FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	560A-03-96	2009	8	27

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

2" O.D. Standard Split Spoon Sampler	Shelby Tube	RQD Rock Quality Designation
3" O.D. Split Tube Sampler	NX / 4" Coring	Water Level

W.O. 04-3977	Kuhio Highway Improvements at Lumahai and Wainiha
Hirata & Associates, Inc.	BORING LOG LEGEND Plate A3.1

Notes:

1. *A geotechnical engineering report entitled "Kuhio Highway Improvements at Lumahai and Wainiha" dated November 8, 2005 has been prepared by Hirata & Associates, 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 Roadway Plans.*
3. *The information presented in the logs of borings depict the subsurface conditions encountered at that specified location and at the time of the field exploration only. Variations of subsoil conditions from those depicted in the logs of borings may occur between and beyond the borings.*
4. *The penetration resistance shown on the logs of borings indicate the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.*
5. *The data given is for general information only. Bidders shall examine the site and the boring data and draw their own conclusions therefrom as to the character of materials to be encountered. The Engineer will not assume responsibility for variations of subsoil quality or conditions other than at the boring locations shown and at the time the borings were taken.*

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 04-3977

BORING NO. B1 DRIVING WT. 140 lb. START DATE 9/7/04
SURFACE ELEV. 139±* DROP 30 in. END DATE 9/8/04

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
			COMPLETELY WEATHERED ROCK (WC) – Mottled gray, moist, stiff. (Clayey/Sandy Silt with weathered rock fragments) Covered by 4 inches of asphaltic concrete. Grinding from 6 inches to 3 feet.
49	77	42	
53	68	49	Dark brown color from 5 feet.
80/6"	67	22	Medium hard, less weathered at 9 feet.
77	75	39	
115	85	38	Highly weathered from 19 to 24 feet.
113	76	39	
87	74	40	Plate A4.1
87	68	38	Highly weathered from 33 feet.
59	76	36	
			End boring at 40.5 feet.
			Neither groundwater nor seepage water encountered.
			* Elevations based on topographic survey map prepared by Portugal Surveying and Mapping Inc., dated September 7, 2004.
			Plate A4.2

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 04-3977

BORING NO. B2 DRIVING WT. 140 lb. START DATE 9/9/04
SURFACE ELEV. 148.5± DROP 30 in. END DATE 9/10/04

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
			Clayey SILT (MH) – Mottled gray and reddish brown, moist, medium stiff to stiff. (Completely Weathered Rock/Saprolite) Covered by 4 inches of asphaltic concrete over 2 inches of base material. Grinding from 0.5 to 1.5 feet.
25	70	53	
33	69	52	
			HIGHLY TO COMPLETELY WEATHERED ROCK (WH-WC) – Mottled grayish brown, moist, stiff. (Sandy Silt with weathered rock fragments.)
47	74	48	
43	67	55	
62	81	39	
53	82	33	Highly weathered at 23 feet.
			HIGHLY WEATHERED ROCK (WH) – Mottled brown, dense to medium hard.
38/6" 50/3"	105	13	Plate A4.3
76/6"	113	13	BASALT (WM) – Mottled gray, medium hard to hard, moderately weathered.
10/No Penetration			
			End boring at 38 feet.
			Neither groundwater nor seepage water encountered.
			Plate A4.4

CRAIG S. ARAKAKI
LICENSED PROFESSIONAL ENGINEER
No. 5510-C
HAWAII, U.S.A.

LICENSE EXP. DATE 04-30-10

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION AS DEFINED IN HAR TITLE 16, CHAPTER 115, RULES OF THE BOARD OF PROFESSIONAL ENGINEERS, ARCHITECTS AND SURVEYORS, STATE OF HAWAII.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KUHIO HIGHWAY
Retaining Walls At Lumahai And Wainiha
Project No. 560A-03-96

Scale: None Date: August 2009

SHEET No. 1 OF 2 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY ____ DATE ____
	DRAWN BY Larson Pacleb "
	TRACED BY ____ "
NOTE BOOK hkuokbor01.dgn	DESIGNED BY Doraine Young "
	QUANTITIES BY ____ "
No. ____	CHECKED BY ____ "

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	560A-03-96	2009	9	27

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING FROM PREVIOUS STUDY

BORING LOG

W.O. 98-3060

BORING NO. B1 DRIVING WT. 140 lb. DATE OF DRILLING 10/15/98
SURFACE ELEV. 135±* DROP 30 in. WATER LEVEL None

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
			WEATHERED ROCK (WC) – Mottled dark brown, moist, stiff, completely weathered, with highly to moderately weathered rock fragments. (Clayey silt with weathered rock fragments) Covered by 8 inches of asphaltic concrete over 4 inches of base material. Hard grind at 1 to 2 feet.
15/No Penetration			
33	66	45	
53	65	52	
62	77	43	
50/6" 10/No Penetration	83	37	Highly weathered from 14 feet.
90	71	42	
84	79	41	Mottled orange brown color at 24 feet.
58	76	38	

Plate A5.1

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30/6" 10/No Penetration	79	38	
82	79	41	
87	87	35	Grinding at 45 feet.
33/6" 25/No Penetration	80	31	
			End boring at 49.5 feet.

* Elevations based on Topographic Map prepared by ControlPoint Surveying, Inc.

Plate A5.2

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING FROM PREVIOUS STUDY

BORING LOG

W.O. 98-3060

BORING NO. B2 DRIVING WT. 140 lb. DATE OF DRILLING 10/14/98
SURFACE ELEV. 144± DROP 30 in. WATER LEVEL None

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
			WEATHERED ROCK (WH–WC) – Mottled dark brown, moist, stiff, highly to completely weathered. (Clayey silt with weathered rock fragments) Covered by 8 inches of asphaltic concrete over 3 inches of base material.
62	80	37	
42	74	42	
17	64	57	Mottled reddish brown color at 5 feet, medium stiff to stiff.
22	68	55	
50	74	50	Mottled brown color, stiff from 14 feet.
33	70	54	
40	69	53	
109	73	49	Highly weathered from 29 feet.

Plate A5.3

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
75	78	40	Grinding at 35 feet.
85	76	42	
62	70	48	
52	61	57	
			End boring at 50.5 feet.

Plate A5.4

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING FROM PREVIOUS STUDY

BORING LOG

W.O. 98-3060

BORING NO. B3 DRIVING WT. 140 lb. DATE OF DRILLING 10/6/98
SURFACE ELEV. 150± DROP 30 in. WATER LEVEL None

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
			WEATHERED ROCK (WC) – Mottled dark brown, moist, medium stiff, completely weathered. (Clayey silt with weathered rock fragments) Covered by 8 inches of asphaltic concrete.
10	58	30	
17	64	35	
20	56	55	Mottled reddish brown color at 9 feet.
36	62	51	Stiff from 14 feet.
39	71	52	
52	72	48	Highly to completely weathered from 24 feet.
48	70	57	

Plate A5.5

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
54	80	23	
46	65	56	
42	59	59	
44	63	59	
			End boring at 50.5 feet.

Plate A5.6

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING FROM PREVIOUS STUDY

BORING LOG

W.O. 98-3060

BORING NO. B13 DRIVING WT. 140 lb. DATE OF DRILLING 10/9/98
SURFACE ELEV. 149± DROP 30 in. WATER LEVEL None

BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
			WEATHERED ROCK (WC) – Mottled reddish brown, moist, medium stiff, completely weathered. (Clayey silt with weathered rock fragments)
18	59	65	
25	61	61	
17	64	54	
9	63	63	
50	72	50	Highly weathered at 14 feet.
			End boring at 15.5 feet.

Plate A5.13

ORIGINAL PLAN
NOTE BOOK hkuokbor02.dgn
No.
SURVEY PLOTTED BY ____ DATE
DRAWN BY Larson Pacleb
TRACED BY
DESIGNED BY Doraine Young
QUANTITIES BY
CHECKED BY

CRAIG S. ARAKAKI
LICENSED PROFESSIONAL ENGINEER
No. 5510-C
HAWAII, U.S.A.

LICENSE EXP. DATE 04-30-10

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION AS DEFINED IN HAR TITLE 16, CHAPTER 115, RULES OF THE BOARD OF PROFESSIONAL ENGINEERS, ARCHITECTS AND SURVEYORS, STATE OF HAWAII.

Craig S. Arakaki

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

BORING LOGS

KUHIO HIGHWAY
Retaining Walls At Lumahai And Wainiha
Project No. 560A-03-96

Scale: None Date: August 2009

SHEET No. 2 OF 2 SHEETS