FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	53	93

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
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	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
MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	SANDS	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	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
50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE	MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

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

GEOTECHNICAL NOTES

1. A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Kamehameha V Highway, Kawela Bridge Replacement, MP 5.110 To MP 5.118 Island of Molokai, Hawaii" dated October 5, 2010 has been prepared by Geolabs, Inc. A copy of the report is on file at the office of the Engineer for review by the Contractor.

2. For boring locations, see Sheet G-2.

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.

ROBIN M. LIM
LICENSED PROFESSIONAL ENGINEER
No. 8436-C
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2012
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

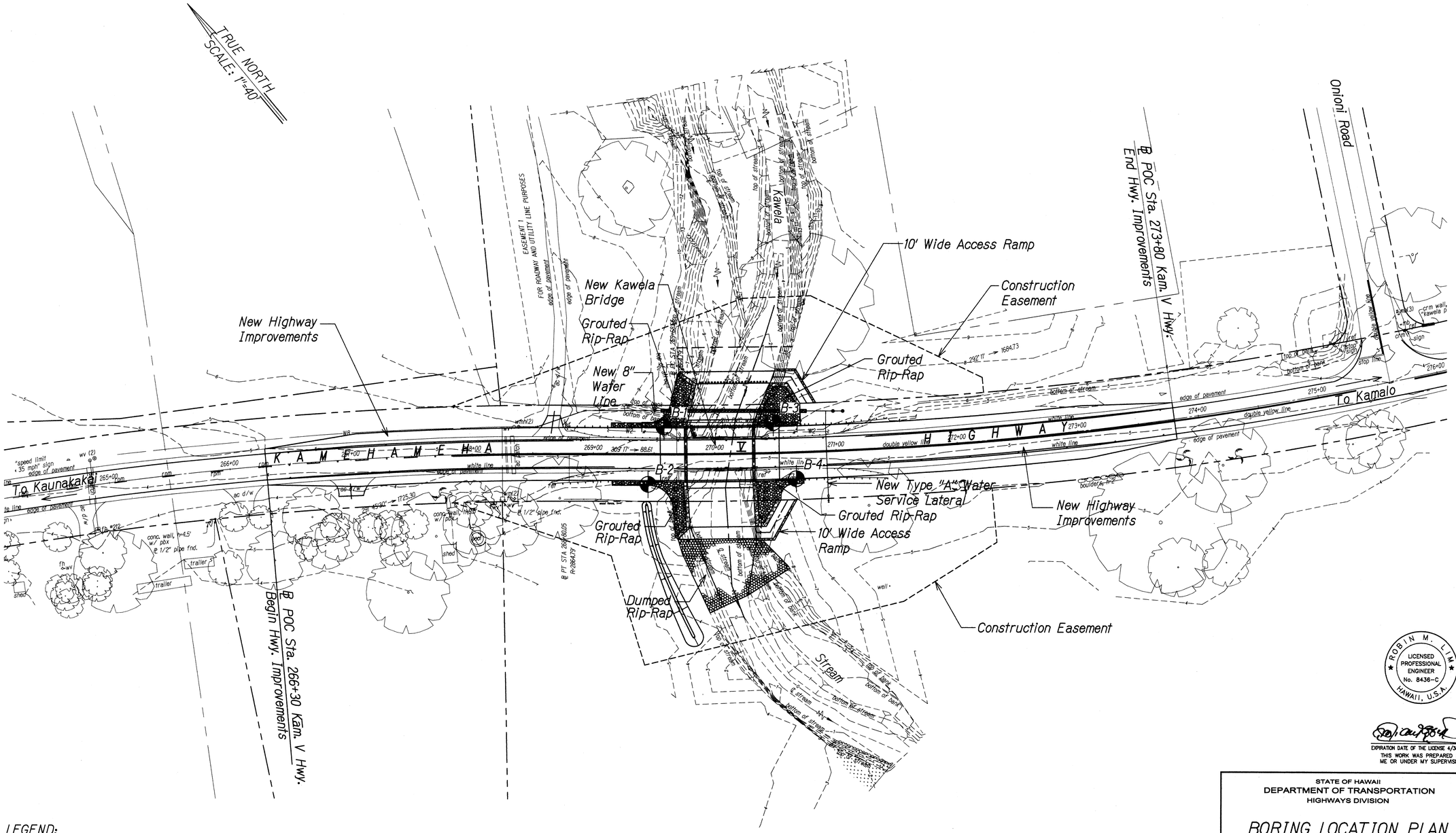
BORING LOG LEGEND & NOTES

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: October, 2010

SHEET No. G-1 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	54	93



LEGEND:

⊕ Approximate Boring Location

0 20 40 80 120 FT.

GRAPHIC SCALE

ROBIN M. LIM
LICENSED PROFESSIONAL ENGINEER
No. 8436-C
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2012
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

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HIGHWAYS DIVISION

BORING LOCATION PLAN

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: October, 2010

SHEET No. G-2 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	55	93

GEOLABS, INC.
Geotechnical Engineering

KAMEHAMEHA V HIGHWAY
KAWELA BRIDGE REPLACEMENT
MP 5.110 TO MP 5.118
ISLAND OF MOLOKAI, HAWAII

Log of Boring 1

Approximate Ground Surface Elevation (feet): 6 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	13	79			37/4" Ref.					ML	Grayish brown SANDY SILT with some gravel and cobbles, very hard, dry (fill)
	5				22		5				grades to very stiff
	22	101	0		26		10			SW-SM	Dark grayish black SILTY SAND (BASALTIC) with cobbles, medium dense to dense (river deposit)
			0		2		15			GW	Gray GRAVEL (BASALTIC) with traces of sand, very loose (lagoonal deposit)
			0		2		20				
	37		0		2		25			GM	Light gray SILTY GRAVEL with some sand, very loose (lagoonal deposit)
	42		0		2		30				
	14		0		6		35			GW-GM	Gray GRAVEL (CORALLINE) with sand and little silt, loose (lagoonal deposit)
	22		0		6		40				
	21		0		5		45			GM	Gray SILTY GRAVEL (CORALLINE) with sand, loose (lagoonal deposit)
	25		0		4		50				grades with traces of clay
	27		29		7		55			SM	Dark gray SILTY SAND (BASALTIC) with some gravel (coralline), loose (lagoonal deposit)
	24		60		29/4" Ref.	4.0					Dark gray COBBLES AND BOULDERS (BASALTIC), dense (alluvium)
			0		10/1" Ref.		60			ML	Dark brown SANDY SILT with some gravel, very dense (alluvium)
			47		13/2" Ref.		65				Dark gray COBBLES AND BOULDERS (BASALTIC), very dense (alluvium)
							70				Boring terminated at 72 feet
							75				

Date Started:	April 16, 2008	Water Level: ▽	4.7 ft. 4/16/08 1541 HRS
Date Completed:	April 16, 2008		
Logged By:	D. Gremminger	Drill Rig:	CME-55
Total Depth:	72 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5909-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
Geotechnical Engineering

KAMEHAMEHA V HIGHWAY
KAWELA BRIDGE REPLACEMENT
MP 5.110 TO MP 5.118
ISLAND OF MOLOKAI, HAWAII

Log of Boring 1

(Continued from previous plate)

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
							80				* Elevations estimated from General Plan transmitted by Austin, Tsutsumi & Associates, Inc. on June 25, 2008.
							85				
							90				
							95				
							100				
							105				
							110				
							115				
							120				
							125				
							130				
							135				
							140				
							145				
							150				

Date Started:	April 16, 2008	Water Level: ▽	4.7 ft. 4/16/08 1541 HRS
Date Completed:	April 16, 2008		
Logged By:	D. Gremminger	Drill Rig:	CME-55
Total Depth:	72 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5909-00	Driving Energy:	140 lb. wt., 30 in. drop

ROBIN M. LIM
LICENSED PROFESSIONAL ENGINEER
No. 8436-C
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS - 1

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: October, 2010

SHEET No. G-3 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	56	93

GEOLABS, INC.
Geotechnical Engineering

KAMEHAMEHA V HIGHWAY
KAWELA BRIDGE REPLACEMENT
MP 5.110 TO MP 5.118
ISLAND OF MOLOKAI, HAWAII

Log of Boring 2

Approximate Ground Surface Elevation (feet): 6 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
	15	68			12/1"			SM	Grayish brown SILTY SAND, very dense, dry (fill)
	26				Ref.				grades to loose, moist
					5		5		
	45	67			2			SP	Dark gray SAND with some gravel, very loose (lagoonal deposit)
			0				10		
					5				
			0				15		
	35				1			ML	Gray SILT with sand and gravel, very soft (lagoonal deposit)
			0				20		
	53				2				
			0				25		
	35				2			GM	Gray SILTY GRAVEL (CORALLINE) with some sand and traces of clay, very loose (lagoonal deposit)
			0				30		
	25				4				
			0				35		
	7				8			GW-GM	grades with less silt, loose
			0				40		
	15				10				
			0				45		
	31				11				
			0				50		
	35				6				
			33				55		Gray COBBLES AND BOULDERS (BASALTIC), very dense (alluvium)
	10				50/6"				
			67		Ref.		60		
					13/1"				
			69		Ref.		65		
			45						
							70		
					15/1"				Boring terminated at 72.1 feet
					Ref.		75		

Date Started:	April 17, 2008	Water Level: ▽	4.8 ft. 4/17/08 1544 HRS
Date Completed:	April 17, 2008		
Logged By:	D. Gremminger	Drill Rig:	CME-55
Total Depth:	72.1 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5909-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
Geotechnical Engineering

KAMEHAMEHA V HIGHWAY
KAWELA BRIDGE REPLACEMENT
MP 5.110 TO MP 5.118
ISLAND OF MOLOKAI, HAWAII

Log of Boring 3

Approximate Ground Surface Elevation (feet): 6 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
	23	92			31/2"			SM	Light gray SILTY SAND with gravel and some cobbles, very dense, dry (fill)
	7				Ref.				grades to dense
					40		5		
	45	72			9	1.3		ML	Dark gray SILT with fine sand, medium stiff to stiff (river deposit)
			0				10		
	21				2			GW	Grayish tan GRAVEL (CORALLINE) with sand, very loose (lagoonal deposit)
			0				15		
	34				2			GW-GM	grades with silt and traces of clay
			0				20		
	16				2			GW	grades without silt and clay
			0				25		
	57				2			SM	Gray SILTY SAND with gravel, very loose (lagoonal deposit)
			0				30		
	11				6				grades to loose
			0				35		
	24				6				
			0				40		
	38				3			ML	Gray GRAVELLY SILT with sand, very soft (lagoonal deposit)
			0				45		
	24				6			GM	Gray SILTY GRAVEL (CORALLINE) with sand, loose (lagoonal deposit)
			0				50		
			77		16/6" +15/2' Ref.				Gray COBBLES AND BOULDERS with gravel, very dense (alluvium)
			41		12/1" Ref.		55		
			47				60		
			51		15/1" Ref.		65		
							70		
							75		Boring terminated at 72 feet

Date Started:	April 15, 2008	Water Level: ▽	4.1 ft. 4/16/08 0928 HRS
Date Completed:	April 15, 2008		
Logged By:	D. Gremminger	Drill Rig:	CME-55
Total Depth:	72 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5909-00	Driving Energy:	140 lb. wt., 30 in. drop

ROBIN M. LIM
LICENSED PROFESSIONAL ENGINEER
No. 8436-C
HAWAII, U.S.A.

EXPIRATION DATE OF THE LICENSE 4/30/2012
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS - 2

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: October, 2010

SHEET No. G-4 OF 93 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-0450(8)	2011	57	93

GEOLABS, INC.
Geotechnical Engineering

KAMEHAMEHA V HIGHWAY
KAWELA BRIDGE REPLACEMENT
MP 5.110 TO MP 5.118
ISLAND OF MOLOKAI, HAWAII

Log of Boring 4

Approximate Ground Surface Elevation (feet): 6 *

Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	14	85			39					SM	Dark brownish gray SILTY SAND with gravel and cobbles, medium dense, dry (fill)
					46						grades to dense
	20				13		5			SP	Dark gray SAND, medium dense (lagoonal deposit)
			0								
					10		10				grades to loose
			0				15				
	41				2					SW-SM	grades with little silt, very loose
			0				20				
	6				3					GW	Grayish tan GRAVEL (CORALLINE) with sand, very loose (lagoonal deposit)
			0				25				
					2						
			0				30				
	20				5						grades to loose
			0				35				
					3						grades to very loose
			0				40				
					3						
			0				45				
	7				5						grades to loose
			0				50				
	15				7						
			0				55				
					35						Dark gray GRAVEL AND COBBLES (BASALTIC), dense (alluvium)
			43								grades to very dense
					15/1"		60				
			81		Ref.						
			0				65				
							70				
			47		25/2"						
					Ref.		75				

Date Started:	April 14, 2008	Water Level: ▽	5.3 ft. 4/15/08 0929 HRS
Date Completed:	April 14, 2008		
Logged By:	D. Gremminger	Drill Rig:	CME-55
Total Depth:	77 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5909-00	Driving Energy:	140 lb. wt., 30 in. drop

GEOLABS, INC.
Geotechnical Engineering

KAMEHAMEHA V HIGHWAY
KAWELA BRIDGE REPLACEMENT
MP 5.110 TO MP 5.118
ISLAND OF MOLOKAI, HAWAII

Log of Boring 4

(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
											Boring terminated at 77 feet
							80				
							85				
							90				
							95				
							100				
							105				
							110				
							115				
							120				
							125				
							130				
							135				
							140				
							145				
							150				

Date Started:	April 14, 2008	Water Level: ▽	5.3 ft. 4/15/08 0929 HRS
Date Completed:	April 14, 2008		
Logged By:	D. Gremminger	Drill Rig:	CME-55
Total Depth:	77 feet	Drilling Method:	4" Auger & HQ Coring
Work Order:	5909-00	Driving Energy:	140 lb. wt., 30 in. drop

ROBIN M. LIM
LICENSED PROFESSIONAL ENGINEER
No. 8436-C
HAWAII, U.S.A.

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BORING LOGS - 3

KAMEHAMEHA V HIGHWAY
Kawela Bridge Replacement
Federal Aid Project No. BR-0450(8)

Scale: AS NOTED Date: October, 2010

SHEET No. G-5 OF 93 SHEETS