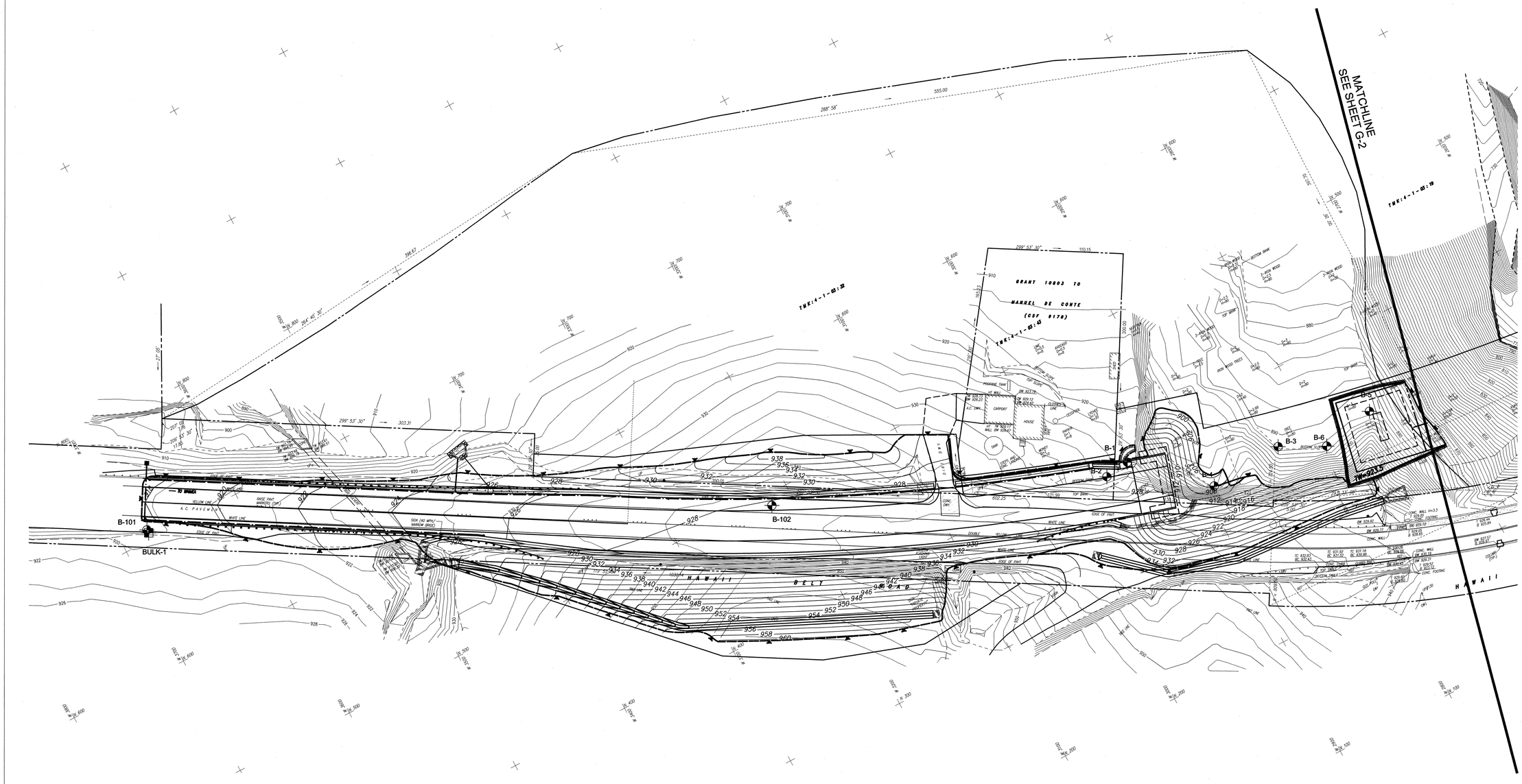
FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	4	155



BORING LOCATION PLAN 1

SCALE: 1"=40'

NORTH

GRAPHIC SCALE
40' 20' 0 40' 80' 120'

LEGEND:

- APPROXIMATE BORING LOCATION
- APPROXIMATE BULK SAMPLE LOCATION

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

ROBIN M. LIM
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GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

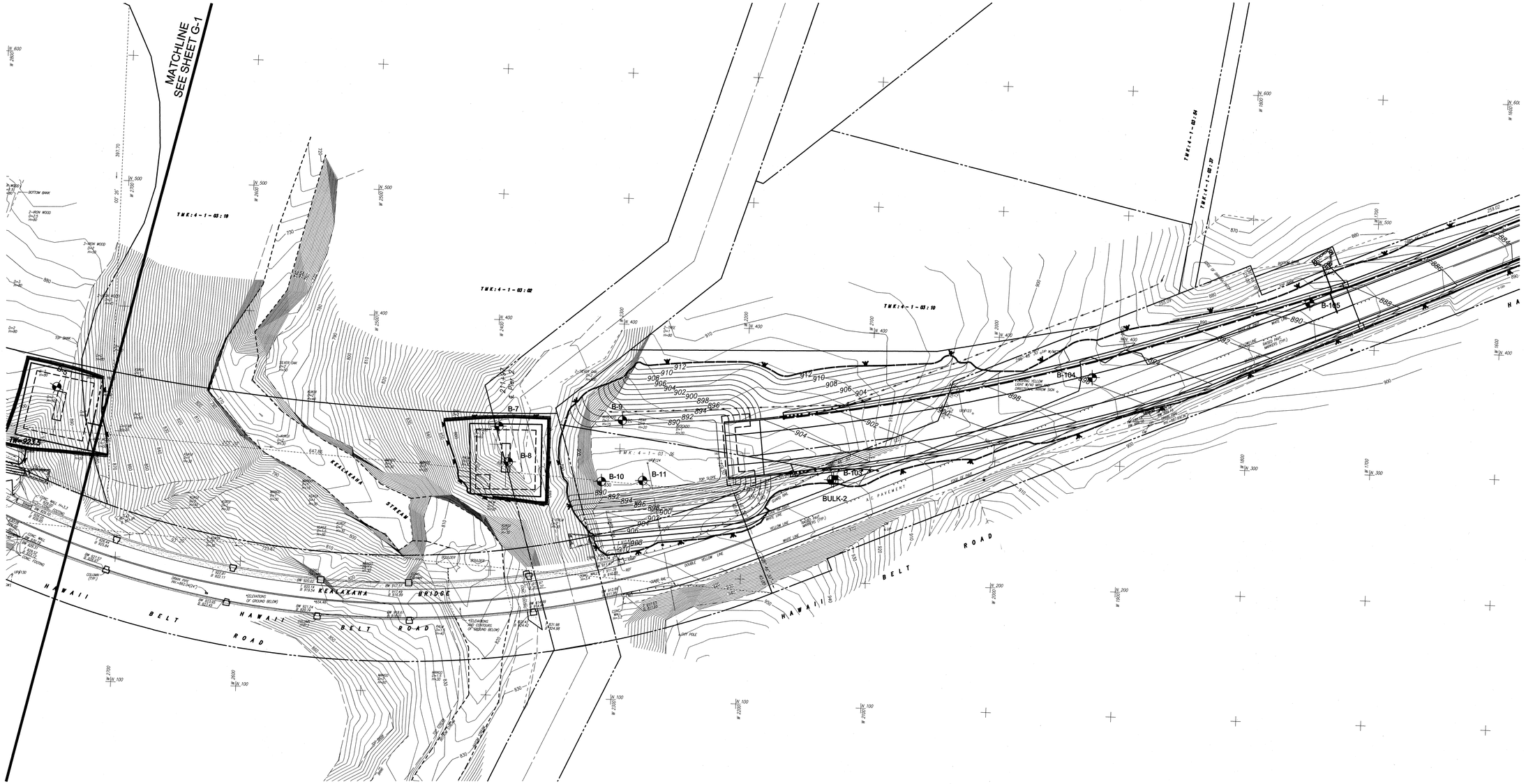
BORING LOCATION PLAN 1

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: 1" = 40' DATE: NOVEMBER 2001

SHEET No. G-1 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	5	155



BORING LOCATION PLAN 2

SCALE: 1"=40'

NORTH

GRAPHIC SCALE

40' 20' 0 40' 80' 120'

LEGEND:

- APPROXIMATE BORING LOCATION
- APPROXIMATE BULK SAMPLE LOCATION

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

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HIGHWAYS DIVISION

BORING LOCATION PLAN 2

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: 1" = 40' DATE: NOVEMBER 2001

SHEET No. G-2 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	6	155

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
	3-INCH O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX
	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)
	CORE SAMPLE	PEN	POCKET PENETROMETER (tsf)
REC	CORE RECOVERY		WATER LEVEL OBSERVED IN BORING
RQD	ROCK QUALITY DESIGNATION		GRAB SAMPLE

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BORING LOG LEGEND
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A

WORK ORDER NO. 3885-00 Sep 98

Date Started: 7/29/98
Date Completed: 7/29/98
Logged By: J. Chen
Total Depth: 14.6 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger
Driving Energy: 140 lb. wt., 30 in. drop

Depth, ft	FIELD: Sample	FIELD: Penetrns. Resist. Blows/ft	LAB: Dry Density pcf	LAB: Moisture Content %	LAB: Compress. Strength tsf	LAB: Other	LAB: Data	Pen, tsf	DESCRIPTION
									Approximate Surface Elevation (ft): 917*
0									3-inch ASPHALT CONCRETE
									3-inch BASE COURSE
		22	62	42				1.7	Brown CLAYEY SILT (MH), stiff to very stiff, moist (residual) grades to yellowish brown, very stiff at 3 feet
		24	46	69				2.5	
5		28	70	33				2.2	
									Brownish gray weathered BASALT FRAGMENTS (GM-MH) with clayey silt, dense (saprolite)
10		43	70	35					
									Gray moderately weathered BASALT, medium hard (clinker)
15		50/.1" Ref.	54	64					Boring terminated at 14.6 feet
									Groundwater not encountered
20									
25									
30									
35									

GEOLABS, INC. — Geotechnical Engineering

LOG OF BORING 101
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-12

WORK ORDER NO. 3885-00 TSK Sep 98

Date Started: 7/29/98
Date Completed: 7/29/98
Logged By: J. Chen
Total Depth: 14.1 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger
Driving Energy: 140 lb. wt., 30 in. drop

Depth, ft	FIELD: Sample	FIELD: Penetrns. Resist. Blows/ft	LAB: Dry Density pcf	LAB: Moisture Content %	LAB: Compress. Strength tsf	LAB: Other	LAB: Data	Pen, tsf	DESCRIPTION
									Approximate Surface Elevation (ft): 934.1*
0									4-inch ASPHALT CONCRETE
		24	56	65				3.3	3-inch BASE COURSE
		50/.3" Ref.		46					Reddish brown CLAYEY SILT (MH), very stiff, moist (residual)
5		50/.3" Ref.		25					Dark gray vugular moderately weathered BASALT, medium hard (clinker)
10		50/.4" Ref.	86	30				>4.5	Brown CLAYEY SILT (MH) with gravel, very stiff, moist (saprolite)
									Gray moderately weathered BASALT, medium hard (clinker)
15		30/.1" Ref. 30/.0" Ref.		30					Boring terminated at 14.1 feet
									Groundwater not encountered
20									
25									
30									
35									

GEOLABS, INC. — Geotechnical Engineering

LOG OF BORING 102
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-13

WORK ORDER NO. 3885-00 TSK Sep 98

GEOTECHNICAL NOTES

1. A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Kealakaha Stream Bridge Replacement, Project No. BR-019-2(26), Kealakaha, Hamakua, Hawaii" dated April 2000 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 Sheets G-1 and 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.

INDEX

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

ROBIN M. LIM
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GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-3 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL - AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	7	155

LOG OF BORING 103

Date Started: 7/29/98
Date Completed: 7/29/98
Logged By: J. Chen
Total Depth: 14.9 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 905.2*

Depth, ft	FIELD: Penetra. Resist. Blows/ft	LABORATORY: Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
	37/.3'	77	25				Yellowish brown CLAYEY SILT (MH) with gravel, very stiff, moist (saprolite)
	36	58	51				Dark gray BASALT FRAGMENTS (GM-MH) with clayey silt, dense, moist (saprolite)
5	20		23				grades to reddish gray
10	28/.5' +20/.0'	76	43				grades to very dense
15	50/.4' Ref.		30				Boring terminated at 14.9 feet Groundwater not encountered
20							
25							
30							
35							

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LOG OF BORING 103
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-14

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 104

Date Started: 7/29/98
Date Completed: 7/29/98
Logged By: J. Chen
Total Depth: 15.5 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 898*

Depth, ft	FIELD: Penetra. Resist. Blows/ft	LABORATORY: Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
	18	59	55			1.2	Brown CLAYEY SILT (MH), stiff to very stiff, damp (residual soil)
	10	52	70			2.5	Brown CLAYEY SILT (MH) with gravel, medium stiff to stiff, moist (saprolite)
5	14		44				grades to stiff, very moist
10	24	64	40			2.7	grades to very stiff
15	19	47	94				grades to yellowish brown Boring terminated at 15.5 feet Groundwater not encountered
20							
25							
30							
35							

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LOG OF BORING 104
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-15

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 105

Date Started: 7/29/98
Date Completed: 7/29/98
Logged By: J. Chen
Total Depth: 15.5 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 877*

Depth, ft	FIELD: Penetra. Resist. Blows/ft	LABORATORY: Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
	15					1.7	Yellowish brown CLAYEY SILT (MH) with traces of gravel, stiff, moist (saprolite)
	27	53	81			3.3	grades to very stiff
5	18	57	36			2.3	grades to stiff
10	15	62	59			2.1	grades to brown, very moist
15	22	63	55			3.8	grades to dark brown, very stiff Boring terminated at 15.5 feet Groundwater not encountered
20							
25							
30							
35							

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LOG OF BORING 105
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-16

WORK ORDER NO. 3885-00 TSK Sep 98

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-4 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	8	155

Date Started: 1/26/98
Date Completed: 1/30/98
Logged By: Y. Chiba
Total Depth: 100.5 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger , HQ Coring
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 922.9"

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen. tsf	DESCRIPTION
								Reddish brown CLAYEY SILT (MH) with some basalt gravel, hard, moist (fill)
		10/.0' Ref.		62				
5								Dark gray with orange mottling extremely weathered BASALT, breaks down to clayey silt (MH) with fragments, very stiff, damp to moist (fill)
		34	81	26			4.0	
10		42	72	43			2.0	Brown with white mottling CLAYEY SILT (MH) with some sand and gravel, very stiff, moist (saprolite)
								grades to brown and gray with white mottling
15		11/.5' +30/.3' Ref.	76	34			1.0	
								grades to soft
20		28	63	47			<0.5	
25		10	63	52			<0.5	
30		15	68	48		LL=57 PI=19	0.5	grades to medium stiff
								grades to brown and gray with white mottling
35		30/.3' Ref.	93	19				Gray vesicular BASALT, severely fractured with reddish brown silt on fracture surfaces, moderately weathered, medium hard (dense basalt formation)
						RUN 1 REC=82% RQD=0%		
40						RUN 2 REC=32% RQD=0%		Gray with reddish brown and white mottling scoriaceous BASALT, severely fractured, highly weathered, soft to medium hard (scoria basalt formation)
45		67		35				
						RUN 3 REC=69% RQD=57%		
50						RUN 4 REC=50% RQD=18%		Gray vesicular BASALT, moderately fractured, moderately weathered, medium hard (dense basalt formation)
								Reddish brown to grayish brown scoriaceous BASALT with lenses of silty sand (SM) with some clay, severely fractured, extremely weathered (scoria basalt formation)
55						RUN 5 REC=45%		Gray vesicular BASALT, slightly to moderately fractured, moderately to slightly weathered, hard (dense basalt formation)
60		40		63				Brownish gray to reddish brown SILTY SAND (SM) with some scoriaceous basalt fragments, medium dense to dense
						RUN 6 REC=63% RQD=53%		
65						RUN 7 REC=72% RQD=0%	0.5	Gray scoriaceous BASALT, slightly to moderately fractured, moderately to highly weathered, medium hard (scoria basalt formation)
								grades with white and tan mottling, extremely weathered, breaks down to sandy silt (ML/SM) with some clay, soft to medium stiff at 65.5 feet
70						RUN 8 REC=62% RQD=0%		Gray vesicular BASALT, closely fractured, moderately to highly weathered, medium hard (dense basalt formation)
75								

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Geotechnical Engineering

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 1
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-1.1

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen. tsf	DESCRIPTION
								(Continued from previous plate)
80						RUN 9 REC=63% RQD=0%		Reddish brown with multi-colored mottling, scoriaceous BASALT, severely fractured, highly weathered, breaks down to silty sand (SM), soft (scoria basalt formation)
						RUN 10 REC=80%	<0.5	Gray to grayish brown with multi-colored mottling extremely weathered, scoriaceous BASALT, breaks down to sandy silt (ML) and clayey silt (MH) with sand (saprolite/scoria basalt formation) grades to brownish gray with multi-colored mottling, breaks down to sandy silt to silty sand (SM/ML) at 86.5 feet
85						RUN 11 REC=42%	<0.5	
90		11		37				
						RUN 12 REC=83%	0.5	
95						RUN 13 REC=77%	0.5	grades to reddish brown, breaks down to sandy silt to clayey silt (MH/ML)
100								grades to tannish gray, breaks down to sand (SP/SM) with some silt
								Boring terminated at 100.5 feet
105								Groundwater not encountered
110								*Elevations estimated from Topographic Map provided by Sato & Associates, Inc. on October 10, 1997.
115								

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WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 1
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-1.2

Date Started: 2/2/98
Date Completed: 2/3/98
Logged By: Y. Chiba
Total Depth: 100.6 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger , HQ Coring
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 925.9"

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen. tsf	DESCRIPTION
								Orange and dark gray with brown mottling CLAYEY SILT (MH) AND BASALT FRAGMENTS, hard, moist (fill)
		13/.5' +16/.3' Ref.	58	59			4.0	
5						RUN 1 REC=44% RUN 2 REC=0%		Gray moderately weathered vesicular BASALT BOULDERS AND COBBLES with silt and sand
10		39		19				grades to highly weathered
						RUN 3 REC=95%		
15						RUN 4 REC=40%		
20		14		31				
						RUN 5 REC=60%	<0.5	
25		26		18				Brown SANDY SILT (ML/SM) with clay and some highly weathered basalt gravel, soft, moist
						RUN 6 REC=14%		
30		17		46			<0.5	grades to grayish brown CLAYEY SILT (MH) with sand and highly weathered basalt gravel
						RUN 7 REC=29%		grades to brown
35		10/.0' Ref.		11		RUN 8 REC=90% RQD=0%		Gray vesicular BASALT, severely fractured, moderately weathered, medium hard (dense basalt formation)
40						RUN 9 REC=0%		Reddish dark brown SANDY SILT (ML) with highly weathered basalt fragments, very hard
45		35/.4' Ref.		13		RUN 10 REC=87% RQD=0%	0.5	Gray vesicular BASALT, severely fractured, highly weathered, medium hard (dense basalt formation)
50						RUN 11 REC=75% RQD=37%		Brownish gray SANDY SILT (SM/ML) with friable basalt fragments and some clay, stiff
55						RUN 12 REC=27% RQD=8%		Gray vesicular BASALT, moderately fractured, moderately to slightly weathered, hard (dense basalt formation)
								grades to closely fractured
60		13/.5' +30/.3' Ref.		41		RUN 13 REC=78% RQD=0%		Gray to tannish gray scoriaceous BASALT, severely fractured, highly weathered, soft to medium hard (scoria basalt formation)
65						RUN 14 REC=83% RQD=20%		grades to extremely weathered, breaks down to silty sand (SM)
70						RUN 15 REC=40% RQD=0%	<0.5	Gray vesicular BASALT, moderately fractured, highly weathered, medium hard to hard (dense basalt formation)
75								

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WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 2
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-2.1

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen. tsf	DESCRIPTION
								(Continued from previous plate)
80		40/.3' Ref.				RUN 16 REC=95% RQD=0%		Gray to tannish gray with reddish orange mottling BASALT, breaks down to silty sand (SM), severely fractured, extremely weathered, soft (scoria basalt formation) grades to brown with multi-colored mottling at 77.5 feet
		27		53			3.5	breaks down to clayey silt (MH) with friable sand
85						RUN 17 REC=100% RQD=0%	0.5	grades to soft
						RUN 18 REC=55% RQD=0%	2.0	Grayish brown with white mottling highly weathered scoriaceous BASALT, breaks down to silty friable sand (SM), soft
90		35/.4' Ref.		22				
						RUN 19 REC=71% RQD=0%	2.0	grades to reddish brown with white mottling, extremely weathered, breaks down to clayey silt (MH/ML) with sand
95						RUN 20 REC=100% RQD=0%		grades to grayish brown, more clay (MH/CH)
100		15/.1' Ref.						Gray vesicular BASALT, severely fractured, highly weathered, medium hard
								Boring terminated at 100.6 feet
105								Groundwater not encountered
110								
115								

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WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 2
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-2.2

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

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GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-5 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	9	155

Date Started: 3/25/98
Date Completed: 3/26/98
Logged By: Y. Chiba
Total Depth: 115.0 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger, HQ Coring
Driving Energy: 140 lb, wt., 30 in. drop

Approximate Surface Elevation (ft): 892.1*

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
0		76		8				Brown with multi-colored mottling SILTY SAND (SM) with basalt gravel and fragments, dense, damp (residual soil)
5						RUN 1 REC=62%		Gray BASALT BOULDERS
10		90		31		RUN 2 REC=64% RQD=0%		Brownish gray and reddish gray SILTY SAND (SM) with gray basalt fragments, very dense, moist
15						RUN 3 REC=38% RQD=0%	1.0	Brownish gray with yellow and white mottling vesicular BASALT, severely fractured, highly to extremely weathered, medium hard to hard (basalt formation)
20		10/.0' Ref.				RUN 4 REC=53% RQD=0%		Orange-brown SILTY CLAY (CH) with scoriaceous basalt gravel and fragments, stiff
25						RUN 5 REC=45% RQD=0%		Brownish gray with multi-colored mottling scoriaceous BASALT, closely to severely fractured, highly to extremely weathered, soft to medium hard (scoria basalt formation)
30		60/.4' Ref.		18		RUN 6 REC=33% RQD=15%		Grayish brown with white mottling scoriaceous BASALT, severely fractured, extremely weathered, breaks down to friable sandy silt (ML) with some clay, soft (scoria basalt formation)
35						RUN 7 REC=50% RQD=30%		grades to medium hard
40		13		53		RUN 8 REC=100% RQD=48%		Brownish gray vesicular BASALT, slightly fractured, slightly weathered, hard (basalt formation)
45						RUN 9 REC=80% RQD=65%		Brown CLAYEY SILT (MH) with friable sand, medium stiff
50						RUN 10 REC=67% RQD=67%		Gray vesicular BASALT, moderately fractured, slightly weathered, very hard (basalt formation)
55						RUN 11 REC=55% RQD=0%		grades to slightly fractured
60		17		63		RUN 12 REC=83% RQD=0%	<0.5 <0.5	Orangish brown BASALT, severely fractured, extremely weathered, breaks down to friable sandy silt (ML) with clay, soft
65		10/.1' Ref.		8		RUN 13 REC=69% RQD=14%		grades to grayish brown
70						RUN 14 REC=52% RQD=0%		Tannish gray vesicular BASALT, moderately to closely fractured, moderately weathered, medium hard
75								grades to brownish gray to reddish gray with white mottling grades to grayish brown with white mottling

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Geotechnical Engineering

LOG OF BORING 3
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-3.1

WORK ORDER NO. 3885-00 TSK Sep 98

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
								(Continued from previous plate)
80						RUN 15 REC=33% RQD=22%		
85		29		37		RUN 16 REC=53% RQD=28%		Gray with white mottling vesicular BASALT, slightly fractured, slightly weathered, very hard (basalt formation)
90		10/.0' Ref.				RUN 17 REC=40% RQD=0%		Grayish brown with white mottling BASALT, severely fractured, extremely weathered, breaks down to silty friable sand (SM), soft
95						RUN 18 REC=80% RQD=0%		grades to closely fractured, highly weathered
100						RUN 19 REC=63% RQD=30%		Gray with multi-colored mottling scoriaceous BASALT, moderately to slightly fractured, moderately to highly weathered, medium hard (scoria basalt formation)
105						RUN 20 REC=97% RQD=30%		grades to closely fractured grades to slightly fractured, slightly weathered
110						RUN 21 REC=100% RQD=62%		grades to closely fractured, highly to extremely weathered, medium hard grades to moderately fractured, slightly to moderately weathered, hard
115						RUN 22 REC=92% RQD=60%		grades to slightly fractured
120								Boring terminated at 115 feet Groundwater not encountered

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LOG OF BORING 3
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-3.2

WORK ORDER NO. 3885-00 TSK Sep 98

Date Started: 2/5/98
Date Completed: 2/6/98
Logged By: Y. Chiba
Total Depth: 100.5 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger, HQ Coring
Driving Energy: 140 lb, wt., 30 in. drop

Approximate Surface Elevation (ft): 907.2*

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
0						RUN 1 REC=64% RQD=19%		Reddish brown SANDY SILT (ML), soft, damp
5						RUN 2 REC=10% RQD=0%		Gray vesicular BASALT, moderately fractured, moderately weathered, medium hard (dense basalt formation)
10		20/.3' Ref.		10		RUN 3 REC=95% RQD=28%		Reddish brown to brownish gray scoriaceous BASALT with sand, severely fractured, highly weathered (clinker)
15						RUN 4 REC=87% RQD=32%		Gray vesicular BASALT, moderately fractured, moderately weathered, medium hard to hard (dense basalt formation)
20						RUN 5 REC=5% RQD=0%		CLINKER
25		25/.3' Ref.		19		RUN 6 REC=63% RQD=11%		Gray vesicular BASALT, closely fractured, moderately to highly weathered, medium hard (dense basalt formation)
30						RUN 7 REC=73% RQD=13%		Grayish tan to tannish gray scoriaceous BASALT, closely to severely fractured, extremely weathered, breaks down to silty sand (SM) (scoria basalt formation)
35						RUN 8 REC=83% RQD=30%		grades to severely fractured at
40						RUN 9 REC=85% RQD=47%		
45						RUN 10 REC=17% RQD=0%		Gray strongly vesicular BASALT, moderately to slightly fractured, moderately weathered, medium hard (dense basalt formation)
50		8/.5' +35/.4' Ref.		46		RUN 11 REC=70% RQD=47%	3.5	Brownish gray with multi-colored mottling BASALT, severely fractured, extremely weathered, breaks down to friable silty sand (SM) with gravel, soft (scoria basalt formation)
55						RUN 12 REC=67% RQD=37%		Gray vesicular BASALT, moderately fractured, moderately weathered, hard (dense basalt formation)
60						RUN 13 REC=0% RQD=0%		Reddish brown scoriaceous BASALT, moderately to closely fractured, highly weathered, medium hard (scoria basalt formation) grades to extremely weathered, breaks down to silty sand (SM) at 60 feet
65		25/.3' Ref.		56		RUN 14 REC=73% RQD=37%	1.5	Gray scoriaceous BASALT, slightly fractured, moderately weathered, medium hard (scoria basalt formation) grades to severely fractured at 68 feet
70						RUN 15 REC=88% RQD=68%	1.5	grades to slightly fractured at 69.5 feet
75								grades to reddish brown

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LOG OF BORING 4
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-4.1

WORK ORDER NO. 3885-00 TSK Sep 98

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength ksf	Other Data	Pen, tsf	DESCRIPTION
								(Continued from previous plate)
80						RUN 16 REC=67% RQD=40%		grades to gray
85						RUN 17 REC=82% RQD=47%		Gray vesicular BASALT, massive, slightly weathered, very hard (dense basalt formation)
90						RUN 18 REC=83% RQD=57%		Reddish brown scoriaceous BASALT FRAGMENTS, severely fractured, highly weathered, soft (scoria basalt formation)
95						RUN 19 REC=40% RQD=0%		Gray vesicular BASALT, closely to severely fractured, moderately to highly weathered, medium hard (dense basalt formation)
100		51		36		RUN 20 REC=45% RQD=8%		grades to extremely weathered, breaks down to friable sandy silt (ML) with clay
105								Boring terminated at 100.5 feet Groundwater not encountered
110								
115								

GEOLABS, INC.
Geotechnical Engineering

LOG OF BORING 4
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-4.2

WORK ORDER NO. 3885-00 TSK Sep 98

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

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-6 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	10	155

Date Started: 2/9/98
Date Completed: 2/12/98
Logged By: Y. Chiba
Total Depth: 121.5 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger, HQ Coring
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 892.1*

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
0	30/.2' Ref.		69	24				Brown SANDY SILT (ML) with gravel and cobbles, stiff, damp (colluvium)
5						RUN 1 REC=20% RQD=0%	<0.5	Dark gray vesicular BASALT BOULDERS AND COBBLES in a dark reddish brown with white mottling clayey silt (MH) matrix with some sand (colluvium)
10	40			27			<0.5	grades to orangish brown clayey silt (MH) matrix
15						RUN 2 REC=75% RQD=75% RUN 3 REC=97% RQD=57%		Gray scoriaceous BASALT, slightly to moderately fractured, moderately weathered, medium hard to soft (scoria basalt formation)
20						RUN 4 REC=30%		Dark brown and gray mottled severely weathered scoriaceous BASALT, breaks down to silty sand (SM) with fragments, soft
25	15			35		RUN 5 REC=60%	1.0	breaks down to clayey silt (MH)
30	6			45		RUN 6 REC=100%		grades to grayish brown with white mottling (MH/ML)
35						RUN 7 REC=23% RQD=0% RQD=0%		Gray with white mottling scoriaceous BASALT, closely to severely fractured, moderately to highly weathered, medium dense (scoria basalt formation)
40	7			46		RUN 8 REC=100% RQD=0%	<0.5	Brown with yellow and gray mottling scoriaceous BASALT, severely fractured, extremely weathered, breaks down to friable sandy silt and clay (ML/CL), soft (scoria basalt formation)
45						RUN 9 REC=75% RQD=17%		
50						RUN 10 REC=75% RQD=23%		Gray vesicular BASALT, moderately to closely fractured, moderately weathered, medium hard to hard (dense basalt formation)
55						RUN 11 REC=65% RQD=0%	2.0	Grayish brown to gray scoriaceous BASALT, severely fractured, extremely weathered, breaks down to clayey silt (MH) with sand, soft (scoria basalt formation) grades to closely to severely fractured
60						RUN 12 REC=50% RQD=0%		
65	23/.5' +30/.3' Ref.			30		RUN 13 REC=100% RQD=56%		Gray vesicular BASALT, slightly fractured, moderately weathered, medium hard (dense basalt formation)
70						RUN 14 REC=67% RQD=0%	1.5	Reddish brown to gray with white and yellow mottling scoriaceous BASALT, severely fractured, highly weathered, breaks down to silty sand (SM), soft (scoria basalt formation)
75								

GEOLABS, INC.
Geotechnical Engineering

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 5
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-5.1

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
		59		21		RUN 15 REC=55% RQD=0%	2.5 <0.5	(Continued from previous plate) grades to gray with white and brown mottling grades to grayish brown to gray
80	30/.0' Ref.			6		RUN 16 REC=83% RQD=50%		Gray vesicular to scoriaceous BASALT, slightly fractured, moderately weathered, medium hard (dense basalt formation)
85						RUN 17 REC=97% RQD=67%		CLINKER grades to weathered
90						RUN 18 REC=75% RQD=37%		CLINKER
95						RUN 19 REC=60% RQD=15%		grades to moderately fractured, medium hard to hard grades to closely fractured, hard
100						RUN 20 REC=53% RQD=13%		Reddish gray scoriaceous BASALT, moderately fractured, moderately weathered, medium hard (scoria basalt formation)
105	40/.3' Ref.			18		RUN 21 REC=88% RQD=70%		Gray vesicular BASALT with many olivine crystals, slightly fractured, moderately to slightly weathered, hard (dense basalt formation)
110						RUN 22 REC=98% RQD=60%		Gray scoriaceous BASALT, moderately fractured, moderately weathered, medium hard (scoria basalt formation)
115	40/.4' Ref.			34		RUN 23 REC=56% RQD=0%		grades to reddish brown, extremely weathered, breaks down to silty sand (SM), soft grades to gray with yellow and white mottling, closely fractured, highly weathered at 118 feet
120	22			34				Boring terminated at 121.5 feet Groundwater not encountered
125								

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Geotechnical Engineering

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 5
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-5.2

Date Started: 5/12/98
Date Completed: 5/19/98
Logged By: V. Bounlangsy
Total Depth: 118.0 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger, HQ Coring
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 887.1*

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
0								Grayish brown SANDY SILT (ML/SM) with gravel and cobbles, medium stiff, moist
5		18	86	33				
10		20		33				
15		23	83	27				
20		25/.1'		32		RUN 1 REC=40% RQD=20%		Gray vesicular BASALT, closely to moderately fractured, moderately to highly weathered, medium hard (basalt formation) CLINKER at 22.5 feet
25						RUN 2 REC=60% RQD=60%		
30						RUN 3 REC=70% RQD=20% RUN 4 REC=50% RQD=20%		Gray vesicular BASALT, severely fractured, moderately to highly weathered, medium hard (basalt formation)
35								
40						RUN 5 REC=80% RQD=70%		grades to moderately fractured, slightly to moderately weathered
45						RUN 6 REC=80% RQD=40%		
50						RUN 7 REC=50% RQD=20%		grades to severely fractured
55						RUN 8 REC=20% RQD=10%		
60						RUN 9 REC=80% RQD=40%		Gray vesicular BASALT, closely to moderately fractured, highly weathered, medium hard (basalt formation)
65						RUN 10 REC=40% RQD=20%		grades to severely fractured, extremely weathered, soft
70						RUN 11 REC=40% RQD=0%		
75								

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WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 7
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-7.1

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
						RUN 12 REC=20% RQD=0%		(Continued from previous plate) Gray vesicular BASALT, severely fractured, extremely weathered, soft (basalt formation)
80						RUN 13 REC=20% RQD=0%		
85	15/.0' Ref.					RUN 14 REC=90% RQD=90%		Gray dense BASALT, moderately to slightly fractured, slightly weathered, very hard (basalt formation)
90						RUN 15 REC=100% RQD=100%		
95						RUN 16 REC=80% RQD=40%		Reddish brown scoriaceous BASALT, moderately to severely fractured, highly weathered, medium hard (scoria basalt formation)
100						RUN 17 REC=80% RQD=60%		
105						RUN 18 REC=80% RQD=30%		Gray vugular BASALT, closely fractured, moderately weathered, hard (basalt formation) grades to reddish brown, breaks down to silty sand and gravel (SM) at 107.6 feet
110						RUN 19 REC=90% RQD=30%		grades to severely fractured, extremely weathered, soft
115						RUN 20 REC=80% RQD=60%		grades to moderately fractured
120								Boring terminated at 118.1 feet Groundwater not encountered
125								

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Geotechnical Engineering

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 7
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-7.2

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

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-7 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	11	155

Date Started: 3/17/98
Date Completed: 3/24/98
Logged By: Y. Chiba
Total Depth: 154.0 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger, HQ Coring
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 894*

Depth, ft	Sample	Pen/rec, Resist, Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
0								Brown BASALT COBBLES AND GRAVEL, with sand and silt, dense, dry (colluvium)
		10/.0' Ref.				RUN 1 REC=75%		
5						RUN 2 REC=45%		
10		16		23				
						RUN 3 REC=57% RQD=0%		Gray vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)
15		20/.5' +25/.3' Ref.		18		RUN 4 REC=73% RQD=0%		Gray scoriaceous BASALT, closely to severely fractured, highly weathered, breaks down to silty sand (SM), soft (scoria basalt formation)
20						RUN 5 REC=15% RQD=0%		Gray vesicular BASALT, severely fractured, highly weathered, medium hard (basalt formation)
25		64		9				grades to scoriaceous basalt fragments, dense
						RUN 6 REC=100%		Brown with white and gray mottling SANDY SILT (ML/MH) with clay, stiff (saprolite)
30		36		50				grades to gray and brown with white mottling
						RUN 7 REC=55%		grades to SILTY SAND (SM), medium dense
35		3		80		LL=65 PI=28 RUN 8 REC=100%		grades to CLAYEY SILT (MH) with sand at 34 feet
						RUN 9 REC=67% RQD=0%		Gray with white mottling vesicular BASALT, severely fractured, highly to extremely weathered, medium hard (basalt formation)
40								
45		10/.0' Ref.				RUN 10 REC=47% RQD=20%		grades to closely fractured
								breaks down to sandy fragments
50		15/.0' Ref.				RUN 11 REC=57% RQD=0%		
55		18		52		RUN 12 REC=67%	0.5	Grayish brown and reddish brown with multi-colored mottling severely weathered BASALT, breaks down to friable sandy silt (ML) with clay, stiff
60		38		50		RUN 13 REC=100%	3.0	grades to tannish gray with multi-colored mottling
65		27		12		RUN 14 REC=100%		
70		78		16		RUN 15 REC=62% RQD=0%		Gray with reddish brown mottling scoriaceous BASALT, closely fractured, moderately to highly weathered, medium hard (scoria basalt formation)
75		30/.3' Ref.						

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LOG OF BORING 6
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-6.1

WORK ORDER NO. 3885-00 TSK Sep 98

Depth, ft	Sample	Pen/rec, Resist, Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
								(Continued from previous plate)
						RUN 16 REC=77% RQD=0%		
80						RUN 17 REC=75% RQD=38%		Gray vesicular BASALT, moderately fractured, moderately weathered, hard (basalt formation)
85						RUN 18 REC=35% RQD=0%		Gray with white and yellow mottling vesicular BASALT, severely fractured, highly to extremely weathered, breaks down to silty sand (SM) and fragments, medium hard
90		30/.3' Ref.		24		RUN 19 REC=100% RQD=10%		breaks down to friable sandy silt (ML) with clay
95						RUN 20 REC=68% RQD=47%		Gray with reddish brown mottling scoriaceous BASALT, slightly to moderately fractured, highly weathered, medium hard (scoria basalt formation)
100						RUN 21 REC=87% RQD=58%		grades with white and tan mottling
105						RUN 22 REC=98% RQD=77%		grades with brown mottling
								grades with white and tan mottling
110						RUN 23 REC=100% RQD=68%		grades to slightly fractured at
115						RUN 24 REC=47% RQD=33%		VOID
120						RUN 25 REC=70% RQD=45%		
125						RUN 26 REC=47% RQD=18%		grades to closely fractured, highly to extremely weathered
								grades to moderately fractured, moderately weathered
130		30/.3' Ref.		17		RUN 27 REC=70% RQD=18%		grades to moderately to closely fractured, highly to extremely weathered, medium hard, some lenses break down to silty sand (SM)
135						RUN 28 REC=60% RQD=47%		
140						RUN 29 REC=50% RQD=18%		grades to moderately fractured, moderately weathered, hard
145						RUN 30 REC=67% RQD=20%		
150						RUN 31 REC=92% RQD=62%		
155		10/.0' Ref.						Boring terminated at 154 feet Groundwater not encountered

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Geotechnical Engineering

LOG OF BORING 6
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-6.2

WORK ORDER NO. 3885-00 TSK Sep 98

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

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-8 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	12	155

Date Started: 2/12/98
Date Completed: 2/19/98
Logged By: Y. Chiba/S. Tanaka
Total Depth: 160.0 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger, HQ Coring
Driving Energy: 140 lb. wt., 30 in. drop

Approximate Surface Elevation (ft): 883.9'

Depth, ft	Sample	Pendra. Resist. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
0	20/.3' Ref.		67	26			1.0	Tannish brown SILT (ML) with some sand, gravel and cobbles, stiff, damp
5						RUN 1 REC=72% RQD=37%		Gray scoriaceous BASALT, moderately fractured, moderately weathered, medium hard to hard (scoria basalt formation)
10						RUN 2 REC=53% RQD=17%		grades with reddish brown mottling
15	52			20		RUN 3 REC=33% RQD=0%		grades to severely fractured
20						RUN 4 REC=77% RQD=50%		Reddish gray vesicular BASALT moderately fractured, slightly to moderately weathered, hard (dense basalt formation)
25						RUN 5 REC=57% RQD=0%		Gray scoriaceous BASALT, severely fractured, highly weathered, soft to medium hard (scoria basalt formation)
30	30/.3' Ref.					RUN 6 REC=40% RQD=0%		
35	20/.1' Ref.			1		RUN 7 REC=33% RQD=0%		
40	20/.3' Ref.			12		RUN 8 REC=49% RQD=0%		grades to moderately to closely fractured
45	17			13		RUN 9 REC=38% RQD=0%		grades to severely fractured
50	10/.0' Ref.					RUN 10 REC=60% RQD=45%		Gray with reddish brown mottling vesicular BASALT, slightly fractured, slightly weathered, hard (dense basalt formation)
55						RUN 11 REC=53% RQD=0%		CLINKER Gray scoriaceous BASALT, severely fractured, highly weathered, medium hard (scoria basalt formation)
60	20/.1' Ref.			12		RUN 12 REC=81% RQD=36%		Gray vesicular BASALT, slightly to moderately fractured, slightly weathered, hard (dense basalt formation)
65						RUN 13 REC=57% RQD=25%		grades to extremely weathered, breaks down to silty sand (SM) and basalt fragments, soft
70	20/.3' Ref.			30		RUN 14 REC=29% RQD=0%		grades to moderately fractured, slightly weathered, hard grades to severely fractured, medium hard
75								

GEOLABS, INC.
Geotechnical Engineering

LOG OF BORING 8
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE
A-8.1

WORK ORDER NO. 3885-00 TSK Sep 98

Depth, ft	Sample	Pendra. Resist. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
								(Continued from previous plate)
80	90			20		RUN 15 REC=95% RQD=29%		Gray SILTY SAND (SM) with basalt fragments, very dense, damp grades with clay
85						RUN 16 REC=70% RQD=50%		Gray vesicular BASALT, moderately fractured, slightly weathered, medium hard (dense basalt formation) CLINKER at 80 feet grades with olivine crystals at 81.6 feet grades to slightly fractured, unweathered, medium hard to hard at 81.7 feet
90						RUN 17 REC=100% RQD=100%		
95						RUN 18 REC=92% RQD=67%		grades to moderately fractured
100	30/.2' Ref.			15		RUN 19 REC=40% RQD=23%		Reddish gray BASALT CLINKER grades with some clay
105						RUN 20 REC=88% RQD=38%		Gray vesicular BASALT, closely to moderately fractured, moderately weathered, medium hard (dense basalt formation)
110						RUN 21 REC=92% RQD=32%		Reddish gray scoriaceous BASALT, closely to severely fractured, moderately weathered, medium hard (scoria basalt formation)
115						RUN 22 REC=77% RQD=50%		grades to gray, moderately to closely fractured
120						RUN 23 REC=73% RQD=50%		grades to moderately to closely fractured, moderately weathered grades to moderately fractured
125						RUN 24 REC=83% RQD=18%		grades to closely to severely fractured, moderately to highly weathered, soft to medium hard, breaks down to silty sand (SM)
130	37			20		RUN 25 REC=58% RQD=8%		grades to highly weathered
135						RUN 26 REC=33% RQD=0%		Gray SILTY SAND (SM), medium dense (extremely weathered scoriaceous basalt) CLINKER
140						RUN 27 REC=75% RQD=30%		Reddish gray scoriaceous BASALT, closely fractured, moderately weathered, medium hard (scoria basalt formation) pocket of gray SILTY SAND (SM) at 138 to 139 feet grades to closely to severely fractured
145						RUN 28 REC=67% RQD=18%		
150						RUN 29 REC=33% RQD=15%		CLINKER from 147 to 149 feet
155						RUN 30 REC=60% RQD=32%		grades to closely fractured, slightly weathered grades to severely fractured

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LOG OF BORING 8
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE
A-8.2

WORK ORDER NO. 3885-00 TSK Sep 98

Depth, ft	Sample	Pendra. Resist. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
								(Continued from previous plate)
160						RUN 31 REC=70% RQD=55%		Gray vesicular BASALT with olivine crystals, moderately fractured, slightly weathered, medium hard to hard (dense basalt formation) Boring terminated at 160 feet Groundwater not encountered
165								
170								
175								
180								
185								
190								
195								

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LOG OF BORING 8
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE
A-8.3

WORK ORDER NO. 3885-00 TSK Sep 98

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

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-9 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	13	155

Date Started: 3/5/98 | Drill Rig: CME-55G
Date Completed: 3/6/98 | Drilling Method: 4" Auger, HQ Coring
Logged By: S. Tanaka | Driving Energy: 140 lb. wt., 30 in. drop
Total Depth: 120.0 feet

Approximate Surface Elevation (ft): 919.9*

Depth, ft	Sample	Pen. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compres. Strength ksf	Other Data	Pen. tsf	DESCRIPTION
								Reddish brown CLAYEY SILT (MH), stiff, moist
		34		39				Gray SILTY SAND (SM) with highly weathered basalt gravel, medium dense, damp (saprolite)
5		29		40				grades to moist
10		40/.3' Ref.		23				
15		9		31				grades to loose to medium dense
20		50/.4' Ref.		17				grades with more highly weathered basalt gravel, breaks down to silty sand (SM/ML)
25		18		79				grades to SANDY SILT (ML/CL) with clay, stiff, very moist
30		30/.2' Ref.				RUN 1 REC=34%		COBBLE
35		14		40		RUN 2 REC=86%		Brown SILTY SAND (SM) with highly weathered basalt gravel, breaks down to silty sand (SM/ML), loose to medium dense, moist (saprolite)
40		8		41		RUN 3 REC=45%		grades to soft to medium stiff
45		20		35		RUN 4 REC=60%		grades to medium stiff
50		20		54		RUN 5 REC=55% RQD=26%		grades to CLAYEY SILT (SM) with some sand, stiff
55						RUN 6 REC=32% RQD=0%		Gray vesicular BASALT, closely to moderately fractured, slightly weathered, medium hard (dense basalt formation)
60		30/.5' Ref.				RUN 7 REC=60% RQD=21%		Reddish gray scoriaceous BASALT, severely fractured, moderately weathered, soft to medium hard (scoria basalt formation) grades to closely to severely fractured
65						RUN 8 REC=50% RQD=28%		grades to moderately to severely fractured
70						RUN 9 REC=53% RQD=0%		grades to severely fractured, highly weathered, breaks down to gravelly sand (SM), soft (scoria basalt formation)
75								

GEOLABS, INC.
Geotechnical Engineering

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 9
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-9.1

(Continued from previous plate)

Depth, ft	Sample	Pen. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compres. Strength ksf	Other Data	Pen. tsf	DESCRIPTION
		18		16				
80						RUN 10 REC=71% RQD=14%		Gray vesicular BASALT, closely to moderately fractured, moderately weathered, medium hard (dense basalt formation) CLINKER
85						RUN 11 REC=58% RQD=10%		grades to severely fractured
90						RUN 12 REC=72% RQD=18%		grades to closely to moderately fractured CLINKER
95						RUN 13 REC=50% RQD=23%		grades to moderately fractured, slightly weathered
100						RUN 14 REC=45% RQD=18%		CLINKER grades to closely fractured, unweathered
105						RUN 15 REC=60% RQD=20%		grades to moderately fractured
110						RUN 16 REC=63% RQD=42%		pocket of SILTY SAND (SM)
115						RUN 17 REC=45% RQD=13%		grades to closely to moderately fractured
120						RUN 18 REC=87% RQD=87%		grades to moderately to slightly fractured Boring terminated at 120 feet Groundwater not encountered
125								

GEOLABS, INC.
Geotechnical Engineering

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 9
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-9.2

Date Started: 3/4/98 | Drill Rig: CME-55G
Date Completed: 3/4/98 | Drilling Method: 4" Auger, HQ Coring
Logged By: S. Tanaka | Driving Energy: 140 lb. wt., 30 in. drop
Total Depth: 60.0 feet

Approximate Surface Elevation (ft): 929.1*

Depth, ft	Sample	Pen. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compres. Strength ksf	Other Data	Pen. tsf	DESCRIPTION
								Reddish brown CLAYEY SILT (MH/ML) with some basalt fragments, very stiff, damp (saprolite)
5		35		40				grades to moist
10		16						grades to gray
15		60/.3' Ref.		15				Gray SILTY SAND (SM) with basalt gravel, dense, damp (saprolite)
20		11		54				Dark brown SANDY SILT (ML) with basalt gravel, medium stiff, very moist (saprolite)
25		20/.0' Ref.				RUN 1 REC=0%		
30		32		25		RUN 2 REC=47% RQD=0%		grades to very stiff
35		28		51		RUN 3 REC=100% RQD=24%		Reddish gray scoriaceous BASALT, closely to severely fractured, highly weathered, soft (scoria basalt formation) breaks down to silty sand (SM) with gravel grades to soft to medium hard
40						RUN 4 REC=60% RQD=38%		Gray vesicular BASALT, closely to moderately fractured, slightly weathered, medium hard (dense basalt formation)
45						RUN 5 REC=30% RQD=12%		Gray scoriaceous BASALT, closely fractured, moderately weathered, medium hard (scoria basalt formation)
50		20/.0' Ref.				RUN 6 REC=85% RQD=62%		grades to moderately fractured
55						RUN 7 REC=58% RQD=15%		grades to closely fractured
60								Boring terminated at 60 feet Groundwater not encountered
65								
70								
75								

GEOLABS, INC.
Geotechnical Engineering

WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 11
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-11

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

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-10 OF 11 SHEETS

13

FED. ROAD DIST. NO.	STATE	FEDERAL – AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(26)	2002	14	155

Date Started: 2/20/98
Date Completed: 3/3/98
Logged By: S. Tanaka
Total Depth: 160.0 feet
Drill Rig: CME-55G
Drilling Method: 4" Auger, HQ Coring
Driving Energy: 140 lb. wt., 30 in. drop

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
								Approximate Surface Elevation (ft): 930.1*
		11						Reddish brown CLAYEY SILT (MH) with gravel and cobbles, medium stiff, damp (residual soil)
5		13		50				Brown with orange mottling SANDY SILT (ML) with gravel, medium stiff, moist (saprolite)
								Dark brown with white mottling CLAYEY SILT (MH), medium stiff, moist (saprolite)
10		8		52				
								Brown SILTY SAND (SM) with basalt fragments, dense, moist (saprolite)
15		47		28				
						RUN 1 REC=86% RQD=38%		Reddish gray scoriaceous BASALT, moderately to closely fractured, moderately weathered, soft to medium hard (scoria basalt formation)
20						RUN 2 REC=10% RQD=0%		Gray BASALT CLINKER
25		50/.3' Ref.		13		RUN 3 REC=12% RQD=0%		
30		8		36				Brown CLAYEY SILT (MH) with basalt fragments, soft to medium stiff, moist (saprolite)
						RUN 4 REC=100%		Brown CLAYEY SILT (MH) with basalt fragments, soft to medium stiff,
35		10		19				moist (saprolite) grades with more basalt fragments
40		23		24				grades to gray with white mottling
45		20/.2' Ref.				RUN 5 REC=74% RQD=38%		Gray strongly vesicular BASALT, closely to moderately fractured, slightly weathered, soft to medium hard (dense basalt formation)
50						RUN 6 REC=93% RQD=72%		grades to moderately fractured, medium hard
55						RUN 7 REC=48% RQD=7%		Gray scoriaceous BASALT, closely to moderately fractured, moderately weathered, soft to medium hard (scoria basalt formation)
60		9		29				Purple-brown CLAYEY SAND (SC) with gravel, loose, moist
65		20/.2' Ref.				RUN 8 REC=0% RUN 9 REC=31% RQD=0%		Purple-gray scoriaceous BASALT, closely to severely fractured, moderately weathered, soft to medium hard (scoria basalt formation)
70		10/.2' Ref.				RUN 10 REC=57%		grades to severely fractured, extremely weathered, breaks down to silty sand (SM) with clay, soft at 70.8 feet
75								

GEOLABS, INC.
Geotechnical Engineering
WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 10
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-10.1

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
		48		24				(Continued from previous plate)
						RUN 11 REC=52% RQD=0%		
80		20/.2' Ref.				RUN 12 REC=52% RQD=10%		grades without clay Gray vesicular BASALT, closely fractured, slightly weathered to unweathered, medium hard (dense basalt formation)
85						RUN 13 REC=52% RQD=7%		grades to closely to severely fractured, slightly weathered
90						RUN 14 REC=73% RQD=38%		grades to closely to moderately fractured
95						RUN 15 REC=82% RQD=38%		CLINKER
								CLINKER
100						RUN 16 REC=67% RQD=52%		CLINKER grades to moderately fractured, unweathered
105						RUN 17 REC=65% RQD=15%		Reddish gray scoriaceous BASALT, closely to severely fractured, moderately weathered, medium hard (scoria basalt formation)
110						RUN 18 REC=77% RQD=47%		Gray vesicular BASALT, moderately fractured, unweathered, medium hard (dense basalt formation)
115						RUN 19 REC=77% RQD=43%		CLINKER
120						RUN 20 REC=10% RQD=0%		CLINKER with silty sand (SM)
125		60/.5' Ref.		18		RUN 21 REC=100% RQD=87%		Gray vesicular BASALT with some olivine crystals, slightly fractured, unweathered, hard (dense basalt formation)
130						RUN 22 REC=95% RQD=55%		grades to closely fractured
135						RUN 23 REC=70% RQD=20%		grades to slightly fractured grades to closely to moderately fractured
140						RUN 24 REC=3% RQD=0%		CLINKER
145		35/.3' Ref.				RUN 25 REC=57% RQD=14%		Reddish gray scoriaceous BASALT, closely to severely fractured, moderately weathered, soft to medium hard (scoria basalt formation)
150						RUN 26 REC=100% RQD=87%		grades to gray, slightly fractured
155								

GEOLABS, INC.
Geotechnical Engineering
WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 10
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-10.2

Depth, ft	Sample	Penetra. Resist. Blows/ft	Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Data	Pen. tsf	DESCRIPTION
								(Continued from previous plate)
						RUN 27 REC=100% RQD=68%		grades to moderately fractured
160								Boring terminated at 160 feet Groundwater not encountered
165								
170								
175								
180								
185								
190								
195								

GEOLABS, INC.
Geotechnical Engineering
WORK ORDER NO. 3885-00 TSK Sep 98

LOG OF BORING 10
KEALAKAHA STREAM BRIDGE REPLACEMENT
KEALAKAHA, HAMAKUA, HAWAII

PLATE A-10.3

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

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

GEOLABS, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KEALAKAHA STREAM BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-019-2(26)

SCALE: AS SHOWN DATE: NOVEMBER 2001

SHEET No. G-11 OF 11 SHEETS