FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-037-1(22)	2003	6	72

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B1 (STA 7+50) DRIVING WT. 140 lb. DATE OF DRILLING 6/4/96
SURFACE ELEV. 96±* DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, moist, stiff, with cobbles and gravel.
			10/No Penetration			Cobble at 2 feet.
						Cobble at 3 feet.
5			36	93	25	
						HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, dense.
			50/6"	100	24	
10						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard.
						End boring at 14 feet.
15						* Elevations based on Topographic Survey prepared by Engineers Surveyors Hawaii, Inc.

Plate B1

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B2 (STA 18+00) DRIVING WT. 140 lb. DATE OF DRILLING 6/4/96
SURFACE ELEV. 102± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, moist, stiff, with weathered gravel.
			20	101	27	
5			46/11"	99	19	HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, dense.
						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard.
10						End boring at 11 feet.

Plate B2

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B3 (STA 31+50) DRIVING WT. 140 lb. DATE OF DRILLING 6/4/96
SURFACE ELEV. 104± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, moist, medium stiff, with cobbles and gravel. Cobble at 1 foot.
			41/9"	96	27	HIGHLY WEATHERED BASALT (WH) – Mottled yellowish brown, moist, dense.
5						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard, fractured. Begin NX coring at 4 feet. 100% recovery from 4 to 9 feet. RQD=28% Highly weathered basalt from 5.5 to 8.5 feet, dense.
10						End boring at 9 feet.

Plate B3

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B4 (STA 41+50) DRIVING WT. 140 lb. DATE OF DRILLING 6/4/96
SURFACE ELEV. 110± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			19	73	17	Silty CLAY (CL-ML) – Reddish brown, moist, medium stiff, with weathered gravel.
5			12	98	25	
			12/10"	85	36	HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, medium dense.
						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard.
10						End boring at 10 feet.

Plate B4

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B5 (STA 53+50) DRIVING WT. 140 lb. DATE OF DRILLING 6/4/96
SURFACE ELEV. 120.5± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			24	90	24	Silty CLAY (CL-ML) – Reddish brown, moist, stiff.
5			74	98	23	Cobbles from 5.5 to 7 feet.
			18	92	34	COMPLETELY TO HIGHLY WEATHERED BASALT (WC-WH) – Mottled reddish brown, moist, medium stiff.
			4/6" 20/2"	69	44	Hard at 14.5 feet.
15						End boring at 14.5 feet.

Plate B5

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B6 (STA 87+70) DRIVING WT. 140 lb. DATE OF DRILLING 5/28/96
SURFACE ELEV. 192± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			13	96	19	Silty CLAY (CL-ML) – Reddish brown, moist, medium stiff, with gravel.
5			27	86	29	HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, dense.
10			100/8"	91	28	Dense to medium hard from 10 feet.
15			73/10"	78	26	
20						MODERATELY WEATHERED BASALT (WM) – Mottled gray, medium hard.
			50/3"	Tip Recovery		
25						End boring at 25 feet.

Plate B6

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B7 (STA 88+30) DRIVING WT. 140 lb. DATE OF DRILLING 5/24/96
SURFACE ELEV. 195± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, moist, medium stiff, with cobbles and gravel.
			16	85	39	COMPLETELY WEATHERED BASALT (WC) – Mottled reddish and grayish brown, moist, medium dense.
5			15	85	38	
			80/8"	107	15	HIGHLY WEATHERED BASALT (WH) – Mottled gray, slightly moist, dense to medium hard, highly fractured.
10						
15						MODERATELY TO SLIGHTLY WEATHERED BASALT (WM-WS) – Gray, hard, fractured. Begin NX coring at 11.5 feet. 100% Recovery from 11.5 to 16.5 feet. RQD = 40% 90% Recovery from 16.5 to 21.5 feet. RQD = 24%
20						End boring at 21.5 feet.

Plate B7

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B8 (STA 98+80) DRIVING WT. 140 lb. DATE OF DRILLING 5/30/96
SURFACE ELEV. 231± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			36/8"	94	26	Silty CLAY (CL-ML) – Reddish brown, moist, stiff, with cobbles and gravel.
						Cobble at 3.5 feet.
5			32	80	30	Cobble at 5 feet. Mottled reddish brown color from 5.5 feet.
						Cobble at 7.5 feet.
10						Boulder at 9 to 10 feet. Cobble at 10 feet.
						Cobble at 11.5 feet.
			14	92	31	COMPLETELY WEATHERED BASALT (WC) – Mottled reddish brown, moist, medium dense.
15						End boring at 14.5 feet.

Plate B8

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

j34-56 fB-1.dwg ESH-1 Plot:1=1 11/21/2002 AMR

ERIC N. S. HEE
LICENSED PROFESSIONAL ENGINEER
No. 5292-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Eric N. S. Hee
ENGINEERS SURVEYORS HAWAII, INC.

LICENSE EXPIRATION DATE: 4/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

HALEAKALA HIGHWAY WIDENING, PHASE I
HANA HIGHWAY TO PUKALANI BYPASS
FED. AID PROJ. NO. NH-037-1(22)

SCALE: AS NOTED DATE: NOV., 2002

SHEET No. 1 OF 5 SHEETS

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-037-1(22)	2003	7	72

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B9 (STA 108+50) DRIVING WT. 140 lb. DATE OF DRILLING 5/30/96
SURFACE ELEV. 266± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, slightly moist, stiff.
			33	86	14	COMPLETELY TO HIGHLY WEATHERED BASALT (WC-WH) – Mottled brown, slightly moist to moist, dense.
5			67	84	22	
						SLIGHTLY WEATHERED BASALT (WM) – Gray, hard, highly vesicular. Begin NX coring at 6 feet. 90% Recovery from 6 to 11 feet. RQD = 68%
10						
						End boring at 11 feet.
						Plate B9

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B10 (STA 129+00) DRIVING WT. 140 lb. DATE OF DRILLING 5/24/96
SURFACE ELEV. 339± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, moist, medium stiff.
			14	94	30	
			13	69	34	COMPLETELY TO HIGHLY WEATHERED BASALT (WC-WH) – Mottled grayish brown, moist, medium dense.
5						
						Dense from 7 feet.
			39	91	16	
10						
						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard, highly vesicular. Begin NX coring at 12 feet. 100% Recovery from 12 to 17 feet. RQD = 86%
15						
						End boring at 17 feet.
20						Plate B10

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B11 (STA 129+70) DRIVING WT. 140 lb. DATE OF DRILLING 5/23/96
SURFACE ELEV. 340± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			26/6"	79	14	Silty CLAY (CL-ML) – Reddish brown, moist, stiff, with cobbles and gravel.
			10/No Penetration			Cobbles at 1.5 feet.
			40	99	25	
5						
			13	87	37	COMPLETELY WEATHERED BASALT (WC) – Mottled reddish brown, moist, medium dense.
			17	78	41	Mottled grayish brown color from 9.5 feet.
10						
			15	73	40	
15						
						MODERATELY WEATHERED BASALT (WM) – Gray, medium hard.
			90/9"	Tip Recovery		Dense to medium hard from 19 feet.
20						
			50/3"	No Recovery		
25						End boring at 24.5 feet.
						Plate B11

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B12 (STA 140+50) DRIVING WT. 140 lb. DATE OF DRILLING 5/30/96
SURFACE ELEV. 376± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Brown, moist, stiff, with cobbles and gravel.
			40	98	21	
5			40	114	17	Cobble at 5 feet. Grayish brown color from 5.5 feet.
			56/10"	97	21	Mottled reddish brown color from 9 feet.
10						Boulder at 10.5 to 11.5 feet. Cobble at 12 feet.
			51/11"	97	23	
15						End boring at 15.5 feet.
						Plate B12

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B13 (STA 150+50) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 411± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty GRAVEL (GM) – Grayish brown, slightly moist, dense, with cobbles.
			90/9"	109	12	
						Cobble at 3 feet.
5			50/5"	No Recovery		Cobbles at 4.5 feet.
						Cobbles from 6.5 to 8 feet.
			10/No Penetration			Cobble at 9 feet.
10						
						MODERATELY TO SLIGHTLY WEATHERED BASALT (WM-WS) – Gray, medium hard to hard.
15						End boring at 14 feet.
						Plate B13

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B14 (STA 171+10) DRIVING WT. 140 lb. DATE OF DRILLING 5/23/96
SURFACE ELEV. 477± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			64	104	21	Silty CLAY (CL-ML) – Reddish brown, moist, stiff. Cobble at 1.5 feet.
			14	96	30	Medium stiff at 3 feet.
5			44	87	30	Brown color from 6 feet.
						Firm from 8 to 11.5 feet.
10			6	84	35	
15			65/5"	118	18	HIGHLY WEATHERED BASALT (WH) – Dark brown, moist, dense.
						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard. Begin NX coring at 17 feet. 100% Recovery from 17 to 22 feet. RQD = 100%
20						
						End boring at 22 feet.
25						Plate B14

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B15 (STA 171+70) DRIVING WT. 140 lb. DATE OF DRILLING 5/23/96
SURFACE ELEV. 480± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			24	93	20	Silty CLAY (CL-ML) – Reddish brown, moist, stiff, with sand.
			11	95	27	Medium stiff from 4 to 7 feet.
5						Brown color from 7 feet.
			49	100	27	
10						
			65/6"	70	22	COMPLETELY WEATHERED BASALT (WC) – Mottled dark brown, moist, dense.
15						
			86/10"	104	16	
20						
			10/No Penetration			SLIGHTLY WEATHERED BASALT (WM) – Gray, hard.
25						End boring at 24 feet.
						Plate B15

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B16 (STA 183+60) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 529± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			27	96	24	Silty CLAY (CL-ML) – Reddish brown, moist, stiff, with gravel.
			22	98	29	
5						COMPLETELY WEATHERED BASALT (WC) – Mottled reddish brown, moist, firm.
			7	75	47	
10						Hard at 12 feet.
						End boring at 12.5 feet.
15						Plate B16

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

J:94-56 f8-2.dwg ESH-1 Plot:1=1 11/21/2002 AM8

ERIC N. S. HEE
LICENSED PROFESSIONAL ENGINEER
No. 5292-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Eric N. S. Hee
ENGINEERS SURVEYORS HAWAII, INC.

LICENSE EXPIRATION DATE: 4/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

HALEAKALA HIGHWAY WIDENING, PHASE I
HANA HIGHWAY TO PUKALANI BYPASS
FED. AID PROJ. NO. NH-037-1(22)

SCALE: AS NOTED DATE: NOV., 2002

SHEET No. 2 OF 5 SHEETS

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-037-1(22)	2003	8	72

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B17 (STA 196+00) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 592.5± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty GRAVEL (GM) – Grayish brown, moist, medium dense.
			6/6"			
			10/6"	93	27	Silty CLAY (CL-ML) – Reddish brown, moist, medium stiff, with cobbles, gravel, and sand. Boulder at 4 to 5 feet. Begin NX coring at 5 feet. 58% recovery from 5 to 9 feet. Cobbles from 5 to 6 feet.
5						Cobbles from 7.5 to 8.5 feet.
						End NX coring at 9 feet. Cobbles from 9 to 11 feet.
10						
			19	80	31	Silty CLAY (CL-ML) – Brown, moist, medium stiff.
15						End boring at 14.5 feet.

Plate B17

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B18 (STA 205+50) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 641± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, slightly moist, stiff, with cobbles, gravel, and sand. Boulder at 0.5 to 2 feet.
			70/10"	105	11	Cobbles from 3 to 4.5 feet.
5						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard. Begin NX coring at 5 feet. 94% Recovery from 5 to 10 feet. RQD = 80%
10						End boring at 10 feet.

Plate B18

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B19 (STA 239+75) DRIVING WT. 140 lb. DATE OF DRILLING 5/23/96
SURFACE ELEV. 815± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			4/6"			Silty CLAY (CL-ML) – Brown, moist, medium stiff, with cobbles.
			15/No	Tip Recovery Penetration		Cobbles from 2 to 3 feet.
			16	95	30	
5			15	86	37	
			17	82	22	COMPLETELY WEATHERED BASALT (WC) – Mottled brown, moist, medium dense.
10						
			15/No	Penetration		SLIGHTLY WEATHERED BASALT (WS) – Gray, hard, vesicular. Begin NX coring at 13 feet. 100% Recovery from 13 to 18 feet. RQD = 80%
15						
						End boring at 18 feet.
20						

Plate B19

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B20 (STA 240+25) DRIVING WT. 140 lb. DATE OF DRILLING 5/22/99
SURFACE ELEV. 811± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			19	99	27	Silty CLAY (CL-ML) – Dark brown, moist, medium stiff.
						Cobble at 2 feet.
			7	90	30	Firm at 3 feet.
5			13	95	31	
10			10/No	Penetration		SLIGHTLY WEATHERED BASALT (WS) – Gray, hard, fractured. Begin NX coring at 10 feet. 100% Recovery from 10 to 15 feet. RQD = 50% Vesicular from 11.5 feet.
15						100% Recovery from 15 to 20 feet. RQD = 84%
20						End boring at 20 feet.

Plate B20

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B21 (STA 255+20) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 870± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			13	84	28	Silty CLAY (CL-ML) – Brown, moist, medium stiff, with gravel. Covered by 3 inches of asphaltic concrete.
			21	97	24	COMPLETELY TO HIGHLY WEATHERED BASALT (WC-WH) – Mottled grayish brown, moist, dense.
5						
			28	88	38	
10						
			63	93	25	
15						End boring at 14 feet.

Plate B21

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B22 (STA 270+00) DRIVING WT. 140 lb. DATE OF DRILLING 5/28/96
SURFACE ELEV. 951± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			13	75	39	COMPLETELY WEATHERED BASALT (WC) – Mottled brown, moist, medium dense. Covered by 2.5 inches of asphaltic concrete.
			20	76	42	
5						
			50/6"	86	20	HIGHLY WEATHERED BASALT (WH) – Grayish brown, moist, dense.
10						
			82/7"	Tip Recovery		MODERATELY WEATHERED BASALT (WM) – Mottled gray, dense to medium hard.
15						End boring at 15 feet.

Plate B22

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B23 (STA 284+10) DRIVING WT. 140 lb. DATE OF DRILLING 5/28/96
SURFACE ELEV. 1022± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			12	89	31	Silty CLAY (CL-ML) – Grayish brown, moist, medium stiff, with gravel. Brown color from 1 foot.
			20	80	30	
5						
			21	73	46	COMPLETELY TO HIGHLY WEATHERED BASALT (WC-WH) – Mottled yellowish brown, moist, medium dense.
10						
			50/2"	No Recovery		MODERATELY WEATHERED BASALT (WM) – Gray, medium hard.
15						End boring at 14 feet.

Plate B23

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG — W.O. 95-2687

BORING NO. B24 (STA 65+40) DRIVING WT. 140 lb. DATE OF DRILLING 5/30/96
SURFACE ELEV. 146± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, slightly moist, medium stiff.
			24	70	21	COMPLETELY WEATHERED BASALT (WC) – Grayish brown, moist, dense.
5						MODERATELY TO SLIGHTLY WEATHERED BASALT (WM-WS) – Gray, hard, vesicular. Begin NX coring at 5 feet. 98% Recovery from 5 to 10 feet. RQD = 82%
10						End boring at 10 feet.

Plate B24

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

194-56 fig-3.dwg ESH-1 Plot=1 11/21/2002 AMR

ERIC N. S. HEE
LICENSED PROFESSIONAL ENGINEER
No. 5292-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

ENGINEERS SURVEYORS HAWAII, INC.

LICENSE EXPIRATION DATE: 4/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

HALEAKALA HIGHWAY WIDENING, PHASE I
HANA HIGHWAY TO PUKALANI BYPASS
FED. AID PROJ. NO. NH-037-1(22)

SCALE: AS NOTED DATE: NOV., 2002

SHEET No. 3 OF 5 SHEETS

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-037-1(22)	2003	9	72

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B25 (STA 78+00) DRIVING WT. 140 lb. DATE OF DRILLING 5/30/96
SURFACE ELEV. 170± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Reddish brown, moist, stiff.
			51	87	18	
5			10/No Penetration			HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, dense to medium hard.
			15/4" 10/No Penetration	80	15	
10						MODERATELY WEATHERED BASALT (WM) – Gray, medium hard. Dense to medium hard from 12 feet.
15						End boring at 15 feet.

Plate B25

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B26 (STA 118+60) DRIVING WT. 140 lb. DATE OF DRILLING 5/30/99
SURFACE ELEV. 302± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty GRAVEL (GM) – Grayish brown, slightly moist, dense.
			40/4"	Tip Recovery		Silty CLAY (CL-ML) – Grayish brown, slightly moist, stiff, with cobbles and gravel. Cobble at 1 foot. Cobble at 3 feet.
5			50/5"	No Recovery		MODERATELY WEATHERED BASALT (WM) – Gray, medium hard, highly vesicular.
			50/2"	Tip Recovery		
10						
15			10/No Penetration			End boring at 15 feet.

Plate B26

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B27 (STA 160+70) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 444± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			47	119	6	Silty GRAVEL (GM) – Grayish brown, slightly moist, dense. Brown color from 2 feet.
5			24	97	26	Silty CLAY (CL-ML) – Reddish brown, moist, stiff.
			4/6" 12/6"	93	30	COMPLETELY TO HIGHLY WEATHERED BASALT (WC-WH) – Mottled grayish brown, moist, medium dense to dense.
10						End boring at 9.5 feet.

Plate B27

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B28 (STA 216+60) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 697± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL-ML) – Brown, moist, stiff, with gravel.
			35	88	29	HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, dense.
5			65	105	18	Mottled yellowish brown color at 4 feet.
			50/5"	Tip Recovery		
10						SLIGHTLY WEATHERED BASALT (WS) – Gray, hard.
15						End boring at 12.5 feet.

Plate B28

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B29 (STA 227+90) DRIVING WT. 140 lb. DATE OF DRILLING 5/29/96
SURFACE ELEV. 754± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty GRAVEL (GM) – Reddish brown, slightly moist, dense.
			29/6" 35/1"	97	23	HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, dense.
5			50/5"	Tip Recovery		MODERATELY WEATHERED BASALT (WM) – Mottled gray, dense to medium hard.
			50/3"	No Recovery		
10						End boring at 9 feet.

Plate B29

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B30 (STA 126+25) DRIVING WT. 140 lb. DATE OF DRILLING 8/25/99
SURFACE ELEV. 333± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			42	91	26	Silty CLAY (CL-ML) – Reddish brown, moist, stiff, with sand and gravel.
			45	90	28	
5			43	86	34	
			19/2"	No Recovery		HIGHLY WEATHERED BASALT (WH) – Mottled grayish brown, moist, dense.
10			10/No Penetration			MODERATELY WEATHERED BASALT (WM) – Gray, medium hard.
			10/No Penetration			
15						End boring at 13 feet.

Plate B30

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG W.O. 95-2687

BORING NO. B31 (STA 128+00) DRIVING WT. 140 lb. DATE OF DRILLING 8/25/99
SURFACE ELEV. 337± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			50	99	26	Silty CLAY (CL-ML) – Brown, moist, stiff, with sand and gravel.
			38	90	29	
5			16	81	34	
			53/6" 10/No Penetration	68	18	HIGHLY WEATHERED BASALT (WH) – Grayish brown, moist, dense.
10			10/No Penetration			MODERATELY WEATHERED BASALT (WM) – Gray, medium hard.
15						End boring at 15 feet.

Plate B31

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

i34-56 18-4.dwg ESH-1 Plot1=1 11/21/2002 AMR

ERIC N. S. HEE
LICENSED PROFESSIONAL ENGINEER
No. 5292-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

ENGINEERS SURVEYORS HAWAII, INC.

LICENSE EXPIRATION DATE: 4/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

HALEAKALA HIGHWAY WIDENING, PHASE I
HANA HIGHWAY TO PUKALANI BYPASS
FED. AID PROJ. NO. NH-037-1(22)

SCALE: AS NOTED DATE: NOV., 2002

SHEET No. 4 OF 5 SHEETS

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-037-1(22)	2003	10	72

SITE EVALUATION/PERCOLATION TEST

Date/Time: May 3, 2001
Test performed by: Ernest K. Hirata & Associates, Inc.
Owner: State of Hawaii - Department of Transportation - Highways Division
Station No. along Haleakala Highway: Near Sta. 1+10 (Existing Sta. 38+80)
Test Hole Number: P1

Elevation: 88.0± ft.
Depth to Groundwater Table: >20 ft. below grade
Depth to Bedrock (if observed): 3.5 ft. below grade
Diameter of Hole: 4 in.
Depth to Hole Bottom: 20 ft. below grade

Depth (inches)	Soil Profile (Color, texture, other)
0 - 42	Clayey SILT (ML) - Reddish to grayish brown, slightly moist, stiff with sand.
42 - 84	MODERATELY WEATHERED BASALT (WM) - Mottled grayish brown, medium hard.
84 - 240	SLIGHTLY WEATHERED BASALT (WS) - Gray, hard.

PERCOLATION READINGS

Time 12 inches of water to seep away: NA minutes
Time 12 inches of water to seep away: NA minutes

___ For percolation tests in sandy soils, record time intervals and water drops every 10 minutes for at least 1 hour.

___ For percolation tests in non-sandy soils, presoak the test hole for at least 4 hours. Record time intervals and water drops at least every 10 minutes for 1 hour; or if the time for the first 6 inches to seep away is greater than 30 minutes, record time intervals and water drops at least every 30 minutes for 4 hours or until 2 successive drops do not vary by more than 1/16 inch.

Time interval*	Drop in inches	Time interval	Drop in inches

* Water pumped into hole at rate of 25 gallons per minute for a period of 30 minutes. Unable to fill hole.

Approximate Percolation Rate (time/final water level drop): _______ min/in

As the engineer responsible for gathering and providing site information and percolation test results, I attest to the fact that above site information is accurate and that the site evaluation was conducted in accordance with the provisions of Chapter 11-62, "Wastewater Systems" and the results were acceptable.

PAUL S. MORIMOTO LICENSED PROFESSIONAL ENGINEER No. 5299-C HAWAII, U.S.A.

Engineer's Signature/Stamp

Plate A1

SITE EVALUATION/PERCOLATION TEST

Date/Time: May 1, 2001
Test performed by: Ernest K. Hirata & Associates, Inc.
Owner: State of Hawaii - Department of Transportation - Highways Division
Station No. along Haleakala Highway: Sta. 8+60 (Existing Sta. 46+30)
Test Hole Number: P2

Elevation: 96.6± ft.
Depth to Groundwater Table: >20 ft. below grade
Depth to Bedrock (if observed): 11 ft. below grade
Diameter of Hole: 4 in.
Depth to Hole Bottom: 19.5 ft. below grade

Depth (inches)	Soil Profile (Color, texture, other)
0 - 132	Clayey SILT (ML) - Grayish brown, slightly moist, medium stiff, with sand and gravel.
132 - 180	MODERATELY WEATHERED BASALT (WM) - Mottled grayish brown, medium hard.
180 - 234	SLIGHTLY WEATHERED BASALT (WS) - Gray, hard.

PERCOLATION READINGS

Time 12 inches of water to seep away: NA minutes
Time 12 inches of water to seep away: NA minutes

___ For percolation tests in sandy soils, record time intervals and water drops every 10 minutes for at least 1 hour.

___ For percolation tests in non-sandy soils, presoak the test hole for at least 4 hours. Record time intervals and water drops at least every 10 minutes for 1 hour; or if the time for the first 6 inches to seep away is greater than 30 minutes, record time intervals and water drops at least every 30 minutes for 4 hours or until 2 successive drops do not vary by more than 1/16 inch.

Time interval*	Drop in inches	Time interval	Drop in inches

* Water pumped into hole at rate of 25 gallons per minute to fill hole. After hole was filled, water pumped in at a rate of 0.88 gallons per minute to maintain water level for a period of 30 minutes.

Approximate Percolation Rate (time/final water level drop): _______ min/in

As the engineer responsible for gathering and providing site information and percolation test results, I attest to the fact that above site information is accurate and that the site evaluation was conducted in accordance with the provisions of Chapter 11-62, "Wastewater Systems" and the results were acceptable.

PAUL S. MORIMOTO LICENSED PROFESSIONAL ENGINEER No. 5299-C HAWAII, U.S.A.

Engineer's Signature/Stamp

Plate A2

SITE EVALUATION/PERCOLATION TEST

Date/Time: May 2, 2001
Test performed by: Ernest K. Hirata & Associates, Inc.
Owner: State of Hawaii - Department of Transportation - Highways Division
Station No. along Haleakala Highway: Sta. 24+30 (Existing Sta. 62+00)
Test Hole Number: P3

Elevation: 106.5± ft.
Depth to Groundwater Table: >20 ft. below grade
Depth to Bedrock (if observed): 10.5 ft. below grade
Diameter of Hole: 4 in.
Depth to Hole Bottom: 20 ft. below grade

Depth (inches)	Soil Profile (Color, texture, other)
0 - 126	Clayey SILT (ML) - Reddish brown, slightly moist, medium stiff to stiff.
126 - 138	MODERATELY WEATHERED BASALT (WM) - Mottled grayish brown, medium hard.
138 - 240	SLIGHTLY WEATHERED BASALT (WS) - Gray, hard.

PERCOLATION READINGS

Time 12 inches of water to seep away: NA minutes
Time 12 inches of water to seep away: NA minutes

___ For percolation tests in sandy soils, record time intervals and water drops every 10 minutes for at least 1 hour.

___ For percolation tests in non-sandy soils, presoak the test hole for at least 4 hours. Record time intervals and water drops at least every 10 minutes for 1 hour; or if the time for the first 6 inches to seep away is greater than 30 minutes, record time intervals and water drops at least every 30 minutes for 4 hours or until 2 successive drops do not vary by more than 1/16 inch.

Time interval*	Drop in inches	Time interval	Drop in inches

* Water pumped into hole at rate of 25 gallons per minute to fill hole. After hole was filled, water pumped at a rate of 1.07 gallons per minute for a period of 30 minutes.

Approximate Percolation Rate (time/final water level drop): _______ min/in

As the engineer responsible for gathering and providing site information and percolation test results, I attest to the fact that above site information is accurate and that the site evaluation was conducted in accordance with the provisions of Chapter 11-62, "Wastewater Systems" and the results were acceptable.

PAUL S. MORIMOTO LICENSED PROFESSIONAL ENGINEER No. 5299-C HAWAII, U.S.A.

Engineer's Signature/Stamp

Plate A3

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

ERIC N. S. HEE LICENSED PROFESSIONAL ENGINEER No. 5292-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

ENGINEERS SURVEYORS HAWAII, INC.

LICENSE EXPIRATION DATE: 4/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

HALEAKALA HIGHWAY WIDENING, PHASE I
HANA HIGHWAY TO PUKALANI BYPASS
FED. AID PROJ. NO. NH-037-1(22)

SCALE: AS NOTED DATE: NOV., 2002