

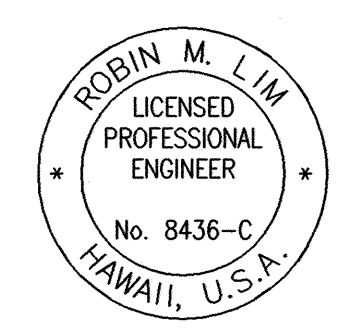
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(4)	2003	71	76



**LEGEND:**  
B-7 APPROXIMATE BORING LOCATION AND NUMBER



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

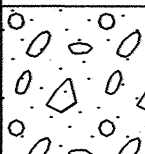


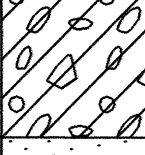
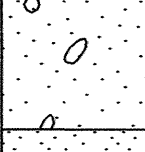
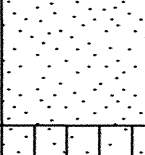
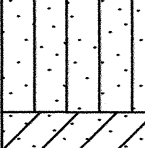
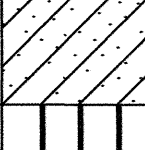
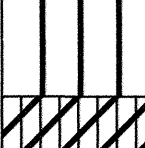
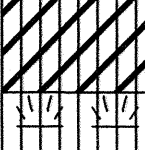
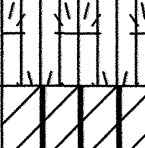
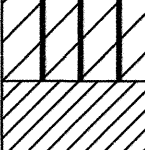
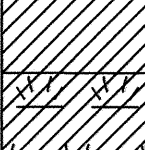
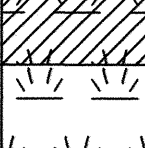
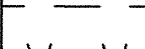


THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION  
SIGNATURE: *Robin M. Lim* 4-30-04  
EXPIRATION DATE OF THE LICENSE  
GEOLABS, INC.

DATE	REVISION
	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
	<u>BORING LOCATION PLAN</u>
	<u>KAMEHAMEHA V HIGHWAY</u> <u>EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE</u> <u>FEDERAL AID PROJECT NO. ER-12(4)</u>
	Scale: As Noted Date: Nov. 25, 2002
	SHEET NO. 61 OF 6 SHEETS

# Boring 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



3-INCH O.D. MODIFIED CALIFORNIA SAMPLE



SHELBY TUBE SAMPLE



GRAB SAMPLE



CORE SAMPLE

LL

LIQUID LIMIT

PI

PLASTICITY INDEX

TV

TORVANE SHEAR (tsf)

PEN

POCKET PENETROMETER (tsf)



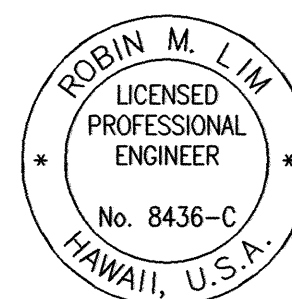
WATER LEVEL OBSERVED IN BORING

## GEOTECHNICAL NOTES

- A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Kamehameha V Highway, Emergency Replacement Of Kawaikapu Bridge, Federal Aid Project No. ER-12(4), Island Of Molokai, Hawaii" dated March 2001 has been prepared by Geolabs, Inc. A copy of the report is on file at the office of the Engineer for review by the Contractor.
- For boring locations, see Sheet G1.
- 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 subsurface conditions from those depicted in the logs of borings may occur between and beyond the borings.
- The penetration resistance shown on the logs of borings indicate the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.
- The data given is for general information only. Bidders shall examine the site and the boring data and draw their own conclusions therefrom as to the character of materials to be encountered. The Engineer will not assume responsibility for variations of subsurface material quality or conditions other than at the boring locations shown and at the time the borings were taken.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(4)	2003	72	76

SURVEY PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NO.	



THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION  
SIGNATURE: *Robin M. Lim* EXPIRATION DATE OF THE LICENSE: 4-30-04  
GEOLABS, INC.


DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>LEGEND AND NOTES</u>	
KAMEHAMEHA V HIGHWAY EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE FEDERAL AID PROJECT NO. ER-12(4)	
Scale: As Noted	Date: Nov. 25, 2002

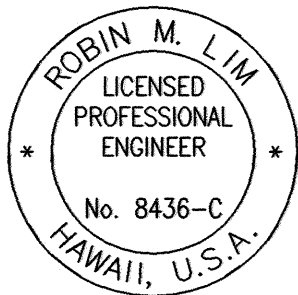
SHEET No. G2 OF 6 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(4)	2003	73	76

GEOLABS, INC. Geotechnical Engineering					EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI					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): 8 *	
										Description	
TV=0.2	29	77			20	2.0			MH	Dark brown CLAYEY SILT with some sand and gravel, very stiff, damp to moist (fill)	
	32				6					grades with more sand, medium stiff	
	38	80			2	<0.5	5		MH	Dark brown mottled purple CLAYEY SILT with some sand, very soft, wet (alluvium)	
	23				22		10		GM	Brown SILTY GRAVEL with some sand, medium dense (alluvium)	
	41	81			5		15			grades with more sand	
TV=0.15	52				3		20		MH	Dark brown SANDY SILT with gravel and traces of shell fragments, very soft (alluvium)	
	86	51			5	<0.5	25		MH	Dark brown SANDY SILT with traces of clay, soft (alluvium)	
	69				5		30			grades with traces of shell fragments	
TV=0.15	64	63			2	<0.5	35		MH	Dark gray CLAYEY SILT with traces of sand, very soft (lagoonal)	
TV=0.25	61	60			5	<0.5	40				
LL=58 PI=6	69				12		45		SM	Dark gray SILTY SAND with gravel, medium dense (lagoonal)	
										50	
Date Started: January 16, 2001					Water Level: ∇ 7.5 ft. 01/16/01 1345 HRS						
Date Completed: January 19, 2001					5.1 ft. 01/19/01 1230 HRS						
Logged By: K. Gronseth					Drill Rig: CME-55						
Total Depth: 88 feet					Drilling Method: 4" Auger & HQ Coring						
Work Order: 4630-00					Driving Energy: 140 lb. wt., 30 in. drop						

GEOLABS, INC. Geotechnical Engineering							EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI				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	(Continued from previous plate)	
										Description	
	21	97	14		51		55		SM	BASALT BOULDER	
										Dark gray SILTY SAND with gravel, medium dense (lagoonal)	
										Dark gray SANDY SILT with some gravel, medium stiff (lagoonal)	
										BASALT BOULDER	
										Dark gray SILTY SAND with some gravel, loose to medium dense (lagoonal)	
										BASALT BOULDER	
										Dark gray SILTY GRAVEL with some sand, loose to medium dense (lagoonal)	
										Gray BASALT BOULDERS AND COBBLES with gravel, moderately weathered, hard to very hard (alluvium/colluvium)	
										Boring terminated at 88 feet	
										* Elevations estimated from Site Plan provided by Wilson Okamoto & Associates, Inc. on January 11, 2001.	
100											
Date Started: January 16, 2001							Water Level: ∇ 7.5 ft. 01/16/01 1345 HRS				
Date Completed: January 19, 2001							5.1 ft. 01/19/01 1230 HRS				
Logged By: K. Gronseth							Drill Rig: CME-55				
Total Depth: 88 feet							Drilling Method: 4" Auger & HQ Coring				
Work Order: 4630-00							Driving Energy: 140 lb. wt., 30 in. drop				




THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION  
SIGNATURE: *[Signature]* EXPIRATION DATE OF THE LICENSE: 4-30-04  
GEOLABS, INC.

DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KAMEHAMEHA V HIGHWAY EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE FEDERAL AID PROJECT NO. ER-12(4)	
Scale: As Noted	Date: Nov. 25, 2002

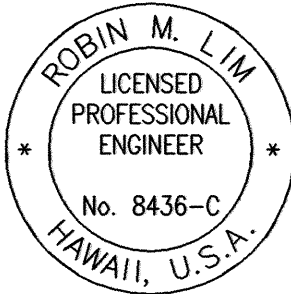
SHEET No. 63 OF 6 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(4)	2003	74	76

GEOLABS, INC. Geotechnical Engineering					EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI					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): 7.7 *	
										Description	
	21	97			24				ML	5-inch ASPHALT CONCRETE	
									SM	Brown SANDY SILT with gravel (fill)	
	31				7				MH	Dark brown SILTY SAND with gravel, medium dense, damp (fill)	
	48	69			4	<0.5	5		MH	Brown CLAYEY SILT with some sand and gravel, medium stiff, damp to moist (fill)	
										Dark brown CLAYEY SILT with some sand and gravel, soft, wet (alluvium)	
	18				13		10		GM	Dark brown SILTY GRAVEL with some sand, loose to medium dense (alluvium)	
					10		15				
	57				4	<0.5	20		MH	Dark brown SANDY SILT with some shell fragments, soft (alluvium)	
					7		25				
	72				3	<0.5	30		MH	Dark brown SANDY SILT with some shell fragments, very soft (alluvium)	
	57				2		35				
	63				2		40		MH	Dark gray CLAYEY SILT with some sand and organic material, very soft (lagoonal)	
	58				3		45			grades with shell fragments	
							50				
Date Started: January 17, 2001									Water Level:  6 ft. 01/17/01 0925 HRS		
Date Completed: January 17, 2001									6.8 ft. 01/17/01 1739 HRS		
Logged By: K. Gronseth									Drill Rig: CME-55		
Total Depth: 87 feet									Drilling Method: 4" Auger & HQ Coring		
Work Order: 4630-00									Driving Energy: 140 lb. wt., 30 in. drop		

GEOLABS, INC. Geotechnical Engineering					EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI					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	(Continued from previous plate)	
										Description	
TV=0.25	64	59			17	0.8	52		MH	Dark gray CLAYEY SILT with some sand and shell fragments and traces of organic material, stiff (lagoonal)	
	81				4		55		GM	Dark gray SILTY GRAVEL with some sand, medium dense (lagoonal)	
	37	81			13		60		MH	Dark gray CLAYEY SILT with some sand and shell fragments and traces of organic material, stiff (lagoonal)	
									SM	Dark gray SILTY SAND with some gravel, loose (lagoonal)	
	37				11		65			grades with more silt	
TV=0.3	65	65			13	<0.5	70		MH	Dark gray CLAYEY SILT with some sand, medium stiff to stiff (lagoonal)	
			100				75			Gray BASALT BOULDERS AND COBBLES with gravel, moderately weathered, hard to very hard (alluvium/colluvium)	
			30				80				
			50				85				
							87			Boring terminated at 87 feet	
							90				
							95				
							100				
Date Started: January 17, 2001									Water Level: ∇ 6 ft. 01/17/01 0925 HRS		
Date Completed: January 17, 2001									6.8 ft. 01/17/01 1739 HRS		
Logged By: K. Gronseth									Drill Rig: CME-55		
Total Depth: 87 feet									Drilling Method: 4" Auger & HQ Coring		
Work Order: 4630-00									Driving Energy: 140 lb. wt., 30 in. drop		



THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION  
SIGNATURE: *[Signature]* EXPIRATION DATE OF THE LICENSE: 4-30-04  
GEOLABS, INC.

DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KAMEHAMEHA V. HIGHWAY EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE FEDERAL AID PROJECT NO. ER-12(4)	
Scale: As Noted	Date: Nov. 25, 2002



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

DRAWN BY: \_\_\_\_\_

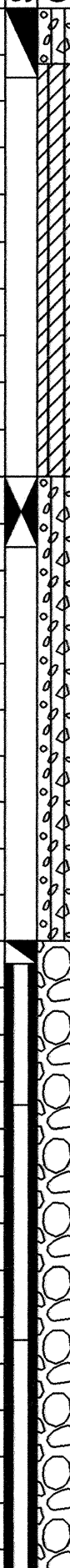

NOTED BY: \_\_\_\_\_

QUANTITIES BY: \_\_\_\_\_

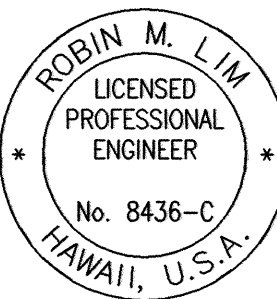
CHECKED BY: \_\_\_\_\_

ORIGINAL PLAN No. \_\_\_\_\_

GEOLABS, INC. Geotechnical Engineering						EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI				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): 6 *	
										Description	
TV=0.15	36	79			17	1.0	5	SM		Brown SILTY SAND with gravel, medium dense, damp (fill)	
					3		MH		Tannish brown SANDY SILT with some clay, very soft, wet (fill)		
					3		SM		Tan SILTY SAND, very loose, wet (fill/alluvium)		
					5		MH		Brown CLAYEY SILT with some sand, soft (fill/alluvium)		
							SP-SM		Tan SAND with some silt, loose (alluvium)		
	41				18		10		GM	Dark gray SILTY GRAVEL with some sand, loose (lagoonal)	
					15						
					7						
					20		MH		Dark gray CLAYEY SILT with some sand and traces of gravel and organic material, very soft (lagoonal)		
					25						
TV=0.1	61	61			2	0.8	30			grades with some shell fragments	
					35				grades with traces of coralline gravel		
					40		GM		Whitish brown SILTY CORALLINE GRAVEL with some sand, loose (alluvium)		
					45						
					50						
Date Started: January 19, 2001										Water Level: ∇ 4.8 ft. 01/19/01 1430 HRS	
Date Completed: January 20, 2001										4 ft. 01/20/01 1100 HRS	
Logged By: K. Gronseth										Drill Rig: CME-55	
Total Depth: 83.5 feet										Drilling Method: 4" Auger & HQ Coring	
Work Order: 4630-00										Driving Energy: 140 lb. wt., 30 in. drop	

GEOLABS, INC.		EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE					Log of Boring			
Geotechnical Engineering		DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI					3			
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
	48	49			4		55		GM MH GM	Brown CLAYEY SILT with some sand, soft (alluvium)
	60				Dark brown and grayish white SILTY CORALLINE GRAVEL, medium dense (lagoonal)					
	65									
	70				Gray BASALT BOULDERS AND COBBLES with gravel, moderately weathered, hard to very hard (alluvium/colluvium)					
	75									
	80									
	85				Boring terminated at 83.5 feet					
	90									
	95									
	100									
Date Started: January 19, 2001							Water Level:  4.8 ft. 01/19/01 1430 HRS			
Date Completed: January 20, 2001							4 ft. 01/20/01 1100 HRS			
Logged By: K. Gronseth							Drill Rig: CME-55			
Total Depth: 83.5 feet							Drilling Method: 4" Auger & HQ Coring			
Work Order: 4630-00							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.	ER-12(4)	2003	75	76



THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION  
SIGNATURE: \_\_\_\_\_ EXPIRATION DATE OF THE LICENSE: 4-30-04  
GEOLABS, INC.

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

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

BORING LOGS

KAMEHAMEHA V HIGHWAY  
EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE  
FEDERAL AID PROJECT NO. ER-12(4)

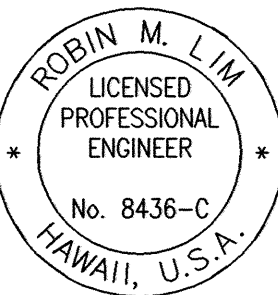
Scale: As Noted Date: Nov. 25, 2002

SHEET No. 65 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	ER-12(4)	2003	76	76

GEOLABS, INC. Geotechnical Engineering				EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI				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): 6 *	
										Description	
TV=0.15	26	68			29	2.3			MH	Brown CLAYEY SILT with sand and gravel, very stiff, dry to damp (fill)	
	24				7					grades to medium stiff	
	21	103			14		5		GM	Brown SILTY GRAVEL with sand, loose to medium dense (alluvium)	
	12				27		10			grades to medium dense	
	65				8		15		SM	Dark gray SILTY SAND with shell and wood fragments, loose to medium dense (lagoonal)	
	75	52			6	<0.5	20		MH	Dark gray SANDY SILT with some clay, shell and wood fragments, soft (lagoonal)	
	77				7	0.8	25			grades with more sand and without wood fragments	
	71				2	0.5	30				
	68				Push/ 1.5'		35				
	62	60			4	1.3	40		MH	Dark gray CLAYEY SILT with some sand, very soft to soft (lagoonal)	
TV=0.35							45				
							50		SM		
Date Started: January 20, 2001									Water Level: ∇ 4.5 ft. 01/20/01 1230 HRS		
Date Completed: January 20, 2001									4.8 ft. 01/20/01 1600 HRS		
Logged By: K. Gronseth									Drill Rig: CME-55		
Total Depth: 70 feet									Drilling Method: 4" Auger		
Work Order: 4630-00									Driving Energy: 140 lb. wt., 30 in. drop		

GEOLABS, INC. Geotechnical Engineering				EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE DISTRICT OF MOLOKAI, ISLAND OF MOLOKAI				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	(Continued from previous plate)	
										Description	
	47				4				SM	Dark gray SILTY SAND with traces of gravel, loose (lagoonal)	
							55		SM	Dark gray SILTY SAND with traces of gravel, loose (alluvium)	
	64				5		60				
	45				13		65				
							70			Gray BASALT BOULDERS AND COBBLES with gravel, moderately weathered, hard to very hard (alluvium/colluvium)	
										Boring terminated at 70 feet	



THIS WORK WAS PREPARED BY  
ME OR UNDER MY SUPERVISION  
SIGNATURE: *[Signature]* EXPIRATION DATE OF THE LICENSE: 4-30-04  
GEOLABS, INC.

DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
BORING LOGS	
KAMEHAMEHA V HIGHWAY EMERGENCY REPLACEMENT OF KAWAIKAPU BRIDGE FEDERAL AID PROJECT NO. ER-12(4)	
Scale: As Noted	Date: Nov. 25, 2002