Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	5	0	102	8	0	9
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	1.00	0.88	0.92	0.54
Hourly flow rate (vph)	20	0	102	9	0	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	123	107			111	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	123	107			111	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	872	948			1479	

Direction, Lane #	NW 1	NE 1	SW 1
Volume Total	20	111	17
Volume Left	20	0	0
Volume Right	0	9	0
cSH	872	1700	1479
Volume to Capacity	0.02	0.07	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.2	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.2	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	15.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	113	1146	1926	36	168	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	150
Storage Lanes	1			0	1	1
Taper Length (ft)	25			25	25	25
Satd. Flow (prot)	1770	1863	3529	0	1770	1583
Flt Permitted	0.069				0.950	
Satd. Flow (perm)	129	1863	3529	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			4			105
Link Speed (mph)		35	35		25	
Link Distance (ft)		592	801		431	
Travel Time (s)		11.5	15.6		11.8	
Peak Hour Factor	0.90	0.90	1.00	0.88	0.81	0.90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	126	1273	1967	0	207	203
Turn Type	pm+pt					Perm
Protected Phases	1	6	2		8	
Permitted Phases	6					8
Detector Phase	1	6	2		8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	21.0	21.0		21.0	21.0
Total Split (s)	10.0	69.0	59.0	0.0	21.0	21.0
Total Split (%)	11.1%	76.7%	65.6%	0.0%	23.3%	23.3%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None	Min	Min		None	None
Act Effct Green (s)	62.8	62.8	52.7		14.0	14.0
Actuated g/C Ratio	0.72	0.72	0.61		0.16	0.16
v/c Ratio	0.67	0.95	0.92		0.73	0.59
Control Delay	29.7	27.3	23.9		50.4	24.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	29.7	27.3	23.9		50.4	24.5
LOS	C	C	C		D	C
Approach Delay		27.5	23.9		37.6	
Approach LOS		C	C		D	
Queue Length 50th (ft)	19	551	481		111	49
Queue Length 95th (ft)	#101	#977	#708		163	119

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Internal Link Dist (ft)		512	721		351	
Turn Bay Length (ft)						150
Base Capacity (vph)	188	1379	2205		328	379
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.67	0.92	0.89		0.63	0.54

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 86.8
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 26.7 Intersection LOS: C
Intersection Capacity Utilization 82.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Farrington Highway & Lualualei Naval Access Road

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	2	1	23	7	0	67
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	1.00	0.88	0.92	0.54
Hourly flow rate (vph)	8	4	23	8	0	124
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	151	27			31	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	151	27			31	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	841	1049			1582	

Direction, Lane #	NW 1	NE 1	SW 1
Volume Total	12	31	124
Volume Left	8	0	0
Volume Right	4	8	0
cSH	900	1700	1582
Volume to Capacity	0.01	0.02	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	9.1	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.1	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	212	2049	673	49	148	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	150
Storage Lanes	0			0	1	1
Taper Length (ft)	25			25	25	25
Satd. Flow (prot)	0	3522	3507	0	1770	1583
Flt Permitted		0.625			0.950	
Satd. Flow (perm)	0	2212	3507	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			14			49
Link Speed (mph)		35	35		25	
Link Distance (ft)		592	801		431	
Travel Time (s)		11.5	15.6		11.8	
Peak Hour Factor	1.00	1.00	0.62	0.68	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	2261	1157	0	148	49
Turn Type	pm+pt					Perm
Protected Phases	1	6	2		8	
Permitted Phases	6					8
Detector Phase	1	6	2		8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	21.0		21.0	21.0
Total Split (s)	9.0	129.0	120.0	0.0	21.0	21.0
Total Split (%)	6.0%	86.0%	80.0%	0.0%	14.0%	14.0%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None	Max	Max		None	None
Act Effct Green (s)		124.0	124.0		15.2	15.2
Actuated g/C Ratio		0.83	0.83		0.10	0.10
v/c Ratio		1.23	0.40		0.82	0.24
Control Delay		125.6	3.6		98.3	18.3
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		125.6	3.6		98.3	18.3
LOS		F	A		F	B
Approach Delay		125.6	3.6		78.4	
Approach LOS		F	A		E	
Queue Length 50th (ft)		~1437	124		144	0
Queue Length 95th (ft)		#1564	85		#257	42

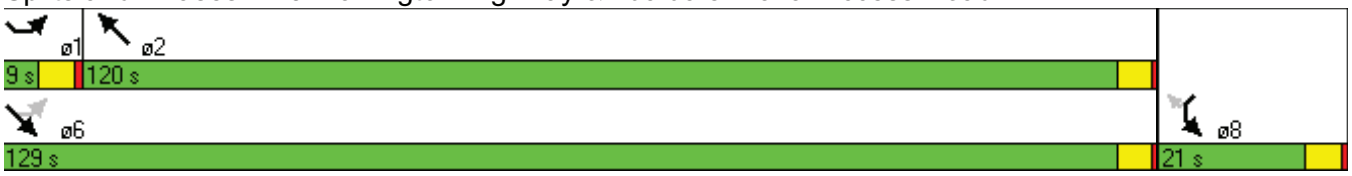
Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Internal Link Dist (ft)		512	721		351	
Turn Bay Length (ft)						150
Base Capacity (vph)		1839	2918		190	214
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.23	0.40		0.78	0.23

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 149.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.23			
Intersection Signal Delay: 84.0		Intersection LOS: F	
Intersection Capacity Utilization 103.7%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Farrington Highway & Lualualei Naval Access Road



Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	5	0	109	9	0	10
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	1.00	0.88	0.92	0.54
Hourly flow rate (vph)	20	0	109	10	0	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	133	114			119	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	133	114			119	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	861	939			1469	

Direction, Lane #	NW 1	NE 1	SW 1
Volume Total	20	119	19
Volume Left	20	0	0
Volume Right	0	10	0
cSH	861	1700	1469
Volume to Capacity	0.02	0.07	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.3	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.3	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	16.3%	ICU Level of Service	A
Analysis Period (min)	15		

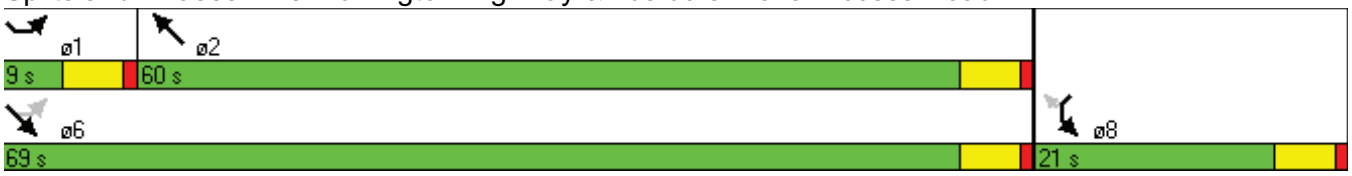
Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	120	1222	2053	38	179	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	150
Storage Lanes	1			0	1	1
Taper Length (ft)	25			25	25	25
Satd. Flow (prot)	1770	1863	3529	0	1770	1583
Flt Permitted	0.067				0.950	
Satd. Flow (perm)	125	1863	3529	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			4			84
Link Speed (mph)		35	35		25	
Link Distance (ft)		594	801		431	
Travel Time (s)		11.6	15.6		11.8	
Peak Hour Factor	0.90	0.90	1.00	0.88	0.81	0.90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	1358	2096	0	221	217
Turn Type	pm+pt					Perm
Protected Phases	1	6	2		8	
Permitted Phases	6					8
Detector Phase	1	6	2		8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	21.0		21.0	21.0
Total Split (s)	9.0	69.0	60.0	0.0	21.0	21.0
Total Split (%)	10.0%	76.7%	66.7%	0.0%	23.3%	23.3%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None	Max	Max		None	None
Act Effct Green (s)	64.0	64.0	55.0		14.5	14.5
Actuated g/C Ratio	0.72	0.72	0.62		0.16	0.16
v/c Ratio	0.81	1.01	0.95		0.76	0.66
Control Delay	48.2	41.1	28.1		53.5	31.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.2	41.1	28.1		53.5	31.3
LOS	D	D	C		D	C
Approach Delay		41.7	28.1		42.5	
Approach LOS		D	C		D	
Queue Length 50th (ft)	24	~831	546		119	69
Queue Length 95th (ft)	#77	#1081	#778		174	145

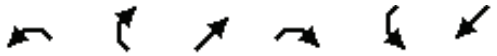
Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Internal Link Dist (ft)		514	721		351	
Turn Bay Length (ft)						150
Base Capacity (vph)	165	1348	2196		320	355
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.81	1.01	0.95		0.69	0.61

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 88.5
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 34.7 Intersection LOS: C
Intersection Capacity Utilization 87.0% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Farrington Highway & Lualualei Naval Access Road





Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	2	1	23	7	0	67
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.25	0.25	1.00	0.88	0.92	0.54
Hourly flow rate (vph)	8	4	23	8	0	124
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	151	27			31	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	151	27			31	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	841	1049			1582	

Direction, Lane #	NW 1	NE 1	SW 1
Volume Total	12	31	124
Volume Left	8	0	0
Volume Right	4	8	0
cSH	900	1700	1582
Volume to Capacity	0.01	0.02	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	9.1	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.1	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	339	2231	732	378	237	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	600			0	0	150
Storage Lanes	0			0	1	1
Taper Length (ft)	25			25	25	25
Satd. Flow (prot)	0	3514	3369	0	1770	1583
Flt Permitted		0.499			0.950	
Satd. Flow (perm)	0	1766	3369	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			143			54
Link Speed (mph)		35	35		25	
Link Distance (ft)		587	801		420	
Travel Time (s)		11.4	15.6		11.5	
Peak Hour Factor	1.00	1.00	0.62	0.68	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	2570	1737	0	237	66
Turn Type	Prot					Perm
Protected Phases	1	6	2		8	
Permitted Phases						8
Detector Phase	1	6	2		8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	21.0		21.0	21.0
Total Split (s)	10.0	126.0	116.0	0.0	24.0	24.0
Total Split (%)	6.7%	84.0%	77.3%	0.0%	16.0%	16.0%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None	Max	Max		None	None
Act Effct Green (s)		121.0	121.0		19.0	19.0
Actuated g/C Ratio		0.81	0.81		0.13	0.13
v/c Ratio		1.86	0.63		1.06	0.27
Control Delay		408.1	6.3		136.8	21.9
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		408.1	6.3		136.8	21.9
LOS		F	A		F	C
Approach Delay		408.1	6.3		111.8	
Approach LOS		F	A		F	
Queue Length 50th (ft)		~2005	271		~253	11
Queue Length 95th (ft)		#2124	150		#432	58

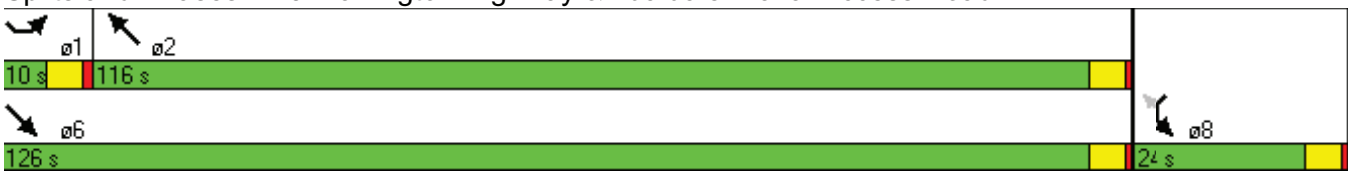
Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Internal Link Dist (ft)		507	721		340	
Turn Bay Length (ft)						150
Base Capacity (vph)		1383	2745		224	248
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		1.86	0.63		1.06	0.27

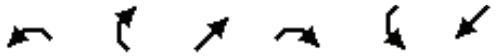
Intersection Summary	
Area Type:	Other
Cycle Length: 150	
Actuated Cycle Length: 150	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.86	
Intersection Signal Delay: 237.3	Intersection LOS: F
Intersection Capacity Utilization 129.5%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Farrington Highway & Lualualei Naval Access Road





Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	95	0	118	442	0	10
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	1.00	0.88	0.92	0.54
Hourly flow rate (vph)	103	0	118	502	0	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	388	369			620	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	388	369			620	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	100			100	
cM capacity (veh/h)	616	676			960	

Direction, Lane #	NW 1	NE 1	SW 1
Volume Total	103	620	19
Volume Left	103	0	0
Volume Right	0	502	0
cSH	616	1700	960
Volume to Capacity	0.17	0.36	0.00
Queue Length 95th (ft)	15	0	0
Control Delay (s)	12.0	0.0	0.0
Lane LOS	B		
Approach Delay (s)	12.0	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	136	1222	2053	131	486	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300			0	0	150
Storage Lanes	1			0	1	1
Taper Length (ft)	25			25	25	25
Satd. Flow (prot)	1770	1863	3504	0	1770	1583
Flt Permitted	0.044				0.950	
Satd. Flow (perm)	82	1863	3504	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			8			67
Link Speed (mph)		35	35		25	
Link Distance (ft)		594	801		431	
Travel Time (s)		11.6	15.6		11.8	
Peak Hour Factor	0.90	0.90	1.00	0.88	0.81	0.90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	151	1358	2202	0	600	330
Turn Type	pm+pt					Perm
Protected Phases	1	6	2		8	
Permitted Phases	6					8
Detector Phase	1	6	2		8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	21.0		21.0	21.0
Total Split (s)	10.0	101.0	91.0	0.0	49.0	49.0
Total Split (%)	6.7%	67.3%	60.7%	0.0%	32.7%	32.7%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None	Max	Max		None	None
Act Effct Green (s)	96.0	96.0	86.0		44.0	44.0
Actuated g/C Ratio	0.64	0.64	0.57		0.29	0.29
v/c Ratio	1.39	1.14	1.09		1.16	0.64
Control Delay	245.7	100.4	82.4		136.6	43.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	245.7	100.4	82.4		136.6	43.1
LOS	F	F	F		F	D
Approach Delay		114.9	82.4		103.4	
Approach LOS		F	F		F	
Queue Length 50th (ft)	~145	~1545	~1277		~691	227
Queue Length 95th (ft)	#298	#1813	#1407		#784	340

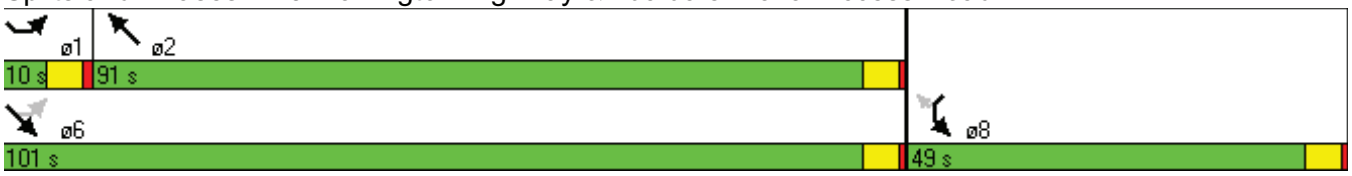
Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Internal Link Dist (ft)		514	721		351	
Turn Bay Length (ft)	300					150
Base Capacity (vph)	109	1192	2012		519	512
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.39	1.14	1.09		1.16	0.64

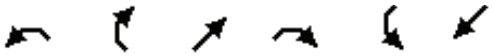
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.39			
Intersection Signal Delay: 97.2		Intersection LOS: F	
Intersection Capacity Utilization 107.9%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Farrington Highway & Lualualei Naval Access Road





Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	409	0	25	109	0	71
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	445	0	27	118	0	77
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	164	86			146	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	164	86			146	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	46	100			100	
cM capacity (veh/h)	827	972			1436	

Direction, Lane #	NW 1	NE 1	SW 1
Volume Total	445	146	77
Volume Left	445	0	0
Volume Right	0	118	0
cSH	827	1700	1436
Volume to Capacity	0.54	0.09	0.00
Queue Length 95th (ft)	82	0	0
Control Delay (s)	14.3	0.0	0.0
Lane LOS	B		
Approach Delay (s)	14.3	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	9.5		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	320	2049	673	374	224	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350			250	350	0
Storage Lanes	1			0	2	1
Taper Length (ft)	25			25	25	25
Satd. Flow (prot)	1770	3539	3362	0	3433	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	3539	3362	0	3433	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			110			62
Link Speed (mph)		35	35		25	
Link Distance (ft)		587	801		431	
Travel Time (s)		11.4	15.6		11.8	
Peak Hour Factor	1.00	1.00	0.62	0.68	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	320	2049	1635	0	224	62
Turn Type	Prot					pm+ov
Protected Phases	1	6	2		8	1
Permitted Phases						8
Detector Phase	1	6	2		8	1
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	21.0		21.0	9.0
Total Split (s)	32.0	104.0	72.0	0.0	21.0	32.0
Total Split (%)	25.6%	83.2%	57.6%	0.0%	16.8%	25.6%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?						
Recall Mode	None	Max	Max		None	None
Act Effct Green (s)	25.0	99.0	69.1		13.0	42.9
Actuated g/C Ratio	0.20	0.81	0.57		0.11	0.35
v/c Ratio	0.88	0.71	0.84		0.61	0.10
Control Delay	73.0	7.2	26.1		59.6	6.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	73.0	7.2	26.1		59.6	6.4
LOS	E	A	C		E	A
Approach Delay		16.1	26.1		48.1	
Approach LOS		B	C		D	
Queue Length 50th (ft)	242	307	529		88	0
Queue Length 95th (ft)	#402	428	334		130	29

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Internal Link Dist (ft)		507	721		351	
Turn Bay Length (ft)	350				350	
Base Capacity (vph)	392	2872	1951		450	623
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.82	0.71	0.84		0.50	0.10

Intersection Summary	
Area Type:	Other
Cycle Length: 125	
Actuated Cycle Length: 122	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 22.0	Intersection LOS: C
Intersection Capacity Utilization 71.4%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Farrington Highway & Lualualei Naval Access Rd

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	136	1222	2053	131	486	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350			0	350	0
Storage Lanes	1			0	2	1
Taper Length (ft)	25			25	25	25
Satd. Flow (prot)	1770	3539	3504	0	3433	1583
Flt Permitted	0.048				0.950	
Satd. Flow (perm)	89	3539	3504	0	3433	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			11			12
Link Speed (mph)		35	35		25	
Link Distance (ft)		587	801		431	
Travel Time (s)		11.4	15.6		11.8	
Peak Hour Factor	0.90	0.90	1.00	0.88	0.81	0.90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	151	1358	2202	0	600	330
Turn Type	pm+pt					pm+ov
Protected Phases	1	6	2		8	1
Permitted Phases	6					8
Detector Phase	1	6	2		8	1
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	21.0		21.0	9.0
Total Split (s)	14.0	97.0	83.0	0.0	28.0	14.0
Total Split (%)	11.2%	77.6%	66.4%	0.0%	22.4%	11.2%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?						
Recall Mode	None	Max	Max		None	None
Act Effct Green (s)	92.0	92.0	78.2		23.0	36.8
Actuated g/C Ratio	0.74	0.74	0.63		0.18	0.29
v/c Ratio	0.82	0.52	1.00		0.95	0.70
Control Delay	60.4	7.9	43.4		75.9	46.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	60.4	7.9	43.4		75.9	46.6
LOS	E	A	D		E	D
Approach Delay		13.2	43.4		65.5	
Approach LOS		B	D		E	
Queue Length 50th (ft)	70	217	~897		250	228
Queue Length 95th (ft)	#185	261	#1114		#298	338

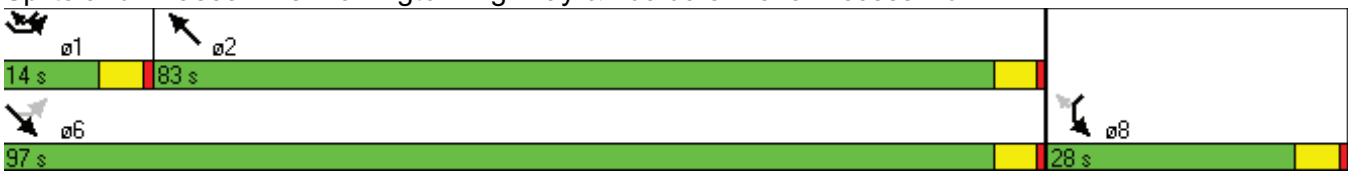
Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Internal Link Dist (ft)		507	721		351	
Turn Bay Length (ft)	350				350	
Base Capacity (vph)	187	2605	2197		632	477
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.81	0.52	1.00		0.95	0.69

Intersection Summary	
Area Type:	Other
Cycle Length: 125	
Actuated Cycle Length: 125	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 38.0	Intersection LOS: D
Intersection Capacity Utilization 94.8%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Farrington Highway & Lualualei Naval Access Rd



APPENDIX F

An Archaeological Inventory Survey for the Proposed Lualualei Golf Course, Lualualei, Waiʻanae, Oʻahu. Hallet H. Hammatt, Ph.D., Jennifer J. Robins, and Mark Stride, January 1991

An Archaeological Inventory Survey
for the Proposed Lualualei Golf Course
Lualualei, Wai'anae, O'ahu

DRAFT

By

Hallett H. Hammatt, Ph.D.
Jennifer J. Robins, B.A.
Mark Stride

Prepared for
Hida, Okamoto and Associates

by

Cultural Surveys Hawaii

January 1991

Abstract

Cultural Surveys Hawaii was requested by Hida, Okamoto and Associates to undertake an archaeological inventory survey for the approximately 170-acre proposed Lualualei Golf Course Development Project (TMK 8-7-9:portion 2; 8-7-10 parcels 6 and 10; and 8-7-19, portion 1) located in the ahupua'a of Lualualei, Island of O'ahu.

The survey and limited testing were conducted during four field days in the month of November 1990. As a result of the fieldwork eight sites were located within the project area including two traditional Hawaiian sites and six historic sites related to ranching and military activities. The historic sites include a cattle wall, a furnace, wells, a house lot, and cement foundation structure. The two traditional Hawaiian sites include one habitation complex and one wall remnant.

Limited subsurface testing for cultural deposits was conducted at the habitation complex - site 50-80-08-4366 - within a suspected hearth feature; no midden or artifacts were recovered. According to the Lualualei Golf Course development plan, site 50-80-08-4366 lies outside of the impact area and thus should be spared any disturbance. However, in the event that the impact zone is extended into the site area, we would recommend that it be preserved since it represents the only unequivocal, traditional Hawaiian habitation site in the project area.

Of the remaining seven sites identified within the project area, none are considered significant for future research.

Acknowledgments

We wish to thank Mr. Harvey Hida of Hida, Okamoto and Associates for supplying the general information and maps for this project. Recognition and thanks is given to Messrs. Chris Bailey, Don Hugo, and Aron Suzuki who, along with the authors comprised the field crew. We would also like to thank Ms. Carol Kawachi of the State Historic Preservation Office for supplying information necessary for this report, Dr. Vicki Creed of Windword Processing for typing this report, and Mr. Dennis Tom for drafting the site maps. We especially thank Mr. Rodney Chiogioji and Mr. David Shideler for editing this report.

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I. Introduction

At the request of Hida, Okamoto and Associates, Cultural Surveys Hawaii conducted an archaeological inventory survey of the proposed Lualualei Golf Course (170 acres) in the ahupua'a of Lualualei, Island of O'ahu (TMK 8-7-9:portion 2; 8-7-10 parcels 6 and 10; and 8-7-19: portion 1)(Figures 1-5).

The objective of this survey was to locate, inventory and evaluate the significance of the cultural resources in the project area and provide recommendations for treatment of these resources.

Fieldwork was conducted over a period of four days during the month of November 1990, by a crew of four persons. Limited subsurface testing was conducted at site 50-80-08-4366 to determine if cultural deposits are present.

The project area is located along the northeastern perimeter of Lualualei Valley and along the base of Pu'u Heleakala Ridge which partially separates Lualualei Valley from Nanakuli Valley.

As a result of the survey, eight sites were identified within the project area (Figure 6). Two of these sites (50-80-08-4366 and -4367) are interpreted as traditional Hawaiian sites, while the remaining six are clearly attributable to historic activities related to ranching and military presence.

A. Scope and Methods

This project consisted of reconnaissance, description and mapping of archaeological sites within the project area.

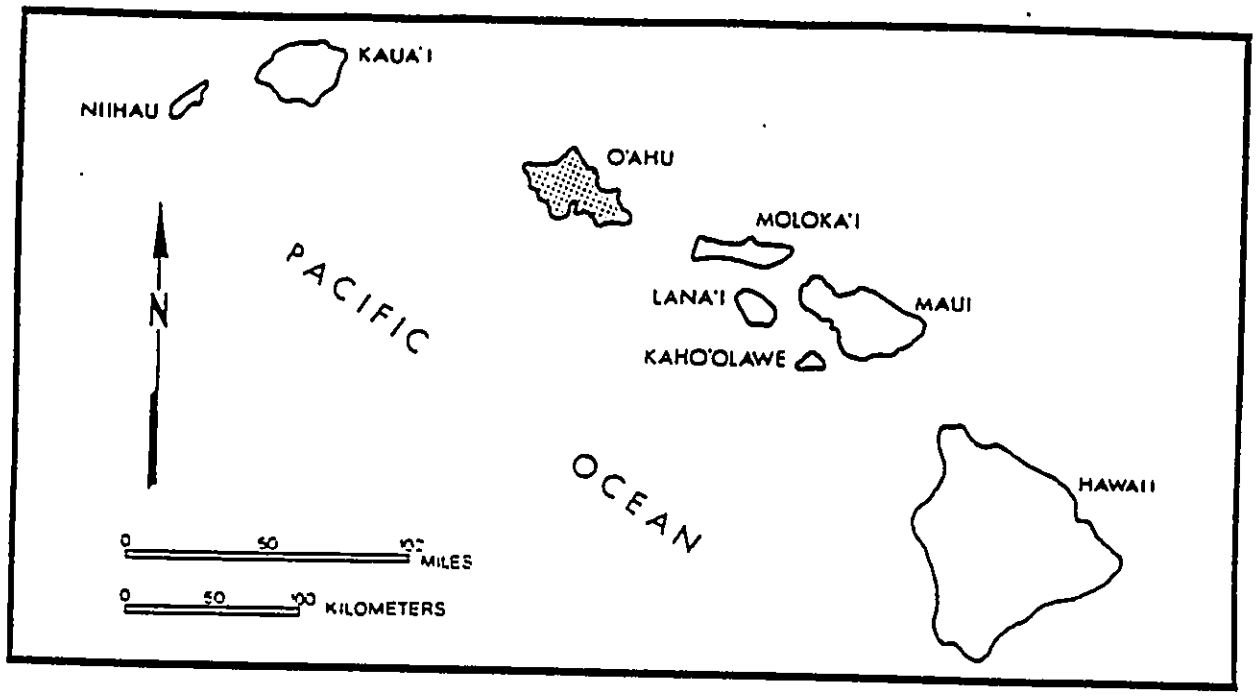

Fig. 1. State of Hawaii

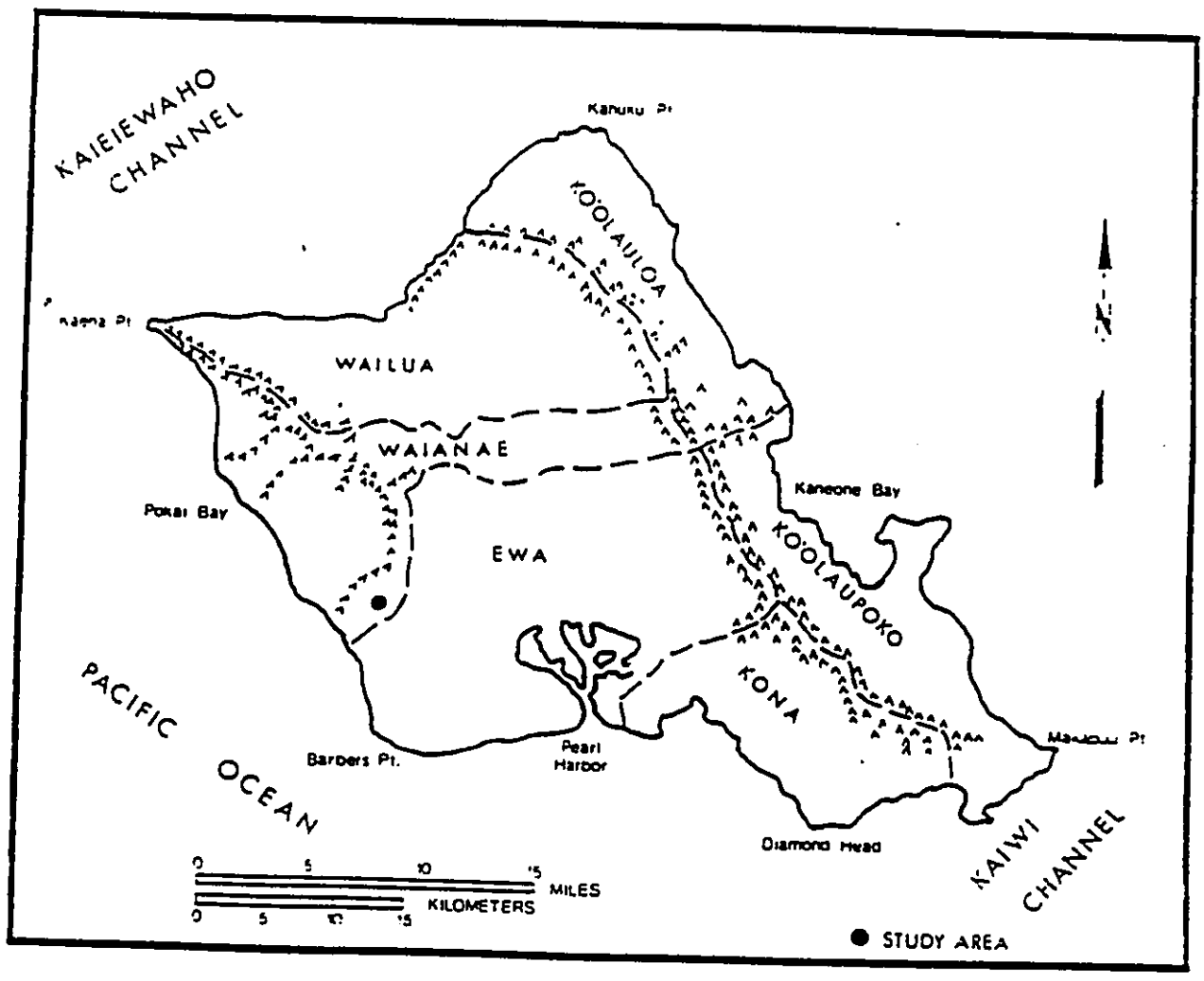

Fig. 2. General Location Map, O'a'hu Island.

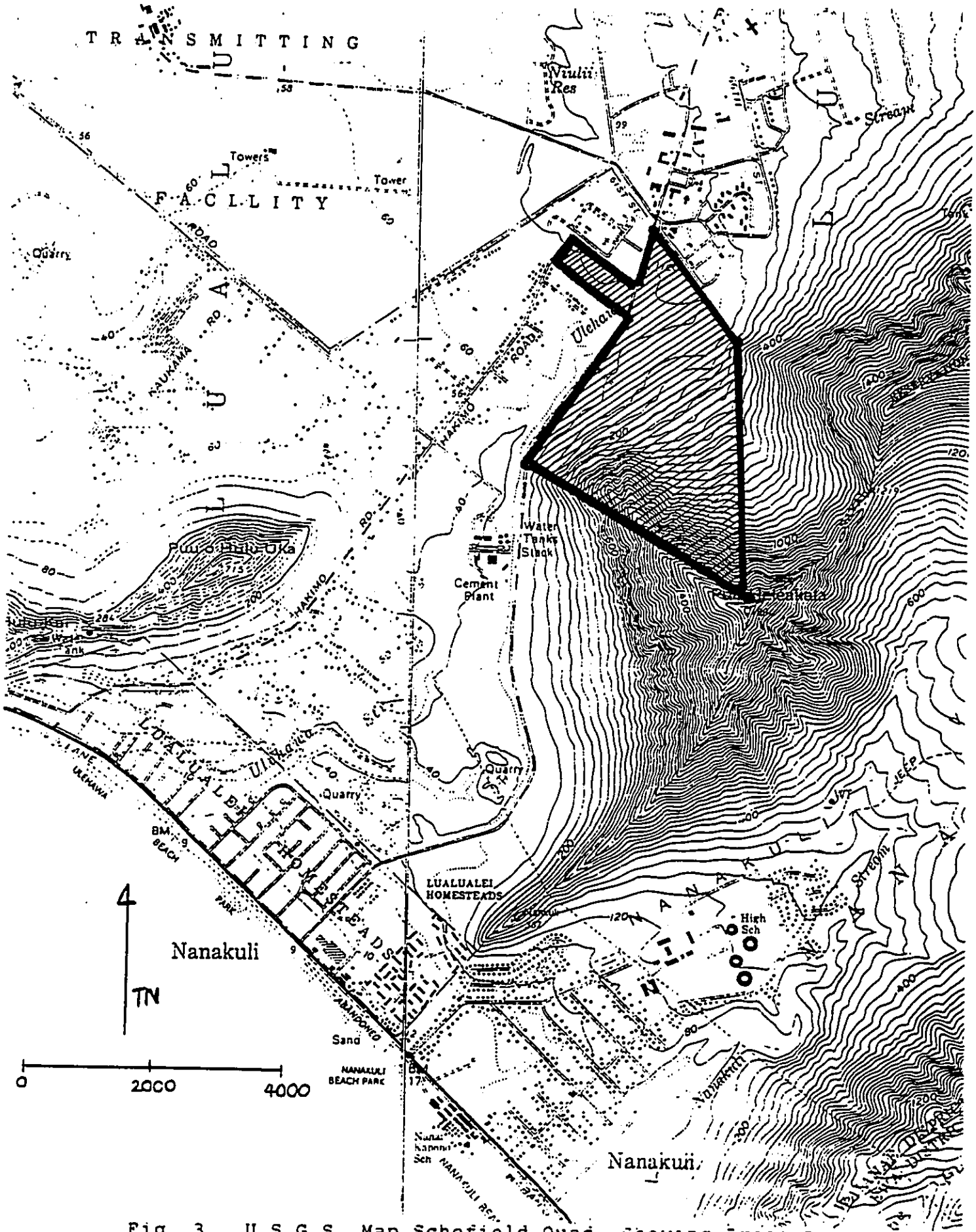

Fig. 3 U.S.G.S. Map Schofield Quad, Showing Project Area (Shaded)

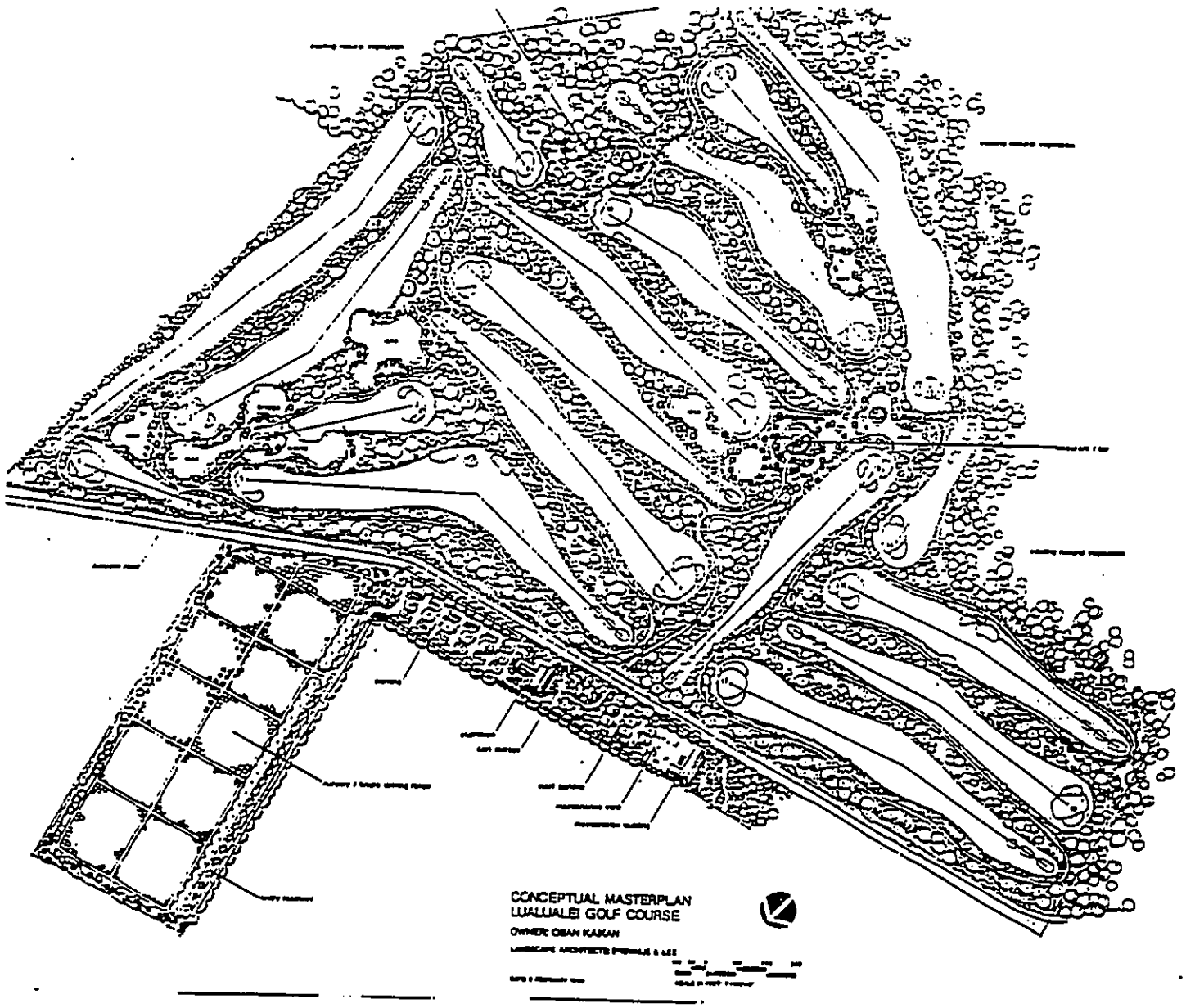

Fig. 4 Proposed Lualualei Golf Course

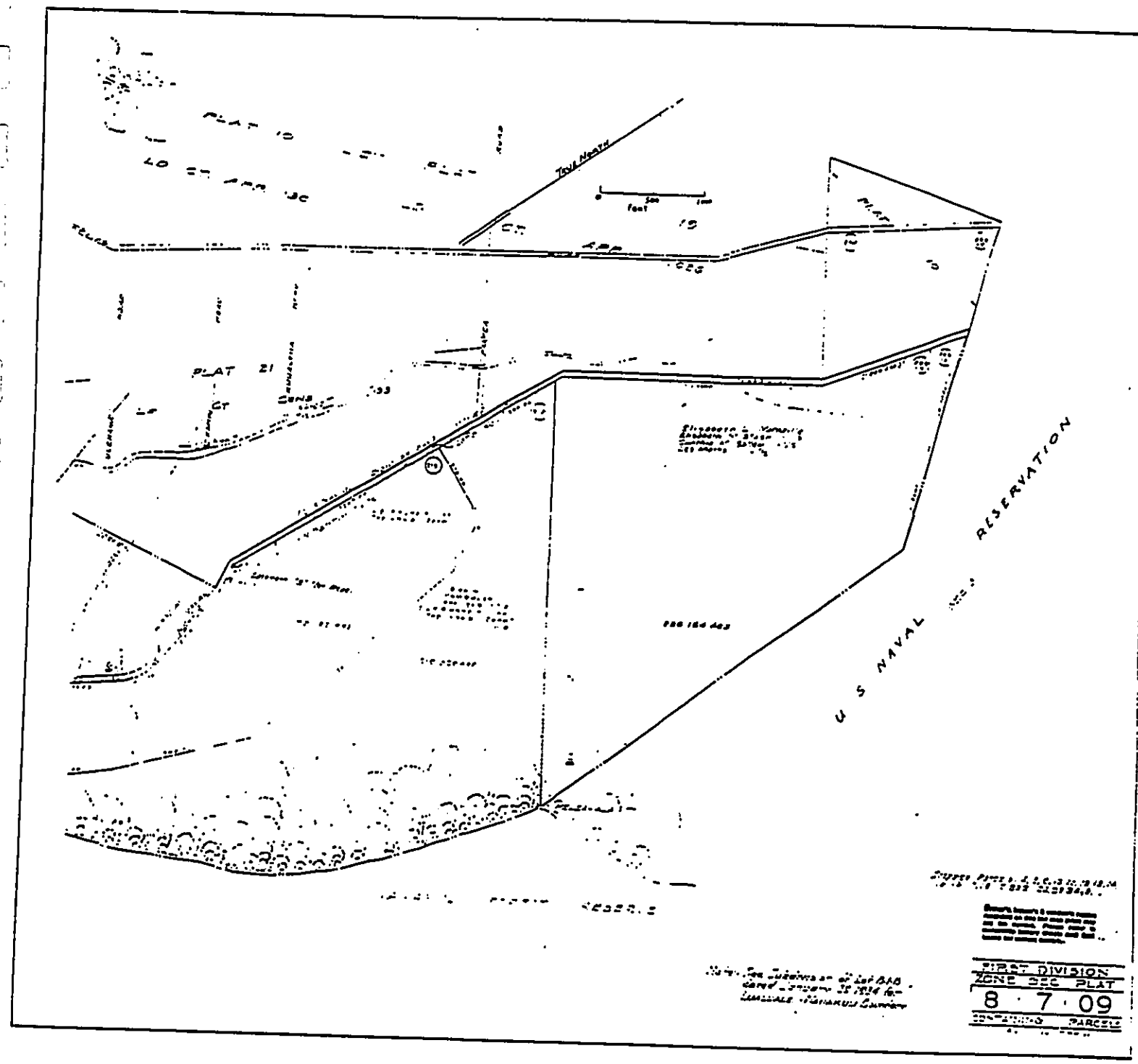

Figure 5 Tax Map of Project Area

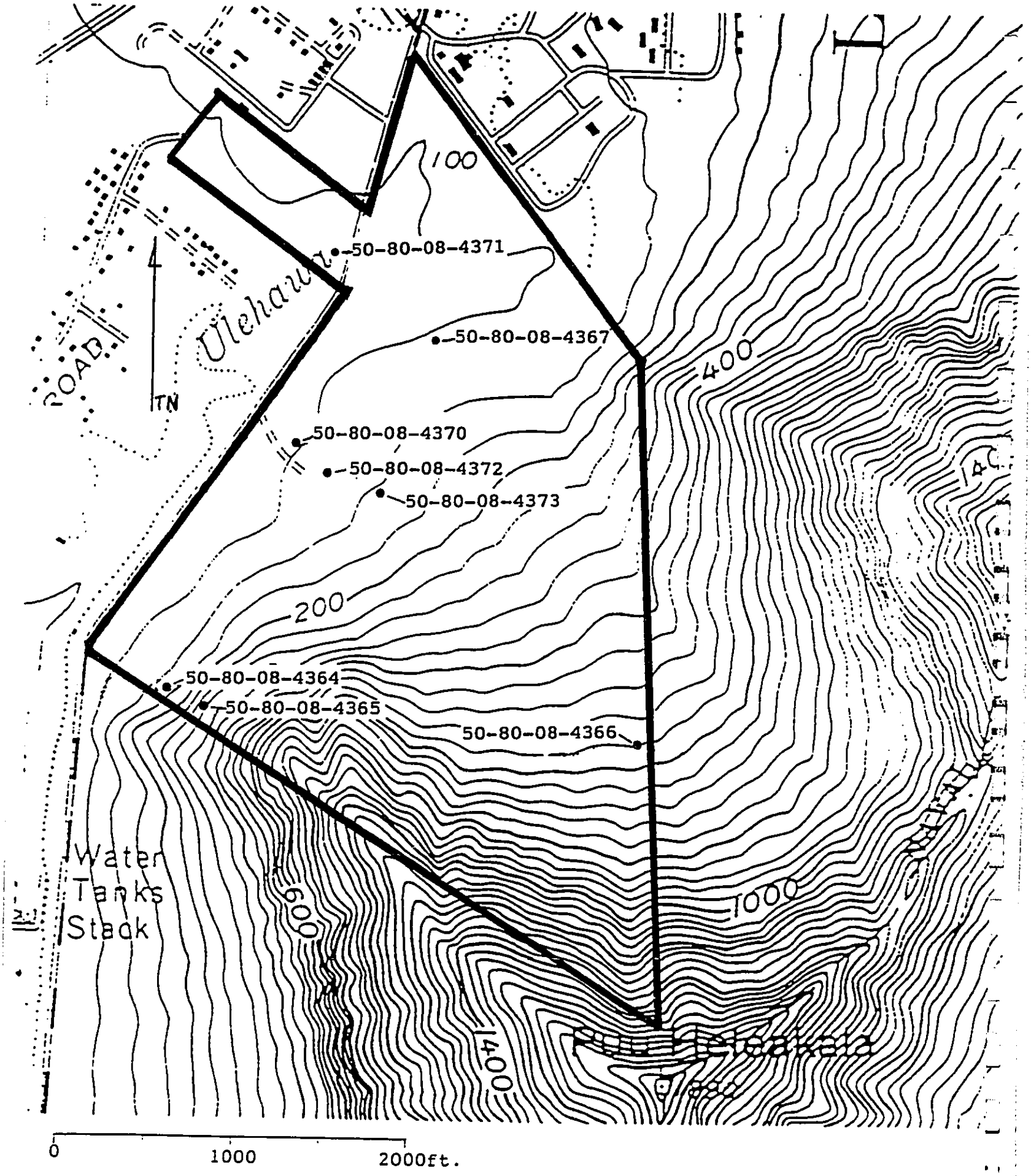

Figure 6 Project Area Showing Site Locations

Access to the property was gained from Lualualei U.S. Naval Road on the northwest boundary. Three gates along this road were used to enter the project area. A crew of three-four archaeologists, spaced at intervals of 50 ft.-100 ft. depending on the vegetation and visibility, systematically surveyed the property by pedestrian sweeps (usually west to east). The steep slope and cliffs along Pu'u Heleakala rendered the ground survey impossible above the 400 ft. to 600 ft. elevation.

All sites were recorded by formal category and given temporary site numbers. Fieldwork at each site included triangulating and mapping its location onto a project map; interpreting the site's nature, extent, and probable function; and searching for the presence of surface artifacts. Specific sites were mapped - using a compass and tape - and photographed. All sites were flagged with heavy yellow construction tape. Edges of sweeps were marked with pink or red flagging tape.

Following the fieldwork all sites were given State Site numbers. Two sites that were originally given temporary site numbers were later determined to be noncultural. Consequently, gaps exist in the temporary site number list.

B. Project Area Description

The project area comprises vacant, unused lands. It is undeveloped and contains several remnant and abandoned historic structures.

The project area extends in a northeasterly direction from

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Access to the property was gained from Lualualei U.S. Naval Road on the northwest boundary. Three gates along this road were used to enter the project area. A crew of three-four archaeologists, spaced at intervals of 50 ft.-100 ft. depending on the vegetation and visibility, systematically surveyed the property by pedestrian sweeps (usually west to east). The steep slope and cliffs along Pu'u Heleakala rendered the ground survey impossible above the 400 ft. to 600 ft. elevation.

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Following the fieldwork all sites were given State Site numbers. Two sites that were originally given temporary site numbers were later determined to be noncultural. Consequently, gaps exist in the temporary site number list.

B. Project Area Description

The project area comprises vacant, unused lands. It is undeveloped and contains several remnant and abandoned historic structures.

The project area extends in a northeasterly direction from

Lualualei Naval Road to the foothills of Pu'u Heleakala. Below the 200-foot elevation level the terrain is fairly level with gradual slope. Above the 200-foot elevation level the terrain slopes steeply uphill toward Pu'u Heleakala Ridge which is at approximately the 1880-foot elevation level (no golf course construction will occur beyond the 400-ft. elevation).

The lower, flatter portion of the project area adjacent to the Lualualei Naval Road consists mostly of weedy grasses and koa haole shrubs. Approximately 15 acres located in the north portion of the project area were cultivated for vegetable crops until early 1988; much of the irrigation system is still evident. Kiawe trees and wild grasses dominate the remaining portion of the project area along the foothills of Pu'u Heleakala. Above the 250-foot elevation level, steep outcroppings dominate and the vegetation is low shrubs and grasses. A number of Wiliwili trees were present in the project area most especially along the foothills of Pu'u Heleakala.

The major soil types in the project area consist mostly of Lualualei extremely stony clay 3 to 35 percent slopes (LPE) with some Lualualei clay 2 to 6 percent slopes (LuB) covering the flatter portions of the project area adjacent to the Lualualei Naval Road (Foote et al. 1972).

II. Cultural Setting

A. Prehistory and Early History

Numerous Hawaiian legends, in addition to archaeological evidence, reveal the Wai'anae coast and mauka interior to be an important center of Hawaiian prehistory and early history.

The present study area is located in the ahupua'a of Lualualei which extends from the leeward ridge of the Wai'anae Range to the coast between Nanakuli Valley to the south and Wai'anae Valley to the north.

Traditional accounts of Lualualei focus on the mythological cycle of the demi-god Maui. Samuel Kamakau cites Ulehawa Stream at the coast of Lualualei as the birthplace of the Polynesian demi-god Maui and his brothers: it was here that Maui learned the secret of making fire for mankind and perfected his fishing skills. Other famous accounts of Maui at Ulehawa Stream refer to: the cave in which Hina (moon goddess, mother of Maui) made her tapa; the fishhook, Manai-a-ka-lani (with which Maui attempted to unite the Hawaiian Islands); the snare for catching the sun (which Maui used to advantage on Haleakala); and the place where Maui's adzes were made (Kamakau, 1961).

John Papa I'i describes three trails crossing over the mountains into Lualualei Valley and running along the coastline from 'Ewa. These trails are certainly of some antiquity with the southern-most trail through Pohakea Pass possibly once traversing a portion of the present study area along Ulehawa Stream.

During prehistory the arid coastal regions of Nanakuli and

Lualualei Valley likely supported a sparse population which was limited to isolated, perhaps temporary, habitations focusing on fishing; this scene was undoubtedly similar to George Vancouver's description of the Wai'anae coast observed at the time of contact. Here, Vancouver reported seeing "one barren, rocky waste, nearly destitute of verdure, cultivation or inhabitants" with only a "few straggling fishing huts" scattered along the coastline (in McGrath et al., 1973:17). Amidst the sparsely inhabited expanse he observed at the leeward coast, Vancouver encountered a village along the beach at Wai'anae, where he was offered a number of hogs and a wide variety of vegetables (Handy and Handy, 1972:468). Wai'anae - the wettest valley on the leeward side of O'ahu - was the largest settlement on the coast. Roger C. Green suggests it was one of the first Hawaiian settlements in the Wai'anae District (Green, 1980:72).

A story told by Mary Kawena Pukui about how Nanakuli Valley got its name clearly reveals the early Hawaiians' struggle and the unique character formed by adapting to the more unfavorable environments of the leeward coast:

> '...Because of the great scarcity of water and vegetable food, they [the Nanakuli people] were ashamed to greet passing strangers. They remained out of sight as much as possible. Sometimes they met people before they were able to hide, so they just looked at strangers with expressionless faces and acted as though they were stone deaf and did not hear the greeting. This was so that the strangers would not ask for water which they did not have in that locality...So the place they lived was called Nana, or look, and kuli, deaf--that is, Deaf mutes who just look.' (in Sterling and Summers, 1978:61-62)

Although these and various other historic accounts describe the coastal regions of Nanakuli and Lualualei as relatively uninhabited because of their limited subsistence resources, archaeological evidence suggests that late prehistoric and early historic land usage occurred inland of the coastline.

Subsequent to western contact in the area (after ca. 1790), the landscape of Lualualei Valley and the surrounding slopes of the Wai'anae Mountains were adversely impacted by the removal of the sandalwood forest and by the introduction of domesticated animals and new vegetation species.

In the early 1800s when Wai'anae fist became involved in the sandalwood trade, King Kamehameha the Great ordered the people of the leeward district to cut sandalwood to pay for the ship "Columbia" which he purchased at the price of "twice the full of the vessel" (in Hammatt et al., 1985:24). In addition to obliterating the sandalwood forest, the intensive sandalwood trade adversely impacted the traditional Hawaiian culture. Kamakau writes that because so many commoners were ordered to participate in the harvesting of sandalwood "famine was experienced from Hawaii to Kauai" forcing the people to "eat herbs and fern roots because there was no food to be had" (in McGrath et al. 1973:18). As a result of an accelerated oppression of the people following the death of Kamehameha in 1819 - when control of the rich sandalwood trade was placed in the hands of local chiefs - the people of Wai'anae pulled out the sandalwood saplings to avoid future harvesting (Ibid.).

Domesticated animals including goats, sheep, and cattle were brought to the Hawaiian Islands by Vancouver in the early 1790s and allowed to graze freely about the land for some time after. It is unclear when the domesticated animals were first brought to O'ahu; however, L.A. Henke reports the existence of a longhorn cattle ranch in Wai'anae by at least 1840 (Frierson, 1972:10). During this same period, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the dwindling sandalwood forest and erosional effects of animal grazing. The following dates of specific vegetation introduced to Hawai'i are given by R. Smith and outlined by Frierson (1972:-10-11):

1) "early," c. 1790
   Prickly pear cactus, Opuntia tuna
   Haole koa, leucaena glauca
   Guava, Psidium guajava

2) 1835-1840
   Burmuda [sic] grass Cynodon dactylon
   Wire grass, Eleusine indica

3) Lantana, Lantana camara

The kiawe tree was also introduced during this period, either in 1828 or 1837 (Ibid.:11).

Following the western encroachment into the Wai'anae Coast, a swift decline in population occurred due to disease and a "tendency to move to the city where there was more excitement" (McGrath et al., 1973:25). In 1835, a missionary census listed 1,654 residents on the Wai'anae Coast. This was a small fraction

of the 4000-6000 inhabitants estimated to have lived in Wai'anae in 1778 by state statistician Robert Schmitt (Ibid.). The population of the Wai'anae Coast was decimated by a small pox epidemic in late 1853. In 1855, the Wai'anae tax collector recorded 183 taxpayers on the leeward coast, which is thought to represent a total population of about 800 people. This catastrophic depopulation facilitated the passing of large tracts of land into the hands of few landholders and led to the decline of the traditional Hawaiian economy that once supported the region.

B. Mid to Late 19th Century

During the Great Mahele in the mid 1800s, the ahupua'a(s) of Wai'anae, Lualualei, and Nanakuli became crown lands and were intended to be personal property of the king and his heirs providing sufficient revenue to support the king and his family (Haun and Kelly, 1984:35). In Lualualei six lands claims were awarded to at least eight families in Puhawa'i located at the northern end of the valley. According to information provided by the claimants in the Register of the Land Commissioners to Quiet Land Titles, these families were cultivating "a total of at least 163 lo'i or taro pondfields, in addition to dryland crops on the kula and wauke in the small valleys" (Ibid.:32).

Between 1850 and 1880, ranching was the leading industry of the Wai'anae Coast. During this time and prior to 1886 (year of King Kamehameha IV's death) large tracts of crown lands in the Wai'anae District were sold with fee simple titles or placed

under long-term leases to various entrepreneurs and families such as Samuel Andrews in Makua Valley; the Dowsetts in Nanakuli, Lualualei, Mikilua, and later in Wai'anae; and the Holt clan in Makaha.

In 1878, Hermann A. Widemann - a retired Supreme Court Justice - began Wai'anae Plantation, the first sugar plantation on O'ahu. Roger Green reports that "between 1878 and 1884 the economy and community of Wai'anae underwent a major change, in which the former Hawaiian landscape virtually disappeared" (Green, 1980:12). With the hiring of 20 local Hawaiians, 15 haole technicians and almost 60 Chinese laborers, Widemann essentially created a town at Wai'anae to support the cultivation and processing of sugarcane. This included the building of 24 new houses and a manager's residence along with a sugar mill and various extensive irrigation systems. In 1884, the Hawaiian Directory reported Wai'anae to be the largest settlement on the island outside of Honolulu. By 1890 the Wai'anae Sugar Plantation had over 600 acres in sugar cultivation, 12 miles of railroad and 350 laborers; the 1890 census reported 903 residents in the Wai'anae District.

On George Bower's trip around O'ahu in 1880, he described Lualualei Valley as "occupied as a grazing farm" by Dowsett and Galbraith who leased "sixteen thousand acres from the Crown" (in Haun and Kelly, 1984:32).

Following the overthrow of the Hawaiian monarchy in 1893, crown lands along with government lands became recognized as

public domain and subsequently became available for homesteading.

C. 20th Century

At the turn of this century the ahupua'a of Lualualei was divided into numerous homestead lots. The largest homestead lot (including the present study area) totaled 2,629 acres and was sold to H.M. von Holt in 1903 for ranching cattle (Haun and Kelly, 1984:37-38). The majority of the present study area continued to be used for cattle ranching and was probably once included in the extensive McCandless Cattle Ranch covering a large portion of Lualualei Valley. By 1929 over 8,184 acres of the McCandless Cattle Ranch land, "the area which now constitutes the Lualualei branch" (in Haun and Kelly, 1984:41) had been purchased by the U.S. Military.

Although most of the present study area continued to be utilized for cattle ranching up into modern times, the northeast portion of the lot was used by the military, as is evidenced by the presence of a few quonset huts and associated military debris.

D. Modern Land Use

During more recent times the project area has been vacant and unused with the exception of roughly 15 acres along the northern portion which was leased to tenant farmers - Mr. and Mrs. Ryoei Higa - for vegetable cultivation. After initial protest, an amicable agreement was reached between the owner and

tenants, and the Higas stopped farming and terminated the lease in 1988.

III. Previous Archaeological Work

No archaeological research has been conducted within the project area prior to this present study.

The earliest attempt to record archaeological sites in the nearby regions of Lualualei and Nankuli was in the 1930s by J. Gilbert McAllister. Sites located closest to the present study area include Nioiula Heiau, Ilihune Heiau and a large rock referred to as "Maui" (McAllister, 1933:110).

Nioiula Heiau (State Site no. 50-80-08-1179) is located on Halona Ridge near Pohakea Pass. The site is described as a paved and walled heiau with the northern portion almost completely destroyed after many of its stones were removed to build a cattle pen for the McCandless Ranch. The site is said to have been of ancient antiquity, once belonging to the chief Kakuihewa. In addition, McAllister suggests it to be the "heiau on which was placed the body of the boxer killed by Kewalo" (Ibid.).

Ilihune Heiau (State Site no. ?) is located on the Nanakuli side of the western ridge of Pu'u Heleakala and was originally described by Thomas G. Thrum as "a small walled heiau of Pookanaka class; used about 1860 by Frank Manini as a cattle pen, for which natives prophesied his poverty and death" (in McAllister, 1933:110). McAllister only approximated the location of this site as no surface structure or structures remained.

The large rock, referred to as "Maui," is located on the coast near Ulehawa Stream. Oral tradition denotes this rock as the place where the demi-god Maui "reposed and sunned himself"