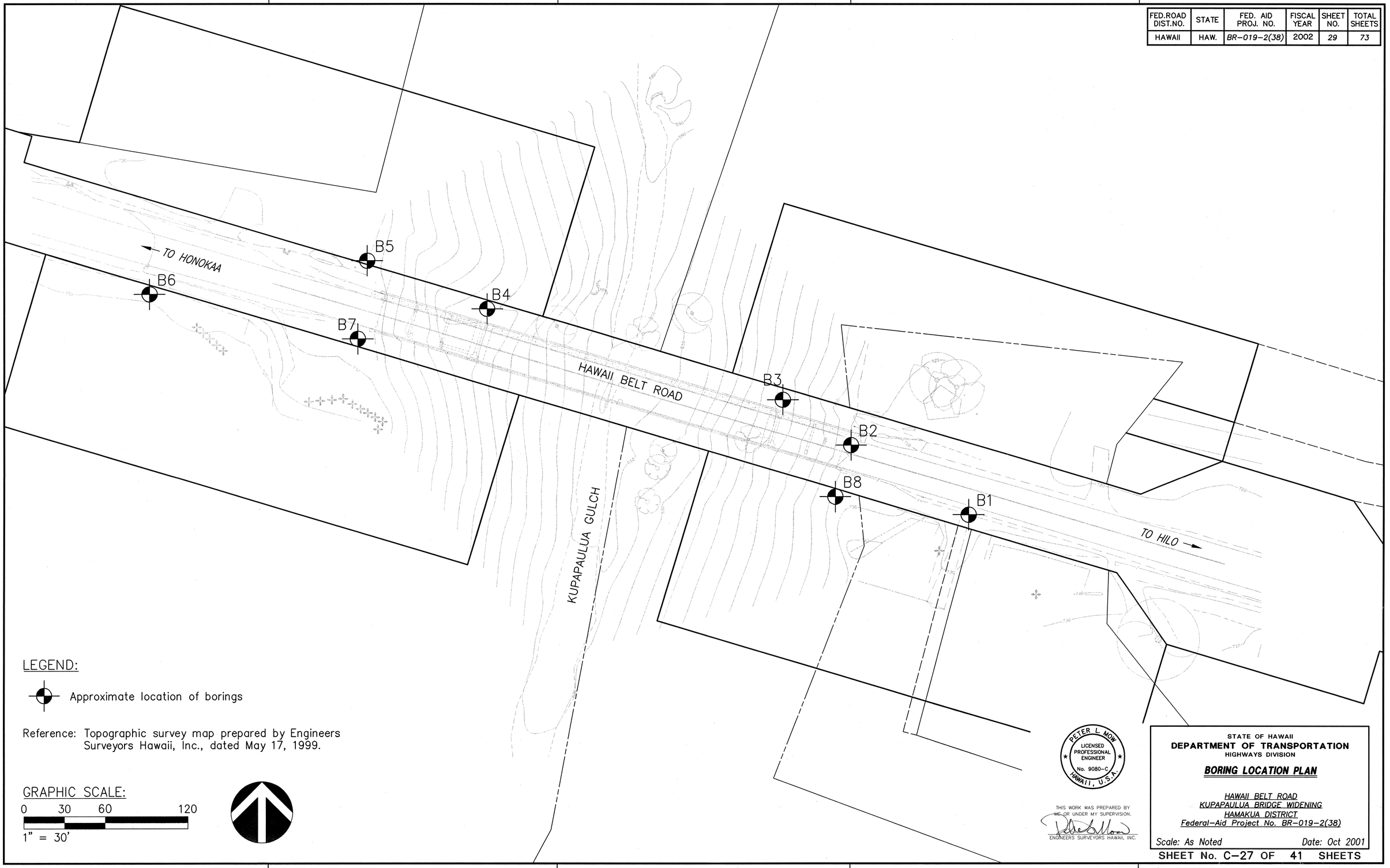
FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(38)	2002	29	73



LEGEND:

Approximate location of borings

Reference: Topographic survey map prepared by Engineers Surveyors Hawaii, Inc., dated May 17, 1999.

GRAPHIC SCALE:

0 30 60 120

1" = 30'

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

PETER L. MOW
LICENSED PROFESSIONAL ENGINEER
No. 9080-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

ENGINEERS SURVEYORS HAWAII, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOCATION PLAN

HAWAII BELT ROAD
KUPAPAULUA BRIDGE WIDENING
HAMAKUA DISTRICT
Federal-Aid Project No. BR-019-2(38)

Scale: As Noted Date: Oct 2001

SHEET No. C-27 OF 41 SHEETS

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(38)	2002	30	73

MAJOR DIVISIONS			GROUP SYMBOLS		TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of the material is LARGER than No. 200 sieve size.)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines.)		GW	Well graded gravels, gravel-sand mixtures, little or no fines.
				GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines.)		GM	Silty gravels, gravel-sand-silt mixtures.
				GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size.)	CLEAN SANDS (Little or no fines.)		SW	Well graded sands, gravelly sands, little or no fines.
				SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines.)		SM	Silty sands, sand-silt mixtures.
				SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of the material is SMALLER than No. 200 sieve size.)	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 GREATER than 50.)			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
				CH	Inorganic clays of high plasticity, fat clays.
				OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS				PT	Peat and other highly organic soils.
					FRESH TO MODERATELY WEATHERED BASALT
					VOLCANIC TUFF / HIGHLY TO COMPLETELY WEATHERED BASALT
					CORAL

SAMPLE DEFINITION

- 51 mm O.D. Standard Split Spoon Sampler
- 76 mm O.D. Split Tube Sampler
- Shelby Tube
- NX / 102 mm Coring
- RQD Rock Quality Designation
- Water Level

W.O. 97-2944	Kupapaulua Bridge Widening
Ernest K. Hirata & Associates, Inc.	BORING LOG LEGEND

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 97-2944

BORING NO. B1 DRIVING WT. 63.5 kg DATE OF DRILLING 10-3-97
SURFACE ELEV. 219.8±* DROP 760 mm WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0			73	15	21	Silty GRAVEL (GM) – Orange brown, slightly moist, dense. (Fill) Covered by 25 mm of asphaltic concrete over 406 mm of base course material.
1			10/No	Penetration		BASALT (WM) – Gray, medium hard, moderately weathered, highly fractured, with weathered seams. Begin NX coring from 0.9 meters. 100% Recovery from 0.9 to 2.4 meters. RQD = 9%
2						100% Recovery from 2.4 to 4.0 meters. RQD = 56% Slightly weathered from 2.4 to 3.7 meters.
3						Highly weathered from 3.7 to 4.1 meters.
4						80% Recovery from 4.0 to 5.5 meters. RQD = 0% Moderately to highly weathered, dense to medium hard from 4.1 meters.
5						End boring at 5.5 meters.
6						
7						
8						
9						
10						

* Topographic survey map prepared by Engineers Surveyors Hawaii, Inc., dated May 17, 1999.

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 97-2944

BORING NO. B2 DRIVING WT. 63.5 kg DATE OF DRILLING 10-7-97
SURFACE ELEV. 219.5± DROP 760 mm WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0			30	13	25	Silty GRAVEL (GM) – Mottled gray and brown, moist, medium dense to dense. (Fill) Covered by 229 mm of asphaltic concrete.
1			13	11	31	Clayey SILT (MH) – Mottled orange brown, moist, medium stiff with basalt gravel. (Fill)
2			11	10	62	Moist to very moist at 2.1 meters.
3			25	9	79	Cobbles at 2.4 meters.
4			15/No	Penetration		WEATHERED BASALT (WH-WC) – Mottled gray, dense to medium hard, highly to completely weathered, highly fractured.
5			43	11	41	Begin NX coring from 5.2 meters. 69% Recovery from 5.2 to 6.4 meters. RQD = 0 % Moderately weathered from 5.2 to 5.6 meters.
6						60% Recovery from 6.4 to 7.9 meters. RQD = 8% Moderately weathered from 6.1 to 7 meters.
7						
8						50% Recovery from 7.9 to 9.5 meters. RQD = 32%
9						Slightly to moderately weathered from 9 to 9.8 meters. 66% Recovery from 9.5 to 11.0 meters. RQD = 18%
10						Highly to moderately weathered from 9.8 meters.
11						100% Recovery from 11.0 to 12.5 meters. RQD = 16% Slightly to moderately weathered from 11 meters.
12						End boring at 12.5 meters.
13						

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

PETER L. MOW LICENSED PROFESSIONAL ENGINEER No. 9080-C HAWAII, U.S.A.

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ENGINEERS SURVEYORS HAWAII, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

HAWAII BELT ROAD
KUPAPAULUA BRIDGE WIDENING
HAMAKUA DISTRICT
Federal-Aid Project No. BR-019-2(38)

Scale: As Noted Date: Oct 2001

SHEET No. C-28 OF 41 SHEETS

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(38)	2002	31	73

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 97-2944

BORING NO. B3 DRIVING WT. 63.5 kg DATE OF DRILLING 10-8-97
SURFACE ELEV. 205.1± DROP 760 mm WATER LEVEL None

DEPTH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0					Clayey SILT (MH) – Brown, moist, firm to medium stiff.
1		7	11	34	WEATHERED BASALT (WH–WC) – Mottled brown, moist, medium dense, highly to completely weathered.
2		20	11	47	Very moist from 1.5 meters. Medium hard at 2 meters. Begin NX coring from 2.4 meters. 9% Recovery from 2.4 to 4.0 meters. RQD = 0%
3					
4					
5		14	9	62	
6		70/152 mm	17	13	BASALT (WM) – Gray, dense to medium hard, moderately weathered, highly fractured. Begin NX coring from 6.7 meters. 96% Recovery from 6.7 to 8.2 meters. RQD = 17% Moderately to highly weathered from 7.3 meters.
7					
8					WEATHERED BASALT (WH) – Mottled gray, dense to medium hard, highly weathered, fractured. 80% Recovery from 8.2 to 9.8 meters. RQD = 45% Moderately to highly weathered from 8.2 to 8.9 meters. Slightly to moderately weathered from 8.9 to 9.3 meters.
9					
10					51% Recovery from 9.8 to 11.3 meters. RQD = 28% Highly to moderately weathered from 9.8 meters. Moderately weathered from 10.9 to 11.3 meters.
11					92% Recovery from 11.3 to 12.8 meters. RQD = 5% Moderately weathered from 12.3 to 12.6 meters.
12					
13					71% Recovery from 12.8 to 14.3 meters. RQD = 36% Moderately to slightly weathered from 12.8 to 13.7 meters.
14					
15					10% Recovery from 14.3 to 15.9 meters. RQD = 0% Highly to completely weathered from 14.3 to 15.9 meters.
16					94% Recovery from 15.9 to 17.4 meters. RQD = 34%
17					BASALT (WS) – Gray, medium hard to hard, slightly weathered, highly fractured.
18					97% Recovery from 17.4 to 18.9 meters. RQD = 12% Moderately weathered from 17.4 meters.
19					End boring at 18.9 meters.
20					

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 97-2944

BORING NO. B4 DRIVING WT. 63.5 kg DATE OF DRILLING 10-15-97
SURFACE ELEV. 201.8± DROP 760 mm WATER LEVEL None

DEPTH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0					
1		5	9	45	Clayey SILT (MH) – Brown, moist, firm to medium stiff, with rock fragments and cobbles.
2		17	10	42	WEATHERED BASALT (WH–WC) – Mottled brown, moist, medium dense, highly to completely weathered.
3		16	9	50	
4					Dense from 3.7 meters.
5		60	16	17	
6		15/No Penetration			Moderately weathered from 5.2 to 5.6 meters. Begin NX coring from 5.5 meters. 100% Recovery from 5.5 to 7.0 meters. RQD = 70%
7					BASALT (WS–WM) – Gray, medium hard to hard, slightly to moderately weathered. 100% Recovery from 7.0 to 8.5 meters. RQD = 81%
8					
9					100% Recovery from 8.5 to 10.1 meters. RQD = 100%
10					
11		25/No Penetration			50% Recovery from 10.1 to 11.6 meters. RQD = 0% Highly to completely weathered from 10.3 to 11.7 meters.
12					90% Recovery from 11.6 to 13.1 meters. RQD = 49%
13					WEATHERED BASALT (WH) – Mottled grayish brown, dense to medium hard, highly weathered. 30% Recovery from 13.1 to 14.6 meters. RQD = 8%
14					
15					Moderately to highly weathered from 14.3 meters. 83% Recovery from 14.6 to 16.2 meters. RQD = 8%
16					Moderately weathered from 15.7 meters.
17					End boring at 16.2 meters.

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 97-2944

BORING NO. B5 DRIVING WT. 622.7 N DATE OF DRILLING 10-27-97
SURFACE ELEV. 221.3± DROP 760 mm WATER LEVEL None

DEPTH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0					
1		12	7	102	Clayey SILT (MH) – Brown, moist, firm to medium stiff, with rock fragments and cobbles.
2		23	9	58	Medium stiff from 1 meter. Begin NX coring from 1.5 meters. 83% Recovery from 1.5 to 2.1 meters.
3		15	11	54	
4					
5		27/102 mm	No Recovery		BASALT (WS–WM) – Gray, medium hard to hard, slightly to moderately weathered. 75% Recovery from 4.6 to 6.1 meters. RQD = 55%
6					
7					96% Recovery from 6.1 to 7.6 meters RQD = 48% Completely weathered from 6.4 to 6.7 meters
8					WEATHERED BASALT (WH) – Grayish brown, dense, highly weathered. 45% Recovery from 7.6 to 9.1 meters. RQD = 7%
9					No Recovery from 9.1 to 10.7 meters.
10					
11		14		42	Completely weathered (clayey silt) from 10.7 meters.
12		12		53	
13					Medium hard at 13.1 meters. 50% Recovery from 13.4 to 14.9 meters. RQD = 7% Moderately to highly weathered from 13.4 meters.
14					
15					BASALT (WM) – Gray, medium hard to hard, moderately weathered, highly fractured. 100% Recovery from 14.9 to 15.9 meters. RQD = 0%
16					100% Recovery from 15.9 to 16.8 meters. RQD = 52%
17					90% Recovery from 16.8 to 18.3 meters. RQD = 7%
18					
19					85% Recovery from 18.3 to 19.8 meters. RQD = 20%
20					

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.F.. 97-2944

BORING NO. B5 (Continued) DRIVING WT. 622.7 N DATE OF DRILLING 10-29-97
SURFACE ELEV. 221.3± DROP 760 mm WATER LEVEL None

DEPTH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
20					WEATHERED BASALT (WH) – Gray, dense to medium hard, highly weathered, fractured. 63% Recovery from 19.8 to 21.3 meters. RQD = 0%
21					48% Recovery from 21.3 to 22.9 meters. RQD = 0% Moderately weathered from 21.4 to 21.8 meters
22					
23					100% Recovery from 22.9 to 24.4 meters. RQD = 0%
24					Moderately weathered from 23.8 meters.
25					End boring at 24.4 meters.

SURVEY PLOTTED BY
DRAWN BY
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DESIGN BY
QUANTITIES BY
CHECKED BY
DATE

ORIGINAL PLAN
NOTE BOOK
No.

PETER L. MOW
LICENSED PROFESSIONAL ENGINEER
No. 9080-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
ENGINEERS SURVEYORS HAWAII, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

HAWAII BELT ROAD
KUPAPAULUA BRIDGE WIDENING
HAMAKUA DISTRICT
Federal-Aid Project No. BR-019-2(38)

Scale: As Noted Date: Oct 2001

SHEET No. C-29 OF 41 SHEETS

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-019-2(38)	2002	32	73

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 97-2944

BORING NO. B6 DRIVING WT. 63.5 kg DATE OF DRILLING 11-4-97
SURFACE ELEV. 227.4± DROP 760 mm WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (MH) – Brown, very moist, medium stiff, with rock fragments and cobbles.
1			16	7	97	Cobbles at 0.6 meters.
						Cobbles at 1.2 meters.
2			15	11	45	Medium stiff, transitioned to completely weathered basalt from 1.5 meters.
3			75/255 mm	15	19	BASALT (WS-WM) – Gray, medium hard, slightly to moderately weathered, highly fractured. Begin NX coring from 3.0 meters. 100% Recovery from 3.0 to 4.5 meters. RQD = 18%
4						Moderately to highly weathered from 3.7 to 4.5 meters.
5						100% Recovery from 4.5 to 6.1 meters. RQD = 0%
6						End boring at 6.1 meters.
7						
8						
9						
10						

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 97-2944

BORING NO. B7 DRIVING WT. 63.5 kg DATE OF DRILLING 11-5-97
SURFACE ELEV. 221.1± DROP 760 mm WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (MH) – Brown, very moist, medium stiff, with rock fragments.
1			119/280 mm	17	12	WEATHERED BASALT (WH) – Mottled brown, moist, dense, highly weathered. Moderately weathered, medium hard from 0.9 to to 1.2 meters. Begin NX Coring from 0.9 meters.
			10/No Penetration			60% Recovery from 0.9 to 1.5 meters RQD = 25%
2			71	19	21	50% Recovery from 1.5 to 1.8 meters. RQD = 0% Completely weathered (clayey silt) from 2.1 meters.
3			54	16	23	
4			22	9	43	
5						86% Recovery from 4.9 to 6.0 meters. RQD = 24% Slightly to moderately weathered from 4.9 to 5.3 meters.
6						90% Recovery from 6.0 to 7.5 meters. RQD = 20% Slightly to moderately weathered from 6 to 6.8 meters.
7						
8						92% Recovery from 7.5 to 9.0 meters. RQD = 0%
9						Moderately weathered from 8.4 to 9 meters.
10						64% Recovery from 9.0 to 10.5 meters. RQD = 0% Moderately to highly weathered from 9 meters.
11						14% Recovery from 10.5 to 11.6 meters. RQD = 0%
12			49/152 mm 10/No Penetration		27	Completely weathered (clayey silt) at 11.6 meters. 100% Recovery from 11.7 to 12.2 meters. RQD = 47% Slightly weathered from 11.9 to 12.2 meters. 37% Recovery from 12.2 to 13.7 meters. RQD = 7%
13						Slightly weathered from 13.4 to 13.9 meters.
14						40% Recovery from 13.7 to 14.6 meters. RQD = 0%
15						90% Recovery from 14.6 to 15.2 meters. RQD = 75% Slightly to moderately weathered from 14.6 meters.
16						End boring at 15.2 meters.

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 97-2944

BORING NO. B8 DRIVING WT. 622.7 N DATE OF DRILLING 11-10-97
SURFACE ELEV. 220.1± DROP 760 mm WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER 0.3 m	DRY DENSITY (kN/m³)	MOIST. CONT. (%)	DESCRIPTION
0			29	10	56	Clayey SILT (MH) – Brown, very moist, medium stiff to stiff, with weathered sand and rock fragments.
1			22	10	46	WEATHERED BASALT (WH-WC) – Mottled grayish brown, moist, dense, highly to completely weathered.
2			17	10	69	
						Medium hard at 2.3 meters.
3			29	12	46	
4						
5			68	16	25	Dense to medium hard from 4.3 meters. Moderately weathered from 4.6 to 4.9 meters. Begin NX coring from 4.9 meters. 40% Recovery from 4.9 to 5.8 meters. RQD = 0%
6						75% Recovery from 5.8 to 7.3 meters. RQD = 12% Moderately weathered from 6.1 to 7.3 meters.
7						
8						56% Recovery from 7.3 to 8.8 meters. RQD = 0%
9						Moderately weathered from 8.4 meters.
10						End boring at 8.8 meters.

ORIGINAL PLAN
SURVEY PLOTTED BY DATE
DRAWN BY
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BORING LOGS

HAWAII BELT ROAD
KUPAPAULUA BRIDGE WIDENING
HAMAKUA DISTRICT
Federal-Aid Project No. BR-019-2(38)

Scale: As Noted Date: Oct 2001

SHEET No. C-30 OF 41 SHEETS