
 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>116</b>						
Laboratory		Field			Approximate Ground Surface Elevation (feet MSL): 284'						
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	52	84			38	>4.5				MH	Orangish brown CLAYEY SILT, very stiff, moist (residual soil)
	37				20	3.0					
	34	92			47	>4.5	5				
	34				15	1.8	10			MH	Orangish brown with gray mottling CLAYEY SILT with traces of weathered gravel (basaltic) basalt, stiff, moist (residual soil/saprolite)
	32				11	1.5	15				
	34	82			36	>4.5	20			MH	Orangish brown with weathered gravel (basaltic) and fine sand, very stiff, moist (saprolite)
	40				27	2.5	25				
LL=62 PI=22	44				15	2.0	30				
							35				
									Date Started: November 16, 2006 Date Completed: November 16, 2006 Logged By: D. Sjolund Total Depth: 81.5 feet Work Order: 5742-00(A)		
									Water Level: <input type="checkbox"/> Not Encountered Drill Rig: CME-55 Drilling Method: 6" Hollow-Stem Auger Driving Energy: 140 lb. wt., 30 in. drop		
									Plate <b>A - 16.1</b>		

 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>116</b>						
Laboratory		Field			(Continued from previous plate)						
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	49	48			20	2.0	40			MH	
	48				27	2.5	45				
	44	55			24	3.0	50			MH-SM	Purplish brown with gray and black mottling CLAYEY SILT with some fine sand, stiff to very stiff, moist (saprolite)
	47				13	1.8	55				
	53				19	2.5	60				
	51	73			37	2.5	65			MH-SM	
							70				
									Date Started: November 16, 2006 Date Completed: November 16, 2006 Logged By: D. Sjolund Total Depth: 81.5 feet Work Order: 5742-00(A)		
									Water Level: <input type="checkbox"/> Not Encountered Drill Rig: CME-55 Drilling Method: 6" Hollow-Stem Auger Driving Energy: 140 lb. wt., 30 in. drop		
									Plate <b>A - 16.2</b>		

BORING LOG 5742-00(A) GP1 GEOLABS GDT 1/15/07

BORING LOG 5742-00(A) GP1 GEOLABS GDT 1/15/07





**GEOLABS, INC.**  
Geotechnical Engineering

**Log Legend**

**UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)**

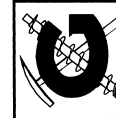
MAJOR DIVISIONS	USCS	TYPICAL DESCRIPTIONS
GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GRAVELS WITH FRACTION OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SM	SILTY SANDS, SAND-SILT MIXTURES
SANDS WITH COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY SANDS, SANDS WITH SLIGHT PLASTICITY
FINE-GRAINED SOILS	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYEY SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS	MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY
50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	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
- (3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE
- SHELBY TUBE SAMPLE
- GRAB SAMPLE
- CORE SAMPLE
- LL LIQUID LIMIT
- PI PLASTICITY INDEX
- TV TORVANE SHEAR (tsf)
- PEN POCKET PENETROMETER (tsf)
- UC UNCONFINED COMPRESSION (psi)
- ∇ WATER LEVEL OBSERVED IN BORING

Plate **B**



**GEOLABS, INC.**  
Geotechnical Engineering


PRINCEVILLE EASTERN PLATEAU  
AGRICULTURAL SUBDIVISION  
PRINCEVILLE, KAUA'I, HAWAII

Log of Boring **1**


Laboratory	Field					Depth (feet)	Sample Graphic	USCS	Approximate Ground Surface Elevation (feet MSL): 248 *	Description
	Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)					
LL=63 PI=36	37	73				10		CH		Reddish brown SILTY CLAY with traces of decomposed basaltic gravel, stiff to very stiff, moist (residual soil)
	34					5		MH		Reddish brown CLAYEY SILT with some fine sand, very stiff, moist (saprolite)
	33	77				10		MH		Reddish brown CLAYEY SILT with some fine sand, very stiff, moist (saprolite)
	32					15		MH		grades to brown with multi-color mottling
	49	66				20		MH		
	41					25		MH		
	46	75				30		MH		
						35		MH		

Date Started:	January 19, 2004	Water Level:	∇ Not Encountered
Date Completed:	January 19, 2004	Drill Rig:	CME-55
Logged By:	Y. Chiba	Drilling Method:	4" Auger
Total Depth:	91.5 feet	Driving Energy:	140 lb. wt., 30 in. drop
Work Order:	5144-00		

W. O. 5742-00 (A) PLATE B-1.1


 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>1</b>						
Laboratory		Field			(Continued from previous plate)						
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	45				23	3.5	35			MH	Tannish brown with multi-color mottling CLAYEY SILT with some fine sand, very stiff, wet (saprolite)
	44	76			42	3.5	40			MH	possible groundwater seepage at 35 feet Brown with multi-color mottling CLAYEY SILT with some sand and extremely weathered basaltic gravel, very stiff, damp (saprolite)
	42				18	>4.5	45				
	49	72			23	>4.5	50			SM	Brown with multi-color mottling SILTY SAND with some extremely weathered basaltic gravel, medium dense, moist (saprolite)
	39				53	>4.5	55			MH/CH	Brown with multi-color mottling SILTY CLAY with some fine sand, very stiff, moist (saprolite)
	49				26	3.0	60				
	42				37	>4.5	65			MH	Brown with multi-color mottling CLAYEY SILT with some fine sand, very stiff to hard, moist (saprolite)
							70			MH	
Date Started: January 19, 2004 Date Completed: January 19, 2004 Logged By: Y. Chiba Total Depth: 91.5 feet Work Order: 5144-00		Water Level: <input checked="" type="checkbox"/> Not Encountered Drill Rig: CME-55 Drilling Method: 4" Auger Driving Energy: 140 lb. wt., 30 in. drop			Plate <b>A - 1.2</b>						

W. O. 5742-00 (A) PLATE B-1.2


 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>1</b>						
Laboratory		Field			(Continued from previous plate)						
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	49	71			35	4.0	40			MH	Brown with multi-color mottling CLAYEY SILT with some fine sand and decomposed gravel, very stiff to hard, moist (saprolite)
	49				22	3.5	75				
	55	70			60	4.0	80				
	48				47	4.0	85			MH	Orangish brown with multi-color mottling CLAYEY SILT, stiff, wet
	57				25	2.0	90				Boring terminated at 91.5 feet * Elevations estimated from Aerial Topographic Base Map transmitted by Esaki Surveying & Mapping on December 8, 2003.
							95				
							100				
							105				
Date Started: January 19, 2004 Date Completed: January 19, 2004 Logged By: Y. Chiba Total Depth: 91.5 feet Work Order: 5144-00		Water Level: <input checked="" type="checkbox"/> Not Encountered Drill Rig: CME-55 Drilling Method: 4" Auger Driving Energy: 140 lb. wt., 30 in. drop			Plate <b>A - 1.3</b>						

W. O. 5742-00 (A) PLATE B-1.3


BORING LOG 5144-00.GPJ GEOLABS.GDT 1/15/07

 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>2</b>						
Laboratory		Field			Approximate Ground Surface Elevation (feet MSL): 267 *						
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	28				16	2.5	5			CH	Reddish brown SILTY CLAY with traces of extremely weathered basaltic gravel, very stiff, damp (residual soil)
	33	81			22	4.0	5			MH	Reddish brown CLAYEY SILT with some decomposed basaltic gravel, very stiff, damp (saprolite)
	28				13	1.0	10			MH	Reddish brown CLAYEY SILT with some fine sand, stiff, damp (saprolite)
	45	66			17	4.0	5			MH	grades with multi-color mottling, very stiff grades to moist
	45				15	2.0	20			MH	Reddish brown with multi-color mottling CLAYEY SILT with some fine sand, stiff, wet (saprolite)
	44	77			26	2.5	25			MH	possible groundwater seepage at 25 feet
	51				15	1.5	30			MH	grades to medium stiff, moist
					23	3.5	35			MH	grades to very stiff
Date Started: January 20, 2004 Date Completed: January 20, 2004 Logged By: Y. Chiba Total Depth: 90.5 feet Work Order: 5144-00		January 20, 2004 January 20, 2004 Y. Chiba 90.5 feet 5144-00			Water Level: $\nabla$ Not Encountered		Plate <b>A - 2.1</b>				

W. O. 5742-00(A) PLATE B-2.1


 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>2</b>						
Laboratory		Field			(Continued from previous plate)						
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	50				21	3.5	40			MH	possible groundwater seepage at 45 feet
	54	69			35	4.0	45			MH	Dark brown with multi-color mottling CLAYEY SILT with silt fine sand, very stiff, moist (saprolite)
	52	65			35	3.0	55			MH	Reddish brown with black mottling CLAYEY SILT with some fine sand, very stiff, wet (saprolite)
	41				56	2.5	60			MH	Tannish gray with multi-color mottling CLAYEY SILT with some fine sand, very stiff, moist (saprolite)
	52	67			41	2.5	65			MH	grades to brownish red
	39				86	3.5	70			MH	Reddish brown CLAYEY SILT with some fine sand, very stiff to hard, moist (saprolite)
Date Started: January 20, 2004 Date Completed: January 20, 2004 Logged By: Y. Chiba Total Depth: 90.5 feet Work Order: 5144-00		January 20, 2004 January 20, 2004 Y. Chiba 90.5 feet 5144-00			Water Level: $\nabla$ Not Encountered		Plate <b>A - 2.2</b>				

W. O. 5742-00(A) PLATE B-2.2

 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII				Log of Boring <b>2</b>			
Laboratory		Field				USCS Graphic	Sample Depth (feet)	Description	
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)				Pocket Pen. (tsf)
	48	75			58	3.5	75	(Continued from previous plate)	
	53				26	2.5	80		
	53	71			77	>4.5	85	Reddish brown with multi-color mottling <b>CLAYEY SILT</b> with some fine sand and decomposed basaltic gravel, hard, wet (saprolite) possible groundwater seepage at 85 feet	
	41				77	>4.5	90	Boring terminated at 90.5 feet	
							95		
							100		
							105		
Date Started: January 20, 2004 Date Completed: January 20, 2004 Logged By: Y. Chiba Total Depth: 90.5 feet Work Order: 5144-00		January 20, 2004 January 20, 2004 Y. Chiba 90.5 feet 5144-00				Water Level: <input checked="" type="checkbox"/> Not Encountered Drill Rig: CME-55 Drilling Method: 4" Auger Driving Energy: 140 lb. wt., 30 in. drop			Plate <b>A - 2.3</b>


W. O. 5742-00(A)

PLATE B-2.3


 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII				Log of Boring <b>3</b>			
Laboratory		Field				USCS Graphic	Sample Depth (feet)	Description	
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)				Pocket Pen. (tsf)
	40				14	2.0	5	OH Reddish brown <b>SILTY CLAY</b> with rootlets, stiff to very stiff, damp (residual soil)	
	126	49			13	1.0	5	MH Brownish red with black mottling <b>CLAYEY SILT</b> with some fine sand and decomposed basaltic gravel, stiff, moist (saprolite)	
	27				5	2.5	10	ML Reddish brown with black mottling <b>SANDY SILT</b> with clay and decomposed basaltic gravel, medium stiff, damp (saprolite)	
	35	82			12	4.0	15	MH Grayish tan with multi-color mottling <b>CLAYEY SILT</b> with some fine sand, stiff to very stiff, moist (saprolite)	
	44				18	2.0	20	MH Reddish brown with multi-color mottling <b>CLAYEY SILT</b> with some fine sand, very stiff, wet (saprolite)	
	49	72			25	4.0	25	possible groundwater seepage at 25 feet	
	51				14	3.5	30	MH Dark brown with multi-color mottling <b>CLAYEY SILT</b> with some fine sand, very stiff, moist (saprolite)	
	53	69			41	2.5	35		
Date Started: January 20, 2004 Date Completed: January 21, 2004 Logged By: Y. Chiba Total Depth: 90.5 feet Work Order: 5144-00		January 20, 2004 January 21, 2004 Y. Chiba 90.5 feet 5144-00				Water Level: <input checked="" type="checkbox"/> Not Encountered Drill Rig: CME-55 Drilling Method: 4" Auger Driving Energy: 140 lb. wt., 30 in. drop			Plate <b>A - 3.1</b>

W. O. 5742-00(A)


PLATE B-3.1

 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>3</b>	
Laboratory		Field			Description <small>(Continued from previous plate)</small>	
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)		
	50		17	2.0	40	grades to medium stiff/stiff
	40	80	85	>4.5	45	Brown with multi-color mottling <b>SANDY SILT</b> with some clay and decomposed basaltic gravel, hard, wet (saprolite) possible groundwater seepage at 45 feet
	53		19	2.0	50	Brown with multi-color mottling <b>CLAYEY SILT</b> with some fine sand, stiff to very stiff, wet (saprolite) possible groundwater seepage at 50 feet
	53	67	30	2.0	55	
	60		11	2.0	60	groundwater seepage encountered at 60 feet
	62		23	1.5	65	Dark brown with multi-color mottling fine <b>SANDY SILT</b> with some clay and decomposed basaltic gravel, stiff, wet (saprolite) possible groundwater seepage at 65 feet
					70	
Date Started: January 20, 2004 Date Completed: January 21, 2004 Logged By: Y. Chiba Total Depth: 90.5 feet Work Order: 5144-00		Water Level: <input checked="" type="checkbox"/> Not Encountered Drill Rig: CME-55 Driving Method: 4" Auger Driving Energy: 140 lb. wt., 30 in. drop			Plate <b>A - 3.2</b>	

BORING LOG 5144-00.GPJ GEOLABS.GDT 1/15/07  
 W.O. 5742-00(A)  
 PLATE B-3.2


 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII			Log of Boring <b>3</b>	
Laboratory		Field			Description <small>(Continued from previous plate)</small>	
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)		
	59	66	32	2.0	75	Brown with multi-color mottling <b>CLAYEY SILT</b> with some fine sand, stiff to very stiff, moist (saprolite)
	64		27		80	Brown with multi-color mottling <b>SILTY SAND AND GRAVEL</b> , medium dense, wet (saprolite) possible groundwater seepage at 80 feet
	70	57	31		85	Brown with multi-color mottling <b>SILTY SAND</b> with some decomposed basaltic gravel, medium dense, wet (saprolite) possible groundwater seepage at 85 feet
	53		30		90	Boring terminated at 90.5 feet
					95	
					100	
					105	
Date Started: January 20, 2004 Date Completed: January 21, 2004 Logged By: Y. Chiba Total Depth: 90.5 feet Work Order: 5144-00		Water Level: <input checked="" type="checkbox"/> Not Encountered Drill Rig: CME-55 Driving Method: 4" Auger Driving Energy: 140 lb. wt., 30 in. drop			Plate <b>A - 3.3</b>	

BORING LOG 5144-00.GPJ GEOLABS.GDT 1/15/07  
 W.O. 5742-00(A)  
 PLATE B-3.3

 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII		Log of Boring <b>4</b>							
Laboratory		Field		Approximate Ground Surface Elevation (feet MSL): 269 *							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	36	81			32	3.5	3			CH	Orange-brown SILTY CLAY with some roots, very stiff, damp (residual soil)
	37				10	2.5	4			CH	Reddish brown SILTY CLAY, very stiff, moist (residual soil)
	34	84			19	2.0	5			MH	Tannish brown with red mottling CLAYEY SILT, stiff, moist (residual soil)
	38				10	1.5	10			MH	Tannish brown with multi-color mottling CLAYEY SILT with some fine sand and decomposed basaltic gravel, stiff, damp (saprolite)
LL=63 PI=20	37	76			16	1.5	15			MH	Brown with multi-color mottling CLAYEY SILT with fine sand, stiff to very stiff, moist (saprolite)
	53				9	1.5	20			MH	Brown with multi-color mottling CLAYEY SILT with fine sand, stiff, moist (saprolite)
	44	72			18	1.5	25			MH	Brown with multi-color mottling CLAYEY SILT with fine sand, stiff, moist (saprolite)
	43				22	2.0	30			MH	Brownish gray with multi-color mottling CLAYEY SILT, stiff, moist groundwater seepage encountered at 65 feet
	40	80			61	4.0	35			SM	
Date Started: January 15, 2004		Date Completed: January 19, 2004		Water Level: <input checked="" type="checkbox"/> Not Encountered		Plate					
Logged By: Y. Chiba		Drill Rig: CME-55		Drilling Method: 4" Auger		A - 4.1					
Total Depth: 90.5 feet		Driving Energy: 5144-00		140 lb. wt., 30 in. drop							
Work Order: 5144-00(A)											

W.O. 5742-00(A)

PLATE B-4.1

 <b>GEOLABS, INC.</b> Geotechnical Engineering		PRINCEVILLE EASTERN PLATEAU AGRICULTURAL SUBDIVISION PRINCEVILLE, KAUAI, HAWAII		Log of Boring <b>4</b>							
Laboratory		Field		(Continued from previous plate)							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	52	71			49	4.0	45			MH	Brown with multi-color mottling CLAYEY SILT with fine sand, stiff to very stiff, moist (saprolite)
	51				24	3.5	50			MH	Brown with multi-color mottling CLAYEY SILT with fine sand, stiff, moist (saprolite)
	54				31	3.5	55			MH	Brown with multi-color mottling CLAYEY SILT with fine sand, stiff, moist (saprolite)
	49				18	1.5	60			MH	Brownish gray with multi-color mottling CLAYEY SILT, stiff, moist groundwater seepage encountered at 65 feet
	58				20	1.0	70			MH	
Date Started: January 15, 2004		Date Completed: January 19, 2004		Water Level: <input checked="" type="checkbox"/> Not Encountered		Plate					
Logged By: Y. Chiba		Drill Rig: CME-55		Drilling Method: 4" Auger		A - 4.2					
Total Depth: 90.5 feet		Driving Energy: 5144-00		140 lb. wt., 30 in. drop							
Work Order: 5144-00(A)											

W.O. 5742-00(A)

PLATE B-4.2





DRAFT

**DRAFT**  
**SUMMARY OF TEST PIT EXPLORATION FOR LANDFILL AREA II**

Princeville Eastern Plateau  
Agricultural Subdivision  
Princeville, Island of Kauai, Hawaii

<u>Test Pit No.</u>	<u>Landfill Waste Encountered</u>	<u>Depth to Waste (Feet)</u>
TP-1	No	N/A
TP-2	No	N/A
TP-3	Yes	1.5
TP-4	No	N/A
TP-5	No	N/A
TP-6	No	N/A
TP-7	Yes	2
TP-8	Yes	2
TP-9	Yes	Surface
TP-10	Yes	Surface
TP-11	Yes	1.5
TP-12	Yes	2
TP-13	Yes	2
TP-14	Yes	Surface
TP-15	Yes	3
TP-16	Yes	3
TP-17	No	N/A
TP-18	Yes	1.5
TP-19	Yes	1.5
TP-20	No	N/A
TP-21	Yes	2
TP-22	No	N/A
TP-23	Yes	1.5

Note: Information extracted from November 22, 2004 report entitled "Preliminary Geotechnical Engineering Exploration, Princeville Eastern Plateau Agricultural Subdivision, TMK: 5-3-06: 1 and 14, Princeville, Kauai, Hawaii"

W.O. 5144-00/5742-00(A)

**GEOLABS, INC.** JANUARY 2007 PLATE C-1

**APPENDIX C**

Previous Test Pit Field Exploration

Test Pit Summary Information reproduced from November 22, 2004 report entitled  
"Preliminary Geotechnical Engineering Exploration  
Princeville Eastern Plateau Agricultural Subdivision  
TMK: 5-3-06: 1 and 14  
Princeville, Kauai, Hawaii"

**DRAFT**  
**SUMMARY OF TEST PIT EXPLORATION FOR LANDFILL AREA I**

Princeville Eastern Plateau  
Agricultural Subdivision  
Princeville, Island of Kauai, Hawaii

<u>Test Pit No.</u>	<u>Landfill Waste Encountered</u>	<u>Depth to Waste (Feet)</u>
TP-24	No	N/A
TP-25	Yes	5
TP-26	No	N/A
TP-27	Yes	4
TP-28	Yes	2
TP-29	Yes	3
TP-30	Yes	5
TP-31	No	N/A
TP-32	No	N/A
TP-33	No	N/A
TP-34	No	N/A
TP-35	No	N/A
TP-36	Yes	6
TP-37	Yes	7
TP-38	No	N/A
TP-39	No	N/A
TP-40	Yes	4
TP-41	Yes	4
TP-42	No	N/A
TP-43	Yes	2.5
TP-44	Yes	9
TP-45	Yes	Surface
TP-46	Yes	Surface

Note: Information extracted from November 22, 2004 report entitled "Preliminary Geotechnical Engineering Exploration, Princeville Eastern Plateau Agricultural Subdivision, TMK: 5-3-06: 1 and 14, Princeville, Kauai, Hawaii"

**DRAFT**  
**SUMMARY OF TEST PIT EXPLORATION FOR LANDFILL AREA I**

Princeville Eastern Plateau  
Agricultural Subdivision  
Princeville, Island of Kauai, Hawaii

<u>Test Pit No.</u>	<u>Landfill Waste Encountered</u>	<u>Depth to Waste (Feet)</u>
TP-47	Yes	Surface
TP-48	Yes	7
TP-49	Yes	7
TP-50	No	N/A
TP-51	No	N/A
TP-52	No	N/A
TP-53	No	N/A
TP-54	Yes	4
TP-55	Yes	5
TP-56	Yes	1.5
TP-57	No	N/A
TP-58	Yes	4

Note: Information extracted from November 22, 2004 report entitled "Preliminary Geotechnical Engineering Exploration, Princeville Eastern Plateau Agricultural Subdivision, TMK: 5-3-06: 1 and 14, Princeville, Kauai, Hawaii"

[h:\5700 Series\5742-00(A).sct1-pg.43]

---

DRAFT

**APPENDIX D**

Laboratory Testing

---

Moisture Content (ASTM D 2216) and Unit Weight (ASTM D 2937) determinations were performed on selected soil samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Borings and the Logs of Test Pits at the appropriate sample depths.

Three one-inch Ring Swell tests were performed on selected samples to evaluate the swelling potential of the near-surface soils. The test results are summarized on Plate D-1.

Seven Atterberg Limits tests (ASTM D 4318) were performed on selected soil samples to evaluate the liquid and plastic limits and to aid in soil classification. The test results are summarized on the Logs of Borings at the appropriate sample depths. Graphic presentation of the test results is provided on Plate D-2.

Six Direct Shear tests (ASTM D 3080) were performed on selected samples of the soils to evaluate the shear strength characteristics. The test results are presented on Plates D-3 through D-8.

Seven Unconfined Compressive Strength tests (ASTM D 2166) were performed on selected soil samples to evaluate the compressive strength characteristics. Results of the unconfined compressive strength tests are presented on Plates D-9 through D-15.

Three Consolidation tests (ASTM D 2435) were performed on selected samples to evaluate the consolidation characteristics. The test results are presented on Plates D-16 thru D-18.

Three laboratory California Bearing Ratio test (ASTM D 1883) was performed on selected bulk samples of the near-surface soils to evaluate the pavement support characteristics of the soils. The samples were remolded to near the optimum moisture content. The test results are presented on Plates D-19 through D-21.

Three Modified Proctor compaction tests (ASTM D 1557A) were performed on selected bulk samples of the near-surface soils to evaluate the dry density and moisture content relationship. The results of the tests are presented on Plates D-22 through D-24.

[h:\5700 Series\5742-00(A)\sct\pg.44]

---

**APPENDIX D**

Laboratory Testing

---

DRAFT

**SUMMARY OF RING SWELL TESTS**

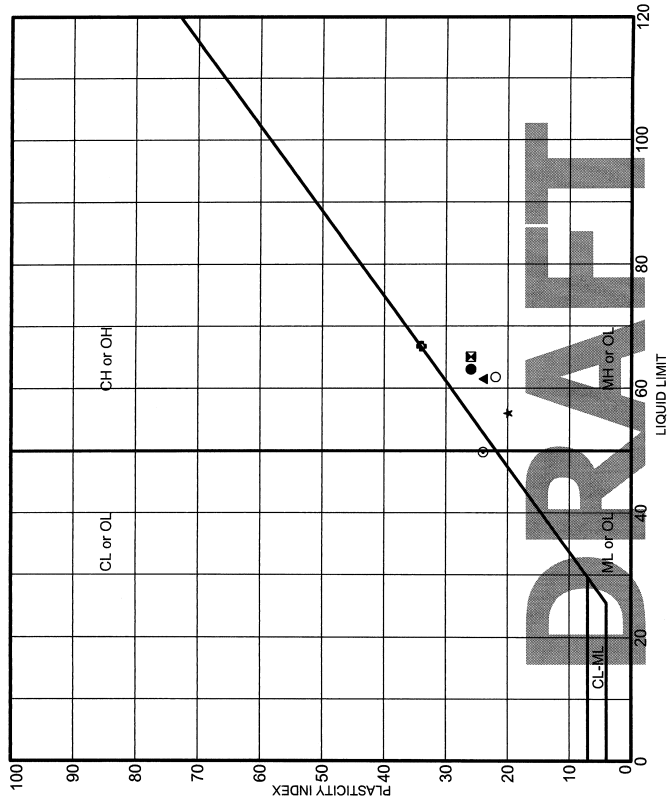
Princeville Grand Estates Subdivision  
 TMK: 5-3-06: 14  
 Princeville, Kauai, Hawaii

Location	Depth (feet)	Soil Description	Dry Density (pcf)	Moisture Contents		Ring Swell (%)
				Initial (%)	Final (%)	
B-101	1.0 - 2.5	Orangish-Brown Clayey Silt	90.5	34.4	28.6	36.6
B-107*	1.0 - 2.5	Brown Clayey Silt	85.5	38.7	33.6	39.7
B-109	5.0 - 6.5	Orangish-Brown Clayey Silt	90.6	35.4	28.5	36.4

NOTE: Samples tested were either undisturbed or remolded in 2.4-inch diameter by 1-inch high rings. They were air-dried overnight and then saturated for 24 hours under a surcharge pressure of 55 psf.

\* Remolded

[h:\5700 Series\5742-00(A).scr1-pg.45]

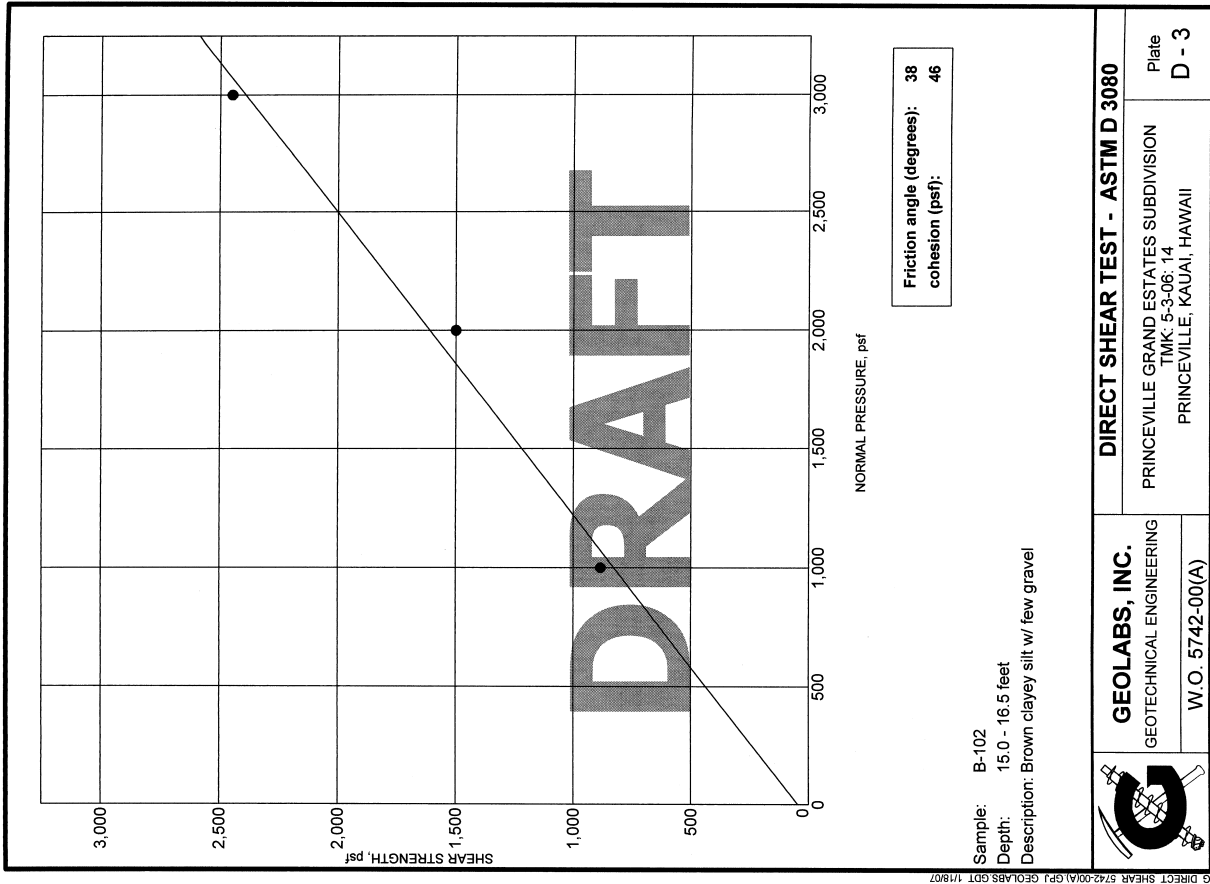



Sample	Depth (ft)	LL	PL	PI	Description
B-103	15.0-16.5	63	37	26	Brown clayey silt (MH)
B-111	15.0-16.5	65	39	26	Tan clayey silt (MH)
B-112	60.0-61.5	61	37	24	Purplish brown clayey silt (MH)
B-113	15.0-16.5	56	36	20	Reddish brown clayey silt (MH)
B-114	2.5-4.0	50	26	24	Orangish brown silty clay (CL)
B-115	10.0-11.5	67	33	34	Brown clayey silt (MH)
B-116	30.0-31.5	62	40	22	Orangish brown clayey silt (MH)

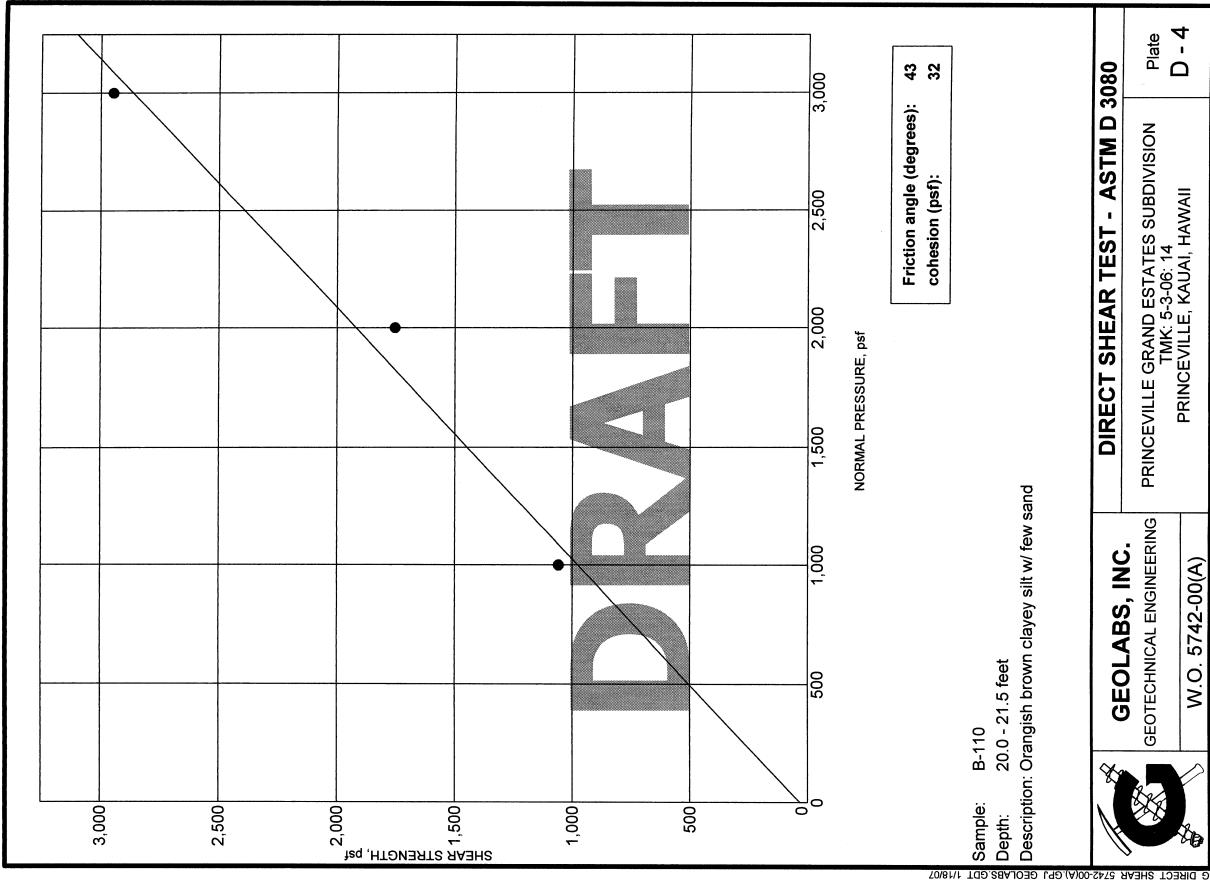


**GEOLABS, INC.**  
 GEOTECHNICAL ENGINEERING  
 W.O. 5742-00(A)

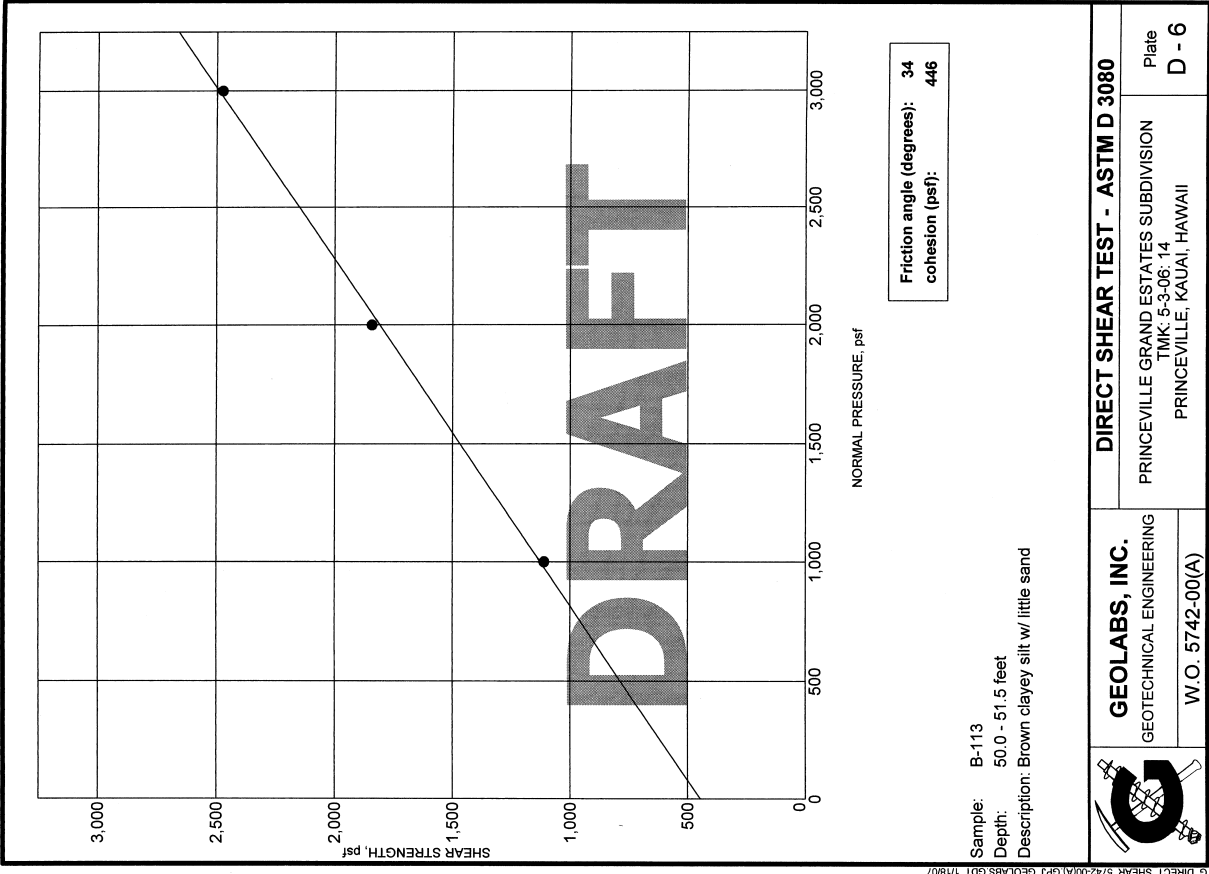
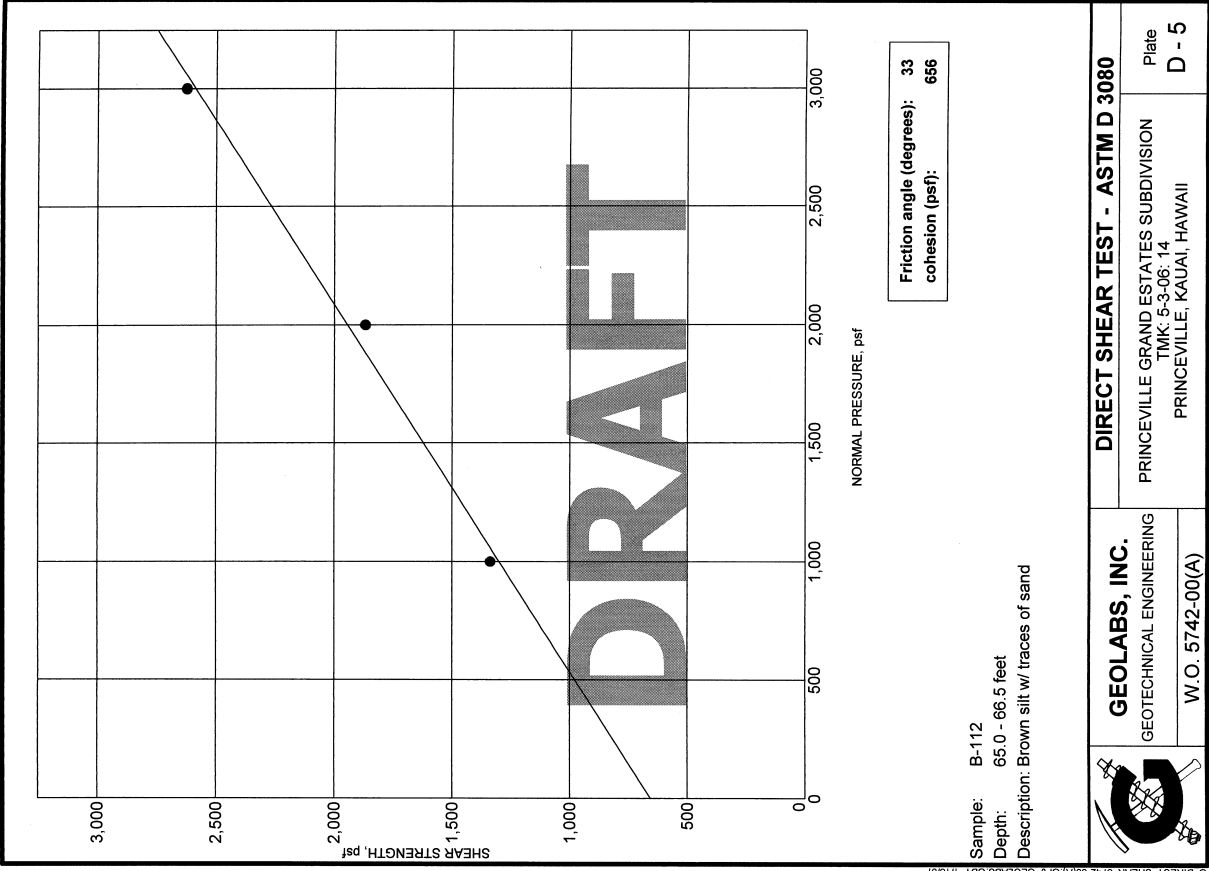
**ATTERBERG LIMITS TEST RESULTS - ASTM D 4318**  
 PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII  
 Plate D - 2



 <b>GEOLABS, INC.</b> GEOTECHNICAL ENGINEERING W.O. 5742-00(A)	<b>DIRECT SHEAR TEST - ASTM D 3080</b>	
	PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII	Plate D - 3



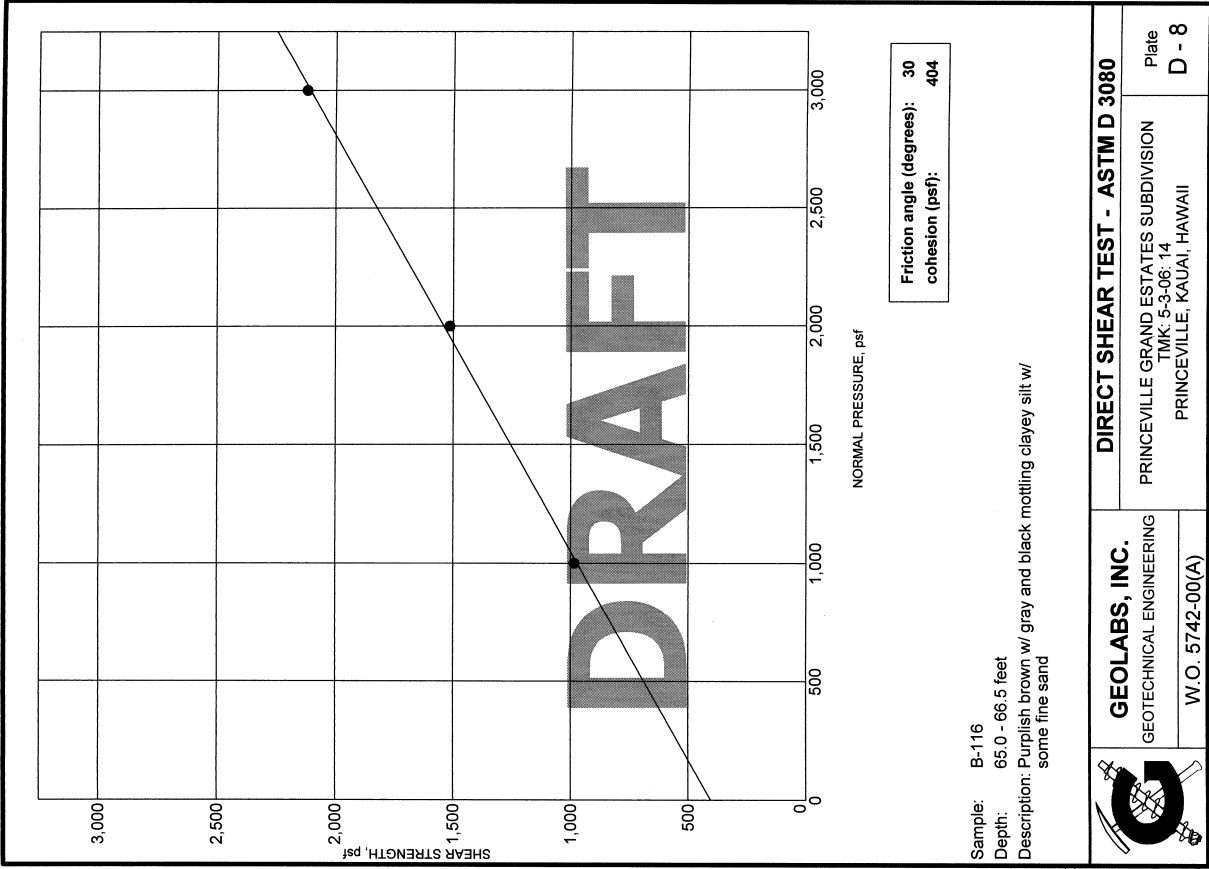
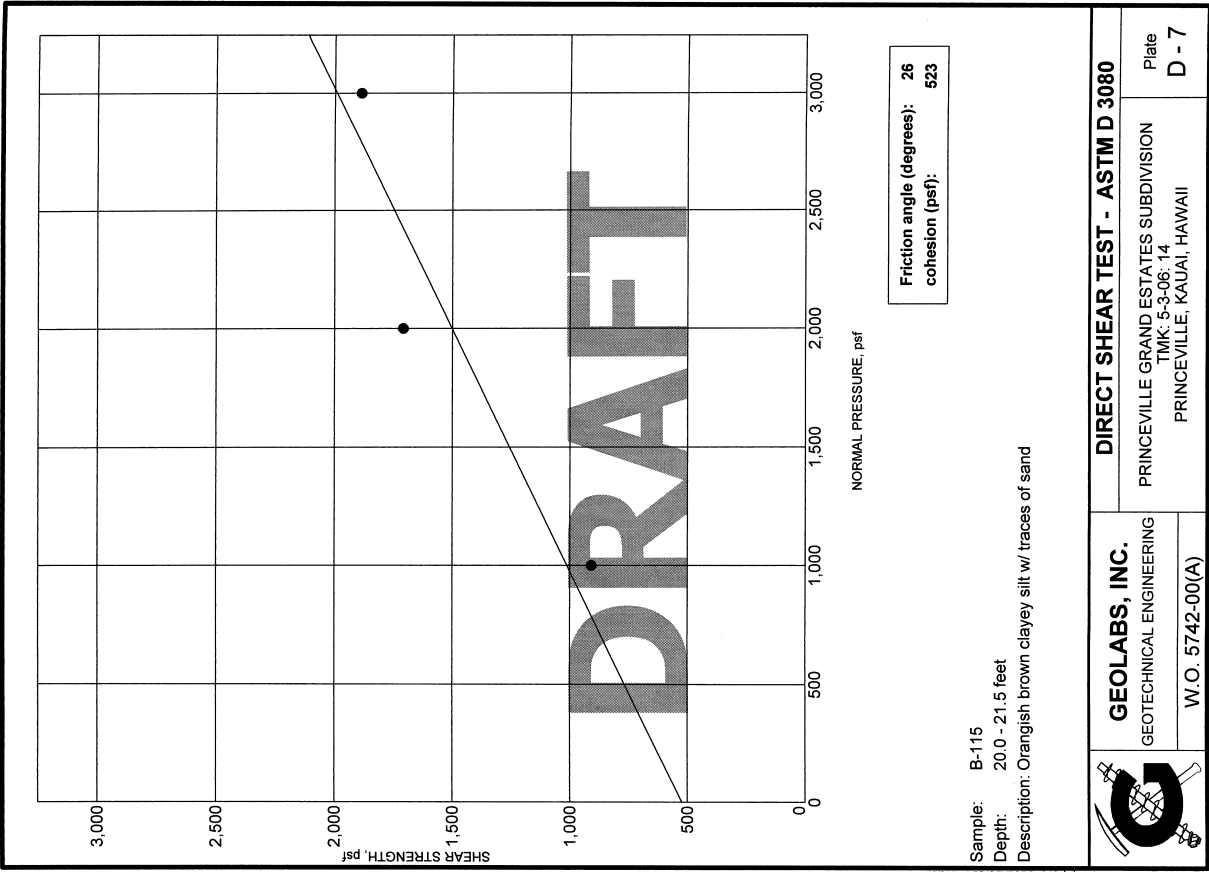
 <b>GEOLABS, INC.</b> GEOTECHNICAL ENGINEERING W.O. 5742-00(A)	<b>DIRECT SHEAR TEST - ASTM D 3080</b>	
	PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII	Plate D - 4



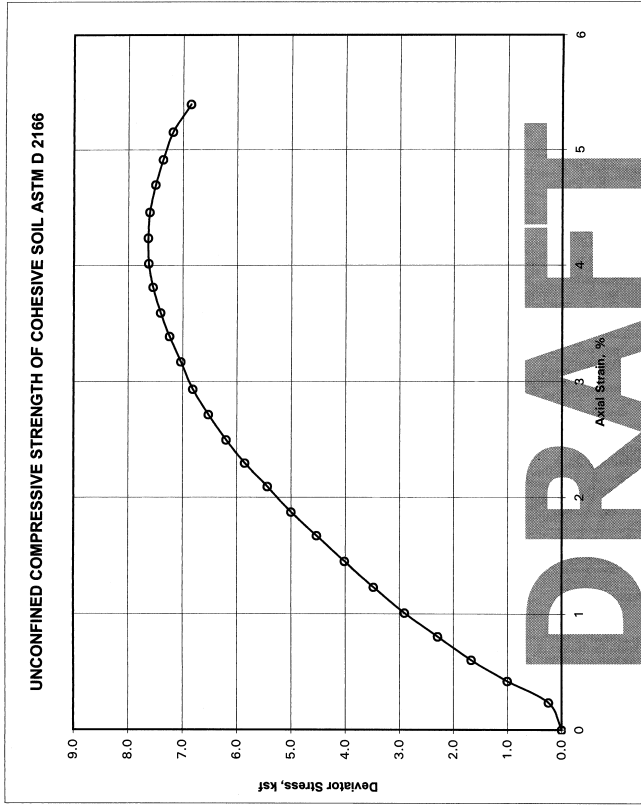
9 DIRECT SHEAR 5742-00(A).GPT GEOLABS GDT 1/18/07

	<b>GEOLABS, INC.</b> GEOTECHNICAL ENGINEERING W.O. 5742-00(A)	<b>DIRECT SHEAR TEST - ASTM D 3080</b> PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII	Plate <b>D - 5</b>
	DIRECT SHEAR TEST - ASTM D 3080 PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII		

	<b>GEOLABS, INC.</b> GEOTECHNICAL ENGINEERING W.O. 5742-00(A)	<b>DIRECT SHEAR TEST - ASTM D 3080</b> PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII	Plate <b>D - 6</b>
	DIRECT SHEAR TEST - ASTM D 3080 PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII		







LOCATION: B - 101  
 DEPTH: 5 - 6.5 feet  
 DESCRIPTION: Orangish brown clayey silt

DRY DENSITY: 76.3 pcf  
 MOISTURE CONTENT: 47.2 %  
 SAMPLE DIAMETER: 2.360 inches  
 SAMPLE HEIGHT: 5.452 inches

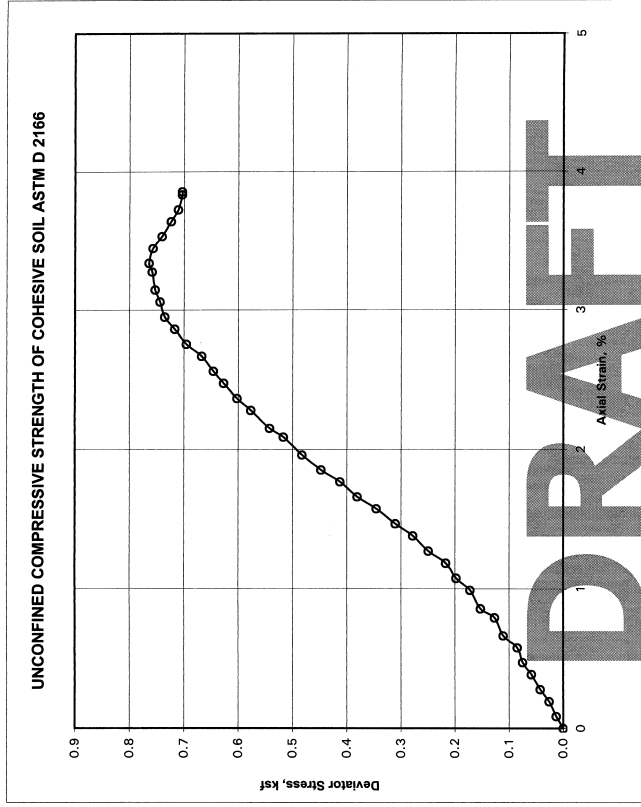
AT FAILURE

STRAIN RATE = 0.86 %/min.  
 UNCONFINED COMPRESSIVE STRENGTH = 7.6 ksf @ 2.5 % STRAIN

UNCONFINED COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Dec-06
W.O.	5742-00(A)

PROJECT: PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII

PLATE D - 9



LOCATION: B-105  
 DEPTH: 15 - 16.5 feet  
 DESCRIPTION: Tan clayey silt

DRY DENSITY: 69.8 pcf  
 MOISTURE CONTENT: 37.1 %  
 SAMPLE DIAMETER: 2.364 inches  
 SAMPLE HEIGHT: 4.641 inches

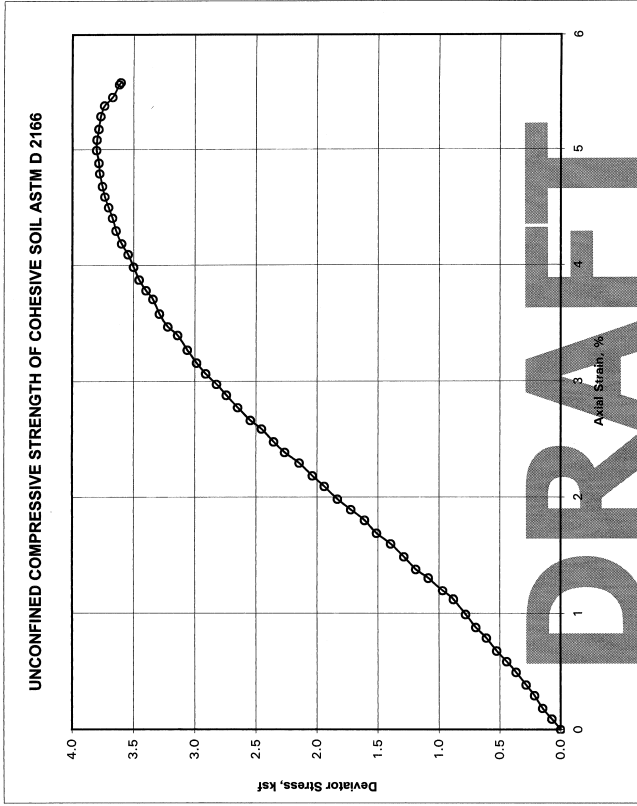
AT FAILURE

STRAIN RATE = 0.99 %/min.  
 UNCONFINED COMPRESSIVE STRENGTH = 0.8 ksf @ 3.3 % STRAIN

UNCONFINED COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Dec-06
W.O.	5742-00(A)

PROJECT: PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII

PLATE D - 10



LOCATION: B-110  
 DEPTH: 5 - 6.5 feet  
 DESCRIPTION: Orangish brown clayey silt

DRY DENSITY: 80.2 pcf  
 MOISTURE CONTENT: 36.1 %

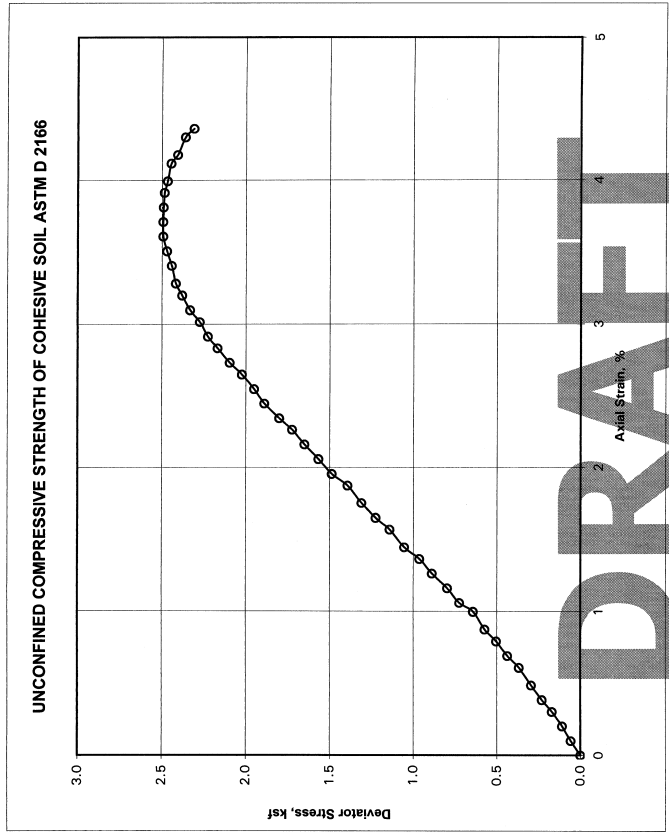
SAMPLE DIAMETER: 2.407 inches  
 SAMPLE HEIGHT: 5.446 inches

**AT FAILURE**

STRAIN RATE = 1.01 %/min.  
 UNCONFINED COMPRESSIVE STRENGTH = 3.8 ksf @ 5.1 % STRAIN

UNCONFINED COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Dec-06 5742-00(A)

PROJECT:  
 PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII



LOCATION: B - 112  
 DEPTH: 20 - 21.5 feet  
 DESCRIPTION: Orangish brown clayey silt

DRY DENSITY: 79.4 pcf  
 MOISTURE CONTENT: 38.8 %

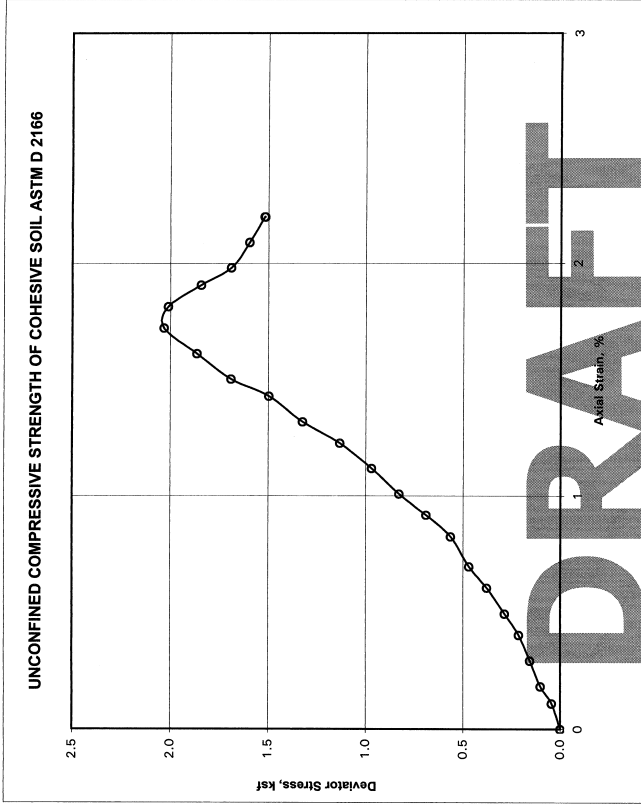
SAMPLE DIAMETER: 2.389 inches  
 SAMPLE HEIGHT: 4.906 inches

**AT FAILURE**

STRAIN RATE = 0.96 %/min.  
 UNCONFINED COMPRESSIVE STRENGTH = 2.5 ksf @ 3.6 % STRAIN

UNCONFINED COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Dec-06 5742-00(A)

PROJECT:  
 PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII



LOCATION: B-113  
 DEPTH: 35 - 36.5 feet  
 DESCRIPTION: Reddish brown clayey silt  
 DRY DENSITY: 83.4 pcf  
 MOISTURE CONTENT: 35.1 %  
 SAMPLE DIAMETER: 2.395 inches  
 SAMPLE HEIGHT: 5.451 inches

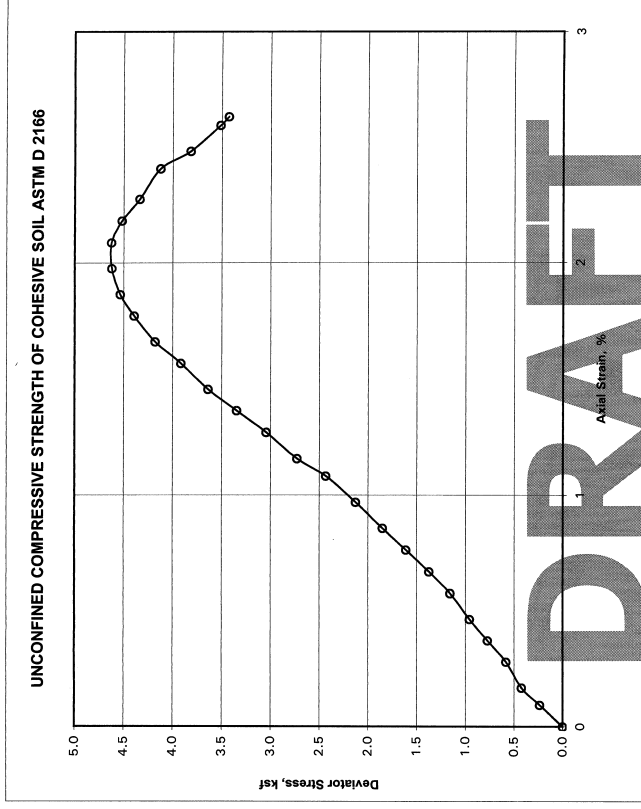
AT FAILURE

STRAIN RATE = 1.02 %/min.  
 UNCONFINED COMPRESSIVE STRENGTH = 2.0 ksf @ 1.7 % STRAIN

UNCONFINED COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Dec-06
W.O.	5742-00(A)

PROJECT: PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII

PLATE D - 13



LOCATION: B-115  
 DEPTH: 5 - 6.5 feet  
 DESCRIPTION: Orangish brown clayey silt

DRY DENSITY: 84.6 pcf  
 MOISTURE CONTENT: 34.3 %  
 SAMPLE DIAMETER: 2.399 inches  
 SAMPLE HEIGHT: 5.364 inches

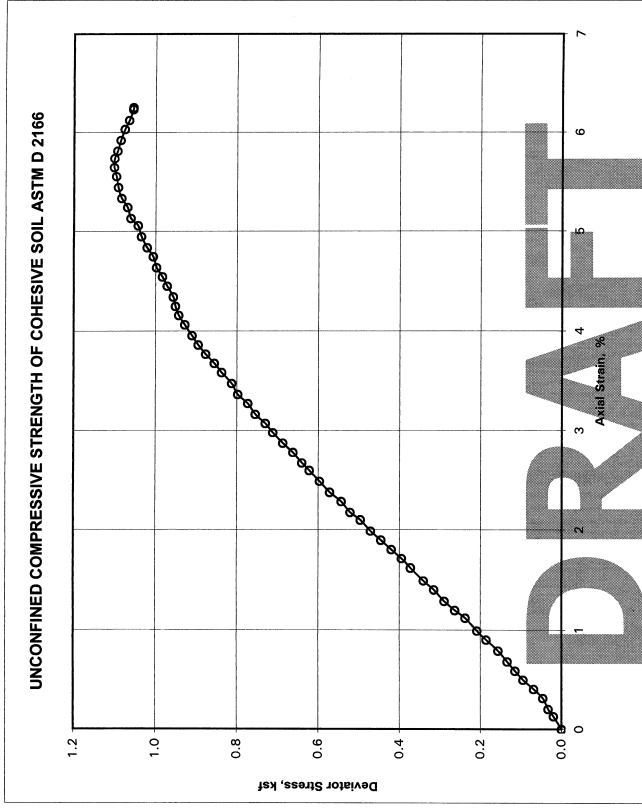
AT FAILURE

STRAIN RATE = 1.01 %/min.  
 UNCONFINED COMPRESSIVE STRENGTH = 4.6 ksf @ 2.1 % STRAIN

UNCONFINED COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Dec-06
W.O.	5742-00(A)

PROJECT: PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII

PLATE D - 14



**LOCATION:** B-116  
**DEPTH:** 30 - 31.5 feet  
**DESCRIPTION:** Orangish brown clayey silt

**DRY DENSITY:** 76.5 pcf  
**MOISTURE CONTENT:** 41.9 %

**SAMPLE DIAMETER:** 2.361 inches  
**SAMPLE HEIGHT:** 5.438 inches

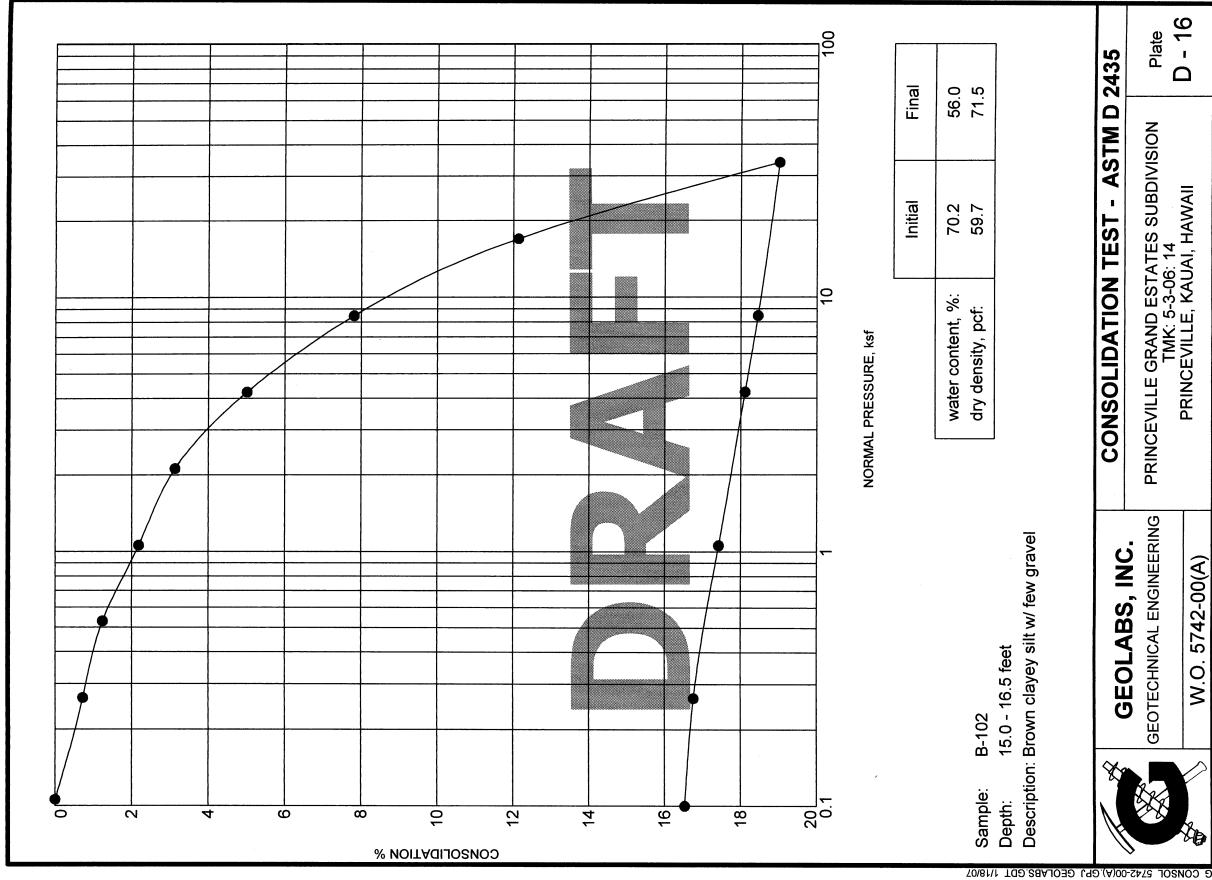
**AT FAILURE**

STRAIN RATE =	1.00 %/min.
UNCONFINED COMPRESSIVE STRENGTH =	1.1 ksf @ 5.7 % STRAIN

UNCONFINED COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Dec-06
W.O.	5742-00(A)

PLATE D - 15

**PROJECT:**  
 PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII

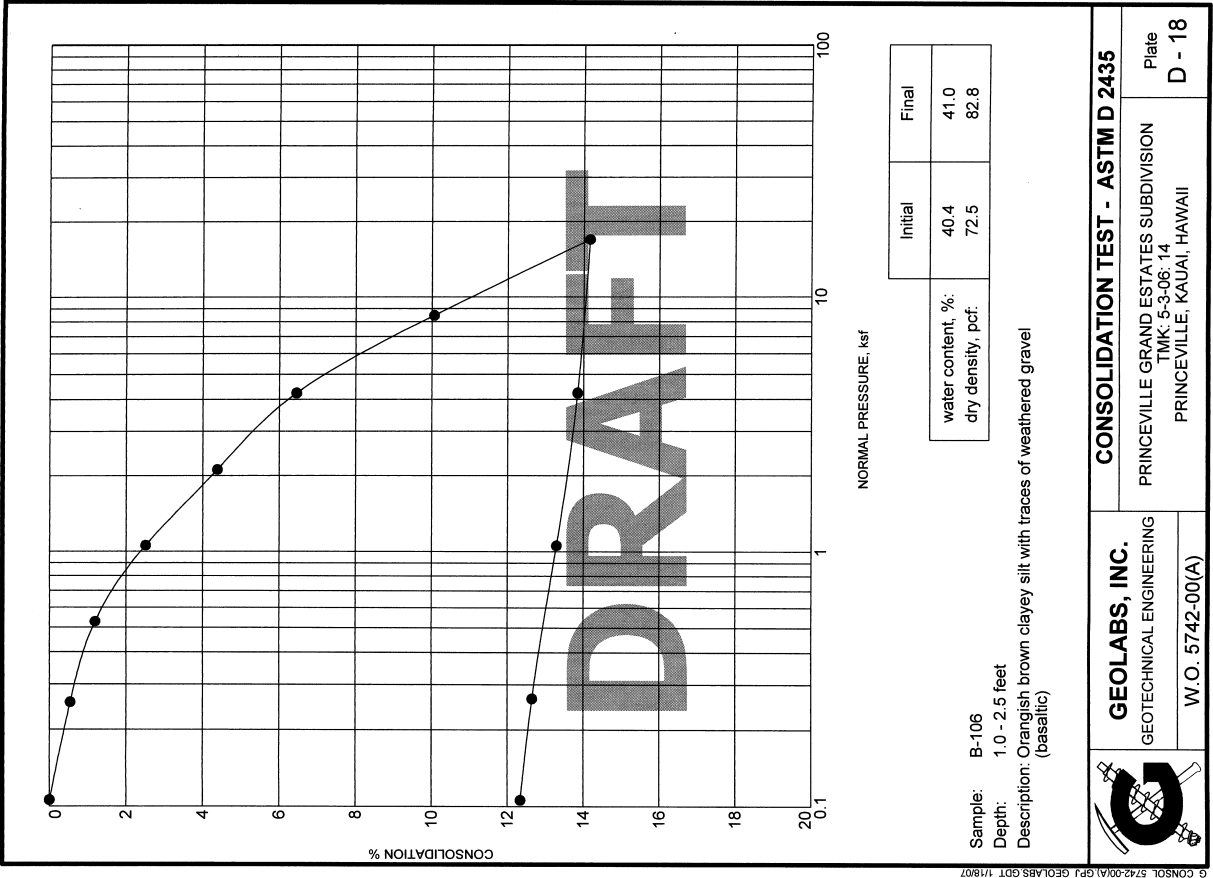
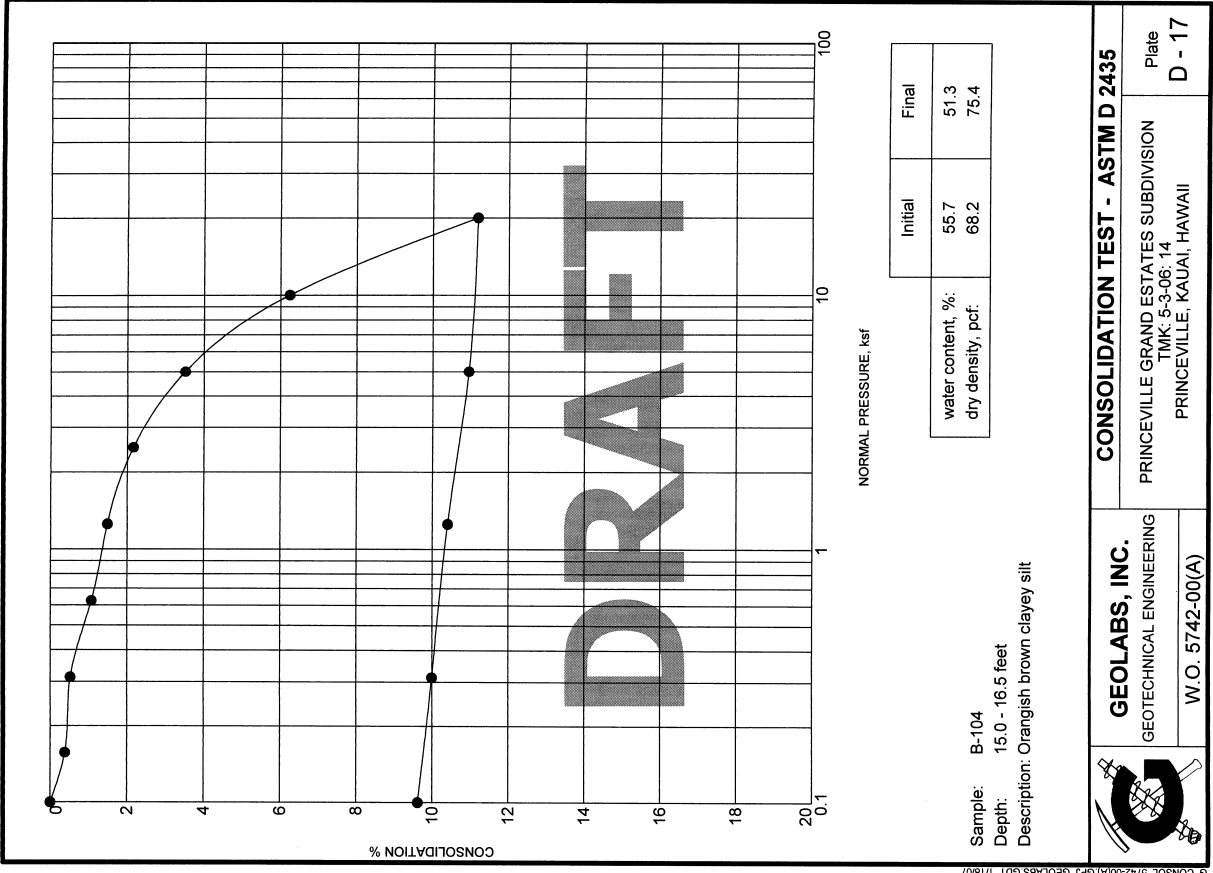


**Sample:** B-102  
**Depth:** 15.0 - 16.5 feet  
**Description:** Brown clayey silt w/ few gravel

water content, %: dry density, pcf:	Initial	Final
	70.2 59.7	56.0 71.5

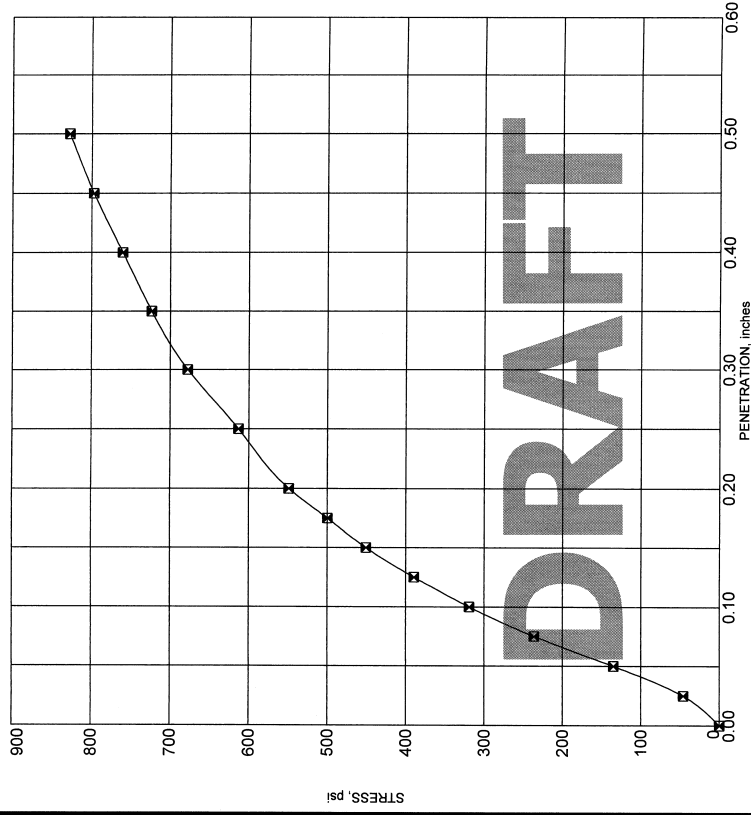
	<b>GEOLABS, INC.</b> GEOTECHNICAL ENGINEERING	
	W.O. 5742-00(A)	
<b>CONSOLIDATION TEST - ASTM D 2435</b>		
PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06: 14 PRINCEVILLE, KAUAI, HAWAII		Plate D - 16

5 CONSOL: 5742-00(A).GPT GEOLABS.GPT 1/18/07



9 CONSOL. 5742-00(A) GFI GEOLABS GPT 1/18/07

9 CONSOL. 5742-00(A) GFI GEOLABS GPT 1/18/07



Sample:	Bulk-101	Corr. CBR @ 0.1"	36.0
Depth:	n/a	Swell (%)	0.22

Description: Brown clayey silt with gravel

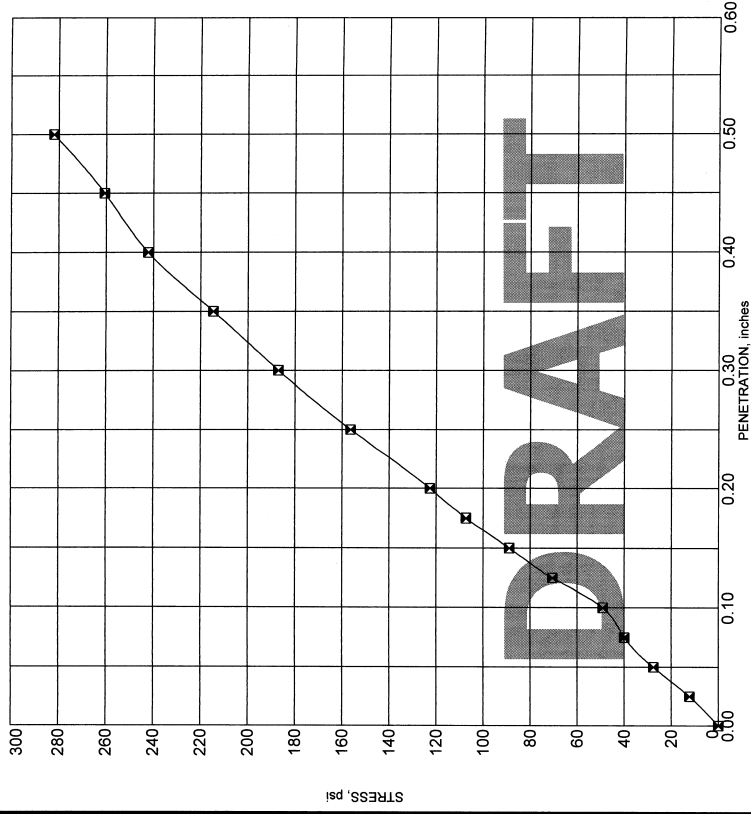
Molding Dry Density (pcf)	105.4	Hammer Wt. (lbs)	10
Molding Moisture (%)	25.2	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

**GEOLABS, INC.**  
 GEOTECHNICAL ENGINEERING  
 W.O. 5742-00(A)

**CALIFORNIA BEARING RATIO - ASTM D 1883**

PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII

Plate  
**D - 19**



Sample:	Bulk-102	Corr. CBR @ 0.1"	8.5
Depth:	0.0 - 1.5 feet	Swell (%)	1.33

Description: Reddish brown silty clay

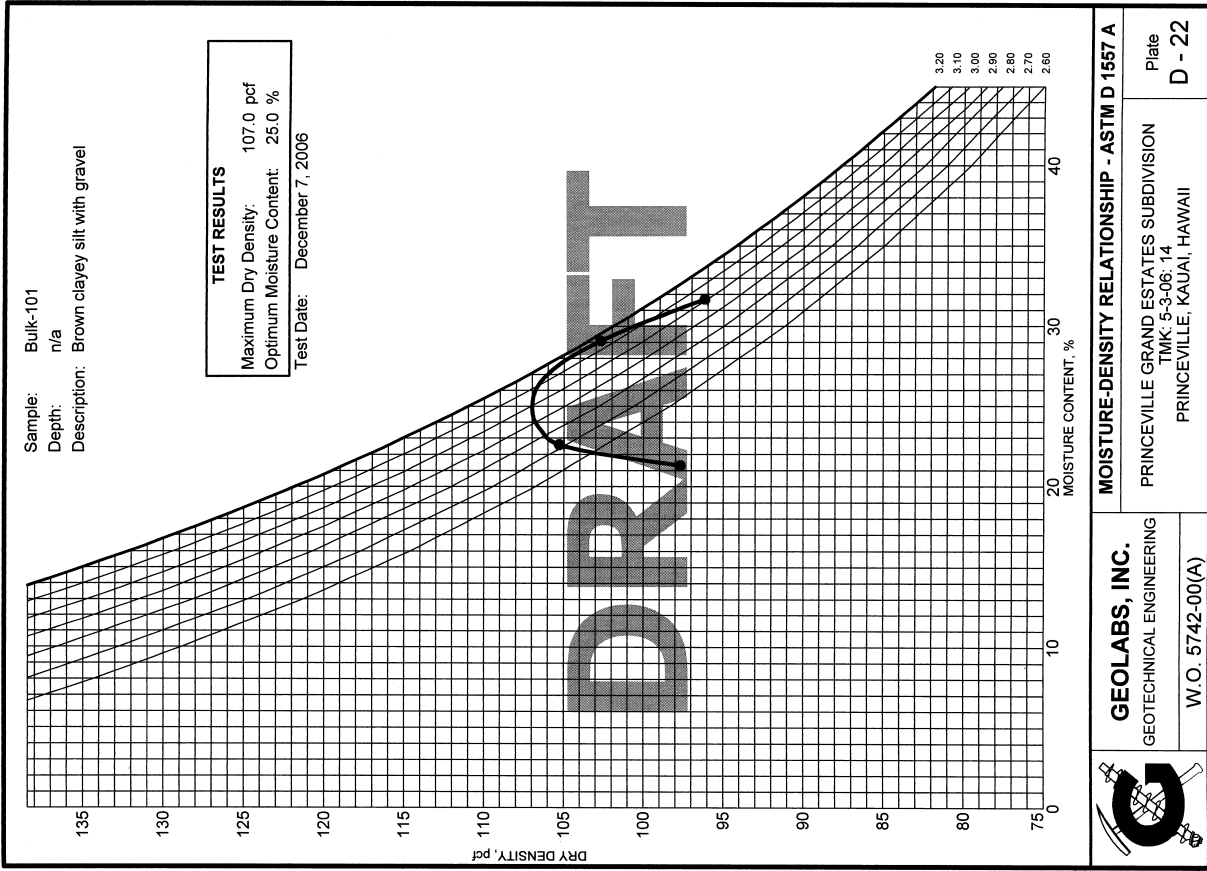
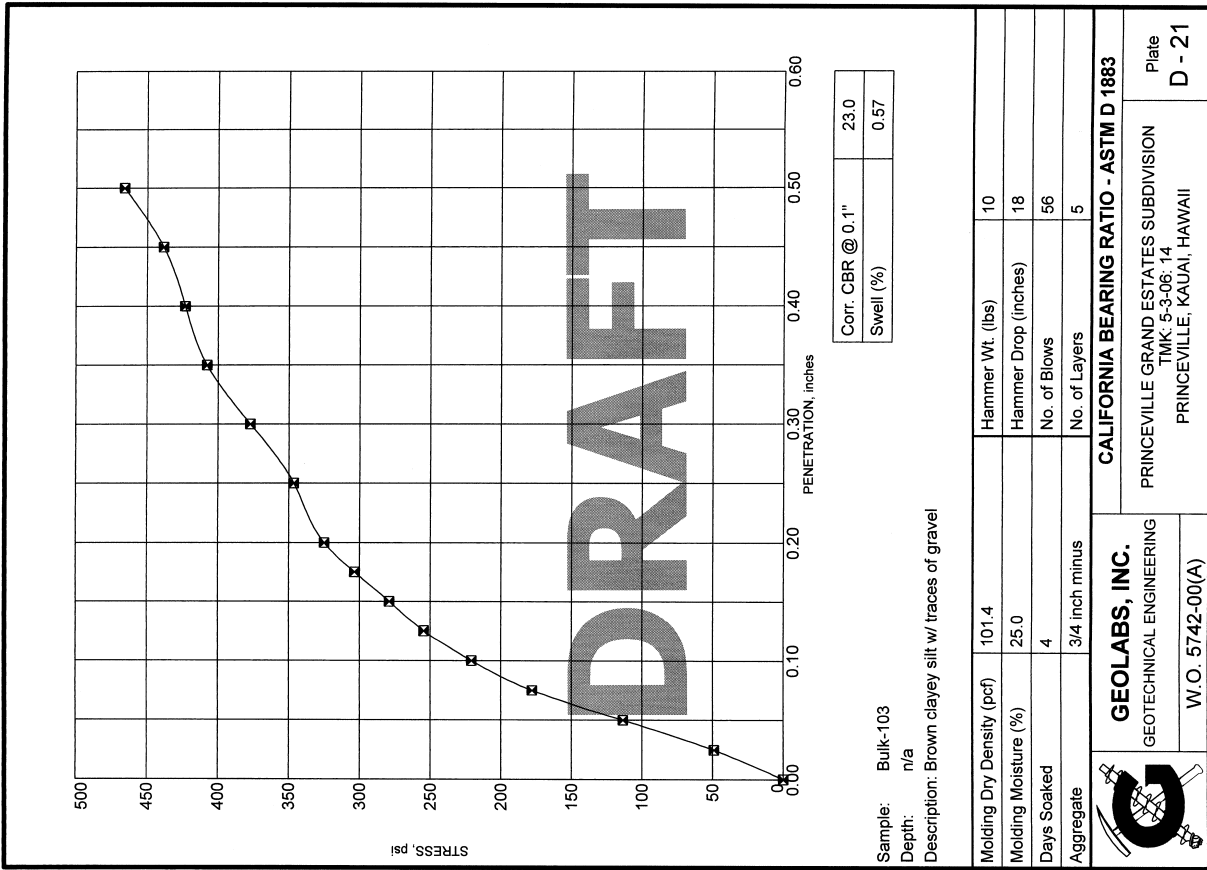
Molding Dry Density (pcf)	90.9	Hammer Wt. (lbs)	10
Molding Moisture (%)	28.1	Hammer Drop (inches)	18
Days Soaked	5	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

**GEOLABS, INC.**  
 GEOTECHNICAL ENGINEERING  
 W.O. 5742-00(A)

**CALIFORNIA BEARING RATIO - ASTM D 1883**

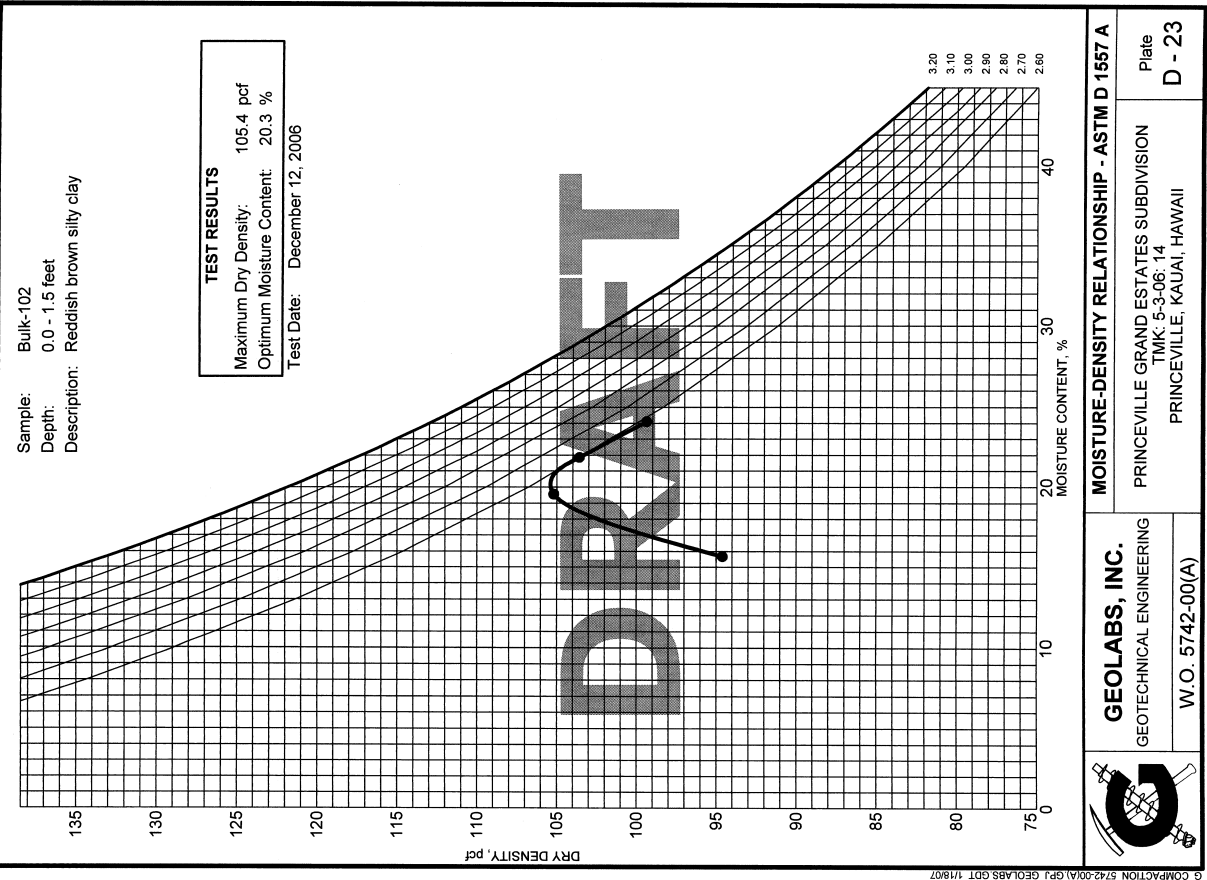
PRINCEVILLE GRAND ESTATES SUBDIVISION  
 TMK: 5-3-06: 14  
 PRINCEVILLE, KAUAI, HAWAII

Plate  
**D - 20**

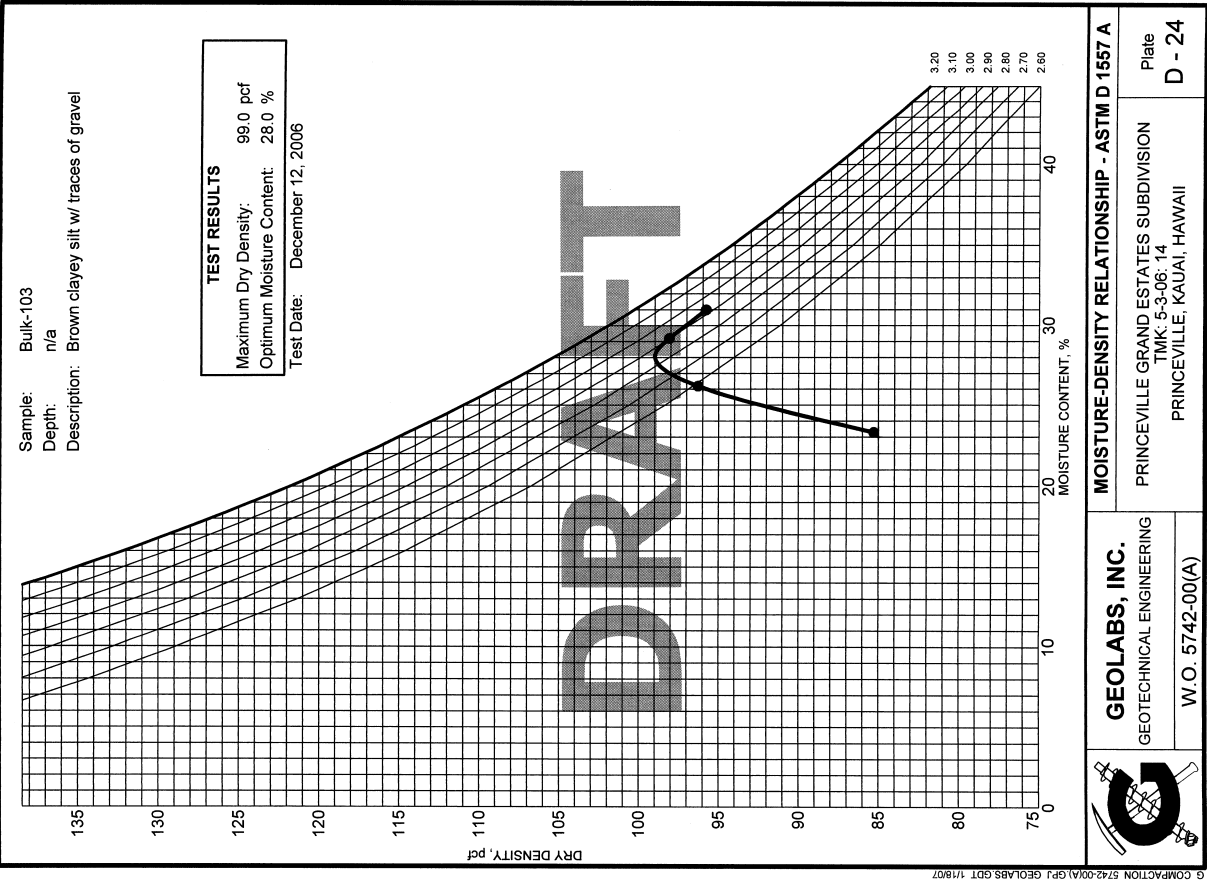


	<b>GEOLABS, INC.</b>	<b>CALIFORNIA BEARING RATIO - ASTM D 1883</b>
	GEOTECHNICAL ENGINEERING	PRINCEVILLE GRAND ESTATES SUBDIVISION
W.O. 5742-00(A)		TMK: 5-3-06: 14
		PRINCEVILLE, KAUAI, HAWAII
		Plate D - 21

	<b>GEOLABS, INC.</b>	<b>MOISTURE-DENSITY RELATIONSHIP - ASTM D 1557 A</b>
	GEOTECHNICAL ENGINEERING	PRINCEVILLE GRAND ESTATES SUBDIVISION
W.O. 5742-00(A)		TMK: 5-3-06: 14
		PRINCEVILLE, KAUAI, HAWAII
		Plate D - 22



 <b>GEOLABS, INC.</b> GEOTECHNICAL ENGINEERING W.O. 5742-00(A)	<b>MOISTURE-DENSITY RELATIONSHIP - ASTM D 1557 A</b>	PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06:14 PRINCEVILLE, KAUAI, HAWAII	Plate <b>D - 23</b>
	PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06:14 PRINCEVILLE, KAUAI, HAWAII		



 <b>GEOLABS, INC.</b> GEOTECHNICAL ENGINEERING W.O. 5742-00(A)	<b>MOISTURE-DENSITY RELATIONSHIP - ASTM D 1557 A</b>	PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06:14 PRINCEVILLE, KAUAI, HAWAII	Plate <b>D - 24</b>
	PRINCEVILLE GRAND ESTATES SUBDIVISION TMK: 5-3-06:14 PRINCEVILLE, KAUAI, HAWAII		



DRAFT

DRAFT

**SUMMARY OF RING SWELL TESTS**

Princeville Eastern Plateau  
Agricultural Subdivision  
Princeville, Island of Kauai, Hawaii

Location	Depth (feet)	Soil Description	Dry Density (pcf)	Moisture Contents		Ring Swell (%)	
				Initial (%)	Air-Dried (%)	Final (%)	Final (%)
B-2	4.0 – 5.5	Brown Clayey Silt	79.8	36.0	17.4	42.4	1.6
B-3	4.0 – 5.5	Brown Clayey Silt	90.2	32.0	11.5	31.9	0.2
B-4	1.0 – 2.5	Reddish Brown Silty Clay	84.9	35.1	18.4	37.9	0.0

**APPENDIX E**

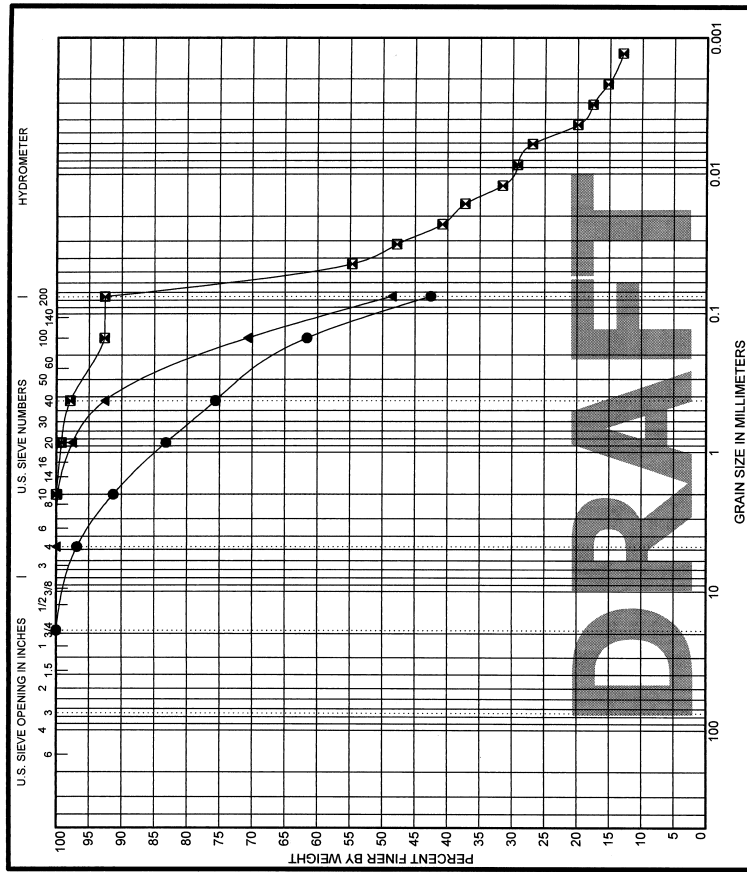
Previous Laboratory Testing

Laboratory testing data reproduced from November 22, 2004 report entitled  
"Preliminary Geotechnical Engineering Exploration  
Princeville Eastern Plateau Agricultural Subdivision  
TMK: 5-3-06: 1 and 14  
Princeville, Kauai, Hawaii"

NOTE: Samples tested were remolded in 2.4-inch diameter by  
1-inch high rings. They were air-dried overnight and then  
saturated for 24 hours under a surcharge pressure of 55 psf.

Laboratory testing data reproduced from November 22, 2004  
report entitled "Preliminary Geotechnical Engineering  
Exploration, Princeville Eastern Plateau Agricultural  
Subdivision, TMK: 5-3-06: 1 and 14, Princeville, Kauai,  
Hawaii"

[h:\5700 Series\5742-00(A)\sct-fig.47]



Sample	Depth (ft)	Description	GRAVEL			SAND			SILT OR CLAY			
			coarse	fine	coarse	medium	fine	LL	PL	PI	Cc	Cu
B-1	50.0-51.5	Brown w/ multi-color mottling SILTY SAND (SM)	19	0.141	3.2	54.3	42.6					
B-2	29.0-30.5	Reddish brown w/ multi-color mottling CLAYEY SILT (MH)	2	0.047	0.0	7.4	92.6					
B-4	34.0-35.5	Brown w/ multi-color mottling SILTY SAND (SM)	4.75	0.107	0.0	51.4	48.6					

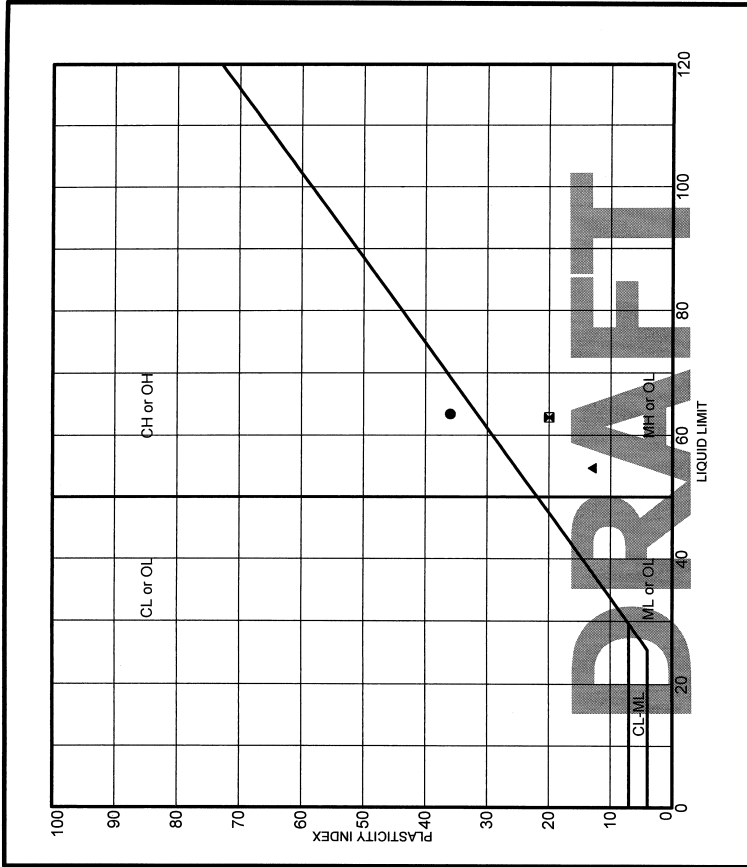
**GEOLABS, INC.**  
 GEOTECHNICAL ENGINEERING  
 W.O. 5144-00

**GRAIN SIZE DISTRIBUTION - ASTM C 117 & C 136**

PRINCEVILLE EASTERN PLATEAU  
 AGRICULTURAL SUBDIVISION  
 PRINCEVILLE, KAUAI, HAWAII

Plate **C - 1**

W.O. 5742-00(A) PLATE E-2



Sample	Depth (ft)	LL	PL	PI	Description
B-1	1.0-2.5	63	27	36	Reddish brown SILTY CLAY (CH)
B-4	19.0-20.5	63	43	20	Tannish brown w/ multi-color mottling CLAYEY SILT (MH)
B-5	15.0-16.5	55	42	13	Reddish brown w/ multi-color mottling CLAYEY SILT (MH)

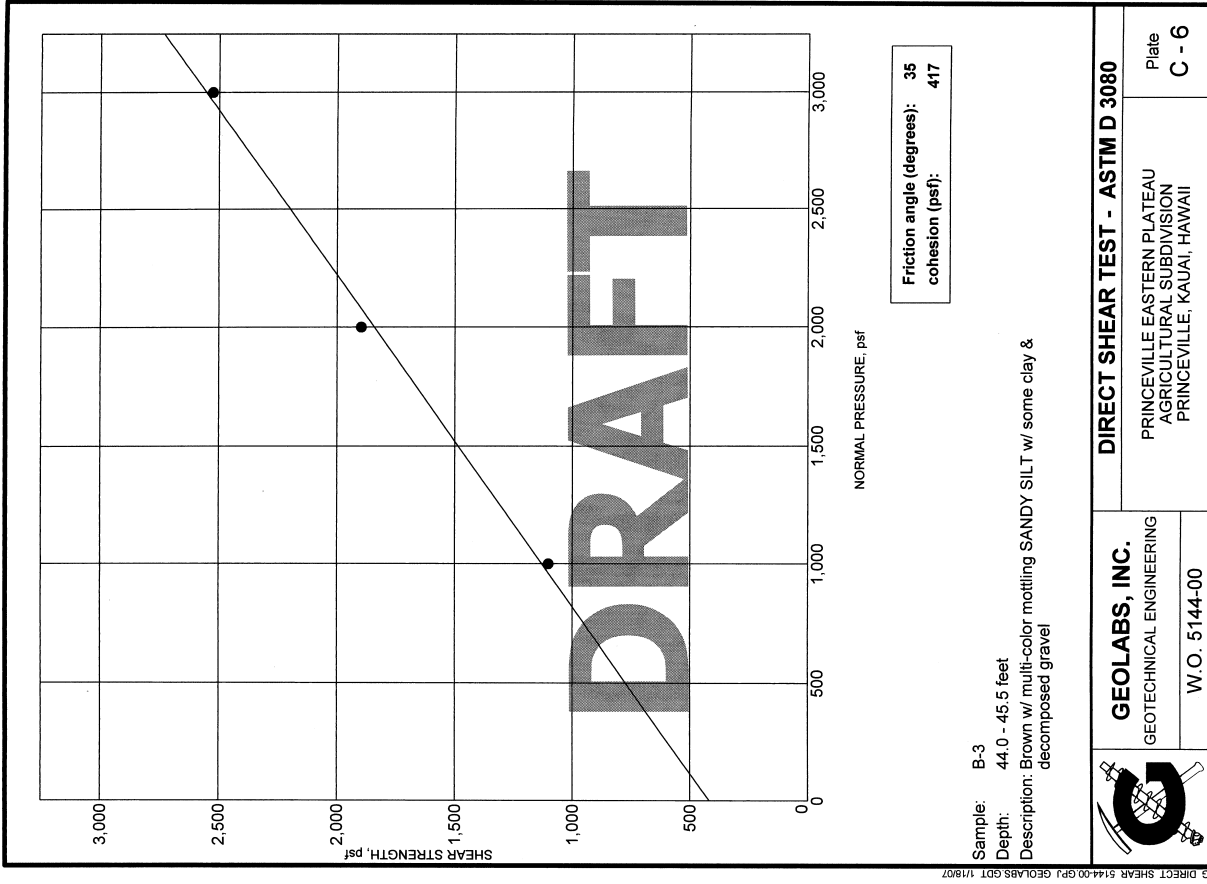
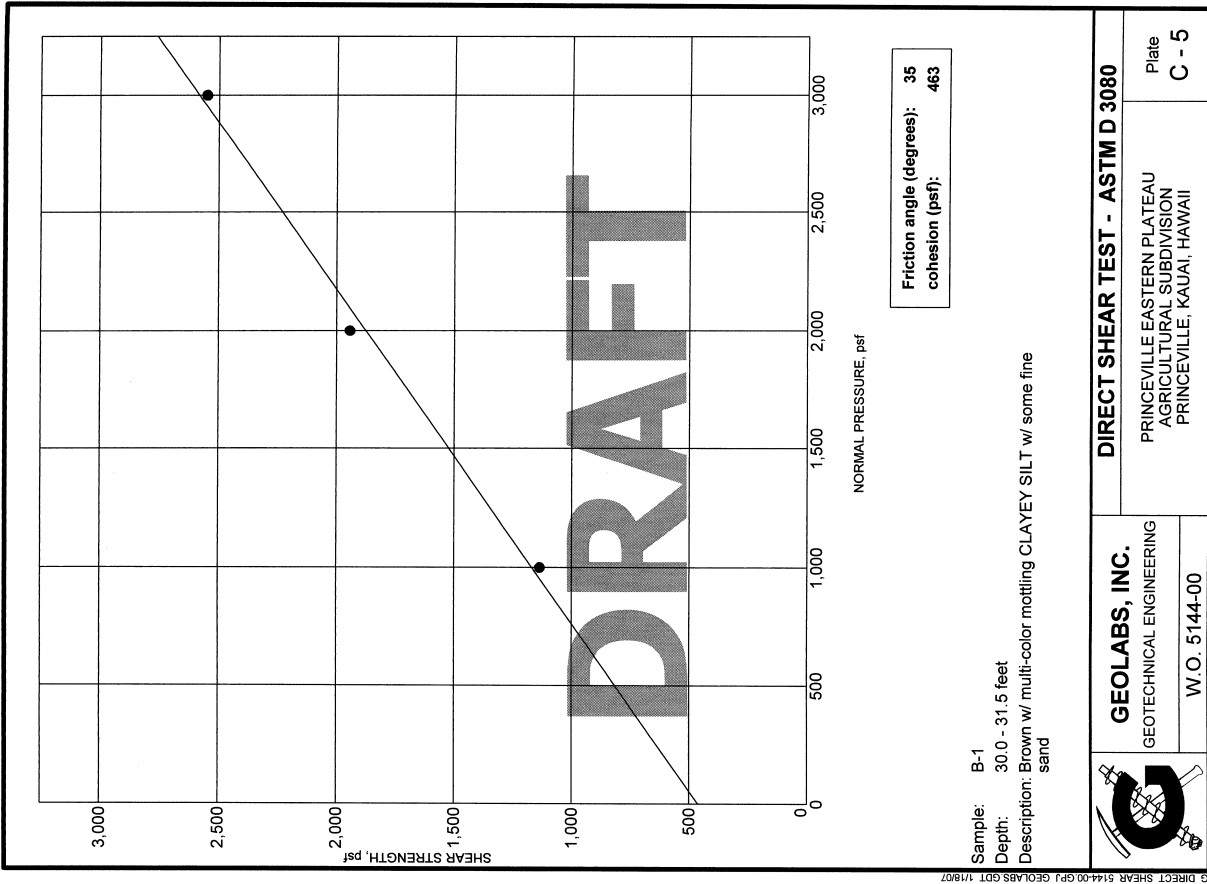
**GEOLABS, INC.**  
 GEOTECHNICAL ENGINEERING  
 W.O. 5144-00

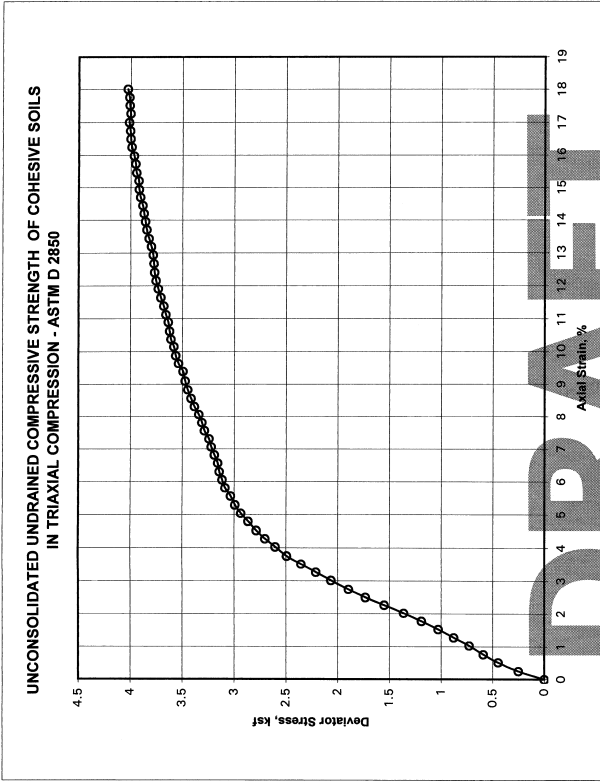
**ATTERBERG LIMITS TEST RESULTS - ASTM D 4318**

PRINCEVILLE EASTERN PLATEAU  
 AGRICULTURAL SUBDIVISION  
 PRINCEVILLE, KAUAI, HAWAII

Plate **C - 3**

W.O. 5742-00(A) PLATE E-3





LOCATION: B-2  
DEPTH : 34.0 - 35.5 feet

DESCRIPTION: Reddish brown CLAYEY SILT with some fine sand

DRY DENSITY: 66.2 pcf      SAMPLE DIAMETER: 2.399 inches  
MOISTURE CONTENT: 56.9 %      SAMPLE HEIGHT: 4.899 inches

AT FAILURE

STRAIN RATE = 1.02 %/min.  
CONFINING PRESSURE = 1.7 ksf  
MAX. DEVIATOR STRESS = 3.9 ksf @ 15.0 % STRAIN

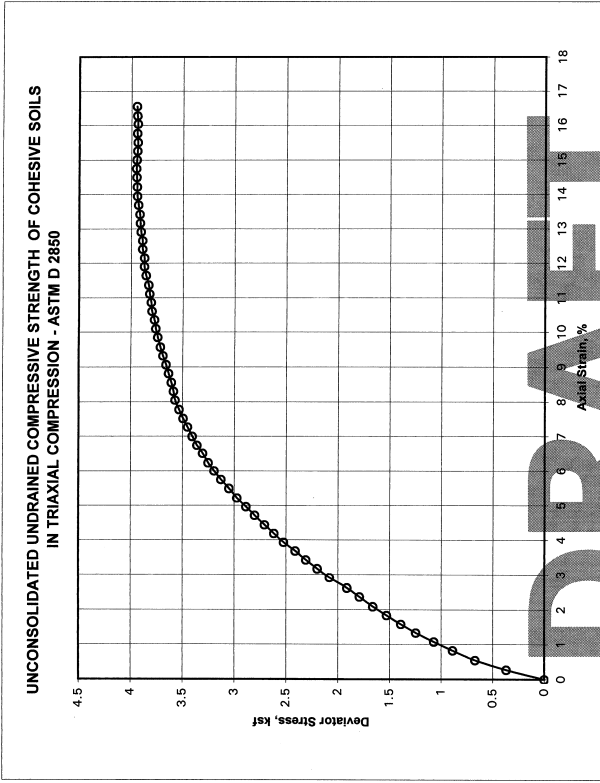
UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Feb 04
W.O.	5144-00

PROJECT: PRINCEVILLE EASTERN PLATEAU  
AGRICULTURAL SUBDIVISION  
PRINCEVILLE, KAUAI, HAWAII

PLATE C - 7

W.O. 5742-00(A)

PLATE E-6



LOCATION: B-4  
DEPTH : 55 - 56.5 feet

DESCRIPTION: Brown CLAYEY SILT with fine sand

DRY DENSITY: 65.3 pcf      SAMPLE DIAMETER: 2.398 inches  
MOISTURE CONTENT: 52.3 %      SAMPLE HEIGHT: 4.840 inches

AT FAILURE

STRAIN RATE = 1.04 %/min.  
CONFINING PRESSURE = 2.9 ksf  
MAX. DEVIATOR STRESS = 3.9 ksf @ 15.0 % STRAIN

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST	
<b>GEOLABS, INC.</b> <i>Geotechnical Engineering</i>	
DATE	Feb 04
W.O.	5144-00

PROJECT: PRINCEVILLE EASTERN PLATEAU  
AGRICULTURAL SUBDIVISION  
PRINCEVILLE, KAUAI, HAWAII

PLATE C - 8

W.O. 5742-00(A)

PLATE E-7

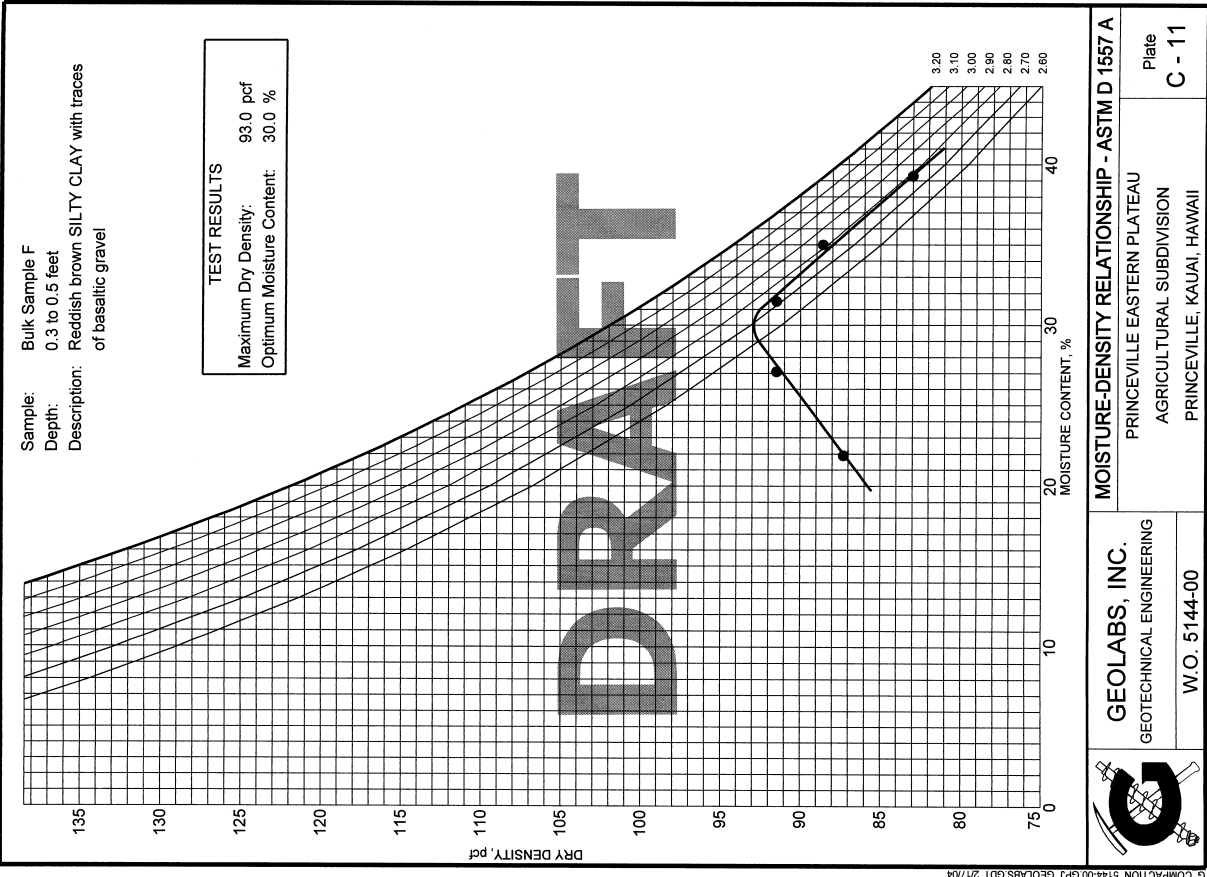


PLATE E-8

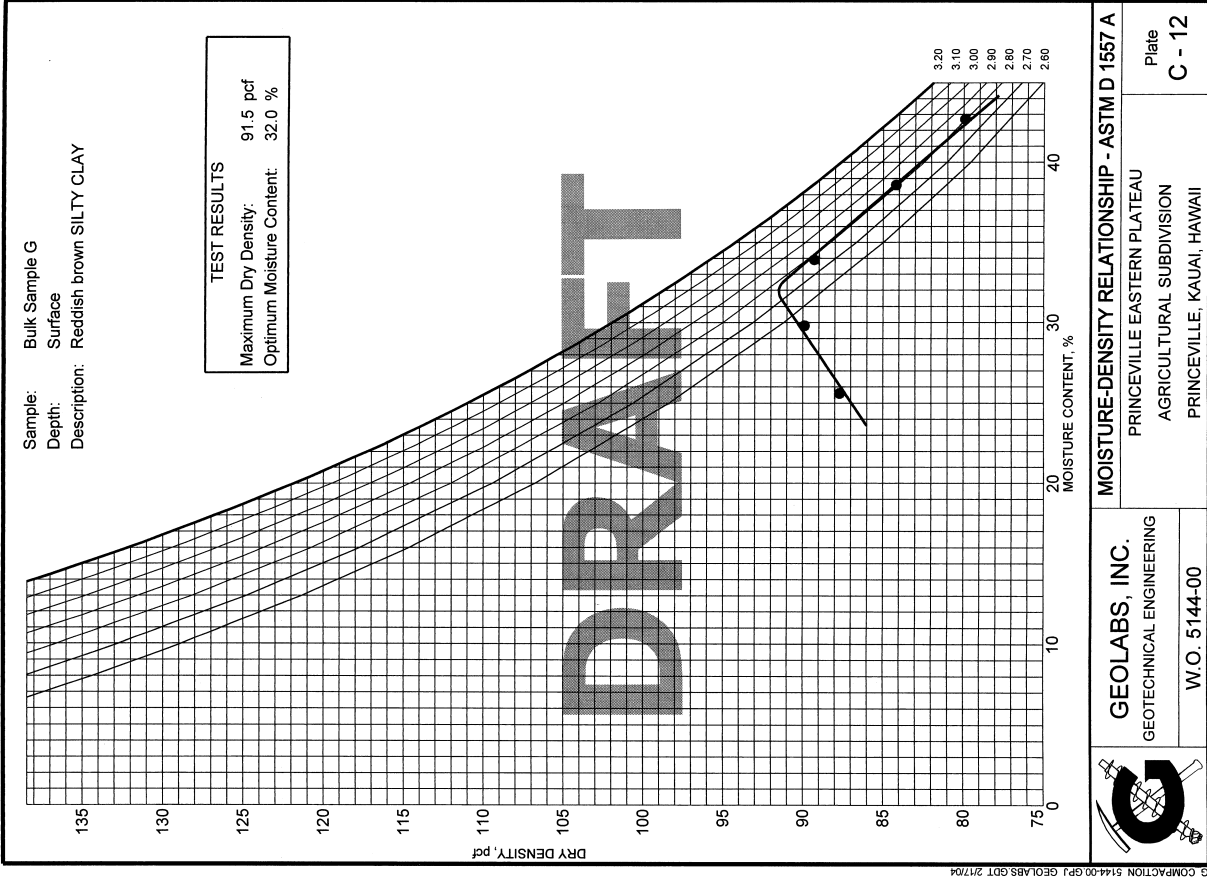


PLATE E-9

**APPENDIX G. FINAL ARCHAEOLOGICAL INVENTORY SURVEY FOR  
THE PROPOSED AGRICULTURAL SUBDIVISION, INCLUDING  
DEVELOPED AND UNDEVELOPED LANDS FOR THE PRINCEVILLE  
FINAL SUBDIVISION PROJECT, HANAIEI, KALIIHAI AND  
KALIIHAI AHUPUA'A, HANAIEI DISTRICT, KAUA'I ISLAND**

**Management Summary**

<b>Reference</b>	Archaeological Inventory Survey for the Proposed Agricultural Subdivision, including Developed and Undeveloped Lands for the Princeville Final Subdivision Project, Hanalei, Kalihiwai, and Kalihikai Ahupua'a, Hanalei District, Kaua'i Island, (TMK: [4] 5-3-006: 001 & 014) (Yucha and Hammatt 2008)
<b>Date</b>	April 2009
<b>Project Number (s)</b>	Cultural Surveys Hawaii Job Code: HANALEI 4
<b>Investigation Permit Number</b>	Cultural Surveys Hawaii, Inc. performed all archaeological fieldwork for this project under state archaeological permit No 08-14 as issued by the State of Hawaii Department of Land and Natural Resources/State Historic Preservation Division (SHPD/DLNR), per Hawaii Administrative Rules (HAR) Chapter 13-13-282.
<b>Project Location</b>	In general the project area is bounded by the Princeville Makai Golf Course on the west, Amini Road on the north, Kalihiwai Ahupua'a on the east, and Kūhiō Highway on the south. This area is depicted on the 1996 Lihue USGS 7.5-minute topographic quadrangle (Figure 1).
<b>Land Jurisdiction Agencies</b>	Private, Princeville Prince Golf Course, LLC. SHPD/DLNR
<b>Project Description</b>	The proposed project consists of the creation of an agricultural subdivision consisting of approximately 20 individual lots accessible by a system of roadways that extend from Kūhiō Highway
<b>Project Acreage</b>	Approximately 400 acres.
<b>Historic Preservation Regulatory Context</b>	This document was prepared to support the proposed project's historic preservation review under Hawaii Revised Statutes (HRS) Chapter 6E-42 and Hawaii Administrative Rules (HAR) Chapter 13-284.
<b>Fieldwork Effort</b>	The fieldwork component of this archaeological inventory survey was accomplished between September 9th and November 12th, 2008 by five CSH archaeologists, Missy Kamai, B.A., Kaipo Akama, B.A., Gerald Ida, B.A., Trevor Yucha, B.S., and Doug Thurman, B.A. under the general supervision of Hallett H. Hammatt, Ph.D (principal investigator). The field work required approximately 75 person-days to complete.
<b>Number of Historic Properties Identified</b>	A total of 11 historic properties were identified within or near the current project area.

**Final  
Archaeological Inventory Survey for the Proposed  
Agricultural Subdivision, including Developed and  
Undeveloped Lands for the Princeville Final Subdivision  
Project, Hanalei, Kalihikai and Kalihiwai Ahupua'a,  
Hanalei District, Kaua'i Island**

**[TMK: (4) 5-3-006: 001 & 014]**

Prepared for  
Princeville Prince Golf Course, LLC

Prepared by  
Trevor Yucha, B.S.,  
and  
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaii, Inc.  
Kailua, Hawaii  
(Job Code: HANALEI 4)

April 2009

O'ahu Office  
P.O. Box 1114  
Kailua, Hawaii 96734  
Ph.: (808) 262-9972  
Fax: (808) 262-4950

Maui Office  
1993 Main St.  
Wailuku, Hawaii 96793  
Ph: (808) 242-9882  
Fax: (808) 244-1994

[www.culturalsurveys.com](http://www.culturalsurveys.com)

<p><b>Historic Properties Recommended Eligible to the Hawai'i Register of Historic Places (Hawai'i Register)<sup>1</sup></b></p>	<p>All 11 historic properties identified within or near the current project area are recommended eligible to the Hawai'i Register:</p> <p>SIHP # 50-80-03-5013 (CSH 1), pre-contact era irrigation ditch, recommended Hawai'i Register-eligible under Criterion D</p> <p>SIHP # 50-80-03-5014 (CSH 2), pre-contact era habitation/agricultural complex, recommended Hawai'i Register-eligible under Criterion C and Criterion D</p> <p>SIHP # 50-80-03-5015 (CSH 3), pre-contact era terrace, recommended Hawai'i Register-eligible under Criterion D</p> <p>SIHP # 50-80-03-5016 (CSH 4), pre-contact era modified outcrop, recommended Hawai'i Register-eligible under Criterion D</p> <p>SIHP # 50-80-03-5017 (CSH 5), historic era wall, recommended Hawai'i Register-eligible under Criterion D</p> <p>SIHP # 50-80-03-5018 (CSH 6), pre-contact era irrigation ditch, recommended Hawai'i Register-eligible under Criterion D</p> <p>SIHP # 50-80-03-5019 (CSH 7), pre-contact era irrigation ditch, recommended Hawai'i Register-eligible under Criterion D</p> <p>SIHP # 50-80-03-5020 (CSH 8), historic era bunker, recommended Hawai'i Register-eligible under Criterion A and Criterion D</p> <p>SIHP # 50-80-03-5021 (CSH 9), historic era cemetery, recommended Hawai'i Register-eligible under Criterion D and Criterion E</p> <p>SIHP # 50-80-03-5022 (CSH 10), pre-contact era terrace, recommended Hawai'i Register-eligible under Criterion D</p> <p>SIHP # 50-80-03-5023 (CSH 11), pre-contact habitation/burial/agricultural complex, recommended Hawai'i Register-eligible under Criterion D and Criterion E</p>
<p><b>Effect Recommendation</b></p>	<p>The archaeological inventory survey investigation identified 11 historic properties within the project area. All 11 historic properties will potentially be affected by the proposed project.</p> <p>CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures." The recommended mitigation measures will reduce the project's potential adverse effect on these significant historic properties.</p>

<p><b>Mitigation Recommendation</b></p>	<p>The following recommended significant historic properties will potentially be adversely affected by the proposed project. The recommended mitigation measures listed below are intended to alleviate this adverse effect. The scope and methods for these mitigation measures should be developed in consultation with SHPD/DLNR.</p> <p>SIHP # 50-80-03-5013 (CSH 1), pre-contact era irrigation ditch: Preservation</p> <p>SIHP # 50-80-03-5014 (CSH 2), pre-contact era habitation/agricultural complex: Preservation</p> <p>SIHP # 50-80-03-5015 (CSH 3), pre-contact era terrace: No Further Work</p> <p>SIHP # 50-80-03-5016 (CSH 4), pre-contact era modified outcrop: No Further Work</p> <p>SIHP # 50-80-03-5017 (CSH 5), historic era wall: No Further Work</p> <p>SIHP # 50-80-03-5018 (CSH 6), pre-contact era irrigation ditch: No Further Work</p> <p>SIHP # 50-80-03-5019 (CSH 7), pre-contact era irrigation ditch: No Further Work</p> <p>SIHP # 50-80-03-5020 (CSH 8), historic era bunker: Preservation</p> <p>SIHP # 50-80-03-5021 (CSH 9), historic era cemetery: Preservation</p> <p>SIHP # 50-80-03-5022 (CSH 10), pre-contact era terrace: No Further Work</p> <p>SIHP # 50-80-03-5023 (CSH 11), pre-contact habitation/burial/agricultural complex: Preservation and most likely preparation of a burial treatment plan</p> <p>A Preservation plan is recommended to address the five sites that are recommended for preservation. Consultation with the SHPD is recommended regarding the appropriateness of addressing sites -5021 and/or -5023 within an additional Burial Treatment Plan.</p>
---	---

<sup>1</sup> To be considered eligible for listing on the Hawai'i Register a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the following broad cultural/historic significance criteria: "A" associated with events that have made an important contribution to the broad patterns of our history; "B" associated with the lives of persons important in our past; "C" embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, or possesses high artistic value; "D" have yielded, or is likely to yield information important for research on prehistory or history; and, "E" have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property, or due to associations with traditional beliefs, events or oral history accounts – these associations being important to the group's history



## Table of Contents

<b>Management Summary</b> .....	i
<b>Section 1 Introduction</b> .....	1
1.1 Project Background .....	1
1.2 Scope of Work .....	1
1.3 Environmental Setting .....	7
1.3.1 Natural Environment .....	7
1.3.2 Built Environment .....	7
<b>Section 2 Methods</b> .....	9
2.1 Field Methods .....	9
2.2 Document Review .....	9
<b>Section 3 Background Research</b> .....	10
3.1 Mythological and Traditional Accounts .....	10
3.1.1 <i>‘Ōlelo No ʻeau</i> .....	10
3.1.2 The Story of Lono/kamakahiki .....	10
3.1.3 Legend of Kaipalaoa .....	11
3.1.4 Kawelo and Hanalei .....	12
3.1.5 Legend of Pahila .....	13
3.1.6 Legend of Kapunohu .....	13
3.1.7 Legend of Kamapuaʻa .....	13
3.1.8 Story of Halali .....	14
3.1.9 Story of the <i>‘Ōhelo</i> .....	14
3.1.10 Legend of the lovers Paalua and Kawelu .....	14
3.1.11 A Maiden from the Mu .....	14
3.1.12 Legend of Kaleleluaka .....	14
3.1.13 Account of Kawelu .....	15
3.1.14 Village Belle of Pokiʻi .....	15
3.1.15 Kaʻawakō Heau .....	15
3.1.16 The <i>Moʻo</i> Kamoʻookamuliwai .....	15
3.2 Place Names of Hanalei .....	15
3.3 Pre-Contact and Early Contact Periods .....	18
3.4 The Russian Enterprise at Hanalei .....	19
3.5 Fort Barclay and Russian Enterprise at the Coast .....	20
3.6 The 1820s .....	21
3.7 1830s to 1850 .....	22
3.8 Mid-Nineteenth Century .....	24
3.9 1850s to 1900 .....	27
3.10 1900 to the Present .....	31
3.11 Land Use Patterns in the Project Area and Vicinity .....	34
3.12 Previous Archaeological Research .....	36
3.13 Background Summary and Predictive Model .....	45
3.13.1 Background Summary .....	45
3.13.2 Predictive Model .....	46

<b>Section 4 Results of Fieldwork</b> .....	47
4.1 Survey Findings .....	47
4.2 Site Descriptions .....	47
4.2.1 SHHP #: 50-80-03-5013 (CSH 1) .....	47
4.2.2 SHHP #: 50-80-03-5014 (CSH 2) .....	52
4.2.3 SHHP #: 50-80-03-5015 (CSH 3) .....	59
4.2.4 SHHP #: 50-80-03-5016 (CSH 4) .....	59
4.2.5 SHHP #: 50-80-03-5017 (CSH 5) .....	61
4.2.6 SHHP #: 50-80-03-5018 (CSH 6) .....	65
4.2.7 SHHP #: 50-80-03-5019 (CSH 7) .....	65
4.2.8 SHHP #: 50-80-03-5020 (CSH 8) .....	67
4.2.9 SHHP #: 50-80-03-5021 (CSH 9) .....	67
4.2.10 SHHP #: 50-80-03-5022 (CSH 10) .....	71
4.2.11 SHHP #: 50-80-03-5023 (CSH 11) .....	75
<b>Section 5 Summary and Interpretation</b> .....	84
<b>Section 6 Significance Assessments</b> .....	85
<b>Section 7 Project Effect and Mitigation Recommendations</b> .....	88
7.1 Mitigation Recommendations .....	88
7.2 Preservation Measures .....	90
<b>Section 8 References Cited</b> .....	92

## List of Figures

Figure 1. USGS 7.5-minute 1996 Lihue Quadrangle Map showing the project area.....	2
Figure 2. Portion of Tax Map Key (TMK) [4] 5-3-06 depicting the project area.....	3
Figure 3. Aerial photograph showing the project area (source: USGS Orthoimagery 2005).....	4
Figure 4. Surveyors map showing proposed development within the current project area.....	5
Figure 5. Overlay of Soil Survey of the State of Hawai'i (Foote et al. 1972), indicating sediment types within the project area.....	8
Figure 6. 1907 W.E. Wall Map showing LCAs in the vicinity of the current project area.....	25
Figure 7. 1878 W.D. Alexander map showing the Princeville Plantation within the current project area.....	30
Figure 8. USGS 7.5-minute 1996 Lihue Quadrangle Map showing previous archaeological studies located in the vicinity of the current project area.....	40
Figure 9. USGS 7.5-minute 1996 Lihue Quadrangle Map showing historic properties within the project area (properties for preservation are outlined in yellow, others are recommended for no further work).....	48
Figure 10. Plan view map showing SIHP # 50-80-03-5014 (CSH 2) and portions of SIHP # 50-80-03-5013 (CSH 1).....	49
Figure 11. Plan view map showing SIHP # 50-80-03-5015 (CSH 3), SIHP # 50-80-03-5016 (CSH 4), and portions of SIHP # 50-80-03-5013 (CSH 1).....	50
Figure 12. Plan view map showing SIHP # 50-80-03-5022 (CSH 10) and portions of SIHP # 50-80-03-5013 (CSH 1).....	51
Figure 13. SIHP # 50-80-03-5013 (CSH 1) irrigation ditch, view to west.....	53
Figure 14. SIHP # 50-80-03-5013 (CSH 1) irrigation ditch within CSH 2 complex, view to north.....	53
Figure 15. SIHP # 50-80-03-5014 (CSH 2) Feature A terrace, view to north.....	54
Figure 16. Flaked glass bottle at SIHP # 50-80-03-5014 (CSH 2) Feature A terrace, view to east.....	56
Figure 17. Flaked glass bottle at SIHP # 50-80-03-5014 (CSH 2) Feature A terrace, view to east.....	56
Figure 18. SIHP # 50-80-03-5014 (CSH 2) Feature B terrace, view to southeast.....	57
Figure 19. SIHP # 50-80-03-5014 (CSH 2) Feature C terrace, view to south.....	57
Figure 20. SIHP # 50-80-03-5014 (CSH 2) Feature D terrace, view to north.....	58
Figure 21. SIHP # 50-80-03-5014 (CSH 2) Feature E terrace, view to east.....	58
Figure 22. SIHP # 50-80-03-5014 (CSH 2) Feature F terrace, view to south.....	60
Figure 23. SIHP # 50-80-03-5015 (CSH 3) terrace, view to east.....	60
Figure 24. SIHP # 50-80-03-5016 (CSH 4) modified outerop, view to east.....	62
Figure 25. SIHP # 50-80-03-5016 (CSH 4) modified outerop, view to west.....	62
Figure 26. SIHP # 50-80-03-5017 (CSH 5) mortared wall portion, view to north.....	63
Figure 27. Water gauge observed near SIHP # 50-80-03-5017 (CSH 5), view to northwest.....	63
Figure 28. SIHP # 50-80-03-5017 (CSH 5) single course alignment portion, view to northeast.....	64
Figure 29. Steering wheel observed near SIHP # 50-80-03-5017 (CSH 5), view to west.....	64
Figure 30. SIHP # 50-80-03-5018 (CSH 6) irrigation ditch, view to north.....	66
Figure 31. SIHP # 50-80-03-5019 (CSH 7) irrigation ditch, view to east.....	66
Figure 32. Plan view map showing SIHP # 50-80-03-5020 (CSH 8) military bunker.....	68
Figure 33. SIHP # 50-80-03-5020 (CSH 8) military bunker roof, view to northeast.....	69
Figure 34. SIHP # 50-80-03-5020 (CSH 8) military bunker entrance, view to northeast.....	69
Figure 35. SIHP # 50-80-03-5020 (CSH 8) military bunker interior, view to north.....	70

Figure 36. SIHP # 50-80-03-5021 (CSH 9) historic cemetery, view to north.....	70
Figure 37. SIHP # 50-80-03-5021 (CSH 9) cemetery Headstone 1, view to south.....	72
Figure 38. SIHP # 50-80-03-5021 (CSH 9) cemetery, Headstone 2, view to south.....	72
Figure 39. SIHP # 50-80-03-5021 (CSH 9) cemetery Headstone 3, view to south.....	73
Figure 40. SIHP # 50-80-03-5021 (CSH 9) cemetery Headstone 4, view to south.....	73
Figure 41. SIHP # 50-80-03-5021 (CSH 9) cemetery Headstone 5, view to west.....	74
Figure 42. SIHP # 50-80-03-5021 (CSH 10) terrace, view to northeast.....	74
Figure 43. Plan view map showing SIHP # 50-80-03-5023 (CSH 11) Features A-G.....	76
Figure 44. Plan view map showing SIHP # 50-80-03-5023 (CSH 11) Feature H.....	77
Figure 45. SIHP # 50-80-03-5023 (CSH 11) Feature A surface showing bottle scatter, view to north.....	78
Figure 46. SIHP # 50-80-03-5023 (CSH 11) Feature B terrace, view to west.....	78
Figure 47. SIHP # 50-80-03-5023 (CSH 11) Feature C terrace, view to west.....	79
Figure 48. SIHP # 50-80-03-5023 (CSH 11) Feature D alignment, view to west.....	81
Figure 49. SIHP # 50-80-03-5023 (CSH 11) Feature E mound, view to east.....	81
Figure 50. SIHP # 50-80-03-5023 (CSH 11) Feature F terrace, view to east.....	82
Figure 51. SIHP # 50-80-03-5023 (CSH 11) Feature G mound, view to east.....	82
Figure 52. SIHP # 50-80-03-50-23 (CSH 11) Feature H terrace, view to south.....	83
Figure 53. SIHP # 50-80-03-5023 (CSH 11) Feature H terrace, view to southwest.....	83

## List of Tables

Table 1. Land Commission Awards in the vicinity of the project area.....	26
Table 2. Archaeological studies located near the current project area.....	37
Table 3. Summary of Sites with Significance Assessments and Recommendations.....	86

## Section 1 Introduction

### 1.1 Project Background

At the request of Princeville Prince Golf Course LLC, Cultural Surveys Hawaii's, Inc. (CSH) has conducted an archaeological inventory survey for the proposed agricultural subdivision, including developed and undeveloped lands for the Princeville final subdivision project, Hanalei, Kālihiwai, and Kālihiwai Ahupua'a, Hanalei District, Kaua'i Island, (TMK: [4] 5-3-006: 001 & 014). In general the project area is bounded by the Princeville Makai Golf Course on the west, 'Anini Road on the north, Kālihiwai Ahupua'a on the east, and Kūhiō Highway on the south. This area is depicted on the 1996 Lihue USGS 7.5-minute topographic quadrangle, tax map and aerial photograph (Figure 1 to Figure 3).

The project area is privately owned by Princeville Prince Golf Course LLC. The proposed project involves the creation of an agricultural subdivision consisting of approximately 20 individual lots accessible by a system of roadways that extend from Kūhiō Highway (Figure 4).

Under Hawaii's state historic preservation legislation, archaeological inventory surveys are designed to identify, document, and provide significance and mitigation recommendations for historic properties. Under this legislation, historic properties are defined as any "building, structure, object, district, area, or site, including *heiau* and underwater site, which is over fifty years old." A project's effect and potential mitigation measures are evaluated based on the project's potential impact to "significant" historic properties (those historic properties determined eligible, based on established significance criteria, for inclusion in the Hawaii's Register of Historic Places [Hawaii's Register]). Determinations of eligibility to the Hawaii's Register result when a state agency official's historic property "significance assessment" is approved by the State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), or when SHPD/DLNR itself makes an eligibility determination for an historic property (HAR Chapter 13-284).

In consultation with SHPD, this inventory survey investigation was designed to fulfill the state requirements for archaeological inventory surveys (HAR Chapter 13-276).

### 1.2 Scope of Work

The scope of work was designed to satisfy the Hawaii's Administrative Rules Title 13 (Department of Land and Natural Resources), Subtitle 13 (State Historic Preservation Division), Chapter 276 (Rules Governing Standards for Archaeological Inventory Surveys and Reports). The scope of work includes:

- 1) Historic and archaeological background research, including a search of historic maps, written records, Land Commission Award documents, and the reports from prior archaeological investigations. This research will focus on the specific project area's past land use, with general background on the pre-contact and historic settlement patterns of the *ahupua'a* and district. This background information will be used to compile a predictive model for the types and locations of historic properties that could be expected within the project area.

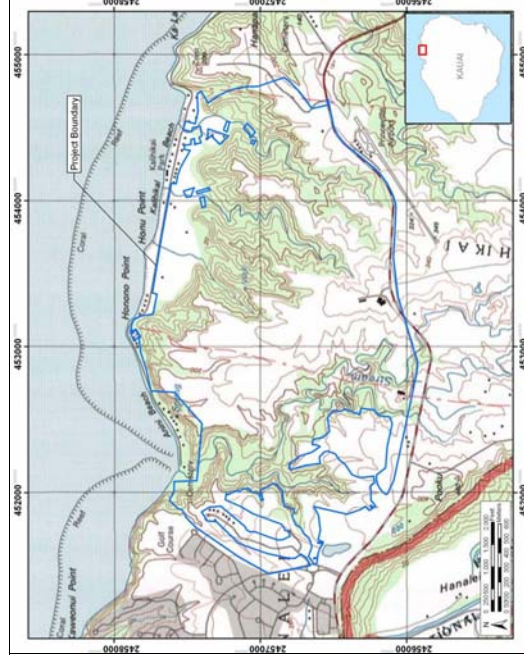


Figure 1. USGS 7.5-minute 1996 Lihue Quadrangle Map showing the project area.

Archaeological Inventory Survey for the Proposed Princeville Ag Subdivision

TMK: (4) 5-3-006: 001 & 014

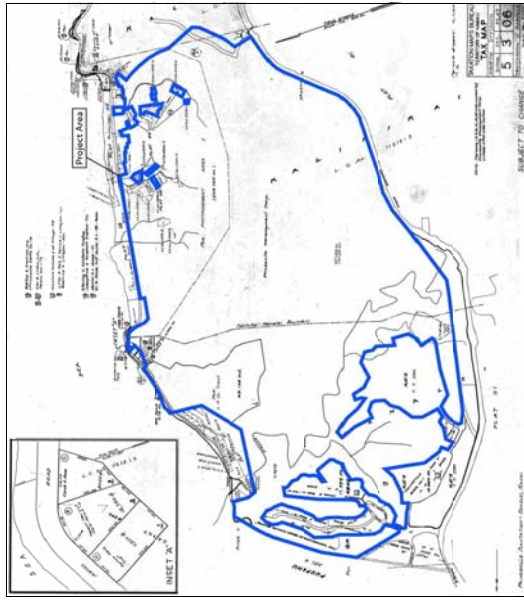


Figure 2. Portion of Tax Map Key (TMK) [4] 5-3-06 depicting the project area.

Archaeological Inventory Survey for the Proposed Princesville Ag Subdivision  
TMK: (4) 5-3-006:001 & 014



Figure 3. Aerial photograph showing the project area (source: USGS Orthomimagery 2005).

Archaeological Inventory Survey for the Proposed Princesville Ag Subdivision  
TMK: (4) 5-3-006:001 & 014

- 2) A complete (100 %) systematic pedestrian inspection of the project area to identify any potential surface historic properties. Surface historic properties will be recorded with an evaluation of age, function, interrelationships, and significance. Documentation will include photographs, scale drawings, and, if warranted, limited controlled excavation of select sites and/or features.
- 3) Based on the project area's environment and the results of the background research, subsurface testing with a combination of hand and backhoe excavation to identify and document subsurface historic properties that would not be located by surface pedestrian inspection may be appropriate.

Appropriate samples from these excavations will be analyzed for cultural and chronological information. All subsurface historic properties identified will be documented to the extent possible, including geographic extent, content, function/derivation, age, interrelationships, and significance.

- 4) As appropriate, consultation with knowledgeable individuals regarding the project area's history, past land use, and the function and age of the historic properties documented within the project area.
- 5) As appropriate, laboratory work to process and gather relevant environmental and/or archaeological information from collected samples.
- 6) Preparation of an inventory survey report, which will include the following:
  - a) A project description;
  - b) A section of a USGS topographic map showing the project area boundaries and the location of all recorded historic properties;
  - c) Historical and archaeological background sections summarizing prehistoric and historic land use of the project area and its vicinity;
  - d) Descriptions of all historic properties, including selected photographs, scale drawings, and discussions of age, function, laboratory results, and significance, per the requirements of HAR 13-276. Each historic property will be assigned a Hawai'i State Inventory of Historic Properties number;
  - e) If appropriate, a section concerning cultural consultations [per the requirements of HAR 13- 276-5(g) and HAR 13-275/284-8(a)(2)].
  - f) A summary of historic property categories, integrity, and significance based upon the Hawai'i Register of Historic Places criteria;
  - g) A project effect recommendation;
  - h) Treatment recommendations to mitigate the project's adverse effect on any historic properties identified in the project area that are recommended eligible to the Hawai'i Register of Historic Places.

This scope of work included full coordination with the State Historic Preservation Division (SHPD), and county relating to archaeological matters. This coordination took place after consent of the owner or representatives.



Figure 4. Surveyors map showing proposed development within the current project area



## Section 2 Methods

### 2.1 Field Methods

The fieldwork component of this archaeological inventory survey was accomplished between September 9th and November 12th, 2008 by five CSH archaeologists, Missy Kamai, B.A., Kaipo Akana, B.A., Gerald Ida, B.A., Trevor Yucha, B.S., and Doug Thurman, B.A. under the general supervision of Hallett H. Hammatt, Ph.D (principal investigator). The fieldwork required approximately 75 person-days to complete.

Fieldwork consisted of a 100% coverage pedestrian inspection within all accessible portions of the project area. Steep cliff faces and ridge slopes that could not be accessed on foot were visually inspected for the presence of cave openings, overhangs, and areas of potential human modification that have been known throughout the state to contain human burials. The pedestrian inspection of the remainder of the project area was accomplished through systematic sweeps. The interval between the archaeological surveys was generally 5-10 m. Portions of the project area that were suspected to exhibit human modification (historic properties) were cleared of ground vegetation using hand tools in order to define site areas, provide accurate descriptions, and facilitate mapping. All historic properties encountered were recorded and documented with a written field description, site maps, photographs, scale drawings, and each site was located using Garmin GPSmap 60CSx GPS survey technology (accuracy 5-10 m).

### 2.2 Document Review

Background research included: a review of previous archaeological studies on file at SHPD/DLNR; review of documents at Hamilton Library of the University of Hawaii; the Hawaii's State Archives, the Mission Houses Museum Library, the Hawaii's Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawaii's State Archives and the Archives of the Bishop Museum; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waiihona 'Ama database ([www.waiihona.com](http://www.waiihona.com)).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of historic properties in the project area.

## Section 3 Background Research

### 3.1 Mythological and Traditional Accounts

#### 3.1.1 'Ōlelo No'eau

It seems likely the most proverbial sayings associated with Hanalei are references to the rains. One is simply *Ka ua loku o Hanalei* ("The pouring rain of Hanalei") (Pukui 1983:170). Another is *Lai'ulū'u Hanalei i ka ua nui; kaumaha i ka noe o Alaka'i* ("Heavily weighted is Hanalei in the pouring rain; laden down by the mist of Alaka'i") (Pukui 1983:170). Pukui explains the poetic meaning "An expression used in dirges and chants of woe to express the burden of sadness, the heaviness of grief, and tears pouring freely like rain. Rains and fogs of other localities may also be used."

Pukui (1983:50) associates the poetical saying: *Haehae ka manu, ke 'ale nei ka wai* ("Tear up the birds, the water is surging") with Hanalei. She explains:

Let us hurry, as there is no time for niceties. Kane'alohi and his son lived near the lake of Halulu at Wai'ale'ale, Kaua'i. They were catchers of 'ua'u birds. Someone falsely accused them of poaching on land belonging to the chief of Hanalei, who sent a large company of warriors to destroy them. The son noticed agitation in the water of Halulu and cried out a warning to his father, who tore the birds to hasten cooking.

Wichman (1998:109) gives a very similar account (below) associated with a peak near the summit of Wai'ale'ale named Haehae-ka-manu-a-Kāne'alohi-ke-'ale-mai-nei-ka-wai.

A last poetic saying Me'e'u'i o Hanalei ("The handsome hero of Hanalei") "said of one who is attractive" (Pukui 1983:234) would seem to be a clear reference to Kauhōa (see Legends of Kawelo below).

Items particularly associated with Hanalei include the limu-kā-kanaka (*limu-kā-kanaka-o-Manu'akepa*). Pukui and Elbert 1986:191 relate the following:

A slimy blue-green alga (*Nostoc commune*), bright-green when fresh, growing on the shores of Hanalei, Kaua'i, famous in song. In the wet season it covers the ground with a thin slippery layer. Lit. man-striking moss, so called because people are said to slip on it and fall.

#### 3.1.2 The Story of Lonoikamakahiki

In the Story of Lonoikamakahiki (Formander 1919 Vol IV Part II:284-285, 304-305) the ruling chief Lonoikamakahiki and Kaikilani chant similar chants about various places in Hawai'i nei including a reference to the rains of Hanalei:

*O Hanalei kamu a ka ua* Hanalei, the source of the rains  
*I amo a haathaa* Made low from carrying such a burden

Kapaiahilima also chants of his wanderings at Hanalei with Lonokamakahiki also focusing on the rains:

My companion of the tall pandanus..

[That extend] from Kīlauea to Kalihī,

The pandanus that had been pecked by birds,

[The Pandanus] of Po'okū in Hanalei

Thus did we two wander along, my companion,

Through the heavy and wind-blown rain,

The ceaseless and general rain.

We drank of the 'awa of Koukou,

The fragrant leaved 'awa of Māmalahoa.

Say, my companion!

A companion, a friend of Lono, a man,

A companion of the deafening rains.

As the rain traveled in the uplands at

Hanalei iki,

To Hanaleimui

One rain was from the highlands,

One rain was from the lowlands,

One rain was from the east,

One rain was from the west,

Along the pandanus cape of Pu'upaoo.

It was there the rain fell on the sand,

The sand, food of the kīna'u,

The kīna'u that ate of the ripe pandanus

at Hanalei

There is a reminiscence of when Lonoikamakahiki "ate of the ripe flowers of the pandanus of Po'okū" (*a'ai i ka pua pala o ka hala o Po'okū*)(Formander 1919 Vol IV, Part II, 360-361)

### 3.1.3 Legend of Kaipalaoa

In the "Legend of Kaipalaoa", the word-smith child, (Formander 1919 Vol IV Part III:576-577) the hero boy arrives at Hanalei by sea from Pōka'i O'ahu in the retinue of the ruling chief of Kaua'i, Pūeouiokona. They meet two canoes of the chief returning with fish and the boy

requests some. He chooses two relatively small insignificant fish (an O'ililepa file-fish and a Kikakapu butterfly-fish) which later figure in his contest of wits at Waitua.

### 3.1.4 Kawelo and Hanalei

In the "Legend of Kawelo", (Formander 1919 Vol V Part I:576-577) the Kaua'i hero was brought up with a certain kinsman, the giant Kauahoa of Hanalei who would become the most noted warrior of the ruling chief 'Aikanaka. In a sidebar, while fishing from a canoe for *ihu* (parrotfish) at Ka'ena O'ahu, Kawelo caught the demi-god Uhumakakai in his net and was towed to near Hanalei where his companion, Mā'akuakeke, asked for that land. Kawelo returns to Kaua'i to fight against the ruling chief 'Aikanaka and the great warrior Kauahoa. The fighting breaks out at Waitua. Aloha for Kauahoa arose within Kawelo and he tries to avoid a fight with a kinsman (*hoahānau*) from his childhood days by trying to win over Kauahoa with a flowery chant referring to Kauahoa repeated by as "the pride of Hanalei (*ka ui o Hanalei*). There are several references to Hanalei: "swollen and enlarged is the moss of Hanalei" (*Pehu kaha ka limu o Hanalei*) "Hanalei, the cold land, the wet land, the land where the end is" (*Hanalei aina anuanu, aina koekoe, aina i ka pea i noho ai*), and "Hanalei the land of rain" (*O Hanalei aina ua*). Kawelo appears to evoke images of the Hanalei landscape:

For the anger of Honokooa is reviling, *Maewa ana ka ukiuki o Honokooa*

At the cliff of Kalehuawehe *I ka pali o Kalehuawehe*

Where the lama and wiliwili bloom, *Pua ka lama me ka wiliwili*

Where the rain sweeps on the outside *O ka ua tele ma waho*

of Māmalahoa *O Māmalahoa*

Kauahoa the stalwart youth of Hanalei *O Kauahoa o ka meui o Hanalei*

(Formander 1919 Vol V Part I:56-57)

Kauahoa rebuffs his overtures of peace and Kawelo then turned to one of his wives, Kanewahineikioa and chants:

Say, Kanewahineikioa *E Kanewahineikioa e;*

your pīkoi (tripping club) throw it up *Ko pīkoi hoolei ia i luna*

At Helelua, at Helelua *I Helelua, i Helelua*

At the ridge-pole of Hanalei, *I kaupoku o Hanalei la.*

Arise thou, Hanalei *E ala e Hanalei e*

Until Kauahoa thou hast killed, *A make o Kauahoa ia oe.*

When Hanalei thou shalt possess, *Ai ae ia Hanalei.*

And the mats of Ni'ihau thou shalt wear, *Aahu ae i ka pawehe o Ni'ihau.*

And the birds of Kaula thou shalt eat *Ai la oe i ka manu o Kaula*

(Formander 1919 Vol V Part I:56-57)



In another story of Kawelo (Formander 1919 Vol V Part III:694-707), Kauahoa is actually the elder brother of Kawelo, born of the same parents, but was adopted by Haulili the great one of Hanalei (*Haulii, ka mea nui o Hanalei*) Kauahoa comes from Hanalei and is referred to as "The champion of Hanalei" (*Ke kamae'u o Hanalei*).

In Pukui's (1951:117-118, 122) account, following the killing of Kauahoa, Kawelo lived with his wife in Hanalei "quietly fishing and planting".

Wichman (1998:111) relates the following:

Hanalei was the home of Kauahoa, a warrior who lived about 1690. He was the last of the great giant kupua warriors, noted for his strength, size, and because he was handsome. He was born on the same day and in the same place as the future ruling chief, Aikanaka, and his cousin Kaweloleimikua. In the war between these two, Aikanaka did not immediately call upon Kauahoa, who angrily sat in the headwaters of the Hanalei River and dammed up the water for so long that the fish gasped in the dry bottom....Kauahoa is often referred to as Kame'e'u'o Hanalei, "handsome hero of Hanalei," and this name was given to a headland in his memory.

### 3.1.5 Legend of Palila

In the Legend of Palila (Formander 1919 Vol V Part I:138-141) is a reference to a club fighting hero of Hanalei named Lupeakawaiowainiha It was said that every time he urinated the land would be flooded.

### 3.1.6 Legend of Kapunohu

In the Legend of Kapunohu the Kaua'i hero became ruling chief of Kaua'i by throwing his ihe spear from Kōloa through the ridge at Anahola leaving a perforation (*puka*), with it finally slowing as it passed over Kalihikai and falling to earth at Hanalei (Formander 1919 Vol V Part I:224-225)

### 3.1.7 Legend of Kamapua'a

In the Legend of Kamapua'a the pig child delivers a chant in his anger describing the sea of Hanalei as tempestuous (*kaiko'o Hanalei e! Kaiko'o*) (Formander 1919 Vol V Part II:350-351). Westervelt (1915:266) relates an account of Kamapua'a at Hanalei as follows:

Courage came back to them [the people of Kaua'i], and at Hanalei the people forced him [Kamapua'a] into a corner, and, carrying stones, tried to fence him in, but he broke the walls down, tore his way through the people and fled. The high chief of Hanalei threw his magic spear at him as he sushed past, but missed him. The spear struck the mountainside near the summit and passed through, leaving a great hole through which the sky on the other side of the mountain can still be seen.

Skinner (1900:229) relates the following account of Kamapua'a at Hanalei:

So ill did he behave in Kaua'i, assailing innocent people and destroying their taro patches, that they determined to dispatch him, and in order to have him under their advantage it was resolved to fence him in near Hanalei. The wall of mountain now existing there is the fence. Just before it was finished the prince in charge of the work sat to rest in a gap which admits the present road. He heard a harsh laugh, and looking up saw Kamapua'a sitting on the top of Hoary Head. A running fight ensued, in which the outlaw escaped across the mountain, and the prince, hurling his spear, but missing his mark, sent the weapon through the crest of the peak, making the remarkable window that is one of the sights of the island.

### 3.1.8 Story of Halalii

In the story of Halalii, the king of the ghosts of O'ahu, there was a time when O'ahu was inhabited only by ghosts. The sole Kaua'i survivor of an act of treachery by the O'ahu ghouls sails to Hanalei and found the ruling chief of Kaua'i at that place. (Formander 1919 Vol V Part II:432-433). With the aid of his kahuna, Namalokama they devise a plan to defeat the O'ahu ghosts.

### 3.1.9 Story of the 'Ōhelo

In the Story of the 'Ōhelo (Formander 1919 Vol V Part III:580-581) the origin of the 'Ōhelo plant is traced to the daughter of a certain Maunakepa and the following couplet is offered:

The moss peoples the barren lands  
*Ka limu kaha kanaka*  
 of Maunakepa  
*o Maunakepa*  
 Spattering thereon is the rain  
*Kapelapeku i luna ka ua*  
 from Hanalei, etc.  
*O Hanalei, a pela aku.*

### 3.1.10 Legend of the lovers Paalua and Kawelu

In the Legend of the lovers Paalua and Kawelu (Thrum 1923:139) Pa'alua regales the daughter of the ruling chief of O'ahu with accounts of "the charms of his home in the vale of Hanalei" - by inference also the home of his father, the ruling chief of Kaua'i. He makes specific reference to the *kamani* and *olonā* that grow in the valley of Hanalei (Thrum 1923:140). Pukui's account (1951:175) has Kawelu exclaim "O Pa'alua, take me to Hanalei." They become the rulers of Kaua'i and Ni'ihau.

### 3.1.11 A Maiden from the Mu

In Pukui's account (1951:72) of "A Maiden from the Mu" a young chief of Hanalei organizes a pig-hunt in Waimiha in search of the daughter of a Hawaiian bird catcher and a Mu wahine.

### 3.1.12 Legend of Kaleleluaka

In the Legend of Kaleleluaka (Thrum 1907:84), the hero of that name goes to Hanalei and defeats a resident chief of great strength in a contest of accuracy in throwing spears at a banana trunk.

### 3.1.13 Account of Kawelu

In Knudsen's (1956:83) account of Kawelu - the Shark God, the man-eating demi-god of Waihua is said to also frequent Hanalei River.

### 3.1.14 Village Belle of Poki'i

In Knudsen's (1956:93) account of the "Village Belle of Poki'i", the beauty is betrothed to a man who lives in Hanalei Valley "and is very rich, with large taro lands and many horses."

### 3.1.15 Ka'awakō Heiau

Regarding Ka'awakō Heiau at summit of Wai'ale'ale, Wichman (1998:109) relates the following account:

The kilo i'a (fish watcher) of the Mū would go to Ka'awakō at the completion of an 'o'opu fish trap. Here he would make a shrine, present an offering of 'awa, bananas and kumu taro. Then he would make a cup of olonā leaves and would chant. This completed the ritual over the fish trap, which he then would close and the fish would be caught.

Regarding Haehae-ka-manu-a-Kāne'alo'hi-ke-'ale-mai-nci-ka-wai, a peak near the summit of Wai'ale'ale, Wichman (1998:109) relates the following account:

Kāne'alo'hi, a bird catcher, lived in this part of the mountains with his nephew Lauhaka. Their camp was on the cliff side of the Alaka'i Swamp beside an open bit of water. The water of this pool rippled whenever anyone stepped into the swamp miles away. Inadvertently, they were breaking the new rules of Kalākānehina, the Waimea chief, who had forbidden the catching of 'ua'u birds, the dark-rumped petrel, which was good eating. Kalākānehina sent some warriors to kill the two birdcatchers, but they were warned by the rippling water as they broiled a petrel over the fire. Lauhaka called out to his uncle to tear the bird apart so they could eat it before the warriors reached them - hence the name.

### 3.1.16 The Mo'o Kamo'ookamuliwai

Wichman (1998:111) relates an account of the *mo'o* (fabulous lizard) Kamo'ookamuliwai "lizard of the river", who:

was a *mo'o* that guarded the river crossing. He refused to let Hi'iaka cross the river on her way to Ha'ema to get Lohi'au for her sister Pele, and sent freshets of water to sweep her off her feet. Hi'iaka struck him dead, and since that time it has not been difficult to cross the river.

## 3.2 Place Names of Hanalei

'Anini

USGS maps; beach and stream northeast Hanalei Ahupua'a; Lit. "dwarf fish, stunted" (Pukui et al. 1974:12); Wichman (1998:110)

suggests named after 'Anini a small tree or perhaps Wanini "pouring water"

USGS maps; district, *ahupua'a*, valley, stream, village, elementary school, landing, beach park, pavillion; Lit. "crescent bay" (Pukui et al. 1974:40-41). Wichman (1998:108) traces the name to "wreath making" and "lei valley" relating "The wreaths are the rainbows that appear in the upper valley from the constant rainshowers."

USGS maps; coastal point east edge of Hanalei

USGS maps; tributary of Hanalei River; south end of Hanalei valley; Lit. "the short stone" (Pukui et al. 1974:61)

*Heiau* at summit of Wai'ale'ale Lit. "the kava drawn along" (Pukui et al. 1974:61)

USGS maps; tributary of Hanalei River; south end of Hanalei valley; Lit. "where frigate birds ('iwa) are often seen" (Pukui et al. 1974:70)

The cape of Pu'u Pōā also known as Lae Hanaiiki; said to be a *kilo i'a* - a place to observe fish from the heights (Kikuchi 1992:3)

USGS maps; approximately 4000 foot high peak on west

boundary of Hanalei with Waioli

Name of a headland, in memory of Kauahoa; Lit. "handsome hero of Hanalei" (Wichman 1998:113)

"The good *mo'o*" probably the name of the freshwater demigodess that lived and cared for the pond. (Kikuchi 1992:3)

USGS maps; 245 foot hill on west boundary of Hanalei with Waioli

USGS maps; approximately 1080 foot high peak where east boundary of Hanalei meets with Kalihiwai and Kalihikai; Lit. "the raindrop" (Pukui et al. 1974:87)

Ridge where the previous Club Med was constructed - seemingly an alternate name for Kaunu'ōpua. (Kikuchi 1992:3)

Ridge between Wai'ē'ia Stream and the Hanalei River (seemingly an alternate name for Kauakaniunu) used traditionally as a *kilo i'a* or fish searching site (Kikuchi 1992:3)

USGS maps; spur ridge and 3300 foot high peak on south end of Hanalei valley; Lit. "the suspended water" (Pukui et al. 1974:98)

USGS maps; northern coastal point of Hanalei; Lit. "the large redness" (Pukui et al. 1974:100)

USGS maps; ridge and falls on south end of Hanalei Valley

Kenomene	USGS maps; coastal area northeast Hanalei Bay
Kīloa	USGS maps; 2390 foot peak, south end of Hanalei Valley; Lit. "the long ti plant" (Pukui et al. 1974:111)
Kualapa	USGS maps; 2128 foot high peak on east boundary with Kawahau; Lit. "ridge referring to an inexhaustible sweet potato garden with heaped up earth whose owner had talked to the farming god Makali'i" (Pukui et al. 1974:119)
Kuna Ditch	USGS maps; ditch on east side of central Hanalei River
Lae Hanaiiki	Also known as Ka Lae o Pu'u Pōā; said to be a <i>kilo i'a</i> – a place to observe fish from the heights (Kikuchi 1992:3)
Maheo	USGS maps; 2091 foot high peak on east boundary with Kawahau
Manu'akepa	Land section, Hanalei Pukui et al. (1974:146)
Nāmōlokama Mountain	USGS maps; where Hanalei, Waioli, and Lumaha'i, come together; Lit. "the interweaving bound fast" (Pukui et al. 1974:61)
Pekoa Stream and falls	USGS maps; tributary of Hanalei River, south end of Hanalei valley
Pōhaku Pele	USGS maps; approx. 4200 foot high peak on east boundary with Kawahau; Lit. "lava rock" (Pukui et al. 1974:187)
Po'okū	USGS maps; 460 foot high hill and former <i>heiau</i> on east side of Hanalei Valley
Princeville	USGS maps; resort on bluff above east side of Hanalei Bay; "Named in honor of a visit there in 1860 of Kamehameha IV and Queen Emma and their son, the prince Ka Haku o Hawai'i;" (Pukui et al. 1974:190)
Pu'u Kī	USGS maps; 1312 foot high peak on west boundary of Hanalei with Waioli; Lit. "ti plant hill" (Pukui et al. 1974:199)
Pu'u o Miki	USGS maps; hill on west side of central Hanalei Stream
Pu'u Pōā Point	USGS maps; coastal point on northeast Hanalei Bay
Wai'ale'ale	USGS maps; summit mountain, 5080 feet; Lit. rippling water, or overflowing water (Pukui et al. 1974:199); "the lake at the top of the island" (Wichman 1998:109)
Wai'lē'ia Stream	Stream that flows into Kamo'omaika'i
Waimini	Alternate name for 'Anini; Lit. "spilled water" from the places in the cliffs where water seeps from the rock face (Wichman 1998:110)
Waiopa	USGS maps; approximately 2600 foot high peak on west boundary of Hanalei with Waioli

Waipunaea	USGS maps; tributary of Hanalei Stream and falls, east Hanalei
Waipuni	USGS maps; hill on west side of central Hanalei Stream
Wanini	Alternate name for 'Anini; Lit. "pouring water" (Wichman 1998:110)

### 3.3 Pre-Contact and Early Contact Periods

The land and waters of Hanalei, at 68.5 km<sup>2</sup> the largest *ahupua'a* in the *moku* of Halele'a, had long afforded possibilities for agricultural and cultural development by the Hawaiians of Kaua'i during the centuries before Euro-American contact. E.S. Craighill and Elizabeth Handy present the *ahupua'a* resources that pre-contact Hawaiians utilized and amplified:

Hanalei is unique on Kauai in having a broad river flowing into a magnificent level seaward area...The flats had been the taro *lo'i* of the Hawaiians, amply irrigated by ditches from the Hanalei River...

Because of an abundance of foods of all sorts, Hanalei was, and still is, one of the most attractive dwelling places in the islands. In addition to its rich lands and water resources, and its beautiful beach, it was close enough to the rich deep-sea fishing grounds off the Nāpali coast to supply its people with plenty of fish. (Handy and Handy 1972:420-21)

Confirmation of abundance within Hanalei beyond the agricultural is given in a document of the latter nineteenth century. On July 14, 1873, Kealohanui - a Hawaiian living in Hanalei "since I was very little" - testified before the Commission of Boundaries for the Island of Kauai on the boundaries of the *ahupua'a*. As transcribed in the commission's proceedings, notable among the place names and landmarks along the western boundary of the *ahupua'a* that Kealohanui recalled are:

Kaunaapi	residing place of chiefs Kauanohi & Hula house
Kaunuahelea	a starting place for races to the beach
Kapaka	stone place of worship (Heau [sic])

Apparently, the memory of places associated with the formerly rich cultural life within the *ahupua'a* was sustained well into the nineteenth century.

Elsie H. Wilcox, a descendant of missionaries to Kaua'i, writing in 1917, further characterizes Hawaiian settlement in Hanalei into the early decades of the nineteenth century:

The settlement then extended along the beach, where the climate was drier and where fishing was available, and the grass-thatched houses were set in the midst of gardens of fruit-trees, vegetables and flowers. Bananas, breadfruit, coffee, sugar-cane, coconuts, sweet-potatoes, yams, squashes, pia and taro were cultivated, and chickens and pigs raised. On account of the sandy soil and lack of water "makai", most of the taro-patches were further up the valley, the farmer going up daily to "mahai" and returning at night to his home on the beach. The banks of both rivers were lined with taro-patches which, following the water-

courses, extended far up into the valleys. Terraced remains of these patches are still to be seen far above present habitations, their extent indicating a goodly population at that time. The stretch of land between the two rivers, now used as rice-land (i.e. 1917), was then an undrained swamp, not available for cultivation. (Wilcox 1991:5)

### 3.4 The Russian Enterprise at Hanalei

The nineteenth century would see the Hawaiian-evolved landscaped transformed by the interventions of newly-arrived Euro-American missionaries, entrepreneurs, settlers and adventurers.

Early in the century, a short-lived scheme to establish the Russian Empire in the Hawaiian Islands would unfold on Kaua'i. During a gale in the early morning hours of January 31, 1815, the *Behring* - a 210-ton three-master owned by the Russian-American Company - was beached at Waimea Bay on the south coast of Kaua'i. The *Behring* was loaded with seal skins destined for the company's headquarters at Sitka, the capital of Russian America. Kaumuali'i, the king of Kaua'i, took possession of the vessel and its cargo, maintaining that anything brought to land upon Kaua'i became the king's property.

Alexander Andreievich Baranov, the Russian-American Company's manager at Sitka, chose Georg Anton Schäffer, a German adventurer, to lead a mission to recover the cargo. Schäffer arrived on the island of Hawai'i in November of 1815, but it was not until May 1816 that he sailed for Kaua'i aboard the company's 300-ton vessel, the *Okryvite*, supported by an armed crew. Arms, however, were not needed; Schäffer found Kaumuali'i willing to return the *Behring's* cargo and eager for an alliance with the Russian Empire.

Over the next few months, a busy Schäffer established the Russian presence on Kaua'i, intending to make the island a launching point for control of the entire Hawaiian chain. In September of 1816, Schäffer began construction at Waimea Bay of a lava-rock walled fort to be named after the Russian Empress Elizabeth. He then gave orders for the creation of two earthen-work forts at Hanalei: one named after the Russian General Barclay de Tolly, the other - constructed on a plateau overlooking Hanalei Bay (on the grounds of the present Princeville Hotel) - named after the Emperor Alexander. At the same time, Kaumuali'i deeded Hanalei to Schäffer who renamed the *ahupua'a* "Schäfferthal".

By the spring of 1817 Kaumuali'i had lost confidence in Schäffer. Hearing a false report that Russia and the United States were at war, Kaumuali'i became anxious that he had allied himself with the weaker of the two powers in the Pacific. On the morning of May 8, 1817 Kaumuali'i, accompanied by "a thousand men" (according to Schäffer) at Waimea, ordered the Russian emissary and his compatriots off the island immediately. Aboard two company ships, they fled to Hanalei where Schäffer intended to make a stand; he wrote in his journal:

I took possession of the island of Kauai in the name of His Majesty, the Great Emperor of Russia Alexander Pavlovich, ordered the Russian flag raised on Fort Alexander, fired three cannon shots, and declared myself chief of Hanalei Valley. (in Pierce 1965:202-203)

But Schäffer and the others soon realized their predicament was hopeless. In June 1817 they sailed away from Hanalei Bay and concluded the Russian venture on Kaua'i.

### 3.5 Fort Barclay and Russian Enterprise at the Coast

Little is known of the "lost" Russian Fort Barclay and other Russian infrastructure constructed at the coast. On November 15, 1816 Schäffer records that "until now I have worked energetically on Forts Alexander and Barclay. Platov [Ka'umuali'i's deputy, a Kaua'i chief also known as Obana Tupiga that Schäffer named after a Russian hero] ...works daily with his Indians on constructions of the fortifications." (quoted in Pierce 1965:186). On November 25, 1816 Schäffer wrote to Alexander Baranov that "I now have almost ready here one fortress of stone [Fort Elizabeth in Waimea] and two fortifications of earth, with palisades." [in reference to forts Alexander and Barclay at Hanalei.] (cited in Pierce 1965:82) On April 1, 1817 Schäffer reported "I visited the fortifications and found Forts Alexander and Barclay both nearly finished." (quoted in Pierce 1965:198). Pierce (1965:128) provides the following:

Sheffer accepted the province of Hanalei and started to build two fortresses there, one [Fort Barclay] on the right side of the river Hanalei at the mouth of the harbor and another [Fort Elizabeth] on the same side of the river but much higher, at the harbor itself. Both fortresses were built of earth, however both remained unfinished. The work was being done by promyshlenniks [hunter/trappers working for the Russian American Company], with the aid of the inhabitants of the province, without any aid from the king.

Mills (2002:26) comments that:

These two forts [Fort Alexander and Fort Barclay], built primarily with Russian-American company labor, had low earthenwork walls, possibly with palisades.

Samuel Whitney (1838:50) referred to one or both of them as a "slight breastwork," where a few cannon were mounted.

In addition to Fort Barclay it appears that there was other Russian infrastructure at the coast as referred to in a letter from George Young (and four other Russians) to Schäffer dated December 29, 1816 reporting the murder of an Aleut working as a watchman for the Russians and the arson of a "winery" at Hanalei excerpted below:

The boat with your messenger Fedor Leshchinskii was ready, as was the boat loaded with chalk and clay. Mr. George Young was then on the beach about to send off a letter to you. The natives left their houses and went somewhere near our buildings, which include a winery, by the lake, with [ ] and masses of calabashes. They took two butts of wine and a large quantity of roots used in making alcohol. We, Mr. Young, myself, and Bologov, decided that we needed a watchman so no one, whether an Aleut, a Russian, or a kanaka, would dare to steal or rob [us of] anything. We thought we could avoid trouble that way, but just as we handed the sealed envelope to Leshchinskii, suddenly we heard a gunshot from the guard posted in the kanaka [ ]. We -Captain Young, myself, Bologov, and Leshchinskii - rushed from the room. We found two men from Mr. Young's

boat whom we sent to inquire as to the cause of the shooting. We followed them ourselves and started to run along the shore; before we had covered half of the distance we met the returning men, who told us that the watchman was dead. As soon as we heard that, we saw the building burning on all sides, although there was not one Sandwich Islander to be seen. In ten minutes this unusual fire was over. The grass was burned out and we could see the dead body. Using water brought from the lake in calabashes, Mr. Young, I and the others put out the rest of the fire. We examined the body of the dead man in the presence of a large crowd. We found the cause of death – a large wound in the chest and two more in [ ] . We brought the body to the house... (cited in Pierce 1965:83-84)

The geography referred to is less than certain, but it appears that there was a company house quite close to the mouth of Hanalei Stream and that a different structure, the “winery, by the lake” (evidently a thatched structure), was to the north near the present marsh. The assertion that the fire was put out “using water brought from the lake” suggests the “winery” was closer to the lake than to either the coast or the Hanalei River. Notably there is no reference to Fort Barclay in the account.

### 3.6 The 1820s

Into the early 1820s, the Russian episode in Hanalei was apparently past remembrance. Rev. Hiram Bingham, describing a visit to Hanalei in 1821 with Kaumuali'i and King Liholiho, makes no mention of the former Russian presence but gives details of the on-going Hawaiian culture:

The people in their original state, treated us with such as they had. One ascended a cocoa-nut tree and threw down a nut. Another tore off with his teeth, the thick, fibrous husk, then cracked the shell with a stone, to give us a drink. The head man gave us a course dinner. A pig, baked with heated stones covered in the ground, was set before us on a large, shallow, wooden tray. Kalo, baked in the same manner, and beaten, was laid on large green leaves instead of plates, on the ground... Water was given us in a tumbler consisting of the neck of a gourd-shell, and bananas, ripe, rich, and yellow, were put into our hands singly. (Bingham 1847:143)

Three years later - 1824 - Bingham witnessed at Hanalei an example of the concerted human effort that could still be evoked by the *ali'i*. The brig *Pride of Hawaii*, owned by Liholiho, ran aground in Hanalei Bay. Bingham proclaimed the effort by a great crowd of Hawaiians to salvage the disabled yacht “one of the best specimens of the physical force of the people, which I ever had opportunity to observe for more than twenty years among them--indeed the most striking which I ever saw made by unaided human muscles” (Bingham 1847:221).

The chief Kiaimakani of Waipouli passed up and down through the different ranks, and from place to place, repeatedly sung out with prolonged notes, and trumpet tongue... be quiet - shut up the voice.' To which the people responded... say nothing,' as a continuance of the prohibition to which they were ready to assent when they should come to the tug. Between the trumpet notes, the old chieftain, with the natural tones and inflections, instructed them to grasp the

ropes firmly, rise together at the signal, and leaning inland, to look and draw straight forward, without looking backwards toward the vessel. They being thus marshalled and instructed, remained quiet for some minutes, upon their hams. (Bingham 1847:221)

The salvage efforts ultimately failed and the brig was lost. The grounding of the *Pride of Hawaii* at Hanalei Bay in 1824 would suggest the perils of navigation by western ships within the bay and the rest of the northern Kaula'i coast where wind and sea conditions made impossible any secure anchorage. During subsequent decades of the nineteenth century, as increasing numbers of traders, ranchers and settlers moved into Hanalei, the bay could serve only as one “among the many outposts (in the Hawaiian Islands) supplying provisions to the whaling fleet” (Thomas 1983:23). “Hanalei was visited by an occasional whaler and by inter-island ships, since there was some cargo to be carried out, but it was a dangerous harbor, especially when winter winds and rain blew down from the north” (Joesting 1984:141).

### 3.7 1830s to 1850

When the *Siphur*, an English vessel on a chart-making voyage, visited Hanalei in 1838, its Captain, Edward Belcher, noted:

Hanalee [sic], besides beef and vegetables of the finest quality, furnishes fruits, poultry, turkeys, &c., cheap and in abundance... Our object in coming hither was to embark bullocks, which, we were assured, were better and cheaper than at Oahu; and we were fully repaid for the trouble; we obtained noble animals, and meat as fine as in England. (Belcher 1843, vol.1:61)

“Charltons Farm” - identified on the map of Hanalei, drawn after the expedition, overlooking the northeast side of the valley - provided much of these foodstuffs, along with butter and cheese (Fitzpatrick 1986:68). Richard Charlton, the British Consul in Honolulu from 1825 to 1846, was among the first Euro-Americans who in the 1830s originated schemes to develop new enterprises in Hanalei Valley.

In 1831 (Charlton) leased from Kaikioewa (Governor of Kaula'i) a stretch of land at Hanalei to be used as a cattle ranch. Its extent was not defined by any boundaries, it being generally termed Hanalei, and the cattle were allowed to range without absolute limit, except that they were not to encroach on the cultivated lands adjacent... The lease was for some twenty years from August 27, 1831. (Wilcox 1991:6-7)

In 1834, the same Governor Kaikioewa granted Hanalei land to Joel Deadman for the planting of sugar cane. Deadman's later testimony, recorded in 1844 at the time of the Māhele, reveals the precariousness of the early land ventures at Hanalei and the informality of the land transactions. Kaikioewa "... agreed to cause [the Hanalei land] to be cultivated & planted with sugar cane and [to] find the materials for a mill &c and labor." In exchange, Kaikioewa was to be paid "one half of the sugar & Molasses produced." Deadman "... remained there 6 months at considerable loss & expense and had even work made for the mill" but the plantation never materialized. Deadman further testified that Kaikioewa "was taken sick & soon after went to Oahu [but] on his last visit

to Hanalei before he left Kauai he told me that if he did not look after [the land] himself the natives would not do anything properly, so he gave it up, but he told me then and repeatedly afterwards both at Kauai & Oahu to keep the land, that it was my own." In 1842, Deadman would sell the land to Dr. T. C. B. Rooke, father of the future Queen Emma.

An enterprise that actually took hold in Hanalei during the 1830s was silk making: Charles Titcomb, an American sailor, started a silk plantation which, by the early 1840s, comprised four varieties of mulberry trees and was reported to have been producing excellent silk (Wilcox 1991:7). Titcomb had also established a plantation at Kōloa.

Also during the 1830s, the Protestant American Board of Commissioners for Foreign Missions (A.B.C.F.M.) established a mission station at Hanalei Bay in the neighboring *ahupua'a* of Waioli.

The Waioli valley seemed the best place on the north shore of Kauai to build a church, school and the necessary domestic buildings which together made up a mission station. Hawaiians there were enthusiastic. (Ritznik 1987:5)

The first missionary assigned to the station was William Patterson Alexander who, along with his wife and son, arrived at Hanalei Bay in 1834. The Alexanders would remain at Waioli until 1843.

Censuses taken by the missionaries throughout the Hawaiian Islands beginning in 1831 provide the first record of the native population after the first decades of western contact. According to the 1834-35 census of Kauai, a total of 1505 Hawaiians - adults and children - were then living in the *moku* (district) of Halele'a (Schmitt 1973:26). Of that total, 522 Hawaiians, or fully one-third, resided in Hanalei-Ahupua'a.

During the 1840s, a new agricultural pursuit - coffee growing - would transform Hanalei. Charles Titcomb's silk plantation at Kōloa had been wiped out in 1840 by a "drought...bringing in its train insect pests, aphids and spiders" and by heavy winds, "trade and kona, whipping off the mulberry leaves" (Kuykendall 1938:183). The Hanalei plantation escaped this disaster but "finally encountered financial and other troubles" and the silk-making enterprise was abandoned there in 1844; Titcomb is reported to have lost \$15,000 in the venture on Kauai (Kuykendall 1938:183).

Despite his losses, Titcomb was able to replant his Hanalei fields in coffee with seed procured from Kona. Coffee growing had been introduced to Hanalei in 1842 when John Bernard and Godfrey Rhodes started the Hanalei Coffee Plantation on two pieces of land leased from the Government - "one on the east side of the Hanalei River containing ninety acres and one on the west side containing sixty acres" (Wilcox 1991:8) - with "plants and seeds...secured from Governor Boki's land in Manoa Valley [on O'ahu]" (Wilcox 1991:9). While coffee had already been grown on O'ahu and Hawaii's islands, the fields at Hanalei represented the "first extensive coffee plantations" in the Hawaiian islands (Kuykendall 1938:316) and in 1844 the plantations of Titcomb and of Bernard and Rhodes comprised "upward of 100,000 trees" (Wilcox 1991:9).

Near mid-century, coffee dominated the Hanalei landscape: "a great part of the whole valley, at least to the extent of 1,000 acres, was under cultivation in coffee at this time" (Wilcox 1991:10). William DeWitt Alexander, son of the former Waioli missionary William P.

Alexander, describes a return visit to Hanalei in 1849, six years after his family had left Kauai: "His first view of the valley is of the "majestic Hanalei River winding its way through coffee plantations, & the graceful curve of the bay, bordered with houses, & groves" (Alexander 1991:125). He later visited the two coffee plantations:

Capt. Rhodes has a fine coffee plantation. It contains upwards of 100 acres. It is in very fine cultivation. He had also banana, & orange trees, & a very fine grove of bamboo. I was much interested in observing the operation of the coffee mill. As in a sugar mill, a mule turns a perpendicular post. To the top of this is fitted a large horizontal cog wheel. This sets in motion a fly wheel which is connected to the rest of the machinery by bands. There are 3 or 4 mills which perform different stages of the operations. The noise which they made was most deafening. (Alexander 1991:127-128)

The Titcomb coffee plantation is characterized as "flourishing" though "not as large as Mr. Rhodes', nor is the coffee as luxuriant" (Alexander 1991:128). John Bernard, the partner of Godfrey Rhodes, had died at sea off Hanalei Bay in 1845; Rhodes and other investors continued the coffee operation, now renamed the Rhodes & Co. Coffee Plantation, which in 1846 comprised 750 of the 1000 acres of Hanalei land then under cultivation of coffee (Wilcox 1991:9-10).

### 3.8 Mid-Nineteenth Century

The middle 19<sup>th</sup> century brought great changes to Hanalei-Ahupua'a, including private and public land ownership laws known as the Māhele (literally, 'to divide' or 'to section'). The Kuleana Act of 1850 allowed *maka āimāna*, in principle, to own land parcels at which they were currently and actively cultivating and/or residing.

As a result of the Māhele, Land Commission Awards (LCA) were claimed in five distinct clusters within Hanalei-Ahupua'a; the shoreline, the Mahaana (laro fields adjacent to Waioli Ahupua'a), Puapua-hoi-Limanui (the bottom lands of the Hanalei River), 'Anini (on the coast northeast of Hanalei Bay), and Kīloa (inland and adjacent to Limanui). Almost all of the Hanalei Ahupua'a LCAs were lowland locations far from the current project area, with the exception of those at 'Anini, which are located along the northwest edge of the project area (Figure 6 and see Figure 2). In Kālīhikai the situation is reversed - almost all of the LCAs lie within the project area (See Figure 2). Table 1, below, lists all of the LCAs in the vicinity of the current project area.

Table 1. Land Commission Awards in the vicinity of the project area

LCA No.	Awardee	Contents
<b>Hanaiei Ahupua'a</b>		
7671	Keahi	No. 1 is a house lot, 6 <i>lo'i</i> and a pasture.
8224	Ikua	No. 1 is a house lot and 1 <i>lo'i</i> . No. 2 is 9 small <i>lo'i</i> .
9956	Lua	No. 1 is a house lot, 1 large <i>lo'i</i> and 5 or 6 small <i>lo'i</i> and a small pasture.
10328	Nainoaakua	No. 1 is 2 large <i>lo'i</i> ; 3 small <i>lo'i</i> , a pasture and a house lot.
10720	Pukiki	No. 1 is a pond, five small <i>lo'i</i> , a pasture & a house lot
<b>Kalihikai Ahupua'a</b>		
7585	Kamiona	No. 1 is a house lot in "Niula." No. 2 is 3 <i>lo'i</i> in 'ili "Kahihei."
8266	Ikua	No. 1 is a house lot in "Kaluhapa." No. 2 is 10 <i>lo'i</i> in 'ili "Kaiki." No. 3 is 2 <i>lo'i</i> in 'ili "Kaluhapa."
9129	Kapuhae	No. 1 is 2 <i>lo'i</i> & <i>kula</i> adjacent. No. 2 is 1 <i>lo'i</i> in 'ili "Papaula."
11215	Aarona Kelihonui	Kalihikai Ahupua'a (2362 acres)
11244	Hulihia	No. 1 is 1 large & several small <i>lo'i</i> in "Kuiki" No. 2 [is] 4 <i>lo'i</i> in "Kouiki."
11245	Mose	No. 1 is a house lot in "Kaiki." No. 2 is 3 <i>lo'i</i> in "Kapapala." No. 3 is 1 taro patch in "Koholaiki."
11246	Puhi	No. 1 is a house lot in "Kaiki." No. 2 is 3 <i>lo'i</i> .
11247	Kekoa	No. 1 is a house lot in ili "Kapapala." No. 2 is 3 taro patches in same ili.
11248	Keolamui	No. 1 is a house lot in 'ili "Kapapala." No. 2 is 3 <i>lo'i</i> in "Kaiki." No. 3 is <i>kula</i> having orange tree in Kapalai.

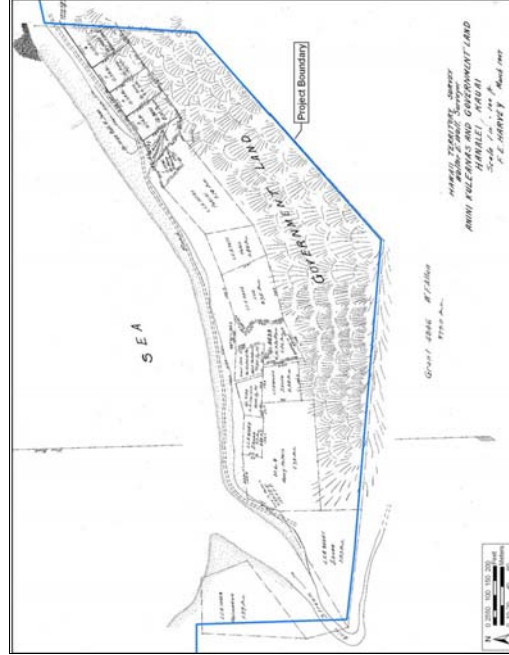


Figure 6. 1907 W.E. Wall Map showing LCAs in the vicinity of the current project area

11249	Kaunakahi	No. 1 is a house lot in "Kaiki." No. 2 is 3 <i>lo i</i> .
11250	Kahakamoku	No. 1 is 6 <i>lo i</i> & a house lot in "Nuila." No. 2 is 3 <i>lo i</i>
11253	Kuanaio	No. 1 is a house lot & 2 <i>lo i</i> in "Nuila." No. 2 is 3 <i>lo i</i> in "Nuila." No. 3 is <i>kala</i> & 1 orange tree in Kaluakanaka.
11254	Naea	No. 1 is a house lot in Nuila. No. 2 is 6 <i>lo i</i> .
11255	Ezera	No. 1 is a house lot in 'i'i "Kapapala." No. 2 is 3 <i>lo i</i> in "Kaholaiki." No. 3 [is] one <i>lo i</i> .

### 3.9 1850s to 1900

According to records of the Royal Hawaiian Agricultural Society - organized in 1850 - in Honolulu, "for the twelve months from July, 1850, to June, 1851...Hanalet exported (to Honolulu) 21,298 pounds of coffee, 39 barrels of Irish potatoes, and 20 head of cattle, at a total value of \$2,744.08" (Damon 1931:334). Coffee-growing continued to dominate Hanalei, apparently established firmly within the landscape. However, the plantation owners were apprehensive: they foresaw an eventual lack of manpower in their fields as production increased. They also feared a growing intransigence among the Hawaiian workers: "Mr. Rhodes stated (in an 1851 report) that laborers were demanding one dollar a day...and that some had refused to work even at four dollars a day" (Damon 1931:351). Many of the Hawaiian laborers had already left the island to work in the gold mines of California. The Hanalei planters thus welcomed the plan of the Agricultural Society to import for the various plantations throughout the Hawaiian Islands "Chinese coolie laborers under contracts based on the indentures used in employing seamen" (Damon 1931:351). In 1852 the first Chinese laborers arrived at Hanalei to work on the coffee plantations. By the next year the Chinese were fully integrated in the labor system; Rhodes' 1853 report on Hanalei to the Agricultural Society noted:

Mr. Titcomb's Coffee Plantation is in fine order, and he expects a large crop, of perhaps 80 to 100 M. lbs. He has lately cleared more land for planting: his plantation is compact, and well managed. I believe he is satisfied with his coolies. He has a number of natives engaged, but has difficulty in making them fulfil their agreements. Our own plantation is thriving, although a number of years must elapse before it re-attains the prosperous state it was in 1849 and 1850, when our natives all left us, smitten with the California fever. I am very well satisfied with the coolies, and much prefer them as laborers. (in Damon 1931:352-353)

Whatever comfort the coffee planters of Hanalei may have obtained from the newly-available labor force, they were finally vulnerable - in the 1850s - to natural forces beyond their control. That vulnerability had been foreshadowed earlier, in 1847, when a torrential rain flooded the valley, severely damaging the coffee trees. In 1851 and 1852 the Hawaiian Islands suffered through a severe drought and a subsequent blight ravaged coffee trees at Hanalei and on all the islands. The plantations were able to continue producing through a few more years but, by the end of the 1850s, the Hanalei plantations were devastated; a visitor in 1860 contrasted the current despoliation with the flourishing scene of three years earlier:

The coffee blight has entirely covered the two Hanalei plantations which in the spring of 1857 we saw in full and successful culture, yielding 200,000 pounds of excellent coffee. It was sad to witness the contrast. Then scores of women and children were busy picking the ripe berries, and depositing their gatherings at night at the overseer's office, but now all was silent. Not a gatherer was abroad, and we saw laborers bringing in coffee trees upon their shoulders, to heat the fires under the sugar boilers of Mr. Titcomb. (Damon 1931:351)

The "sugar boilers of Mr. Titcomb" the visitor noted were evidence of an unflagging resilience; for Titcomb, who had earlier converted his fields from silk to coffee, turned his energies to sugar growing during the latter 1850s.

Godfrey Rhodes, the other Hanalei coffee grower, had already sold his coffee plantation: on March 14, 1853 the land occupied by the Rhodes Coffee Plantation was bought from the Government for \$1,300 and on Sept. 13, 1855 Rhodes sold out his interest in the plantation for \$8,000 (Wilcox 1991:13). The man who purchased the land and plantation was Robert Critchton Wylie, the Hawaiian Kingdom's Minister of Foreign Affairs.

Wylie, a Scotsman who had made his fortune as a merchant in South America, arrived in the Hawaiian Islands in 1844. Though Wylie had not intended to settle in Hawai'i, in 1845 he accepted an appointment by King Kamehameha III as Minister of Foreign Affairs and served in that office until his death twenty years later.

As Foreign Minister, Wylie's great ambition was the recognition of the Hawaiian Kingdom as a sovereign nation by the world's powers. But a more personal aspiration also captivated Wylie: to build for himself a manor at Hanalei quite as magnificent as any he had known in Scotland. So in 1853 he began acquiring tracts of Hanalei land - beginning with the Rhodes Coffee Plantation - that within a few years would comprise an estate and plantation. Wylie attempted to save the coffee plantation:

For ten years (Wylie) doggedly fought against [the] blight which gradually withered the trees. Finally facing reality, he pulled out the dead trees and planted a new crop, sugar. (Hackler 1982:66)

By 1862, Wylie had "constructed an extensive sugar factory and other buildings at the eastern end of the Valley, along the river, importing much of the machinery from Scotland" (1000 Friends...1987:32) and in 1863 he bought Titcomb's lands, only one piece among the extensive land purchases Wylie made during the early 1860s:



On Feb. 5, 1863, Mr. Titcomb sold out to Mr. Wylle. In all, four pieces of land passed to Wylle, 750 acres at Emmasville, 1 acre at the landing, Kanoa Pond, 10 A., and Kukia on the opposite side of the river. Wylle had before this, on April 17, 1862, bought the Ahupuaa of Kalihiwai, this being the property of A. Keliiahonu, grandfather of Levi Halelea, given to Keliiahonu by an old ali'i. On Oct. 5, 1862, Wylle bought at public auction from J.W. Austin and Chas. Kanaina (Guardians of W.C. Lunaliilo) the Ahupuaa of Kalihiwai. (Wilcox 1991:14)

Wylle's land purchases and substantial investment in the development of his sugar operation reflected the brilliant future he envisioned for his estate. He intended to name as heir to his lands the young "Prince of Hawaii" (*Ka Haka o Hawai'i*) Albert Edward Kamehameha IV and Queen Emma. Kamehameha, who had been born in 1858, the son of King Kamehameha IV and Queen Emma. It was after a visit by the royal family to Hanalei in 1860 that Wylle named the estate "Princeville". He resolved to petition the king to proclaim the estate the "Barony of Princeville" - making it a fit legacy for the prince - but his plans were undone in 1862 when Albert died at the age of four. Wylle himself died three years later. The estate and plantation were discovered to be deeply in debt and in 1867 Wylle's lands were auctioned off in 1867, sold for \$40,051.50 to Elisha Hunt Allen who, like Wylle, was an official of the Hawaiian government.

The Princeville Plantation continued in operation - in 1872 "the average crop was 400 tons, capacity of the mill, 1,000 tons (Wilcox 1991:18) - under changing ownership until the 1890s (Figure 7). By the last decade of the nineteenth century, the difficulties of growing sugar cane at Hanalei were insurmountable:

...the cane had never done well in that cool, wet climate. Much of it rotted in the lower fields; the upper fields were, it is said, not plowed deeply enough and at times there was not water enough to flume the cane down to the mill. (Wilcox 1991:18-19)

The company failed; the last crop was harvested in 1893. By 1899, Albert S. Wilcox had secured control of the entire plantation: "The lower lands were rented out to Chinese rice-planters, and the upper lands between Hanalei and Kalihiwai were planted to imported grasses and turned into a cattle-ranch" (Wilcox 1991:19). (Wilcox would later, in 1916, sell the land to Lihue Plantation Company and W.F. Sanborn (Wilcox 1991:19).)

Where, half a century earlier, William Alexander had viewed the Hanalei valley dominated by coffee plantations, a visitor in the 1890s would come upon an entirely transformed landscape. Eric A. Knudsen, recounting a trip around Kaua'i in 1895, presents the view of Hanalei as his party approached from Kalihiwai Ahupua'a:

We...were glad when we reached the great valley of Hanalei. The road in those early days almost dived straight down to the bridge. It was steep and in wet weather very slippery...

About half way down, the valley began to open up. Rice fields and taro patches covered the flat bottom lands as far as the eye could see...the view to our right, the

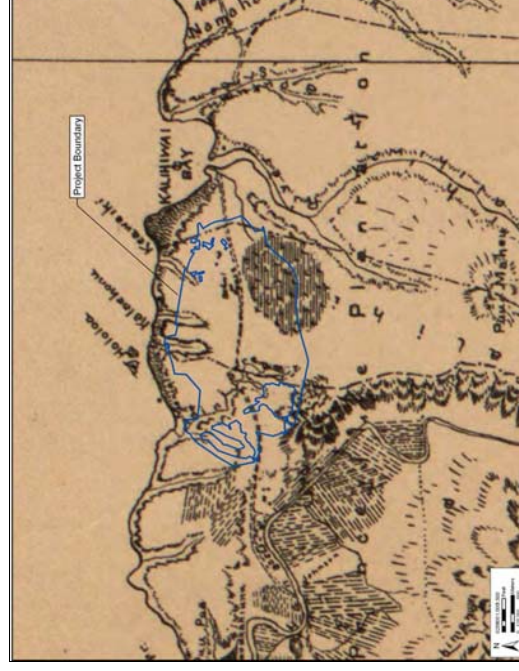


Figure 7. 1878 W.D. Alexander map showing the Princeville Plantation within the current project area

Archaeological Inventory Survey for the Proposed Princeville Ag Subdivision  
TMK: (4) 5-3-006: 001 & 014

winding river with a barge loaded with rice slowly drifting down on its placid surface, and beyond the great sweep of sandy beach, were a truly inspiring sight. (Knudsen 1991:153)

Knudsen's account reveals significant features of the Hanalei landscape during the last years of the nineteenth century. The bridge which now spanned the Hanalei River from the government road was a recent development. Until the 1880s, as noted in a tourist guide of that decade, there was no bridge over the river but there was a "ferry opposite the Princeville Plantation, where passengers, cattle, teams, etc., can pass the river free of charge, the ferry being supported by the Government and the Princeville Plantation, jointly" (in 1000 Friends...1987:58-59).

### 3.10 1900 to the Present

During the first decade of the twentieth century, rice-farming by the Chinese continued to be the focus of large-scale economic activity in Hanalei.

Two significant structures, which still exist, were constructed at Hanalei in 1912: the pier at the mouth of Hanalei River and the bridge spanning the river. The pier is described, in an application for placement on the National Register of Historic Places, as a "wooden deck...built during a period of economic prosperity in the area, primarily the result of a thriving rice industry" which "replaced an earlier shorter pier and primarily was employed for the shipment of rice."

While the new pier reflected the current flourishing rice-based economy of the valley, the construction of the bridge - replacing the wood bridge Eric Knudsen had crossed in 1895 - would provide an impetus to further change within Hanalei. The bridge is described, in an application for placement on the National Register of Historic Places, as a "106-foot, single span, steel through-truss (Pratt Truss) bridge built on reinforced concrete abutments, with a 17-foot roadway deck made of timber planks." The application also notes that the construction of such substantial steel structures, replacing older, flimsier timber bridges "helped stimulate the economic and social growth of the then relatively isolated North Shore" of Kaua'i. The facilitated access in and out of the valley may have accelerated the development of vacation houses along the Hanalei beach to take advantage of the pleasant breezes and spectacular water views.

A 1916 article in the "Garden Island" characterized Hanalei's attractions by the second decade of the twentieth century:

Hanalei has been a popular and populous community of late, a sort of suburb of Lihue since there were many Lihue people summering there, the various beach houses being full to overflowing. Morning, noon, and night the wharf has been alive with enthusiastic but "green" fishermen, mostly of a tender age, and the sands dappled with figures in proper costume and the waters flecked with tumbling swimmers who mostly couldn't swim. (In 1000 Friends...1987:63)

Clearly foreshadowed is the future development of Hanalei and Princeville as a resort destination.

Rice farming declined sharply throughout the Hawaiian Islands after the first decades of the twentieth century as lower-priced rice grown in California inundated the market. Total acreage in the islands dropped from a high of 9,425 acres in 1909 to 1,130 acres in 1935. By the end of the 1930s, the rice industry had ceased entirely on the islands of Hawai'i, Maui and Moloka'i (Coulter and Chun 1937:62). The rice farming that survived at Hanalei was of a different character. Already in the preceding decades, Chinese rice planters at Hanalei and elsewhere had begun selling their fields to immigrant Japanese rice growers. In 1916, 16% of the rice lands in the then Territory of Hawai'i were controlled by Japanese growers. By 1932, a survey indicated that 62 percent of the Hawai'i-grown rice was being cultivated by Japanese. At first the Japanese sold their paddy to Chinese owned rice mills; then, gradually, they took over the mills too. (Glick 1980:59)

As increasing numbers of Japanese moved into Hanalei to reside and work the rice fields, the original Chinese rice-growers moved to other commercial pursuits. For example, the Haraguchi family began leasing rice land at Hanalei from the Man Sing family and subsequently purchased the Man Sing mill in 1924. The family cultivated 75 acres in the valley. When the original Man Sing mill was destroyed by fire in 1930, the Haraguchi family built the still extant mill that is presently listed on the National Register of Historic Places. The documentation for the mill's placement on the Register notes that the Japanese rice growers replaced the Chinese variety of rice with shorter grain rice that the Japanese preferred.

In the 1930s, the Agricultural Extension Service of the University of Hawaii began a program to increase rice production at Hanalei, resulting in a brief "resurgence in rice cultivation"; acreage in Hanalei increased from "759 in 1933 to 1058 in 1934," and by 1936 Hanalei "produced over two-thirds of all rice in Hawaii, almost all of it for consumption within the Territory" (1000 Friends...1987:117-118). It is this rice-dominated Hanalei landscape that E.S. Craighill Handy, in his 1940 study of planting areas throughout the Hawaiian Islands, describes as it appeared in the 1930s. Handy's account is especially valuable, and merits citation at length, as he notes both present usages, based on his field observations, and former usages, based on information from native informants:

The swampy land below the hills at the west end of Hanalei next to Waioli is unused. The land between the highway and the bay on the west side of the river, much of which used to be terraces, is now given over to pasture and home sites. The land named Paele in the great bend of the river east of the bay, which used to be in rice or taro, is now used for pasture. The broad area inland from the river, named Kahanawai, is now planted with rice, except for the flats adjoining the base of the hill. According to Sheriff Lota, this area was only partly developed in terraces in ancient times. In the 1880's, the land just above the highway was planted in sugar cane, which gradually extended far up Hanalei Valley. Subsequently much of this land, which had not previously been in terraces, was cut up by the Chinese into paddy fields. It was only in the flats of Hanalei Valley proper that terraces were continuous in the old days. At present, rice paddies are continuous for 1.3 miles from the highway bridge where the Hanalei River turns east; another sizable rice patch lies four tenths of a mile beyond, the land between being neglected. Beyond this farthest rice plantation the Hawaiian homesteads commence. A few Hawaiians and other homesteaders plant a little taro for home

consumption. It is said that there are numerous areas of abandoned small terraces farther in the interior. In lower eastern Hanalei, Mr. Sanborn is successfully growing taro in flats that have been used for rice for over 30 years. (Handy 1940:72)

Handy's description suggests that by 1930s, Hanalei Valley comprised a patchwork of mutating idle and active agricultural fields and pastures which reflected the vagaries of decades of shifting economic pressures.

While Handy asserts that taro farming survived in the 1930s only as a subsistence crop for a "few Hawaiians and other homesteaders" other sources suggest that the taro-growing area at Hanalei was somewhat more expansive: a U.S. Department of Commerce census of agriculture of 1939 recorded 108 acres in taro at Hanalei, comprising fully one-fifth of the total 529 acres in taro throughout Hawai'i (in 1000 Friends...:1987:118).

According to National Register of Historic Places documentation on the Haraguchi rice mill, by the "early 1950s there were about 50 growers cultivating 170 acres of rice on Kauai" with Hanalei holding 90 of those acres, a precipitous drop from the 1058 acres recorded in 1934. Clearly, rice farming at Hanalei was no longer viable, once again frustrated by inexpensive rice imported into the Territory. The last rice mill, run by the Haraguchi family, ceased operating by the early 1960s.

As the Japanese farmers phased out rice production in the 1950s and 60s, they converted their fields to taro *lo'i*. By the late 1980s, taro-growing, that once dominated the traditional Hawaiian landscape, was firmly re-established within Hanalei, and farmed in two areas of the valley:

...195 active taro *lo'i* cover 140 acres within the Hanalei National Wildlife Refuge. These terraces range in size from 40 feet by 70 feet, to 220 feet by 400 feet, although taro *lo'i* are characteristically not regular in shape. The smallest taro patch recorded within the refuge was one-twentieth of an acre, while the largest was over two acres in size...

Currently (in 1987), there are 201 active taro patches covering 93 acres mauka of Kuhio Highway, across from Hanalei town...These range in size from 30 by 90 feet, to 160 by 130 feet. The smallest taro patch within this area is one-fifteenth of an acre, while the largest is one-half an acre in size. (1000 Friends...:1987:27-28)

As taro-farming secured its place in Hanalei during the second half of this century, contemporary developments, entrepreneurial and governmental, within the *ahupua'a* would further re-define the character of Hanalei. Beginning in the 1960s, the Princeville area began its evolution - which continues at present - as a major resort and condominium complex. At the same time:

...the Federal government became a partner in shaping land use in the Hanalei Valley...by working with the Princeville Development Corporation to acquire land for the U.S. Fish and Wildlife waterbird refuge. The refuge has a supportive policy of continued taro production and the maintenance of the irrigation system and existing houses and farm outbuildings. (1000 Friends...:1987:10)

The Hanalei National Wildlife Refuge was established in 1972 to provide feeding and nesting areas for endangered Hawaiian water birds, including the coot, stilt, gallinule and duck. It encompasses 917 acres of Hanalei Valley, including 70 acres of ponds, 600 acres of forest, and mountain areas, and in 1993, 125 acres of commercial taro fields.

More recently, severe hurricanes - "Iva" in 1982 and "Iniki" in 1992 - have demonstrated the precariousness of human development within the Hanalei environment, just as natural disasters thwarted the efforts of the newly-arrived nineteenth century entrepreneurs. However, the endurance of taro through the changes documented above - and its flourishing today - may preserve the memory of the pre-contact Hanalei with its *heiau*, hula house, and starting places for races to the beach.

### 3.1.1 Land Use Patterns in the Project Area and Vicinity

Although a portion of the project area lies within the Hanalei Ahupua'a, its topography and post-contact land use pattern are very much closer to those of Kalihikai Ahupua'a than to the rest of Hanalei Ahupua'a. Its location on the uplands, north and east above the river valley, sets the project area apart from the irrigated lowlands associated with the agricultural pursuits of both pre- and post-contact periods. (Māhele records indicate the presence of traditional agriculture and house lots in the project area along the coast and lowlands near 'Anini Stream and the three smaller streams in Kalihikai Ahupua'a).

Numerous accounts attest to extensive Pandanus groves in the uplands of Hanalei, Kalihikai and Kalihwai in the early nineteenth century (Alexander 1991; Lydgate 1991; King 1991; Bird 1890). William DeWitt Alexander (1991:124) describes these groves during a trip around the island in 1849, "Five more miles of riding through woods of *hala*, brought us to the tip of the hill that overlooks Hanalei Valley...". William T. Brigham visited Kauai in 1865 and also commented on the extensive pandanus, "Vast numbers of pandanus cover the hillsides and grow so luxuriantly as to furnish an admirable shelter from the rain" (Lydgate 1991:139).

Prior to western contact, this area may well have been used for gathering as part of the land open to all ahupua'a members. Economically viable plants have been identified in association with archaeological remains on the lower slopes (25 to 125-foot elevation) of the valley ridge; these have been associated with dry land or *kala* lands to supplement the crops growing in the adjoining terraces (Cleghorn 1979; Schilt 1980). The pandanus groves of the upper slopes of the valley wall would have been another resource for residents of Hanalei Ahupua'a, who would not have to travel so far *mauka* to find the *hala* needed for their mats, etc.

Another reason the residents of Hanalei would have valued the eastern bluff of Hanalei Valley was Po'okū Heiau. Although very little is known about the *heiau*, there is some evidence this *heiau* played an important role in the prehistory of Hanalei. Besides being physically situated on the eastern boundary of Hanalei Valley, the *heiau* was constructed in a strategic location for fortification Bennett discusses the benefits of using hills to construct *heiau*, "Hilltops are favorable sites for making an imposing structure with the minimum labor" (Bennett 1931:35). Po'okū Heiau was constructed on an old volcanic vent and has the highest elevation of all landmarks nearest the road, giving one a commanding view of the Hanalei Valley as well as a good view of the adjacent Kalihikai Ahupua'a uplands. Ching's work on Po'okū Heiau in 1974

presented the story of a local informant describing the site being used as a fort during a threat of warfare from a neighboring chief:

The small river stones found on this heiau date back to a time when the chief of Waimeha Valley threatened to make war on the chief of Hanalei. The people of Hanalei formed a long line, extending from Po'oku to Hanalei River. Directly below Po'oku is a shallow rapids, it is from this rapids that stones were collected and passed along this human chain, up the hill to Po'oku. The stones were ammunition for the men of Hanalei, who used them in their slings, to ward off attack (Ching 1974).

The first recorded use of the uplands of Hanalei and Kalihikai by a non-Hawaiian was in 1831, when the British Consul of the Sandwich Islands, Richard Charlton, was awarded the use of land to feed his livestock at "Hanalei", Kaua'i by the Governor of Kaua'i, Kaikio'ewa (Wilcox 1991). This land use agreement set a precedent for all historic land use in this area thereafter in that *ahupua'a* boundaries were not recognized. In the agreement, no land boundaries were specified and apparently there was no limit to the range of the cattle. The only stipulation other than the conditions of exchange was that the cattle be kept from cultivated lands. Wilcox (1991:7) describes the cattle ranging over the slopes, between Hanalei and Kalihikai. This plateau land would be a favorable place to have the cattle as the topography is fairly uniform, descending gradually *mauka-makai* and the uplands are generally removed from the cultivated lands found in gulches and alluvial lands associated with more abundant water resources at lower elevations. Besides failing to fulfill his contract with Kaikio'ewa, Charlton also failed to keep the livestock from encroaching upon cultivated lands. Earle (1978:149) reports on the mid nineteenth century "decline of kula farming due to the destruction of gardens by newly introduced cattle" in the region.

In 1845, a French consul of the Sandwich Islands, Captain Jules Dudoit, purchased the lease of the Hanalei uplands from Charlton (Damon 1931) and continued the cattle operation upon the same Hanalei-Kalihikai uplands. The sale of cattle and salt beef in Honolulu and to whalers was supplemented with the production of milk. A visitor in 1850 commented on the "1800 head of fine cattle" on Mr. Dudoit's estate (Damon 1931:335). This was a tremendous growth over the 100 head of cattle estimated in 1840 and is a logical explanation for the destruction of *kula* lands reported above, and the native landscape in general.

At the termination of the lease in 1851, the Dudoit's moved to the Ko'olau District and it is uncertain whether cattle ranching continued in the uplands of Hanalei and Kalihikai. There is some mention of sheep in Hanalei although their grazing lands are not identified (Damon 1931). In 1853, Robert Crichton Wylie, who served for many years as Minister of Foreign Affairs, began acquiring lands in the Hanalei Valley. He began by purchasing the same portion of Hanalei that Charlton had leased. By the time he had acquired the *ahupua'a* of Kalihikai and Kalihikai in 1862 and consolidated his lands into the Princeville Plantation, sugar cane cultivation had become his primary agricultural pursuit. Although no sugar cane cultivation was recorded in the project area during William Bringham's 1865 visit to Kaua'i, Bringham did make mention of the pandanus and the grasslands of the Hanalei uplands (Lydgate 1991). An account of a ride from Mr. Wylie's Lanihuli House up to Po'okū Heiau is recorded by Bringham in 1865:

The view on all sides was very fine, and as we rode up the ridge next morning over the smooth grassy fields, the almost uncomfortable volcanic presence disappeared, and the land seemed free from Pele's undesirable authority...We rode up the ridge some distance to a mound or small hill, which in ancient times was kapu and none but the kahunas who dwelt there, or the chiefs, could come onto it on pain of death. On its summit was a pavement, where human sacrifices were offered, and from which the poor victims had a view which even to their eyes must have made them loth to leave the beautiful earth under pleasanter circumstances (Lydgate 1991: 137).

The earliest record of sugar cane cultivation occurring in the uplands appears on a map of Hanalei from 1885. The map depicts the old Charlton Farm, the road that runs near Po'okū Heiau and sugarcane growing on the east side of 'Anini Gulch (east of the project area). By the end of the nineteenth century, however, cane cultivation in the uplands was abandoned (Wilcox 1991). The uplands were converted back to pastures after the new owner, Albert S. Wilcox purchased the Princeville Plantation in 1899 (Wilcox 1991: 19).

Lands of the Princeville Plantation were sold again in 1916, this time to the Lihue Plantation (Damon 1931). Lihue Plantation was not interested in growing cane, their interest lay less in the lands than in "... the very valuable water rights which accompany them and to which seven miles of open ditches and tunneling under the mountains have given free access. This taps the upper sources of the Hanalei River, the largest stream on any of the islands, and was not begun until 1923" (Damon 1931:918). The cattle ranch operated by Wilcox was maintained by Lihue Plantation until 1969 when Princeville was sold to Consolidated Oil and Gas Corporation of Colorado. Approximately 900 acres of the Princeville Plantation lands in the Hanalei Valley floor were purchased by the Federal Government in the 1970s with the intention of creating a National Wildlife Refuge. The remainder of the Princeville Plantation in the uplands was converted into a resort-residential community with hotels, condominiums, restaurants and golf courses.

### 3.12 Previous Archaeological Research

Previous archaeological studies in the vicinity of the current project area are presented in Table 2 and Figure 8. The following is a summary of these archaeological studies:

The first comprehensive study of the archaeology of Kaua'i was undertaken by Wendell C. Bennett (1931) based on field work accomplished in 1928-29. Bennett recorded five sites in Hanalei Ahupua'a:

Site 139 Po'okū Heiau, on the east bluff of Hanalei valley a short distance from the government road on a knoll marked on the map as "Pookū."

Only a few stones remain to mark the location of this *heiau* which Thrum [1906:43] describes as "An unenclosed *heiau* of about two acres in area. Of *luakini* class, terraced down on all sides from the central platform."

Table 2. Archaeological studies located near the current project area

Source	Location	Nature of Study	Findings
Bennett (1931)	Hanaiei Ahupua'a	Archaeological survey	Site 139 - Po'okū Heiau (near current project area)
Earle (1978)	Halele'a District	Dissertation Research	44 agricultural systems within Halele'a District Ka-D10-10 within current project area
Clegghorn (1979a)	Hanaiei and Kalihikai <i>ahupua'a</i>	Archaeological Reconnaissance Survey	SIHP# 50-30-03-1702
Clegghorn (1979b)	Hanaiei Wildlife Refuge	Archaeological Survey	SIHP# 50-30-03-1007 to -1016
Hammatt (1980)	Portions of the Kaau'i Belt Road, Kalihawai to Princeville, Kaau'i.	Archaeological Reconnaissance Survey	No significant finds
Schilt (1980)	Hanaiei Wildlife Refuge	Archaeological Investigation	SIHP# 50-30-03-1017 to -1027
Kikuehi (1981)	Hanaiei Wildlife Refuge	Archaeological Investigation	SIHP# 50-30-03-604
Athens (1983)	Hanaiei Wildlife Refuge	Archaeological Investigation	Subsurface excavations at SIHP# 50-30-03-1007
Kikuehi (1988a)	Princeville Corporation's Nursery Staging and Light Equipment Storage Area.	Archaeological Investigation	No significant finds
Kikuehi (1988b)	Church of the Pacific	Archaeological Investigation	No significant finds
Quebral and Clegghorn (1990)	Kūhiō Highway Improvements Project and TMK 5-03-06: 14	Archaeological and Historical Survey	No significant finds

Source	Location	Nature of Study	Findings
Bordner (1991)	Hanaiei Garden Farms	Archaeological Reconnaissance Survey	No significant finds
Raymond and Burnside (1991)	Hanaiei Wildlife Refuge	Subsurface Excavation	SIHP# 50-30-03-991
McMahon (1993)	Po'okū Heiau	Archaeological Field Inspection	Nearby nursery determined to have adversely affected Po'okū Heiau
Shapiro (1993)	Hanaiei Wildlife Refuge	Archaeological Inventory Survey	SIHP# 50-30-03-0726 to -0741, -0408, and -9385
Spear and Chaftee (1994)	Hanaiei Wildlife Refuge	Data Recovery	Subsurface excavations at SIHP# 50-30-03-1007. One new feature recorded
Bordner (1994)	Hanaiei Garden Farms	Archaeological Reconnaissance Survey	No significant finds
McIntosh and Clegghorn (1994)	Hanaiei Wildlife Refuge	Archaeological Monitoring	No significant finds
Jourdane (1996)	Princeville	Recovery of Inadvertently Discovered Human Remains	SIHP# 50-30-03-1984 (human burial remains)
McGerty and Spear (1999)	Lot 3, 'Anini Vista Subdivision	Archaeological Inventory Survey	No significant finds
McMahon (1999)	'Anini Road	Recovery of Inadvertently Discovered Human Remains	SIHP# 50-80-03-0645 (human burial remains)

Source	Location	Nature of Study	Findings
Hammatt et al. (2000)	5- acre Parcel of the Proposed Hanalei Valley Scenic Stop, Kūhiō Highway	Archaeological Inventory Survey	No significant finds
Dega (2003)	*Anini Road (TMK: 5-3-04:36)	Archaeological Monitoring Report	SIHP# 50-80-03-2080 (human burial remains)
Fong et al. (2006)	A 10-Mile stretch of Kūhiō Highway,	Archaeological Monitoring Report	No significant finds

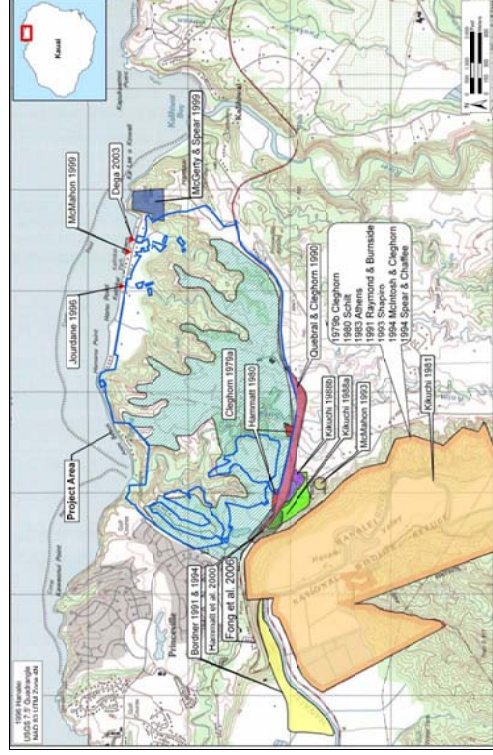


Figure 8. USGS 7.5-minute 1996 Lihue Quadrangle Map showing previous archaeological studies located in the vicinity of the current project area

Archaeological Inventory Survey for the Proposed Princeville Ag Subdivision  
 TMK: (4) 5-3-006: 001 & 014

## Site 140

Kapaka Heiau, on top of Kapaka hill on the east bluff of Hanalei valley just within the forest line. Thrum describes this structure as "A paved open platform heiau without walls; stones set edgewise traversing through. Kāne, its deity. Said to have had connection with Kapinao at Waiakalua in its workings." This site has had many stones removed, or covered over with vegetation. The river stones seem to cover the top of the hill for a diameter of about 75 feet. The extent of the *heiau* could not be accurately determined. The stones set edgewise traversing through could not be found.

## Site 141

*Heiau* and house sites, at Kalama-iki, an old village on the river flats, four miles up Hanalei Valley. There is a stone structure 18 by 20 feet with walls all around 2.5 feet wide and 2 feet high. In front is a paved section extending 5 feet, like a lanai, to a drop of 4 feet of the river terrace. The river is 50 feet out in front. Both river stones and rough rocks were used, but no coral was seen. The wall was chinked with smaller stones in front. Taro terraces and house sites are on the plains along the river.

## Site 142

Kaapoku Heiau, inland from Site 141 in Hanalei Valley. This small shrine consists of a paved platform 18 by 20 feet made of rough stones. A village was across the stream.

## Site 143

Ditch and house sites, across the river from Site 142 in Hanalei Valley. Site also includes taro terraces and a ditch that runs from 0.5 mile or so up the stream to water this plain. The water comes through a big rock which is conveniently cracked. The legend runs, that Pele sent lightning to split the rock so that the people could get the water down to the fields. Upstream from here a large, overhanging rock forms a natural shelter. It has been built up along the front a bit. The house sites of the solidly paved type, as well as those merely outlined with stones, are found. (Bennett 1931:134-35)

Only one of the sites recorded by Bennett, (Site 139 Po'okū Heiau), is located near the present project area approximately 400.0 m south of the southern boundary.

During fieldwork for his dissertation research, Earle (1978) identified one historic property within the current project area. Ka-D10-10, a U-shaped ditch and dam complex is described as follows:

The ditch is the only feature preserved at the site. It was a contour ditch (slope of .009) which formed a U-shaped line around the ridge. Water diverted from Anini stream was channeled around the base of the ridge and along the ridge facing the sea. The ditch was retained against the ridge by a stone-faced earth embankment (Earle 1978:100).

In 1979, Department of Anthropology, Bishop Museum, conducted an archaeological reconnaissance survey of approximately 620 acres of Princeville land, the majority of which is

located within the current project area (Cleghorn 1979a). Only one historic property (SIHP# 50-30-03-1702), an upright boulder and adjacent semicircular excavation, was located within the study area. SIHP# 50-30-03-1702 was suggested to be a World War II-era defensive post (Cleghorn 1979a). No further archaeological work was recommended for the study area.

Additionally, three historic properties (a historic cemetery, a series of five agricultural systems, and Po'okū Heiau), were identified outside of the approximately 620-acre study area.

Cleghorn describes the historic cemetery as follows:

The cemetery covers an area approximately 10 by 10 meters and contains at least 20 grave plots. Three of the plots are marked with headstones dated 1945, 1946, and 1963. One grave plot is marked by an unscribed concrete capstone, and two others by alignments of stones, each measuring c. 1.5 meters in length. The remainder are simply marked by a can or a jar set into the ground to serve as flower containers (Cleghorn 1979a:4).

The historic cemetery is likely located within the current project area. The series of five agricultural systems likely correlates with Ka-D10-10 previously identified by Earle (1978). Ka-D10-10 is also likely located within the current project area. Po'okū Heiau (Bennett Site 139) is located approximately 400.0 m south of the current project area.

In 1979, Department of Anthropology, Bishop Museum, conducted an archaeological reconnaissance survey within the Hanalei Wildlife Refuge (Cleghorn 1979b). A total of ten historic properties were identified during pedestrian survey. SIHP# 50-30-03-1007 consists of eight post-contact agricultural terraces and three post-contact remnant irrigation ditches related to rice cultivation. SIHP# 50-30-03-1008 consists of two to three post-contact agricultural terraces. SIHP# 50-30-03-1009 consists of a stacked stone wall located adjacent to cultivated taro fields and an inactive irrigation ditch. SIHP# 50-30-03-1010 consists of an historic-era cement foundation with a surface scatter of historic artifacts. SIHP# 50-30-03-1011 is composed of three features, Feature A-C, consisting of two cement foundations and a concentration of cement covered small boulders. SIHP# 50-30-03-1012 consists of two pre-contact earthen terraces and a boulder-lined depression. SIHP# 50-30-03-1013 is composed of two features (Feature A-B) consisting of an historic-era cement foundation and a concentration of cement covered cobbles. SIHP# 50-30-03-1014 consists of an enclosure composed of several stone alignments and a probable interior fireplace. SIHP# 50-30-03-1015 consists of a system of pre-contact terraces and one possible habitation feature. SIHP# 50-30-03-1016 consists of an L-shaped wall. A system of data recovery, including subsurface testing, was recommended for historic properties located within the study area (Cleghorn 1979b).

In 1980, Archaeological Research Center Hawaii, Inc. (ARCH) conducted an archaeological reconnaissance survey of portions of the Kaula'i Belt Road (Hammatt 1980). Modern construction and disturbance including evidence of bulldozing was observed throughout the study area. No historic properties were identified. No further archaeological work was recommended for the study area.

In 1980, Department of Anthropology, Bishop Museum, conducted archaeological investigations in specified areas of the Hanalei Wildlife Refuge (Schilt 1980). A total of 21 historic properties were identified with the study area. In addition to ten previously recorded

historic properties, SIHP# 50-30-03-1007 to -1016 (Cleghorn 1979b), eleven historic properties (SIHP# 50-30-03-1017 to -1027) were identified during the study. Nine of these newly identified historic properties were interpreted as being associated with pre-contact agricultural cultivation and one historic property was determined to be an historic midden scatter (Schilt 1980). A program of site-specific monitoring was recommending during proposed construction within the study area.

In 1981, Crafts-Hawai'i conducted archaeological fieldwork involving the documentation of an earthen tunnel system along the Kuma Ditch (Kikuchi 1981). Three earthen tunnel sections (SIHP# 50-30-03-0604) were documented and assessed for safety concerns. No evidence of cultural deposits was identified within the study area. No further archaeological work was recommended for the study area.

In 1983, Department of Anthropology, Bishop Museum, conducted archaeological investigations at the Hanalei Wildlife Refuge (Athens 1983). The fieldwork focused on subsurface excavations at SIHP# 50-30-03-1007 (Bishop Museum # 50-Ka-D10-12), previously recorded by Cleghorn (1979b). Six backhoe trenches were excavated within the floodplain containing SIHP# 50-30-03-1007. A total lithic assemblage of 62 basalt stone and 3 volcanic glass artifacts were collected during excavation along with two historic artifacts. Additionally, three possible post molds and at least two agricultural soil layers were identified.

In 1988, ARCHAIOS conducted an archaeological investigation for the proposed nursery staging and light equipment storage area (Kikuchi 1988a). No historic properties were identified during surface inspection or subsurface testing within the study area.

In 1988, ARCHAIOS conducted an archaeological investigation for the proposed Church of the Pacific (Kikuchi 1988b). No historic properties were identified during surface inspection or subsurface observations of utility trenches within the study area.

In 1990, Applied Research Group, Bishop Museum, conducted an archaeological and historical survey of the proposed Kūhiō Highway realignment project (Quebral and Cleghorn 1990). A total of five hand-excavated tunnels were located and documented in the project area but were not considered significant historic properties. No further archaeological work was recommended for the study area.

In 1991, Social Research Systems Co-op conducted an archaeological reconnaissance survey for Hanalei Garden Farms (Bordner 1991). A rectangular stone alignment was observed within the study area but was not considered a significant historic property. No further archaeological work was recommended for the study area.

In 1991, The US Fish and Wildlife Service conducted subsurface excavation of three exploratory trenches at the Hanalei Wildlife Refuge (Raymond and Burnside 1991). One historic property, SIHP# 50-30-03-991, was identified during subsurface excavation and consisted of a cultural layer (possible habitation) containing a total of 15 basalt stone artifacts. No further archaeological work was recommended for the study area.

In 1993, SHPD/DLNR conducted an archaeological field inspection at Po'okū Heiau in order to determine the extent of impact on the historic property by the nearby nursery (McMahon 1993). The study recommended the constructed of a 200-400 ft buffer zone around Po'okū Heiau.

In 1993, BioSystems Analysis, Inc. conducted an archaeological inventory survey at the Hanalei Wildlife Refuge (Shapiro 1993). During the study, the majority (19) of previously identified historic properties within the study area (SIHP# 50-30-03-1007 to -1027, -0993, -0994, and -6004) were relocated. Additionally, 13 newly identified historic properties and 7 previously undocumented historic properties were located (SIHP# 50-30-03-0726 to -0741, -0408, and -9385). A program of site-specific monitoring was recommending during proposed construction within the study area.

In 1994, Scientific Consultant Services, Inc. (SCS) conducted archaeological data recovery excavations at SIHP# 50-30-03-1007 within the Hanalei Wildlife Refuge (Spear and Chaffee 1994). A total of six backhoe test trenches were excavated within the study area. One subsurface feature, a possible storage pit, and a total of 27 artifacts were identified during excavation. The artifact assemblage consisted of 23 basalt stone tools and debitage, 3 coral manuports, and one historic artifact. Monitoring was recommended during proposed construction within the study area.

In 1994, Social Research Systems Co-op conducted an archaeological reconnaissance survey and subsurface testing for Hanalei Garden Farms (Bordner 1994). A total of six backhoe test trenches were excavated within the study area. No significant historic properties were identified during subsurface testing. No further archaeological work was recommended for the study area.

In 1994, BioSystems Analysis, Inc. conducted archaeological monitoring of initial ground altering activities for the proposed US Fish and Wildlife Headquarters within the Hanalei Wildlife Refuge (McIntosh and Cleghorn 1994). No significant historic properties were identified during excavation. Based on proposed construction plans, no further archaeological work was recommended for the study area.

In 1996, SHPD/DLNR conducted the recovery of inadvertently discovered human remains at 'Anini County Park, SIHP# 50-30-03-1984 (Jourdane 1996). Burial remains "consisted of a few cranial parts, leg, foot and hand bones" (Jourdane 1996:1). The burial remains were considered to represent one individual. Burial reinterment was recommended.

In 1999, SCS conducted an archaeological inventory survey at Lot 3 within the 'Anini Vista Subdivision (McGerty and Spear 1999). A total of nine shovel test probes were excavated within the study area. No significant historic properties were identified during excavation. No further archaeological work was recommended for the study area.

In 1999, SHPD/DLNR documented the inadvertent discovery of human remains along 'Anini Road (McMahon 1999). Burial remains consisted of "...broken fragments of the jaw, skull and some toe phalanxes" (McMahon 1999:1). The burial remains were designated SIHP# 50-80-03-0645. Additionally, a single-piece fishhook, a basalt stone flake, and midden were discovered within previously excavated footings. Monitoring was recommended for any future excavations within the study area.

In 2000, CSH conducted an archaeological inventory survey of an approximately 5 acre parcel of the proposed Hanalei Valley Scenic Stop along Kūhiō Highway (Hammatt et al. 2000). No significant historic properties were identified during excavation. No further archaeological work was recommended for the study area.

historic properties, SIHP# 50-30-03-1007 to -1016 (Cleghorn 1979b), eleven historic properties (SIHP# 50-30-03-1017 to -1027) were identified during the study. Nine of these newly identified historic properties were interpreted as being associated with pre-contact agricultural cultivation and one historic property was determined to be an historic midden scatter (Schilt 1980). A program of site-specific monitoring was recommending during proposed construction within the study area.

In 1981, Crafts-Hawai'i conducted archaeological fieldwork involving the documentation of an earthen tunnel system along the Kuma Ditch (Kikuchi 1981). Three earthen tunnel sections (SIHP# 50-30-03-0604) were documented and assessed for safety concerns. No evidence of cultural deposits was identified within the study area. No further archaeological work was recommended for the study area.

In 1983, Department of Anthropology, Bishop Museum, conducted archaeological investigations at the Hanalei Wildlife Refuge (Athens 1983). The fieldwork focused on subsurface excavations at SIHP# 50-30-03-1007 (Bishop Museum # 50-Ka-D10-12), previously recorded by Cleghorn (1979b). Six backhoe trenches were excavated within the floodplain containing SIHP# 50-30-03-1007. A total lithic assemblage of 62 basalt stone and 3 volcanic glass artifacts were collected during excavation along with two historic artifacts. Additionally, three possible post molds and at least two agricultural soil layers were identified.

In 1988, ARCHAIOS conducted an archaeological investigation for the proposed nursery staging and light equipment storage area (Kikuchi 1988a). No historic properties were identified during surface inspection or subsurface testing within the study area.

In 1988, ARCHAIOS conducted an archaeological investigation for the proposed Church of the Pacific (Kikuchi 1988b). No historic properties were identified during surface inspection or subsurface observations of utility trenches within the study area.

In 1990, Applied Research Group, Bishop Museum, conducted an archaeological and historical survey of the proposed Kūhiō Highway realignment project (Quebral and Cleghorn 1990). A total of five hand-excavated tunnels were located and documented in the project area but were not considered significant historic properties. No further archaeological work was recommended for the study area.

In 1991, Social Research Systems Co-op conducted an archaeological reconnaissance survey for Hanalei Garden Farms (Bordner 1991). A rectangular stone alignment was observed within the study area but was not considered a significant historic property. No further archaeological work was recommended for the study area.

In 1991, The US Fish and Wildlife Service conducted subsurface excavation of three exploratory trenches at the Hanalei Wildlife Refuge (Raymond and Burnside 1991). One historic property, SIHP# 50-30-03-991, was identified during subsurface excavation and consisted of a cultural layer (possible habitation) containing a total of 15 basalt stone artifacts. No further archaeological work was recommended for the study area.

In 1993, SHPD/DLNR conducted an archaeological field inspection at Po'okū Heiau in order to determine the extent of impact on the historic property by the nearby nursery (McMahon 1993). The study recommended the constructed of a 200-400 ft buffer zone around Po'okū Heiau.



In 2003, SCS conducted monitoring for a property along 'Anini Beach (Dega 2003). Disarticulated human remains consisting of "...the proximal end of two tibiae, a portion of the femur shaft, and the distal portion of a humerus" were discovered within the study area and designated SIHP# 50-30-03-2080 (Dega 2003:8). Additionally, faunal (dog) remains and historic glass and ceramic artifacts were encountered. Monitoring was recommended for any future excavations within the study area.

In 2006, CSH conducted monitoring for an approximately 10-mile stretch of Kūhiō Highway (Fong et al. 2006). No significant historic properties were identified during excavation. Monitoring was recommended for any future excavations within the study area due to the potential of encountering cultural deposits and human burials.

### 3.13 Background Summary and Predictive Model

#### 3.13.1 Background Summary

Many mythological and legendary accounts pertaining to the *ahupua'a* encompassing the current project area document the abundance of food resources afforded by ample rainfall within the area. In addition, the area is located near the prime coastal fishing grounds of the Nā Pali Coast. Evidence of abundant pre-contact wetland agriculture has been observed within the relatively level table lands that originate within the project area and continue south, especially within the well-documented Hanalei Wildlife Refuge located along the southwestern edge of the project area (Cleghorn 1979b; Schilt 1980; Shapiro 1993).

The arrival of Euro-Americans to Kauai Island brought significant changes to traditional subsistence practices within the Hanalei area. An 1831 land lease to Richard Charlton by the governor of Kauai provided the first large scale cattle ranching operation in the area. This enterprise was soon followed by sugar cane and silk production in the mid-1830's with varying degrees of success. By the 1840's, coffee cultivation had come to dominate the landscape of the Hanalei area comprising an estimated 1000 acres within Hanalei Valley. Coffee cultivation continued to thrive until the 1850's when a severe drought and a subsequent blight ravaged coffee trees at Hanalei as well as elsewhere throughout Hawaii. It was at this time in the 1850's that a resurgence of sugar cane cultivation pioneered by Mr. Charles Titcomb and later by Robert Crichton Wylie led to the creation of the Princeville Plantation, portions of which are located within the current project area. It seems likely that the multitude of post-contact agricultural operations significantly impacted, if not destroyed, a number of previously existing pre-contact structures within and near the current project area.

It was soon realized that sugar cane was unsuitable for the somewhat unpredictable climate of the Hanalei area and efforts were abandoned with the last crop harvested in 1893. Plantation land was subdivided and leased to for rice cultivation in the lowlands and cattle ranching in the table lands. Rice continued as the dominant cultivar into the 20<sup>th</sup> century, but began to decline shortly after as lower-priced rice grown in California inundated the market. By the 1930's, most of the original Chinese rice farmers had sold their lands to Japanese rice farmers and the decline in rice cultivation continued until the last rice mill, run by the Haraguchi family closed in the early 1960's.

Throughout the short-lived success and eventual failures of several agricultural pursuits (coffee, silk, sugar cane, rice), one well-suited crop, taro, continued to thrive in the Hanalei area throughout the 20<sup>th</sup> century. As Japanese farmers phased out rice production in the 1950's and 60's, they converted their fields to taro *lo'i*. By the late 1980's, taro growing, that once dominated the traditional Hawaiian landscape, was firmly re-established within Hanalei. Wetland taro cultivation continues to present day occupying many of the same terraces and planting areas that have been used throughout the centuries.

#### 3.13.2 Predictive Model

Prior to the extensive land alteration caused by over a century of commercial agricultural activities, portions of the project area would likely have contained historic properties related to dry land agriculture within the southern table lands, wetland cultivation within the deep central valleys, and habitation remnants along the northern coast. These historic properties would have included stone and earthen terraces, irrigation ditches, and mounds. Buried pre-contact cultural deposits within the project area may consist of *lo'i* sediment, midden, artifact scatters, and possible human remains. Remnants of post-contact agricultural infrastructure are also likely to exist within the project area and may include terraces, historic artifact scatters, and water control features. The presence of one WWII-era defensive post in the vicinity of the project area (Cleghorn 1979a) suggests that military infrastructure may also be present within the current project area. Previously identified historic properties within the current project area consist of a cemetery with approximately 20 grave plots (Cleghorn 1979a) and Ka-D10-10 an agricultural system near the mouth of 'Anini Stream (Earle 1978).

## Section 4 Results of Fieldwork

### 4.1 Survey Findings

A total of 11 historic properties consisting of a total of 23 total features were identified within or near the approximately 400-acre project area (Figure 9). A total of 10 of these historic properties are located along the northern (*makaai*) boundary of the project area with the majority (7) located along 'Anini Stream.

Modifications observed along or near the banks of 'Anini Stream consisted of two irrigation ditches SIHP # 50-80-03-5013 and SIHP # 50-80-03-5018 (CSH 1 and CSH 6), two single terraces SIHP # 50-80-03-5015 and SIHP # 50-80-03-5022 (CSH 3 and CSH 10), a modified outcrop SIHP # 50-80-03-5016 (CSH 4), a partially mortared wall SIHP # 50-80-03-5017 (CSH 5), and a complex of adjacent terraces SIHP # 50-80-03-5014 (CSH 2). A historic-era cemetery SIHP # 50-80-03-5021 (CSH 9) consisting of five headstones was observed on a ridge top in the northwestern corner of the project area approximately 158.0 m west of 'Anini Stream. SIHP # 50-80-03-5014 (CSH 2), SIHP # 50-80-03-5017 (CSH 5), and portions of SIHP # 50-80-03-5013(CSH 1) are located outside of the current project area boundary.

Additional historic properties located within the project area include a military bunker SIHP # 50-80-03-5020 (CSH 8), a remnant irrigation ditch SIHP # 50-80-03-5019 (CSH 7), and a complex SIHP # 50-80-03-5023 (CSH 11) consisting of 4 terraces, 2 mounds, 1 alignment, and 1 leveled area. The SIHP # 50-80-03-5020 (CSH 8), military bunker, is located along the northern boundary of the project area approximately 167.0 m south of Honono Point. SIHP # 50-80-03-5019 (CSH 7), remnant irrigation ditch, is located at the base of a ridge south of the polo field along 'Anini Road. The SIHP # 50-80-03-5023 (CSH 11) complex is located at the base of the western tributary gulch of 'Anini Stream.

Detailed descriptions of all historic properties identified during the current study are presented below.

### 4.2 Site Descriptions

#### 4.2.1 SIHP # : 50-80-03-5013 (CSH 1)

<b>SITE TYPE:</b>	Irrigation Ditch
<b>FUNCTION:</b>	Agriculture, Water Control
<b>FEATURES:</b>	1
<b>DIMENSIONS:</b>	Approx. 390 m long
<b>CONDITION:</b>	Good
<b>PROBABLE AGE:</b>	Pre-Contact
<b>TAX MAP KEY:</b>	[4] 5-3-006:014, 5-3-007:003, 004, 005, and 015
<b>DESCRIPTION:</b>	

SIHP # 50-80-03-5013 (CSH 1) is an irrigation ditch located along the eastern slope of 'Anini Gulch within 75 m southeast of the mouth of 'Anini Stream. The ditch is V-shaped in plan and measures approximately 390 m from end to end. The irrigation ditch originates to the east along



Figure 9. USGS 7.5-minute 1996 Lihue Quadrangle Map showing historic properties within the project area (properties for preservation are outlined in yellow, others are recommended for no further work)

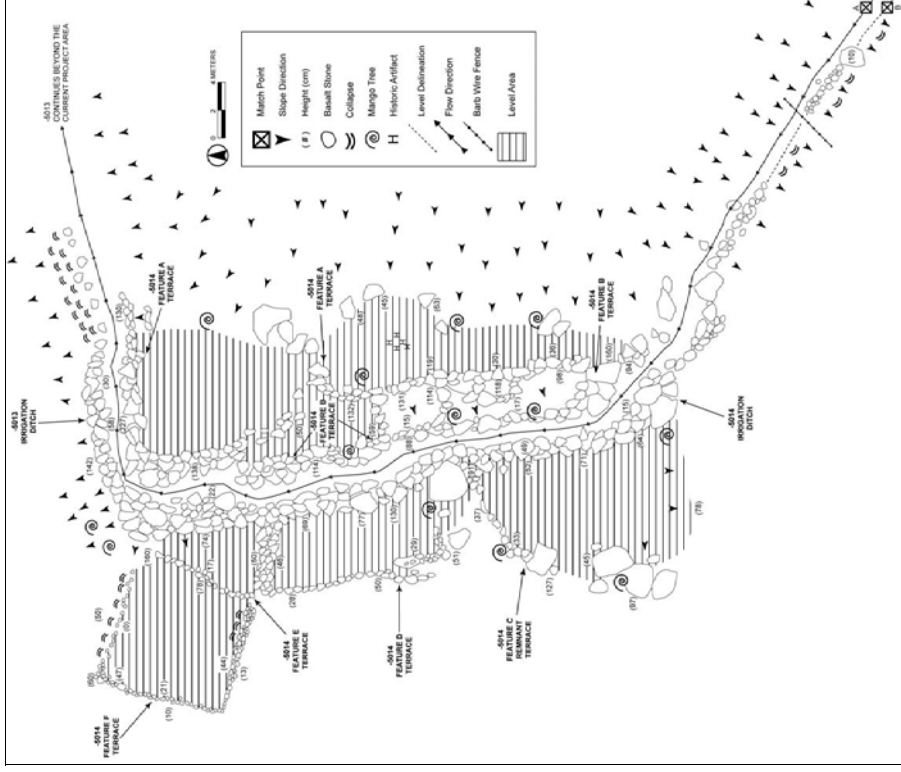


Figure 10. Plan view map showing SIHP # 50-80-03-5014 (CSH 2) and portions of SIHP # 50-80-03-5013 (CSH 1)

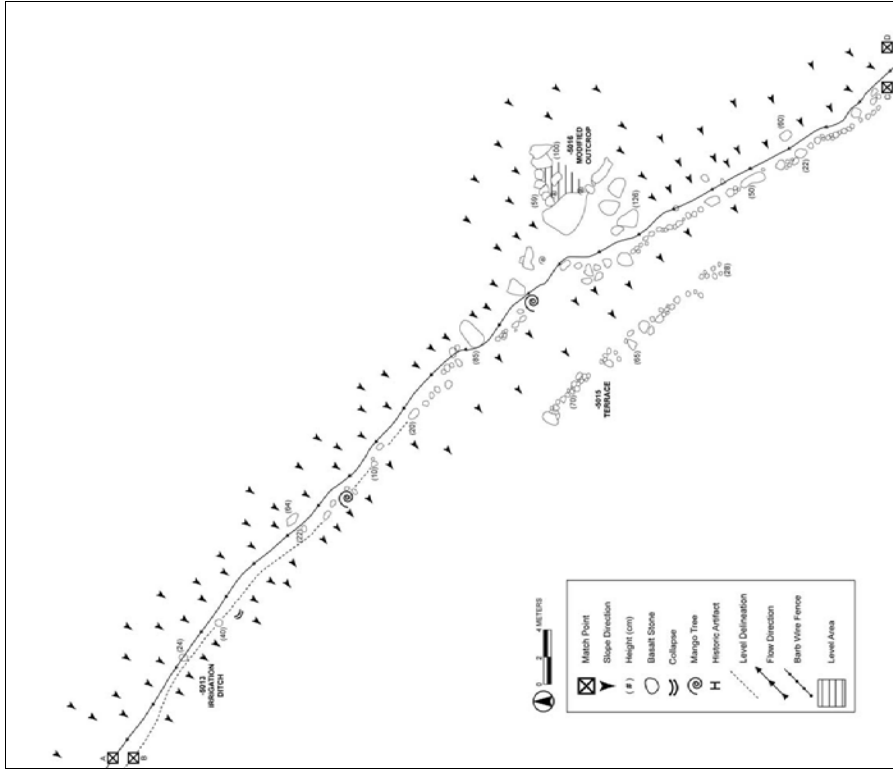


Figure 11. Plan view map showing SIHP # 50-80-03-5015 (CSH 3), SIHP # 50-80-03-5016 (CSH 4), and portions of SIHP # 50-80-03-5013 (CSH 1)

the edge of the stream and extends down slope to the west where the ditch bisects SIHP # 50-80-03-5014 (CSH 2) and curves back to the east (Figure 10 to Figure 12). The majority of the northern half of the ditch (approx 146 m) was determined to be located outside of the current project area (See Figure 9). The southern half of the ditch, located within the project area, extends approximately 244 m parallel to and upslope from 'Anini Stream.

Construction methods of SIHP # 50-80-03-5013 (CSH 1) consisted of cutting a vertical wall and U-shaped ditch, measuring variably between 0.6-2.0 m wide, into the clay soils along the sloping edge of the gulch (Figure 13). Additionally, a stone alignment composed of medium basalt cobbles to large boulders was constructed intermittently along the down slope edge of the slope-cut ditch (Figure 14). The alignment contains 1-2 courses of exposed basalt stone, but likely extends into the clay subsurface.

The irrigation ditch has been significantly impacted from a combination of upslope colluvial erosion/deposition, down slope alluvial erosion/deposition, and vegetation. Several portions of the ditch have been filled in with sediment level with the ground surface leaving only the immediate slope alignment to delineate the course. Other portions, especially those in the immediate vicinity of 'Anini Stream, appear to be eroding. Vegetation, specifically mango trees (*Mangifera indica*), has caused root damage to the stone alignment and has masked the orientation of the ditch. The best preserved portion of SIHP # 50-80-03-5013 (CSH 1) is located in the area where the ditch bisects SIHP # 50-80-03-5014 (CSH 2). Historic glass bottles in this area suggest that this portion of SIHP # 50-80-03-5013 (CSH 1) as well as the SIHP # 50-80-03-5014 (CSH 2) complex have been used or maintained in some capacity through the historic period.

**4.2.2 SIHP # 50-80-03-5014 (CSH 2)**

**SITE TYPE:** Complex  
**FUNCTION:** Habitation, Agriculture  
**FEATURES:** 6  
**DIMENSIONS:** 46 m N/S x 32 m E/W  
**CONDITION:** Good  
**PROBABLE AGE:** Pre-Contact  
**TAX MAP KEY:** [4] 5-3-007:003

**DESCRIPTION:**

SIHP # 50-80-03-5014 (CSH 2) is a complex of six terraces located on the eastern slope of 'Anini Gulch along 'Anini Stream (See Figure 9 and Figure 10). The mouth of 'Anini Stream is located approximately 88 m northwest of SIHP # 50-80-03-5014 (CSH 2) Feature A. The SIHP # 50-80-03-5014 (CSH 2) complex is bisected by SIHP # 50-80-03-5013 (CSH 1) with two terraces located upslope (Features A and B) and four terraces located downslope (Features C through F) of the irrigation ditch. Vegetation in the area consists of mango (*Mangifera indica*), *ti* (*Cordia* sp.), *fruticosa*, *noni* (*Morinda citrifolia*), *laua'e* (*Phymatosorus grossus*), cat's claw (*Caesalpinia decapetaloid*), and thick stands of *hau* (*Hibiscus tiliaceus*).

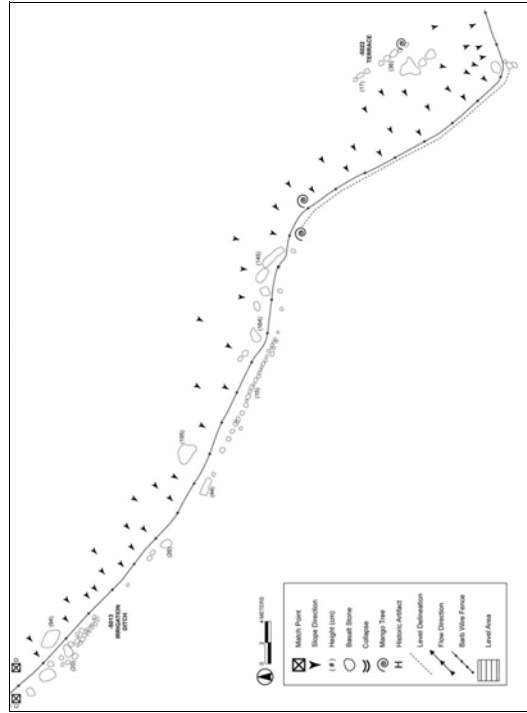


Figure 12. Plan view map showing SIHP # 50-80-03-5022 (CSH 10) and portions of SIHP # 50-80-03-5013 (CSH 1)