T Kwok 04/30/14
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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. G10 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	239	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 19

Approximate Ground Surface Elevation (feet MSL): 338 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										GM	Reddish brown SILTY GRAVEL, dense, damp (fill)
			56	12							Reddish gray COBBLES AND GRAVEL (BASALTIC), dense, damp
							5				Gray moderately vesicular BASALT, closely fractured, highly weathered, medium hard (basalt formation)
			85	60							grades to slightly fractured, hard
							10				Reddish gray highly vesicular BASALT, closely fractured, moderately weathered, soft (basalt formation)
			100	68							Gray moderately vesicular BASALT, slightly to moderately fractured, slightly weathered, medium hard (basalt formation)
							15				Boring terminated at 16 feet
							20				

Date Started:	September 10, 2004	Water Level: ▽	Not Encountered
Date Completed:	September 10, 2004		
Logged By:	B. Bachelder	Drill Rig:	DIEDRICH D-25
Total Depth:	16 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 20

Approximate Ground Surface Elevation (feet MSL): 310 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	17	116			42/.5' Ref.					ML	Reddish brown SANDY SILT with cobbles (basaltic), very stiff, damp (fill)
			39	8			5				Gray moderately to highly vesicular BASALT very dense (possible cobble and boulder riprap fill)
			72	12							Gray slightly to moderately vesicular BASALT, severely fractured, highly weathered, medium hard (basalt formation)
			100	77			10				grades to slightly fractured, slightly to moderately weathered, hard
							15				Boring terminated at 17.3 feet
							20				

Date Started:	August 31, 2004	Water Level: ▽	Not Encountered
Date Completed:	August 31, 2004		
Logged By:	B. Bachelder	Drill Rig:	DIEDRICH D-25
Total Depth:	17.3 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING_LOG_DOT 5189-00&10(A).GPJ GEOLABS.GDT 5/18/10

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

Teddy S.T. Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

DATE	REVISION

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. G11 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	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**

Approximate Ground Surface Elevation (feet MSL): 325.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											7.5-inch ASPHALTIC CONCRETE
	7	108			46						5-inch BASE COURSE
										ML	Dark brown SANDY SILT with cobbles (basaltic), stiff, damp
	8				32						Hit waterline at 3 feet
							5				Boring terminated at 4 feet
							10				

Date Started:	August 30, 2004	Water Level: ▽	Not Encountered
Date Completed:	August 30, 2004		
Logged By:	B. Bachelder	Drill Rig:	DIEDRICH D-25
Total Depth:	4 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 **21A**

Approximate Ground Surface Elevation (feet MSL): 325.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										ML	Dark brown SANDY SILT with gravel, stiff, damp (fill)
	15				33						
			96	22			5				Gray moderately vesicular BASALT, moderately fractured, moderately weathered, medium hard (basalt formation)
			82	15							grades to closely fractured, soft
			82	13			10				grades to severely fractured
							15				
											Boring terminated at 17.3 feet
							20				

Date Started:	August 30, 2004	Water Level: ▽	Not Encountered
Date Completed:	August 30, 2004		
Logged By:	B. Bachelder	Drill Rig:	DIEDRICH D-25
Total Depth:	17.3 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
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KEAAU - PAHOA ROAD
SHOULDER LANE CONVERSION
KEAAU BYPASS ROAD TO SHOWER DRIVE
KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII

Log of Boring **101**

Approximate Ground Surface Elevation (feet MSL): 295.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											Gray COBBLES AND BOULDERS (BASALTIC), dense
			71	48			5				Gray highly vesicular BASALT, moderately fractured, moderately weathered, medium hard to hard (basalt formation)
			97	55			10				
			77	35			15				grades to slightly vugular
			30	0			20				grades to vugular with olivine crystals, severely fractured possible VOID
			100	58			25				Gray moderately vesicular to moderately vugular BASALT with olivine crystals, moderately to severely fractured, moderately weathered, medium hard to hard (basalt formation)
			83	45			30				grades with cinder layers VOID VOID VOID
			100	75			35				grades to massive to severely fractured, hard

Date Started:	May 9, 2007	Water Level: ▽	Not Encountered
Date Completed:	May 9, 2007		
Logged By:	D. Gremminger	Drill Rig:	MOBILE B-53
Total Depth:	52 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

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

FEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

DATE	REVISION

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. G12 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	241	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 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							Reddish brown highly vesicular CINDER, medium hard to hard (clinker)
											VOID
							45				Gray moderately vesicular to moderately vugular BASALT, slightly to severely fractured, moderately weathered, medium hard to hard (basalt formation)
			92	73							possible VOID
							50				Boring terminated at 52 feet
							55				

Date Started:	May 9, 2007	Water Level: ⧖	Not Encountered
Date Completed:	May 9, 2007		
Logged By:	D. Gremminger	Drill Rig:	MOBILE B-53
Total Depth:	52 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring
Work Order:	5189-00 & 10 (A)	Driving Energy:	140 lb. wt., 30 in. drop

BORING LOG DOT 5189-00&10(A).GPJ GEOLABS.GDT 6/18/10

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							Gray highly vesicular BASALT, closely to severely fractured, moderately weathered, medium hard to hard (basalt formation)
			83	25							
			78	73			5				grades to slightly to moderately fractured
			82	78			10				possible VOID
			75	65			15				possible VOID
			78	48			20				Gray highly vesicular to moderately vugular BASALT with olivine crystals, moderately to severely fractured, moderately weathered, hard (basalt formation)
			83	42			25				
			87	82			30				grades to vugular
							35				Boring terminated at 34 feet

Date Started:	May 8, 2007	Water Level: ⧖	Not Encountered
Date Completed:	May 9, 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

BORING LOG DOT 5189-00&10(A).GPJ GEOLABS.GDT 6/18/10

ORIGINAL PLAN
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TEDDY S. T. KWOK LICENSED PROFESSIONAL ENGINEER No. 7951-C HAWAII, U.S.A.

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

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. G13 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	2012	242	288

GEOLABS, INC.
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KEAAU - PAHOA ROAD
SHOULDER LANE CONVERSION
KEAAU BYPASS ROAD TO SHOWER DRIVE
KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII

Log of Boring 103

Approximate Ground Surface Elevation (feet MSL): 288 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
			83	83							Gray moderately to highly vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)
			89	78							
			98	97			5				
			57	30			10				grades to moderately to severely fractured
			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
										CH	Reddish brown CLAY seam
							35				Boring terminated at 34 feet

Date Started:	May 7, 2007	Water Level: ▽	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

BORING_LOG_DOT_5189-00&10(A).GPJ GEOLABS.GDT 6/18/10

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KEAAU - PAHOA ROAD
SHOULDER LANE CONVERSION
KEAAU BYPASS ROAD TO SHOWER DRIVE
KEAAU, DISTRICT OF PUNA, ISLAND OF HAWAII

Log of Boring 104

Approximate Ground Surface Elevation (feet MSL): 297.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	8				20					GW-GM	Dark gray well-graded GRAVEL (BASALTIC) with silt and sand, medium dense, damp (fill)
			25				5				Dark gray COBBLES AND BOULDERS (BASALTIC), dense
			92	42			10				Gray moderately vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)
			97	73			15				grades to highly vesicular, massive to closely fractured VOID at 12.5 feet VOID
			60	27			20				grades to slightly to severely fractured possible VOID
			0								Gray GRAVEL AND COBBLES (BASALTIC), loose, damp
							25			CH	Reddish brown SILTY CLAY, soft, damp
			0								
	4		33	0	37/.3' Ref.		30				Gray COBBLES AND BOULDERS (BASALTIC) with olivine crystals, dense
							35				

Date Started:	May 10, 2007	Water Level: ▽	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

BORING_LOG_DOT_5189-00&10(A).GPJ GEOLABS.GDT 6/18/10

SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

ORIGINAL PLAN
NOTE BOOK
No.

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

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Teddy ST Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

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. G14 OF 18 SHEETS

DATE	REVISION

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-0130(28)PHJ	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
			88	35			40				Gray moderately vesicular BASALT with olivine crystals, moderately to severely fractured, moderately weathered, hard (basalt formation)
			79	62							grades to highly vesicular to slightly vugular, slightly to closely fractured
	55									CH	CLAY seam
							45				Boring terminated at 45 feet
							50				

Date Started:	May 10, 2007	Water Level: ▽	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
										SW-SM	4-inch ASPHALTIC CONCRETE
	5				28						Dark gray well-graded SAND with silt and gravel, medium dense, damp (fill)
	4				27/.0' Ref.						Gray BASALT, dense
					15/.0' Ref.		5				Boring terminated at 5 feet
							10				

Date Started:	May 3, 2007	Water Level: ▽	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
										GW-GM	4.5-inch ASPHALTIC CONCRETE
	5				54						Dark gray well-graded GRAVEL with silt and sand, very dense, damp (fill)
	6				33/.5' Ref.						Gray BASALT, dense
					15/.0' Ref.		5				Boring terminated at 5 feet
							10				

Date Started:	May 3, 2007	Water Level: ▽	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
										GW-GM	4-inch ASPHALTIC CONCRETE
	7				56						Dark gray well-graded GRAVEL with silt and sand, very dense, damp (fill)
	4				27/.3' Ref.						Gray BASALT, dense
					15/.0' Ref.		5				Boring terminated at 5 feet
							10				

Date Started:	May 3, 2007	Water Level: ▽	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

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

DATE | REVISION

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TEDDY S.T. KWOK — LICENSED PROFESSIONAL ENGINEER — No. 7951-C — HAWAII, U.S.A.

Teddy S.T. Kwok 04/30/14
SIGNATURE — EXPIRATION DATE OF THE LICENSE
GEOLABS, INC.

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. G15 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	244	288

GEOLABS, INC.
Geotechnical Engineering

KEAAU-PAHOA ROAD
SOUTHBOUND SHOULDER LANE
KEAAU BYPASS TO SHOWER DRIVE
KEAAU, DISTRICT OF PUNA, HAWAII

Log of Boring 201

Approximate Ground Surface Elevation (feet): 325 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											10-inch ASPHALTIC CONCRETE
										GW	Dark gray SANDY GRAVEL (BASALTIC) with some silt, medium dense, damp (base course)
	25				35					GW	Dark brown with multi-color mottling SANDY GRAVEL (BASALTIC) with traces of silt, medium dense, damp (fill)
	18				14						
	5				11		5				grades with cobbles
										SM	Reddish brown with gray mottling SILTY SAND (BASALTIC) with some gravel, dense, moist (cinder)
	17				15/3"		10				
											Boring terminated at 10.75 feet
							15				* 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		
Logged By:	Y. Chiba	Drill Rig:	MOBILE B-80
Total Depth:	10.75 feet	Drilling Method:	4" Auger
Work Order:	5189-20	Driving Energy:	140 lb. wt.,30 in. drop

BORING_LOG_DOT 5189-20.GPJ GEOLABS.GDT 5/18/10

GEOLABS, INC.
Geotechnical Engineering

KEAAU-PAHOA ROAD
SOUTHBOUND SHOULDER LANE
KEAAU BYPASS TO SHOWER DRIVE
KEAAU, DISTRICT OF PUNA, HAWAII

Log of Boring 202

Approximate Ground Surface Elevation (feet): 342 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											8-inch ASPHALTIC CONCRETE
										GW	Dark gray SANDY GRAVEL (BASALTIC), dense, damp (base course)
	7				34					SW	Dark grayish brown GRAVELLY SAND (BASALTIC) with some silt, medium dense, damp (fill)
					8/1"					GP	Gray with multi-color mottling GRAVEL (BASALTIC) with cobbles and some sand, dense, damp (clinker)
			98	89			5				Gray vesicular BASALT, slightly fractured, slightly weathered, very hard
			100	100			10				Boring terminated at 10 feet

Date Started:	February 19, 2009	Water Level: ▽	Not Encountered
Date Completed:	February 19, 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

BORING_LOG_DOT 5189-20.GPJ GEOLABS.GDT 5/18/10

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

DATE	REVISION

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

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Teddy S T Kwok 04/30/14
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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. G16 OF 18 SHEETS

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

Approximate Ground Surface Elevation (feet): 315 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											4-inch ASPHALTIC CONCRETE
	7				17/3"					SW-SM	Dark grayish brown well-graded SAND (BASALTIC) with silt and gravel, dense, damp (base course)
			98	95	5/1"		5				Gray vesicular BASALT, closely fractured, slightly weathered, very hard
			100	100							grades to slightly fractured
							10				Boring terminated at 10 feet
							15				

Date Started:	February 18, 2009	Water Level: ▽	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

BORING LOG.DOT 5189-20.GPJ GEOLABS.GDT 5/19/10

GEOLABS, INC.
Geotechnical Engineering

KEAAU-PAHOA ROAD
SOUTHBOUND SHOULDER LANE
KEAAU BYPASS TO SHOWER DRIVE
KEAAU, DISTRICT OF PUNA, HAWAII

Log of Boring 204

Approximate Ground Surface Elevation (feet): 321 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											4-inch ASPHALTIC CONCRETE
	15				19/6" +5/0"					SW	Dark gray GRAVELLY SAND (BASALTIC) with some silt, dense, damp (base course)
										SC	Dark grayish brown CLAYEY SAND (BASALTIC) with some gravel, medium dense, moist (fill)
			100	94			5				Gray vesicular BASALT, closely to moderately fractured, slightly weathered, very hard
			100	92							grades to slightly fractured
							10				Boring terminated at 10 feet
							15				

Date Started:	February 18, 2009	Water Level: ▽	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

BORING LOG.DOT 5189-20.GPJ GEOLABS.GDT 5/19/10

SURVEY PLOTTED BY ____ DATE ____
DRAWN BY ____
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ORIGINAL PLAN
NOTE BOOK
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TEDDY S. T. KWOK LICENSED PROFESSIONAL ENGINEER No. 7951-C HAWAII, U.S.A.

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE
GEOLABS, INC.

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. G17 OF 18 SHEETS

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

Approximate Ground Surface Elevation (feet): 316 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											4-inch ASPHALTIC CONCRETE
	8				20/3"					SW	Dark gray GRAVELLY SAND (BASALTIC), dense, damp (base course)
			87	50			5				Gray vesicular BASALT, closely fractured, slightly weathered, very hard
											VOID
			100	100							grades to slightly fractured
							10				Boring terminated at 10 feet
							15				

Date Started:	February 18, 2009	Water Level: ▽	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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Geotechnical Engineering

KEAAU-PAHOA ROAD
SOUTHBOUND SHOULDER LANE
KEAAU BYPASS TO SHOWER DRIVE
KEAAU, DISTRICT OF PUNA, HAWAII

Log of Boring 206

Approximate Ground Surface Elevation (feet): 330.5 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											5-inch ASPHALTIC CONCRETE
										SW	Dark gray GRAVELLY SAND (BASALTIC), dense, damp (base course)
	7				36					SW-SM	Dark grayish brown well-graded SAND (BASALTIC) with silt and gravel, medium dense, damp (fill)
					6/3"					GP	Gray COBBLES (BASALTIC) with gravel and sand, dense, damp (fill)
			100	100			5				Gray vesicular BASALT, slightly fractured, slightly weathered, very hard
							10				Boring terminated at 10 feet
							15				

Date Started:	February 19, 2009	Water Level: ▽	Not Encountered
Date Completed:	February 19, 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

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

TEDDY S. T. KWOK
LICENSED PROFESSIONAL ENGINEER
No. 7951-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Teddy S T Kwok 04/30/14
SIGNATURE EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

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SHEET No. G18 OF 18 SHEETS

DATE	REVISION