JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

February 28, 2001

'01 MAR -2 P2:39 OFC. OF ENVIRONMENTAL QUALITY CONTROL

'01 FEB 30 P2:37 OFC. OF ENVIRONMENTAL QUALITY CONTROL

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

RE: Final Environmental Assessment (FEA) for the 184 Unit Napili Villas, TMK: 4-3-003:110, 122, and 123, Napili, Maui, Hawaii

The Maui Planning Commission (Commission) on February 27, 2001 reviewed the final environmental assessment for the subject project, and has made a Finding of No Significant Impact (FONSI). Please publish the FONSI for this project in the March 23, 2001 issue of the Office of Environmental Quality Control (OEQC) Environmental Notice.

Enclosed is a completed OEQC Publication Form and four copies of the final EA. The project summary was sent during the draft EA submittal and remains the same. Also, a copy of the final EA was sent to the Lahaina Public Library by copy of this letter. If you have any questions, please call Ms. Colleen Suyama, Staff Planner, of our office at 270-7735.

Very truly yours,

John E. Min

JOHN E. MIN
Director of Planning

JEM:CMS:
Enclosures
c: Clayton Yoshida, AICP, Deputy Planning Director
Colleen Suyama, Staff Planner
Kathy Inouye, General Services, Inc.
Gwen Ohashi Hiraga, Munekiyo & Hiraga, Inc.
Lahaina Public Library
Project File
General File (K:\WP_DOCS\PLANNING\SM1\00sm124NapiliVillas\OEQCTransmittalFinalEA.wpd)

Appendix B Levels of Service Definitions

The *Highway Capacity Manual* defines six Levels of Service (LOS), labeled A through F, from best to worst conditions. Levels of Service for signalized and unsignalized intersections are defined in terms of average user delays. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time.

For unsignalized intersections, the *Highway Capacity Manual* evaluates gaps in the major street traffic flow and calculates available gaps for left-turns across oncoming traffic and for the left and right-turns onto the major roadway from the minor street.

LEVEL-OF-SERVICE A: Little or no delay.

LEVEL-OF-SERVICE B: Short traffic delays.

LEVEL-OF-SERVICE C: Average traffic delays.

LEVEL-OF-SERVICE D: Long traffic delays.

LEVEL-OF-SERVICE E: Very long traffic delays.

LEVEL-OF-SERVICE F: Demand volume exceeds capacity, resulting in extreme delays with queuing that may cause severe congestion and affect other movements at the intersection.

Appendix C Intersection Capacity Analysis Worksheets

Existing
Intersection Operation Analyses

Center For Microcomputers In Transportation
University of Florida
512 Weil Hall
Gainesville, FL 32611-6585
Ph: (352) 392-0378

Streets: (N-S) Honoapiilani Hwy (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst.................. Laurel Chun
Date of Analysis.......... 8/11/0
Other Information......... AM PEAK HOUR, EXISTING YEAR 2000
Two-way Stop-controlled Intersection

	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R
No. Lanes	1	1	1	1	1	1	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	196	269	15	3	138	24	39	3	286	8	5	8
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	283	145
Potential Capacity: (pcph)	995	1169
Movement Capacity: (pcph)	995	1169
Prob. of Queue-Free State:	0.99	0.72

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	299	170
Potential Capacity: (pcph)	1235	1423
Movement Capacity: (pcph)	1235	1423
Prob. of Queue-Free State:	1.00	0.84

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	662	653
Potential Capacity: (pcph)	490	496
Capacity Adjustment Factor due to Impeding Movements	0.84	0.84
Movement Capacity: (pcph)	411	416
Prob. of Queue-Free State:	0.99	0.99

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	790	644
Potential Capacity: (pcph)	369	449
Major LT, Minor TH Impedance Factor:	0.83	0.83
Adjusted Impedance Factor:	0.87	0.87
Capacity Adjustment Factor due to Impeding Movements	0.62	0.86
Movement Capacity: (pcph)	230	386

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	45	386 >	388	10.6	0.4	C	
EB T	3	416 >					5.1
EB R	331	1169		4.3	1.3	A	
WB L	9	230 >	279	13.6	0.0	C	
WB T	6	411 >					9.8
WB R	9	995		3.7	0.0	A	
NB L	227	1423		3.0	0.6	A	1.2
SB L	3	1235		2.9	0.0	A	0.1

Intersection Delay = 2.5 sec/veh

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512 Weil Hall
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Ph: (352) 392-0378

Streets: (N-S) Honoapiilani Hwy (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst.................. Laurel Chun
Date of Analysis.......... 8/11/0
Other Information......... PM PEAK HOUR, EXISTING YEAR 2000
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	272	243	9	8	309	53	40	4	433	17	10	7
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	256	325
Potential Capacity: (pcph)	1027	948
Movement Capacity: (pcph)	1027	948
Prob. of Queue-Free State:	0.99	0.47

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	265	381
Potential Capacity: (pcph)	1282	1129
Movement Capacity: (pcph)	1282	1129
Prob. of Queue-Free State:	0.99	0.72

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	931	884
Potential Capacity: (pcph)	354	375
Capacity Adjustment Factor due to Impeding Movements	0.72	0.72
Movement Capacity: (pcph)	253	268
Prob. of Queue-Free State:	0.95	0.99

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	1106	884
Potential Capacity: (pcph)	242	326
Major LT, Minor TH Impedance Factor:	0.71	0.68
Adjusted Impedance Factor:	0.77	0.75
Capacity Adjustment Factor due to Impeding Movements	0.36	0.75
Movement Capacity: (pcph)	88	244

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	46	244 >	246	18.3	0.7	C	
EB T	4	268 >					8.9
EB R	502	948		8.0	3.3	B	
WB L	20	88 >	116	42.5	0.9	E	
WB T	12	253 >					34.4
WB R	8	1027		3.5	0.0	A	
NB L	315	1129		4.4	1.3	A	2.3
SB L	9	1282		2.8	0.0	A	0.1

Intersection Delay = 4.7 sec/veh

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Ph: (352) 392-0378

Streets: (N-S) Hanawai Street (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/11/0
Other Information.........Existing year 2000 AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	< 0	1	1	< 0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	7	161	35	13	152	14	51	6	32	45	8	23
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	188	168
Potential Capacity: (pcph)	1112	1138
Movement Capacity: (pcph)	1112	1138
Prob. of Queue-Free State:	0.97	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	206	175
Potential Capacity: (pcph)	1367	1415
Movement Capacity: (pcph)	1367	1415
Prob. of Queue-Free State:	0.99	0.99

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	384	394
Potential Capacity: (pcph)	686	678
Capacity Adjustment Factor due to Impeding Movements	0.98	0.98
Movement Capacity: (pcph)	675	667
Prob. of Queue-Free State:	0.99	0.99

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	392	396
Potential Capacity: (pcph)	628	624
Major LT, Minor TH Impedance Factor:	0.97	0.97
Adjusted Impedance Factor:	0.98	0.98
Capacity Adjustment Factor due to Impeding Movements	0.95	0.95
Movement Capacity: (pcph)	600	591

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	59	600 >	607	6.7	0.3	B	
NB T	7	675 >					5.5
NB R	37	1112		3.3	0.0	A	
SB L	52	591 >	601	6.7	0.3	B	
SB T	9	667 >					5.6
SB R	26	1138		3.2	0.0	A	
EB L	8	1415		2.6	0.0	A	0.1
WB L	15	1367		2.7	0.0	A	0.2

Intersection Delay = 1.8 sec/veh

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Center For Microcomputers In Transportation
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512 Weil Hall
Gainesville, FL   32611-6585
Ph: (352) 392-0378

Streets: (N-S) Hanawai Street   (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/11/0
Other Information.........Existing Year 2000 PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	< 0	1	1	< 0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	29	286	78	23	208	45	67	11	38	43	12	19
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

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Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	342	242
Potential Capacity: (pcph)	929	1044
Movement Capacity: (pcph)	929	1044
Prob. of Queue-Free State:	0.95	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	383	266
Potential Capacity: (pcph)	1126	1280
Movement Capacity: (pcph)	1126	1280
Prob. of Queue-Free State:	0.98	0.97

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	663	680
Potential Capacity: (pcph)	490	480
Capacity Adjustment Factor due to Impeding Movements	0.95	0.95
Movement Capacity: (pcph)	466	456
Prob. of Queue-Free State:	0.97	0.97

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	656	666
Potential Capacity: (pcph)	442	436
Major LT, Minor TH Impedance Factor:	0.92	0.92
Adjusted Impedance Factor:	0.94	0.94
Capacity Adjustment Factor due to Impeding Movements	0.92	0.90
Movement Capacity: (pcph)	407	391

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	78	407 >	414	11.1	0.9	C	8.8
NB T	13	466 >					
NB R	44	929		4.1	0.0	A	
SB L	50	391 >	404	10.6	0.6	C	8.8
SB T	14	456 >					
SB R	22	1044		3.5	0.0	A	
EB L	34	1280		2.9	0.0	A	0.2
WB L	26	1126		3.3	0.0	A	0.3

Intersection Delay = 2.1 sec/veh

Center For Microcomputers In Transportation
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512 Weil Hall
Gainesville, FL 32611-6585
Ph: (352) 392-0378

Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/11/0
Other Information.........Existing year 2000 AM Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1 <	0	0	> 1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		51	45	157	35					39		190
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	78	
Potential Capacity: (pcph)	1264	
Movement Capacity: (pcph)	1264	
Prob. of Queue-Free State:	0.83	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	101	
Potential Capacity: (pcph)	1534	
Movement Capacity: (pcph)	1534	
Prob. of Queue-Free State:	0.88	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.88	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	280	
Potential Capacity: (pcph)	729	
Major LT, Minor TH Impedance Factor:	0.88	
Adjusted Impedance Factor:	0.88	
Capacity Adjustment Factor due to Impeding Movements	0.88	
Movement Capacity: (pcph)	641	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	45	641		6.0	0.1	B	
							3.9
WB R	220	1264		3.4	0.7	A	
SB L	182	1534		2.7	0.4	A	2.2

Intersection Delay = 2.5 sec/veh

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HCS: Unsignalized Intersections   Release 2.1g    HONOPM.HC0      Page 1
=======================================================================
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Ph: (352) 392-0378
=======================================================================
Streets: (N-S) Lower Honoapiilani             (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/11/0
Other Information.........Existing year 2000 PM Peak Hour
Two-way Stop-controlled Intersection
=======================================================================
           | Northbound  | Southbound  |  Eastbound  |  Westbound
           | L    T    R | L    T    R | L    T    R | L    T    R
           |---- ---- ----|---- ---- ----|---- ---- ----|---- ---- ----
No. Lanes  | 0    1  < 0 | 0  > 1    0 | 0    0    0 | 1    0    1
Stop/Yield |           N|           N|             |
Volumes    |      96   50| 344  86     |             |  66       230
PHF        |     .95  .95| .95 .95     |             | .95       .95
Grade      |       0     |      0      |             |       0
MC's (%)   |             |             |             |
SU/RV's (%)|             |             |             |
CV's (%)   |             |             |             |
PCE's      |             |1.10         |             |1.10      1.10
-----------------------------------------------------------------------


                     Adjustment Factors

Vehicle                                 Critical          Follow-up
Maneuver                                Gap (tg)          Time (tf)
------------------------------------------------------------------
Left Turn Major Road                      5.00              2.10
Right Turn Minor Road                     5.50              2.60
Through Traffic Minor Road                6.00              3.30
Left Turn Minor Road                      6.50              3.40
```

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	128	
Potential Capacity: (pcph)	1193	
Movement Capacity: (pcph)	1193	
Prob. of Queue-Free State:	0.78	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	154	
Potential Capacity: (pcph)	1448	
Movement Capacity: (pcph)	1448	
Prob. of Queue-Free State:	0.73	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.71	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	580	
Potential Capacity: (pcph)	489	
Major LT, Minor TH Impedance Factor:	0.71	
Adjusted Impedance Factor:	0.71	
Capacity Adjustment Factor due to Impeding Movements	0.71	
Movement Capacity: (pcph)	347	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	76	347		13.3	0.9	C	6.0
WB R	266	1193		3.9	1.0	A	
SB L	398	1448		3.4	1.3	A	2.7

Intersection Delay = 3.4 sec/veh

Year 2002 Baseline
Intersection Operation Analyses

```
HCM: SIGNALIZED INTERSECTION SUMMARY    Version 2.4g        08-11-2000
              Center For Microcomputers In Transportation
==========================================================================
Streets: (E-W) Napilihau Street              (N-S) Honoapiilani Hwy
Analyst: Laurel Chun                         File Name: HWYAM02.HC9
Area Type: Other                             8-11-0 AM Peak
=====================================================YEAR 2002 BASELINE
             |  Eastbound     |  Westbound     |  Northbound    |  Southbound
             |  L    T    R   |  L    T    R   |  L    T    R   |  L    T    R
             |---- ---- ----  |---- ---- ---- |---- ---- ----  |---- ---- ----
No. Lanes    |  0  > 1    1   |  0  > 1    1   |  1    1    1   |  1    1    1
Volumes      |  44    3  297  |  8    5    8   | 219  302   17  |  3  144   25
PHF or PK15  |0.95 0.95 0.95  |0.95 0.95 0.95  |0.95 0.95 0.95  |0.95 0.95 0.95
Lane W (ft)  |     12.0 12.0  |     12.0 12.0  |12.0 12.0 12.0  |12.0 12.0 12.0
Grade        |       0        |       0        |       0        |       0
% Heavy Veh  |  2    2    2   |  2    2    2   |  2    2    2   |  2    2    2
Parking      |N      N        |N      N        |N      N        |N      N
Bus Stops    |            0   |            0   |            0   |            0
Con. Peds    |            0   |            0   |            0   |            0
Ped Button   | (Y/N)  Y 14.5 s| (Y/N)  Y 14.5 s| (Y/N)  Y 11.5 s| (Y/N)  Y 11.5
Arr Type     |       3    3   |       3    3   |  3    3    3   |  3    3    3
RTOR Vols    |            0   |            0   |            0   |            0
Lost Time    |3.00 3.00 3.00  |3.00 3.00 3.00  |3.00 3.00 3.00  |3.00 3.00 3.00
Prop. Share  |                |                |                |
Prop. Prot.  |                |                |                |
--------------------------------------------------------------------------
                               Signal Operations
Phase Combination 1     2     3     4  |        5     6     7     8
EB  Left          *                    |NB Left      *     *
    Thru          *                    |   Thru            *     *
    Right         *                    |   Right           *     *
    Peds                               |   Peds
WB  Left          *                    |SB Left      *
    Thru          *                    |   Thru                  *
    Right         *                    |   Right                 *
    Peds                               |   Peds
NB  Right                              |EB Right     *     *
SB  Right                              |WB Right     *
Green          13.0P                   |Green       8.0P 18.0P 21.0P
Yellow/AR       5.0                    |Yellow/AR   0.0   0.0   5.0
Cycle Length:  70 secs  Phase combination order: #1 #5 #6 #7
--------------------------------------------------------------------------
                     Intersection Performance Summary
     Lane   Group:   Adj Sat   v/c     g/C                    Approach:
     Mvmts   Cap      Flow    Ratio   Ratio   Delay   LOS    Delay   LOS
     -----   ----   -------   -----   -----   -----   ---    -----   ---
EB   LT      365     1703     0.134   0.214    16.9    C      7.3     B
     R       927     1583     0.338   0.586     5.8    B
WB   LT      364     1701     0.036   0.214    16.5    C     14.8     B
     R       520     1583     0.015   0.329    12.1    B
NB   L       582     1770     0.397   0.329    14.0    B      9.0     B
     T      1091     1863     0.291   0.586     5.5    B
     R       927     1583     0.019   0.586     4.6    A
SB   L       126     1770     0.024   0.071    23.0    C     13.1     B
     T       612     1863     0.248   0.329    13.1    B
     R       520     1583     0.050   0.329    12.2    B
                 Intersection Delay =    9.2 sec/veh Intersection LOS = B
Lost Time/Cycle, L =    6.0 sec   Critical v/c(x)     = 0.306
--------------------------------------------------------------------------
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HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4g 08-11-2000
Center For Microcomputers In Transportation

Streets: (E-W) Napilihau Street (N-S) Honoapiilani Hwy
Analyst: Laurel Chun File Name: HWYPM02.HC9
Area Type: Other 8-11-0 PM Peak

YEAR 2002 BASELINE

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	> 1	1	0	> 1	1	1	1	1	1	1	1
Volumes	45	4	451	18	10	7	305	272	11	8	321	55
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y	14.5 s	(Y/N)	Y	14.5 s	(Y/N)	Y	11.5 s	(Y/N)	Y	11.5
Arr Type		3	3		3	3	3	3	3	3	3	3
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*	*		
Thru	*				Thru		*	*	
Right	*				Right		*	*	
Peds					Peds				
WB Left	*				SB Left	*			
Thru	*				Thru			*	
Right	*				Right			*	
Peds					Peds				
NB Right					EB Right	*	*		
SB Right					WB Right	*			
Green	13.0P				Green	8.0P	18.0P	21.0P	
Yellow/AR	5.0				Yellow/AR	0.0	0.0	5.0	

Cycle Length: 70 secs Phase combination order: #1 #5 #6 #7

Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	344	1603	0.148	0.214	17.0	C	7.9	B
	R	927	1583	0.512	0.586	6.9	B		
WB	LT	354	1651	0.085	0.214	16.7	C	15.8	C
	R	520	1583	0.013	0.329	12.0	B		
NB	L	582	1770	0.552	0.329	15.5	C	10.6	B
	T	1091	1863	0.262	0.586	5.4	B		
	R	927	1583	0.013	0.586	4.6	A		
SB	L	126	1770	0.063	0.071	23.0	C	15.2	C
	T	612	1863	0.552	0.329	15.5	C		
	R	520	1583	0.112	0.329	12.5	B		

Intersection Delay = 11.0 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.527

HCS: Unsignalized Intersections   Release 2.1g   HANAAM.HC0   Page 1

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Streets: (N-S) Hanawai Street   (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/11/0
Other Information.........Year 2002 Baseline AM Peak Hour
Two-way Stop-controlled Intersection

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	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	< 0	1	1	< 0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	7	177	35	13	176	14	51	6	32	45	8	23
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	204	192
Potential Capacity: (pcph)	1091	1107
Movement Capacity: (pcph)	1091	1107
Prob. of Queue-Free State:	0.97	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	223	200
Potential Capacity: (pcph)	1342	1377
Movement Capacity: (pcph)	1342	1377
Prob. of Queue-Free State:	0.99	0.99

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	426	436
Potential Capacity: (pcph)	652	644
Capacity Adjustment Factor due to Impeding Movements	0.98	0.98
Movement Capacity: (pcph)	641	633
Prob. of Queue-Free State:	0.99	0.99

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	434	438
Potential Capacity: (pcph)	594	590
Major LT, Minor TH Impedance Factor:	0.97	0.97
Adjusted Impedance Factor:	0.98	0.98
Capacity Adjustment Factor due to Impeding Movements	0.95	0.95
Movement Capacity: (pcph)	566	558

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	59	566 >	573	7.1	0.4	B	
NB T	7	641 >					5.8
NB R	37	1091		3.4	0.0	A	
SB L	52	558 >	568	7.1	0.3	B	
SB T	9	633 >					6.0
SB R	26	1107		3.3	0.0	A	
EB L	8	1377		2.6	0.0	A	0.1
WB L	15	1342		2.7	0.0	A	0.2

Intersection Delay = 1.7 sec/veh

HCS: Unsignalized Intersections   Release 2.1g   HANAPM.HC0   Page 1

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Streets: (N-S) Hanawai Street   (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/11/0
Other Information.........Year 2002 Baseline PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1 <	0	1	1 <	0	0 >	1	1	0 >	1	1
Stop/Yield			N			N						
Volumes	29	309	78	23	243	45	67	11	38	43	12	19
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	366	280
Potential Capacity: (pcph)	903	999
Movement Capacity: (pcph)	903	999
Prob. of Queue-Free State:	0.95	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	407	303
Potential Capacity: (pcph)	1097	1229
Movement Capacity: (pcph)	1097	1229
Prob. of Queue-Free State:	0.98	0.97

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	724	742
Potential Capacity: (pcph)	455	445
Capacity Adjustment Factor due to Impeding Movements	0.95	0.95
Movement Capacity: (pcph)	432	422
Prob. of Queue-Free State:	0.97	0.97

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	717	726
Potential Capacity: (pcph)	407	402
Major LT, Minor TH Impedance Factor:	0.92	0.92
Adjusted Impedance Factor:	0.94	0.94
Capacity Adjustment Factor due to Impeding Movements	0.92	0.89
Movement Capacity: (pcph)	373	359

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	78	373 >	380	12.4	1.0	C	
NB T	13	432 >					9.7
NB R	44	903		4.2	0.0	A	
SB L	50	359 >	371	11.7	0.6	C	
SB T	14	422 >					9.7
SB R	22	999		3.7	0.0	A	
EB L	34	1229		3.0	0.0	A	0.2
WB L	26	1097		3.4	0.0	A	0.2

Intersection Delay = 2.2 sec/veh

HCS: Unsignalized Intersections Release 2.1g HONOAM.HC0 Page 1

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Ph: (352) 392-0378

Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/11/0
Other Information.........Year 2002 Baseline AM Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1 <	0	0 >	1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		51	49	169	35					43		210
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	80	
Potential Capacity: (pcph)	1261	
Movement Capacity: (pcph)	1261	
Prob. of Queue-Free State:	0.81	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	106	
Potential Capacity: (pcph)	1526	
Movement Capacity: (pcph)	1526	
Prob. of Queue-Free State:	0.87	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.87	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	295	
Potential Capacity: (pcph)	714	
Major LT, Minor TH Impedance Factor:	0.87	
Adjusted Impedance Factor:	0.87	
Capacity Adjustment Factor due to Impeding Movements	0.87	
Movement Capacity: (pcph)	620	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	50	620		6.3	0.2	B	4.0
WB R	243	1261		3.5	0.8	A	
SB L	196	1526		2.7	0.4	A	2.2

Intersection Delay = 2.6 sec/veh

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Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/11/0
Other Information.........Year 2002 Baseline PM Peak Hour
Two-way Stop-controlled Intersection

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	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1 <	0	0 >	1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		96	54	363	86					74		257
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	130	
Potential Capacity: (pcph)	1190	
Movement Capacity: (pcph)	1190	
Prob. of Queue-Free State:	0.75	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	158	
Potential Capacity: (pcph)	1441	
Movement Capacity: (pcph)	1441	
Prob. of Queue-Free State:	0.71	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.69	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	602	
Potential Capacity: (pcph)	474	
Major LT, Minor TH Impedance Factor:	0.69	
Adjusted Impedance Factor:	0.69	
Capacity Adjustment Factor due to Impeding Movements	0.69	
Movement Capacity: (pcph)	328	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	86	328		14.8	1.1	C	6.4
WB R	298	1190		4.0	1.1	A	
SB L	420	1441		3.5	1.4	A	2.8

Intersection Delay = 3.7 sec/veh

Year 2002 with Phase 1 Traffic Intersection Operation Analyses

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4g 08-14-2000
Center For Microcomputers In Transportation

Streets: (E-W) Napilihau Street (N-S) Honoapiilani Hwy
Analyst: CEY File Name: HWYAM02P.HC9
Area Type: Other 8-11-0 AM Peak
Comment: Year 2002 with Phase 1

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	> 1	1	0	> 1	1	1	1	1	1	1	1
Volumes	46	3	320	8	5	8	225	302	17	3	144	25
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y	14.5 s	(Y/N)	Y	14.5 s	(Y/N)	Y	11.5 s	(Y/N)	Y	11.5
Arr Type		3	3		3	3	3	3	3	3	3	3
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*	*		
Thru	*				Thru		*	*	
Right	*				Right		*	*	
Peds					Peds				
WB Left	*				SB Left	*			
Thru	*				Thru			*	
Right	*				Right			*	
Peds					Peds				
NB Right					EB Right	*	*		
SB Right					WB Right	*			
Green	13.0P				Green	8.0P	18.0P	21.0P	
Yellow/AR	5.0				Yellow/AR	0.0	0.0	5.0	

Cycle Length: 70 secs Phase combination order: #1 #5 #6 #7

Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	Approach: LOS
EB	LT	365	1701	0.140	0.214	16.9	C	7.4	B
	R	927	1583	0.363	0.586	5.9	B		
WB	LT	363	1696	0.036	0.214	16.5	C	14.8	B
	R	520	1583	0.015	0.329	12.1	B		
NB	L	581	1770	0.408	0.329	14.1	B	9.1	B
	T	1091	1863	0.291	0.586	5.5	B		
	R	927	1583	0.019	0.586	4.6	A		
SB	L	126	1770	0.024	0.071	23.0	C	13.1	B
	T	612	1863	0.248	0.329	13.1	B		
	R	520	1583	0.050	0.329	12.2	B		

Intersection Delay = 9.2 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.322

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4g 08-14-2000
Center For Microcomputers In Transportation

Streets: (E-W) Napilihau Street (N-S) Honoapiilani Hwy
Analyst: Laurel Chun File Name: HWYPM02P.HC9
Area Type: Other 8-11-0 PM Peak

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	> 1	1	0	> 1	1	1	1	1	1	1	1
Volumes	46	4	463	18	10	7	329	272	11	8	321	57
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Arr Type		3	3		3	3	3	3	3	3	3	3
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												

Signal Operations

Phase Combination	1	2	3	4
EB Left	*			
Thru	*			
Right	*			
Peds				
WB Left	*			
Thru	*			
Right	*			
Peds				
NB Right				
SB Right				
Green	13.0P			
Yellow/AR	5.0			

	5	6	7	8
NB Left	*	*		
Thru		*	*	
Right		*	*	
Peds				
SB Left	*			
Thru			*	
Right			*	
Peds				
EB Right	*	*		
WB Right	*			
Green	8.0P	18.0P	21.0P	
Yellow/AR	0.0	0.0	5.0	

Cycle Length: 70 secs Phase combination order: #1 #5 #6 #7

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	Approach: LOS
EB	LT	343	1601	0.152	0.214	17.0	C	8.0	B
	R	927	1583	0.525	0.586	7.0	B		
WB	LT	353	1648	0.085	0.214	16.7	C	15.8	C
	R	520	1583	0.013	0.329	12.0	B		
NB	L	581	1770	0.595	0.329	16.1	C	11.2	B
	T	1091	1863	0.262	0.586	5.4	B		
	R	927	1583	0.013	0.586	4.6	A		
SB	L	126	1770	0.063	0.071	23.0	C	15.2	C
	T	612	1863	0.552	0.329	15.5	C		
	R	520	1583	0.115	0.329	12.5	B		

Intersection Delay = 11.2 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.535

HCS: Unsignalized Intersections Release 2.1g PHANAAM.HC0 Page 1

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Streets: (N-S) Hanawai Street (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1 AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1 <	0	1	1 <	0	0 >	1	1	0 >	1	1
Stop/Yield			N			N						
Volumes	7	177	37	19	176	14	59	6	57	45	8	23
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	206	192
Potential Capacity: (pcph)	1089	1107
Movement Capacity: (pcph)	1089	1107
Prob. of Queue-Free State:	0.94	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	225	200
Potential Capacity: (pcph)	1339	1377
Movement Capacity: (pcph)	1339	1377
Prob. of Queue-Free State:	0.98	0.99

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	432	444
Potential Capacity: (pcph)	647	638
Capacity Adjustment Factor due to Impeding Movements	0.98	0.98
Movement Capacity: (pcph)	633	624
Prob. of Queue-Free State:	0.99	0.99

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	441	458
Potential Capacity: (pcph)	588	575
Major LT, Minor TH Impedance Factor:	0.96	0.97
Adjusted Impedance Factor:	0.97	0.97
Capacity Adjustment Factor due to Impeding Movements	0.95	0.92
Movement Capacity: (pcph)	558	527

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	68	558 >	564	7.4	0.4	B	
NB T	7	633 >					5.6
NB R	66	1089		3.5	0.1	A	
SB L	52	527 >	539	7.5	0.3	B	
SB T	9	624 >					6.3
SB R	26	1107		3.3	0.0	A	
EB L	8	1377		2.6	0.0	A	0.1
WB L	22	1339		2.7	0.0	A	0.2

Intersection Delay = 2.0 sec/veh

HCS: Unsignalized Intersections Release 2.1g PHANAPM.HC0 Page 1

Center For Microcomputers In Transportation
University of Florida
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Ph: (352) 392-0378

Streets: (N-S) Hanawai Street (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1 PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1 <	0	1	1 <	0	0 >	1	1	0 >	1	1
Stop/Yield			N			N						
Volumes	29	309	86	49	243	45	72	11	51	43	12	19
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	370	280
Potential Capacity: (pcph)	899	999
Movement Capacity: (pcph)	899	999
Prob. of Queue-Free State:	0.93	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	416	303
Potential Capacity: (pcph)	1086	1229
Movement Capacity: (pcph)	1086	1229
Prob. of Queue-Free State:	0.95	0.97

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	756	778
Potential Capacity: (pcph)	438	426
Capacity Adjustment Factor due to Impeding Movements	0.92	0.92
Movement Capacity: (pcph)	404	392
Prob. of Queue-Free State:	0.97	0.96

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	750	766
Potential Capacity: (pcph)	390	381
Major LT, Minor TH Impedance Factor:	0.89	0.89
Adjusted Impedance Factor:	0.91	0.92
Capacity Adjustment Factor due to Impeding Movements	0.89	0.86
Movement Capacity: (pcph)	349	326

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	84	349 >	355	13.9	1.1	C	
NB T	13	404 >					10.2
NB R	59	899		4.3	0.1	A	
SB L	50	326 >	338	13.1	0.7	C	
SB T	14	392 >					10.7
SB R	22	999		3.7	0.0	A	
EB L	34	1229		3.0	0.0	A	0.2
WB L	57	1086		3.5	0.0	A	0.5

Intersection Delay = 2.5 sec/veh

HCS: Unsignalized Intersections Release 2.1g PHONOAM.HC0 Page 1

Center For Microcomputers In Transportation
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Ph: (352) 392-0378

Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1 AM Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	0	> 1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		51	50	170	35					46		215
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	80	
Potential Capacity: (pcph)	1261	
Movement Capacity: (pcph)	1261	
Prob. of Queue-Free State:	0.80	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	107	
Potential Capacity: (pcph)	1524	
Movement Capacity: (pcph)	1524	
Prob. of Queue-Free State:	0.87	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.87	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	296	
Potential Capacity: (pcph)	714	
Major LT, Minor TH Impedance Factor:	0.87	
Adjusted Impedance Factor:	0.87	
Capacity Adjustment Factor due to Impeding Movements	0.87	
Movement Capacity: (pcph)	620	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	53	620		6.3	0.2	B	4.0
WB R	249	1261		3.6	0.8	A	
SB L	197	1524		2.7	0.5	A	2.2

Intersection Delay = 2.7 sec/veh

HCS: Unsignalized Intersections Release 2.1g PHONOPM.HC0 Page 1

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Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1 PM Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	0	> 1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		96	57	368	86					76		260
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	131	
Potential Capacity: (pcph)	1188	
Movement Capacity: (pcph)	1188	
Prob. of Queue-Free State:	0.75	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	161	
Potential Capacity: (pcph)	1437	
Movement Capacity: (pcph)	1437	
Prob. of Queue-Free State:	0.70	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.69	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	609	
Potential Capacity: (pcph)	470	
Major LT, Minor TH Impedance Factor:	0.69	
Adjusted Impedance Factor:	0.69	
Capacity Adjustment Factor due to Impeding Movements	0.69	
Movement Capacity: (pcph)	323	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	88	323		15.3	1.1	C	6.6
WB R	301	1188		4.1	1.1	A	
SB L	426	1437		3.6	1.4	A	2.9

Intersection Delay = 3.7 sec/veh

Year 2003 Baseline
Intersection Operation Analyses

```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        08-14-2000
          Center For Microcomputers In Transportation
=======================================================================
Streets: (E-W) Napilihau Street        (N-S) Honoapiilani Hwy
Analyst: CEY                           File Name: HWYAM03.HC9
Area Type: Other                       8-14-0 AM Peak
Comment: Year 2003 Baseline
=======================================================================
           |   Eastbound    |   Westbound    |   Northbound   |   Southbound   |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |---- ---- ----|---- ---- ----|---- ---- ----|---- ---- ----
No. Lanes  | 0  > 1    1  | 0  > 1    1  | 1    1    1  | 1    1    1
Volumes    | 46    3  303| 9     5    9| 232  320   18|  3  147   26
PHF or PK15|0.95 0.95 0.95|0.95 0.95 0.95|0.95 0.95 0.95|0.95 0.95 0.95
Lane W (ft)|     12.0 12.0|     12.0 12.0|12.0 12.0 12.0|12.0 12.0 12.0
Grade      |       0      |       0      |       0      |       0
% Heavy Veh|  2    2    2|  2    2    2|  2    2    2|  2    2    2
Parking    |N      N      |N      N      |N      N      |N      N
Bus Stops  |            0|            0|            0|            0
Con. Peds  |            0|            0|            0|            0
Ped Button | (Y/N)  N     | (Y/N)  N     | (Y/N)  N     | (Y/N)  N
Arr Type   |       3    3|       3    3|  3    3    3|  3    3    3
RTOR Vols  |            0|            0|            0|            0
Lost Time  |3.00 3.00 3.00|3.00 3.00 3.00|3.00 3.00 3.00|3.00 3.00 3.00
Prop. Share|              |              |              |
Prop. Prot.|              |              |              |
-----------------------------------------------------------------------
                          Signal Operations
Phase Combination 1     2     3     4  |             5     6     7     8
EB  Left          *                    |NB  Left     *     *
    Thru          *                    |    Thru           *     *
    Right         *                    |    Right          *     *
    Peds                               |    Peds
WB  Left          *                    |SB  Left     *
    Thru          *                    |    Thru                 *
    Right         *                    |    Right                *
    Peds                               |    Peds
NB  Right                              |EB  Right    *     *
SB  Right                              |WB  Right    *
Green          13.0P                   |Green      8.0P 18.0P 21.0P
Yellow/AR       5.0                    |Yellow/AR  0.0   0.0   5.0
Cycle Length:  70 secs  Phase combination order: #1 #5 #6 #7
-----------------------------------------------------------------------
                  Intersection Performance Summary
     Lane  Group:  Adj Sat   v/c     g/C                    Approach:
     Mvmts   Cap    Flow    Ratio   Ratio   Delay  LOS    Delay   LOS
     -----   ----  -------  -----   -----   -----  ---    -----   ---
EB   LT      363    1695    0.140   0.214    16.9   C      7.3     B
     R       927    1583    0.344   0.586     5.8   B
WB   LT      361    1685    0.039   0.214    16.6   C     14.8     B
     R       520    1583    0.017   0.329    12.1   B
NB   L       581    1770    0.420   0.329    14.2   B      9.1     B
     T      1091    1863    0.309   0.586     5.6   B
     R       927    1583    0.020   0.586     4.6   A
SB   L       126    1770    0.024   0.071    23.0   C     13.2     B
     T       612    1863    0.253   0.329    13.1   B
     R       520    1583    0.052   0.329    12.2   B
             Intersection Delay =     9.3 sec/veh Intersection LOS = B
Lost Time/Cycle, L =    6.0 sec   Critical v/c(x)     = 0.311
-----------------------------------------------------------------------
```

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4g 08-14-2000
Center For Microcomputers In Transportation

Streets: (E-W) Napilihau Street (N-S) Honoapiilani Hwy
Analyst: CEY File Name: HWYPM03.HC9
Area Type: Other 8-14-0 PM Peak
Comment: Year 2003 Baseline

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	1	0	> 1	1	1	1	1	1	1	1
Volumes	47	4	459	19	10	7	327	288	12	9	327	56
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Arr Type		3	3		3	3	3	3	3	3	3	3
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*	*		
Thru	*				Thru		*	*	
Right	*				Right		*	*	
Peds					Peds				
WB Left	*				SB Left	*			
Thru	*				Thru			*	
Right	*				Right			*	
Peds					Peds				
NB Right					EB Right	*	*		
SB Right					WB Right	*			
Green	13.0P				Green	8.0P	18.0P	21.0P	
Yellow/AR	5.0				Yellow/AR	0.0	0.0	5.0	

Cycle Length: 70 secs Phase combination order: #1 #5 #6 #7

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	Approach: LOS
EB	LT	341	1593	0.155	0.214	17.0	C	8.0	B
	R	927	1583	0.521	0.586	7.0	B		
WB	LT	351	1639	0.088	0.214	16.7	C	15.9	C
	R	520	1583	0.013	0.329	12.0	B		
NB	L	581	1770	0.592	0.329	16.1	C	11.0	B
	T	1091	1863	0.278	0.586	5.5	B		
	R	927	1583	0.014	0.586	4.6	A		
SB	L	126	1770	0.071	0.071	23.1	C	15.3	C
	T	612	1863	0.562	0.329	15.6	C		
	R	520	1583	0.113	0.329	12.5	B		

Intersection Delay = 11.2 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.536

HCS: Unsignalized Intersections Release 2.1g HANAAM.HC0 Page 1

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Streets: (N-S) Hanawai Street (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2003 Baseline AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	1	1 <	0	1	1 <	0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	7	185	35	13	190	14	51	6	32	45	8	23
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	214	208
Potential Capacity: (pcph)	1079	1086
Movement Capacity: (pcph)	1079	1086
Prob. of Queue-Free State:	0.97	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	232	215
Potential Capacity: (pcph)	1329	1354
Movement Capacity: (pcph)	1329	1354
Prob. of Queue-Free State:	0.99	0.99

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	450	460
Potential Capacity: (pcph)	633	626
Capacity Adjustment Factor due to Impeding Movements	0.98	0.98
Movement Capacity: (pcph)	622	615
Prob. of Queue-Free State:	0.99	0.99

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	458	462
Potential Capacity: (pcph)	575	572
Major LT, Minor TH Impedance Factor:	0.97	0.97
Adjusted Impedance Factor:	0.98	0.98
Capacity Adjustment Factor due to Impeding Movements	0.95	0.94
Movement Capacity: (pcph)	548	540

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	59	548 >	555	7.4	0.4	B	6.0
NB T	7	622 >					
NB R	37	1079		3.5	0.0	A	
SB L	52	540 >	550	7.4	0.3	B	6.2
SB T	9	615 >					
SB R	26	1086		3.4	0.0	A	
EB L	8	1354		2.7	0.0	A	0.1
WB L	15	1329		2.7	0.0	A	0.2

Intersection Delay = 1.7 sec/veh

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Ph: (352) 392-0378

Streets: (N-S) Hanawai Street (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2003 Baseline PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1 <	0	1	1 <	0	0 >	1	1	0 >	1	1
Stop/Yield			N			N						
Volumes	29	319	78	23	266	45	67	11	38	43	12	19
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	377	304
Potential Capacity: (pcph)	892	971
Movement Capacity: (pcph)	892	971
Prob. of Queue-Free State:	0.95	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	418	327
Potential Capacity: (pcph)	1084	1197
Movement Capacity: (pcph)	1084	1197
Prob. of Queue-Free State:	0.98	0.97

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	759	776
Potential Capacity: (pcph)	436	427
Capacity Adjustment Factor due to Impeding Movements	0.95	0.95
Movement Capacity: (pcph)	413	405
Prob. of Queue-Free State:	0.97	0.97

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	752	762
Potential Capacity: (pcph)	388	383
Major LT, Minor TH Impedance Factor:	0.92	0.92
Adjusted Impedance Factor:	0.94	0.94
Capacity Adjustment Factor due to Impeding Movements	0.91	0.89
Movement Capacity: (pcph)	355	341

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	78	355 >	362	13.3	1.0	C	
NB T	13	413 >					10.3
NB R	44	892		4.2	0.0	A	
SB L	50	341 >	353	12.4	0.7	C	
SB T	14	405 >					10.2
SB R	22	971		3.8	0.0	A	
EB L	34	1197		3.1	0.0	A	0.2
WB L	26	1084		3.4	0.0	A	0.2

Intersection Delay = 2.2 sec/veh

HCS: Unsignalized Intersections Release 2.1g HONOAM.HC0 Page 1

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Ph: (352) 392-0378

Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst.................. cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2003 Baseline AM Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1 <	0	0	> 1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		51	51	175	35					45		222
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	81	
Potential Capacity: (pcph)	1260	
Movement Capacity: (pcph)	1260	
Prob. of Queue-Free State:	0.80	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	108	
Potential Capacity: (pcph)	1523	
Movement Capacity: (pcph)	1523	
Prob. of Queue-Free State:	0.87	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.86	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	302	
Potential Capacity: (pcph)	708	
Major LT, Minor TH Impedance Factor:	0.86	
Adjusted Impedance Factor:	0.86	
Capacity Adjustment Factor due to Impeding Movements	0.86	
Movement Capacity: (pcph)	612	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	52	612		6.4	0.2	B	4.1
WB R	257	1260		3.6	0.9	A	
SB L	202	1523		2.7	0.5	A	2.3

Intersection Delay = 2.7 sec/veh

HCS: Unsignalized Intersections Release 2.1g HONOPM.HC0 Page 1

Center For Microcomputers In Transportation
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512 Weil Hall
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Ph: (352) 392-0378

Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2003 Baseline PM Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1 <	0	0 >	1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		96	55	372	86					79		275
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	130	
Potential Capacity: (pcph)	1190	
Movement Capacity: (pcph)	1190	
Prob. of Queue-Free State:	0.73	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	159	
Potential Capacity: (pcph)	1440	
Movement Capacity: (pcph)	1440	
Prob. of Queue-Free State:	0.70	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.68	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	613	
Potential Capacity: (pcph)	468	
Major LT, Minor TH Impedance Factor:	0.68	
Adjusted Impedance Factor:	0.68	
Capacity Adjustment Factor due to Impeding Movements	0.68	
Movement Capacity: (pcph)	320	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	91	320		15.7	1.2	C	6.7
WB R	318	1190		4.1	1.2	A	
SB L	431	1440		3.6	1.4	A	2.9

Intersection Delay = 3.8 sec/veh

Year 2003 with Phase 1 & 2 Traffic Intersection Operation Analyses

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4g 08-14-2000
Center For Microcomputers In Transportation

Streets: (E-W) Napilihau Street (N-S) Honoapiilani Hwy
Analyst: CEY File Name: HWYAM03P.HC9
Area Type: Other 8-14-0 AM Peak
Comment: Year 2002 with Phase 1&2

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0 >	1	1	0 >	1	1	1	1	1	1	1	1
Volumes	50	3	328	9	5	9	244	320	18	3	148	26
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Arr Type		3	3		3	3	3	3	3	3	3	3
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*	*		
Thru	*				Thru		*	*	
Right	*				Right		*	*	
Peds					Peds				
WB Left	*				SB Left	*			
Thru	*				Thru			*	
Right	*				Right			*	
Peds					Peds				
NB Right					EB Right	*	*		
SB Right					WB Right	*			
Green	13.0P				Green	8.0P	18.0P	21.0P	
Yellow/AR	5.0				Yellow/AR	0.0	0.0	5.0	

Cycle Length: 70 secs Phase combination order: #1 #5 #6 #7

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	362	1689	0.155	0.214	17.0	C	7.5	B
	R	927	1583	0.372	0.586	6.0	B		
WB	LT	359	1673	0.039	0.214	16.6	C	14.8	B
	R	520	1583	0.017	0.329	12.1	B		
NB	L	581	1770	0.442	0.329	14.4	B	9.3	B
	T	1091	1863	0.309	0.586	5.6	B		
	R	927	1583	0.020	0.586	4.6	A		
SB	L	126	1770	0.024	0.071	23.0	C	13.2	B
	T	612	1863	0.255	0.329	13.1	B		
	R	520	1583	0.052	0.329	12.2	B		

Intersection Delay = 9.4 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.330

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4g 08-14-2000
Center For Microcomputers In Transportation

Streets: (E-W) Napilihau Street (N-S) Honoapiilani Hwy
Analyst: CEY File Name: HWYPM03P.HC9
Area Type: Other 8-14-0 PM Peak
Comment: Year 2003 with Phase 1&2

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	> 1	1	0	> 1	1	1	1	1	1	1	1
Volumes	49	4	472	19	10	7	379	288	12	9	329	58
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Arr Type		3	3		3	3	3	3	3	3	3	3
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*	*		
Thru	*				Thru		*	*	
Right	*				Right		*	*	
Peds					Peds				
WB Left	*				SB Left	*			
Thru	*				Thru			*	
Right	*				Right			*	
Peds					Peds				
NB Right					EB Right	*	*		
SB Right					WB Right	*			
Green	13.0P				Green	8.0P	18.0P	21.0P	
Yellow/AR	5.0				Yellow/AR	0.0	0.0	5.0	

Cycle Length: 70 secs Phase combination order: #1 #5 #6 #7

Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LT	340	1588	0.165	0.214	17.0	C	8.1	B
	R	927	1583	0.536	0.586	7.1	B		
WB	LT	349	1630	0.089	0.214	16.7	C	15.9	C
	R	520	1583	0.013	0.329	12.0	B		
NB	L	581	1770	0.686	0.329	17.8	C	12.4	B
	T	1091	1863	0.278	0.586	5.5	B		
	R	927	1583	0.014	0.586	4.6	A		
SB	L	126	1770	0.071	0.071	23.1	C	15.3	C
	T	612	1863	0.565	0.329	15.6	C		
	R	520	1583	0.117	0.329	12.5	B		

Intersection Delay = 11.8 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.546

HCS: Unsignalized Intersections   Release 2.1g   PHANAAM.HC0   Page 1

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Gainesville, FL   32611-6585
Ph: (352) 392-0378

Streets: (N-S) Hanawai Street   (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1&2 AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	< 0	1	1	< 0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	7	185	40	25	190	14	69	6	61	45	8	23
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	216	208
Potential Capacity: (pcph)	1076	1086
Movement Capacity: (pcph)	1076	1086
Prob. of Queue-Free State:	0.93	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	237	215
Potential Capacity: (pcph)	1322	1354
Movement Capacity: (pcph)	1322	1354
Prob. of Queue-Free State:	0.98	0.99

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	464	478
Potential Capacity: (pcph)	623	612
Capacity Adjustment Factor due to Impeding Movements	0.97	0.97
Movement Capacity: (pcph)	606	595
Prob. of Queue-Free State:	0.99	0.98

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	472	492
Potential Capacity: (pcph)	564	549
Major LT, Minor TH Impedance Factor:	0.96	0.96
Adjusted Impedance Factor:	0.97	0.97
Capacity Adjustment Factor due to Impeding Movements	0.94	0.91
Movement Capacity: (pcph)	533	498

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	80	533 >	538	8.0	0.6	B	
NB T	7	606 >					6.0
NB R	70	1076		3.6	0.1	A	
SB L	52	498 >	510	8.0	0.4	B	
SB T	9	595 >					6.6
SB R	26	1086		3.4	0.0	A	
EB L	8	1354		2.7	0.0	A	0.1
WB L	29	1322		2.8	0.0	A	0.3

Intersection Delay = 2.1 sec/veh

HCS: Unsignalized Intersections   Release 2.1g   PHANAPM.HC0   Page 1

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Ph: (352) 392-0378

Streets: (N-S) Hanawai Street   (E-W) Napilihau Street
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1&2 PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	< 0	1	1	< 0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	29	319	97	77	265	45	77	11	53	43	12	19
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	387	304
Potential Capacity: (pcph)	882	971
Movement Capacity: (pcph)	882	971
Prob. of Queue-Free State:	0.93	0.98

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	438	327
Potential Capacity: (pcph)	1060	1197
Movement Capacity: (pcph)	1060	1197
Prob. of Queue-Free State:	0.92	0.97

Step 3: TH from Minor Street	NB	SB
Conflicting Flows: (vph)	826	854
Potential Capacity: (pcph)	402	389
Capacity Adjustment Factor due to Impeding Movements	0.89	0.89
Movement Capacity: (pcph)	358	346
Prob. of Queue-Free State:	0.96	0.96

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	819	836
Potential Capacity: (pcph)	355	347
Major LT, Minor TH Impedance Factor:	0.85	0.86
Adjusted Impedance Factor:	0.89	0.89
Capacity Adjustment Factor due to Impeding Movements	0.87	0.83
Movement Capacity: (pcph)	308	287

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	89	308 >	314	16.9	1.4	C	
NB T	13	358 >					12.2
NB R	62	882		4.4	0.1	A	
SB L	50	287 >	298	15.4	0.8	C	
SB T	14	346 >					12.4
SB R	22	971		3.8	0.0	A	
EB L	34	1197		3.1	0.0	A	0.2
WB L	89	1060		3.7	0.2	A	0.7

Intersection Delay = 2.9 sec/veh

HCS: Unsignalized Intersections   Release 2.1g   PHONOAM.HC0   Page 1

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===

Streets: (N-S) Lower Honoapiilani   (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1&2 AM Peak Hour
Two-way Stop-controlled Intersection

===

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	0	> 1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		51	53	178	35					52		233
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	82	
Potential Capacity: (pcph)	1258	
Movement Capacity: (pcph)	1258	
Prob. of Queue-Free State:	0.79	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	110	
Potential Capacity: (pcph)	1519	
Movement Capacity: (pcph)	1519	
Prob. of Queue-Free State:	0.86	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.86	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	306	
Potential Capacity: (pcph)	704	
Major LT, Minor TH Impedance Factor:	0.86	
Adjusted Impedance Factor:	0.86	
Capacity Adjustment Factor due to Impeding Movements	0.86	
Movement Capacity: (pcph)	606	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	61	606		6.6	0.3	B	4.2
WB R	270	1258		3.6	0.9	A	
SB L	206	1519		2.7	0.5	A	2.3

Intersection Delay = 2.8 sec/veh

HCS: Unsignalized Intersections Release 2.1g PHONOPM.HC0 Page 1

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University of Florida
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Ph: (352) 392-0378

Streets: (N-S) Lower Honoapiilani (E-W) Napilihau Street
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst................... cey
Date of Analysis.......... 8/14/0
Other Information.........Year 2002 w/Phase 1&2 PM Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	0	> 1	0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes		96	63	383	86					83		281
PHF		.95	.95	.95	.95					.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10						1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	134	
Potential Capacity: (pcph)	1184	
Movement Capacity: (pcph)	1184	
Prob. of Queue-Free State:	0.72	

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	167	
Potential Capacity: (pcph)	1427	
Movement Capacity: (pcph)	1427	
Prob. of Queue-Free State:	0.69	
TH Saturation Flow Rate: (pcphpl)	1700	
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:	0.67	

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	628	
Potential Capacity: (pcph)	458	
Major LT, Minor TH Impedance Factor:	0.67	
Adjusted Impedance Factor:	0.67	
Capacity Adjustment Factor due to Impeding Movements	0.67	
Movement Capacity: (pcph)	308	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
WB L	96	308		16.9	1.3	C	7.1
WB R	326	1184		4.2	1.3	A	
SB L	443	1427		3.7	1.5	A	3.0

Intersection Delay = 4.0 sec/veh

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Ph: (352) 392-0378

Streets: (N-S) Honoapiilani Hwy   (E-W) Napili Villas
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst...................
Date of Analysis.......... 8/14/0
Other Information.........   Year 2003 with Phases 1 & 2 am peak hou
r

Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	2	< 0	0	0	1	0	0	0
Stop/Yield			N			N						
Volumes					484	1			26			
PHF					.95	.95			.95			
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's									1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		255
Potential Capacity: (pcph)		1028
Movement Capacity: (pcph)		1028
Prob. of Queue-Free State:		0.97

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
							3.6
EB R	30	1028		3.6	0.0	A	

Intersection Delay = 0.2 sec/veh

HCS: Unsignalized Intersections   Release 2.1g   DWYPM.HCO   Page 1

==

Center For Microcomputers In Transportation
University of Florida
512 Weil Hall
Gainesville, FL   32611-6585
Ph: (352) 392-0378

==

Streets: (N-S) Honoapiilani Hwy   (E-W) Napili Villas
Major Street Direction.... NS
Length of Time Analyzed... 15 (min)
Analyst...................
Date of Analysis.......... 8/14/0
Other Information......... Year 2003 with Phases 1 & 2 pm peak hou
r
Two-way Stop-controlled Intersection

==

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	2	< 0	0	0	1	0	0	0
Stop/Yield			N			N						
Volumes					818	2			14			
PHF					.95	.95			.95			
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's									1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		432
Potential Capacity: (pcph)		836
Movement Capacity: (pcph)		836
Prob. of Queue-Free State:		0.98

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB R	17	836		4.4	0.0	A	4.4

Intersection Delay = 0.1 sec/veh

Appendix D

SHPD Letter Dated January 20, 1998

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

GILBERT COLOMA-AGARAN

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STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

'98 JAN 29 P12:14

RECEIVED

January 20, 1998

Mr. David Blane, Director
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

LOG NO: 20840
DOC NO: 9801BD15

Dear Mr. Blane:

SUBJECT: **Chapter 6E-42 Historic Preservation Review of a Draft Environmental Assessment for the Napilihau Villages**
'Alaeloa Ahupua'a, Lahaina District, Island of Maui
TMK 4-3-3: 108, 110, 122, and 123

This letter is a Historic Preservation review of a draft EA for the Napilihau Villages located in 'Alaeloa Ahupua'a. Our review is based on reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field check was conducted of the subject property.

An archaeological inventory survey was conducted of the subject property in 1992 and the report was reviewed by this office (SHPD DOC NO. 9302AG05). No historic sites were recorded during the survey, so we found the proposed development to have "no effect" on significant historic sites (SHPD DOC NO. 9309AG30).

In the event that unrecorded historic remains (i.e. architecture, artifacts, or bones) are inadvertently uncovered during any construction on the site, all work should cease in the vicinity and the contractor should immediately contact the State Historic Preservation Division.

If you have any questions please contact Boyd Dixon at 243-5169

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

BD:jen

cc Ralph Nagamine, Maui County Department of Public Works (fax 243-7972)

Appendix E

Water Quality Monitoring Reports

Pentec ENVIRONMENTAL

Baseline Marine Environmental Surveys
Keonenui and Alaeloaiki Bays
Napili, West Maui, Hawaii

Project No. 363-001

Prepared for:

Napilihau Villages Joint Venture

Prepared by:

Pentec Environmental, Inc.
120 Third Avenue South, Suite 110
Edmonds, Washington 98020
(425) 775-4682

December 23, 1997

Baseline Marine Environmental Surveys
Keonenui and Alaeloaiki Bays
Napili, West Maui, Hawaii

Project No. 363-001

Prepared for:

Napilihau Villages Joint Venture
Pioneer Plaza, Suite 1560
900 Fort Street
Honolulu, Hawaii 96813

Prepared by:

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December 23, 1997

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Figure 2 Survey traverses.

Figure 3 Sediment deposit from sheetwater runoff on Haukoe Point.

Figure 4 Sand-scoured volcanic boulders in central Keonenui Bay.

Figure 5 Prevailing surface-water currents, Keonenui and Alaeloaiki bays.

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Figure 7 Wave-exposed tide pools on Haukoe Point (water quality analytical instruments are shown in foreground).

Figure 8 Zone of well-cropped fleshy and filamentous algae in Alaeloaiki Bay.

Figure 9 Manini grazing on algae-covered rocks in Alaeloaiki Bay.

Figure 10 Agricultural erosion impacting water quality in Napili coastal waters (R.M. Towill Corporation, photograph No. 8893-1, July 29, 1993). Napilihau Villages site outlined in red.

TABLE

Table 1 Water quality observed in Keonenui and Honokeana Bays, Napili, West Maui.

Baseline Marine Environmental Surveys
Keonenui and Alaeloaiki Bays
Napili, West Maui, Hawaii

INTRODUCTION

Baseline marine environmental surveys were conducted in Keonenui and Alaeloaiki bays, Napili, West Maui, to define extant physical, chemical, circulation, and biotic conditions, and to determine the direct, indirect, and cumulative impacts, if any, of a proposed townhouse development and associated drainage improvement plan on coastal and nearshore marine resources.

Survey results indicate that environmental impact on marine biota and coastal water quality will be negligible. This determination is based on the following factors

- The long-standing usage of coastal embayments as receiving waters for upland agricultural runoff.
- Circulation patterns that permit rapid flushing of each bay.
- Use of upland (off-site) and on-site sediment detention basins to collect runoff water and remove suspended solids.
- A decrease in the volume of stormwater discharges.
- The projected improved quality of stormwater discharges originating from both upland (off-site) agricultural areas and the project site.

No sensitive resources, nor any known rare, threatened, or endangered species, will be directly or indirectly affected by proposed project actions.

PURPOSE

The purpose of the surveys is to develop baseline physical, chemical, and biological information for the Napilihau Villages Joint Venture (the developer). This information is to be used for preparation of an environmental assessment (EA) for the Napilihau Villages townhouse development, Napili, West Maui. In November 1997, the Hawaii Supreme Court ruled that Maui County had erred in not requiring the developer to prepare an EA for the entire project and rescinded the Special Management Area (SMA) permit. The November ruling stopped construction. However, on the basis of public safety considerations, Maui County subsequently authorized the developer to complete construction of several townhouses within Phase 1 of the development that were nearing completion. The court ruling stipulated that the Napilihau Villages Joint Venture must prepare and submit an EA encompassing the entire project, and undergo public review and comment in order to proceed with subsequent phases of the development.

METHODS

CHEMICAL/PHYSICAL MEASUREMENTS

Salinity and temperature measurements were made with a Yellow Springs Instrument Company (YSI) salinity-conductivity-temperature meter equipped with a YSI Model 3300 nickel-platinum conductivity and temperature probe. According to manufacturer-supplied specifications, maximum worst-case instrument and probe error is ±0.7 degrees Centigrade (°C); salinity, ±0.2 parts per thousand (ppt).

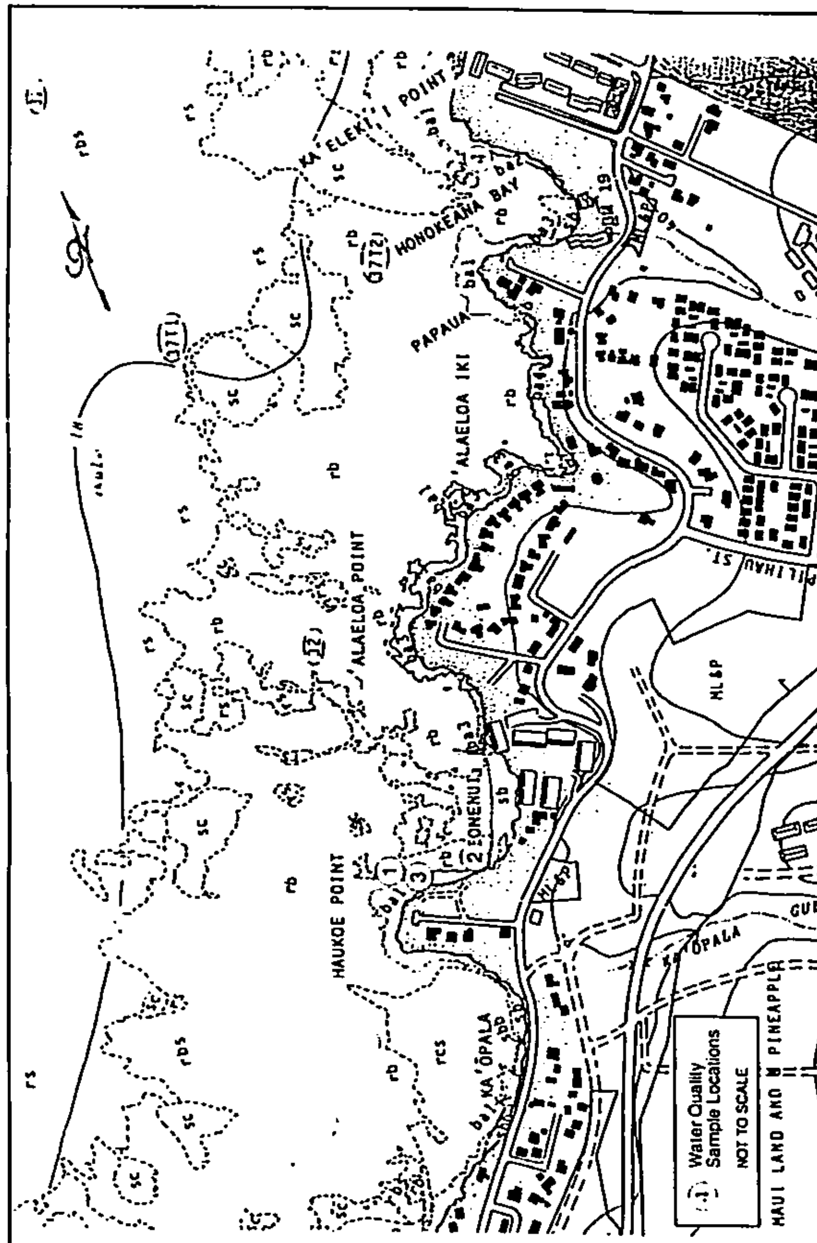
Dissolved oxygen (DO) measurements were made with a YSI Model 51B dissolved oxygen meter equipped with a YSI Model 5739 pressure-compensated polarographic sensor. The instrument was calibrated according to factory guidelines in a water-vapor-saturated chamber. Manufacturer's data indicate a probable error accumulation (maximum worst-case situation) of ±0.52 parts per million (ppm). All measurements entailed *in situ* sampling.

Water quality sampling stations are shown in Figure 1.

WATER CURRENT MEASUREMENTS

Water current measurements were made using disposable surface drogues that expose less than 2 percent of their surface area above water. Surface drogues were used to determine water circulation and residence times because storm drain runoff waters would consist of low-density fresh water that would ride atop the denser ocean waters upon discharge into both Keonenui and Alaeloaiki bays. Drogue deployments were timed to analyze water circulation patterns during the morning incoming (flood) tide and the afternoon outgoing (ebb) tide periods that were encountered on December 9, 11, and 12, 1997. Three drogues, deployed from shoreline and spaced roughly 50 ft apart, were used in all water current studies in Keonenui Bay.

In Keonenui Bay, drogue velocity measurements were conducted by estimating distance traveled over time along a 100-meter-long surveyors' tape placed parallel to the north shore of Haukoe Point. These velocity estimates were subsequently verified by a diver tracking several drogues between measured offshore reference points during comparable tidal periods. This comparison showed close agreement with drogue velocity differences averaging less than ±10 percent over shoreline-based estimates.



Pentec ENVIRONMENTAL Pentec Environmental, Inc. Edmonds, Washington 98020 (425) 775-4682

MAUI BASELINE MARINE SURVEYS
Maui, Hawaii
for Napilihau Villages Joint Venture

Figure 1
Water quality sampling stations.

12/19/97 Fig_1.FH7

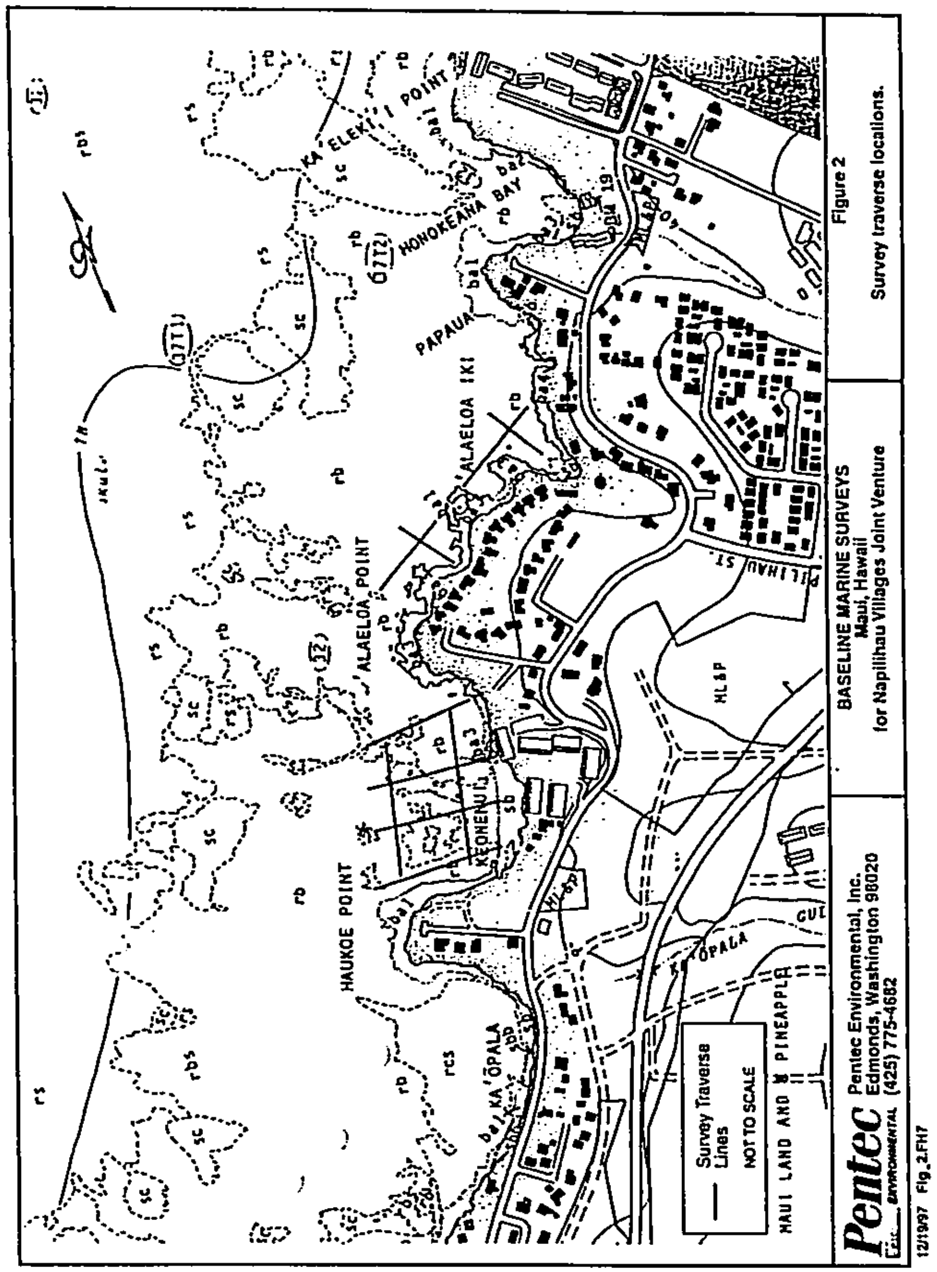
Because of high surf action and difficult shoreline access, water current measurements in Alaeloaiki Bay were conducted by the diver tracking individual drogues along a surveyors' tape deployed along the rough path of the drogue. Generally, between 5 to 10 meters of tape was placed across the bottom and the diver "tracked" the drogue, measuring distance traveled over time. Distances measured varied as a function of site-specific bottom conditions (surge channels and underwater topography). A total of three separate drogue casts were made in Alaeloaiki Bay under normal tradewind conditions on December 10, 1997.

BIOLOGICAL SURVEYS

Qualitative marine biological surveys were conducted with mask and snorkel apparatus. The general physical features, habitats, and biota within both Keonenui and Alaeloaiki bays were defined through a series of more or less random snorkel traverses from approximately the shoreline to the mouth of both bays, and several traverses along the length of each bay (Figure 2). Care was exercised in selecting traverses that appeared representative of the physical features and habitats of both bays, as determined by review of US Geological Survey (USGS) (Napili Quadrant 1983) and Maui Island Coastal Resource Inventory (MICRI) (Aecos, Inc., 1981) maps, and aerial photographs. Overall survey coverage of marine habitats in both bays is estimated at between 10 and 15 percent.

The nearshore subtidal boulder and intertidal zone on Haukoe Point (south side of Keonenui Bay) could not be surveyed by a diver because of hazardous wave conditions and limited underwater visibility. Because of the adverse physical conditions, walkover surveys were conducted from shore during low tide over the December 9-12, 1997, survey period. Morning low tides ranged from a predicted +0.8 to +1.0 ft, adjusted for time and tidal high and low tides to Lahaina, Maui. (Hawaiian Dredging Construction Company 1997). Although the shoreline surveys proved adequate for identifying intertidal flora and fauna, the boulder (talus) zone within a roughly 50-ft-wide "surge and wave zone" corridor adjacent to Haukoe Point was not surveyed. Nonetheless, one traverse was made in this boulder-covered zone that was roughly 100 ft from shore and parallel to the south side of Haukoe Point. However, because of water visibilities limited to less than 3 ft, certain resident fishes, algae, and invertebrates associated with the more wave-exposed reaches of this zone were likely omitted from the data record.

Tide pool surveys (and water quality measurements) were conducted on the north side of Haukoe Point on December 9, 1997, and intermittently between December 10-12, 1997, when wave conditions permitted. Because of their prevailing small size, tide pools were examined by immersion of the diver's head into the water, or by observations from above the pool.



Representative physical features and habitats in all study areas were photographically documented using a Nikonos V underwater camera.

PROJECT SITE SURVEY OF TOWNHOUSE AND UPLAND DETENTION BASINS

On December 8, 1997, brief surveys were made of the Napilihau Villages Phase 1 interim sediment detention basin and an off-site upland detention basin (detention basin "A") adjacent to Hui Road and upland agricultural fields (Napilihau Village - Phase 1 blueprint drawing dated 3/27/95, prepared by Warren S. Unemori Engineering, Inc.). Detention basin A was recently constructed by the developers as part of the project's erosion control plan. This detention basin is situated immediately below an older sediment detention basin.

The surveys indicate that both basins appear to be functioning as designed. Both basins showed evidence of sediment accumulation. The interim detention basin (below the Phase 1 development) also appears to be serving as an efficient trap for wind-blown trash, cans, and other debris.

A brief conversation with the construction contractor (Jeffery T. Weller, Albert C. Kobyashi, Inc., General Contractor) revealed that exposed soils on the site are periodically watered to reduce dust during construction. A plastic fence also has been installed to minimize fugitive dust from affecting adjacent areas.

KEONENUI BAY

Keonenui Bay is roughly 1,000 ft wide from north to south and is fronted by the Pailolo Channel. It is bounded at its south end by Haukoe Point, and on its north end by Alaeloa Point. The south and north sides of the bay are dominated by a wave-exposed, elevated volcanic bench that extends roughly 6 to 20 ft above mean sea level. Massive subtidal boulders occur in a zone that extends roughly 100 ft offshore along the entire north side of Haukoe Point.

A narrow (10- to 20-ft-wide) wave and wave backwash-scoured moat occurs near the shoreline across most of the inshore reaches of the bay. The beach is characterized by a relatively steep 12 to 20 percent slope that, during periods of modest to large wave action, produces a significant, moat-scouring backwash.

The south side of the bay is subjected to significant North Pacific swells and wave action. Swell and wave action in the bay during gusty tradewind and "high surf advisory" periods (experienced in the afternoons during the December 8-12 survey period) is both irregular and complex. Although most swells or wave sets were observed impacting perpendicular to the beach, some incoming swells or wave sets deflect off the south, inshore, side of Haukoe Point, and result in an unusual wave break that is directed northeast and almost parallel to the bay's beach.

The head of the bay is dominated by a broad sand beach, low basalt cliffs, stone masonry seawalls and stairs, and numerous stormwater drainage pipelines that emanate from the Kahana Sunset condominium and adjacent residential housing to the south. Sheetflow rainwater runoff and/or irrigation runoff from an undeveloped, partially landscaped area on the north side of Haukoe Point periodically contribute silt and sediment to the bay (Figure 3). ;

The central portion of the bay is dominated by wide expanses of unconsolidated sand; occasional deposits of bioclastic rubble, boulders, and cobbles; and, in localized areas, undulating, sand-scoured volcanic rock (Figure 4). There is no evidence of terrigenous (upland) sediment deposition in the bay.

Figure 3 Sediment deposit from sheetwater runoff on Haukoe Point.

Figure 4 Sand-scoured volcanic boulders in central Keonenui Bay.

Land use above (mauka) the beach consists of the Kahana Sunset condominium and single-family residences. Strand vegetation surrounding the bay is dominated by *Scaevola* sp., casuarina (*Casuarina* sp.), coconut palms (*Cocos nucifera*), grass lawns and, in the rocky supratidal zone on Haukoe Point, an unidentified small prostrate succulent.

A small intertidal blow hole occurs adjacent to the shoreline near the northeastern corner of the bay.

ALAELOAIKI BAY

Alaeloaiki Bay is roughly 2,000 ft long from north to south and is dominated by an irregular, rocky shoreline and five small coves. Eroded basalt and massive, craggy boulders characterize this very sinuous, wave-exposed shoreline. A gently sloping to sometimes steep volcanic cliffline borders south and east sides the bay.

Historically, the bay appears to have received runoff waters from a gulch that once drained upland agricultural lands through the general area of the present Napili Plaza shopping center. Dense vegetation occurs in the gulch on the west (makai) side of Lower Honoapiilani Road. The presence of dense vegetation and the absence of stormwater debris in the lower gulch suggests that surface-water flows have been significantly attenuated or re-directed to other areas in recent years.

Inshore areas in Alaeloaiki Bay are dominated by massive volcanic boulders, ledges, and rock outcrops, some of which expose during low tide. Wave-scoured surge channels intersperse the area and provide vertical relief on an otherwise undulating volcanic rock bottom. Some surge channels form depositional areas for bioclastic rubble and occasional coralline sand deposits. None of the surge channels showed evidence of sediment from terrigenous sources.

Land use above the shoreline is dominated by single-family housing, planted coconut palms, *Scaevola* sp., and grass lawns.

WATER QUALITY

KEONENUI BAY

Water quality conditions encountered within the study area were typical of coastal embayments along the West Maui shoreline. Ocean water temperatures ranged from 24.8 to 25.5°C during the survey period (Table 1). The lower temperature readings were the result of sampling observed during early morning, or of intertidal or subtidal groundwater discharges.

Also as a result of groundwater discharges, nearshore salinity readings were often variable and generally lower than at adjacent offshore sampling areas. Salinity measurements ranged from 32.1 to 33.0 ppt.

Table 1 Water quality observed in Keonenui and Honokeana Bays, Napili, West Maui.

Station no.	Date	Time (hours)	Temperature (°C)	Salinity (ppt)	Dissolved oxygen (ppm)
1 (ocean)	12/9/97	0945	24.8	33.0	6.75
2 (ocean)	12/9/97	0950	24.8	32.8	6.78
3 (low tide pool)	12/9/97	1006	24.8	33.0	6.74
3 (mid tide pool)	12/9/97	1008	24.0	33.1	6.52
3 (high tide pool)	12/9/97	1012	22.0	22.2	4.22
4 (ocean)	12/10/97	0912	24.9	32.8	6.52
4 (ocean)	12/10/97	1028	25.6	33.0	6.65
1 (ocean)	12/11/97	1330	25.5	33.0	6.75
2 (ocean)	12/11/97	1337	24.5	32.1	6.74
3 (low tide pool)	12/11/97	1346	25.5	33.0	6.70
3 (mid tide pool)	12/11/97	1348	25.2	33.0	6.44
3 (high tide pool)	12/11/97	1355	21.0	23.1	5.03
4 (ocean)	12/11/97	1610	24.9	33.0	6.60

Dissolved oxygen measurements indicated saturated to near-saturated conditions, as would be expected along a turbulent, wave-exposed shoreline. These DO measurements ranged from 6.52 to 6.75 ppm.

Water quality measurements conducted within several large tide pools on Haukoe Point showed wide variability compared to adjacent ocean waters. In general, the closer the tide pool to the ocean, the greater the similarity to ocean water conditions. By contrast, water temperatures in elevated "splash zone" tide pools were low (e.g., as low as 21.0°C) as a result of cool nighttime air temperatures. Splash zone tide pools are subject to rainwater runoff and/or irrigation water runoff, which resulted in salinity measurements as low as 22.2 ppt. Measurements of DO also yielded similar variability, with saturated conditions dominating low, wave-exposed pools, and low DO levels (probably resulting from algal respiration at night) characterizing high intertidal or splash zone tide pools.

ALAELOAIKI BAY

Because of hazardous waves and the absence of public access to nearshore waters, water quality measurements could not be conducted in Alaeloaiki Bay. As an alternative, water quality measurements were conducted at the adjacent Honokeana Bay, which was protected from wave action and was accessible by shoreline. These measurements were comparable to conditions found within Keonenui Bay, and are believed to be representative of conditions that would be found within Alaeloaiki Bay. Water temperatures ranged from 24.9 to 25.6°C; salinity values from 32.8 to 33.0 ppt; and DO from 6.52 to 6.65 ppm (Table 1). The only significant visible difference between Honokeana Bay and Keonenui and Alaeloaiki bays was its extremely low turbidity. Waters were essentially pristine (underwater visibility about 70 ft) and, despite the presence of a massive (6-by-12-ft) concrete box culvert, showed no evidence of silt or sediment accumulation.

WATER CIRCULATION

KEONENUI BAY

At Keonenui Bay, water circulation patterns appear to be the result of strong currents originating out of the northeast (associated with the Pailolo Channel), of North Pacific swell and associated inshore wave action, and of tradewind influences. Surface-water circulation did not appear to be significantly influenced by tidal period during the December 9-12, 1997, survey period.

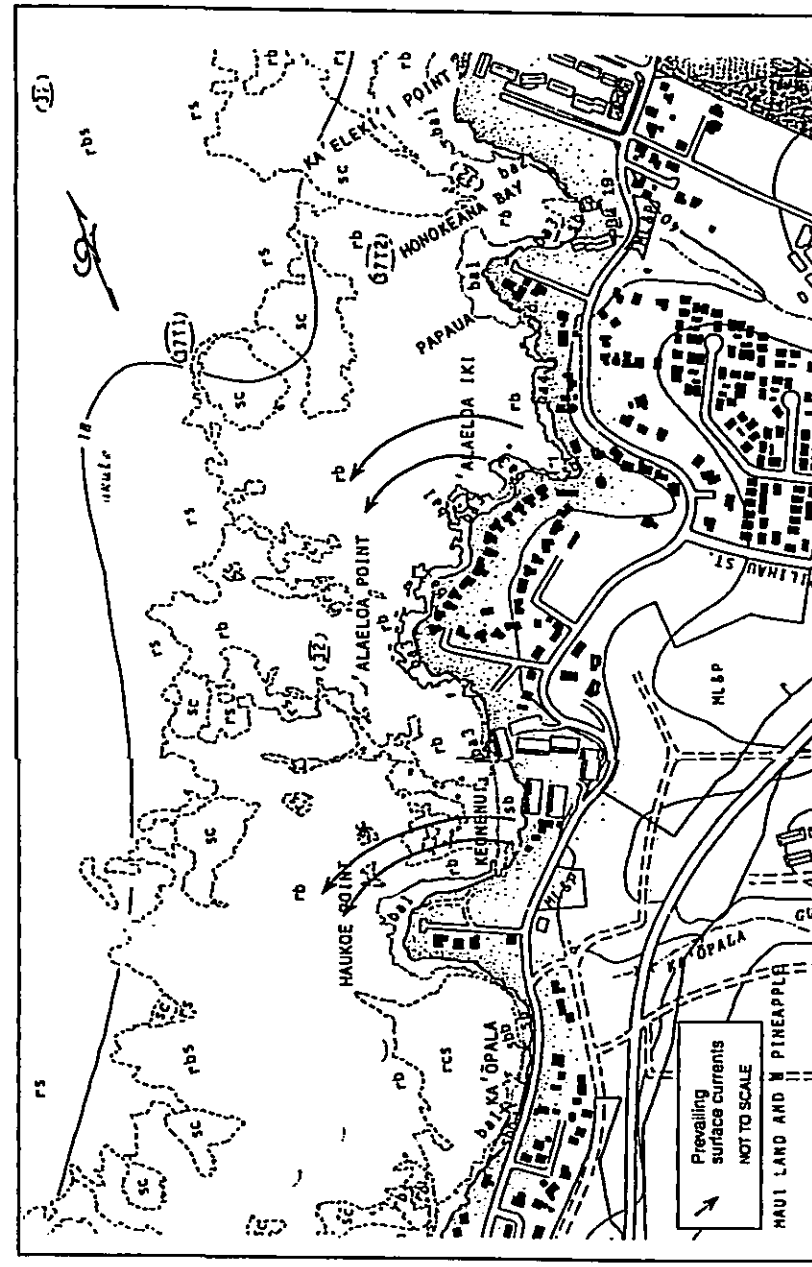
During weak to modest tradewind conditions on December 9 and 10, water currents demonstrated a strong seaward and southwesterly flow during both flood and slack (ebb) tide periods. Strong, sustained, and gusty tradewinds during the afternoon of December 9 complicated water currents as a result of both wave action and a significant wind fetch on all but the most inshore reaches of Keonenui Bay.

During "normal" afternoon tradewinds, strong wave action on the bay's south side results in water "piling up" in the bay, which is reflected in moderately high-velocity currents that exit the bay on its southwest side. Surface current velocities during such periods are variable and range from about 3 to 12 ft/minute. Upon exiting the bay on its southwest side, water current velocities increase to between 10 and 20 ft/minute as the bay's water mass interacts with the strong southwesterly currents and fetch associated with the Pailolo Channel. Surface waters appear to flush Keonenui Bay within a period of between 45 to 55 minutes under normal tradewind conditions. Figure 5 depicts the prevailing surface-water current pattern observed during the study period in Keonenui Bay.

During extremely high tradewinds and "high surf advisory" conditions reported by the US Weather Service (observed during the afternoon on December 11 and 12), surface-water circulation in the inner third of the bay is complicated by large wave sets (between an estimated 6 to 10 ft), the previously reported irregular shoreline wave break, and a strong wind fetch. During such periods, circulation in the bay appears to "stall" in the extreme southeast, inshore side of the bay (adjacent to the landward edge of Haukoe Point) because of large breaking waves (both perpendicular and parallel to the beach) and wind fetch. (Two of three drogues were briefly grounded on the shore during the afternoon of December 11.) This stalling phenomenon appears to be more the result of the method used to determine water current patterns and velocities than the result of actual surface-water movements. Drogue casts conducted within the middle reaches of the bay during the same afternoon period on December 11 demonstrated a seaward and southwesterly movement at velocities of about 20 ft/minute. During this period, drogues advanced seaward and to the southwest against a significant shore break.

ALAELOAIKI BAY

Water circulation in the general vicinity of Alaeloaiki Bay was heavily influenced by the prevailing southwesterly currents (associated with the Pailolo Channel) and inshore wave action during the survey period (December 10, 1997). Tradewinds appear to exert a minimal influence on water circulation because of the alignment of the bay with respect to the coastline and prevailing winds. Although water current measurements were limited by hazardous wave action, all drogue measurements indicated a strong southwesterly component, with velocities of between 3 and 7 ft/minute recorded during weak tradewind conditions on December 10. Figure 5 depicts the prevailing surface-water current pattern observed during the study period in Alaeloaiki Bay.



Pentec ENVIRONMENTAL Pentec Environmental, Inc. Edmonds, Washington 98020 (425) 775-4682

MAUI BASELINE MARINE SURVEYS Maui, Hawaii for Napilihau Villages Joint Venture

Figure 5
Prevailing surface water currents.

12/19/97 Fig_5.FH7

KEONENUI BAY

Corals

Coral diversity and density are very low throughout Keonenui Bay. Represented species include low, encrusting colonies of lobe coral (*Porites lobata*) and *Montipora flabellata*, occasional colonies of arborescent cauliflower coral (*Pocillopora meandrina*), and two colonies of *Leptastrea purpurea* (Figure 6).

Several colonies of *P. damicornis* demonstrated structural deformities, such as broken or sand-abraded branches, and many of the colonies observed were partially overgrown with filamentous green epibenthic algae. Although density is low throughout the bay, corals are most abundant along the bay's northern side, where numerous boulders and ledges provide wave-protected solid surfaces above the bay's sandy basin. Corals are absent from all mid-bay locations surveyed because of the absence of significant vertical relief and the presence of shifting, unconsolidated sand. Unconsolidated sands are inimical to coral settlement and growth as a result of chronic abrasion.

A few colonies of encrusting *P. lobata* were recorded near the wave-exposed southern shoreline of the bay (offshore of Haukoe Point), but extant colonies were small, patchy in distribution, and sometimes partially covered by a sand veneer. Most colonies of *P. lobata* demonstrated irregular fissures caused by the burrowing of snapping shrimp (*Alpheus* sp.). Wave action and sand scour produce conditions not generally suitable for coral development in sandy areas along the bay's southeast shoreline.

Algae

Conspicuous algae noted on the north and south sides of the bay include *Ulva fasciata* ("palahalaha"), *Acanthophora spicifera*, *Hypnea* sp., *Sargassum echinocarpum*, *Ahnfeltia concinna* (dark red growth form only), *Dictyota acutiloba*, and, in high intertidal tide pools, a turf composed of *Enteromorpha* sp. Encrusting coralline algae observed included *Porolithon onkodes*, which dominated all high-energy intertidal and subtidal habitats in the study area, *Hydrolithon breviclavium*, *Hydrolithon reinboldii*, *Lithophyllum kotschyanum*, and *Neogoniolithon frutescens*. Observations from atop the Haukoe Point cliffline indicated that inshore boulders and vertical

Figure 6 The corals *Porites lobata* and *Pocillopora meandrina* on north side of Keonenui Bay.

Figure 7 Wave-exposed tide pools on Haukoe Point (water quality analytical instruments are shown in foreground).

walls support a very dense and diverse algal flora. However, hazardous swells, breaking waves, and poor underwater visibility precluded underwater surveys from being conducted in this zone. Algal species associated with this physically dominated shoreline were therefore omitted from the data record.

Fishes

Keonenui Bay supports a modest fish fauna, but overall density is low. Only one species, the convict tang (*Acanthurus triostegus*; "manini") was observed to be ubiquitous throughout the various habitats within the bay (and in intertidal tide pools) and is considered abundant. Large schools (more than 100 individuals) of manini appeared to be numerous on the bay's north and south sides, and small schools (less than 10 individuals) of juveniles were frequently observed feeding upon epibenthic algae associated with scattered rock and cobble outcrops in the sandy central portion of the bay. Aside from the convict tang, the blue jack (*Caranx melampygus*; "omilu"), which was recorded in several small schools of perhaps 10 to 20 individuals in the sandy central and northern section of the bay, is the only other species considered abundant.

A school of perhaps 30 to 50 juvenile needlefish (*Tylosurus crocodilus*) was observed just outside the shorebreak, adjacent to the south side of the bay.

Wave-swept rocky areas provide the preferred habitat for surgeonfishes. As a result, surgeonfishes are common in the study area. In addition to the manini, represented surgeonfishes observed include the eye-stripe surgeonfish (*Acanthurus dussumieri*; "palani"), whitebar surgeonfish (*Acanthurus leucopareius*; "maikoiko"), orangeband surgeonfish (*Acanthurus olivaceus*; "na'ena'e"), achilles tang (*Acanthurus achilles*; "paku'iku'i"), goldring surgeonfish (*Ctenochaetus strigosus*; "kole"), and the orangespine unicornfish (*Naso lituratus*; "umaumalei").

Along the bay's north side, juvenile reef triggerfish (*Rhinecanthus rectangulus*; "humuhumu-nukunuku-a-pua'a") and lei triggerfish (*Sufflamen bursa*) are common, as is the blackside hawkfish (*Paracirrhites forsteri*; "hilu pili-ko'a"), saddle wrass (*Thalassoma duperrey*; "*hinalea lau-wili*"), yellow-tail coris wrass (*Coris gaimard*) (juveniles with red and white spots), juvenile rockmovers (*Novaculichthys taeniourus*), unidentified parrotfishes (*Scarus* sp.), and a single filefish ("o'ili"). At least four other species of juvenile wrasses (family Labridae) were observed. However, limited underwater visibility and the inability to distinguish color patterns sufficient to identify these fish to either the genus or species level (many juvenile wrasses undergo distinctive color pattern and morphological changes as they mature, making accurate field identification particularly problematic) made identification impossible.

Butterflyfishes (family Chaetodontidae) were observed to be uncommon to rare. Represented species observed include the raccoon butterflyfish (*Chaetodon lunula*; "kikakapu"), threadfin butterflyfish (*Chaetodon auriga*), saddleback butterflyfish (*Chaetodon ephippium*), lined butterflyfish (*Chaetodon lineolatus*; "kikakapu"), and the reticulated butterflyfish (*Chaetodon reticulatus*). A spotted puffer (*Arothron meleagris*) and a spotted trunkfish (*Ostracion meleagris*) also were observed on the north side of the bay.

Damselfishes (family Pomacentridae) were uncommon throughout the areas surveyed. Represented species observed include the Hawaiian sergeant (*Abudefduf abdominalis*; "mamo"), adult black-spot seargents (*Abudefduf sordidus*), and the Pacific gregory (*Stegastes fasciolatus*).

Other species of fish are probably associated with the wave-exposed base of the cliffline and subtidal boulders (talus) along Haukoe Point. However, hazardous wave surge and restricted underwater visibility prevented underwater surveys from being conducted in this area.

A somewhat unusual finding was the absence of goatfishes (family Mullidae) and squirrelfishes (family Holocentridae) from all areas surveyed, as was the relatively few butterflyfishes (family Chaetodontidae) that were observed. The small number of butterflyfishes observed may be explained by the absence of significant coral reef development and/or fish collecting. The absence of squirrelfishes and goatfishes, and the prevailing small size of other species observed (including manini), may be the result of shorecasting or spearfishing activities (there are a number of fishing pole holders secured on Haukoe Point).

Tide pools on Haukoe Point (Figure 7) were observed to harbor a large number of juvenile black-spot seargents, a small eel (*Gymnothorax* sp.), juvenile manini, numerous blennies (*Cirripectes* sp.), unidentified juvenile wrasses, and a single juvenile mullet (*Mugil* sp.).

Macroinvertebrates

The larger and more conspicuous invertebrates observed include patchy growths of zooanthids (*Palythoa tuberculosa* and *Zoanthus* sp.), slate pencil urchins (*Heterocentrotus mammillatus*), rock-boring urchins (*Echinometra mathaei*), and black-spined urchins (*Diadema paucispinum*; "wana"). A single sea cucumber (either *Holothuria atra* or *Holothuria nobilis*) was observed in a protected sandy depression in the center of the bay.

High intertidal and splash zone organisms associated with rocky shorelines were observed, including periwinkles (*Littorina* sp.; "pupu kolea"), black nerites (*Nerita picea*; "pipipi"), false opihi (*Siphonaria normalis*), shingle urchins (*Colobocentrotus atratus*), and grapsid crabs (*Grapsus tenuicrustatus*; "a'ama").

ALAELOAIKI BAY

Corals

In contrast to the low coral density in Keonenui Bay, coral density is significantly greater in all areas surveyed within Alaeloaiki Bay. Coral coverage is estimated to range between 2 and 5 percent, though overall coverage appears lower because of the preponderance of encrusting corals over that of arborescent corals. In localized areas, coral coverage is occasionally higher, though generally patchy. Represented species include *P. lobata*, *M. flabellata*, and *P. meandrina*. Although measurements were not made, qualitative observations suggest that the corals associated with Alaeloaiki Bay are generally larger than colonies observed in Keonenui Bay. Factors responsible for the larger coral colonies observed may include the location of the bay, which confers some degree of protection from direct influences of seasonal North Pacific swell and associated wave action, and the absence of abrasive sand deposits.

Algae

Ulva fasciata and *Ahnfeltia concinna* are the dominant algae of the wave-exposed intertidal zone. Encrusting coralline algae also are common in areas of breaking waves. Represented species include the dominant *P. onkodes*, and confluent to sometimes patchy growths of *N. frutescens*, *H. breviclavium*, *H. reinboldii*, and *L. kotschyanum*. Rocks and boulders not encrusted with coralline algae are frequently covered by a turf composed of a mix of well-cropped filamentous red and green epibenthic algae (Figure 8). The cropped nature of the algae (most likely resulting from their use as forage by herbivorous fish) made it impossible to identify the algae.

Fishes

Because of the wave-exposed nature of the small embayments that Alaeloaiki Bay comprises, there is little habitat diversity demonstrated along the coastline. The fish biota is similar to that observed along the rocky, wave-dominated north side of Keonenui Bay. Manini was observed to be the most common fish (Figure 9), and was frequently observed in schools of an estimated 20 to 50 individuals. Surgeonfishes are ranked second in abundance. Represented species (in order of estimated abundance) include the achilles tang, orangespine unicornfish, eye-stripe

Figure 8 Zone of well-cropped fleshy and filamentous algae in Alaeloaiki Bay.

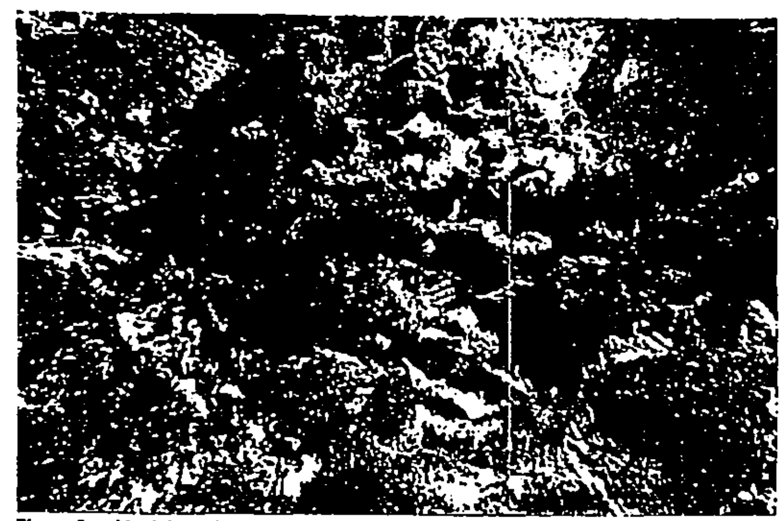


Figure 9 Manini grazing on algae-covered rocks in Alaeloaiki Bay.

surgeonfish, and the goldring surgeonfish. The endemic saddle wrass is common in all areas surveyed. Also observed were numerous juvenile wrasses representing several different species. Damselfishes and butterflyfishes were occasionally to rarely observed in association with widely scattered arborescent coral colonies.

Macroinvertebrates

Macroinvertebrates are not well-represented in the wave-exposed subtidal waters of Alaeloaki Bay (or were difficult to identify or enumerate in high-energy, low-visibility waters). The most commonly observed invertebrate was the rock-boring urchin.

ENDANGERED, THREATENED, AND PROTECTED SPECIES

A single green sea turtle (*Chelonia mydas*; "honu") with a carapace length estimated at between 25 and 30 inches was observed foraging on marine algae immediately adjacent to Haukoe Point on December 10, 1997.

Several pods of spinner dolphins (*Stenella longirostris*) were observed transiting the coastline between Keonenui and Alaeloaiki bays on December 9 and 10. An estimated 100 to 200 dolphins were observed in a single pod during the morning of December 9.

DISCUSSION

REGIONAL CONSIDERATIONS

Review of available published and unpublished reports revealed little additional information on physical environmental conditions, water quality, or biota associated with Keonenui or Alaeloaiki bays. The Maui Coastal Zone Atlas (Aecos, Inc., 1981) did not identify any defined environmentally sensitive habitats (areas designated by diverse marine life [high coral cover and/or a diversity and abundance of fishes], seabird populations, native strand vegetation, or waterbird habitat) within either bay or along any portion of the West Maui coastline between Kaanapali and Honokahua Bay. This is not unusual given the historic use of the area for agriculture and, more recently, extensive urban, commercial, and tourism development.

Water quality related to coastal development in West Maui is often a contentious issue within county and state government and the affected publics. Although agricultural soil management and erosion control practices have improved over the years, and numerous federal and county-government supported watershed programs, including construction of runoff settling basins for agricultural runoff, have been constructed (or are currently under construction; e.g., the Honolua Watershed project, Honokeana Basin - Structure No.3), stormwater runoff from agricultural uplands will continue to exert a negative impact upon coastal and marine resources in West Maui. A roughly 2-mile-long swath (extending from near Kapalua to near the eastern edge of the Kaanapali Airport) of pineapple fields has been recently cleared south (mauka) of Honoapiilani Highway, exposing topsoil to potential erosion. Thus, stormwater runoff, soil erosion, and associated coastal sedimentation is a regional, not a site-specific, problem.

Given the small acreage of the proposed Napilihau Villages development, as well as its in-place or planned off-site and on-site sediment detention basins, stormwater runoff and associated potential erosion from this development is negligible compared to other areas in West Maui that experience upland agricultural runoff and erosion without the benefit of settling basins. Figure 10 depicts regional runoff and sedimentation in the Napili area on July 29, 1993 (R.M. Towill Aerial Photography; photograph No. 8893-1). As shown in the photograph, there is a relatively small area of discolored coastal water in the vicinity of the Napilihau Villages project site; whereas a large area of discolored water characterizes the area east (makai) of cleared upland agricultural lands.

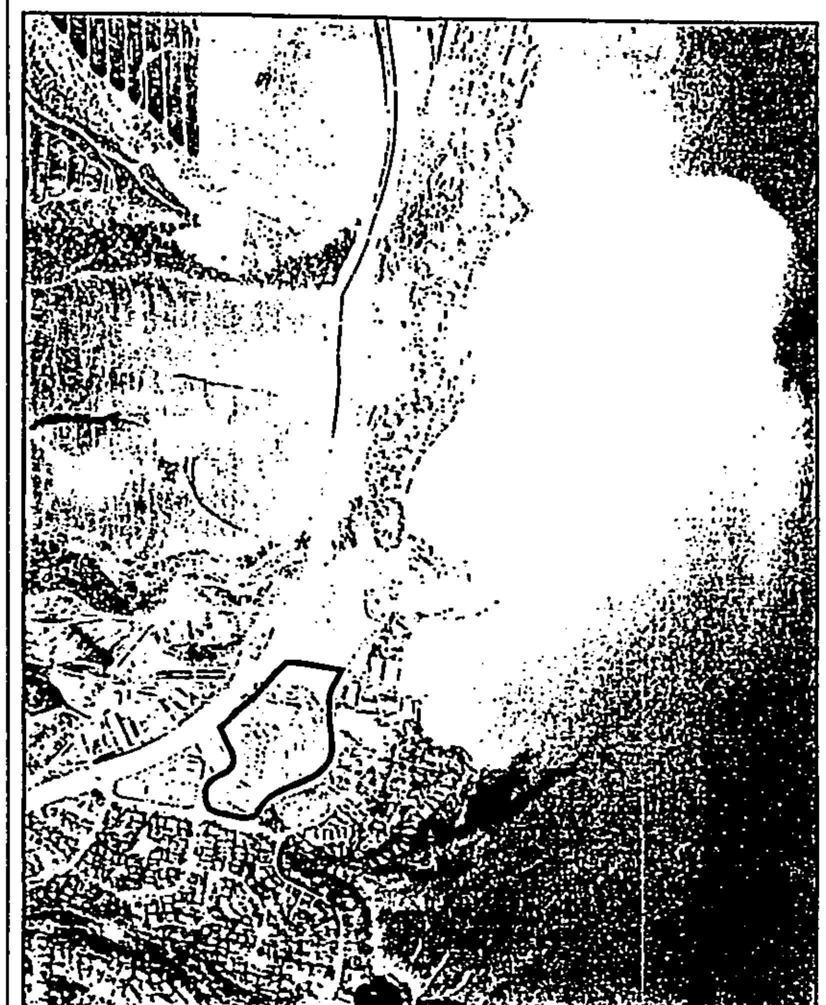


Fig_10.FH7

Figure 10 Agricultural erosion impacting water quality in Napili coastal waters (R.M. Towill Corporation, photograph No. 8893-1, July 29, 1993). Napilihau Villages site outlined in red.

Except in areas demonstrating exceptionally heavy or chronic sediment loading, such as at the mouths of major drainage gulches, or in areas demonstrating poor mixing with adjacent ocean water (e.g., Kaopala Bay—an embayment in Napili demonstrating a pronounced counterclockwise eddy [MBA International 1992]), most coastal areas in West Maui are well-flushed by strong currents associated with the Pailolo Channel and wind fetch caused by the prevailing tradewinds.

Flushing is also significant in many exposed coastal areas (e.g., Keonenui Bay) as a result of the North Pacific swell during the winter months (the condition observed during the surveys reported herein). These coastal areas probably flush to a similar degree during periods of South Pacific swell generated during generally infrequent southerly ("Kona") wind conditions.

Regional tropical cyclonic disturbances, such as hurricanes, may also contribute to ameliorating sediment impacts by transporting deposited sediments offshore or directing sediments to beach areas.

As a result of circulation and mixing, many coastal embayments in West Maui that have been subjected to chronic and often massive stormwater and associated silt and sediment discharges often demonstrate little evidence of significant, long-term, or cumulative impacts on corals, fish, or other benthic resources (including Keonenui, Alaeloaiki, and Kaopala bays). This conclusion is in part based upon a brief survey conducted in Honokeana Bay on December 9, 1997.

Honokeana Bay was selected for a brief survey because of public accessibility, its location below a major drainage gulch, and the presence of a massive (roughly 6-by-12-ft) concrete box culvert at the shoreline. The size of the box culvert suggests that, at least historically, this tiny, protected bay was a receiving water for massive upland stormwater runoff and associated sediment loads. The surveys indicated that the bay is pristine. Sediment was not evident, water visibility was in excess of 70 ft, and marine biota demonstrated high diversity. More than 33 species of fish, 18 species of noncoralline algae, and 3 species of corals were inventoried in less than 10 minutes along a roughly 300-ft snorkel dive across the center of the bay (data not shown). Although limited in scope, this evidence suggests that water circulation significantly ameliorates stormwater and sediment discharges and the cumulative, long-term impacts on nearshore biota are not readily apparent, even in a relatively wave-protected bay such as Honokeana.

KEONENUI BAY

Physical Environment

The proposed project is not expected to produce any significant long-term or cumulative changes or impacts upon the physical environment of Keonenui Bay. Minor quantities of silt may be temporarily deposited in the central portion of the bay if runoff from the Napilihau Villages townhouses development coincided with becalmed conditions. However, this runoff would be visually indistinguishable from runoff from existing drainage sources, and would contain quantitatively less silt and other suspended solids than is currently discharged into the bay from drainage pipelines and sheetflow originating from existing condominium and residential housing, and from Haukoe Point. Increased sediment loading from the proposed townhouse development is unlikely, because both in-place and planned upland (off-site) detention basins, and on-site detention basins within the townhouse development would trap most sediment. Because the bay's benthic environment is dominated by unconsolidated sands and sand-scoured boulders and cobbles, there is no significant benthic fauna that would be adversely impacted.

Under normal tradewind conditions, no significant silt deposition is expected within the bay, because wave action and water currents would rapidly dilute and disperse any such discharges into the strong currents associated with the Pailolo Channel. Because of the presence of existing and planned upland detention basins, and existing and planned on-site detention basins, total annual sediment loading to West Maui's coastal waters will be reduced.

Water Quality

A minor, short-term degradation in water quality is expected to occur during and immediately following significant rainfall events, even with in-place or planned sediment detention basins. Water quality degradation would be in the form of a temporary increase in suspended solids, turbidity, and nutrient levels within Keonenui Bay.

The increase in suspended solids and turbidity levels would be visible from the shoreline and take the form of a silt plume that would turn bay waters into a reddish-brown color until the discharge ceased and the bay flushes. Silty waters and silt plumes resulting from stormwater runoff associated with local, regional, and cyclonic rainfall events currently characterize the bay. Most of the sediment contribution to Keonenui Bay (and other West Maui coastal areas and embayments) appears to originate from pre-existing, off-site soil erosion associated with upland agricultural activity. However, according to the developer's drainage and soil erosion report (Warren S. Unemori Engineering, Inc., 1995), the bay will be receiving a smaller volume of higher-quality runoff water associated with the proposed townhouse development because of diversion of pre-existing flows and use of off-site and on-site sediment detention basins. Such actions should improve the quality and decrease the volume of runoff waters entering Keonenui Bay.

Nutrient level (nitrogen and phosphorus) associated with normal soils and runoff from fertilized upland agricultural areas may temporarily increase during periods of heavy runoff within Keonenui Bay. However, because of ample flushing of the bay, nutrient residence time would be insufficient to result in an increase in primary production in the bay, or result in any detectable eutrophication of the bay.

Stormwater discharges would result in a short-term reduction in the salinity of surface waters within Keonenui Bay. Such short-term changes in salinity are not considered significant because of the rapid flushing of the bay, adaptations of intertidal organisms to rapid salinity changes, and the presence of existing stormwater discharges. Existing freshwater discharges into the bay have not produced any evidence of adverse impacts.

Although terrestrially derived silt and sediment particles are able to act as pollutants themselves, they are also able to carry other chemical compounds that become attached to individual sediment particles and have the potential to be incorporated into biological systems. Hydrocarbons originating from on-site or off-site bitumuls mixing, fuel trucks, and equipment mobilization yards are examples of pollutants that could attach to sediment particles and be transported into coastal waters. However, existing and proposed detention basins would provide effective traps for any such hydrocarbons or related pollutants, and largely prevent them from entering coastal waters at a concentration that might prove injurious to marine biota.

Water Circulation

Stormwater runoff entering the bay from the townhouse development is composed of fresh water, which, because of its low density, would ride atop and float upon the denser (saltier) ocean water. Except for some mixing that is likely to occur in the inshore wave zone, most of the water will be transported out of the bay in a southwesterly direction during normal tradewind conditions. Because of the small size of most silt particles, most of the silt will be retained within the surface layer of the bay, where it would be transported into the strong

currents and wind fetch associated with the Pailolo Channel. Mixing and dilution would rapidly take place within channel waters.

Discharge waters originating from the townhouse development and adjacent uplands will be of a higher quality than most existing stormwater discharges into Keonenui Bay because of the presence of upland (off-site) and on-site detention basins that would retain suspended solids.

Biota

As a function of the tidal period, a surface layer of silty water flowing out of Keonenui Bay may produce minor, short-term impacts to tide pool flora and fauna in the vicinity of Haukoe and Alaeloa points. This could occur if runoff periods coincided with normal tradewind and wave conditions, which could deposit silty surface waters into exposed tide pools. However, this impact is judged to be inconsequential, because tide pool organisms are extremely resilient and well-adapted to withstand silt loading, freshwater inundation, varying water temperatures, stagnant waters, low DO levels, intense solar radiation, and other physical extremes.

A silt-laden freshwater plume is not expected to adversely impact benthic organisms associated with the deeper, central portion of the bay, because the low-saline water and any associated silt would not, except in areas of heavy wave action, come in contact with benthic organisms. Unlike heavier sediments that could adversely impact corals, silt particles are generally of a size that corals can easily remove from exposed tissues. Surveys did not show the present of terrigenous silt or sediment deposits anywhere within Keonenui Bay. The bay's biota demonstrate no evidence of chronic or cumulative adverse impacts from historic discharges. There is no reason to suggest that future discharges, which will be of a better quality and lower volume, would do anything other than enhance conditions in the bay for resident biota.

A silt plume would be expected to result in a short-term reduction in primary production in the bay as a result of an attenuation in photosynthetic rates among microscopic, fleshy and calcareous algae residing in the bay. Any such reductions in primary production are not significant, because normal photosynthesis processes would quickly resume shortly following cessation of runoff and subsequent flushing of the bay.

ALAELOAIKI BAY

Physical Environment

Stormwater runoff is not expected to produce any significant short- or long-term or cumulative impacts upon Alaeloaiki Bay's physical environment, beyond that currently experienced under normal runoff conditions. Water quality is likely to improve because of the existing or planned sediment detention basins. The combination of upland (off-site) agricultural and on-site sediment detention basins, and strong wave and water currents would prevent sediment deposition from altering intertidal or subtidal habitats within the bay. Although a receiving basin for upland agricultural runoff for years, there were no areas of silt or sediment buildup observed in any portion of the bay during the survey period.

Water Quality

Because of the exposed nature of the bay to wave action, strong currents associated with the Pailolo Channel, and wave fetch associated with tradewind conditions, no significant impacts upon intertidal or subtidal habitats or species is expected from temporarily elevated levels of silt associated with stormwater runoff. Similarly, a temporary reduction in the salinity level as a result of a point-source stormwater discharge is not expected to produce conditions inimical to the survival of intertidal or subtidal biota. Because of rapid flushing, nutrients (e.g., nitrogen and phosphorus) would have insufficient retention time in the bay to increase primary production or result in any detectable eutrophication.

Water Circulation

Coastal water circulation patterns in or near Alaeloaiki Bay would not be significantly altered by the proposed discharge of off-site or on-site stormwater. As was described for Keonenui Bay, stormwater runoff entering the bay from the townhouse development and upland agricultural fields is composed of fresh water, which, because of its low density, would ride atop and float upon the denser (saline) ocean water. Except for mixing, which is likely to occur in the inshore wave zone, most of the stormwater runoff will be transported out of the bay in a southwesterly direction during normal tradewind conditions.

Because of the small size of silt particles, most suspended silt will be retained within the surface layer of the bay, where it would be transported into the strong currents and wind fetch

associated with the Pailolo Channel. Rapid dilution and dispersion would take place within offshore channel waters.

Although possibly not visually discernible, discharge waters originating from the townhouse development and adjacent uplands will be of a higher quality than most existing stormwater discharges into Alaeloaiki Bay. This is the result of the presence of upland (off-site) and on-site detention basins that will retain sediments and other suspended solids.

Biota

Stormwater discharges and temporarily elevated silt levels may exert a minor but insignificant impact upon tide pool organisms during periods of normal tradewind and wave action. Intertidal organisms, including juvenile fishes that often use tide pools as nurseries, are adapted to withstand physical environmental extremes, and would not be adversely impacted. Extant biota associated with subtidal reef flats, surge channels, and channel walls show no evidence of silt or sediment stress from existing stormwater runoff.

ENDANGERED, THREATENED, AND PROTECTED SPECIES

There are four federally listed endangered or threatened species associated with ocean and coastal waters in the vicinity of Maui: the endangered humpback whale (*Megaptera novaeangliae*), Hawaiian monk seal (*Monachus schauinslandi*), hawksbill turtle (*Eretmochelys imbricata*; "honu'ea"), and the threatened green sea turtle (*Chelonia mydas*; "honu").

Humpback whales frequent Hawaiian waters during the winter and are commonly observed in offshore waters between December and April. Because of their oceanic, pelagic distribution, the proposed project would have no impact on humpback whale populations.

The Hawaiian monk seal has a range that could occasionally include coastal waters and beaches in the vicinity of Maui. The range of the monk seal is largely restricted to the northwestern Hawaiian Islands. A small colony is believed to exist on Lehua Island and at Niihau Island (Naughton, J., National Marine Fisheries Service. 1987. Pers. comm.). Because of the unlikelihood of their presence in Maui's coastal waters, the project would have no impact on monk seal colonies or statewide populations as a whole.

The hawksbill turtle is critically endangered throughout its range. In Hawaii, hawksbill nesting has been occasionally recorded on isolated beaches on Hawaii, Oahu, Molokai, and Maui.

Because of disturbances associated with extensive urbanization and high recreational use of beaches, it is unlikely that hawksbill turtles would use West Maui beaches for nesting. Therefore, the proposed project is not expected to impact hawksbill turtles.

A single green sea turtle was observed foraging in Keonenui Bay on December 10, 1997. Green sea turtles are relatively common in coastal areas of West Maui. In Hawaiian waters, most green sea turtle nesting occurs at French Frigate Shoals in the remote northwestern Hawaiian Islands. Because there will be no construction activities associated with coastal waters, no significant disturbances to green sea turtles or their foraging or resting habitats is expected to result from the proposed project.

Several pods of spinner dolphins were observed transiting the coastline between Keonenui and Alaeloaiki bays on December 9 and 10, 1997. Spinner dolphins (and bottlenose dolphins (*Tursiops truncatus*)) are of common occurrence in offshore waters throughout Hawaii. Although not protected under the Endangered Species Act, the Marine Mammal Protection Act confers some degree of protection to these marine mammals. Because of their largely oceanic, pelagic distribution, no impacts on protected marine mammals are expected to result from the proposed project.

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HAWAI'I WILDLIFE FUND

Marine Environmental Survey, 1998
Keonenui Bay (Kahana Sunset)
Napili, West Maui, Hawai'i

Prepared for:
Kahana Sunset Residential Resort
4909 L. Honoapi'ilani Road
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March, 1999

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Marine Environmental Survey , 1998
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Abstract

The following report has been written to assist the clients and residents of the Kahana Sunset Residential Resort in assessing the current status of the health of the nearshore waters and reef in front of the resort at Keonenui Bay. This assessment may be used for future comparison should this environment change.

Three marine environmental surveys of Keonenui Bay, West Maui, Hawai'i, were conducted between August and October 1998 to determine existing chemical and biological conditions for both nearshore and offshore areas of the bay. A water quality assessment was conducted using standard parameters to detect the presence of nutrients and certain pollutants in the bay; turbidity of the water, salinity, pH and dissolved oxygen were measured. A biological assessment of the bay was conducted using line-transect methodology and SCUBA equipment, and the presence of living corals, algae, fish and macroinvertebrates were determined and quantified. Benthic substrate was also characterized. A comparison of these findings with historical data is presented.

Objectives

I. Assess the current quality of nearshore waters of Keonenui Bay.
II. Conduct biological surveys of the reef environment of Keonenui Bay.

Introduction

Due to past agricultural practices and coastal development, West Maui has experienced coral reef degradation and nuisance algae blooms. As local residents become more aware of the fragile state of the coral reef ecosystem, they wish to take actions to protect them and the nearshore waters for their own quality of life as well as for the intrinsic value of the environment (West Maui Watershed Management Advisory Committee, 1997).

In response to proposed development upslope (mauka) of them and in order to gain a more comprehensive picture of water quality and the reef habitat of Keonenui Bay, the Kahana Sunset Residential Resort contracted Hawai'i Wildlife Fund to conduct water quality and reef surveys in the summer/fall, 1998. The results from the current study are compared to available historical surveys.

Methods

I. Water Quality.

Three discrete sampling events were conducted on August 31, October 1, and October 22, 1998 in Keonenui Bay (Fig. 1). Two replicate seawater samples were collected at four different surface sites within the bay: "nearshore" (at a buoy approximately 50 m from shore), "offshore" (approximately 100 m from shore due west of the buoy), and the "north" (an area of emergent rocks) and "south" (at approximately 100 m from shore and parallel to a sign on Haukoe Point) ends of the bay. An additional sample at depth was collected at the "offshore" site.

The water samples were stored on ice and airshipped to Aecos, Inc., Analytical Laboratories (970 N. Kalaheo Avenue, Kailua, O'ahu, 96734). Standard parameters indicative of water quality were analyzed including total nitrogen (TN), nitrate + nitrite (NO_3 and NO_2), ammonia (NH_4), and total phosphorus (TP). Additional surface samples were analyzed for Total Petroleum Hydrocarbon (TPH). Field measurements of dissolved oxygen (DO), salinity, temperature, pH and turbidity were conducted by the Hawai'i Wildlife Fund dive team. Dissolved oxygen was measured using a YSI Model 51B dissolved oxygen meter, turbidity measurements were taken using Lamotte Turbidity Meter model 2008, and salinity measurements were made with a refractometer.

II. Reef surveys.

Comprehensive reef surveys were conducted on the same days as water quality sampling on August 31, October 1 and October 22, 1998. Type and abundance of benthic organisms were recorded and percent coral cover calculated. Fish (and other vertebrates) abundance and identification surveys were also conducted. Underwater surveys were conducted by University of Hawai'i certified scientific SCUBA divers and by SCUBA divers from Hawai'i Wildlife Fund and the University of Hawai'i's Marine Option Program. Underwater survey methodologies developed and endorsed by the University of Hawai'i's Quantitative Underwater Ecological Surveying Techniques program (QUEST) were employed.

Two depth isobaths parallel to shore were characterized: "nearshore", approximately 50 m from shore and 15 feet deep and "offshore", approximately 100 m from shore at a depth of 20 feet (Fig. 2). Two 50-meter by 5-meter transects (replicates) were laid side by side on the seafloor. Divers traversed each of the 50-meter transects methodically measuring biological parameters within 1 m^2 quadrats placed along the transect every 10 meters, deriving 11 data points (from transect meter mark 0 to transect meter mark 50) for each transect surveyed. Each survey event for each area (nearshore and offshore) therefore had 22 sample items from two replicate transect surveys.

For each quadrat surveyed the following parameters were determined: total % of algae and coral coverage; the type of seafloor substrate, dividing relative percentages (totaling 100%) between rock, dead coral, live coral, rubble and sand (algae coverage was considered as separate from the five seafloor substrate percentages.); identification of species of algae present, % frequency of occurrence and relative percentages (totaling 100%); identification of species of live corals present, % frequency of occurrence and relative percentages (totaling 100%); presence and number of macroinvertebrates. Percent frequency of occurrence was calculated as the number of quadrates in which a particular species of coral or algae occurred as a percentage of the total number of quadrates sampled (66).

Results

I. Water Quality.

Water quality measurements are presented in Table 1. During the sampling period, mean salinity was normal for seawater (35 ppt), pH was acceptable for seawater (8.6) and the mean temperature (25°C, or 77°F) was typical for that depth at that time of year. Mean dissolved oxygen (7.39 ppm), reflected saturated conditions typical of the surf zone where the measurements were taken and is acceptable by Hawai'i State Department of Health standards.

Some nutrients measured in this study ($NO_3 + NO_2$; NH_4) were higher than Hawai'i State Department of Health standards for embayments found in Hawaii Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards "dry" criteria (based on insignificant rainfall and negligible inflow of freshwater during the survey period). Total nitrogen and total phosphorus were lower than state standards (see Table 1).

The Total Petroleum Hydrocarbon values are at detectable levels only, indicating little influence of run-off from nearby impervious surfaces.

Mean turbidity values (5.0 NTU), while low, did exceed the acceptable values (0.40 NTU) for embayments found in Hawaii Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards "dry" criteria for embayments (based on insignificant rainfall and negligible inflow of freshwater during the survey time period).

II. Reef Surveys.

There was relatively low live coral cover at the survey sites, both nearshore and offshore (Table 2), but the offshore site had significantly more live coral than the nearshore site (Kruskall-Wallis rank test, $H = 14.36$, 3 df, $N = 132$, $p = 0.0025$). There were at least five different species of live coral present (mostly rice and lobe coral) (Table 3).

Both nearshore and offshore sites were characterized by a high percentage of algal cover (Table 4). A nested ANOVA was performed (Table 5) to determine if one of these sites had significantly more algae than the other (no significance, $p = 0.491$); to determine if the transects were significantly different across the two areas (significant, $p = 0.013$); to determine if the sites differed by date alone (no significance, $p = 0.411$), and date vs. site (no significance, $p = 0.297$); and to determine if the 2 transects were significantly different across time (no significance, $p = 0.082$). Both nearshore and offshore sites were rich in algal diversity, with at least 14 species represented (Table 6). The most common algal species for both sites was <u>Acanthophora spicifera.</u> The nuisance, introduced alga, <u>Hypnea musciformis,</u> was the second most common species in the nearshore site, with very little occurrence in the offshore site.

A small number of macroinvertebrates were documented at both sites, but this must be considered a gross underestimate, as it is extremely destructive to reefs to expose cryptic invertebrates to get a more accurate count (Table 7).

Fish diversity was high, with at least 46 different species documented (Table 8). Many fish were observed in both areas, but because of their high mobility, attaching significance to abundance estimates for fish observed less frequently than weekly is unsound. Figures 3 and 4 give a picture of relative abundance of fishes for both sites combined by family. Trophic groups of fishes are presented in Figures 5 and 6.

Discussion

Water Quality.

Pentec Environmental (1997) documented the physical features of Keonenui Bay and conducted water quality surveys in the winter of 1997. These surveys, however, did not include nutrients, contaminants, or quantitative surveys of the reef environment. To determine the general health of nearshore waters and reefs, it is important to conduct numerous studies, preferably over time, to detect seasonal changes or problems. Unfortunately, multiple surveys are usually cost-prohibitive, therefore whenever possible, we will compare our findings with those previously published (that were obtainable) to provide a more complete understanding of the Bay.

Keonenui Bay is a semi-enclosed cove and therefore has lower rates of mixing than the nearby channels or open coastline. Dollar and Andrews (1997) demonstrated that the nearshore waters of West Maui have a surplus of nitrate plus nitrite (referred to hereafter as NO_3), likely derived from past land-use practices (largely over-fertilization) that allow the seepage of NO_3 into groundwater, where it is carried to the nearshore waters. While not inherently dangerous to human health, this nutrient causes problems in the nearshore waters by enhancing the growth of algae. Algae (or seaweed) grows faster than coral, and can out-compete corals or even smother them in some cases. Both nearshore and offshore sample sites in the bay were also characterized by old reef structure overgrown with algae.

The water quality data from this study confirms the presence of NO_3 in Keonenui Bay waters in excess of State of Hawai'i Department of Health standards. The presence of NH_4 at higher than state standards may implicate the proximity of some coastal dwellings still on cesspools in the area and deserves further attention beyond the scope of this study. Dollar and Andrews (1997) conducted three water quality surveys between December, 1993 and January, 1995 at Alaeloaiki Bay, a cove adjacent to the north side of Keonenui. Their values for NO_3 and NH_4 were comparable to this study, with TN and TP not exceeding state standards, but a mean NO_3 value (15.5) greater than that of this study, and also of the state water quality standard.

During the sampling period, salinity was normal at 35 ppt in contrast to the slightly lower mean values (31.3 ppt) obtained by Pentec Environmental at Keonenui (1997). This difference may reflect the higher freshwater influx from rain and groundwater during the winter when their study was conducted. Mean temperature values (25.0 °C) were very close to the Pentec study (24.4 °C), reflecting the relatively uniform temperatures of Hawai'i's oceanic waters (excluding cold groundwater seeps). Dissolved oxygen measurements were also close, but those in this study were slightly higher (mean = 7.39), reflecting saturated conditions typical of the surf zone where the measurements were taken. Mean turbidity values were relatively low (5.0 NTU), but exceeded the mean values for this site during the winter/spring of 1998 (Bernard and Mangel, 1998) (Fig. 7) and state water quality standards for "dry" criteria. These values reflect the low flushing or mixing action typical of coastal embayments.

Reef Surveys.

The survey sites for this study contained old reef structure with some live coral, high algal growth and high fish species diversity. Statistical tests performed on algal cover showed that the survey transects were significantly different from each other. This finding reflects that our transects were not fixed (i.e., they were very close to previous spots on different dates, but not dead-on), and indicates a heterogeneous, highly variable substrate.

The fish surveys can be considered a "snapshot" of real usage, hence they may represent an ephemeral distribution. For example, a large school of young jacks was sighted on the transect, yet they may move quickly out of the area; whereas a sighting was made off-transect of a huge shoal of hundreds of unidentified juvenile fishes that may depend on the bay for shelter as a "nursery". The old reef structure provides habitat for the fish to live and reproduce in and offers rich habitat for benthic and algal feeders, such as wrasses and surgeonfishes, to thrive in.

Although no threatened and protected species (such as green sea turtles, and Hawaiian spinner dolphins) were sighted during the surveys, their frequent (almost daily for sea turtles) presence has been documented by one of the homeowners adjacent to the Kahana Sunset complex. Recreational snorkelers and swimmers were present every time a survey was conducted.

Summary

The water quality and reef habitat of Keonenui Bay may be in a delicate balance. The presence of old reef structure suggests previous higher coral coverage in Keonenui Bay at one time. It is not known what factors led to the change in the reef habitat; there are many anthropogenic sources that can adversely impact coral growth (Richmond, 1997). Nevertheless, the reef currently supports high algal and fish diversity and human recreation. Nutrients and turbidity values measured in the bay during the dry season indicate that it experiences low mixing rates typical of coastal embayments. Groundwater influx to the nearshore environment currently harbors enough nutrients to sustain algal overgrowth (Dollar and Andrews, 1997). There is an unknown source for elevated ammonia in the bay. There are currently no measurable amounts of total petroleum hydrocarbons in the bay. Therefore, due to the low mixing or flushing rates, the bay would likely be adversely impacted by additional influx of surface water run-off resulting from new construction mauka of Kahana Sunset Residential Complex.

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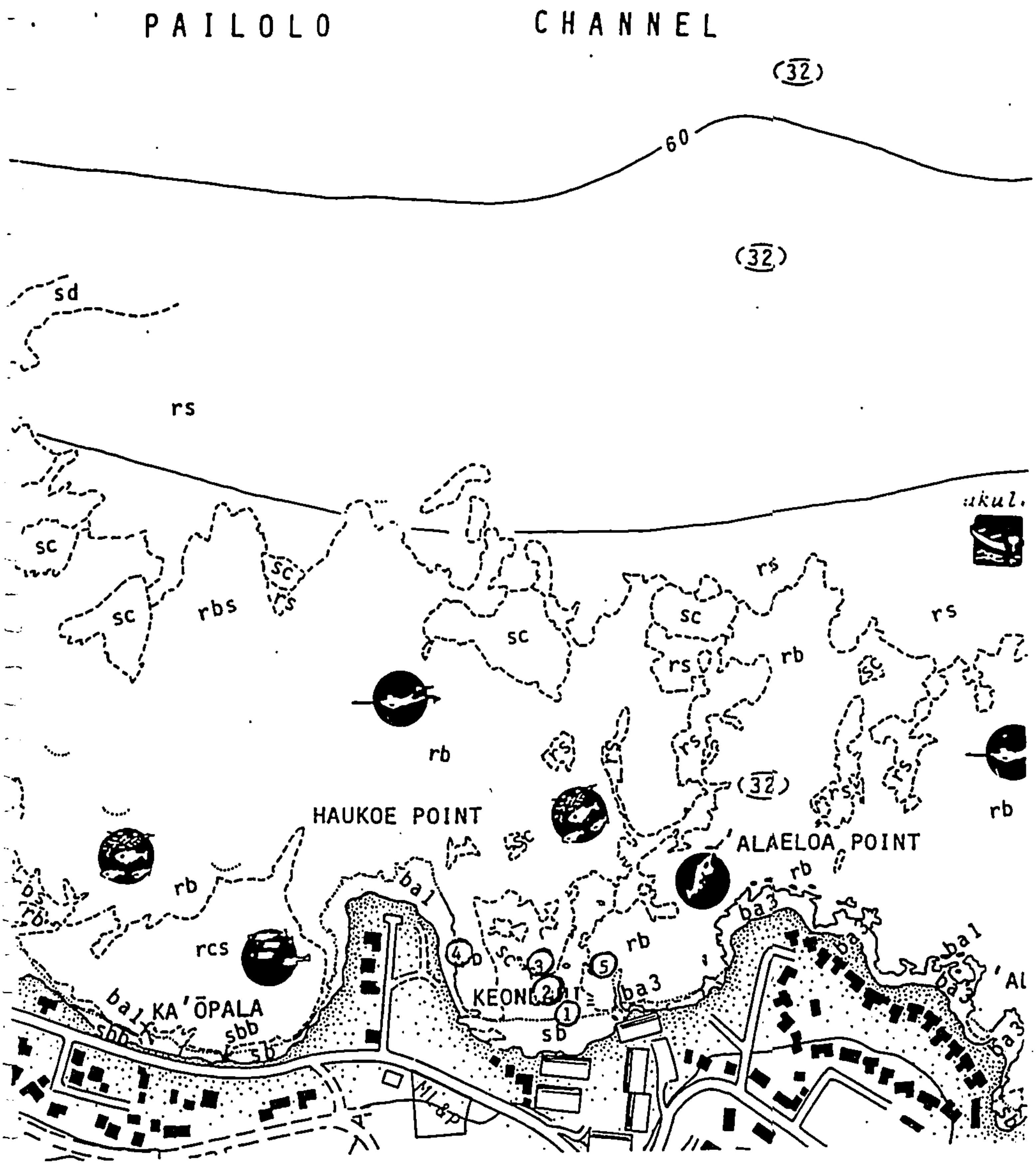


Figure 1. Map of Keonenui Bay and water sampling sites.
1 = Turbidity, DO, T, S, pH.
2 = Nearshore nutrient and contaminant sample sites.
3 = Offshore nutrient and contaminant sample sites.
4 = South nutrient and contaminant sample sites.
5 = North nutrient and contaminant sample sites.

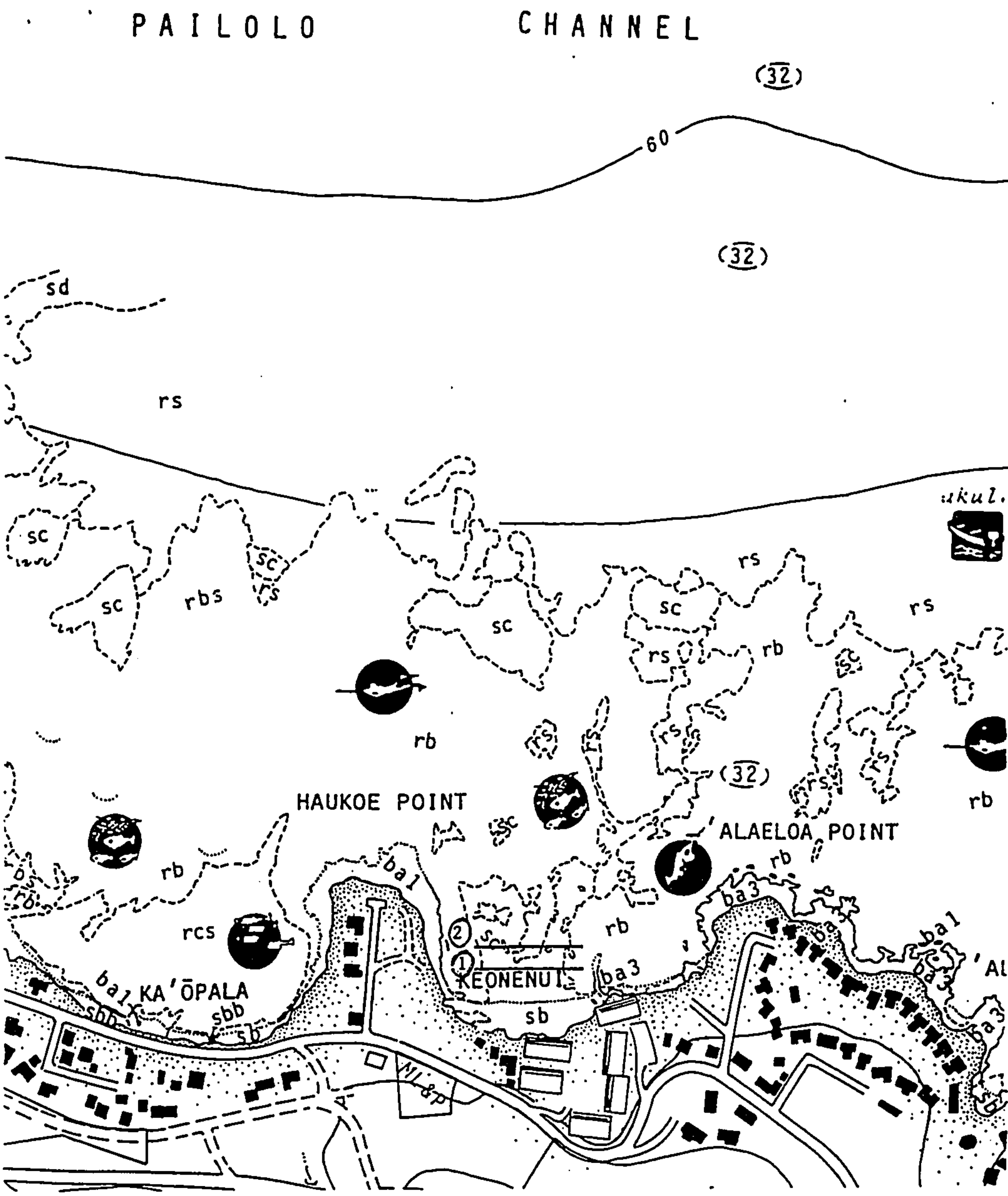


Figure 2. Map of Keonenui Bay and reef survey sites.
1 = Nearshore transect.
2 = Offshore transect.
(Not to scale)

OffShore
Fish Dominance By Family
Total of Three Survey Dates

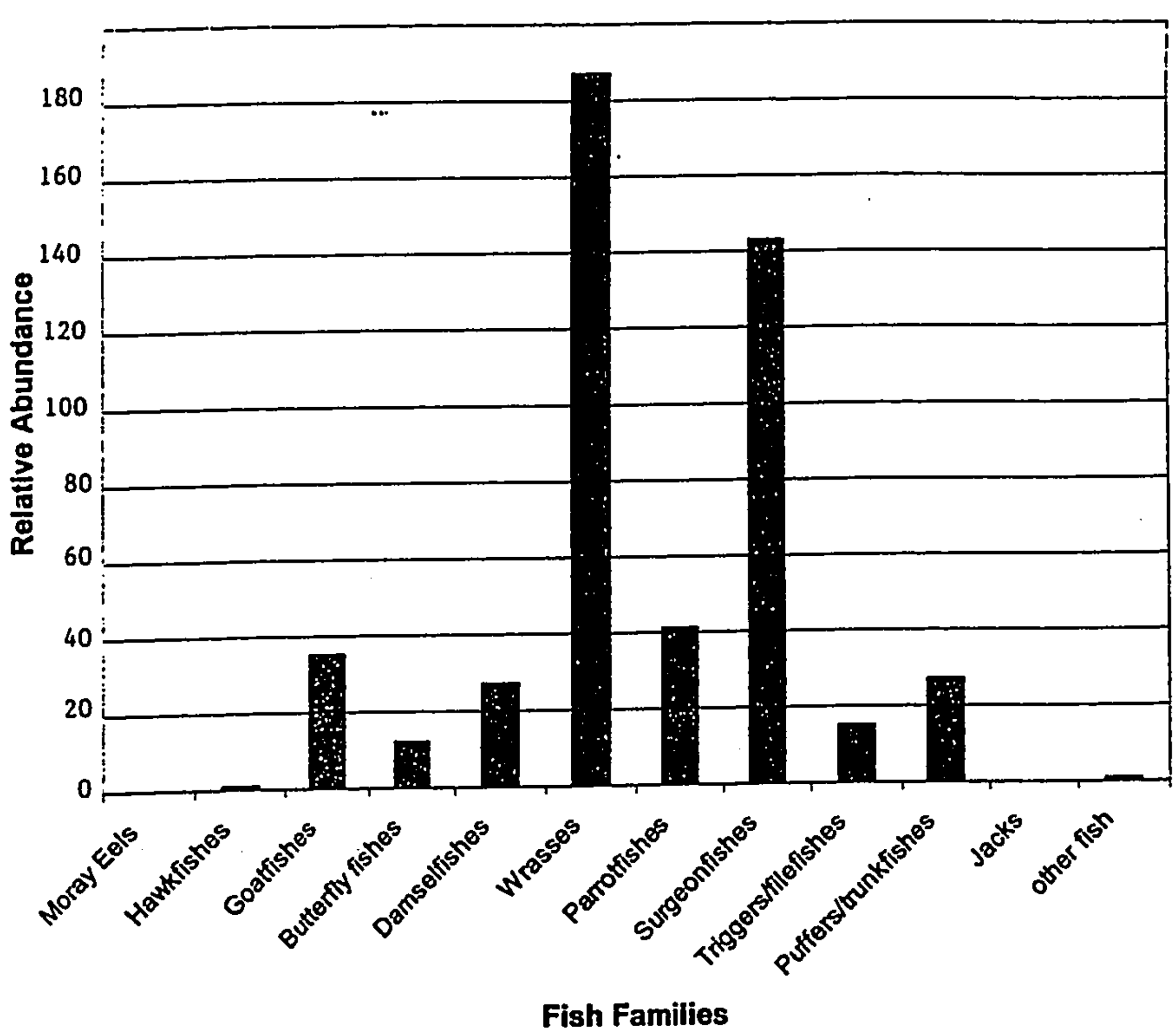


Figure 3. Relative Abundance of Fish Families Offshore site.

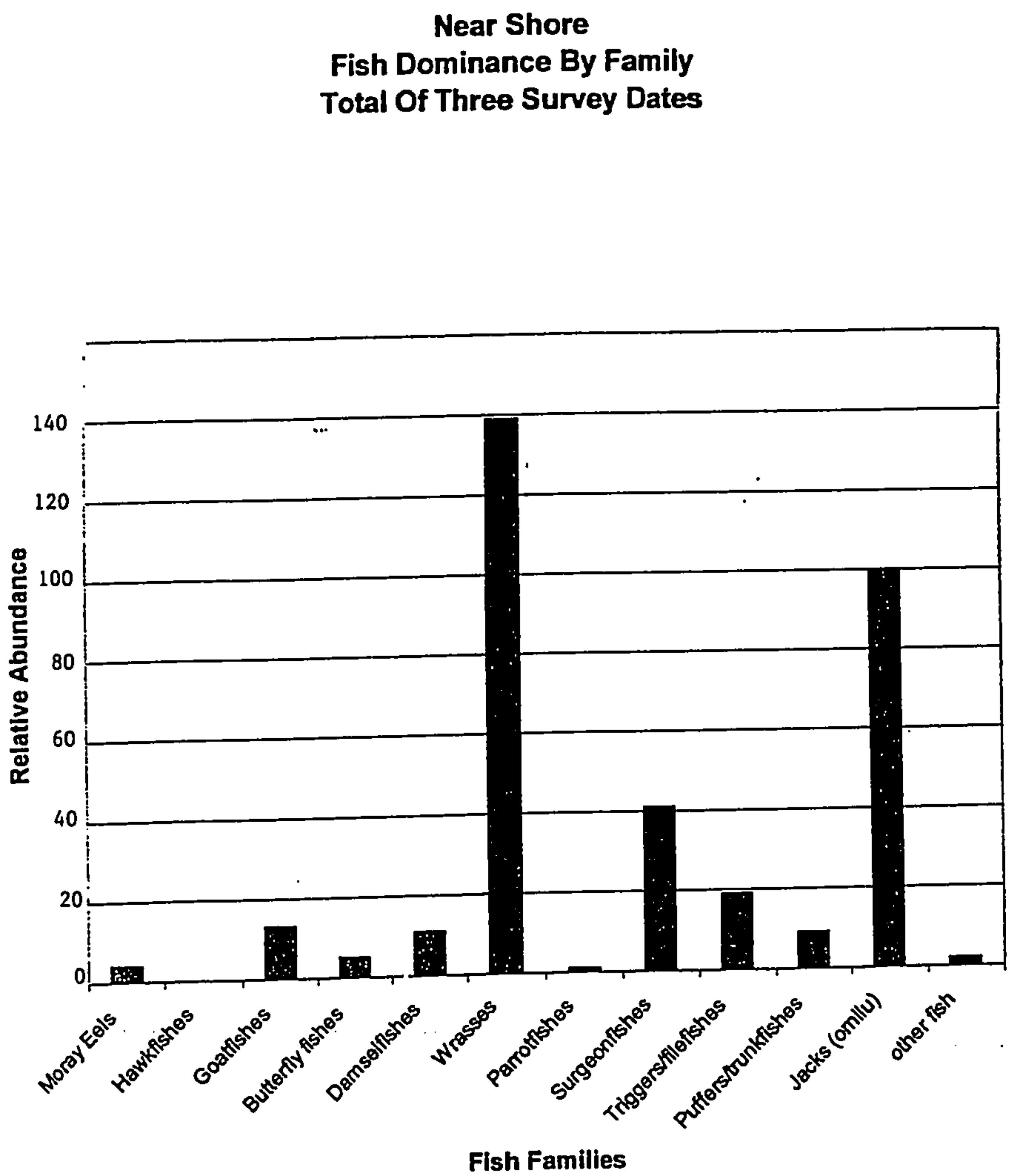
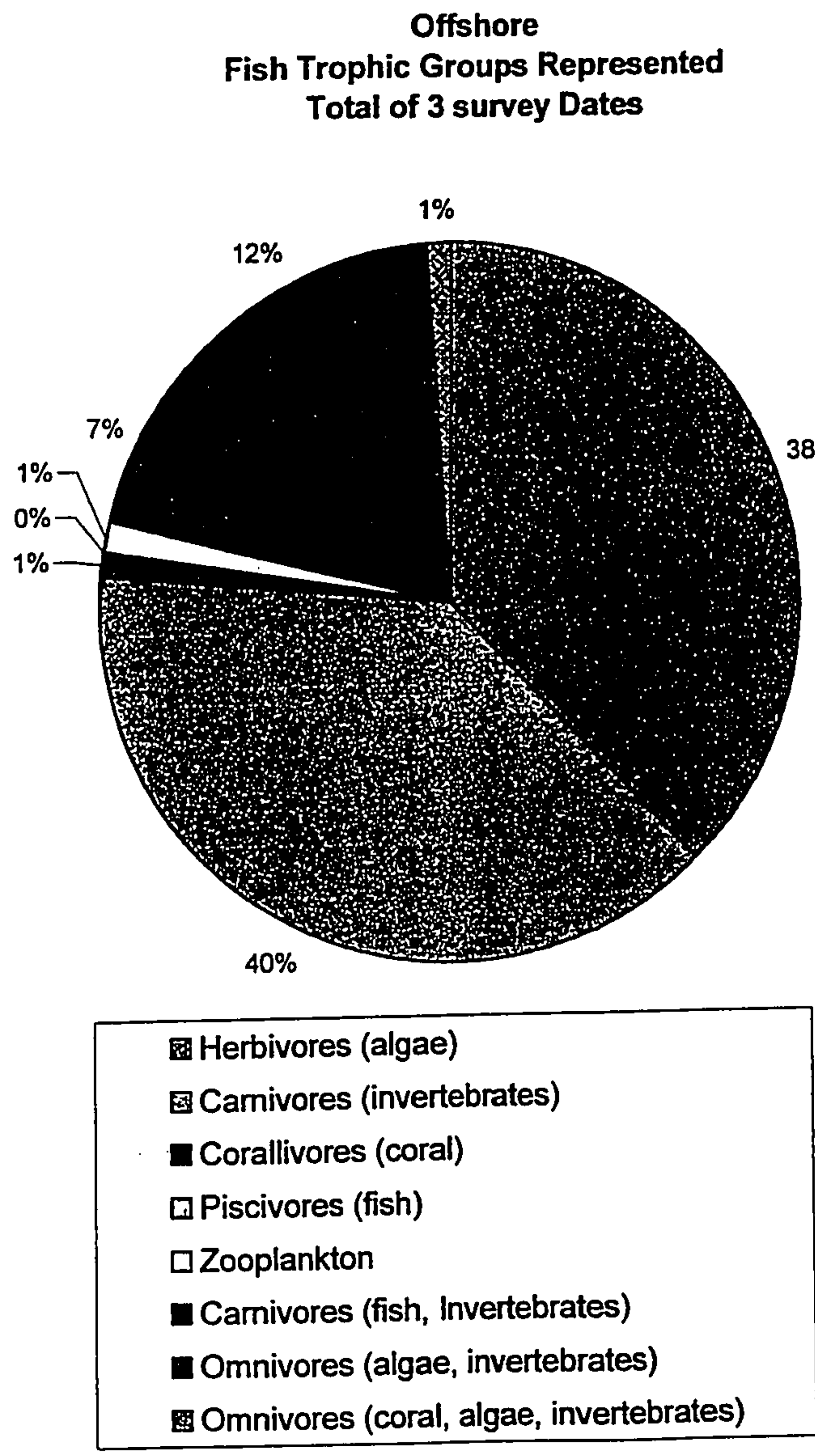
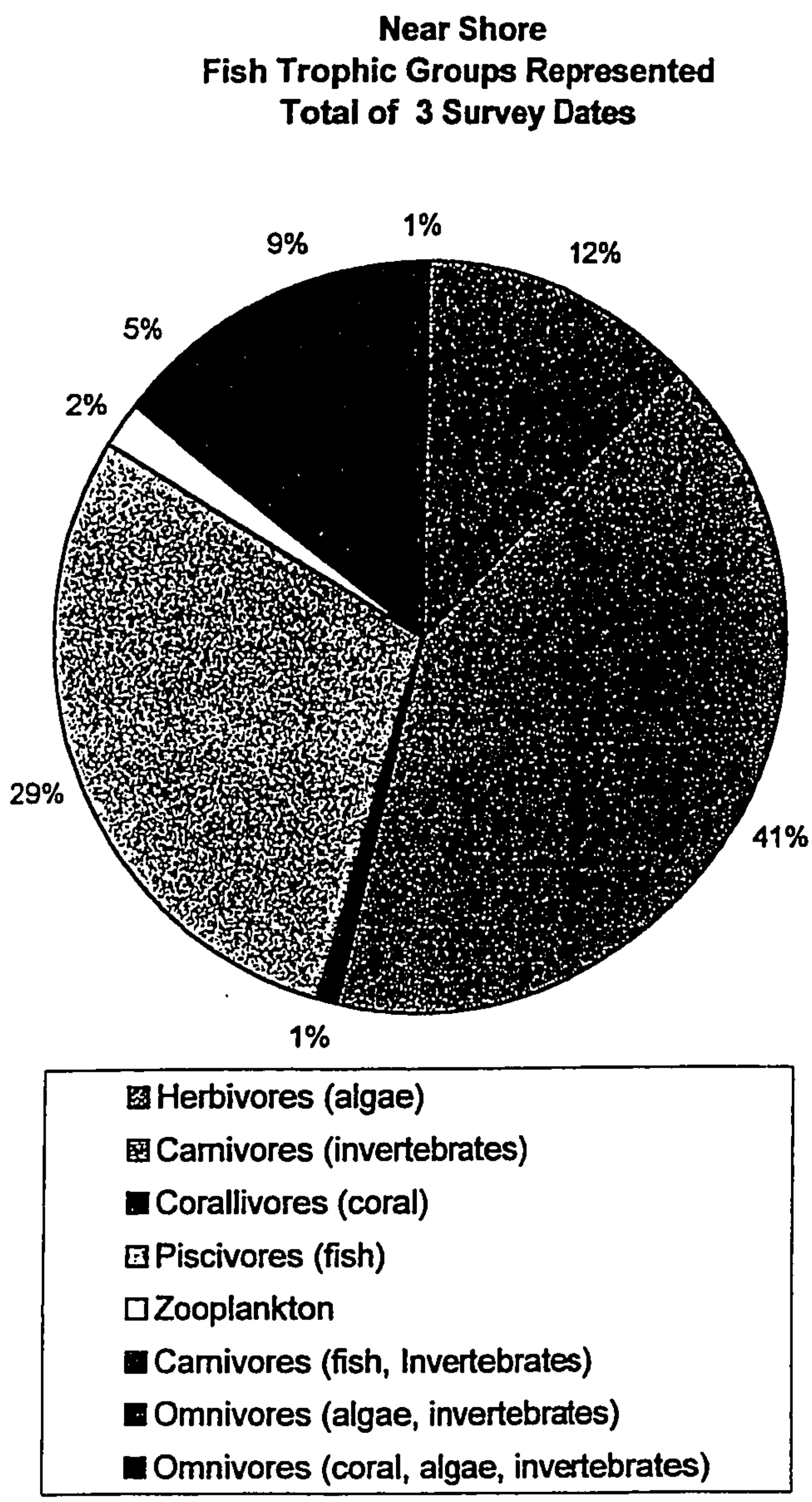


Figure 4. Relative Abundance of Fish Families Nearshore site.


Offshore
Fish Trophic Groups Represented
Total of 3 survey Dates
1%
12%
38%
7%
1%
0%
1%
40%
Herbivores (algae)
Carnivores (invertebrates)
Corallivores (coral)
Piscivores (fish)
Zooplankton
Carnivores (fish, Invertebrates)
Omnivores (algae, invertebrates)
Omnivores (coral, algae, invertebrates)


Near Shore
Fish Trophic Groups Represented
Total of 3 Survey Dates
1%
12%
9%
5%
2%
29%
41%
1%
Herbivores (algae)
Carnivores (invertebrates)
Corallivores (coral)
Piscivores (fish)
Zooplankton
Carnivores (fish, Invertebrates)
Omnivores (algae, invertebrates)
Omnivores (coral, algae, invertebrates)

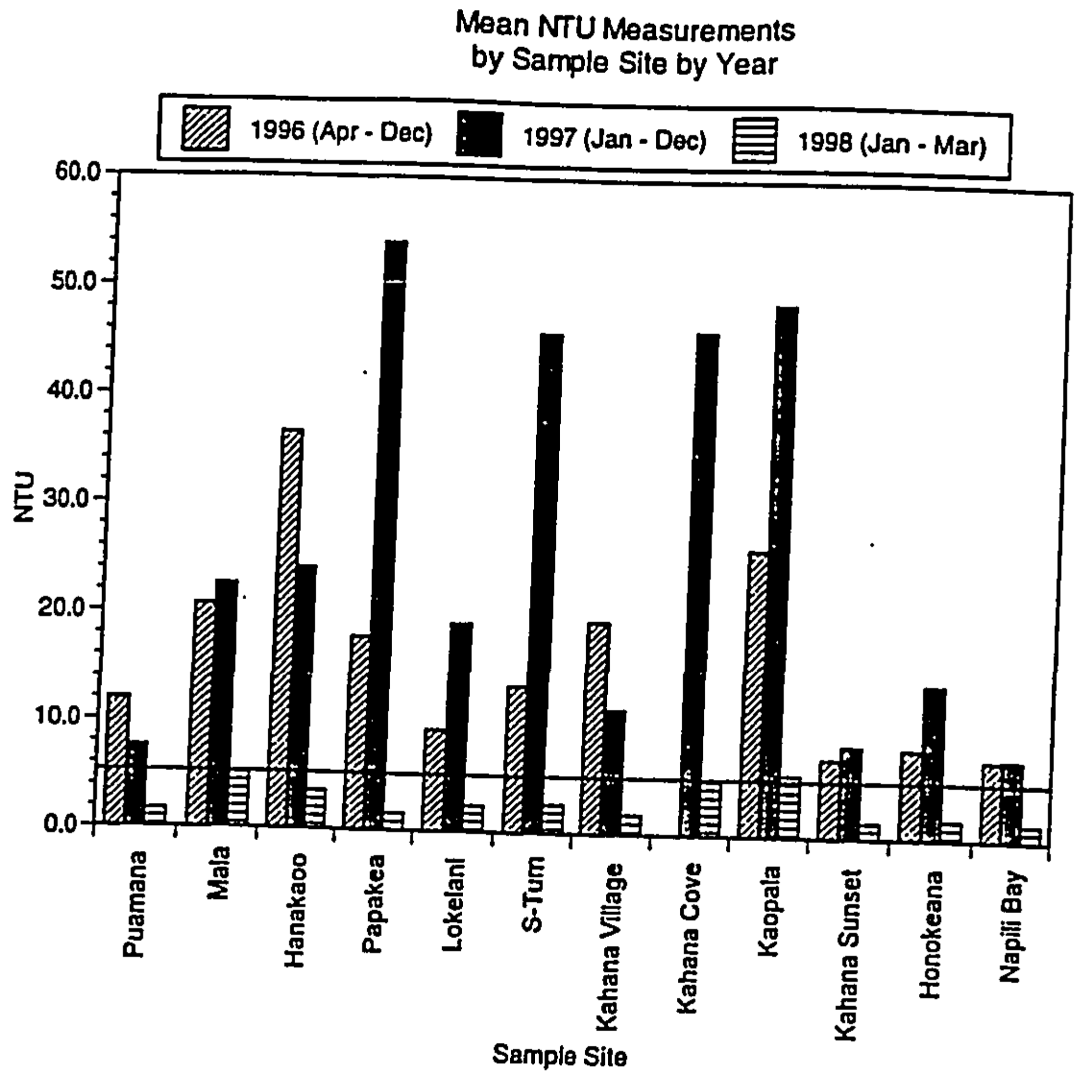


Figure 6. Mean turbidity values in Nephelometric Turbidity units (NTU) from 12 West Maui shoreline sites. Samples taken on 23, 38 and 6 dates for 1996, 1997 and 1998, respectively. Data for April to September 1996 taken from Hodges (1996). Horizontal line indicates applicable State Water Quality Standard for turbidity of 5.0 NTU, under wet conditions.

Figure 7. Mean turbidity values for selected sites on the West Maui coastline from 1996 - 1998 from Bernard and Mangel (1998). Kahana Sunset is Keonenui Bay.

Table 1 Keonenui Water Quality and Chemical Composition

	$(NO_3 + NO_2)$ Nitrate + Nitrite (ug N/L)	(NH_4) Ammonia (ug N/L)	(TN) Total Nitrogen (ug N/L)	(TP) Total Phosphorus (ug P/L)	(TPH) Total Petroleum Hydrocarbons (mg/L)	Temperature (deg C)	Salinity (ppt)	(DO) Dissolved Oxygen (ppm)	Turbidity (ntu)	pH
date sampled: 8/31/98						26	35	7	2.87	–
North	5	6	130	11	< 0.61					
South	12	3	135	12	< 0.61					
Near Shore	10	3	132	19	< 0.61					
Offshore Surface	11	6	136	17	< 0.61					
Offshore 13 ft	9	5	145	13	—					
mean:	*9.4*	*4.6*	*135.6*	*14.4*						
SD:	*2.7*	*1.5*	*5.8*	*3.4*						
median:	10	5	135	13						
	$(NO_3 + NO_2)$ Nitrate + Nitrite (ug N/L)	(NH_4) Ammonia (ug N/L)	(TN) Total Nitrogen (ug N/L)	(TP) Total Phosphorus (ug P/L)	(TPH) Total Petroleum Hydrocarbons (mg/L)	Temperature (deg C)	Salinity (ppt)	(DO) Dissolved Oxygen (ppm)	Turbidity (ntu)	pH
date sampled: 10/1/98						24.1	35	7.66	–	8.6
North	4	4	134	10	< 0.61					
South	9	4	137	11	< 0.61					
Near Shore	6	7	152	11	< 0.61					
Offshore Surface	7	6	137	10	< 0.61					
Offshore 13 ft	7	1	155	10	—					
mean:	*6.6*	*4.4*	*143.0*	*10.4*						
SD:	*1.8*	*2.3*	*9.7*	*0.5*						
median:	7	4	137	10						
	$(NO_3 + NO_2)$ Nitrate + Nitrite (ug N/L)	(NH_4) Ammonia (ug N/L)	(TN) Total Nitrogen (ug N/L)	(TP) Total Phosphorus (ug P/L)	(TPH) Total Petroleum Hydrocarbons (mg/L)	Temperature (deg C)	Salinity (ppt)	(DO) Dissolved Oxygen (ppm)	Turbidity (ntu)	pH
date sampled: 10/22/98						25	35	7.43	7.13	–
North	12	4	114	10	< 0.61					
South	48	4	168	22	< 0.61					
Near Shore	39	3	140	15	< 0.61					
Offshore Surface	15	4	114	11	< 0.61					
Offshore 13 ft	25	3	127	12	—					
mean:	*27.8*	*3.6*	*132.6*	*14*						
SD:	*15.4*	*0.5*	*22.5*	*4.8*						
median:	25	4	127	12						
	$(NO_3 + NO_2)$ Nitrate + Nitrite (ug N/L)	(NH_4) Ammonia (ug N/L)	(TN) Total Nitrogen (ug N/L)	(TP) Total Phosphorus (ug P/L)		Temperature (deg C)	Salinity (ppt)	(DO) Dissolved Oxygen (ppm)	Turbidity (ntu)	pH
						25.03	35	7.36	5.00	8.60
overall mean:	14.6	4.2	137.1	12.9						
standard deviation:	11.5	0.5	5.4	2.2						
avg. median:	14.0	4.3	133.0	11.7						
overall median:	10.0	4.0	136.0	11.0						
Hawaii Administrative Rules Title 11 Department of Health Chapter 54 Water Quality Standards										
"Dry" criteria standards for embayments										
Geometric mean not to exceed the given value										
	5.0	*3.5*	*150.0*	*20.0*						
Not to exceed the given value more than ten percent of the time										
	14.0	8.5	250.0	40.0						
Not to exceed the given value more than two percent of the time										
	25.0	15.0	350.0	60.0						
note: "geometric mean" is a statistical measure of central tendency										

Table 2 Substrate Type, Mean Percent Coral Cover ± 1 Standard Deviation, and Kruskal-Wallis ANOVA Rank Test for % Coral Cover

	Substrate Type									
Location	% algae	% rock	% dead coral	% live coral	% rubble	% sand	N	Mean % Coral Cover	± Standard Deviation	Kruskal-Wallis ANOVA Rank Test for % Coral Cover Sum of Ranks
Keonenui Offshore #1	44.6%	0.8%	1.3%	3.5%	6.5%	37.0%	33	3.52%	8.14	2397.5
8/30/98	52.3%	2.3%	1.4%	5.5%	4.5%	34.1%	11	5.45	9.61	
10/1/98	44.6%	0.0%	0.1%	4.6%	1.4%	49.4%	11	4.55	10.11	
10/22/98	36.9%	0.0%	2.3%	0.6%	13.5%	27.4%	11	0.55	1.51	
Keonenui Offshore #2	54.0%	1.4%	1.7%	4.6%	5.0%	33.3%	33	4.61%	12.93	2459.5
8/30/98	49.5%	4.1%	0.9%	1.4%	1.4%	42.7%	11	1.36	3.23	
10/1/98	56.8%	0.0%	1.8%	11.5%	0.0%	29.9%	11	11.45	20.93	
10/22/98	55.8%	0.0%	2.3%	1.0%	13.5%	27.4%	11	1.00	3.00	
Keonenui Near Shore #1	49.0%	12.3%	1.1%	0.0%	3.7%	33.7%	33	0.03%	0.17	1990.5
8/30/98	63.6%	8.2%	0.0%	0.0%	1.6%	26.5%	11	0	0	
10/1/98	15.6%	22.4%	0.0%	0.0%	9.5%	52.5%	11	0	0	
10/22/98	67.7%	6.4%	3.4%	0.1%	0.0%	22.2%	11	0.09	0.3	
Keonenui Near Shore #2	28.2%	1.1%	0.2%	0.0%	1.4%	69.1%	33	0.00%	0	1930.5
8/30/98	20.1%	0.0%	0.5%	0.0%	0.0%	79.5%	11	0	0	
10/1/98	21.8%	3.3%	0.0%	0.0%	1.4%	73.5%	11	0	0	
10/22/98	42.8%	0.0%	0.1%	0.0%	2.7%	54.4%	11	0	0	

Table 3 Percent Frequency of Occurrence of Corals by Species (N=66)			
	Keonenui	Keonenui	
Coral Species	Offshore	Near Shore	
Montipora flabellata	7.6%	0.0%	
Montipora verrucosa	9.1%	0.0%	
Porites compressa	4.5%	0.0%	
Porites lobata	4.5%	1.5%	
unidentified coral species	1.5%	0.0%	

Table 4 Mean Percent Algal Cover ± 1 standard deviation			
Location	N	Mean % Algal Cover	± Standard Deviation
Keonenui Offshore #1	33	44.61%	34.75
8/30/98	11	52.27	32.66
10/1/98	11	44.64	40.04
10/22/98	11	36.91	32.62
Keonenui Offshore #2	33	54.06%	35.15
8/30/98	11	49.55	39.84
10/1/98	11	56.82	37.84
10/22/98	11	55.82	30.01
Keonenui Near Shore #1	33	48.97%	33.14
8/30/98	11	63.64	27.67
10/1/98	11	15.55	15.47
10/22/98	11	67.73	25.63
Keonenui Near Shore #2	33	28.24%	33.76
8/30/98	11	20.09	31.85
10/1/98	11	21.82	24.52
10/22/98	11	42.82	40.97

Table 5 ANOVA Results For Algal Cover (Arcsin Transformed) at Keonenui Offshore and Nearshore

	df Effect	MS Effect	df Error	MS Error	F	p-level		
Location	1	0.545	2	0.778	0.7	0.491		
Transect	2	0.778	120	0.172	4.514	0.013		
Date	2	0.41	4	0.366	1.12	0.411		
Loc x Tran	--	--	--	--	--	--		
Loc x Date	2	0.612	4	0.366	1.671	0.297		
Tran x Date	4	0.366	120	0.172	2.122	0.082		
Loc x Tran x Date	--	--	--	--	--	--		

Table 6 Percent Frequency of Occurrence of Algae by Species (N=66)			
Algae Species	Keonenui Offshore	Keonenui Near Shore	
Amansia glomerata	16.7%	1.5%	
Acanthophora spicifera	72.7%	74.2%	
Asparagopsis taxiformis	1.5%	3.0%	
Codium edule	0.0%	4.5%	
Dictyota bartayresii	39.4%	1.5%	
Galaxaura acuminata	1.5%	3.0%	
Gracilaria bursapastoris	7.6%	10.6%	
Halimeda opuntia	9.1%	7.6%	
Hypnea musciformis	3.0%	47.0%	
Hydrolithon reinboldii	19.7%	19.7%	
Jania sp.	10.6%	15.2%	
Pterocladia capillacea	28.8%	33.3%	
Ulva fasciata	6.1%	7.6%	
Ulva reticulata	0.0%	3.0%	
unidentified algae species	65.2%	42.4%	

Table 7 Percent Frequency of Occurrence of Macroinvertebrates by Species (N=66)			
Macroinvertebrate Species	Keonenui Offshore	Keonenui Near Shore	
boring urchin	3.0%	15.2%	
brittle star	4.5%	0.0%	
cone shell	0.0%	1.5%	
hermit crab	0.0%	1.5%	
slate pencil urchin	1.5%	0.0%	
unidentified crab	1.5%	0.0%	
unidentified octopus	0.0%	1.5%	
unidentified squid	0.0%	1.5%	

Table 8 Total Number of Fish Observed by Species (for 6 survey events)

Fish Species		Kahana Sunset Offshore	Kahana Sunset Near Shore
common name	scientific name		
Moray Eels			
yellowmargin moray eel	*G. flavimarginatus*		1
snowflake moray eel	*E. nebulose*		1
undulated moray eel	*G. undulatus*		1
whitemouth moray eel	*G. meleagris*		1
Hawkfishes			
stocky hawkfish	*C. pinnulatus*	1	0
Goatfishes			
manybar goatfish	*P. multifasciatus*	35	12
whitesaddle goatfish	*P. porphyreus*	0	0
sidespot goatfish	*P. pleurostigma*		1
Butterfly fishes			
threadfin butterflyfish	*C. auriga*	0	1
racoon butterflyfish	*C. lunula*	3	1
milletseed butterflyfish	*C. miliaris*	7	3
teardrop butterflyfish	*C. unimaculatus*	2	0
Damselfishes			
Hawaiian sergeant	*A. abdominalis*	0	1
brighteye damselfish	*P. imparipennis*	2	1
blue-eye damselfish	*P. johnstonianus*	5	3
Pacific gregory	*S. fasciolatus*	20	3
Hawaiian dascyllus	*D. albisella*	0	2
blackfin chromis	*C. vanderbilti*	0	1
Wrasses			
Hawaiian cleaner wrasse	*L. phthirophagus*	1	0
saddle wrasse	*T. duperrey*	50	6
bird wrasse	*G. varius*	0	29
belted wrasse	*S. balteata*	129	110
ornate wrasse	*H. ornatissimus*	0	0
pearl wrasse	*A. cuvier*	1	0
cigar wrasse	*C. inermis*	0	2
rockmover wrasse	*N. taeniourus*	0	1
Parrotfishes			
bullethead parrotfish	*S. sordidus*	30	0
palenose parrotfish	*S. psittacus*	23	1
Surgeonfishes			
convict tang	*A. triostegus*	32	24
orangeband surgeonfish	*A. olivaceus*	16	0
ringtail surgeonfish	*A. blochii (maia)*	21	13
brown surgeonfish	*A. nigrofuscus*	73	3
goldring surgeonfish	*C. strigosus*	2	0
yellow tang	*Z. flavescens*	6	0
bluespine unicornfish	*N. unicornis*	0	1
Triggers/Filefish			
reef triggerfish	*R. rectangulus*	14	19
spotted boxfish	*O. meleagris*	0	1
squaretail filefish	*C. sandwichiensis*	1	0
Puffers			
Hawaiian whitespotted toby	*C. jactator*	19	8
spotted pufferfish	*A. meleagris*	1	0
striped belly pufferfish	*A. hispidus*	1	0
ambon toby	*C. amboinensis*	6	0
other fish			
scarface blenny	*C. vanderbilti*	1	1
Hawaiian flagtail	*K. sandvicensis*	0	1
bluefin trevally (omilu)	*C. melampygus*	0	100
stingray	*Dasyatis sp.*	0	1
	total number of fish:	501	354

Appendix E-1

Hawaii Wildlife Fund
(December 3, 2000)

HAWAI'I WILDLIFE FUND

MESSAGE:

Mr. John Min
Director
Department of Planning
250 Southam St.
Wailuku, HI 96793

Dear Mr. Min,

It has been brought to my attention that the developer of the Napili Villas, the project proposed Mauka of Kahana Sunset Residential Complex, is designing its drainage system so as not to create any additional adverse impacts to Keonenui Bay.

Sincerely,

Hannah J. Bernard
Executive Director
Hawai'i' Wildlife Fund

PO Box 637 • Paia, Hawaii 96779 • Phone (808) 572-7327 • wild@aloha.net

MAR 23 2001

FILE COPY

2001-03-23-MA-FEA

Final Environmental Assessment

NAPILI VILLAS

Prepared for:

General Services, Inc.

February 2001

MUNEKIYO & HIRAGA, INC.

'01 FEB 12 P2:00

Final
Environmental Assessment

NAPILI VILLAS

Prepared for:

General Services, Inc.

February 2001

MUNEKIYO & HIRAGA, INC.

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Preface

The applicant, General Services, Inc., proposes the development of the Napili Villas, a project consisting of 184 townhouse units and related improvements at Napili, Maui, Hawaii. The project site encompasses an area of approximately 12.5 acres and is identified by TMKs 4-3-03:110, 122, and 123.

Since the proposed action involves the use of State lands (Honoapiilani Highway right-of-way) for traffic and drainage system improvements, an Environmental Assessment (EA) has been prepared as required by Chapter 343, Hawaii Revised Statutes, to document the proposed action's technical characteristics, environmental impacts and alternatives, and advances findings and conclusions relative to the significance of the project.

Chapter I

Project Overview

I. PROJECT OVERVIEW

A. PROJECT LOCATION, EXISTING USE, AND LAND OWNERSHIP

The applicant, General Services, Inc., proposes the development of the Napili Villas (fka, Napilihau Condominiums), a project consisting of 184 townhouse units and related improvements at Napili, Maui, Hawaii. See Figure 1.

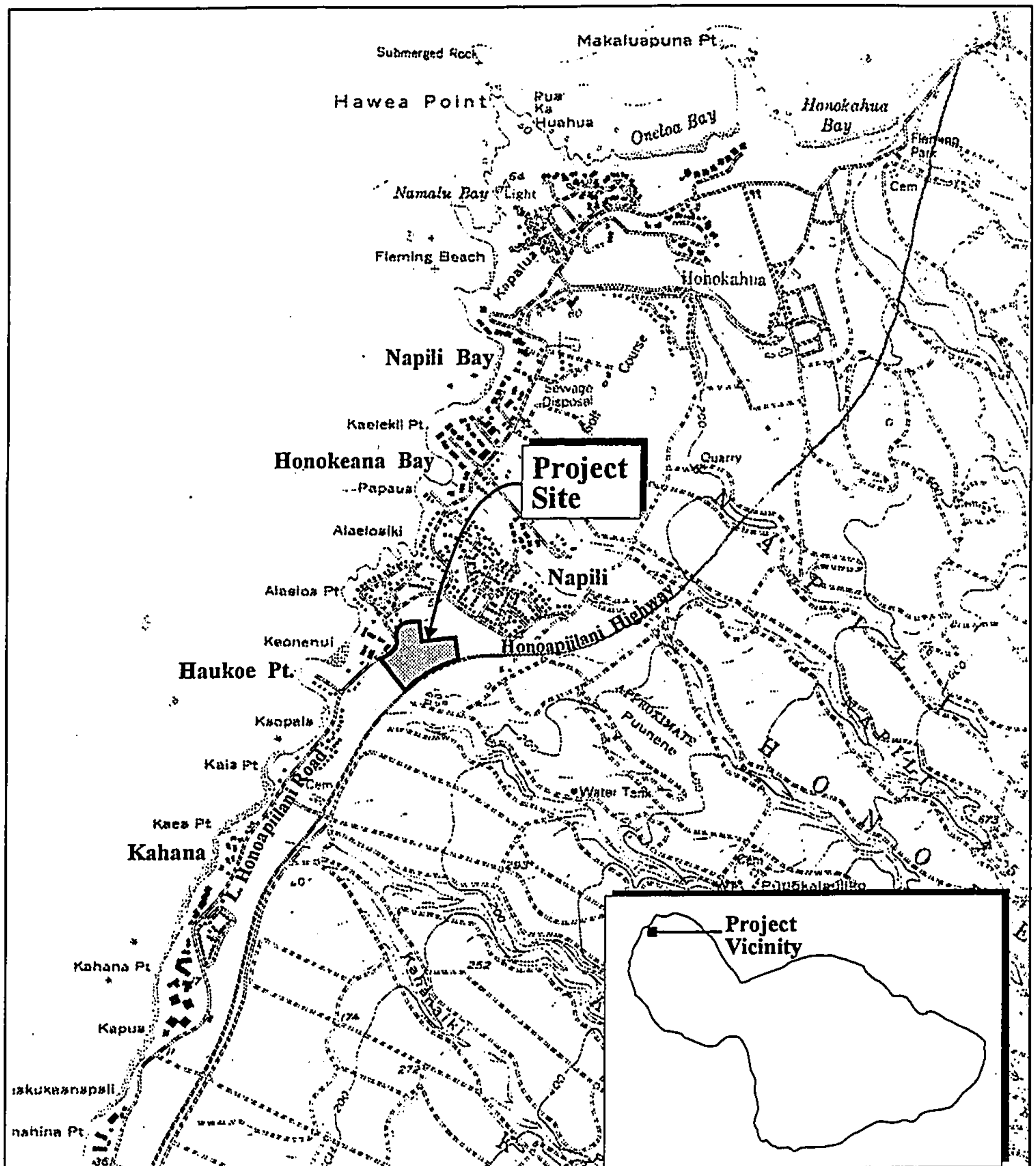
Identified by TMKs 4-3-03:110, 122, and 123, the project site consists of approximately 12.5 acres. See Figure 2. Presently undeveloped, the site is predominantly vegetated with introduced species of grasses and weeds.

Undeveloped land and the Napilihau Villages, a 76-unit multi-family development, border the subject property to the north. To the east, the property is bordered by the Napili Fire Station and by Napili Plaza, a business and commercial complex containing shops, offices, and restaurants. Honoapiilani Highway, a State arterial highway, abuts the project site to the south, while single-family residences and a segment of Lower Honoapiilani Road adjoin the site to the west. See Figure 3. Access to the subject property is currently provided via Hanawai Street.

The Napilihau Villages Joint Venture is the fee simple owner of the subject property.

B. PROPOSED ACTION

The applicant proposes the development of 184 two- and three-bedroom townhouse units on the approximately 12.5 acres encompassed by the subject property. See Appendix A, Preliminary Site, Landscape and Development Plans. The existing TMK parcels comprising the subject property (4-3-03:110, 122, and 123), will be consolidated in connection with the proposed development. Access to the subject property will be



Source: U.S. Geological Survey Map, Napili Quad

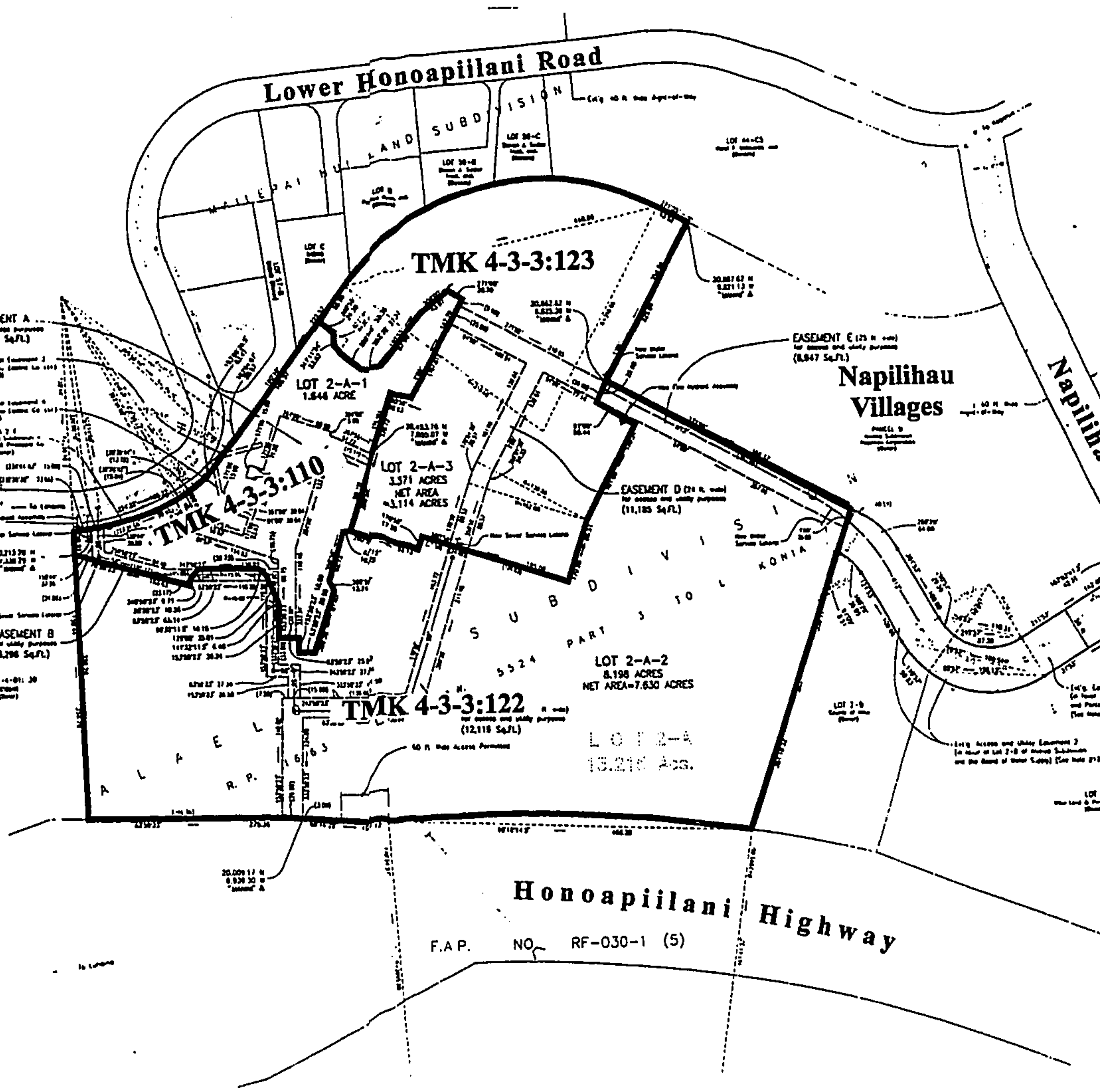
Figure 1

Napili Villas
Regional Location Map

0 500 1000 2000 Feet

MUNEKIYO & HIRAGA, INC.

Prepared for: General Services, Inc.

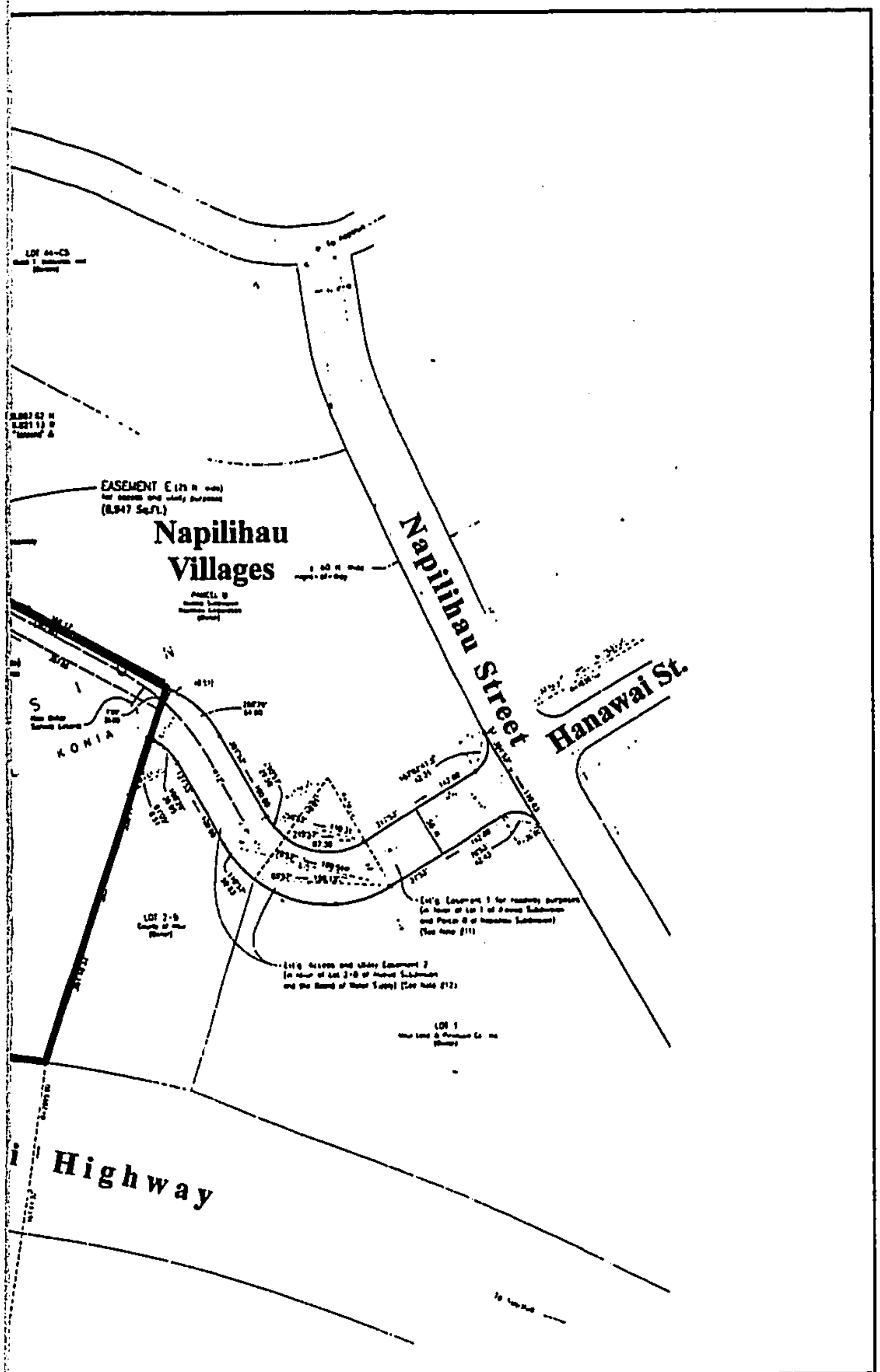


Source: Warren S. Unemori Engineering, Inc.

Figure 2

Napili Villas
Parcel Reference Map

Prepared for: General Services, Inc.



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Map

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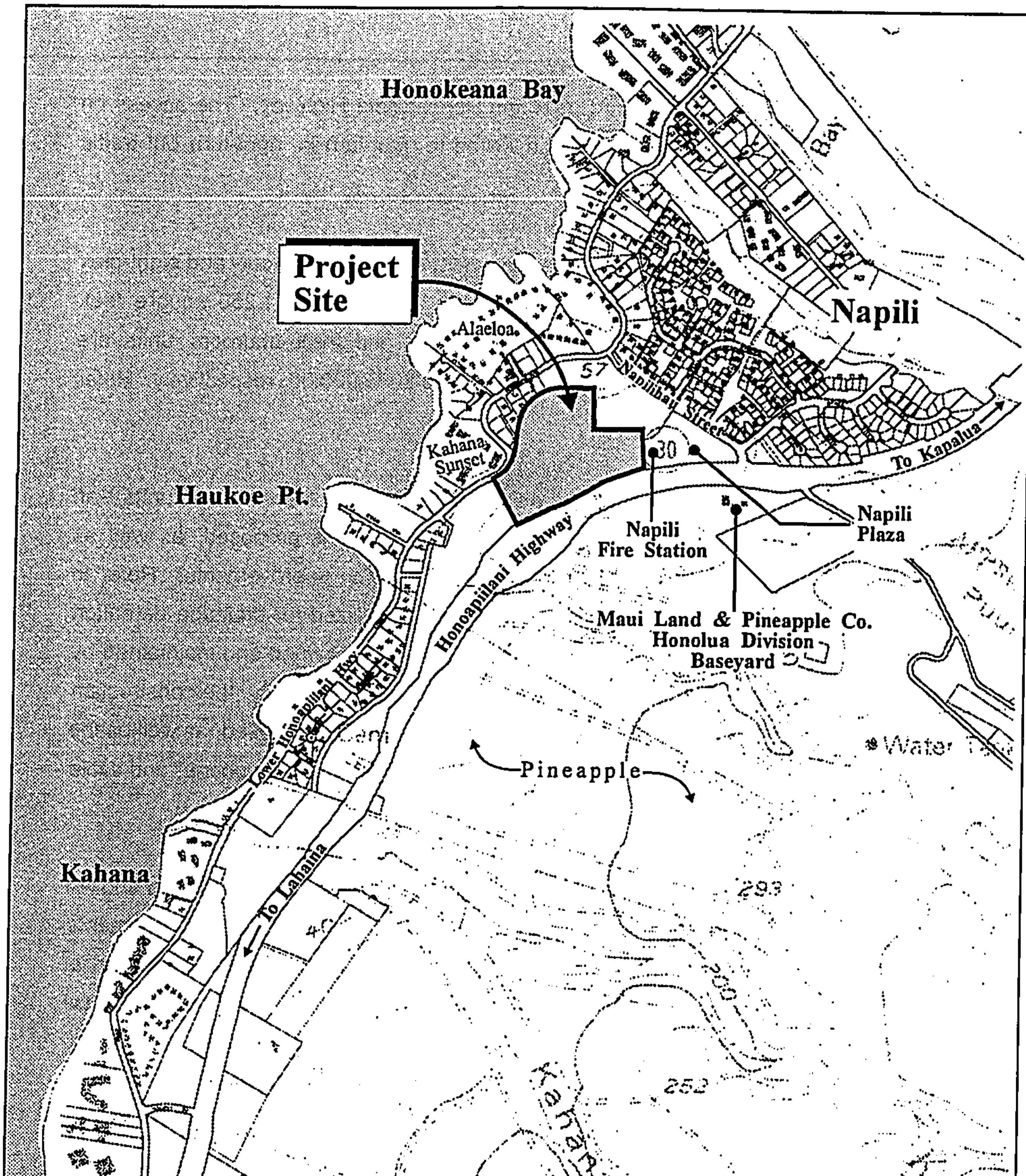


Figure 3

Napili Villas
Site Location Map

0 250 500 1000 Feet

MUNEKIYO & HIRAGA, INC.

Prepared for: General Services, Inc.

provided via Hanawai Street and Honoapiilani Highway. The access on Honoapiilani Highway will be limited to right-turn in, right-turn out traffic movements only.

The townhouse units will be contained in 26 separate four- and eight-plex buildings and will range in size from about 840 to 1,250 square feet. Preliminarily, sales prices for the two- and three-bedroom units are anticipated to average $210,000.00 and $255,000.00, respectively. Refer to Appendix A.

In connection with the development of the townhouse units, an approximately 1.4-acre park (TMK 4-3-3:110) is proposed, as well as parking, landscaping, and landscape irrigation improvements. Refer to Appendix A. The park, which will also be utilized for drainage detention purposes, will be open to the public and will be owned and maintained by the Napili Villas Homeowners' Association. Additionally, the construction of traffic and drainage system improvements are proposed, as well as the installation of utility lines for water, sewer, electrical, telephone, and cable television services.

Work within the Honoapiilani Highway right-of-way will be required and will involve access and drainage system improvements. The improvements proposed for the Honoapiilani Highway access include the relocation of the existing concrete gutter on the north side of the highway and access to the project to accommodate right-turn in, right-turn out traffic movements, and grading to fill a depression at the base of an existing embankment on the north side of the highway. Proposed drainage system improvements include removing existing headwalls at the ends of the 66-inch culvert, connecting to the culvert, and installing drain pipe to extend the culvert into private property. Other drainage improvements consist of grated drain inlets, a manhole, and drain pipe that collect and convey runoff to the onsite park and detention/retention basin. Additional improvements include the installation of grated drain inlets and drainpipe to convey runoff from the existing concrete gutter on the south side of the highway into a proposed offsite detention basin nearby. Refer to Appendix B, Preliminary Drainage Report, for plans of the proposed improvements.

In addition, the onsite wastewater system for the project will need to be connected to the existing County system on Lower Honoapiilani Road. The proposed connection will involve the removal and replacement of a portion of the existing road's paved asphalt surface.

The estimated cost of the proposed improvements is approximately $32.0 million. The development of the project will be undertaken in phases with construction anticipated to commence upon the receipt of all applicable regulatory permits and approvals. It should be noted that project construction and phasing will be dependent on market conditions.

The subject property is situated within the State "Urban" District and is designated "Multi-Family" and "A-1, Apartment District" by the West Maui Community Plan and Maui County zoning, respectively. Since the property is located within the limits of the Special Management Area (SMA) for the island of Maui, an application for a SMA Use Permit for the proposed project has been prepared for review and approval by the Maui Planning Commission.

Since the proposed project involves the use of State lands (Honoapiilani Highway right-of-way) for traffic and drainage system improvements, an

Environmental Assessment (EA) has been prepared as required by Chapter 343, Hawaii Revised Statutes.

Chapter II

Description of the Existing Environment

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL SETTING

1. Surrounding Uses

Located makai or west of Honoapiilani Highway, the project site is situated in the midst of the developed portions of Napili. The site is surrounded by the Napili Fire Station, Napili Plaza, and single family and multi-family residential uses. Across Honoapiilani Highway, to the east, are pineapple fields cultivated by Maui Land & Pineapple Company, Inc.

2. Climate

Like most areas of Hawaii, West Maui's climate is relatively uniform year-round. The region's tropical latitude, its position relative to storm tracts and the Pacific anticyclone, and the surrounding ocean combine to produce this stable climate. Variations in climate among different regions, then, is largely left to local terrain.

In Lahaina, August is historically the warmest month with an average high temperature of approximately 88 degrees Fahrenheit and average low temperature of 70 degrees Fahrenheit. January is normally the coolest month of the year with an average high temperature of 80 degrees Fahrenheit and an average low temperature of approximately 62 degrees Fahrenheit.

Rainfall at Lahaina is highly seasonal, with most precipitation occurring between October and April when winter storms hit the area. Precipitation data collected at the Wahikuli Station (#364) show that on average January is the wettest month, with 3.31 inches of precipitation, while June is the driest, with just 0.25 inches. The average annual total is 18.5 inches.

The winds in the region are also seasonal. The northeasterly tradewind occurs 90 percent of the time during the summer, and just 50 percent of the time in the winter. Wind patterns also vary on a daily basis, with tradewinds generally being stronger in the afternoon. During the day, winds blow onshore toward the warmer land mass. In the evening, the reverse occurs, as breezes blow toward the relatively warm ocean.

3. ***Topography and Soils***

The project site generally slopes in the east to west direction from an elevation of around 105 feet along its easterly boundary to 30 feet near the inlet to the existing 24-inch culvert across Lower Honoapiilani Road. A shallow dry gully bisects the southerly third of the project site between Honoapiilani Highway and Lower Honoapiilani Road.

At a regional scale, the topography of West Maui ranges from the gently sloping coastal areas to steep ridges and large amphitheater valleys. The maximum elevation of the West Maui Mountains is 5,788 feet at Puu Kukui.

The soil types at the project site consist of Kahana silty clay, 3 to 7 percent slopes (KbB) and Kahana silty clay, 7 to 15 percent slopes (KbC). See Figure 4. The KbB and KbC series consist of well-drained soils located on the uplands of Maui. These soils developed in material weathered from basic igneous rock. For Kahana silty clay, 3 to 7 percent slopes, characteristics of the soil include slow runoff and a slight erosion hazard. For Kahana silty clay, 7 to 15 percent slopes, the soil is characterized by moderately rapid permeability, slow to medium runoff and a slight to moderate

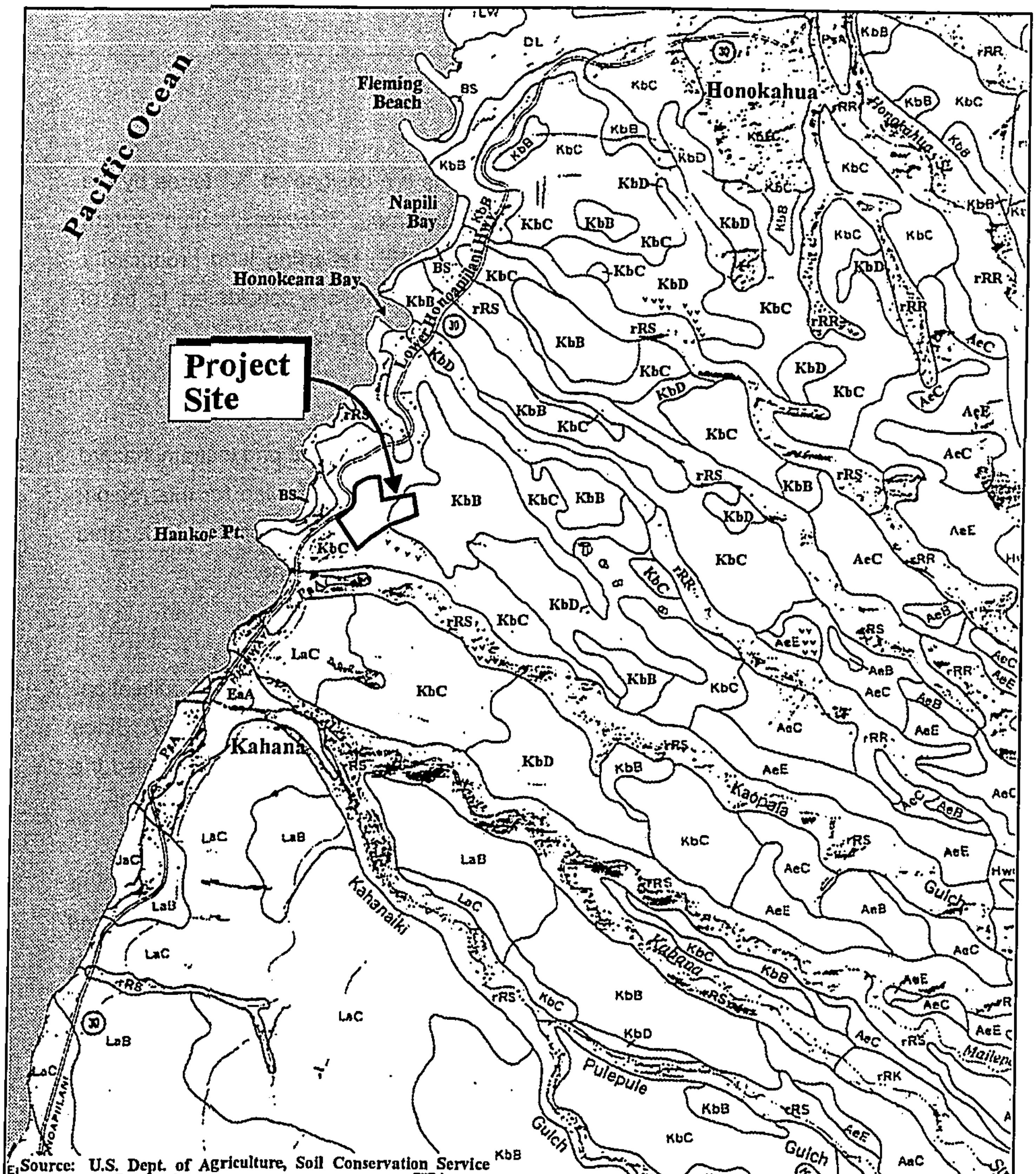


Figure 4

Napili Villas
Soil Classification Map

0 1000 Feet
500 2000

MUNEKIYO & HIRAGA, INC.

Prepared for: General Services, Inc.

erosion hazard.

Lands underlying the project site are designated "C" lands by the University of Hawaii Land Study Bureau. This classification system rates lands on a scale of "A" to "E", reflecting land productivity characteristics. Lands designated "A" are considered to be of highest productivity, with "E" rated lands ranked lowest.

4. *Flood and Tsunami Hazard*

The project site lies in an area of minimal flood and tsunami hazard as determined by the Flood Insurance Rate Map for this region. See Figure 5. At its closest point, the property is located approximately 600 feet away from the shoreline.

5. *Flora and Fauna*

The subject property was formerly used for pineapple cultivation. The last pineapple harvest at this location occurred in 1987. Since then, introduced species of weeds and grasses have occupied the site.

The region's wildlife include a host of introduced species, including the Japanese White-eye, Zebra Dove, Spotted Dove, and Common Myna. Other mammals common to this region include rats, mice, and mongoose. The project site is not considered a significant habitat for avifauna or wildlife. In addition, the U.S. Department of the Interior's National Wetlands Inventory map does not reveal any streams or wetlands located within or in close proximity to the subject property.

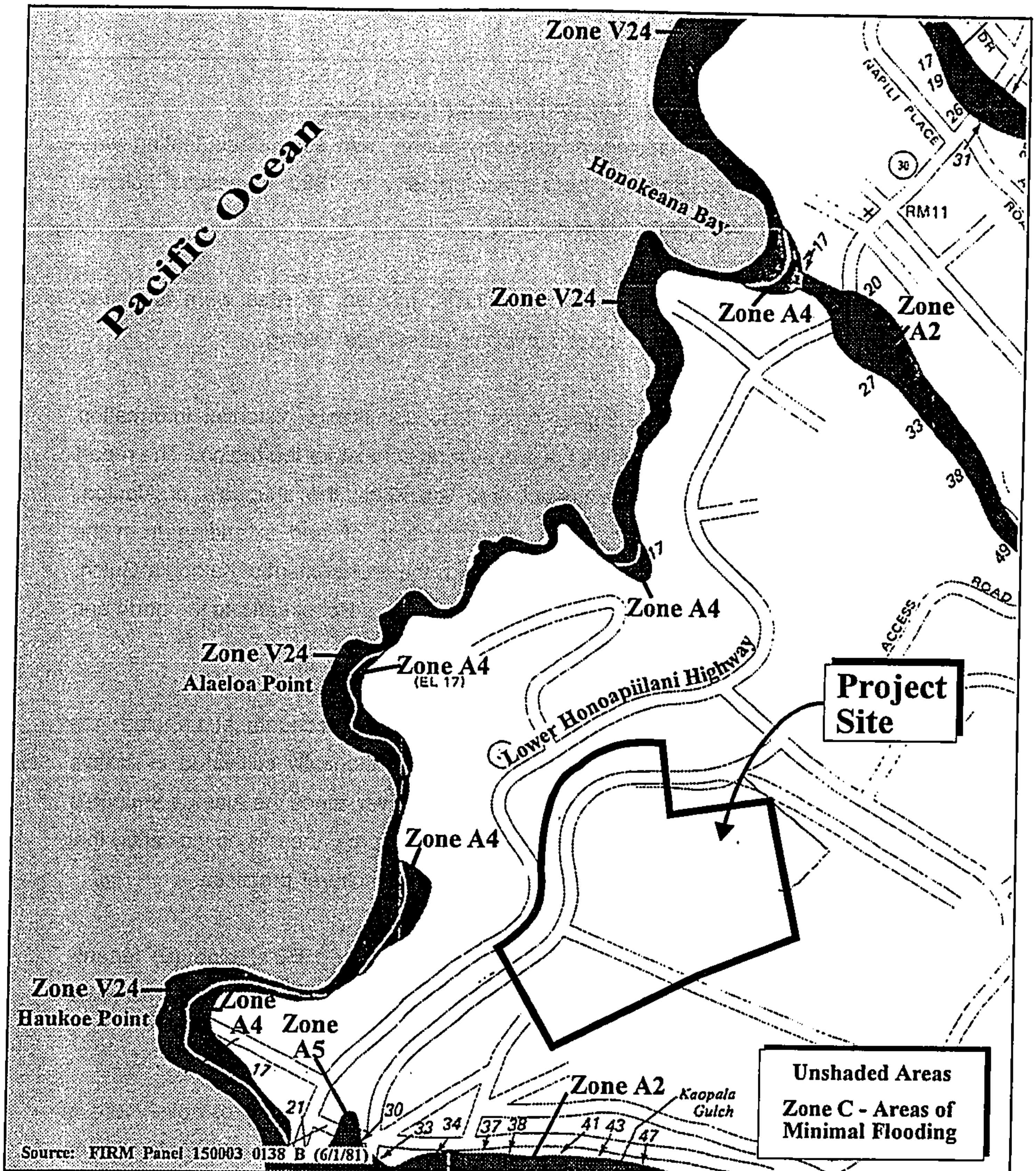


Figure 5

Napili Villas
Flood Insurance Rate Map

Prepared for: General Services, Inc.

MUNEKIYO & HIRAGA, INC.

6. *Archaeological and Cultural Resources*

An archaeological inventory survey with subsurface testing was conducted on the subject property in 1992 to assess cultural resources on the property.

No significant historic artifacts, midden, or sites were identified during the surface survey or subsurface testing.

The archaeological report also documents historical information which provides a general cultural context for the region. The report notes that the project area lies within the ahupua'a of Alaeloa, which encompasses a narrow strip of land extending from the mountains to the sea, including the entire extent of Ka'opala Gulch. Alaeloa is bordered by the ahupua'a of Honokeana to the north and Mailepai to the south.

Starting with whaling and missionary accounts at Lahaina, the report notes that this region was historically cultivated in valleys having reliable water source. However, since the Alaeloa ahupua'a does not have permanent stream source, there is no indication that this area was used for irrigated agricultural practices.

During the Great Mahele of the early 1850's, nine (9) tenants claimed lands in Alaeloa. These claims bordered the Ka'opala Gulch.

Sugar cane in the region was initiated with the establishment of Pioneer Mill in 1865. Fields extended to Ka'opala Gulch. Pineapple cultivation occurred north of Ka'opala Gulch.

A 1923 USGS map shows little evidence of human habitation in Alaeloa. Only six (6) structures are shown in the ahupua'a, one (1) on the coast, and the rest scattered along dirt tracks crossing the land on the northern side of Ka'opala Gulch.

Cultural parameters can also be defined by other archaeological studies which have been conducted in the vicinity of the project site. Griffen and Lovelace, in 1977, studied this area for the Honoapiilani Highway project and found one (1) site in the ahupua'a, at Ka'opala Gulch. A 30-meter section of trail along the northern slope of the gulch was located. This earthen trail was supported by a retaining wall constructed of flat, angular lava rocks. The site was considered of marginal archaeological value.

In 1988, Tourtellote conducted an archaeological inspection at the Rainbow Ranch, which is located about 100 meters inland of the Napilihau Villages project site. There were no sites located on this 13-acre property. A 1989 walk-through reconnaissance of the Napili Fire Station site by Archaeological Consultants of Hawaii, Inc. was also completed without finds.

Other studies conducted in nearby ahupua'a have confirmed sites which include a late pre-historic fishing settlement, historic walls and terraces, rock shelter, and rock platform.

In general, archaeological evidence suggest that the Alaeloa ahupua'a was occupied beginning in late prehistoric times. Early settlements would have relied on sweet potatoes as a staple, supplemented by ocean resources. Permanent habitation of Alaeloa during prehistoric times is uncertain. By historic times, there was a small population living in the ahupua'a. Prior to the introduction of sugar cane and pineapple, the area was probably used for ranching (in the late 19th century).

7. ***Air Quality***

The Lahaina region is not exposed to adverse air quality conditions. There are no point sources of airborne emissions in the immediate vicinity and the air quality at the property is considered good. On the mauka side of the property across Honoapiilani Highway are significant acreages in pineapple cultivation. As such, the area is subject to dust and equipment emissions associated with agricultural activities. Motor vehicles are also a primary source of indirect emissions in the region.

8. ***Noise Characteristics***

There are no significant fixed noise generators in the vicinity of the project site. Background noise in this locale can be attributed to traffic travelling on Honoapiilani Highway and Lower Honoapiilani Highway. The operation of agricultural equipment, such as pineapple harvesters, sprayers and trucks, may also contribute to noise levels on an intermittent and temporary basis. Noise generated by agricultural operations are considered normal and acceptable for such activities and do not adversely affect surrounding lands. In addition, arrival and departure flight tracks for the Kapalua-West Maui Airport lie to the south of the project site, placing the project area beyond the limits of airport noise exposure.

9. ***Scenic Resources***

The project site is located within an urban neighborhood which includes single and multi-family residential and vacation rental uses, the Napili Fire Station, and the Napili Plaza. To the east of the site, across Honoapiilani Highway, are cultivated fields of pineapple managed by Maui Land & Pineapple Company.

The property is located mauka or east of Lower Honoapiilani Road, the local collector road which runs near the coastline.

The site is not a part of a scenic corridor and is not considered to have significant scenic views to the ocean.

10. ***Marine Characteristics***

A marine environmental baseline survey was conducted by Pentec Environmental in December 1997 (in connection with the Napilihau Villages project) for Keonenui and 'Alaeloa Iki Bays, which are located downstream from the subject property. The baseline study notes that circulation patterns within the Keonenui Bay appear to be the result of strong currents originating out of the northeast, the North Pacific swell and associated inshore wave action, and tradewind influence. During the weak to modest tradewind conditions on December 9 and 10, 1997, water currents showed a discernible seaward flow during both flood and slack (ebb) tide periods.

Pentec's survey of biota at Keonenui Bay indicates that coral diversity and density is very low. Coral species found at Keonenui include low, encrusting Porites lobata, a few colonies of encrusting

Montipora flabellata, and occasional colonies of arborescent Pocillopora meandrina.

The survey also documented various species of algae, fish and microinvertebrates at Keonenui. Conspicuous algae included Ulva fasciata, Sargassum echinocarpum, and Ahnfeltia concinna. The survey also indicates that Keonenui Bay supports a modest fish fauna, but overall density is low. Only one (1) specie, the convict tang, demonstrated a ubiquitous distribution and is considered abundant. Microinvertebrates found at this location include patchy growths of zooanthids, the slate pencil urchin, rock-boring urchins and black-spined urchins.

The Pentec survey also noted that a single green sea turtle (Chelonia mydas) was observed foraging on marine algae immediately adjacent to Haukoe Point on December 10, 1997.

In addition to the survey conducted by Pentec Environmental in December 1997, the Hawaii Wildlife Fund (HWF) prepared a Marine Environmental Survey in March 1999 for the Kahana Sunset Residential Resort for the purpose of assessing the current status of the health of the nearshore waters and reef in front of the resort at Keonenui Bay. Refer to Appendix E.

Three marine environmental surveys of Keonenui Bay were conducted between August and October 1998 to determine existing chemical and biological conditions for both nearshore and offshore areas of the bay. A water quality assessment was conducted using standard parameters to detect the presence of nutrients and certain pollutants in the bay; turbidity of water, salinity, pH and dissolved oxygen were measured. A biological assessment of the bay was conducted using line-transect methodology and SCUBA equipment, and the presence of living corals, algae, fish and micro invertebrates were determined and quantified. Benthic substrate was also characterized.

With regard to water quality, the results of the HWF study show mean salinity, pH and mean temperature in normal ranges. Mean dissolved oxygen reflected saturated conditions typical of the surf zone and were within acceptable ranges to Hawaii State Department of Health standards. Some nutrients (NO 3 + NO 2; NH 4) were higher than Hawaii State Department of Health standards for embayments under "dry" criteria (based on insignificant rainfall and negligible inflow of freshwater during the survey period). Total nitrogen and total phosphorus were lower than state standards. The Total Petroleum Hydrocarbon (TPH) values are at detectable levels only, however there are currently no measurable amounts of TPH in the bay. Mean turbidity values (5.0 NTU), while low, did exceed the acceptable values (0.40 NTU) for embayments per Department of Health Water Quality Standards for "dry" criteria. These turbidity values reflect the low flushing or mixing action typical of coastal embayments.

The survey of the reef showed relatively low live coral cover at survey sites, both nearshore and offshore, but the offshore site had significantly more live coral than the nearshore site. Both nearshore and offshore sites were characterized by a high percentage of algal cover. A small number of macro invertebrates were documented at both sites. Fish diversity was high, with at least 46 different species documented. Many fish were observed in both areas, but because of their high mobility, attaching significance to abundance estimates for fish observed less frequently than weekly is unsound.

HWF also notes that although no green sea turtles or spinner dolphins were sighted during the surveys, their presence has been noted by one of the homeowners adjacent to the area surveyed.

B. COMMUNITY SETTING

1. Land Use and Community Character

The vast majority of lands in West Maui are either State designated "Conservation" or "Agricultural". Generally, "Conservation" lands occupy the higher elevations, while the "Agricultural" district spans the middle ground. Major exceptions to this trend are the Honolua Stream and Pohakupule Gulch areas where the "Conservation" district extends down to sea level.

"Urban" designated lands, then, are left to occupy the lower elevations along the coast. Kapalua and Kaanapali contain Community Plan designations reflective of their resort nature. The communities of Kahana and Napili contain a mixture of resort, residential and business uses. Lahaina, meanwhile, encompasses a diverse mix of land uses, including residential, business, light industrial, recreational and agricultural uses.

Napili is located approximately eight (8) miles north of Lahaina Town between Kahana and Kapalua. The urbanized portions of the Kahana-Napili areas, makai of the Honoapiilani Highway, are typified by condominium apartments interspersed with single-family residential neighborhoods.

The town of Lahaina is the commercial center for West Maui. The town contains several shopping centers and retail business areas, and serves as a hub for the region's residential housing.

West Maui's attraction can be attributed to its year-round dry and warm climate, complemented by many white-sand beaches and scenic landscape. Visitor accommodations are located in Lahaina and the resort communities of Kaanapali, Kahana, Napili, and Kapalua. The State of Hawaii's Kapalua-West Maui Airport at Mahinahina links the region to Oahu and other neighbor islands.

Diversified agriculture and pineapple fields occupy much of the land in the area. Pioneer Mill Company, Ltd. and its sister company, Kaanapali Estate Coffee, Inc., cultivate their agricultural lands in the Kaanapali area with coffee, sweet corn, seed corn, and alfalfa. Maui Land & Pineapple Company's fields sprawl along the slopes of the West Maui Mountains north of Lahaina.

2. *Population*

Just as the visitor count has grown, the resident population of the region surrounding the project site has increased in the last two decades. Population gains were especially pronounced in the 1970s as the developing visitor industry attracted many new residents. According to the 1990 Census of Population and Housing, resident population of the Lahaina District was 14,574. A projection of the resident population for the year 2010 is 22,633 (Community Resources, Inc., 1994).

Growth patterns at the County level exhibit a similar pattern. The County's 1980 resident population of 71,000 has since grown to just over 100,000. The estimated County population for the year 2010 is 145,872 (Community Resources, Inc., 1994).

3. ***Economy***

The economy of Maui is heavily dependent upon the visitor industry. The dependency on the visitor industry is especially evident in West Maui, which is one of the State's major resort destination areas.

Agriculture, another vital component of the West Maui economy, is handled by Pioneer Mill Company and Maui Land & Pineapple Company. Until the closure of sugar cultivation in December 1999, Pioneer Mill Company cultivated most of its approximately 6,700 acres of fee simple and leased lands with sugar cane. Pioneer Mill Company is currently in the process of diversifying its agricultural operations by utilizing portions of its lands for sweet corn, seed corn, and alfalfa cultivation. Its sister company, Kaanapali Estate Coffee, presently cultivates about 500 acres in coffee.

Maui Land & Pineapple Company's fields remain an important component of the region's agricultural base. In 1988, Maui Land & Pineapple Company entered the fresh fruit market, air shipping pineapples to the mainland in an effort to diversify its operations.

As of June 2000, the unemployment rate for Maui County and the island of Maui stood at 4.2 percent and 3.8 percent, respectively (State Department of Labor and Industrial Relations, June 2000).

4. ***Police and Fire Protection***

The project site is within the Lahaina Police Station service area, which services all of the Lahaina district. The Lahaina Station is located in the Lahaina Civic Center complex at Wahikuli, and was built in the early 1970's. The Lahaina Patrol includes 54 full-time personnel, consisting of one (1) captain, one (1) lieutenant, seven (7) sergeants, and 39 police officers. The remaining six (6) personnel consist of public safety aides and administrative support staff.

Fire prevention, suppression and protection services for the Lahaina District is provided by the Lahaina Fire Station, also located in the Lahaina Civic Center, and the Napili Fire Station, located adjacent to the project site. The Lahaina Fire Station includes an engine and a ladder company, and is staffed by 30 full-time personnel. The Napili Fire Station consists of an engine company including 15 full-time firefighting personnel.

5. ***Medical Facilities***

The only major medical facility on the Island is Maui Memorial Medical Center, located midway between Wailuku and Kahului. The 194-bed facility provides general, acute, and emergency care services.

Private medical offices, however, are found in West Maui. For example, regular hours are offered by the Maui Medical Group, Lahaina Physicians, West Maui Healthcare Center, and Kaiser Permanente Lahaina Clinic.

6. ***Recreational Facilities***

West Maui is served by numerous recreational facilities offering diverse opportunities for the region's residents. These facilities include several County parks and beach parks in West Maui. Approximately one-third of the County parks are situated along the shoreline and are excellent swimming, diving, and snorkeling areas. In an area to the north of the project site, the County's Napili Park has just been completed on lands between the Honokeana Subdivision and Honoapiilani Highway.

In addition, Kaanapali and Kapalua Resorts operate world-class golf courses which are available for public use.

7. ***Schools***

The State of Hawaii, Department of Education operates four (4) public schools in West Maui: Lahainaluna High School; Lahaina Intermediate School; King Kamehameha Elementary School; and Princess Nahienaena Elementary School. All of the public schools are located within the Lahaina Town area.

The region is also served by privately operated pre-elementary and elementary schools.

C. ***INFRASTRUCTURE***

1. ***Roadway System***

Honoapiilani Highway (State Highway 30) is the principal arterial roadway in West Maui. Its posted speed limit is 45 miles per hour (mph). It runs generally parallel to the coastline of Maui and provides the primary north-south mobility for the area. In the Napili area, it is a two-lane, undivided roadway with paved shoulders and turn lane channelization at most intersections. The highway currently forms a recently signalized intersection with Napilihau Street. The developer has a pro-rata share of the costs of this signalization as part of its requirements under the zoning conditions for the project.

Napilihau Street is a two-lane, collector roadway that is oriented in the mauka-makai direction. Part of it, along the frontage of Napilihau Villages, was improved as part of this project's development. The roadway provides access to the Napili Plaza shopping center and the adjacent residential community located on the north side of Napilihau Street. Napilihau Street is also a key route for vehicles moving between Lower Honoapiilani Road and Honoapiilani Highway. In fact, much of the traffic on Napilihau Street is involved in this type of movement. Napilihau Street intersects Lower Honoapiilani Road at an unsignalized intersections with STOP-sign control on Napilihau Street. Hanawai Street and Kohi Street intersect Napilihau Street at unsignalized intersections with STOP-sign control on those street approaches. The posted speed limit on Napilihau Street is 20 mph.

Lower Honoapiilani Road is a north-south, two-lane roadway oriented parallel to Honoapiilani Highway. It is a major collector roadway that provides access and traffic circulation to development along the West Maui coast between Honokowai and Kapalua. The roadway forms an unsignalized "T" intersection with Napilihau Street with STOP-sign control on Napilihau Street. Its posted speed limit is 20 mph.

Hanawai Street is a two-lane collector roadway oriented in the north-south direction. To the north, it provides access into a residential subdivision. To the south, it provides access to Napili Plaza shopping center, Napili Fire Station, and the existing Napilihau Villages. The intersection of Hanawai Street and Napilihau Street is an unsignalized "two-way stop" intersection with STOP-sign control on Hanawai Street. For the Hanawai Street approach from the south, a left/through lane and an exclusive right-turn lane are provided. The Hanawai Street approach from the north is not channelized but there is enough width to allow right-turning vehicles to bypass vehicles waiting to turn left or to proceed through the intersection. The posted speed limit is 20 mph.

Access to the subject property will be provided from Napilihau Street (via Hanawai Street) and Honoapiilani Highway. As previously indicated, the Honoapiilani Highway access will be limited to right-turn in and right-turn out movements only.

2. *Water*

The West Maui Region is served by the County's Board of Water Supply water system. The County water system services the coastal areas from Launiupoko to Kaanapali and from Honokowai to Napili. The County's system includes both surface and groundwater sources. The source of water are several deep wells located east of the project site at an elevation of around 800 feet. From these wells, water is fed by gravity into a 1.0 million gallon (MG) reinforced concrete reservoir situated at elevation 250 feet, approximately 3,100 feet southeast of the project site. From this storage tank, water is conveyed to the project site by means of 12-

inch lines along Lower Honoapiilani Road, Napilihau Street and Hanawai Street.

3. ***Wastewater Systems***

The County's wastewater collection and transmission system and the Lahaina Wastewater Reclamation Facility (LWRF) accommodate the region's wastewater needs. The LWRF, located along Honoapiilani Highway just north of Kaanapali Resort, has a design capacity of 9.0 MGD. According to the County's Wastewater Division staff, the LWRF has 774,000 gallons of unused capacity left at the plant.

Wastewater generated by the 184 unit Napili Villas project will be collected by an onsite gravity collection system and directed into the County's 21-inch transmission line on Lower Honoapiilani Road. A series of large diameter gravity collectors, pump station, and force mains on Lower Honoapiilani Road transport wastewater collected to the LWRF north of Kaanapali for treatment and disposal.

4. ***Solid Waste Disposal***

Residential refuse collection is provided by the County's Solid Waste Division. Private refuse collectors provide solid waste disposal services for commercial and institutional accounts. With the exception of the Hana region, residential and commercial solid waste from throughout the island is transported to the Central Maui Landfill at Puunene.

A refuse transfer station located at Olowalu accepts household and green wastes, as well as used oil, for transport to the Central Maui

Landfill in Puunene. The disposal of commercial and institutional refuse is not permitted at the Olowalu transfer station.

5. ***Drainage***

The Napili Villas site is primarily undeveloped land, except for a paved driveway and a temporary retention basin at the northeasterly corner of the site. The paved driveway and the basin serve the existing Napilihau Villages project. The paved driveway will also serve the Napili Villas project as its main entry point from Hanawai Street. The ground rises from a low point at elevation 30 feet (above mean sea level) at an existing 24-inch culvert at Lower Honoapiilani Road to a high point at elevation 105 feet next to the Napili Fire Station. The slope between the low and high point averages about 9.5 percent. Overall ground slopes range from about 3 percent to about 13 percent, with an average slope of about 9 percent.

Runoff generally flows toward a gully that divides the southwesterly portion of the site. The runoff then flows through the gully in a northwesterly direction towards the existing 24-inch culvert at Lower Honoapiilani Road. This gully also carries off-site runoff that enters the site through an existing 66-inch culvert at Honoapiilani Highway.

The off-site area to be developed as a detention/retention basin is within a sump area near the inlet of the 66-inch culvert. Improvements in the area include two retention basins and remnants of an old pineapple field. The land slopes toward the inlet area at about 6 to 10 percent.

The Napili Villas site is part of a drainage area that begins at a point about 3,400 feet mauka of the site. From this upper limit, the drainage area extends about 4,400 feet to the ocean. The entire drainage area encompasses an area of about 90 acres. The 12.477-acre Napili Villas site comprises about 14 percent of the total area. (See Preliminary Drainage Report, Figure 7 - Drainage Area Map.)

Three major areas are shown on the drainage area map. Area No. 1 encompasses 6.1 acres and includes the Kahana Sunset site, Lower Honoapiilani Road, and adjoining residences. Area No. 2 includes an area of 18.1 acres. In addition to the 12.477-acre Napili Villas site, this area includes portions of the Napilihau Villages project, the Napili Fire Station, a portion of the undeveloped parcel on the westerly side of the site, and the grassed shoulder area along the Honoapiilani Highway. Area No. 3 encompasses 66.1 acres on the mauka side of the highway. This area includes pineapple fields, the Maui Pineapple Company Honolua Plantation Baseyard, and portions of the Ironwood Ranch (formerly known as the Rainbow Ranch Riding Stables).

At the upper limits of the drainage area, pineapple fields contain diversions that collect and channel runoff to adequate points of disposal. The Natural Resources Conservation Service (NRCS), a branch of the United States Department of Agriculture, designs these diversions and assists agricultural businesses to implement these measures. NRCS also assists local governments to implement flood and sedimentation control measures such as the sedimentation basin within Kaopala Gulch, the major gulch on the southerly side of this project's off-site drainage area. NRCS encourages agricultural businesses to construct diversions to take runoff to major drainageways equipped with such sedimentation basins to aid in improving ocean water quality. As shown on the drainage area map, Maui Pineapple Company has implemented measures to divert some of the runoff from its fields to Kaopala Gulch.

In addition to the diversions, Maui Pineapple Company has constructed two sedimentation basins on the mauka side of Honoapiilani Highway. The basins are located about 200 feet upstream of the 66-inch culvert at the highway. The basins receive runoff from portions of the fields and from their baseyard. Approximate volumes of these basins are 1.2 acre-feet for the upper basin and 0.6 acre-feet for the lower basin.

Immediately downstream of the sediment basins is a 66-inch culvert at Honoapiilani Highway. The culvert receives runoff from the 66.1-acre drainage area shown on the drainage area map and passes the runoff under the highway and into the Napili Villas site. The State of Hawaii, Department of Transportation, Highways Division designed this culvert to handle a 50-year storm flow of 242 cubic feet per second (cfs). In addition to the 66-inch culvert, the highway has an internal system that handles runoff produced within the highway. The internal system consists of concrete gutters, drain inlets, and 24-inch drainlines. The drain inlets collect runoff from the gutters and the drainlines carry the runoff to the bottom of embankment areas to prevent erosion of these areas.

The 18.1-acre on-site area includes a portion of the adjoining developed areas. Portions of the Napili Fire Station and the

Napilihau Villages condominium project drain into the site. Runoff from the fire station sheet flows towards Hanawai Street and towards the highway. Approximately one acre of the Napilihau Villages project also drains into the site. Drainage improvements within this area include grated inlets, catch basins, manholes, and drainlines. A temporary retention basin on the site collects the runoff from this area.

About 450 feet downstream of the 66-inch culvert is a 24-inch culvert at Lower Honoapiilani Road. This culvert receives runoff from about 84 acres and passes the runoff under the road and into the Kahana sunset site. Lower Honoapiilani Road and an old railroad embankment on the Napili Villas site form a sump at the upstream end of the culvert.

The Kahana Sunset drainage system is at the lower end of the drainage area. The drainage system receives runoff from the upstream areas, passes it through the site, and discharges the runoff into the ocean. The drainage system includes drainlines and manholes that convey the upstream runoff to an on-site dry well with an overflow line to the ocean.

6. ***Electrical, Telephone and CATV Service***

Electrical, telephone, and cable television (CATV) services for the West Maui region are provided by Maui Electric Company, Ltd., GTE Hawaii Telephone Company, Incorporated, and Hawaiian Cablevision Company, respectively.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. IMPACTS TO THE PHYSICAL ENVIRONMENT

1. Flora and Fauna

Vegetation on the subject property currently include established weeds, grasses and shrubs, which developed following the abandonment of pineapple cultivation at the property. There are no known rare, endangered or threatened species of flora at the site. Upon completion, the project site will be landscaped and maintained.

There are no known rare, endangered or threatened species of avifauna and wildlife in the vicinity of the project. Project-related lighting will utilize appropriate design features to minimize impacts to migratory seabirds which may traverse the area.

In summary, the development of the Napili Villas project is not anticipated to have an adverse effect on the area's flora and fauna.

2. Archaeological Resources

According to the archaeological inventory survey conducted on the project site, no significant historic artifacts, midden or sites were identified during the surface survey or the subsurface testing on the property. The absence of any significant historic sites can be largely attributed to the effects of pineapple cultivation on any pre-existing features.

The State Historic Preservation Division (SHPD) has determined that the development of the subject property will have "no effect" on significant historic sites. See Appendix D.

Should human burials or significant historic remains be inadvertently encountered during monitoring and ground altering construction, work shall cease at once in the immediate area of the find, and the find shall be protected from further damage. The contractor shall immediately notify the SHPD and procedures for the treatment of inadvertently discovered human remains shall be followed pursuant to Chapter 6E-43.6, HRS.

It is noted that historical research for the Alaeloa ahupua'a indicates that permanent pre-historic habitation at this ahupua'a is uncertain. By historic times, there was a small population living the ahupua'a. Prior to the introduction of sugar cane and pineapple, the area was probably used for ranching (in the late 19th century).

In the context of the area's land use history and surrounding existing developments, the implementation of the Napili Villas project is not anticipated to have an adverse impact upon cultural resources.

3. ***Air Quality***

Air quality impacts attributed to the project will include dust generated by short-term construction-related activities. Site work such as clearing, grubbing and grading, and utilities and roadway construction for example, will generate air-borne particulates. Dust control measures, such as regular watering and sprinkling have been, and will continue to be implemented to minimize wind-blown emissions.

Once the project is completed, project-related vehicular traffic will generate automotive emissions. However, project-related emissions are not expected to adversely impact local and regional ambient air quality conditions.

4. ***Noise***

Dominant noise sources in the project environs are traffic on Honoapiilani Highway and Lower Honoapiilani Road.

Ambient noise conditions will also be temporarily impacted by construction activities. Heavy construction equipment, such as bulldozers, front-end loaders, and materials-carrying trucks and trailers, would be the dominant source of noise during the site construction period. Construction activities will be limited to normal daylight working hours.

Once completed, the project is not anticipated to be a noise source which will adversely impact surrounding properties.

5. ***Marine Resources***

Keonenui Bay is used for a variety of recreational purposes including but not limited to swimming, snorkeling, diving and fishing. Keonenui Bay, which is an embayment containing nearshore ocean waters, is defined by the Department of Health as Class A waters. "Class A waters are to be protected for recreational purposes and aesthetic enjoyment. Other uses of Class A waters are also permitted so long as they are compatible with the protection and propagation of fish, shellfish, and wildlife in these waters." (HAR Section 11-54-03(c)(2)). The marine waters of West Maui, from Lahaina to Kapalua, including Keonenui Bay, have been declared by the Department of Health to be water quality limited, because these waters already exceed state water quality standards for nutrients and turbidity. The Clean Water Act contains an anti-degradation policy that special attention must be given to water limited segments to protect them from further degradation in ocean water quality.

Baseline studies prepared by both Pentec Environmental in December 1997 and Hawai'i Wildlife Fund (HWF) in March 1999 indicate that generally, marine water quality in the vicinity of the property is consistent with water quality along other coastal areas in the region. With regard to water quality, test results indicate that mean salinity, pH and mean temperature are within normal ranges. The baseline study conducted by HWF for Keonenui Bay indicates that the turbidity values, while low (5.0 NTU), did exceed the acceptable values (0.40 NTU) for embayments per Department of Health Water Quality Standards for "dry" criteria. These turbidity values reflect the low flushing or mixing action typical of coastal embayments.

The water quality and reef habitat of Keonenui Bay may be in a delicate balance. The presence of old reef structure suggests previous higher coral coverage in Keonenui Bay at one time. It in not known what factors led to the change in the reef habitat; there are many anthropogenic sources that can adversely impact coral growth (Richmond, 1997). Nevertheless, the reef currently supports high algal and fish diversity and human recreation. Nutrients and turbidity values measured in the bay during the dry season indicate that it experiences low mixing rates typical of coastal embayments. Groundwater influx to the nearshore environment currently harbors enough nutrients to sustain algal overgrowth (Dollar and Andrews, 1997). There is an unknown source for elevated ammonia in the bay. There are currently no measurable amounts of total petroleum hydrocarbons in the bay. Therefore, due to the low mixing or flushing rates, the bay would likely be adversely impacted by additional influx of surface water run-off resulting from new construction mauka of Kahana Sunset Residential Complex.

The proposed drainage systems which will be installed for the project will include new detention/retention basins which are designed to reduce sediments in storm runoff. In addition to reducing sediment loads from runoff generated within the immediate upstream drainage basins, the drainage improvements will reduce peak discharge flows into Keonenui Bay. The HWF, in commenting on the project in December 2000, noted that the developer of the Napili Villas is designing its drainage system so as not to create any additional adverse impacts to Keonenui Bay. Refer to Appendix E-1. Accordingly, there are no anticipated additional adverse impacts to marine resources associated with the Napili Villas project.

B. *IMPACTS TO COMMUNITY SETTING*

1. *Land Use and Community Character*

The proposed Napili Villas project is compatible with surrounding land uses.

The Napili Fire Station and Napili Plaza are located to the east of the proposed project. The master planned Kapalua resort is located approximately one (1) mile to the north of the property.

The Napilihau Planned Unit Development and the Hale Noho residential developments are located in close proximity to the project site, near Napilihau Street. Single-family and multi-family residential uses are located on Lower Honoapiilani Highway.

2. ***Population and Local Economy***

The Napili Villas project will provide construction employment which will support the construction industry in the short term. Employment provided through the construction phase of project development will also help to support other businesses which are economically linked to the construction industry.

In the long term, condominium residents will contribute to the support of the local economy through their purchases of goods and services, as well as their contributions to State and County revenues through the contribution of taxes. The project itself is not anticipated to result in significant population in-migration. The target market for the project is residents living within the community. The proposed two- and three-bedroom condominium homes are primarily targeted to meet the housing needs of those working in the West Maui area who are currently renting homes or rooms in the area.

3. ***Police, Fire and Medical Services***

The proposed project is not anticipated to affect service area limits and capabilities of police, fire and emergency medical operations.

4. ***Recreational Facilities***

To address recreational needs which may be generated by the project, an approximately 1.4-acre park will be provided. This facility will be open to the public and will be owned and maintained by the Napili Villas Homeowners' Association. Park and playground assessment requirements for the project will be coordinated with the County Department of Parks and Recreation.

As previously indicated, the majority of owners and tenants are expected to be current residents of the West Maui Community. From a regional perspective, therefore, the proposed project is not anticipated to create any increase in user demand for regional recreational facilities.

5. <u>Educational Facilities</u>

The Napili Villas project is designed to meet residential needs of West Maui families. In this regard, school-aged children will be a part of this community. However, inasmuch as these families are, for the most part, already residing in the West Maui Community Plan region, the project's impacts to school facilities are not considered adverse.

C. <u>IMPACTS TO INFRASTRUCTURE</u>

1. <u>Roadways</u>

A Traffic Impact Analysis Update was prepared in August 2000 for the proposed project. Refer to Appendix C. This analysis updates the previous 1998 traffic impact assessment study that was prepared by Austin, Tsutsumi & Associates, Inc. for the Napilihau Villages project and focuses on the proposed Napili Villas development. Using newly conducted traffic counts and the benefit of having the existing Napilihau Villages occupied, traffic analyses were updated and used to review the sufficiency of the committed roadway improvements.

Traffic operations at each of the following intersections were evaluated based on the existing roadway conditions and traffic volumes. All intersections were analyzed using the 1994 Highway Capacity Manual methodology for unsignalized intersections. Intersection operating conditions are expressed as a qualitative measure Level-of-Service (LOS). LOS A represents free-flow operating conditions, while LOS F represents congested conditions; LOS A through E are usually considered acceptable for peak hour conditions.

The overall intersection LOS at the intersection of Napilihau Street and Honoapiilani Highway operates at LOS A during both peak hours. The left-turning movements out of the Napilihau Street and Baseyard approaches are calculated to experience delays during peak hours. However, the State of Hawaii Department of Transportation has procured a contractor to install a traffic signal at this intersection and construction of the project has recently been completed.

The Napilihau Street/Hanawai Street intersection operates well during both peak hours. All intersection approaches experience minimal delays.

The intersection of Napilihau Street and Lower Honoapiilani Road also operates well during both peak hours (LOS A), although the left-turn out of Napilihau Street onto Lower Honoapiilani Road experiences occasional delays during the peak hours.

Preliminarily, for traffic analysis purposes, the Napili Villas is assumed to be developed in two (2) phases. The Phase 1 time frame (Year 2002) reflects the development of approximately 100 multi-family residential units and will utilize the existing access at Hanawai Street. Phase 2 (Year 2003) will add an additional 84 multi-family residential units and will provide an additional right-in/right-out access on Honoapiilani Highway, south of Napilihau Street. The estimated traffic generated by Phases 1 and 2 of the Napili Villas development are reflected in Table 1.

Table 1

TRIP GENERATION SUMMARY							
Land Use Type	***No. of Units***	***Morning Peak Hour***			***Evening Peak Hour***		
		Enter	***Exit***	***Total***	***Enter***	***Exit***	***Total***
Phase 1	100	10	40	50	41	21	62
Phase 2	84	8	33	41	34	18	52
Total	184	18	73	91	75	39	114

The three (3) study intersections were analyzed using projected traffic volumes both with and without the Napili Villas project. As indicated by this analysis, the addition of Napili Villas traffic will not change the level of operation at the intersections evaluated along Napilihau Street. The intersections are projected to operate well for peak hour conditions. The proposed right-in/right-out on Honoapiilani Highway is also projected to operate very well during both peak hours.

The traffic impact analysis update concludes that the traffic generated by the proposed buildout of the Napili Villas development can be accommodated by the surrounding roadway system. The roadway improvements previously committed to and being implemented by the developer in connection with the rezoning for the Napilihau Villages and Napili Villas parcels are still valid and sufficient to accommodate the traffic generated by the development. These traffic improvements included:

- Participation in signalization and roadway channelization improvements of the Honoapiilani Highway/Napilihau Street intersection;
- Roadway channelization improvements at the Napilihau Street/Hanawai Street intersection;
- Roadway channelization improvements at the future right-in/right-out access on Honoapiilani Highway, south of Napilihau Street.

The traffic impact analysis update advances recommendations for site access and major intersections as follows:

1. ***Site Access***

   Much of the site access improvements on Napilihau Street have been completed. The extension of Hanawai Street to provide access to the future Napili Villas was completed as part of the existing Napilihau Villages by the developer. The Napilihau Street/Hanawai Street intersection is channelized with exclusive left-turn lanes in Napilihau Street and a left/through and a right-turn lane on the northbound approach of Hanawai Street.

   The frontage of the Napilihau Villages along Napilihau Street was improved by the developer with sidewalks and curb and gutter.

A future right-in/right-out access is planned as part of Phase 2 of the Napili Villas development. Discussions have been held with the State of Hawaii Department of Transportation (SDOT), and SDOT has concurred with the concept of the proposed access. Final SDOT approval for the access configuration is subject to review of the final design plans. The developer will bear the cost of this improvement.

2. ***Major Intersection Improvements***

SDOT has constructed the traffic signal at the Honoapiilani Highway/Napilihau Street intersection. The developer of Napili Villas participated in the cost of this improvement.

2. ***Water***

The water system for the project consists of separate fire protection and domestic lines throughout the site. These new lines will connect to the existing 12-inch line within the Hanawai Street cul-de-sac and will have metering facilities near the property line.

The preliminary design of the fire protection system includes a double check detector assembly near the property line, 8-inch or 12-inch distribution lines, and fire hydrants. The distribution lines will generally follow along the project's driveways. Fire hydrants will be spaced at appropriate intervals to meet the Department of Fire Control's requirements.

The preliminary design of the domestic system calls out for a grouping of 2-inch or 1½-inch water meters near the property line, distribution lines, and laterals for each building. The distribution lines will generally run parallel with the fire protection lines. The total average daily demand for the 184-unit project, based on a guideline of 560 gallons per unit per day, is about 103,000 gallons per day.

The existing source, storage, and distribution systems are adequate to meet the domestic and fire flow requirements. Water requirements for the proposed project will be coordinated with the Department of Water Supply to ensure that adequate supply is available at the time of development.

3. ***Wastewater***

The wastewater system for the project consists of 8-inch gravity lines, manholes, and laterals to each building. The system will connect to an existing 21-inch County line on Lower Honoapiilani Road at the westerly corner of the site. The total average wastewater flow for the 184-unit project, based on 250 gallons per unit per day, is 46,000 gallons per day.

The existing collection system on Lower Honoapiilani Road and treatment facilities at the Lahaina Wastewater Reclamation Facility have adequate capacities to accommodate the wastewater produced by the project. No adverse effects on existing wastewater facilities are anticipated. Wastewater requirements for the proposed project will be coordinated with the Department of Public Works and Waste Management, Wastewater Reclamation Division, during the review and approval phase of the project.

4. ***Solid Waste***

Trash bin enclosures will be placed at appropriate intervals through the project site. Once completed, the proposed project will be served by a private refuse collection company. Solid waste generated from the project will be disposed at the County's Central Maui Landfill.

5. *Drainage*

To mitigate the effects of the project, two separate detention/retention (D/R) basin systems will be constructed to control on-site and off-site flows. Both systems function similarly by collecting runoff, retaining a portion of it, and regulating the outflow from the basin.

Design of the D/R basins will incorporate County of Maui drainage standards and additional requirements stated in a settlement agreement between the Kahana Sunset Owners Association and the developer of the Napili Villas project. The additional requirements, some of which exceed current County of Maui drainage standards, are noted in the Preliminary Drainage Report.

The D/R basins will control flow rates by detaining or temporarily storing runoff, and will control volumes by retaining runoff within the basins. Both D/R basins will be designed to detain flows due to a storm with a 50-year recurrence interval. As stated in the settlement agreement, the systems will be designed to allow a maximum of 44 cfs to enter the existing 24-inch culvert at Lower Honoapiilani Road. The on-site D/R basin will also be designed to retain the increase in runoff volume due to development based on a 2-year, 24-hour storm. Similarly, the off-site D/R basin will be designed to retain runoff. Retention will be provided for an existing retention basin displaced by the new basin, sediment storage, and water quality purposes.

The schematic sectional views in the preliminary drainage report show the typical operational stages of the basins. (See Preliminary Drainage Report, Figure 13 - D/R Basin Schematic Sections, page 22.)

The on-site D/R basin will receive a peak flow of 60 cfs from the 18.1-acre drainage area, control the flow, and release a maximum of 10 cfs into the existing 24-inch culvert at Lower Honoapiilani Road. A preliminary estimate of 4.4 acre-feet of detention volume will be provided.

As noted on the schematic sections, the on-site system will collect runoff and discharge the runoff into a subsurface perforated drain. The perforated drain allows infiltration into the surrounding soil, but at a relatively slow rate compared to the rate of runoff produced during storms. During storms, the perforated pipe will fill and the accumulated runoff will spill over onto the ground surface through the grated openings at ground level. As the storm continues, the D/R basin will continue to fill until the accumulated runoff reaches the top of the flow control inlet. Runoff will then enter the flow control inlet and flow out of the basin through the existing 24-inch culvert. During the 50-year design storm, the water level in the basin will continue to rise, eventually reaching its maximum level, and will start to drop as the storm subsides. As the storm subsides, stored runoff will continue to enter the existing 24-inch culvert until it drops below the top of the flow control inlet. At that point, the outflow stops and the accumulated runoff is retained in the basin. The basin retains 2.2 acre-feet of runoff, the increase in runoff volume due to development based on the 2-year, 24-hour storm.

As a drainage best management practice, the accumulated runoff will eventually dissipate by infiltration into the ground surface and the perforated pipe. Since the D/R basin functions as a park, the perforated pipe will be sized to allow the maximum retained runoff to infiltrate within one to two days. As shown on the preliminary drainage plan, an underdrain system consisting of small diameter perforated pipes will also aid in removing excess moisture from the ground surface by directing flows to the perforated pipe.

The off-site D/R basin will receive a peak flow of 192 cfs from the 66.1-acre drainage area, control the flow, and release a maximum of 32 cfs into the existing 24-inch culvert at Lower Honoapiilani Road. A preliminary estimate of 14.2 acre-feet of detention volume will be provided to control the flow.

The off-site system will function in a similar manner as the on-site system, however, because of the poor quality of the incoming runoff, the basin's larger size, and its location, the following additional drainage best management practices will be incorporated into its design.

Runoff from the pineapple fields will contain sediment and suspended soils. Additional depth will therefore be set aside to allow for the accumulation of sediment and suspended solids. A sediment storage volume of 0.7 acre-feet will be provided to meet the estimated amount of sediment that accumulates within this basin during a year.

Retention volume to offset the loss of one of the existing retention basins will be provided. In addition, more retention volume to allow the retained runoff to infiltrate into the ground over a one to two week period will be provided for water quality purposes. A total volume of 1.5 acre-feet of retention will be provided to meet these requirements.

The off-site D/R basin will also collect runoff that would usually bypass the site. As shown on the preliminary drainage plan, runoff from portions of Honoapiilani Highway will be collected at two grated drain inlets within the highway right-of-way to allow the D/R basin to regulate these flows. To allow for additional flow control, the inlet and outlet of the existing 66-inch will be converted to a closed system. An inlet located at the sump area at the bottom of the new embankment will receive highway runoff and regulate the outflow to the existing 24-inch culvert at Lower Honoapiilani Road. This inlet will release a maximum of 2 cfs into the downstream system and incorporates another drainage best management practice by allowing runoff to flow into the grassed sump area before entering the inlet.

An emergency spillway will be provided to protect the structural integrity of the D/R basin's embankment. Flows through the emergency spillway will be directed to the sump area at the bottom of the new embankment. The spillway runoff will accumulate in the sump, eventually fill the sump, and overflow slowly onto the highway.

These provisions will allow for a complete regulation of the flows entering the existing 24-inch culvert at Lower Honoapiilani Road and limit the flows to 44 cfs. The controlled flows include 10 cfs from the on-site D/R basin, 32 cfs from the off-site D/R basin, and

2 cfs from the inlet at the bottom of the new embankment. The preliminary basin sizes noted above are subject to adjustment as the designs are further refined.

Erosion control measures and construction best management practices will be implemented during the construction period to minimize soil loss and erosion. Grading and erosion control plans will be prepared in accordance with County standards and will be submitted to the County Department of Public Works and Waste Management for review and approval. In addition, an application for a National Pollutant Discharge Elimination System permit for discharge of storm water due to construction activities will be submitted to the State Department of Health for review and approval.

The proposed drainage improvements will be designed to produce no additional adverse effects on the adjacent or downstream properties due to this project. This conclusion is based on maintaining peak discharge rates and volumes at pre-development levels, limiting the flows into the existing 24-inch culvert at Lower Honoapiilani Road, and incorporating drainage best management practices that exceed current County of Maui drainage standards.

6. *Electrical, Telephone and CATV Service*

Electrical, telephone and CATV distribution systems will be extended underground into the project site from Hanawai Street along the interior roadway corridors. Service laterals will be provided to each building so that they can be metered separately. Parking lot and walkway lighting will also be provided.

Chapter IV

Relationship to Land Use Plans, Policies and Controls

IV. RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, established the four (4) major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural", and "Conservation". The subject property is situated within the State "Urban" District. See Figure 6.

The proposed action involves the use of the property for a 184-unit townhouse development which is a permitted use within the "Urban" District.

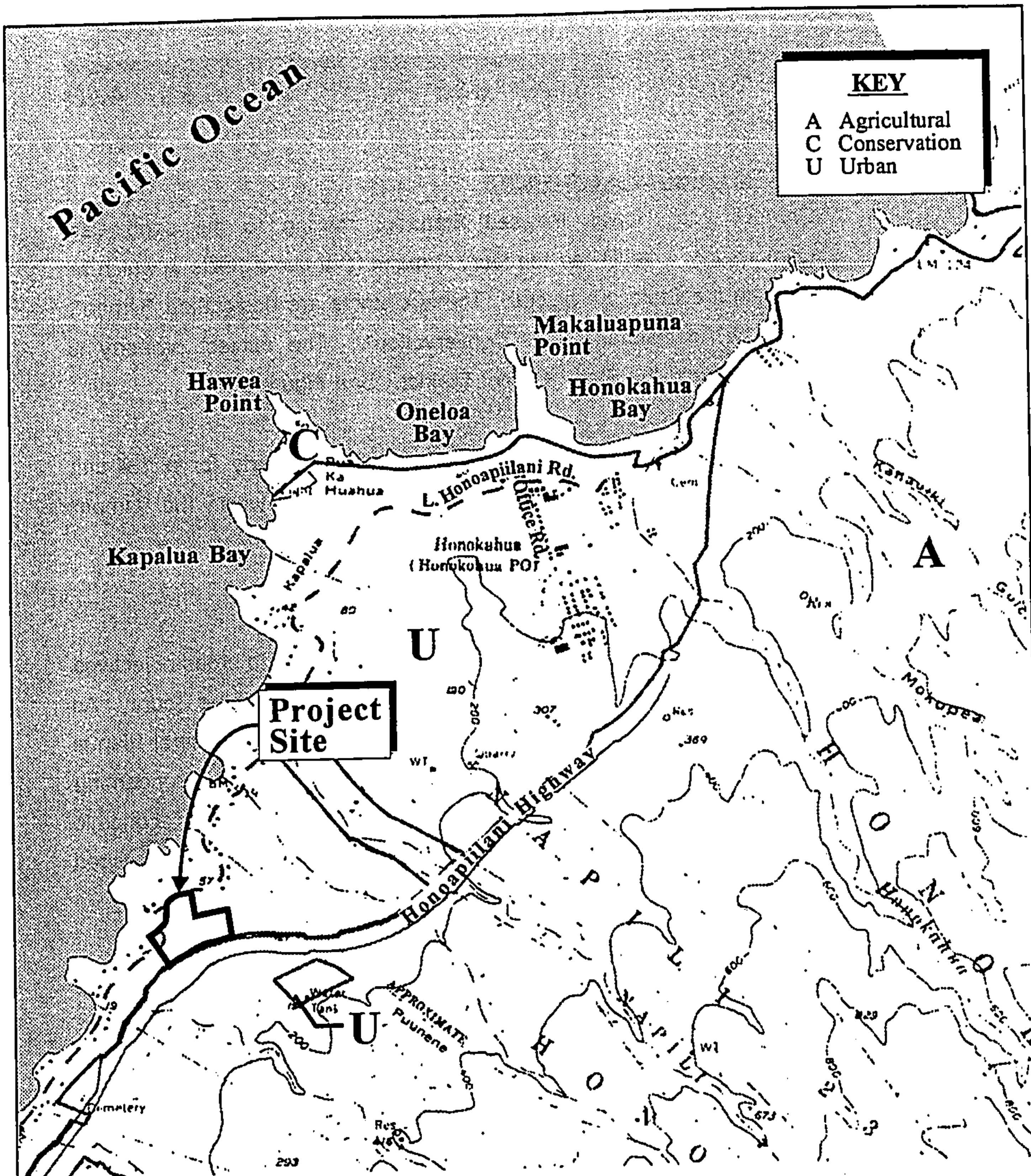
B. MAUI COUNTY GENERAL PLAN

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and the development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development".

The proposed action is in keeping with the following General Plan objectives and policies:

Objective:

To provide an economic climate which will encourage controlled expansion and diversification of the County's economic base.



Source: SLUD Boundary Map, Honolua Quad

Figure 6

Napili Villas

State Land Use Classifications

0 500 1000 2000

MUNEKIYO & HIRAGA, INC.

Prepared for: General Services, Inc.

Policy:

Maintain a diversified economic environment compatible with acceptable and consistent employment.

Objective:

To provide a choice of attractive, sanitary and affordable homes for all our residents.

Policy:

Encourage the construction of housing in a variety of price ranges and geographic locations.

C. *WEST MAUI COMMUNITY PLAN*

Nine (9) community plan regions have been established in Maui County. Each region's growth and development is guided by a Community Plan, which contain objectives and policies drafted in accordance with the County General Plan. The purpose of the Community Plan is to outline a relatively detailed agenda for carrying out these objectives.

The proposed project falls within the jurisdiction of the West Maui Community Plan adopted in 1996. Land use guidelines are set forth by the Lahaina Community Plan Land Use Map. See Figure 7. The subject parcel is designated "Multi-Family Residential" by the Community Plan.

The proposed project is consistent with the Community Plan designation.

The proposed project conforms to the following goals, objectives and policies:

> Promote drainage and stormwater management practices that prevent flooding and protect coastal water quality.

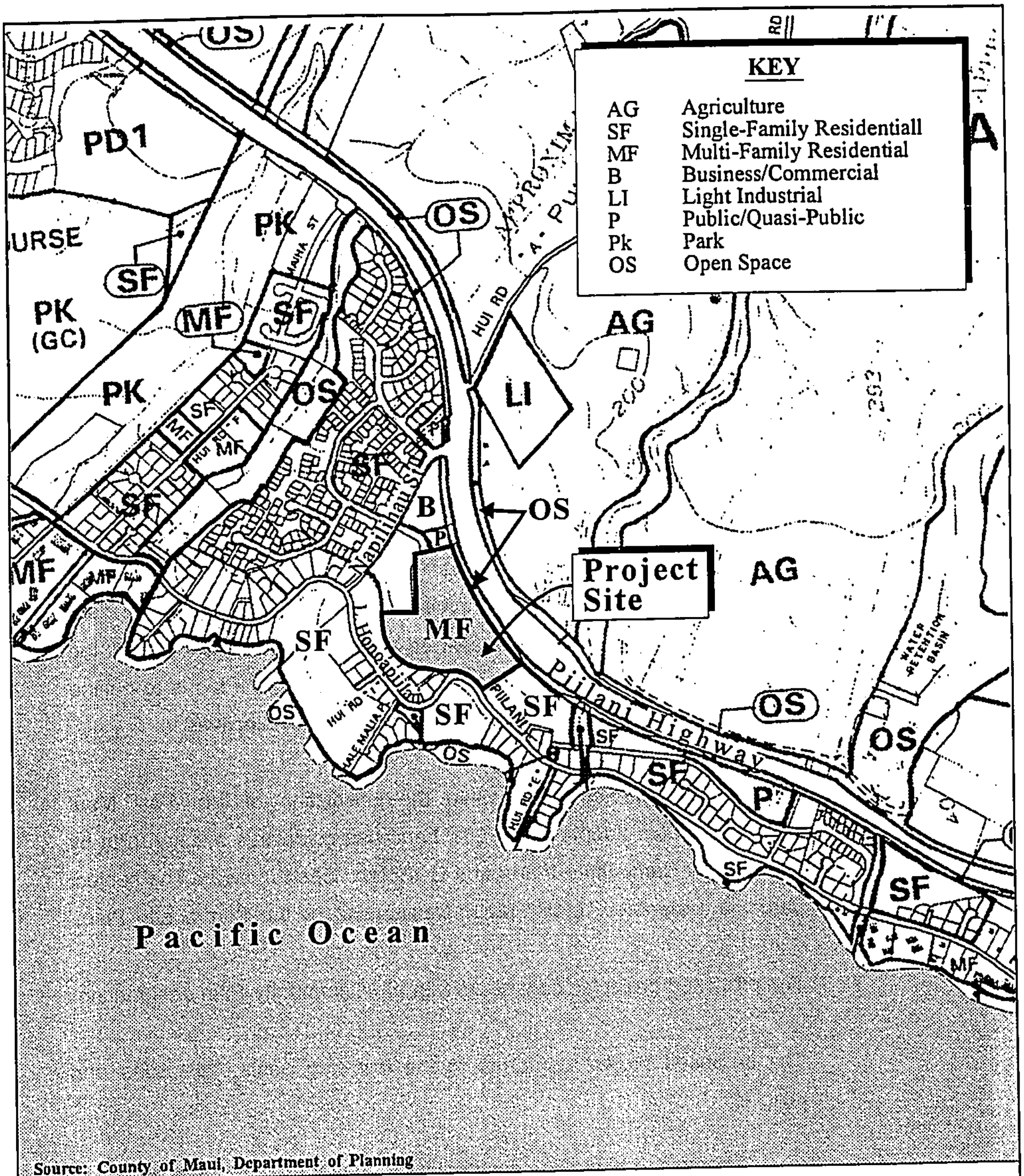


Figure 7

Napili Villas
West Maui Community Plan
Land Use Designations

0 250 500 1000 Feet

MUNEKIYO & HIRAGA, INC.

Prepared for: General Services, Inc.

Goal:

A sufficient supply and choice of attractive, sanitary and affordable housing accommodations for a broad cross section of residents.

Objectives and Policies:

Provide a variety of affordable housing opportunities, including improved lots and self-help projects and special needs housing for the elderly, single parent families, homeless and disabled.

- Promote efficient housing designs in order to reduce residential home energy consumption.

D. *COUNTY ZONING*

The subject property was zoned A-1 Apartment District (Conditional Zoning) by Ordinance 2317 in 1994. The conditions of zoning related to minimum landscaping setback, traffic and roadway improvements, design and constructing the runoff drainage system, and marketing of units for sale.

The Napili Villas project is a permitted use within the A-1 Apartment zoning district.

E. *SPECIAL MANAGEMENT AREA*

The project site is located within the County's Special Management Area (SMA). Accordingly, the project has been reviewed with respect to the SMA objectives and policies as set forth by the Maui Planning Commission's Special Management Area Rules.

(1) *Recreational Resources*

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

(A) Improve coordination and funding of coastal recreational planning and management; and

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county planning commissions; and crediting such dedication against the requirements of Section 46-6, HRS.

Response: The applicant will provide an approximately 1.4-acre park that will be available for public use. The project is also in close proximity to the newly completed Napili Regional Park. Therefore, the project is not anticipated to adversely impact demands on regional recreational facilities.

The applicant's drainage and construction plans have implemented several best management practices and NPDES measures to protect nearshore Class A waters from further degradation of ocean water quality. As such, the project is not anticipated to adversely impact coastal recreational opportunities and resources.

(2) ***Historic Resources***

Objective:

Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

(A) Identify and analyze significant archeological resources;
(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and
(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: There are no historic or cultural features on the property which will be impacted by the Napili Villas project.

(3) ***Scenic and Open Space Resources***

Objectives:

Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

(A) Identify valued scenic resources in the coastal zone management area;

(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

(D) Encourage those developments which are not coastal dependent to locate in inland areas.

Response: The project has been architecturally designed to be compatible in height and mass with surrounding properties. The site is not within a scenic corridor and does not adversely impact views to and along the shoreline.

(4) Coastal Ecosystems

Objective:

Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

(A) Improve the technical basis for natural resource management;

(B) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

(C) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

(D) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Response: The proposed detention/retention basins will be implemented as part of the project's overall drainage system. These detention/retention basins are designed to improve coastal water quality by providing a siltation measure for storm waters generated in mauka agricultural lands. In addition, Best Management Practices (BMPs) will be implemented as part of the project's site construction work. In this regard, appropriate technical measures will be implemented to mitigate adverse impacts to coastal ecosystems.

(5) Economic Uses

Objectives:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

(A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

- (i) Use of presently designated locations is not feasible;
- (ii) Adverse environmental effects are minimized; and
- (iii) The development is important to the State's economy.

Response: The Napili Villas site is located within an area designated for multi-family use by the West Maui Community Plan. This location for multi-family use is considered appropriate in the context of surrounding multi-family, public/quasi-public and commercial uses.

(6) ***Coastal Hazards***

Objectives:

Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies:

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;
(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;
(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program;
(D) Prevent coastal flooding from inland projects; and
(E) Develop a coastal point and nonpoint source pollution control program.

Response: The project site is not located within an environmentally sensitive area which is subject to natural hazards. Appropriate technical measures have been designed to improve stormwater management for the project site and contributing drainage areas.

(7) ***Managing Development***

Objectives:

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

(A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

(B) Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and

(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: The applicant has worked closely with State and County agencies to ensure that regulatory permit requirements are processed in a smooth and timely manner. Opportunity for public understanding of the project has, and will be provided through the County's SMA permit process.

(8) Public Participation

Objectives:

Stimulate public awareness, education, and participation in coastal management.

Policies:

(A) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and

(C) Organize workshops, policy dialogues, and site-specific medications to respond to coastal issues and conflicts.

Response: The project will be reviewed through the County's SMA process to provide opportunity for governmental and public input. In addition, this environmental assessment will be processed in accordance with Chapter 343, Hawaii Revised Statutes to provide opportunity for comment by agencies and the public.

(9) ***Beach Protection***

Objectives:

Protect beaches for public use and recreation.

Policies:

(A) Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;
(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: The Napili Villas project is not located in proximity to beach areas and will not affect beach processes or uses.

(10) ***Marine Resources***

Objectives:

Implement the State's ocean resources management plan.

Policies:

(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
(B) Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

(C) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;

(D) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

(E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

(F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: The applicant has incorporated several best management practices, NPDES measures, and water quality monitoring surveys to protect the nearshore waters from further degradation of ocean water quality. Therefore, the proposed project is not anticipated to adversely impact marine resources in Keonenui Bay, which is located downstream of the project site.

Chapter V

Summary of Adverse Environmental Effects Which Cannot be Avoided

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Implementation of the Napili Villas project will result in temporary construction-related impacts as described in Chapter III, Potential Impacts and Mitigation Measures.

Temporary noise and air quality impacts are typically associated with construction activities. These effects have been and will continue to be mitigated through appropriate construction management practices.

From a long-term perspective, there are no significant adverse environmental effects anticipated as a result of the Napili Villas project.

Chapter VI

Alternatives to the Proposed Action

VI. ALTERNATIVES TO THE PROPOSED ACTION

A. NO ACTION ALTERNATIVE

The "no action" alternative would result in agricultural lands continuing in a fallow state. This alternative does not possess beneficial community value, particularly since the property's land use entitlements enable the provision of new housing opportunities.

B. OTHER LAND USE ALTERNATIVES

The potential for using the subject property for other land uses, such as single family residential use, have been identified in the past. The subject action proposes a multi-family development to address a specific market segment of the community, for which a multi-family format is most suitable. In particular, the provision of units can be met through attached housing construction at densities higher than could be achieved under a single family subdivision format. In this regard, the multi-family project is proposed in keeping with its underlying Multi-Family land use designation set forth by the West Maui Community Plan.

C. SITE PLAN ALTERNATIVES

Initial planning for the project identified site development alternatives which considered options for building spatial configurations, vehicular access, and recreational facilities. Through the project's planning process, a site plan was prepared and reviewed to ensure that all State and County regulatory requirements can be addressed.

Chapter VII

Irreversible and Irretrievable Commitments of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The development of the Napili Villas project would involve the commitment of land for the developrnent of multi-family townhouse units. In addition, labor and materials resources would be expended as part of the project's construction phase. Commitment of these resources are considered irreversible and irretrievable. This commitment, however, is considered appropriate in the context of meeting residential housing needs for the community.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSIONS

Every phase of the proposed action, expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action have been evaluated in accordance with the Significance Criteria of Section 11-200-12 of the Administrative Rules. Discussion of project conformance to the criteria is noted as follows:

1. ***No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resource Would Occur as a Result of the Proposed Project***

   The project will not result in the loss or destruction of any valuable natural resources. The site was previously used for pineapple cultivation and was not considered a significant habitat or source for rare, endangered or threatened species of flora or fauna. Additionally, archaeological studies conducted on the site have been reviewed by the State Historic Preservation Division (SHPD). The SHPD has determined that the action will have no effect on significant historic sites.

   In addition, in the context of the area's land use history and surrounding existing developments, the implementation of the Napili Villas project is not anticipated to have an adverse impact upon cultural resources.

2. ***The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment***

   The Napili Villas project will not curtail the range of beneficial uses of the environment. There are no impacts attributed to the project which will limit the use of surrounding lands. Environmental parameters such as air quality, water quality, and scenic views will similarly not be adversely affected by the project.

3. ***The Proposed Action Does Not Conflict With the State's Long-Term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, HRS***

The State Environmental Policy and Guidelines are set forth in Chapter 344, HRS. The proposed action is in consonance with the following policies and guidelines:

Environmental Policy:

Enhance the quality of life by:

* * *

(A) Establishing communities which provide a sense of identity, wise use of land, efficient transportation, and aesthetic and social satisfaction in harmony with the natural environment which is uniquely Hawaiian.

Guidelines:

* * *

Community Life and Housing

* * *

(A) Foster lifestyles compatible with the environment; preserve the variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods which reflect the culture and mores of the community;

* * *

(D) Foster safe, sanitary and decent homes;

4. ***The Economic or Social Welfare of the Community or State Would Not Be Substantially Affected***

The project will directly benefit the local economy by providing construction and construction-related employment. In the long term, the project will support the local economy through the contribution of salaries, wages, benefits and taxes, as well as through the purchases of goods and services. The proposed project will also have a beneficial effect upon the social welfare of the community by providing a well designed and functional living environment for its residents.

5. ***The Proposed Action Does Not Affect Public Health***

No adverse impacts to the public's health and welfare are anticipated.

6. ***No Substantial Secondary Impacts, Such as Population Changes or Effects on Public Facilities, are Anticipated***

The Napili Villas project is being implemented to provide housing opportunities for Maui residents. The project is not a source of new population to the region as the majority of occupants would be from the West Maui region. Moreover, existing and potential buyers and tenants are expected to be primarily employed in the West Maui region. In this regard, the proposed project is not anticipated to adversely affect public services in the region, such as schools and police and fire protection. It is noted that an approximately 1.4-acre park will be available for public use to address parks and playgrounds assessment requirements for the project.

With regard to public facilities, improvements to infrastructure systems have been provided with the development of the adjacent Napilihau Villages project. Infrastructure systems improvements are designed to mitigate impacts which may be attributed to the Napili Villas project.

7. ***No Substantial Degradation of Environmental Quality is Anticipated***

Excavation, grading, and fill activities will create temporary short-term nuisances related to noise and dust. Appropriate dust control and noise mitigation measures will be implemented by the contractor to ensure that fugitive dust and noise generated in connection with construction is minimized.

Drainage system improvements have been designed to mitigate impacts to downstream properties and costal ecosystems.

Substantial degradation of environmental quality resulting from the project is not anticipated.

8. ***The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Effects On The Environment***

The project consists of 184 multi-family units, an approximately 1.4-acre park and attendant infrastructure improvements. There are no additional development components associated with the project. Accordingly, the impacts assessed herein have been based on the entire action.

9. ***No Rare, Threatened or Endangered Species or Their Habitats Would be Adversely Affected By The Proposed Action***

There are no rare, threatened or endangered species of flora, fauna, or avifauna or their habitats within the project limits.

10. ***Air Quality, Water Quality or Ambient Noise Levels Would Not Be Detrimentally Affected By The Proposed Project***

Construction activities will result in short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling, and installation of dust screens have been and will continue to be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from construction equipment. Equipment mufflers or other noise attenuating equipment, as well as proper equipment and vehicle maintenance, have been and will continue to be used during construction activities.

In the long term, the project is not anticipated to have a significant impact on air quality, water quality or ambient noise conditions.

11. ***The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such As Flood Plains, Tsunami Zones, Erosion-prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters***

The project site is not located within any environmentally sensitive areas. In addition, the property is not located within a flood hazard or tsunami inundation area.

12. ***The Proposed Project Will Not Substantially Affect Scenic Vistas and Viewplanes Identified in County or State Plans or Studies***

The project will not affect coastal scenic and open space resources and will not affect scenic view corridors.

13. ***The Proposed Project Will Not Require Substantial Energy Consumption***

The subject project will involve the commitment of fuel for construction equipment, vehicles, and machinery during construction activities.

In the long term, the 184 multi-family units will create additional demand for electricity. However, in the context of the region's overall energy consumption, the project's demand for electricity is not considered excessive, nor is it considered substantial.

Chapter IX

List of Permits and Approvals

IX. LIST OF PERMITS AND APPROVALS

The following State and County permits and approvals are required for project implementation:

State of Hawaii

National Pollutant Discharge Elimination System (NPDES) Permit
Community Noise Permit

County of Maui

Special Management Area (SMA) Use Permit
Construction Permits (e.g., grading, building, Work to Perform in State Highway Right-of-Way).

Chapter X

Agencies Consulted During the Preparation of the Draft Environmental Assessment; Letters Received and Responses to Substantive Comments

X. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies were consulted during the preparation of the Draft Environmental Assessment. Agency comments and any necessary responses to substantive comments are also included in this section.

1. Neal Fujiwara
   Soil Conservationist
   Natural Resources Conservation Service
   U.S. Department of Agriculture
   210 Imi Kala Street, Suite 209
   Wailuku, Hawaii 96793-2100

2. William Lennan
   Department of the Army
   U.S. Army Engineer District, Hnl.
   Attn: Operations Division
   Bldg. T-1, Room 105
   Fort Shafter, Hawaii 96858-5440

3. Robert P. Smith
   Pacific Islands Manager
   U. S. Fish and Wildlife Service
   P.O. Box 50167
   Honolulu, Hawaii 96850

4. Herbert Matsubayashi
   District Environmental Health Program Chief
   State of Hawaii
   Department of Health
   54 High Street
   Wailuku, Hawaii 96793

5. Timothy Johns, Director
   State of Hawaii
   Department of Land and Natural Resources
   P. O. Box 621
   Honolulu, Hawaii 96809

6. Don Hibbard
   State of Hawaii
   Department of Land and Natural Resources
   State Historic Preservation Division
   601 Kamokila Blvd., Room 555
   Kapolei, Hawaii 96707

7. Robert Siarot, Maui District Engineer
   State of Hawaii
   Department of Transportation
   Highways Division
   650 Palapala Drive
   Kahului, Hawaii 96732

8. David Craddick, Director
   County of Maui
   Department of Water Supply
   200 South High Street
   Wailuku, Hawaii 96793

9. Clayton Ishikawa, Chief
   County of Maui
   Department of Fire Control
   200 Dairy Road
   Kahului, Hawaii 96732

10. Alice Lee, Director
    County of Maui
    Department of Housing and Human Concerns
    200 S. High Street
    Wailuku, Hawaii 96793

11. Floyd Miyazono, Director
County of Maui
Department of Parks and Recreation
1580 C. Kaahumanu Avenue
Wailuku, Hawaii 96793

12. John Min, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

13. Tom Phillips, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawaii 96793

14. Charles Jencks, Director
County of Maui
Department of Public Works and Waste Management
200 South High Street
Wailuku, Hawaii 96793

In addition, the following meetings and contacts have been undertaken:

1. Maui Land and Pineapple Company, Inc.
2. Direct communication with neighbors and Napili Plaza Shopping Center
3. Two meetings with community
4. Two meetings with Kahana Sunset Owners Association (KSOA) Board of Directors
5. Meetings with KSOA's designated representative, Isaac Hall
6. Meeting with Alaeloa Owners Association Board of Directors

Comments

-- - - 2000

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

July 27, 2000

Regulatory Branch

Mr. Michael T. Munekiyo, A.I.C.P.
Project Manager
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

This letter responds to your request for comments on the proposed Napilihau Condominium Project, dated July 21, 2000. The information summary is not sufficiently detailed to determine if a Department of the Army (DA) permit will be required for this project. Please include us on the mailing list for the Supplemental Draft Environmental Assessment and include information in the document concerning the presence or absence of streams or wetlands on the project site.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200000265.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

AUG 0 2 2000

USDA

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

210 Imi Kala St.
Suite 209
Wailuku, HI 96793

Our People...Our Islands...In Harmony

DATE: August 1, 2000

Mr. Michael Munekiyo, A.I.C.P.
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo,

SUBJECT: Proposed Napilihau Condominium Project
TMK: 4-3-03: 110, 122, 123

We have no comment on the proposed project.

Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara

Neal S. Fujiwara
District Conservationist

AUG 1 5 2000

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

JAMES "KIMO" APANA
Mayor
ALICE L. LEE
Director
PRISCILLA P. MIKELL
Deputy Director

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 270-7805 • FAX (808) 270-7165

August 11, 2000

Mr. Michael Munekiyo, A.I.C.P.
Project Manager
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Proposed Napilihau Condominium
Project at TMK: 4-3-03:110, 122 and 123

We have reviewed your July 21, 2000 letter regarding the subject project and wish to inform you that we have no comments to offer at this time.

Thank you for the opportunity to comment.

Very truly yours,

ALICE L. LEE
Director or Housing and
Human Concerns

ETO:df

c: Housing Administrator

AUG 1 / 2000

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE

YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
Fax (808) 244-6411

THOMAS M. PHILLIPS
CHIEF OF POLICE

KEKUHAUPIO R. AKANA
DEPUTY CHIEF OF POLICE

August 15, 2000

MEMORANDUM

TO	:	MICHAEL T. MUNEKIYO, A.I.C.P. MUNEKIYO, ARAKAWA & HIRAGA, INC.
FROM	:	THOMAS M. PHILLIPS, CHIEF OF POLICE MAUI POLICE DEPARTMENT
SUBJECT	:	TMK : 4-3-03:110, 122 and 123 Project Name: Proposed Napilihau Condominium Project Applicant : Napilihau Villages Joint Venture

___X___ No recommendation or special condition is necessary or desired.

______ Refer to attachment.

Acting Assistant Chief Sydney Kikuchi
For: THOMAS M. PHILLIPS
Chief of Police

AUG 18 2000

BENJAMIN J. CAYETANO
GOVERNOR

LEADING HAWAII INTO THE NEW MILLENNIUM
1959 2000+

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

August 15, 2000

IN REPLY REFER TO:
HWY-M2.260-00

MEMORANDUM

TO: **Mike Munekiyo**
Munekiyo, Arakawa & Hiraga, Inc.

FROM: **Paul M. Chung**
State Highways

SUBJECT: **Napilihau Condominium Project**
ME 97-45

This memorandum is in response to your letter dated 7/21/00, regarding the subject project. Based on our review, we have no comments to offer at this time. Please forward a copy of the Draft Environmental Assessment for our review upon completion.

If there are any questions or concerns please call me at 873-3535.

/pmc

AUG 2 1 2000

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE WAILUKU, HAWAII 96793

JAMES "KIMO" APANA
Mayor

FLOYD S. MIYAZONO
Director

ELIZABETH D. MENOR
Deputy Director

(808) 270-7230
FAX (808) 270-7934

August 21, 2000

Mr. Michael T. Munekiyo, AICP
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street, Ste. 104
Wailuku, Hawaii 96793

SUBJECT: **Napilihau Condominium Project**
TMK: 4-3-03: 110, 122, and 123

Dear Mr. Munekiyo:

Thank you for the opportunity to review the proposed multi-family development. We do not have specific comments at this time. We would like to review and comment on the Special Management Area Use Permit application document that you intend to submit to the Planning Department in the future.

Please feel free to call me at 270-7626 during normal working hours should you have any questions.

Sincerely,

Floyd S. Miyazono

FLOYD S. MIYAZONO
Director

FSM:PM:gu

c: Planning & Development Division, SMA Files

west\napilihau-ltr.wpd

AUG 23 2000

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

August 22, 2000

LD-NAV

Ref.: NAPILIHAU.RCM

Munekiyo, Arakawa & Hiraga, Inc.
Michael T. Munekiyo, A.I.C.P.
Project Manager
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: Pre-Consultation for proposed Napilihau Condominium Project at Napili, Island of Maui, Hawaii
TMK: 2nd/ 4-3-03: 110, 122 and 123

Thank you for the opportunity to review and comment on the subject matter.

We had transmitted the subject informational material to our appropriate divisions and their branches for their review and comment on the proposed project.

Attached herewith are copies of our Division of Forestry and Wildlife, Division of State Parks, Division of Aquatic Resources, Land Division Engineering Branch and our Commission on Water Resource Management comments.

The Department has no other comment to offer at this time.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

C: Maui District Land Office

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

AUG 15

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

August 11, 2000

TO: Mr. Dean Uchida, Administrator
Land Division

FROM: Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Napilihau Condominium Pre-Consultation

FILE NO.: NAPILIHAU.COM

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[x] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[X] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[X] OTHER:

The County is currently engaged in community-based planning for water supply within the West Maui Community Plan area. Water supply requirements and probable sources should be coordinated with the County Department of Water Supply at the earliest convenience

If there are any questions, please contact Charley Ice at 587-0251.

RECEIVED

00 JUL 26 P2:24

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

July 25, 2000

LD/NAV
Ref.: NAPILIHAU.COM

Suspense Date: 8/15/00

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Maui District Land Office
Shoreline Processing Services

FROM: Dean Y. Uchida, Administrator
Land Division

SUBJECT: Pre-consultation for proposed Napilihau Condominium Project at Napili, Island of Maui Hawaii TMK: 2nd/ 4-3-03: 110, 122 and 123

Please review the following:

Project overview

and submit your comments (if any) on Division letterhead within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

( ) Comments attached.

Signed:

Date:

DIVISION OF AQUATIC RESOURCES		
DIRECTOR		Suspense Date:
COM FISHERIES		Draft Reply
AQ REC/ENV		Reply Direct
AQ RECR'N		Comments
STAFF SVCS		Information
FISH DEV		Comp Act & File
STATISTICS		Return to:
AFRC		Copies to:
EDUCATION		Remarks:
SECRETARY		
OFFICE SVCS		
FED AID		00-689

RECEIVED
JU...
DIV. AQUATIC RESOURCES

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

July 25, 2000

LD/NAV
Ref.: NAPILIHAU.COM

Suspense Date: 8/15/00

AUG 17 11 17 '00

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Maui District Land Office
Shoreline Processing Services

FROM: Dean Y. Uchida, Administrator
Land Division

SUBJECT: Pre-consultation for proposed Napilihau Condominium Project at Napili, Island of Maui Hawaii TMK: 2nd/ 4-3-03: 110, 122 and 123

Please review the following:

Project overview

and submit your comments (if any) on Division letterhead within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

(X) We have no comments.

( ) Comments attached.

Signed:
Acting Administrator

Date: 8/16/00

'00 JUL 26 AM07:58 WATER & LAND

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

July 25, 2000

LD/NAV
Ref.: NAPILIHAU.COM

Suspense Date: 8/15/00

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Maui District Land Office
Shoreline Processing Services

FROM: Dean Y. Uchida, Administrator
Land Division

SUBJECT: Pre-consultation for proposed Napilihau Condominium Project at Napili, Island of Maui Hawaii TMK: 2nd/ 4-3-03: 110, 122 and 123

Please review the following:

Project overview

and submit your comments (if any) on Division letterhead within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Signed: Andrew M. Monden
ANDREW M. MONDEN, CHIEF ENGINEER

Date: 8/4/00

ENGINEERING BRANCH

COMMENTS

Our current projects are not effected by the proposed project.

According to FEMA Community-Panel No. 150003 0138 B, the project site located in Zone C. This is an area of minimal flooding.

Napili_com_m7.doc

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

July 25, 2000

LD/NAV
Ref.: NAPILIHAU.COM

Suspense Date: 8/15/00

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Maui District Land Office
Shoreline Processing Services

FROM: Dean Y. Uchida, Administrator
Land Division

SUBJECT: Pre-consultation for proposed Napilihau Condominium Project at Napili, Island of Maui Hawaii TMK: 2nd/ 4-3-03: 110, 122 and 123

Please review the following:

Project overview

and submit your comments (if any) on Division letterhead within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

(X) We have no comments.

( ) Comments attached.

Signed:

Date: 7/27/00

Chapter XI

Letters Received During the Initial Draft Environmental Assessment Public Comment Period (September 8, 2000 to October 9, 2000) and Responses to Substantive Comments

XI. LETTERS RECEIVED DURING THE INITIAL DRAFT ENVIRONMENTAL ASSESSMENT PUBLIC COMMENT PERIOD (SEPTEMBER 8, 2000 TO OCTOBER 9, 2000) AND RESPONSES TO SUBSTANTIVE COMMENTS

A Draft Environmental Assessment for the subject project was filed and published in the Office of Environmental Quality Control's The Environmental Notice on September 8, 2000. This draft was subsequently withdrawn as revisions to project engineering designs were made. During the 30-day public comment period, agencies were provided the opportunity to comment on the proposed action. This section incorporates the comments received during the 30-day comment period between September 8, 2000 and October 9, 2000. Responses to the substantive comments are also incorporated herein.

DRAFT ENVIRONMENTAL ASSESSMENT COMMENT LETTERS

BENJAMIN J. CAYETANO
GOVERNOR

SEP 29 2000

PAUL G. LeMAHIEU, Ph.D.
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

'00 SEP 27 P1:14

OFFICE OF THE SUPERINTENDENT

September 21, 2000

Mr. John E. Min
Planning Director
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Napili Villas – SM1 2000/0024

The Department of Education (DOE) requests that the following condition be imposed upon approval of the subject application:

> The applicant shall contribute to the development, funding, and/or construction of school facilities, on a fair-share basis, as determined by and to the satisfaction of the Department of Education (DOE). Terms of the contribution shall be agreed upon by the applicant and the DOE prior to applicant applying for building permits.

The DOE's current fair-share requirement is $1,125 per unit. Funds collected via this condition will be used toward capital improvement projects within the Lahainaluna High School complex. This complex includes Lahainaluna High, Lahaina Intermediate, Princess Nahienaena Elementary, and King Kamehameha III Elementary schools.

Thank you for your consideration of this request. If you have any questions, please call Mr. Sanford Beppu at 733-4862.

Very truly yours,

Paul G. LeMahieu, Ph.D.
Superintendent of Education

PLeM:hy

cc: P. Yoshioka, DAS

SEP 29 2000

BENJAMIN J. CAYETANO
GOVERNOR

RAYMOND H. SATO
COMPTROLLER

STATE OF HAWAII '00 SEP 27 P1:49
DEPARTMENT OF ACCOUNTING
AND GENERAL SERVICES
SURVEY DIVISION
P. O. BOX 119
HONOLULU, HAWAII 96810

RESPONSE REFER TO:

FILE NO. ____________

September 26, 2000

MEMORANDUM

TO: Mr. John E. Min, Planning Director
Maui County Planning Department

ATTN.: Mr. Joseph W. Alueta, Staff Planner

FROM: Randall M. Hashimoto, State Land Surveyor

SUBJECT: I.D.: SM1 2000/0024
TMK: 4-3-003:110, 122 and 123
Project Name: Napili Villas
Applicant: Kathy Inouye, on behalf of General Services

The subject proposal has been reviewed and confirmed that no Government Survey Triangulation Stations and Benchmarks are affected. The Survey Division has no objections to the proposed project.

Should you have any questions, please call me at 586-0390.

Randall M. Hashimoto

RANDALL M. HASHIMOTO
State Land Surveyor

JAMES "KIMO" APANA
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

RON R. RISKA, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

ANDREW M. HIROSE
Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, HAWAII 96793

'00 SEP 28 A9:48

September 26, 2000

MEMO TO: JOHN E. MIN, DIRECTOR OF PLANNING

FROM: DAVID GOODE, DIRECTOR OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBJECT: SPECIAL MANAGEMENT AREA PERMIT APPLICATION
NAPILI VILLAS
TMK: (2) 4-3-003:110, 122, 123
SM1 2000/0024

We reviewed the subject application and have the following comments.

Advisory Comments

1. The developer should be informed that we cannot ensure that wastewater system capacity will be available for the project.

2. Wastewater contribution calculations are required before a building permit is issued.

3. The developer is required to fund any necessary off-site improvements to collection system and wastewater pump stations.

4. The onsite wastewater collection system will remain private as stated in the report.

5. A road widening lot shall be provided for the adjoining half of Lower Honoapiilani Highway to provide for a future 56-foot wide right-of-way and improved to County standards to include, but not be limited to, pavement widening, construction of curb, gutter, and sidewalk, street lights, and relocation of utilities underground. Said lot shall be dedicated to the County upon completion of the improvements.

6. Off street parking, loading spaces, and landscaping shall be provided per Maui County Code, Chapter 19.36.

7. A detailed final drainage report and a site specific erosion control plan shall be submitted with the construction plans for review and approval prior to the issuance of grading or building permits. The drainage report shall include hydrologic and hydraulic calculations and the schemes for the disposal of runoff waters. It must comply with the provisions of the "Rules for Design of Storm Drainage Facilities in the County of Maui" and must provide verification that the grading and runoff water generated by the project will not have an adverse effect on adjacent and downstream properties. The site specific erosion control plan shall show the location and details of structural and non-structural Best Management measures.

<u>Recommended Condition</u>

8. Completion of the installation of a new traffic signal system at the intersection of Honoapiilani Highway and Napilihau Street is required prior to occupancy.

If you have any questions regarding this memorandum, please call me at 270-7845.

DG:sn/mt
S:\LUCA\CZM\napilivi.las.wpd

SEP 29 2000

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

September 27, 2000

Mr. Kazu Hayashida
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Subject: Draft Environmental Assessment for Napili Villas, Maui

Thank you for the opportunity to review and comment on the subject document. We have the following comments.

1. Please consult with groups and individuals that may be affected by this project. The consultation process must include the Kahana Sunset Community Association.

2. Please consider applying sustainable building techniques presented in the "Guidelines for Sustainable Building Design in Hawaii." The guidelines are available at http://www.state.hi.us/health/oeqc/index.html. In the final EA include a description of any of the techniques you will implement.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson
Genevieve Salmonson
Director

c: General Services, Inc.
✓Munekiyo, Arakawa & Hiraga, Inc.

OCT 1 / 2000

JAMES "KIMO" APANA
MAYOR

CLAYTON T. ISHIKAWA
CHIEF

FRANK E. FERNANDEZ, JR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 270-7561
FAX (808) 270-7919

October 13, 2000

Mr. John E. Min
Planner Director
Department of Planning
County of Maui
250 S. High Street
Wailuku, Hi. 96793

Subject: I.D.: SM1 2000/0024
TMK: 4-3-003:110, 122, and 12
Project Name: Napili Villas

Dear Mr. Min:

Thank you for the opportunity to review and comment of the subject application. At this time the Fire Prevention Bureau has no comments on subject application.

If you have any questions, please call me at 270-7122.

Sincerely,

Scott English
Fire Plans Examiner

'00 OCT 13 P1:31

BENJAMIN J. CAYETANO
GOVERNOR

'00 OCT 27 P2:35

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

RECEIVED

OCT 26 2000

IN REPLY REFER TO:

HWY-PS
2.0499

Mr. John E. Min, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Special Management Area Use Permit and Draft Environmental Assessment (SMA1 2000/0024), Napili Villas (aka Napilihau Condominiums, Formerly Known as Napilihau Villages, Phase II, III, and IV), Napilihau Villages Joint Venture, Napili, Maui, Hawaii, TMK: 4-3-003: 110, 122 and 123

Thank you for the opportunity to review the subject application.

We have the following comments and recommendations:

1. In the vicinity of the project, Honoapiilani Highway is classified as a minor arterial and has a 45 mph speed limit. The primary access to the subject project should be through Hanawai Street to Napilihau Street, which is a collector roadway having a newly signalized intersection with Honoapiilani highway. The project's driveway connection to Honoapiilani Highway should be a secondary access and be restricted to only right-turns in and right-turns out.

2. References to an acceleration lane at the proposed access should be omitted from the statements in Chapter 1, page 5, paragraph four, i.e., "improvements proposed for the Honoapiilani Highway access include...the installation of acceleration and deceleration lanes to accommodate right-turn in, right-turn out..." and in Appendix B, page 8, i.e., "Speed change lanes will be installed...to facilitate right turn movements in and out of the project." Although a zoning condition requires the applicant to provide acceleration and deceleration lanes at the access and AASHTO standards require an acceleration lane, we have agreed to a configuration without an acceleration lane.

HWY-PS 2.0499

Mr. John E. Min
Page 2
OCT 26 2000

3. A roadway access plan, such as the one submitted with the request to relocate the existing access to Honoapiilani Highway, should be included in the application to show the requested access relocation.

4. The proposed driveway would be located on a curve on a sloping segment of Honoapiilani Highway. A sight distance analysis is required and sight distances should be noted on the roadway access plan.

5. We have drainage concerns and recommend that the applicant have its consultants work with the Highways Division Maui District Office to resolve them.

6. The two construction phases of 100 units and 84 units mentioned in Chapter 3, Section C (1) should'be shown superimposed on the site plan.

7. Construction plans for all work within the State highway right-of-way must be submitted to our Highways Division for review and approval.

8. All Required improvements must be planned, designed and constructed at no cost to the State.

9. No additional storm water runoff shall be allow in the State highway right-of-way.

If you have any questions, please call Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

DRAFT ENVIRONMENTAL ASSESSMENT RESPONSE LETTERS

MUNEKIYO, ARAKAWA & HIRAGA, INC.

October 4, 2000

David Goode, Director
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Napili Villas, TMK 4-3-003:110, 122, 123 (SM1 2000/0024)

Dear Mr. Goode:

The Department of Planning has provided us with a copy of your memorandum dated September 26, 2000, commenting on the subject application. In reviewing your comments, the following are noted:

1. We acknowledge your advisory comments as noted in items 1, 2, 3, 4, 6 and 7.

2. With regard to advisory comment item 5, it is our understanding that a road widening lot for the adjoining half of Lower Honoapiilani Highway was provided by the previous owner of the property, Maui Land and Pineapple Co. The improvements have been completed and were dedicated to the County.

3. With regard to the recommended condition item 8, the State Department of Transportation, Highways Division, has advised us that the traffic signal system is under construction. The Department anticipates the traffic signal system to be operational at the end of this month.

We appreciate your comments. Should you have any questions or require further information, please do not hesitate to call me.

Very truly yours,

Gwen Ohashi Hiraga

Gwen Ohashi Hiraga
Project Manager

GOH:to
cc: Kathy Inouye, General Services, Inc.
gsi/napiliha/dpwwm.ltr

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

Chapter XII

Letters Received During the Second Draft Environmental Assessment Public Comment Period (December 23, 2000 to January 22, 2001) and Responses to Substantive Comments

XII. LETTERS RECEIVED DURING THE SECOND DRAFT ENVIRONMENTAL ASSESSMENT PUBLIC COMMENT PERIOD (DECEMBER 23, 2000 TO JANUARY 22, 2001) AND RESPONSES TO SUBSTANTIVE COMMENTS

As noted in Chapter XI, the Draft Environmental Assessment for the subject project published in the Office of Environmental Quality Control's (OEQC) The Environmental Notice on September 8, 2000 was withdrawn. Chapter XI incorporates the comments received during the 30-day comment period between September 8, 2000 and October 9, 2000, and the responses to substantive comments.

This section incorporates the comments received during the 30-day comment period between December 23, 2000 and January 22, 2001. Responses to the substantive comments are also incorporated herein.

DRAFT ENVIRONMENTAL ASSESSMENT COMMENT LETTERS

USDA

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

0 Imi Kala St.
Suite 209
Wailuku, HI 96793

'01 JAN -4 P3:10

Our People...Our Islands...In Harmony

DATE: January 3, 2001

Mr. John E. Min, Director
Department of Planning
County of Maui
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Min,

SUBJECT: Napili Villas; TMK: 4-3-003: 110, 122 & 123
I.D. SM1 2000/0024

Our original comments are applicable.

Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara

Neal S. Fujiwara
District Conservationist

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

JAN -8 P2:28
RECEIVED

January 5, 2001

LD-NAV
Ref.: SM12000024.RCM3

Honorable John E. Min
Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

SUBJECT: Napili Villas - I.D.: SM1 2000/0024 - TMK: 4-3-3: var
Revised Drainage Report for Environmental Assessment

Thank you for the opportunity to review and comment on the proposed project.

We had transmitted the subject informational material to our appropriate divisions for their review and comment on the subject matter.

The Department has no comment to offer at this time. Should you have any questions, please feel free to contact Nicholas Vaccaro of the Land Division Support Services Branch at 808-587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

C: Maui District Land Office

JAN 2 6 2001

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

01 JAN 25 P2:50

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

January 23, 2001

LD-NAV
Ref.: SM12000024.RCM4

Honorable John E. Min
Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

SUBJECT: Napili Villas - I.D.: SM1 2000/0024 - TMK: 4-3-3: var
Revised Drainage Report for Environmental Assessment

This is a follow-up to our letter (ref: SMI200024.RCM3) to you dated January 5, 2001, regarding the subject matter.

We have been informed by our Land Division Engineering Branch that the proposed project site, according to FEMA Community Panel Number 150003 0138B, is located in Zone C. This is an area of minimal flooding (no shading).

The Department has no other comment to offer. Should you have any questions, please feel free to contact Nicholas Vaccaro of the Land Division Support Services Branch at 808-587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

C: Maui District Land Office

JAN 17 2001 DOT 4-721
(HWY-M 11/87

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT
TRANSMITTAL MEMORANDUM

Letter No.

TO: Munekiyo, Arakawa & Hiraga, Inc. DATE: January 9, 2001

Attn: Ms. Gwen Ohashi Hiraga

FROM: District Engineer, Maui
SUBJECT: Napili Villas
ME 97-45

We are forwarding the following: ☒ attached ☐ under separate cover

☐ shop drawing ☐ print/sketches ☐ mix design

☐ calculations ☐ change order ☐ plans

☐ ____________________ ☐ letter/memo

☐ COPIES ☐ SETS	DESCRIPTION
1	Letter to John Min dated 10/26/00
1	Memo to Ronald Fukumoto dated 12/28/00

These are transmitted as checked below:

☐ for approval ☐ approved as submitted

☐ for review and comments ☐ approved as noted

☐ for your information and file ☐ returned for corrections

☐ appropriate attention and action ☐ resubmit _____ copies for approval

☒ as requested

REMARKS: Transmitted herewith are our comments to the Draft Environmental Assessment for the subject project. Our previous comments as noted on the enclosures are still applicable. If there are any questions or concerns, please call me at 873-3535.

Copies sent to:

Signed [signature]
Paul M. Chung, P.E.

This space for reply:

650 Palapala Drive, Kahului, Hawaii 96732

BENJAMIN J. CAYETANO
GOVERNOR

'00 OCT 27 P2:35

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

OCT 26 2000

IN REPLY REFER TO:

HWY-PS
2.0499

Mr. John E. Min, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Special Management Area Use Permit and Draft Environmental Assessment (SMA1 2000/0024), Napili Villas (aka Napilihau Condominiums, Formerly Known as Napilihau Villages, Phase II, III, and IV), Napilihau Villages Joint Venture, Napili, Maui, Hawaii, TMK: 4-3-003: 110, 122 and 123

Thank you for the opportunity to review the subject application.

We have the following comments and recommendations:

1. In the vicinity of the project, Honoapiilani Highway is classified as a minor arterial and has a 45 mph speed limit. The primary access to the subject project should be through Hanawai Street to Napilihau Street, which is a collector roadway having a newly signalized intersection with Honoapiilani highway. The project's driveway connection to Honoapiilani Highway should be a secondary access and be restricted to only right-turns in and right-turns out.

2. References to an acceleration lane at the proposed access should be omitted from the statements in Chapter 1, page 5, paragraph four, i.e., "improvements proposed for the Honoapiilani Highway access include...the installation of acceleration and deceleration lanes to accommodate right-turn in, right-turn out..." and in Appendix B, page 8, i.e., "Speed change lanes will be installed...to facilitate right turn movements in and out of the project." Although a zoning condition requires the applicant to provide acceleration and deceleration lanes at the access and AASHTO standards require an acceleration lane, we have agreed to a configuration without an acceleration lane.

HWY-PS 2.0499

Mr. John E. Min
Page 2
OCT 26 2000

3. A roadway access plan, such as the one submitted with the request to relocate the existing access to Honoapiilani Highway, should be included in the application to show the requested access relocation.

4. The proposed driveway would be located on a curve on a sloping segment of Honoapiilani Highway. A sight distance analysis is required and sight distances should be noted on the roadway access plan.

5. We have drainage concerns and recommend that the applicant have its consultants work with the Highways Division Maui District Office to resolve them.

6. The two construction phases of 100 units and 84 units mentioned in Chapter 3, Section C (1) should be shown superimposed on the site plan.

7. Construction plans for all work within the State highway right-of-way must be submitted to our Highways Division for review and approval.

8. All Required improvements must be planned, designed and constructed at no cost to the State.

9. No additional storm water runoff shall be allow in the State highway right-of-way.

If you have any questions, please call Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

BENJAMIN J. CAYETANO
GOVERNOR

FILE COPY

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732

LEADING HAWAII INTO THE NEW MILLENNIUM
1959 2000+

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

December 28, 2000

IN REPLY REFER TO:
HWY-M2.414-00

MEMORANDUM

TO: **Ronald Fukumoto**
Ronald M. Fukumoto Engineering, Inc.

FROM: **Paul M. Chung**
State Highways

SUBJECT: **Napili Villas**
ME 97-45

The following comments are based on our review of the drainage report for the subject project:

1. Not in favor of connecting to the existing 66" culvert.
2. Should Napili Villas connect to the 66" culvert, the State shall not be held liable due to any problems caused by the drainage system or to the system itself.
3. See checkset for additional comments (see enclosed).

If there are any questions or concerns, please call me at 873-3535.

/pmc

'01 JAN 12 P12:52

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
54 South High Street, Room 101
Wailuku, Hawaii 96793-2198

RECEIVED

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

MEMORANDUM

DATE: January 11, 2001

TO: Colleen Suyama, Staff Planner
County of Maui, Planning Department

FROM: Louis Wada, Land Agent *L Wada*
Maui District Land Office

SUBJECT: SM1 2000/0024, TMK: 4-3-003: 110,122 & 123
Napili Villas

The Maui District Land Office of the Department of Land and Natural Resources has no comments on the subject application at this time.

Thank you for allowing us to review the SMA permit application.

C: Maui Board Member
Nick Vaccaro

JAMES "KIMO" APANA
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

RON R. RISKA, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

ANDREW M. HIROSE
Solid Waste Division

January 16, 2001

MEMO TO: JOHN E. MIN, DIRECTOR OF PLANNING

FROM: DAVID GOODE, DIRECTOR OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBJECT: REVISED ENVIRONMENTAL ASSESSMENT
SPECIAL MANAGEMENT AREA PERMIT APPLICATION
NAPILI VILLAS
TMK: (2) 4-3-003:110, 122,123
SM1 2000/0024

'01 JAN 17 A8:30

We reviewed the revised environmental assessment and have the following comments.

1. The Wastewater Reclamation Division cannot insure that wastewater system capacity will be available for this project.

2. The developer is required to fund any necessary off-site improvements to the collection system and wastewater pump stations.

3. The on-site sewer system shall remain private.

4. Pages 26 and 41 incorrectly refer to Appendix B for further information on the sewer system. Appendix B is the drainage report.

5. The Traffic Impact Analysis Update dated August 2000 is acceptable.

6. The submitted preliminary drainage report appears acceptable. A final report based on the final design will be reviewed by the department prior to issuance of a grading permit.

7. Off-street parking, loading spaces, and landscaping shall be provided per Maui County Code, Chapter 19.36.

If you have any questions, please call me at 270-7845.

DG:msc/mt

S:\LUCA\CZM\napilivillas2.wpd

JAN 1 9 2001

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

January 17, 2001

Ms. Gwen Ohashi Hiraga
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Hiraga:

Re: Draft Environmental Assessment (EA) for the 184-Unit Napili Villas and Related Improvements at TMK: 4-3-003:110, 122, and 123, Napili, Maui, Hawaii (EA 2000/0010)

The Maui Planning Department has reviewed the draft EA and has the following comments:

1. The Final EA should include all the agency comments received as well as your responses. These comments should also include the responses obtained relative to the other permits that are being processed concurrently with the EA, in particular, the comments relative to the Special Management Area Use Permit application. As additional responses are received from the agencies, we will transmit a copy to you for inclusion in the report.

2. The description of the proposed action (pp. 1-7) should be amended to include the new inlet catch basin and 24-inch drain line on the east side of the new driveway access on Honoapiilani Highway. From the drainage report, it appears that this system will collect the runoff from the existing 24-inch drainage culvert east of the major 66-inch culvert which collects the runoff from the north side of Honoapiilani Highway.

3. The water quality reports prepared by Hawaii Wildlife Fund should be referenced in the section on Marine Characteristics (pp. 16-19) as Appendix E. The summary of marine resources indicate that "due to the low mixing or flushing rates, the bay would likely be

adversely impacted by additional influx of surface water run-off resulting from new construction mauka of Kahana Sunset Residential Complex." The report's conclusions should be included in the evaluation of Marine Resources (pp. 33-34), in addition to the mitigation measures cited that will reduce such impacts.

4. The information on traffic should be updated to indicate that the acceleration lane for the future right-turn in, right-turn out access has been deleted from the plan with the concurrence of the State Department of Transportation.

5. Under Chapter IV, Section C, West Maui Community Plan, the specific policies, goals, and objectives applicable to the project should be included. Also, under Section D, County Zoning, the conditional zoning of the site should be included.

6. The Assessment Report should also include a summary of the groups and individuals who were consulted regarding the project.

Thank you for your cooperation. If additional clarification is required, please contact Ms. Colleen Suyama, Staff Planner, of this office at 270-7735.

Very truly yours,

John E. Min

JOHN E. MIN
Planning Director

JEM:CMS:cmb
c: Clayton Yoshida, AICP, Deputy Planning Director
Colleen Suyama, Staff Planner
Project File
General File
(K:\WP_DOCS\PLANNING\SM1\00sm124NapiliVillas\ResponsetoDraftEA.wpd)

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

17 January, 2001

Regulatory Branch

Ms. Colleen Suyama, Staff Planner
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Ms. Suyama:

This letter responds to your request for comments on the draft Environmental Assessment for the proposed Napili Villas, Napili, Maui, dated December 18, 2000 (received January 17, 2001). Based on the information contained in the DEA I have determined that a Department of the Army (DA) permit will not be required for this project.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200000265.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Copy furnished:

Ms. Gwen Ohashi Hiraga, Munekiyo & Hiraga, Inc., 305 High Street, Suite 104, Wailuku, Hawaii 96793

JAN 2 3 2001

ISAAC DAVIS HALL

ATTORNEY AT LAW

2087 WELLS STREET

WAILUKU, MAUI, HAWAII 96793

(808) 244-9017

FAX (808) 244-6775

January 22, 2001

Via Facsimile and U.S. Mail
(808) 524-0766

Ms. Kathy Whang Inouye
Executive Vice President
General Services, Inc.
Pauahi Tower, Suite 1570
1001 Bishop Street
Honolulu, Hawaii 96813

Re: Comments on Draft Environmental Assessment for Napili Villas

Dear Kathy Inouye:

This letter is written on behalf of the Kahana Sunset Owners' Association and includes our comments on the Draft Environmental Assessment prepared for the Napili Villas dated December, 2000.

The Napili Villas project had the potential to cause a number of significant adverse impacts, in particular, to the Kahana Sunset and Keonenui Bay, which fronts the Kahana Sunset. It was for this reason that KSOA insisted on the preparation of an Environmental Assessment, at a minimum, for the Napili Villas project.

This State's environmental protection statute, HRS Chapter 343 (HEPA), is largely a procedural law requiring the disclosure of all potential, significant adverse impacts.

For the past several years, KSOA and General Services, Inc. have worked diligently to settle their differences amicably. There are currently two Settlement Agreements which are now in full force and effect. These Settlement Agreements require General Services, Inc. to construct its project in a fashion which actually incorporates mitigation measures to reduce the significant adverse impacts to the Kahana Sunset and to Keonenui Bay to acceptable levels. Because of the legally binding assurances in these two executed agreements, KSOA is able to agree that it would be appropriate to enter a FONSI at this point in time.

The two Settlement Agreements will require monitoring to assure their effectiveness. The parties have not yet agreed upon all of the mitigation measures which must be incorporated into the project in order to reduce impacts to an insignificant level. Nevertheless, the Kahana Sunset is convinced that General Services, Inc. is acting in good faith.

The Kahana Sunset is appreciative that General Services, Inc. has been willing to incorporate legally binding commitments not to allow the water quality in Keonenui Bay to deteriorate further, to limit the amount of runoff discharged through the Kahana Sunset private drainage system and into the ocean and to protect the Kahana Sunset property from flooding. In doing so, General Services, Inc. has agreed upon design, construction and maintenance principles which exceed the requirements of the County of Maui and NPDES permits in order to comply with the mandates of the amended, federal Coastal Zone Management Act and the requisites of the West Maui Community Plan for natural drainageways which will be filled and replaced by underground drainage systems.

Thank you for the opportunity to comment on this Draft Environmental Assessment.

Sincerely yours,

Isaac Hall

IH/sn

cc: Kahana Sunset Owners' Association
Gwen Hiraga
OEQC

ksoa/letinouye8

DRAFT ENVIRONMENTAL ASSESSMENT RESPONSE LETTERS

MUNEKIYO & HIRAGA, INC.

February 2, 2001

David Goode, Director
Department of Public Works and
Waste Management
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Napili Villas, TMK 4-3-003:110, 122 and 123
(EA 2000/0010, SM1 2000/0024)

Dear Mr. Goode:

The Department of Planning has provided us with a copy of your memorandum dated January 16, 2001, commenting on the revised Draft Environmental Assessment. We acknowledge your seven (7) comments and note that with regard to comment 4, we will delete references to Appendix B relative to information on wastewater and also to water, in the Final Environmental Assessment.

We appreciate your review of the revised Draft Environmental Assessment. Should you have any questions or require further information, please do not hesitate to call.

Very truly yours,

Gwen Ohashi Hiraga

Gwen Ohashi Hiraga
Project Manager

GOH:to
cc: John E. Min, Department of Planning
Kathy Inouye, General Services, Inc.
gsi/napiliha/dpwwmltr.001

environment planning

mahinc@aloha.net
305 High Street, Suite 104 · Wailuku, Hawaii 96793 ph: (808)244-2015 · fax: (808)244-8729 · ~~planning@mhinconline.com~~

MUNEKIYO & HIRAGA, INC.

February 2, 2001

John E. Min, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: Napili Villas, TMK 4-3-003:110, 122 and 123 (EA 2000/0010)

Dear Mr. Min:

Thank you for your letter of January 17, 2001, commenting on the Draft Environmental Assessment for the Napili Villas project.

The Final Environmental Assessment will include all agency comments on the Draft Environmental Assessment and the Special Management Area application, as well as our responses. The Final Environmental Assessment will also incorporate the additional information that you have requested.

We appreciate your review of the revised Draft Environmental Assessment. Should you have any questions or require further information, please do not hesitate to call.

Very truly yours,

Gwen Ohashi Hiraga

Gwen Ohashi Hiraga
Project Manager

GOH:to
cc: Kathy Inouye, General Services, Inc.
gsi/napiliha/minltr.001

environment planning
mahinc@aloha.net
305 High Street, Suite 104 · Wailuku, Hawaii 96793 ph: (808)244-2015 · fax: (808)244-8729 · ~~planning@mhinconline.com~~

MUNEKIYO HIRAGA, INC.

February 6, 2001

Robert O. Siarot
Department of Transportation
Highway Division
Attention: Paul M. Chung
650 Palapala Drive
Kahului, Hawaii 96732

Dear Mr. Siarot:

Enclosed is a letter from Ronald M. Fukumoto Engineering, Inc., responding to the comments from Kazu Hayashida to the Department of Planning dated October 26, 2000 and from Paul M. Chung to Ronald Fukumoto dated December 28, 2000.

The comments from the Department of Transportation, as well as the responses from Ronald Fukumoto will be included in the Final Environment Assessment document.

We appreciate your review of the proposed project.

Very truly yours,

Gwen Ohashi Hiraga

Gwen Ohashi Hiraga
Project Manager

GOH:to
Enclosure
cc: John E. Min, Department of Planning (with attachments)
Kathy Inouye, General Services, Inc. (with attachments)
Ronald M. Fukumoto, Ronald M. Fukumoto Engineering, Inc. (with attachments)
gsi/napiliha/dotltr.002

environment

305 High Street, Suite 104 · Wailuku, Hawaii 96793 ph: (808)244-2015 · fax: (808)244-8729 · ~~planning@mhinconline.com~~ mahinc@aloha.net

RONALD M. FUKUMOTO ENGINEERING, INC.
Civil Engineering & Land Surveying Consultants

Ronald M. Fukumoto, PE, LS
Eric H. Yamashige, PE, LS
1721 Wili Pa Loop, Suite 203
Wailuku, Hawaii 96793
Phone: (808) 242-8611
Fax: (808) 244-7510
E-mail: rfe@mauigateway.com

February 5, 2001

Ms. Gwen Ohashi Hiraga, Project Manager
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Hiraga:

Subject: **NAPILI VILLAS**
Special Management Area Use Permit and Draft Environmental Assessment

We are sending you this letter to respond to the comments on the subject permit applications from the State Department of Transportation (DOT). We understand DOT commented on the permit applications with a letter dated October 26, 2000 to Mr. John E. Min, Director, Department of Planning and with a memorandum dated December 28, 2000 to our firm.

We offer the following responses to the items listed in the October 26, 2000 letter.

1. We understand the primary and secondary accesses conform to DOT recommendations.
2. We understand the documents have been corrected to conform to DOT recommendations.
3. Enclosed is a roadway access plan for inclusion in the applications.
4. Our preliminary review indicates adequate sight distances at the proposed driveway. A final sight distance analysis will be submitted with the construction drawings for the project.
5. We have been working with DOT to address the drainage concerns.
6. We have provided a phasing plan to address this comment.
7. We will submit construction drawings for work within the State highway right-of-way to DOT for approval.
8. We understand all required improvements will be planned, designed, and constructed at no cost to the State.
9. Our drainage plan provides for no additional storm water runoff to enter the State highway right-of-way.

We have addressed the comments noted in the December 28, 2000 memorandum and will be working with DOT for the approval of the construction drawings.

Thank you for allowing us to provide these responses.

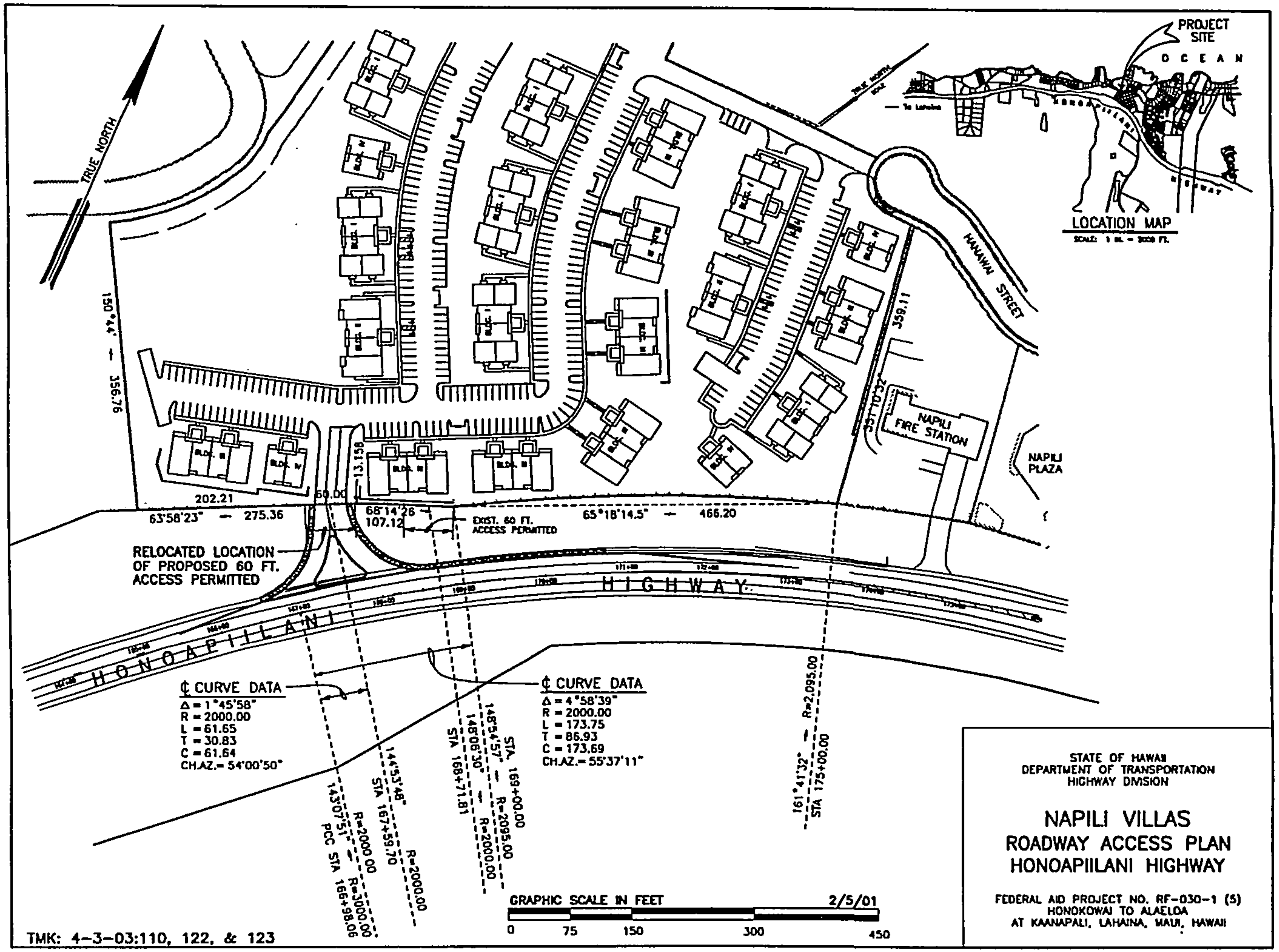
Sincerely,

Ronald M. Fukumoto

Ronald M. Fukumoto, PE, LS
President

Enclosure

GSI01


PROJECT SITE
OCEAN
LOCATION MAP
TRUE NORTH
HANAWAI STREET
NAPILI FIRE STATION
NAPILI PLAZA
359.11
351°10'32"
150°44' — 356.76
202.21
63°58'23" — 275.36
60.00
13.158
68°14'26"
107.12
EXIST. 60 FT. ACCESS PERMITTED
65°18'14.5" — 466.20
RELOCATED LOCATION OF PROPOSED 60 FT. ACCESS PERMITTED
HONOAPIILANI HIGHWAY
℄ CURVE DATA
Δ = 1°45'58"
R = 2000.00
L = 61.65
T = 30.83
C = 61.64
CH.AZ.= 54°00'50"
℄ CURVE DATA
Δ = 4°58'39"
R = 2000.00
L = 173.75
T = 86.93
C = 173.69
CH.AZ.= 55°37'11"
143°07'51" — R=3000.00
PCC STA 166+98.06
R=2000.00
144°53'48"
STA 167+59.70
R=2000.00
148°06'30" — R=2000.00
STA 168+71.81
STA. 169+00.00
148°54'57" — R=2095.00
161°41'32" — R=2,095.00
STA 175+00.00
GRAPHIC SCALE IN FEET
0 75 150 300 450
2/5/01
TMK: 4-3-03:110, 122, & 123
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
NAPILI VILLAS
ROADWAY ACCESS PLAN
HONOAPIILANI HIGHWAY
FEDERAL AID PROJECT NO. RF-030-1 (5)
HONOKOWAI TO ALAELOA
AT KAANAPALI, LAHAINA, MAUI, HAWAII

References

References

Community Resources, Inc., Maui County Community Plan Update Program Socio-Economic Forecast Report, January 1994.

County of Maui, Budget Details for Fiscal Year 1991, 1990.

County of Maui, Departments of Planning and Water Supply, Technical Report and Water Use Development Plan, March 1990.

County of Maui, West Maui Community Plan, February 1996.

Department of Geography, University of Hawaii, Atlas of Hawaii, Second Edition, 1983.

First Hawaiian Bank, Research Department, Supplement to Economic Indicators, July/August 1992.

Locations, Inc. Research and Consulting Division, and SMS Research and Marketing Services, Inc., Hawaii Housing Policy Study Update 1997, November 1997.

Maui County Data Book, 1999.

Munekiyo, Arakawa & Hiraga, Inc., Application for Change in Zoning - Wainee Office Building, December 1998.

Munekiyo, Arakawa & Hiraga, Inc., Application for Special Management Area Permit and Shoreline Setback Variance, Hyatt Regency Maui Spa and Fitness Facility, September 1998.

Munekiyo, Arakawa & Hiraga, Inc., Draft Environmental Assessment, Five-Lot Subdivision, Kaanapali (TMK 4-4-08:16), July 2000.

Munekiyo, Arakawa & Hiraga, Inc., Draft Environmental Assessment, Napilihau Villages, December 1997.

Munekiyo, Arakawa & Hiraga, Inc., Final Environmental Assessment - Honoapiilani Highway Widening (Kaanapali Parkway to Honokowai Stream), April 1998.

Munekiyo, Arakawa & Hiraga, Inc., Final Environmental Assessment - Hyatt Regency Maui Spa and Fitness Facility, December 1998.

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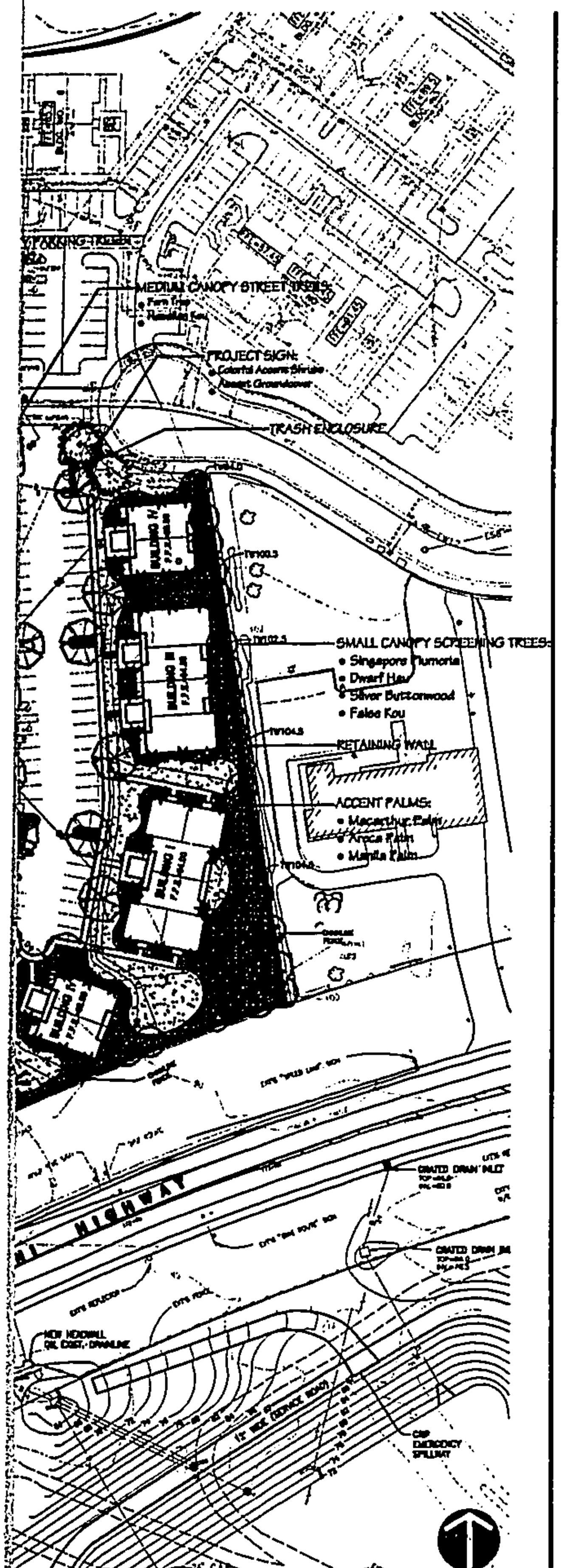
Appendix A

Preliminary Site, Landscape and Development Plans

RETAINING WALL
With Fence
ACCENT SHRUBS:
• Croton
• Spider Lily
• Tiare
• Hibrid Hibiscus
• Eldorado
LOWER HONOAPIILANI ROAD
TALL SINGLE TRUNK PALMS:
• Coconut Palm
• Joannie Palm
BROAD CANOPY TREES:
• Monkeypod
COMMON BERMUDA LAWN GRASS
GROUNDCOVER:
• Wedelia
PERIMETER SCREENING HEDGE:
• Hibiscus
• Eldorado
• Privet
MEDIUM CANOPY TREES:
• Coral Tree
• Crape Myrtle
MEDIUM CANOPY PARKING TREES:
• Hong Kong Orchid
• Autograph Tree
ENTRY FEATURE:
• Signage Wall
• Colorful Accent Shrubs
• Accent Groundcover
HONOAPIILANI HIGHWAY
FIRE TRUCK TURNAROUND

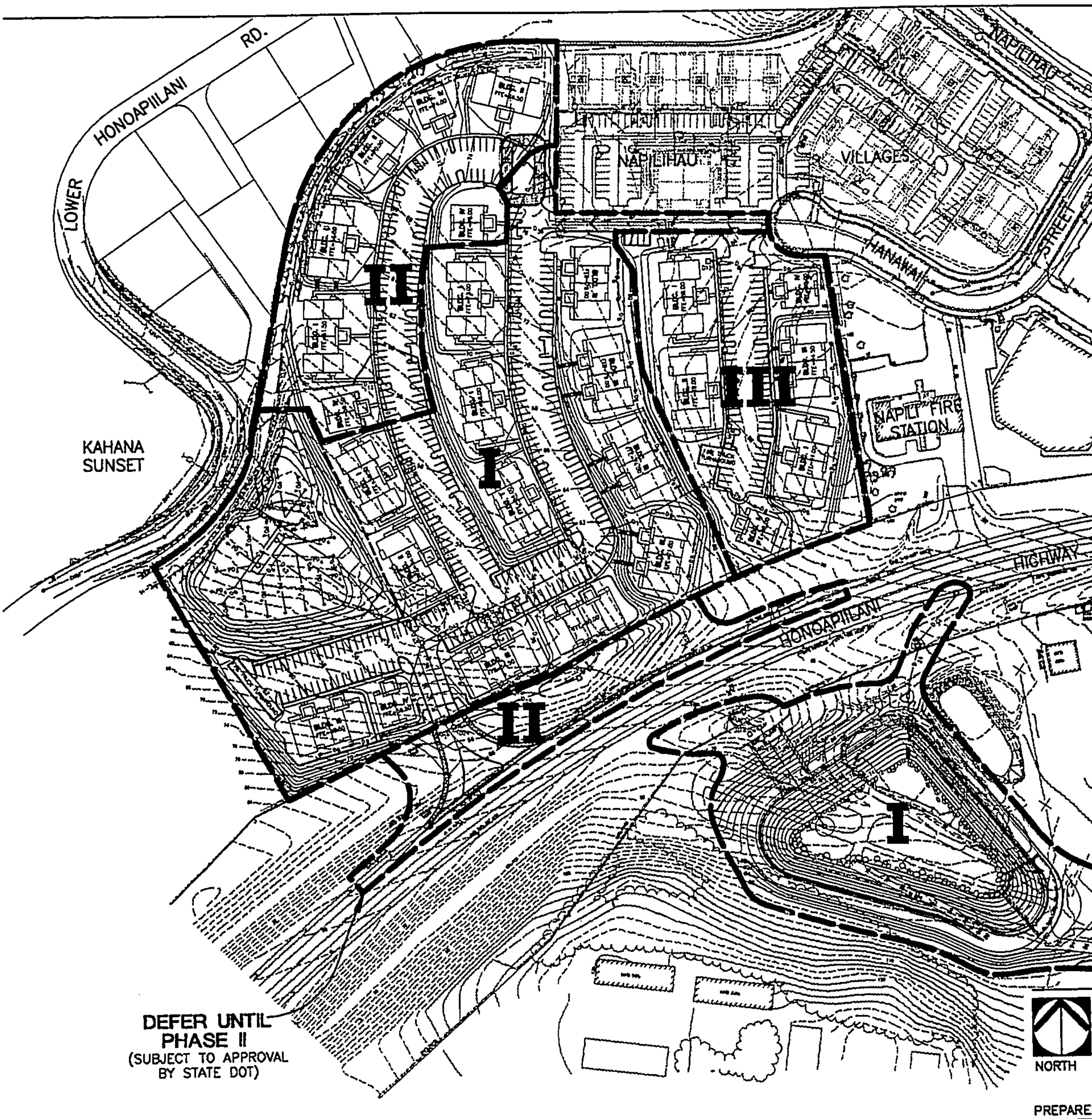


NAPILI VILLAS

LANDSCAPE CONCEPT PLAN

SCALE: 1"-40' DECEMBER 1, 2000

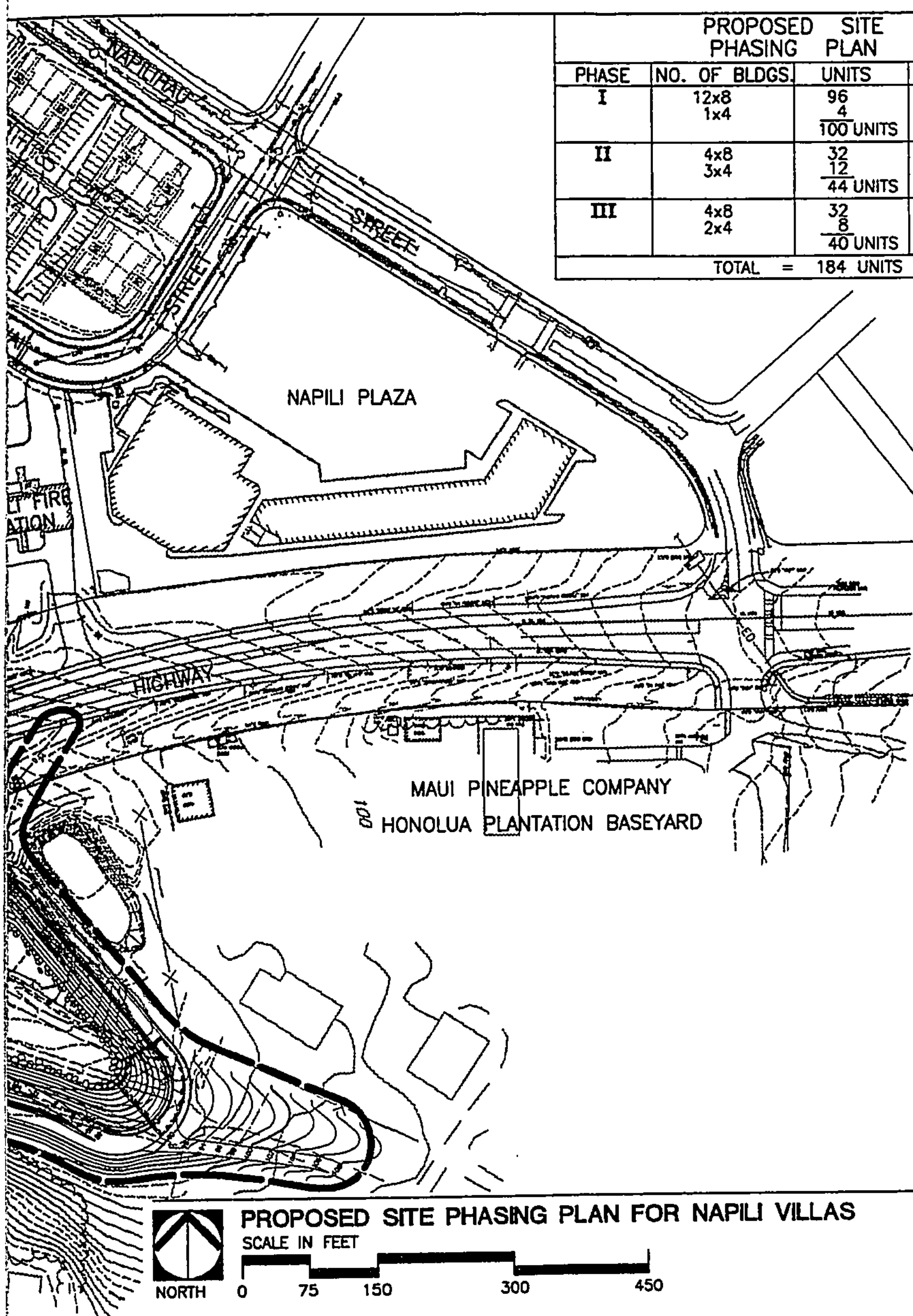
PREPARED BY: BROWNLIE & LEE
201 Merchant Street Suite 1930
Honolulu, Hawaii 96813



LOWER HONOAPIILANI RD.
KAHANA SUNSET
NAPILIHAU
VILLAGES
HANAWAI
STREET
NAPILI FIRE STATION
HONOAPIILANI HIGHWAY
I
II
III
DEFER UNTIL PHASE II (SUBJECT TO APPROVAL BY STATE DOT)
NORTH
PREPARE

PROPOSED SITE PHASING PLAN

PHASE	NO. OF BLDGS.	UNITS	PRKG REQ'D.
I	12x8 1x4	96 4 100 UNITS	200 STALLS
II	4x8 3x4	32 12 44 UNITS	88 STALLS
III	4x8 2x4	32 8 40 UNITS	80 STALLS
	TOTAL =	184 UNITS	



PROPOSED SITE PHASING PLAN FOR NAPILI VILLAS

NORTH

SCALE IN FEET: 0 75 150 300 450

DATE: 1/24/01

RFE

PREPARED FOR: GENERAL SERVICES, INC.

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

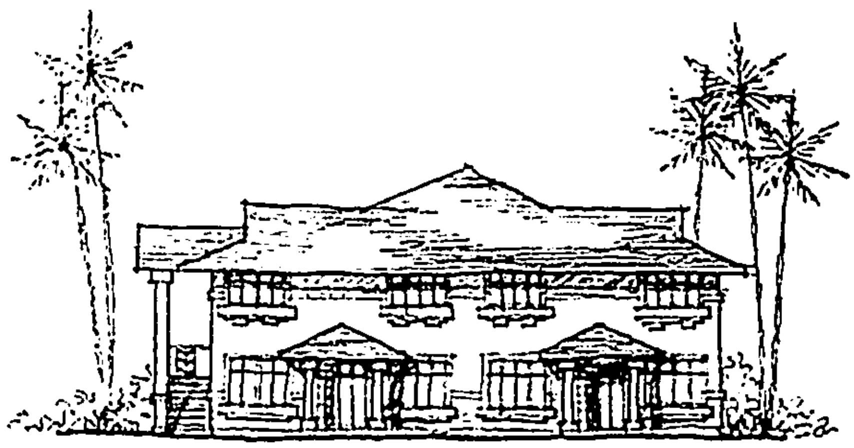
Front Elevation

Rear Elevation

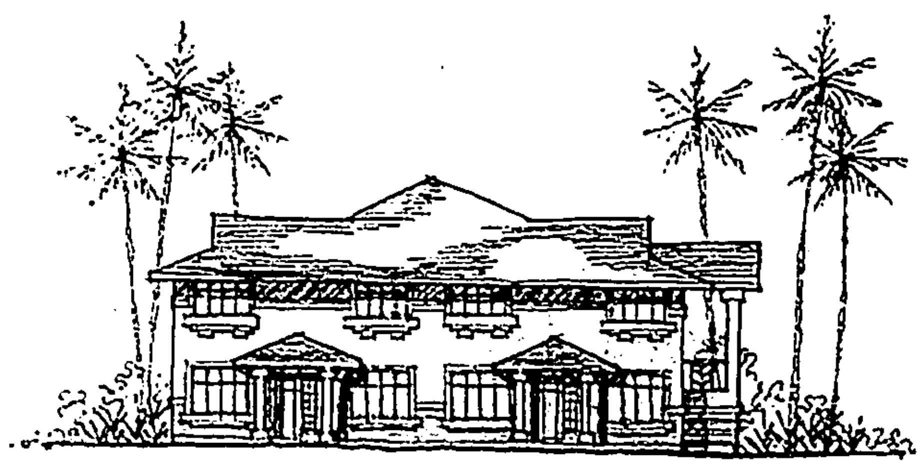
CONCEPTUAL ELEVATIONS

Napili Villas

NAPILI, MAUI, HAWAII



Right Elevation



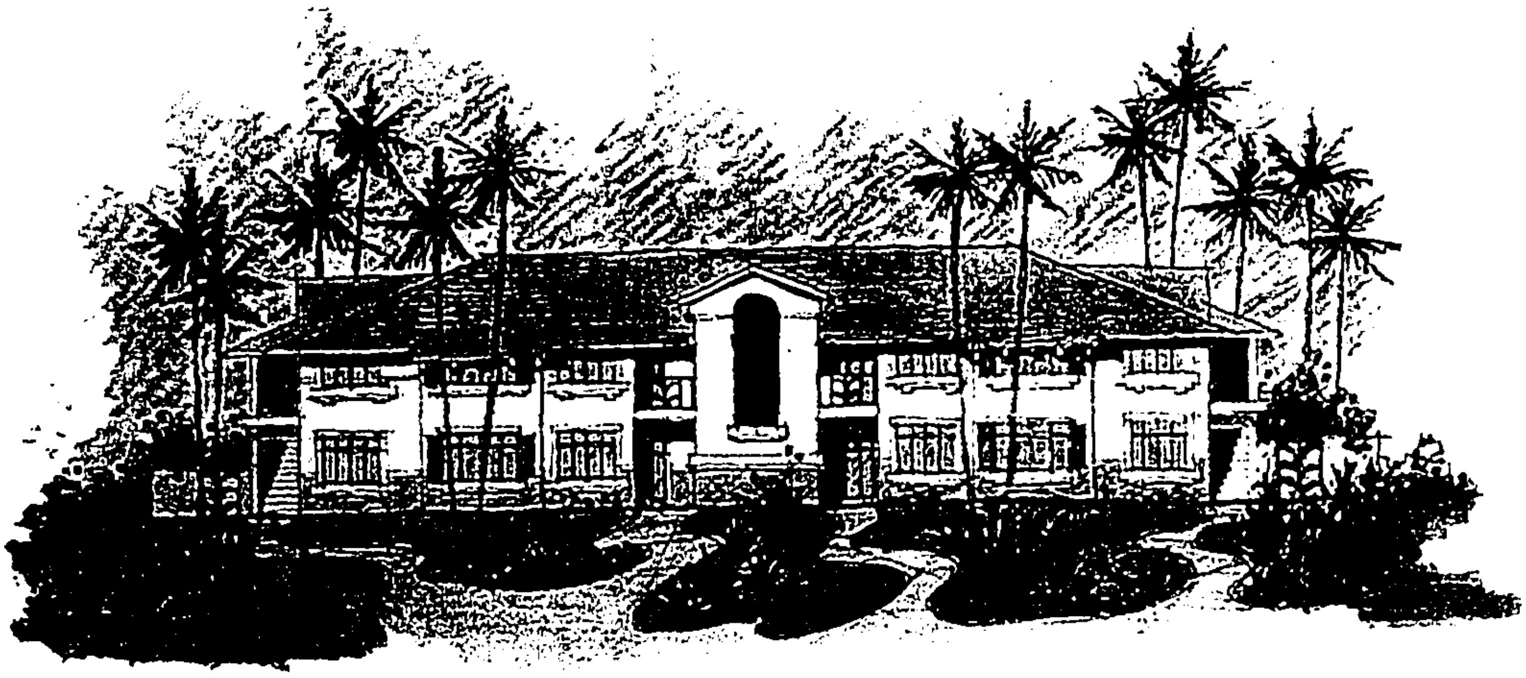
Left Elevation

ELEVATIONS

Villas

I, HAWAII

Building Type I



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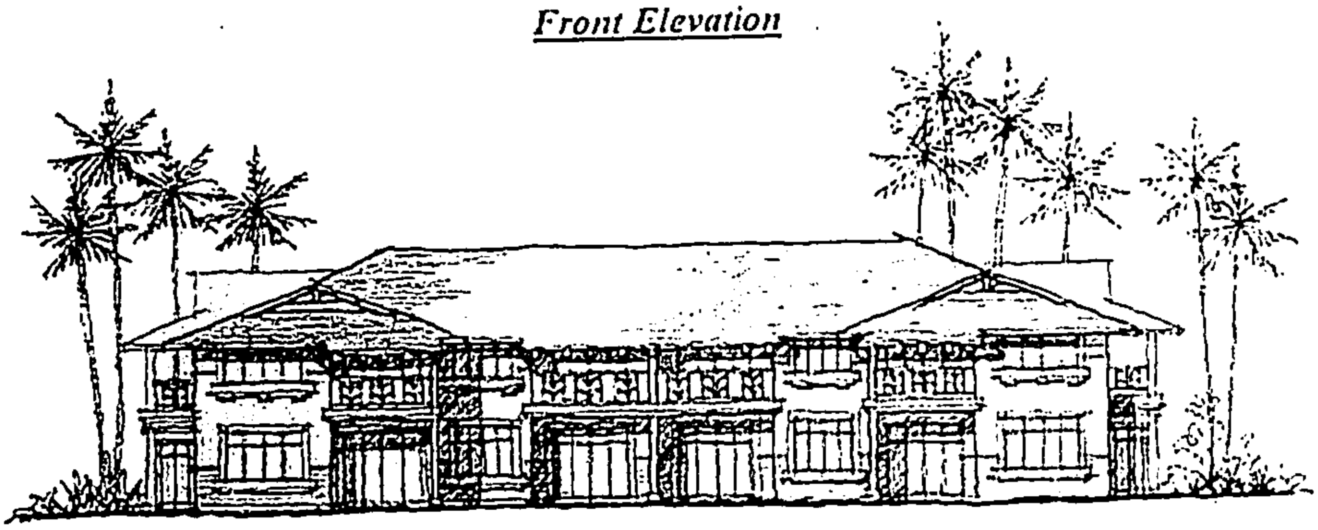
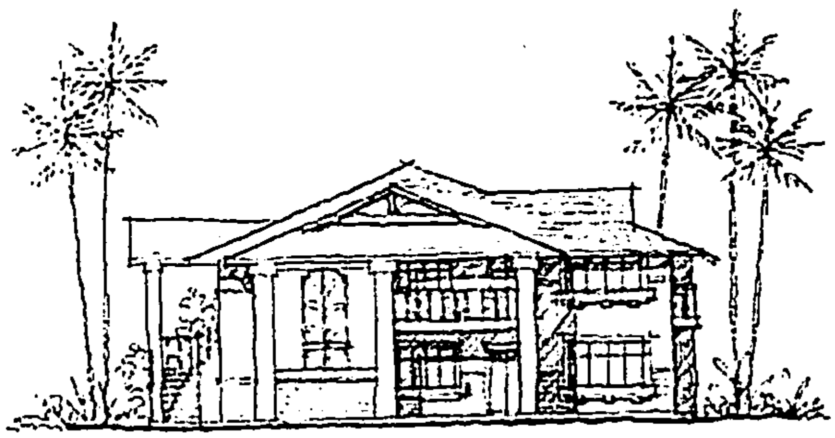


Rear Elevation

CONCEPTUAL ELEVATIONS

Napili Villas

NAPILI, MAUI, HAWAII



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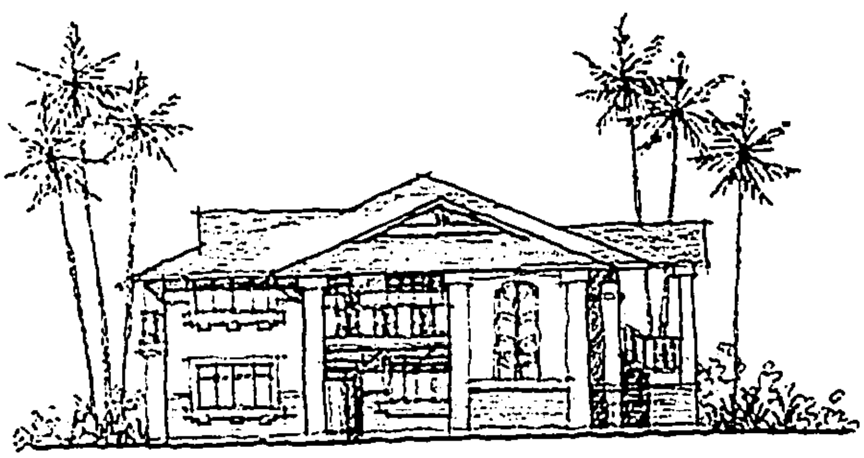


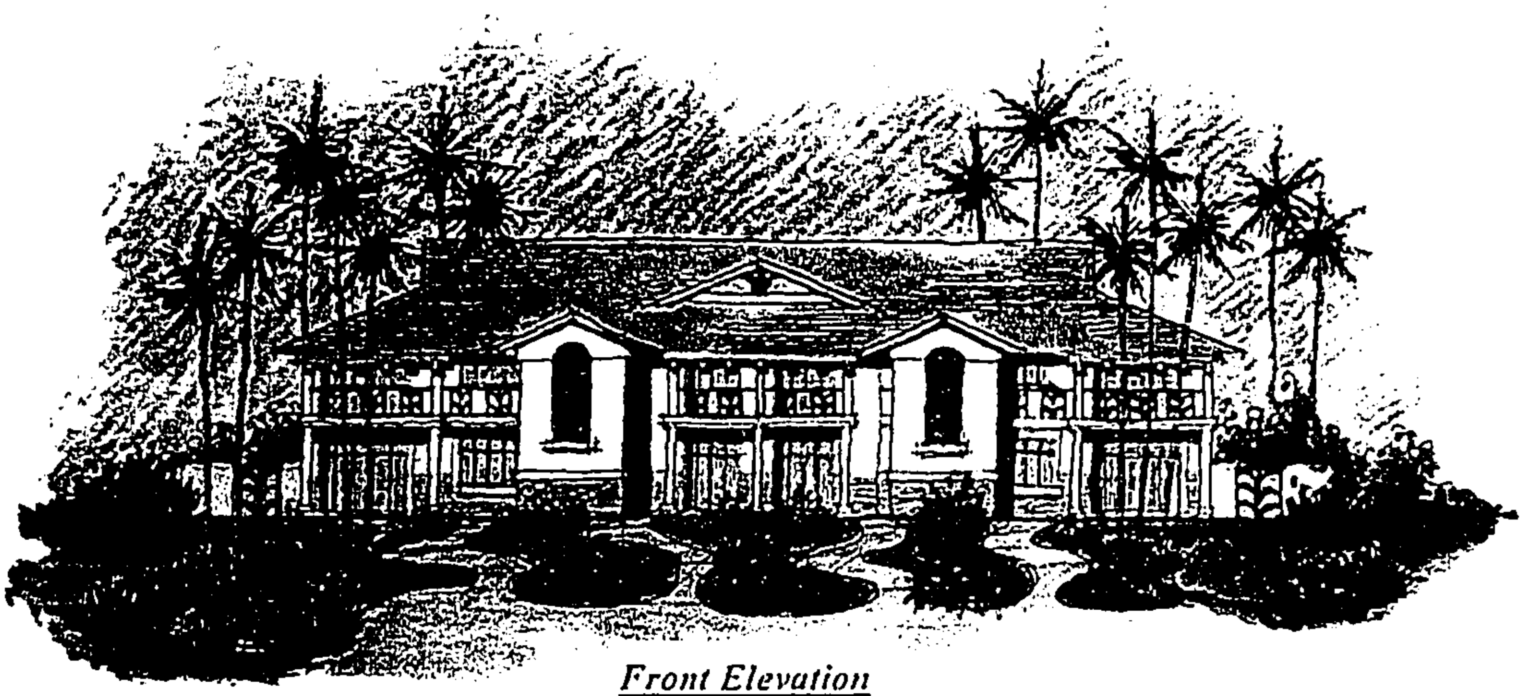
Left Elevation

ELEVATIONS

Villas

I, HAWAII

Building Type II



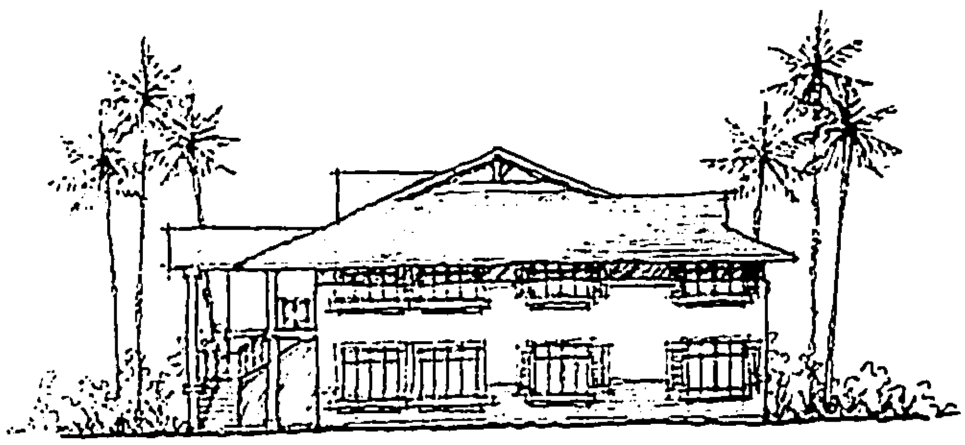
Front Elevation

Rear Elevation

CONCEPTUAL ELEVATIONS

Napili Villas

NAPILI, MAUI, HAWAII



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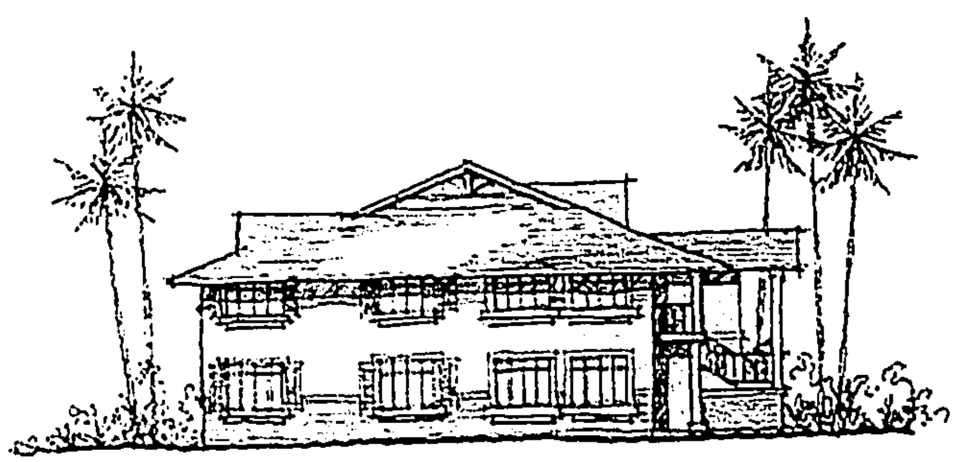


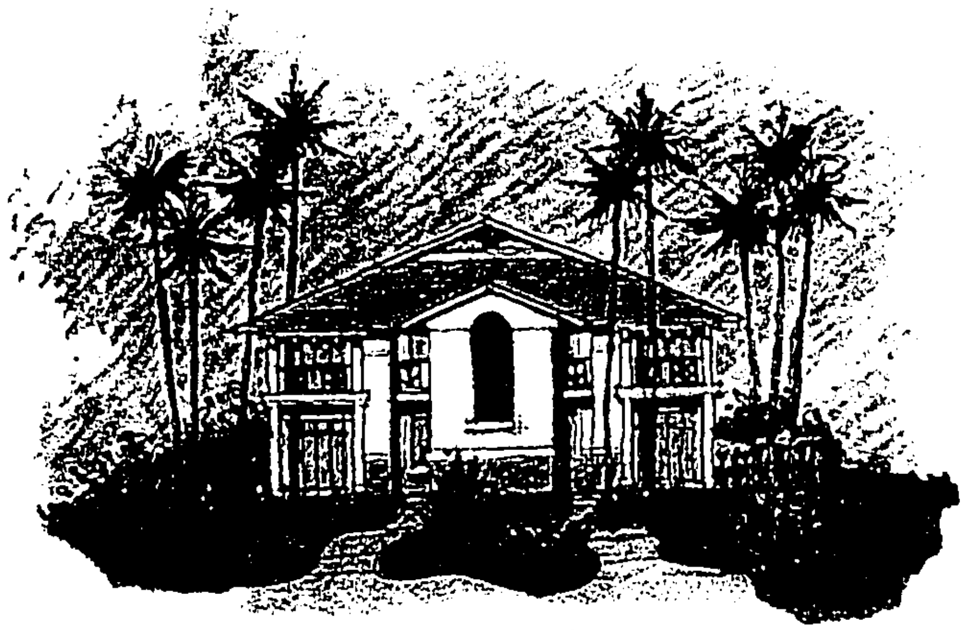
Left Elevation

ELEVATIONS

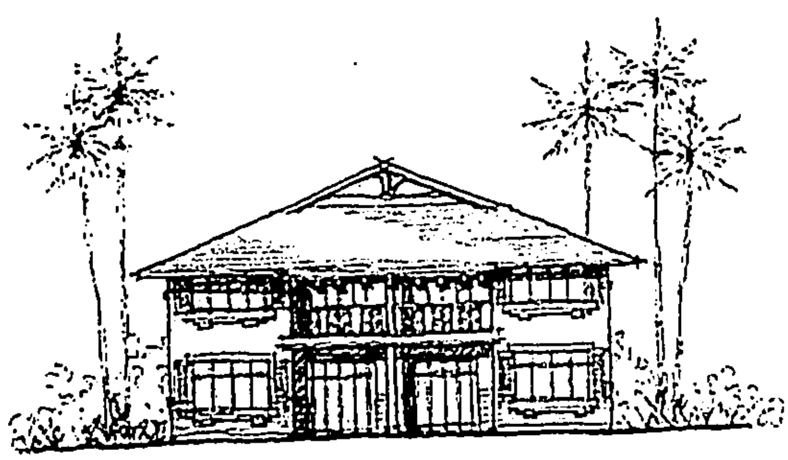
Villas

II, HAWAII

Building Type III



Front Elevation



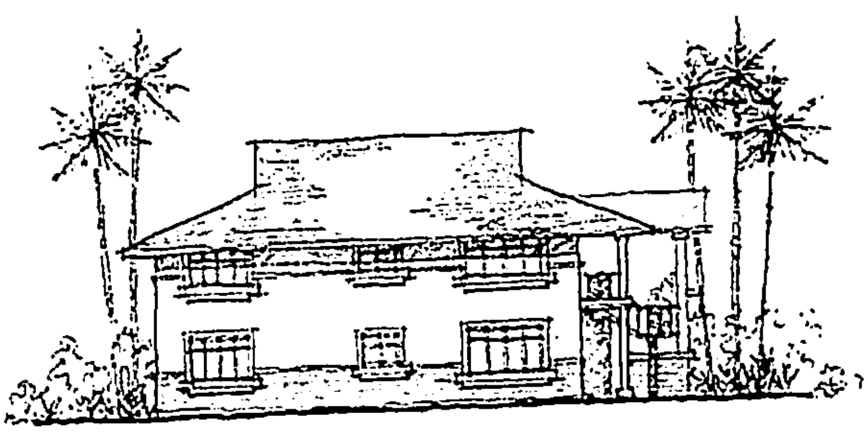
Rear Elevation

CONCEPTUAL ELEVATIONS

Napili Villas

NAPILI, MAUI, HAWAII

Right Elevation



Left Elevation

ELEVATIONS

Villas

UI, HAWAII

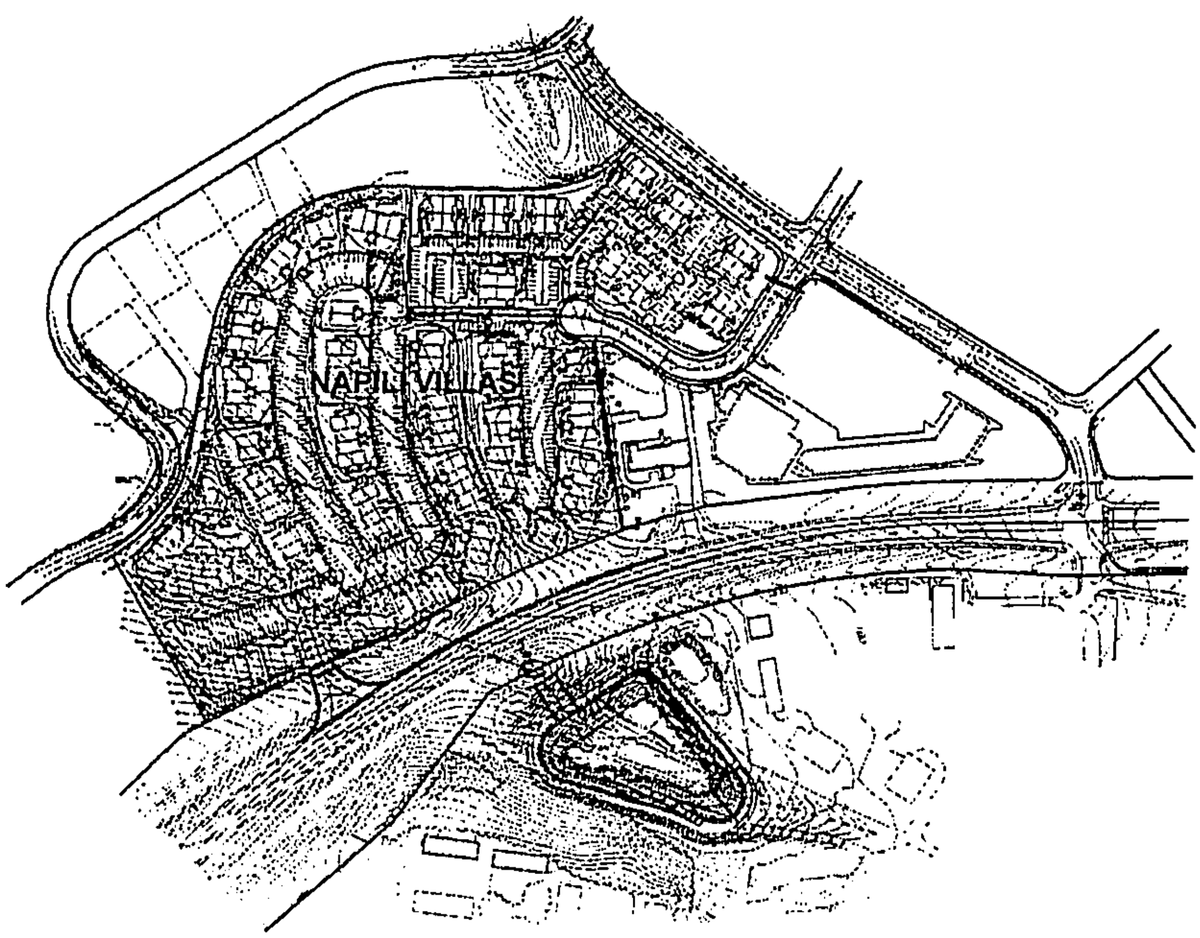
Building Type IV

Appendix B

Preliminary Drainage Report

PRELIMINARY DRAINAGE REPORT
For Napili Villas

Lahaina, Maui, Hawaii
Tax Map Key (2) 4-3-03: 110, 122 & 123



Project:

Napili Villas
Lahaina, Maui, Hawaii

Date:

December 4, 2000

Client:

General Services, Inc.
1001 Bishop Street, Suite 1570
Honolulu, Hawaii 96813
Phone: (808) 535-2130
Fax: (808) 524-0766

Consultant:

Ronald M. Fukumoto Engineering, Inc.
1721 Wili Pa Loop, Suite 203
Wailuku, Hawaii 96793
Phone: (808) 242-8611
Fax: (808) 244-7510
E-Mail: rfe@mauigateway.com

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- B. Soil 2
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Appendix

- Preliminary Drainage Computations A-1

I. PURPOSE

The purpose of this report is to comply with requirements for submittal of a preliminary drainage plan for a County of Maui Special Management Area Permit and submittal of an environmental assessment for the use of State lands within the existing Honoapiilani Highway right-of-way.

This report will describe existing drainage conditions, provide preliminary grading and drainage plans, and provide drainage design information for incorporation into the final designs.

II. PROJECT DESCRIPTION

A. *General Location*

The project involves development of Napili Villas, a 184-unit condominium complex, at Napili, Lahaina, Maui. The site encompasses an area of 13.215 acres at the westerly end of Hanawai Street. Single family residences and the Napilihau Villages condominiums lie to the north of the site. The Napili Fire Station and Hanawai Street adjoin the easterly side of the site. An 850-foot segment of Honoapiilani Highway borders the southeasterly side of the site, and an undeveloped parcel and Lower Honoapiilani Road adjoin the westerly side of the site. Other developed properties in the area include the Napili Plaza shopping center along Hanawai Street and Napilihau Street, the Maui Pineapple Company Honolua Plantation Baseyard on the mauka side of Honoapiilani Highway, and the Kahana Sunset condominiums on the makai side of Lower Honoapiilani Road. (See Figure 1 - Location Map (USGS Map), page 10.)

The site consists of three separate tax map parcels. The tax map designates these parcels as TMK (2) 4-3-03: 110, 122, and 123. (See Figure 2 - Vicinity Map (Tax Map), page 11.)

B. Project Components

The project includes 20 two-story, eight-unit buildings; six two-story, four-unit buildings; and related on-site and off-site improvements. A tentative phasing plan calls for 100 units in the first phase, 44 units in the second phase, and 40 units in the third phase.

Site improvements include building pad grading, asphaltic concrete parking areas and driveways, concrete sidewalks, landscape plantings, and site utilities. Site utilities consist of water, wastewater, drainage, electrical and telephone, and irrigation systems. Honoapiilani Highway improvements consist of grading, paving, and drainage system work for a new driveway connection to the site. In addition, the project includes special on-site and off-site provisions for handling drainage.

III. DRAINAGE

A. Topography

The topographic maps show existing ground contours and improvements of the on-site areas. (See Figure 5 - Topographic Map - North, Figure 6 - Topographic Map - South, pages 14 and 15.)

The Napili Villas site is primarily undeveloped land, except for a paved driveway and a temporary retention basin at the northeasterly corner of the site. The paved driveway and the basin serve the existing Napilihau Villages project. The paved driveway will also serve the Napili Villas project as its main entry point from Hanawai Street. The ground rises from a low point at elevation 30 feet (above mean sea level) at an existing 24-inch culvert at Lower Honoapiilani Road to a high point at elevation 105 feet next to the Napili Fire Station. The slope between the low and high point averages about 9.5 percent. Overall ground slopes range from about 3 percent to about 13 percent, with an average slope of about 9 percent.

Runoff generally flows toward a gully that divides the southwesterly portion of the site. The runoff then runs through the gully in a northwesterly direction towards the existing 24-inch culvert at Lower Honoapiilani Road. This gully also carries off-site flows that enter the site through an existing 66-inch culvert at Honoapiilani Highway.

The topographic maps also show the condition of the off-site areas. The area to be developed as a detention/retention basin is within a sump area near the inlet of the 66-inch culvert. Improvements in the area include two retention basins and remnants of an old pineapple field. The land slopes toward the inlet area at about 6 to 10 percent.

B. Soil

According to the *Soil Survey* prepared by the Soil Conservation Service, the soils on the site consists of Kahana series soil. The Kahana series consists of well-drained soils usually located on uplands. The survey characterizes the soil as having a dark reddish-brown silty clay surface layer approximately 14 inches thick, moderately rapid permeability, slow to medium runoff, and slight to moderate erosion hazard. (See Figure 3 - Soil Map, page 12.)

C. Flood and Tsunami Hazard

The flood insurance rate map of the area shows there are no flood hazard areas on the site. The flood insurance rate map designates the site as Zone C, an area subject to minimal flooding. (See Figure 4 - Flood Insurance Rate Map, page 13.)

D. Existing Drainage Improvements

The Napili Villas site is part of a drainage area that begins at a point about 3,400 feet mauka of the site. From this upper limit, the drainage area extends about 4,400 feet to the ocean. The entire drainage area encompasses an area of about 90 acres. The 13.215-acre Napili Villas site comprises about 15 percent of the total area. (See Figure 7 - Drainage Area Map, page 16 and Figure 8 - Existing Drainage Plan, page 17.)

Three major areas are shown on the drainage area map. Area No. 1 encompasses 6.1 acres and includes the Kahana Sunset site, Lower Honoapiilani Road, and adjoining residences. Area No. 2 includes an area of 18.1 acres. In addition to the 13.215-acre Napili Villas site, this area includes portions of the Napilihau Villages project, the Napili Fire Station, a portion of the undeveloped parcel on the westerly side of the site, and the grassed shoulder area along the Honoapiilani Highway. Area No. 3 encompasses 66.1 acres on the mauka side of the highway. This area includes pineapple fields, the Maui Pineapple Company Honolua Plantation Baseyard, and portions of the Ironwood Ranch (formerly known as the Rainbow Ranch Riding Stables).

Drainage improvements have been built throughout this drainage area. The following are descriptions of existing drainage improvements beginning at the upper end of the drainage basin and moving downstream to the ocean. Existing drainage improvements include pineapple field diversions, sediment basins, a culvert at Honoapiilani Highway, portions of the Napilihau Villages drainage system, a culvert at Lower Honoapiilani Road, and the drainage system through the Kahana Sunset site.

The pineapple fields within the drainage area contain diversions that collect and channel runoff to adequate points of disposal. The Natural Resources Conservation Service (NRCS), a branch of the United States Department of Agriculture, designs these diversions and assists agricultural businesses such as Maui Pineapple Company to implement these measures. NRCS designs these diversions to handle runoff due to a 10-year, 24-hour storm. NRCS also assists local governments to implement flood and sedimentation control measures. An example of a major NRCS project is the sedimentation basin within Kaopala Gulch. The Kaopala sedimentation basin is shown on the drainage area map. One of the goals of the agency is to improve ocean water quality by encouraging agricultural operators to construct diversions to take runoff to major drainageways equipped with such sedimentation basins. As shown on the drainage area map, Maui Pineapple Company has implemented measures to divert some of the runoff from its fields to Kaopala Gulch.

In addition to the diversions, Maui Pineapple Company has constructed two sedimentation basins on the mauka side of Honoapiilani Highway. The basins are located about 200 feet upstream of the 66-inch culvert at the highway. The basins receive runoff from portions of the fields and from their baseyard. Approximate volumes of these basins are 1.2 acre-feet for the upper basin and 0.6 acre-feet for the lower basin.

Immediately downstream of the sediment basins is a 66-inch culvert at Honoapiilani Highway. The culvert receives runoff from the 66.1-acre drainage area shown on the drainage area map and passes the runoff under the highway and into the Napili Villas site. The State of Hawaii, Department of Transportation, Highways Division designed this culvert to handle a 50-year storm flow of 242 cubic feet per second (cfs). In addition to the 66-inch culvert, the highway has an internal system that handles runoff produced within the highway. The internal system consists of concrete gutters, drain inlets, and 24-inch drainlines. The drain inlets collect runoff from the gutters and the drainlines carry the runoff to the bottom of embankment areas to prevent erosion of these areas.

As shown on the drainage area map, the on-site Area 2 includes a portion of the adjoining developed areas. Portions of the Napili Fire Station and the Napilihau Villages condominium project drain into the site. Runoff from the fire station sheet flows towards Hanawai Street and towards the highway. Approximately one acre of the Napilihau Villages project also drains into the site. Drainage improvements within this area include grated inlets, catch basins, manholes, and drainlines. A temporary retention basin on the site collects the runoff from this area.

About 450 feet downstream of the 66-inch culvert is a 24-inch culvert at Lower Honoapiilani Road. This culvert receives runoff from about 84 acres and passes the runoff under the road and into the Kahana sunset site. Lower Honoapiilani Road and an old railroad embankment on the Napili Villas site form a sump at the upstream end of the culvert. (See Figure 5 - Topographic Map - North, page 14.)

The Kahana Sunset drainage system is at the lower end of the drainage area. The drainage system receives runoff from the upstream areas, passes it through the site, and discharges the runoff into the ocean. The drainage system includes drainlines and manholes that convey the upstream runoff to an on-site dry well with an overflow line to the ocean.

E. Proposed Drainage Improvements

The following criteria will be used to design the drainage system for the project. These requirements are part of a settlement agreement between the Kahana Sunset Owners Association and the developer of the Napili Villas project. Some of these requirements exceed current County of Maui drainage standards.

- Keep the existing 24-inch culvert at Lower Honoapiilani Highway between Napili Villas project and Kahana Sunset.
- Limit storm flows from on-site and off-site sources into the existing 24-inch culvert at Lower Honoapiilani Road to 44 cubic feet per second.
- Maintain pre-development peak discharge rate and pre-development runoff volume for a 2-year, 24-hour storm.

- Provide a replacement of the natural filtering function of the existing vegetated on-site area.
- Design the new system to prevent decreasing the water quality in Keonenui Bay.
- Design the new system to prevent additional threat of flooding to Kahana Sunset that is now experienced by Kahana Sunset.
- Replace runoff storage volumes of existing natural or man-made basins displaced by the development.
- Do not connect the existing Maui Pineapple Company basin to the new drainage system without acceptable best management practices.
- Set the height of the retention portion of the off-site D/R basin to allow runoff to remain in the basin for a period of approximately one to two weeks.
- Provide a least one foot of additional depth in the off-site D/R basin to allow for the accumulation of sediment and debris.

Drainage design will be based on the Soil Conservation Service (SCS) method described in *Urban Hydrology for Small Watersheds*, Technical Release 55. The SCS, a branch of the United States Department of Agriculture, is now known as the Natural Resources Conservation Service (NRCS). This method is commonly referred to as TR-55 and is accepted by government agencies for drainage design. TR-55 incorporates procedures for computing storm runoff volumes, peak rates of discharge, hydrographs, and storage volumes.

Drainage improvements that involve transmission of storm flows will conform to the "Rules for the Design of Storm Drainage Facilities in the County of Maui." The rules will be applied to the sizing and spacing of inlets and manholes, and sizing of drainlines, channels, and culverts. Based on the County rules, the drainage system will be designed to handle a storm with a recurrence interval of 50 years since the drainage area is less than 100 acres. This recurrence interval is consistent with the State's design of the 66-inch culvert at Honoapiilani Highway.

The following is a summary of hydrologic design data.

Item	On-Site - Present	On-Site - Developed
Drainage Area	18.1 acres	18.1 acres
2-year, 24-hour Rainfall	4.4 inches	4.4 inches
2-year, 24-hour Runoff	0.51 inches	1.97 inches
2-year, 24-hour Volume	0.77 acre-feet	2.97 acre-feet
2-year, 24-hour Peak Flow	1 cfs	16 cfs
50-year, 24-hour Rainfall	10.0 inches	10.0 inches
50-year, 24-hour Runoff	3.69 inches	6.88 inches
50-year, 24-hour Peak Flow	28 cfs	60 cfs

Item	Off-Site - Present
Drainage Area	63.0 acres (adjusted due to diversions)
2-year, 24-hour Rainfall	5.0 inches
2-year, 24-hour Runoff	1.37 inches
2-year, 24-hour Volume	7.19 acre-feet
2-year, 24-hour Peak Flow	30 cfs
50-year, 24-hour Rainfall	11.7 inches
50-year, 24-hour Runoff	6.46 inches
50-year, 24-hour Peak Flow	192 cfs

The attached Preliminary Grading Plans and Preliminary Drainage Plans show the proposed grading and drainage improvements. (See Figure 9 - Preliminary Grading Plan - North, Figure 10 - Preliminary Grading Plan - South, Figure 11 - Preliminary Drainage Plan - North, and Figure 12 - Preliminary Drainage Plan - South, pages 18 through 21.)

Proposed drainage improvements consist of two separate D/R basin systems to control on-site and off-site flows. Both systems will function similarly by collecting runoff, retaining a portion of it, and regulating the outflow from the basin.

The attached schematic sectional view of the D/R basins shows the typical operational stages of the basins. (See Figure 13 - D/R Basin Schematic Sections, page 22.) As noted on the schematic, the on-site system will collect runoff and discharge the runoff into a subsurface perforated drain. The perforated drain allows infiltration into the surrounding soil, but at a relatively slow rate compared to the rate of runoff produced during storms. During storms, the perforated pipe will fill and the accumulated runoff will spill over onto the ground surface through the grated openings at ground level. As the storm continues, the D/R basin will continue to fill until the accumulated runoff reaches the top of the flow control inlet. Runoff will then enter the flow control inlet and flow out of the basin through the existing 24-inch culvert. During the 50-year design storm, the water level in the basin will continue to rise, eventually reaching its maximum level, and will start to drop as the storm subsides. As the storm subsides, stored runoff will continue to enter the existing 24-inch culvert until it drops below the top of the flow control inlet. At that point, the outflow stops and the accumulated runoff is retained in the basin. The basin retains 2.2 acre-feet of runoff, the required increase in the 2-year, 24-hour storm volume due to development.

As a drainage best management practice, the accumulated runoff will eventually dissipate by infiltration into the ground surface and the perforated pipe. Since the D/R basin functions as a park, the perforated pipe will be sized to allow the maximum retained runoff to infiltrate within one to two days. As shown on the preliminary drainage plan, an underdrain system consisting of small diameter perforated pipes will also aid in removing excess moisture from the ground surface.

The off-site system will function in a similar manner, however, because of the poor quality of the incoming runoff, the basin's larger size, and its location, the following additional drainage best management practices will be incorporated into its design.

Runoff from the pineapple fields will contain sediment and suspended soils. Additional depth will therefore be set aside to allow for the accumulation of sediment and suspended solids.

Retention volume to offset the loss of one of the existing retention basins will be provided. In addition, more retention volume to allow the retained runoff to infiltrate into the ground over a one to two week period will be provided.

The off-site D/R basin will also collect runoff that would usually by-pass the site. As shown on the preliminary drainage plan, runoff from portions of Honoapiilani Highway will be collected at two grated drain inlets within the highway right-of-way to allow the D/R basin to regulate these flows. To allow for additional flow control, the inlet and outlet of the existing 66-inch will be converted to a closed system. An inlet located at the sump area at the bottom of the new embankment will receive highway runoff and regulate the outflow to the existing 24-inch culvert at Lower Honoapiilani Road. Allowing runoff to flow into the grassed sump area before entering the inlet is another example of a drainage best management practice. These provisions will allow for a complete regulation of the flows entering the existing 24-inch culvert. The controlled flows include 10 cfs from the on-site D/R basin, 32 cfs from the off-site D/R basin, and 2 cfs from the inlet at the bottom of the new embankment. The total flow of 44 cfs into the existing 24-inch culvert at Lower Honoapiilani Road conforms to one of the requirements of the settlement agreement.

An emergency spillway has been provided to protect the structural integrity of the D/R basin's embankment. Flows through the emergency spillway would be directed at the sump area at the bottom of the new embankment. The spillway runoff would accumulate in the sump, eventually fill the sump, and overflow slowly onto the highway.

The following is a summary of preliminary design data for the D/R basins. These figures are subject to adjustment as the designs are further refined.

Item	On-Site	Off-Site
Spillway Elevation	50.0 feet	87.0 feet
Bottom Elevation	44.0 feet	72.0 feet
Depth	6.0 feet	15.0 feet
Top Surface Area	40,200 square feet	62,300 square feet
Bottom Surface Area	24,800 square feet	28,200 square feet
Detention Volume	4.4 acre-feet	14.2 acre-feet
Retention Volume	2.2 acre-feet	1.5 acre-feet
Sediment Storage Volume	0.0 acre-feet	0.7 acre-feet
Total Volume	4.4 acre-feet	15.2 acre-feet
Flow Rate In	60 cfs	192 cfs
Flow Rate Out	10 cfs	32 cfs (from basin)
		+ 2 cfs (from highway)
		34 cfs (total off-site)

F. Conclusion

There will be no additional adverse effects on the adjacent or downstream properties due to this project. This conclusion is based on maintaining peak discharge rates and volumes at pre-development levels, limiting the flows into the existing culvert at Lower Honoapiilani Road, and incorporating drainage best management practices that exceed current County of Maui drainage standards.

IV. REFERENCES

1. City and County of Honolulu, Department of Public Works, Division of Engineering, *Storm Drainage Standards*, Honolulu, Hawaii, May 1988.

2. County of Maui, "Title MC-15, Department of Public Works and Waste Management, Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui," Wailuku, Hawaii, November 1995.

3. Federal Emergency Management Agency, Federal Insurance Administration, *Flood Insurance Study, Maui County, Hawaii*, December 1, 1980.

4. R. M. Towill Corporation, *Drainage Master Plan for the County of Maui*, Honolulu, Hawaii, October 1971.

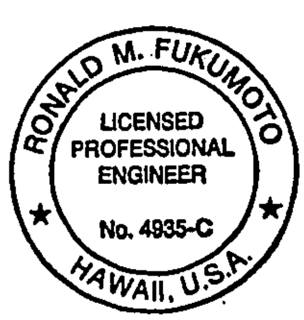
5. U. S. Department of Agriculture, Soil Conservation Service, *Erosion and Sediment Control Guide for Hawaii*, Honolulu, Hawaii, March 1981.

6. U. S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, Washington, D.C., August 1972.

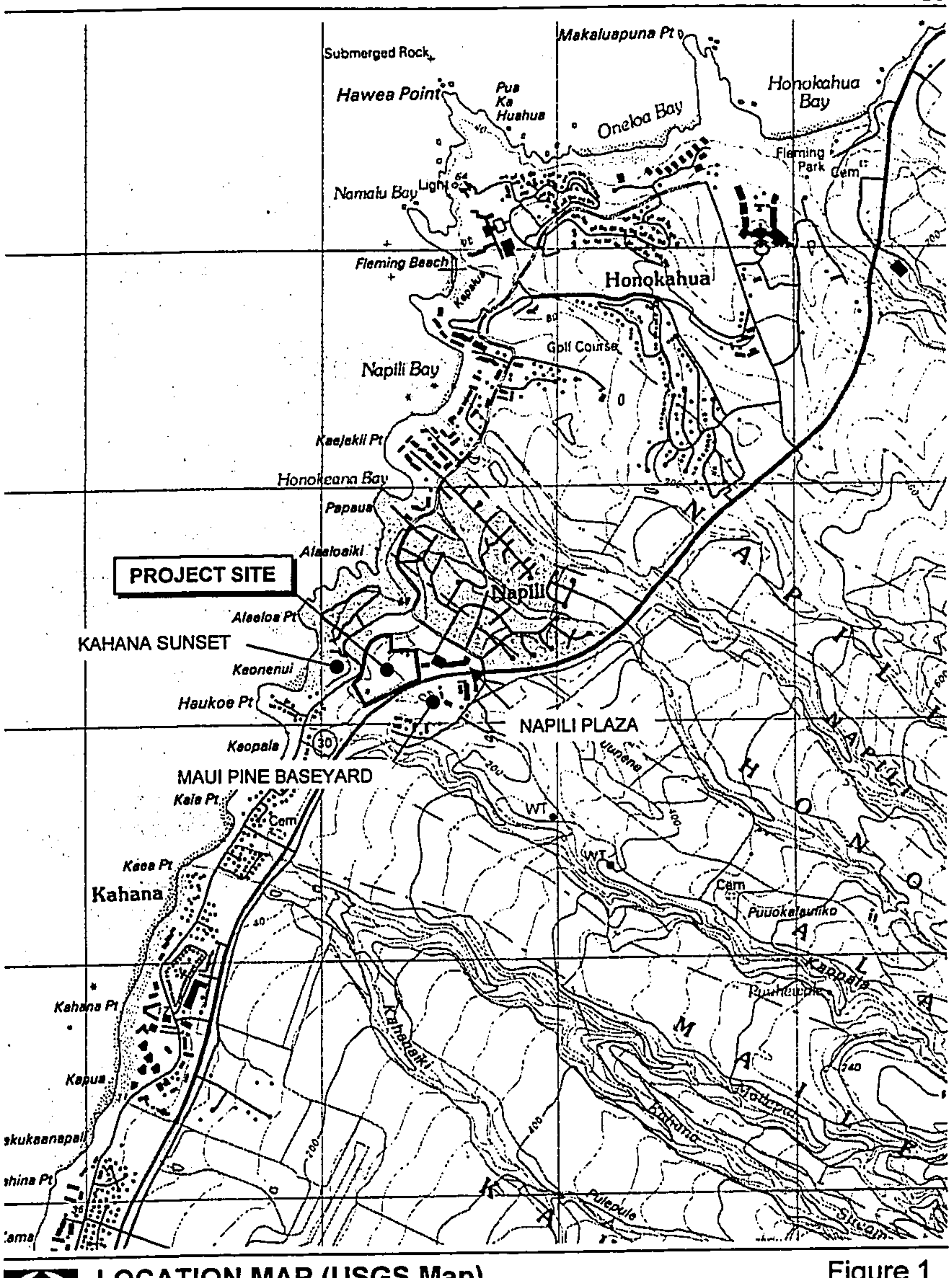
7. U. S. Department of Agriculture, Soil Conservation Service, *Urban Hydrology for Small Watersheds*, Technical Release 55, Second Edition, Washington, D.C., June 1986.

8. U. S. Department of Commerce, Weather Bureau, *Rainfall-Frequency Atlas of the Hawaiian Islands for Areas to 200 Square Miles, Durations to 24 Hours, and Return Periods from 1 to 100 Years*, Technical Paper No. 43, Washington, D.C., 1962.

9. West Maui Watershed Management Advisory Committee, *West Maui Watershed Owners Manual*, Honolulu, Hawaii, November 1997.



This work was prepared by
me or under my supervision.



LOCATION MAP (USGS Map)

SCALE IN FEET

0 1000 2000 4000 6000

NORTH

Figure 1

SOURCE: USGS NAPILI QUADRANGLE MAP

RFE

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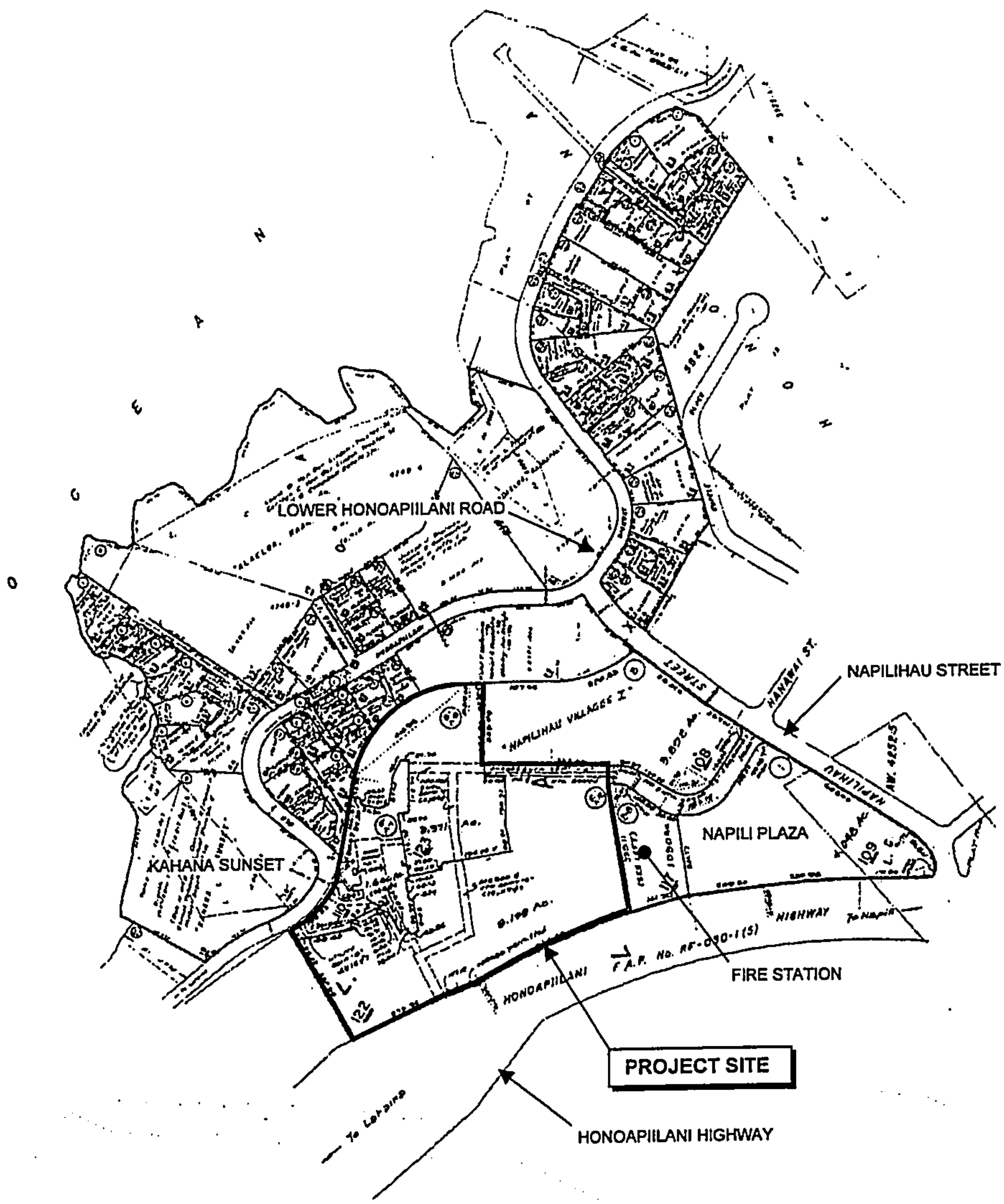

NORTH

VICINITY MAP (Tax Map)

SCALE IN FEET

0 200 400 800 1200

Figure 2

SOURCE: PORTION OF TAX MAP KEY (2) 4-3-03

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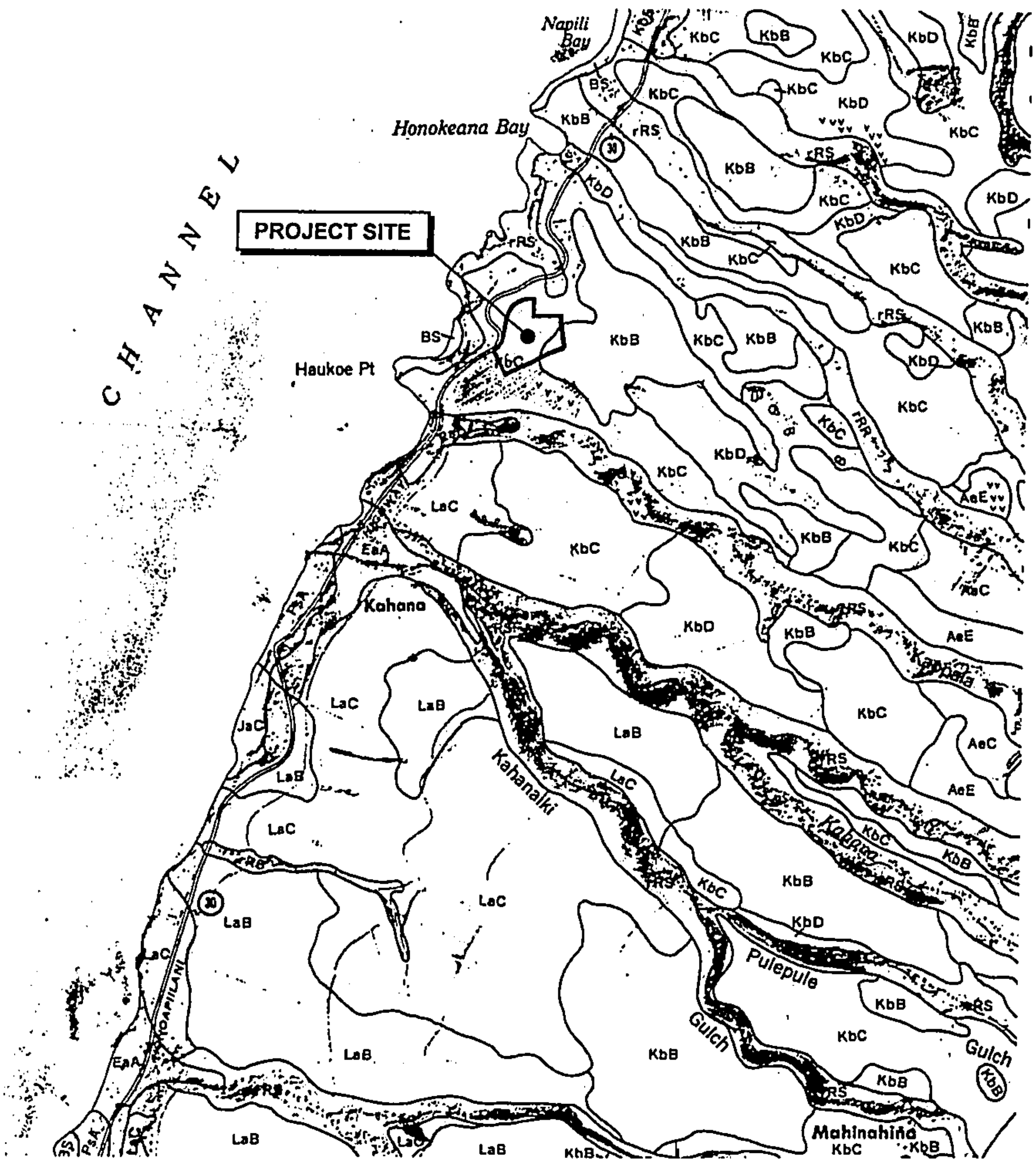

SOIL MAP
SCALE IN FEET

NORTH 0 1000 2000 4000 6000

Figure 3
SOURCE: SOIL SURVEY

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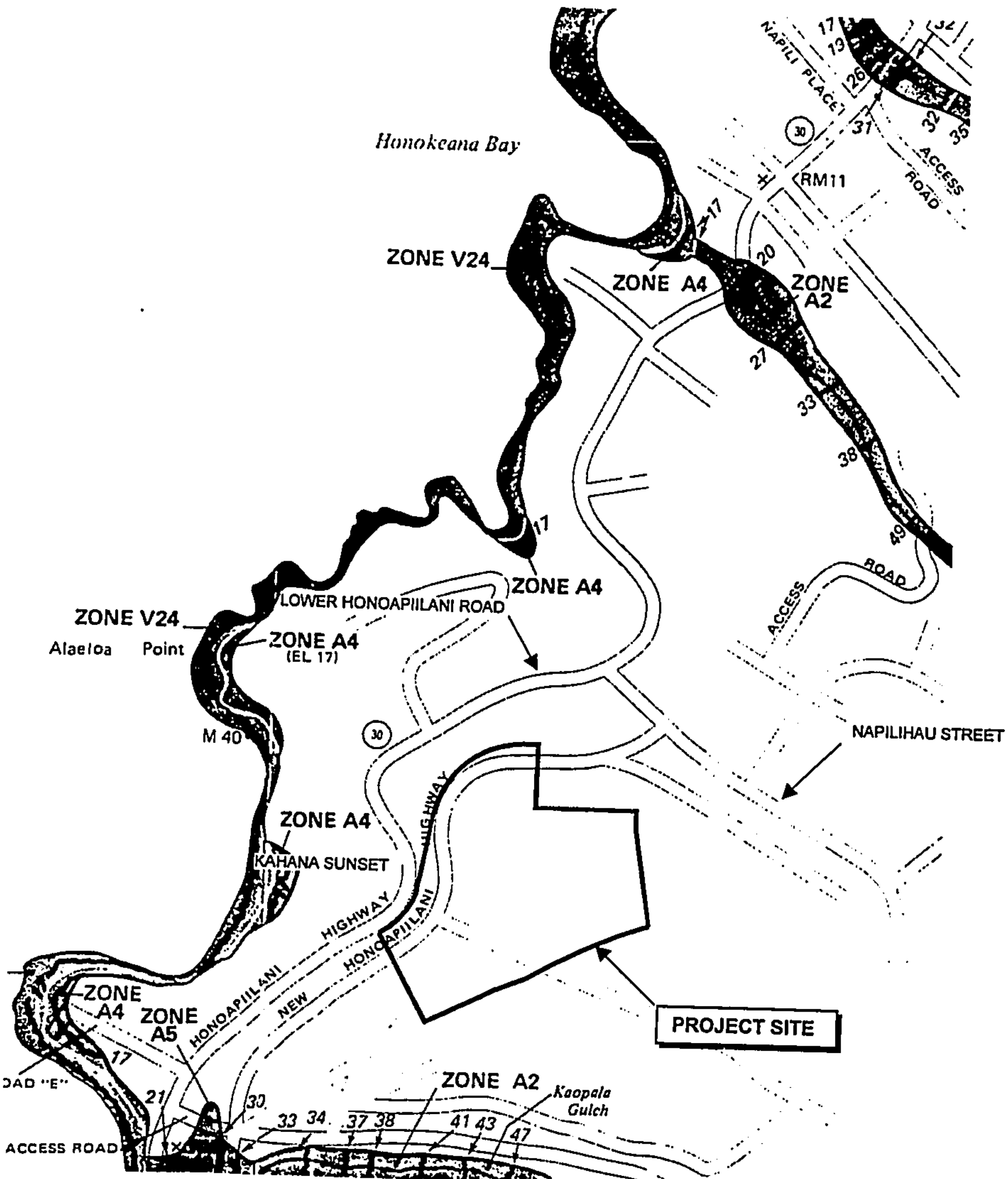

FLOOD INSURANCE RATE MAP

SCALE IN FEET

NORTH 0 250 500 1000 1500

Figure 4

SOURCE: FIRM COMM. PANEL NO. 150003 0138B

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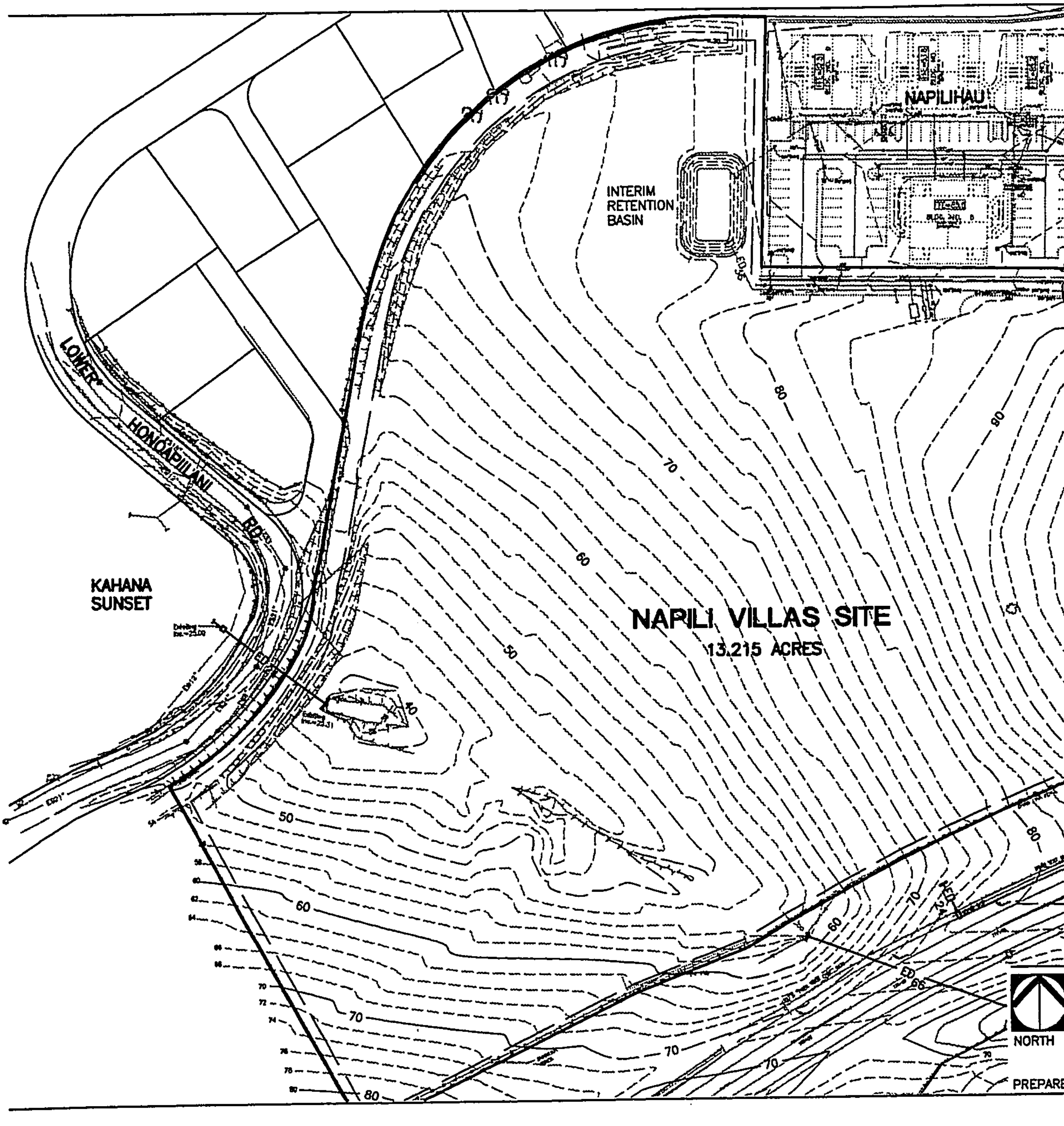
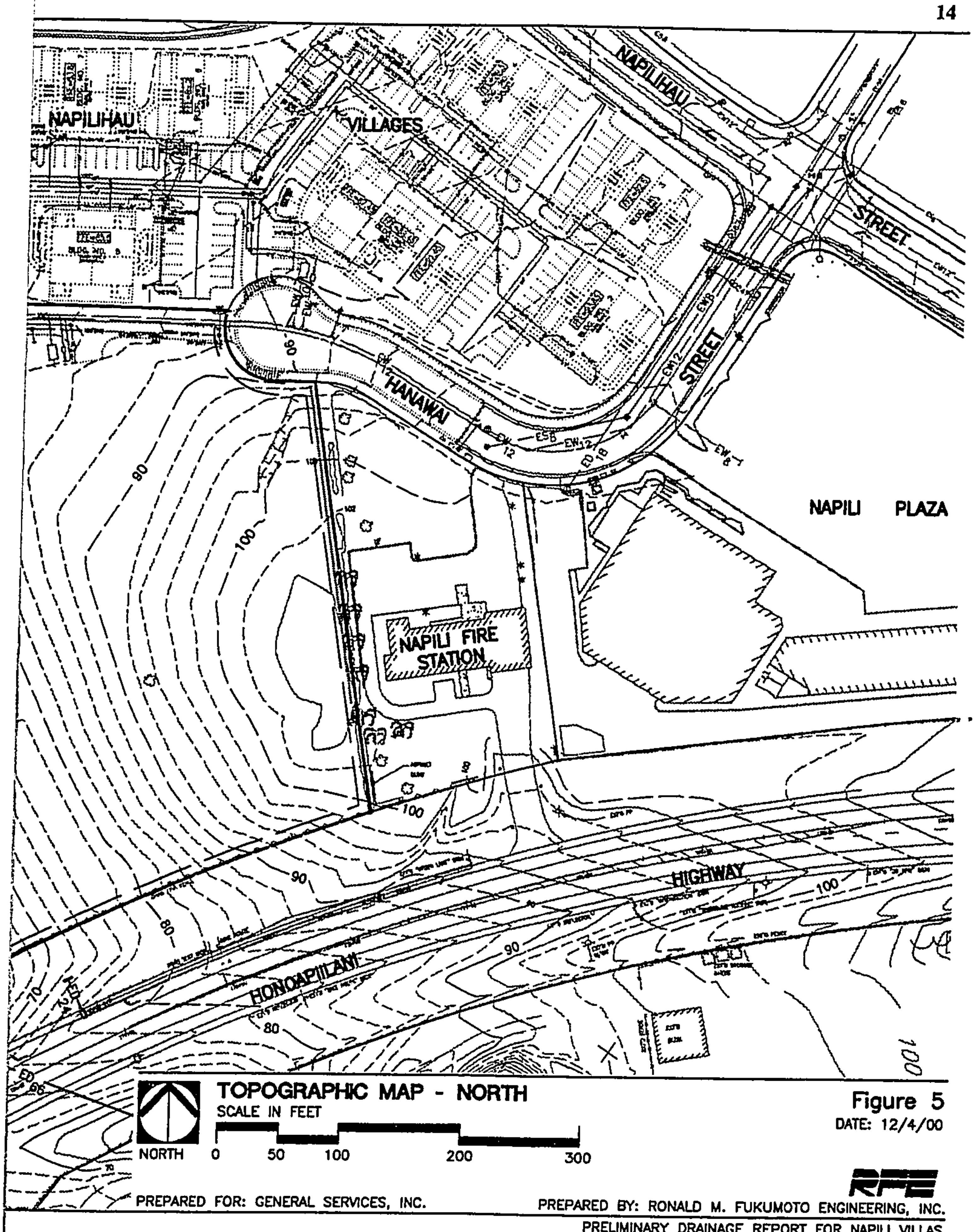
PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.



NAPILIHAU
INTERIM
RETENTION
BASIN
LOWER HONOAPIILANI RD.
KAHANA
SUNSET
NAPILI VILLAS SITE
13.215 ACRES
NORTH
PREPARE



TOPOGRAPHIC MAP - NORTH

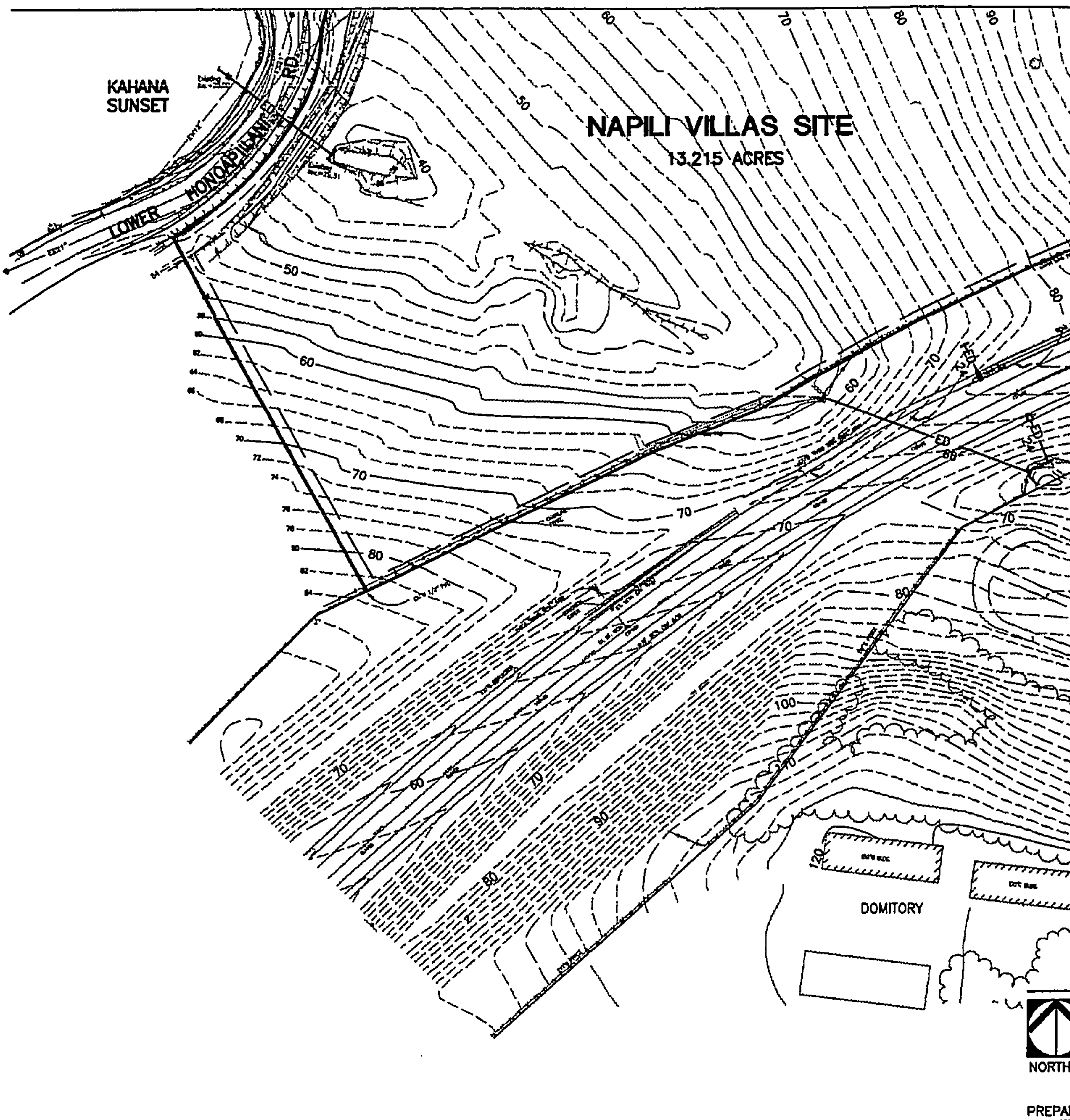
SCALE IN FEET

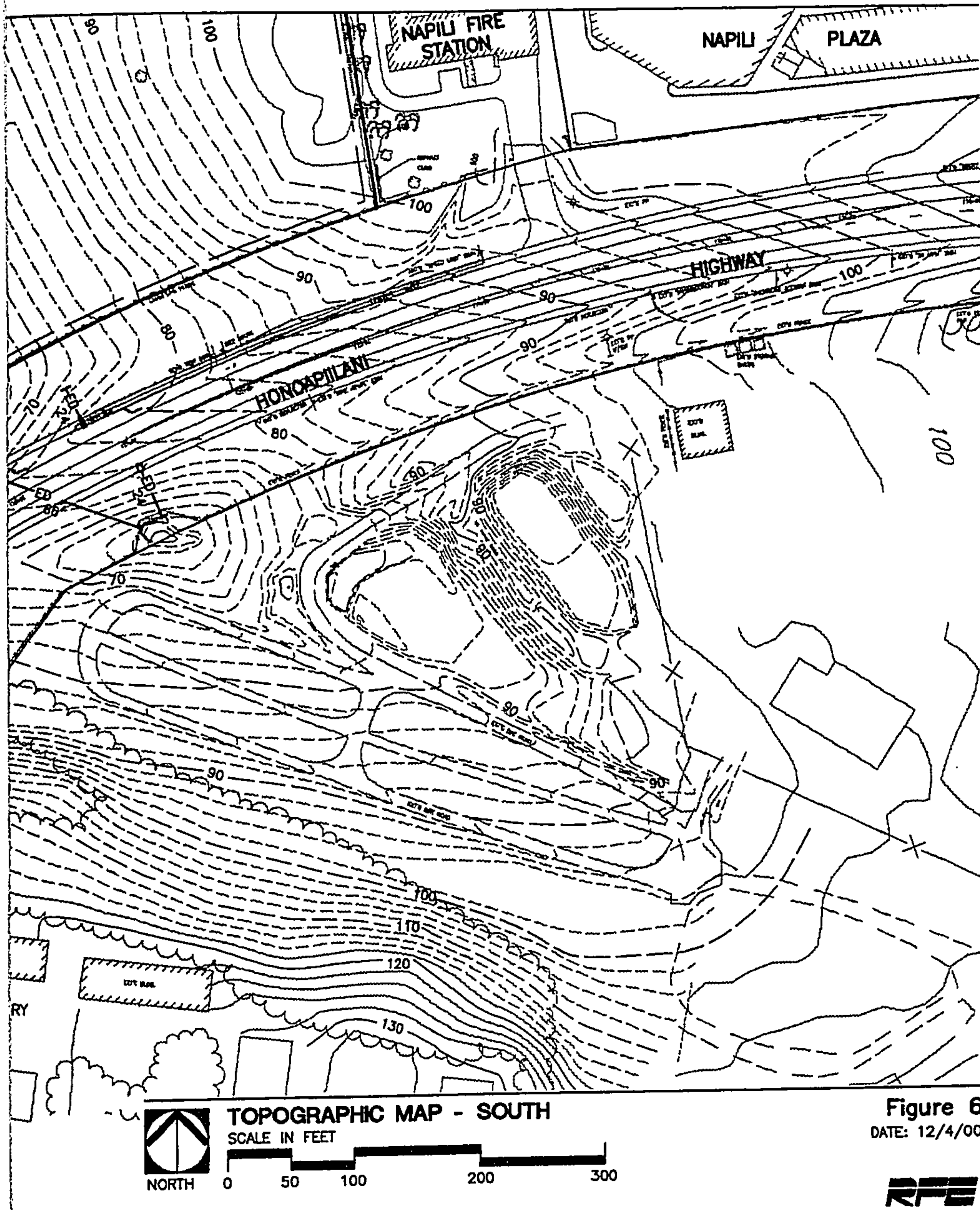
Figure 5

DATE: 12/4/00

PREPARED FOR: GENERAL SERVICES, INC.

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.


KAHANA
SUNSET
LOWER HONOAPIILANI RD.
NAPILI VILLAS SITE
13.215 ACRES
DOMITORY
NORTH
PREPA



TOPOGRAPHIC MAP - SOUTH

Figure 6

DATE: 12/4/00

RFE

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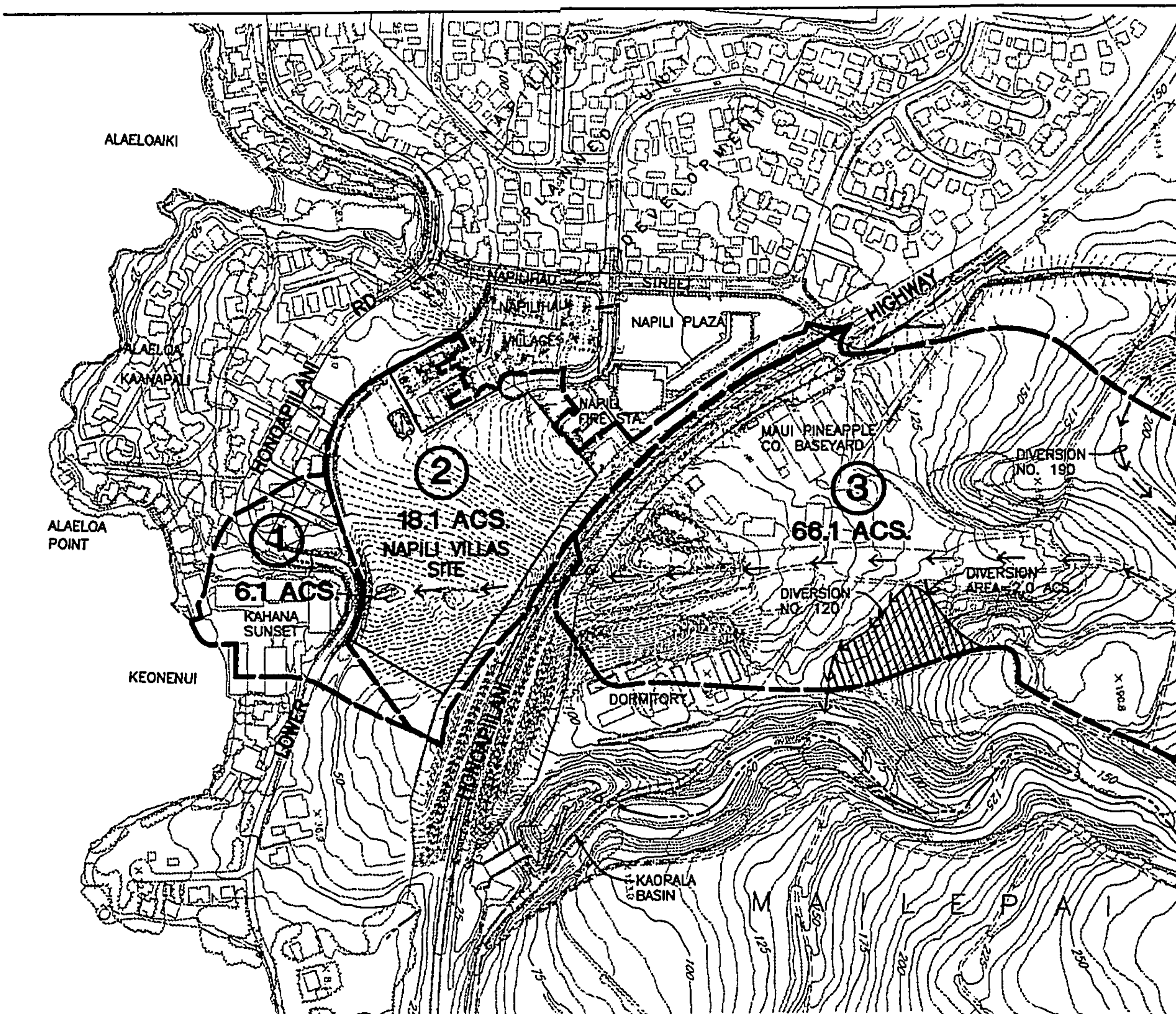
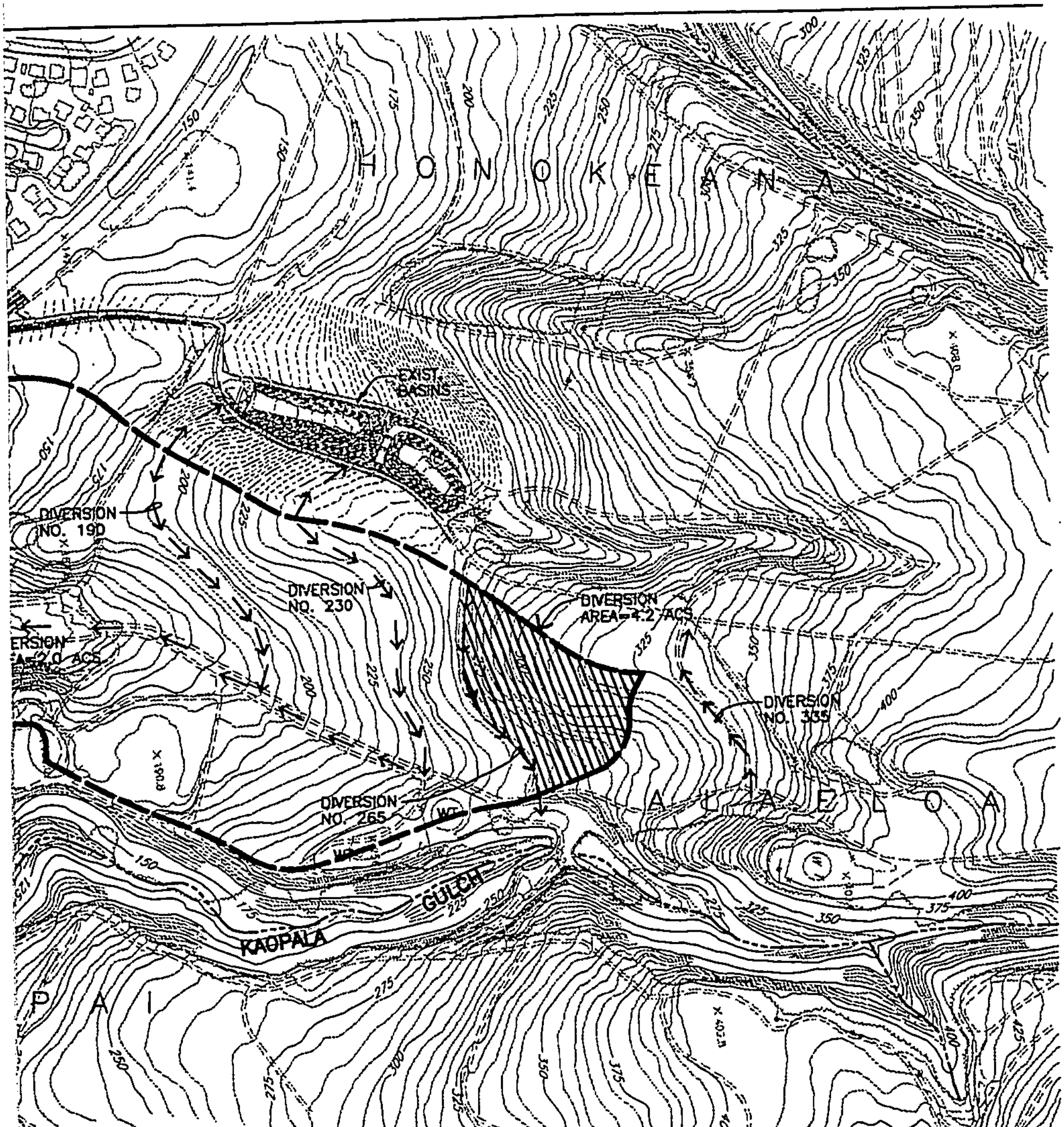


AREA (3) ADJUSTMENT

66.1 ACS. (TOTAL)
(–) 1.0 ACS. (50% OF DIVERSION NO. 120)
(–) 2.1 ACS. (50% OF DIVERSION NO. 265)
63.0 ACS. (ADJUSTED)

NORTH

PREPARE



NORTH

DRAINAGE AREA MAP

SCALE IN FEET

0 200 400 800 1200

Figure 7

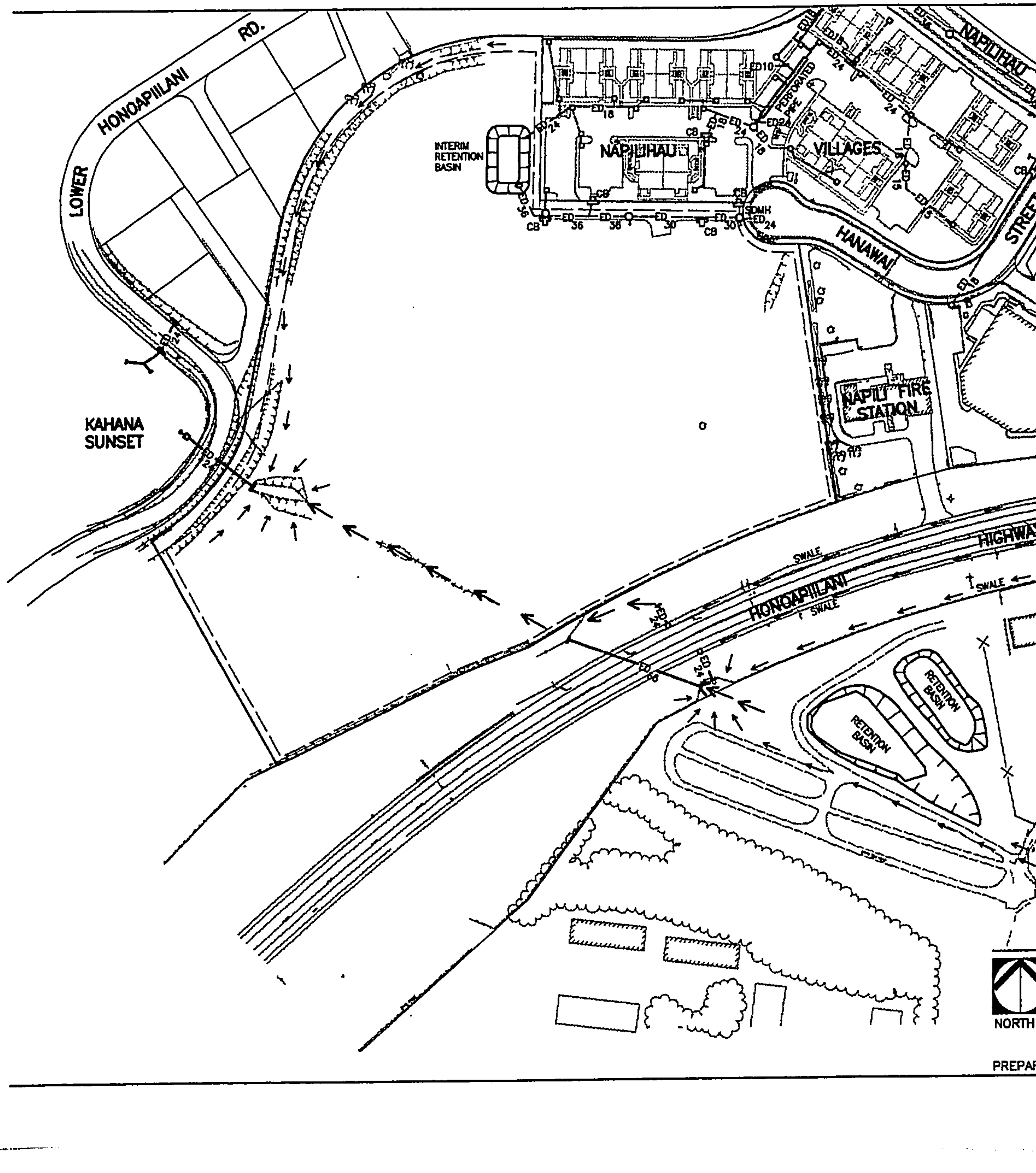
DATE: 12/4/00

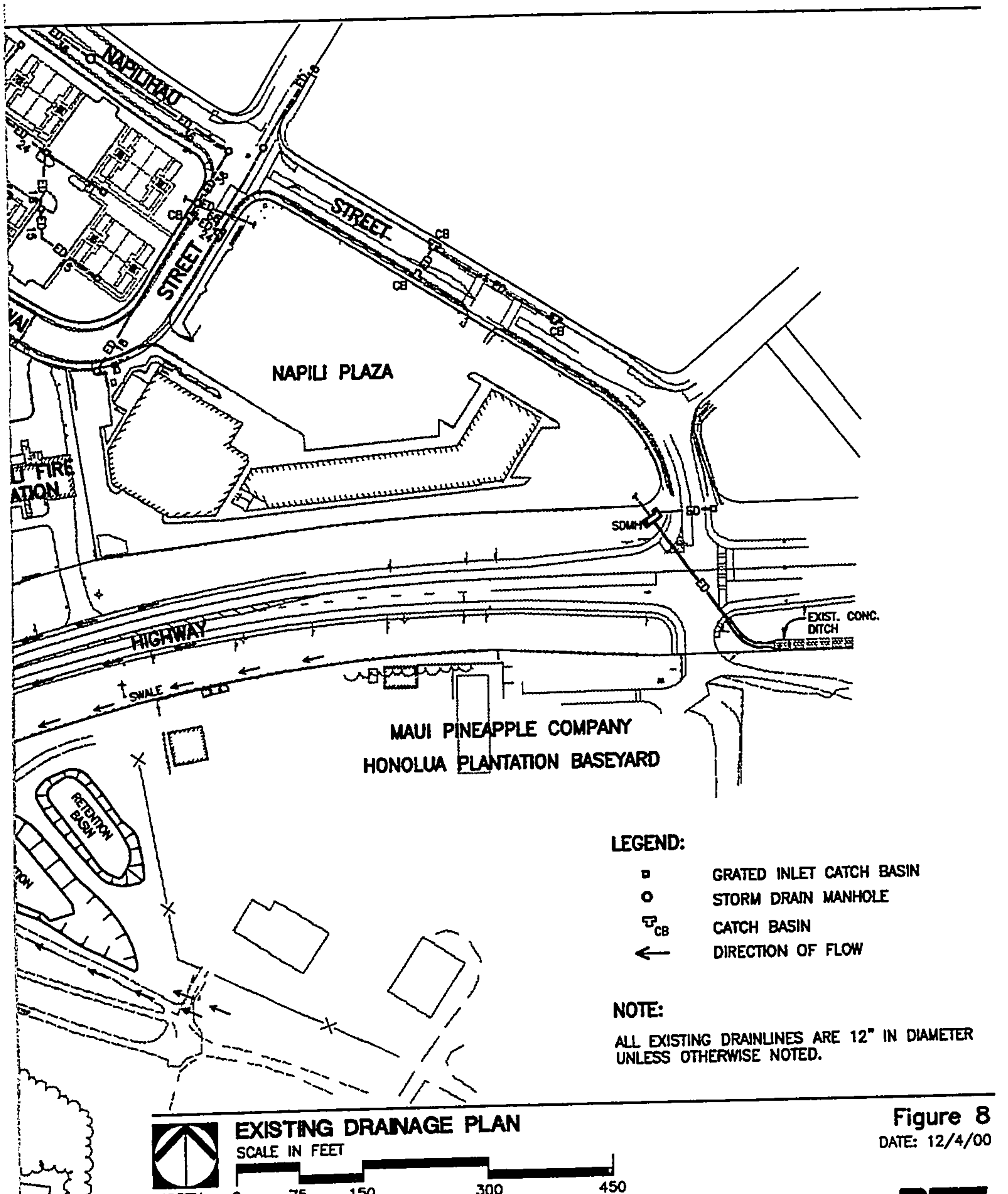
RFE

PREPARED FOR: GENERAL SERVICES, INC.

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

PRELIMINARY DRAINAGE REPORT FOR NAPILI VILLAS


LOWER HONOAPIILANI RD.
KAHANA SUNSET
INTERIM RETENTION BASIN
NAPILIHAU
VILLAGES
NAPILIHAU
PERFORATED PIPE
HANAWAI
STREET
NAPILI FIRE STATION
HONOAPIILANI HIGHWAY
SWALE
RETENTION BASIN
RETENTION BASIN
SDMH
CB
NORTH
PREPAR



EXISTING DRAINAGE PLAN

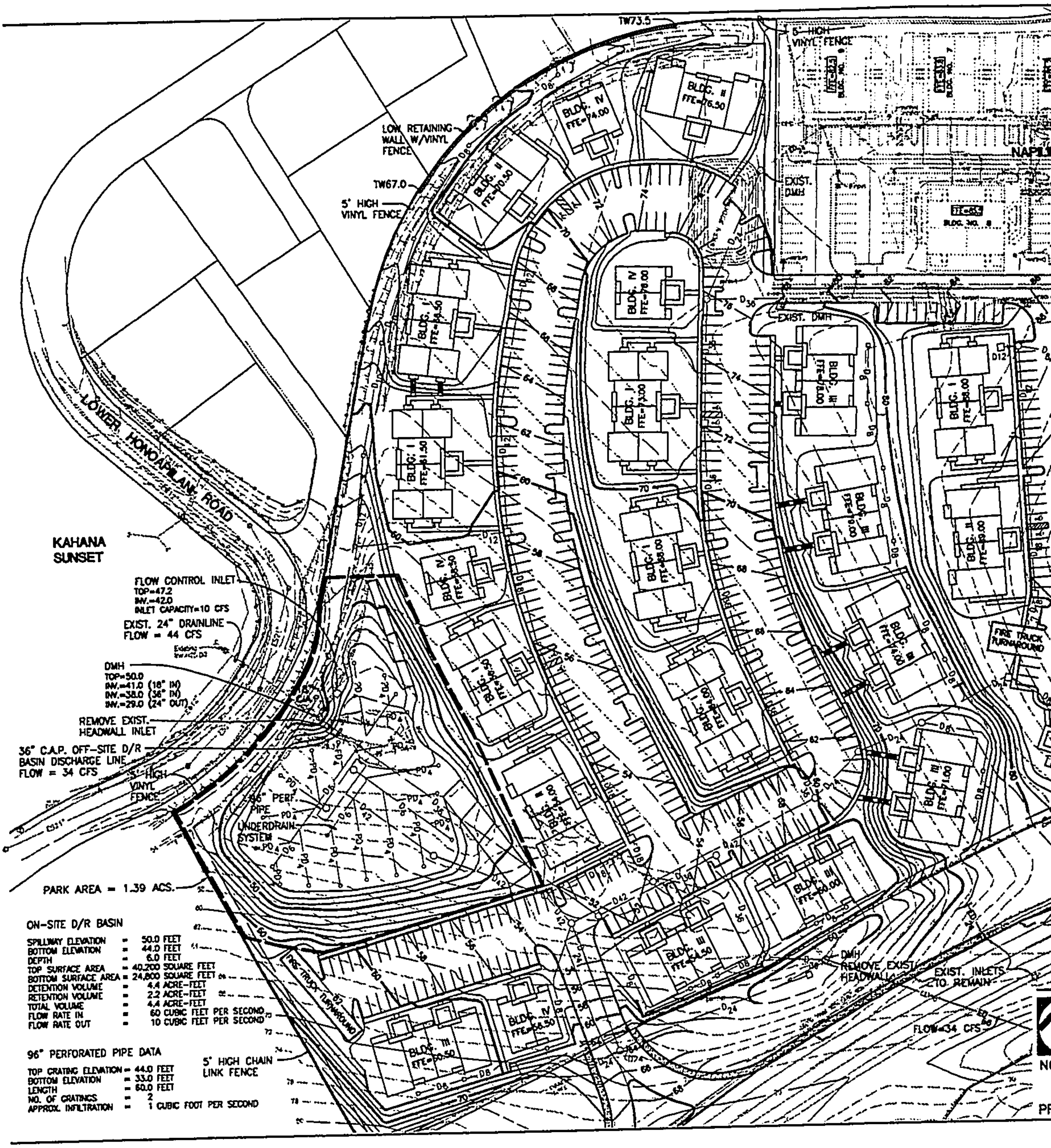
Figure 8

DATE: 12/4/00

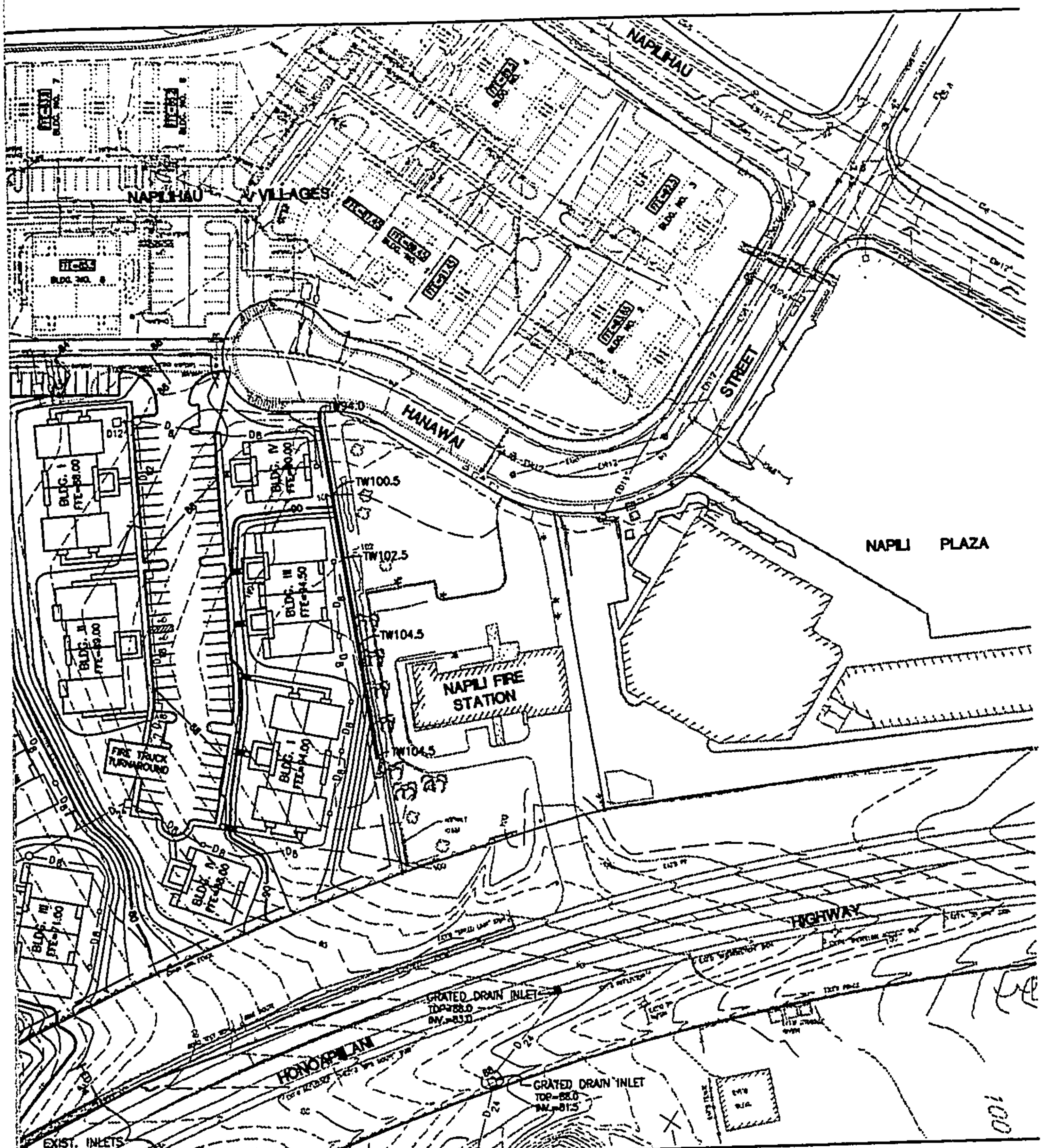
PREPARED FOR: GENERAL SERVICES, INC.

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

PRELIMINARY DRAINAGE REPORT FOR NAPILI VILLAS



TW73.5
5' HIGH VINYL FENCE
LOW RETAINING WALL W/VINYL FENCE
TW67.0
5' HIGH VINYL FENCE
EXIST. DMH
EXIST. DMH
LOWER HONOAPIILANI ROAD
KAHANA SUNSET
FLOW CONTROL INLET
TOP=47.2
INV.=42.0
INLET CAPACITY=10 CFS
EXIST. 24" DRAINLINE
FLOW = 44 CFS
DMH
TOP=50.0
INV.=41.0 (18" IN)
INV.=38.0 (36" IN)
INV.=29.0 (24" OUT)
REMOVE EXIST. HEADWALL INLET
36" C.A.P. OFF-SITE D/R BASIN DISCHARGE LINE
FLOW = 34 CFS
5' HIGH VINYL FENCE
96" PERF. PIPE
UNDERDRAIN SYSTEM
PARK AREA = 1.39 ACS.
FIRE TRUCK TURNAROUND
FIRE TRUCK TURNAROUND
DMH
REMOVE EXIST. HEADWALL
EXIST. INLETS TO REMAIN
FLOW=34 CFS
5' HIGH CHAIN LINK FENCE
BLDG. IV FFE=74.00
BLDG. II FFE=76.50
BLDG. II FFE=70.50
BLDG. IV FFE=78.00
BLDG. I FFE=73.00
BLDG. I FFE=68.00
BLDG. III FFE=60.50
BLDG. IV FFE=58.50
BLDG. III FFE=60.00
ON-SITE D/R BASIN
SPILLWAY ELEVATION = 50.0 FEET
BOTTOM ELEVATION = 44.0 FEET
DEPTH = 6.0 FEET
TOP SURFACE AREA = 40,200 SQUARE FEET
BOTTOM SURFACE AREA = 24,800 SQUARE FEET
DETENTION VOLUME = 4.4 ACRE-FEET
RETENTION VOLUME = 2.2 ACRE-FEET
TOTAL VOLUME = 4.4 ACRE-FEET
FLOW RATE IN = 60 CUBIC FEET PER SECOND
FLOW RATE OUT = 10 CUBIC FEET PER SECOND
96" PERFORATED PIPE DATA
TOP GRATING ELEVATION = 44.0 FEET
BOTTOM ELEVATION = 33.0 FEET
LENGTH = 60.0 FEET
NO. OF GRATINGS = 2
APPROX. INFILTRATION = 1 CUBIC FOOT PER SECOND



PRELIMINARY GRADING PLAN - NORTH

SCALE IN FEET

NORTH 0 50 100 200 300

Figure 9

DATE: 12/4/00

RFE

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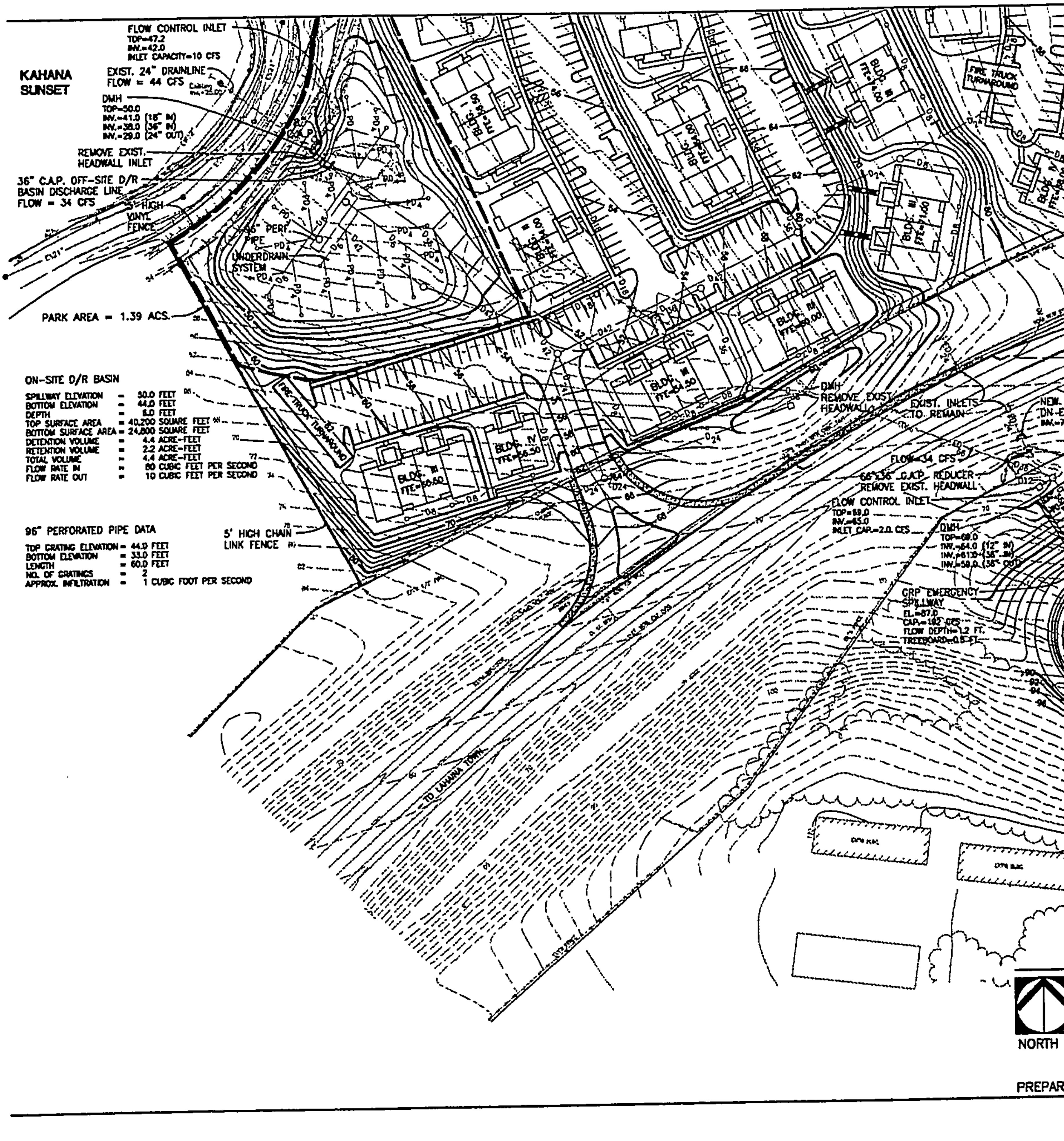
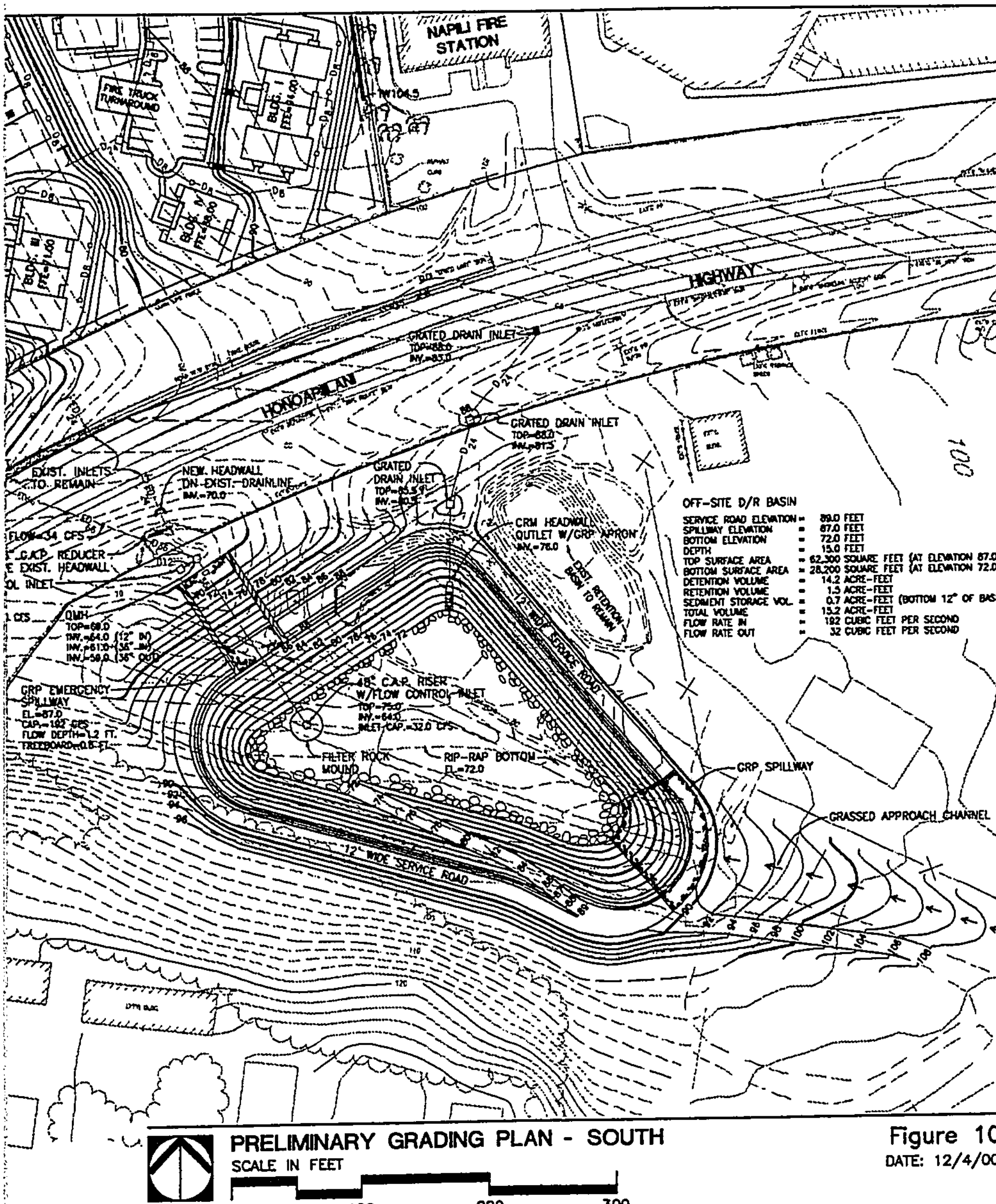
PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

PRELIMINARY DRAINAGE REPORT FOR NAPILI VILLAS


KAHANA SUNSET
FLOW CONTROL INLET
TOP=47.2
INV.=42.0
INLET CAPACITY=10 CFS
EXIST. 24" DRAINLINE
FLOW = 44 CFS
DMH
TOP=50.0
INV.=41.0 (18" IN)
INV.=38.0 (36" IN)
INV.=29.0 (24" OUT)
REMOVE EXIST.
HEADWALL INLET
36" C.A.P. OFF-SITE D/R
BASIN DISCHARGE LINE
FLOW = 34 CFS
5' HIGH
VINYL
FENCE
96" PERF.
PIPE
UNDERDRAIN
SYSTEM
PARK AREA = 1.39 ACS.
ON-SITE D/R BASIN
SPILLWAY ELEVATION = 50.0 FEET
BOTTOM ELEVATION = 44.0 FEET
DEPTH = 6.0 FEET
TOP SURFACE AREA = 40,200 SQUARE FEET
BOTTOM SURFACE AREA = 24,800 SQUARE FEET
DETENTION VOLUME = 4.4 ACRE-FEET
RETENTION VOLUME = 2.2 ACRE-FEET
TOTAL VOLUME = 4.4 ACRE-FEET
FLOW RATE IN = 60 CUBIC FEET PER SECOND
FLOW RATE OUT = 10 CUBIC FEET PER SECOND
96" PERFORATED PIPE DATA
TOP GRATING ELEVATION = 44.0 FEET
BOTTOM ELEVATION = 33.0 FEET
LENGTH = 60.0 FEET
NO. OF GRATINGS = 2
APPROX. INFILTRATION = 1 CUBIC FOOT PER SECOND
5' HIGH CHAIN
LINK FENCE
FIRE TRUCK TURNAROUND
BLDG. IV
FFE=56.50
BLDG. III
FFE=56.50
BLDG. III
FFE=54.50
BLDG. III
FFE=60.00
BLDG. I
FFE=58.50
BLDG. II
FFE=54.00
BLDG. III
FFE=64.00
BLDG. III
FFE=61.00
BLDG. III
FFE=64.00
FIRE TRUCK TURNAROUND
DMH
REMOVE EXIST.
HEADWALL
EXIST. INLETS
TO REMAIN
FLOW=34 CFS
66"x36" C.A.P. REDUCER
REMOVE EXIST. HEADWALL
FLOW CONTROL INLET
TOP=69.0
INV.=65.0
INLET CAP.=2.0 CFS
DMH
TOP=69.0
INV.=64.0 (12" IN)
INV.=61.0 (36" IN)
INV.=59.0 (36" OUT)
GRP EMERGENCY
SPILLWAY
EL.=87.0
CAP.=192 CFS
FLOW DEPTH=1.2 FT.
FREEBOARD=0.8 FT.
TO LAHAINA TOWN
NORTH
PREPAR



PRELIMINARY GRADING PLAN - SOUTH

Figure 10

DATE: 12/4/00

RFE

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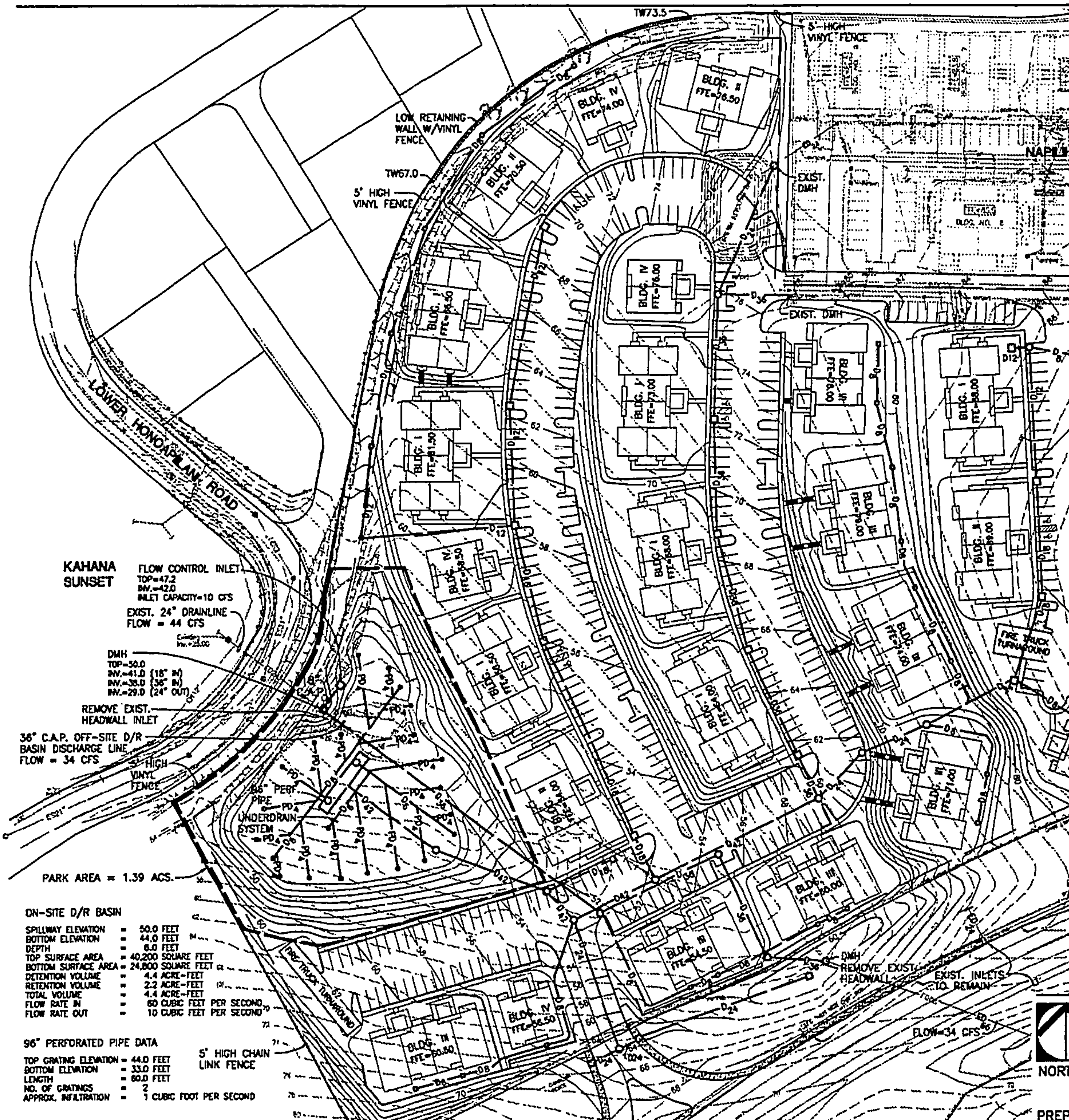
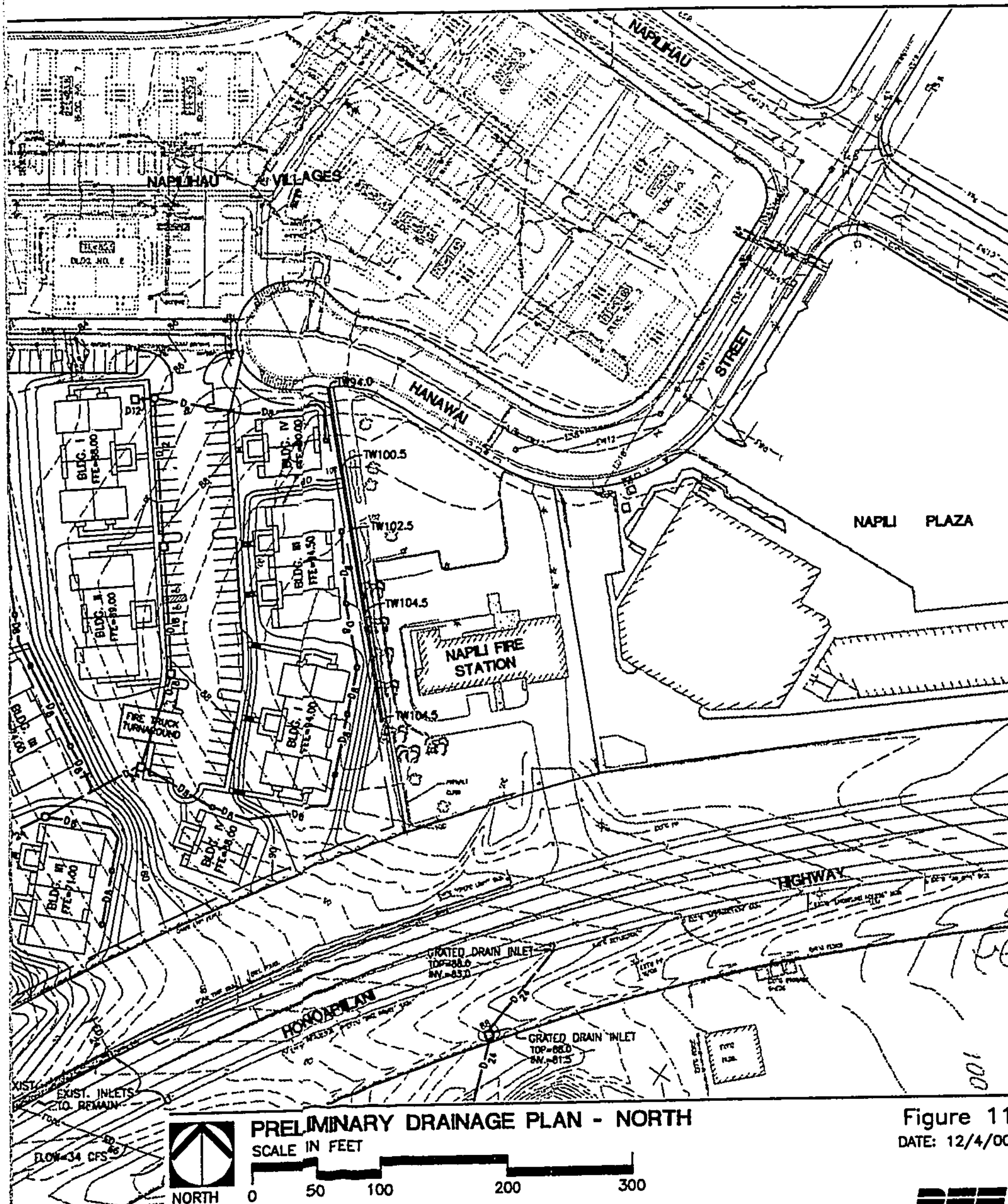
PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.



TW73.5
5' HIGH VINYL FENCE
LOW RETAINING WALL W/VINYL FENCE
TW67.0
5' HIGH VINYL FENCE
EXIST. DMH
BLDG. NO. 8
NAPILI
LOWER HONOAPIILANI ROAD
KAHANA SUNSET
FLOW CONTROL INLET
TOP=47.2
INV.=42.0
INLET CAPACITY=10 CFS
EXIST. 24" DRAINLINE
FLOW = 44 CFS
DMH
TOP=50.0
INV.=41.0 (18" IN)
INV.=38.0 (36" IN)
INV.=29.0 (24" OUT)
REMOVE EXIST. HEADWALL INLET
36" C.A.P. OFF-SITE D/R BASIN DISCHARGE LINE
FLOW = 34 CFS
5' HIGH VINYL FENCE
96" PERF. PIPE
UNDERDRAIN SYSTEM
PARK AREA = 1.39 ACS.
FIRE TRUCK TURNAROUND
DMH
REMOVE EXIST. HEADWALL
EXIST. INLETS TO REMAIN
FLOW=34 CFS
5' HIGH CHAIN LINK FENCE
NORT
PREP
ON-SITE D/R BASIN
SPILLWAY ELEVATION = 50.0 FEET
BOTTOM ELEVATION = 44.0 FEET
DEPTH = 6.0 FEET
TOP SURFACE AREA = 40,200 SQUARE FEET
BOTTOM SURFACE AREA = 24,800 SQUARE FEET
DETENTION VOLUME = 4.4 ACRE-FEET
RETENTION VOLUME = 2.2 ACRE-FEET
TOTAL VOLUME = 4.4 ACRE-FEET
FLOW RATE IN = 60 CUBIC FEET PER SECOND
FLOW RATE OUT = 10 CUBIC FEET PER SECOND
96" PERFORATED PIPE DATA
TOP GRATING ELEVATION = 44.0 FEET
BOTTOM ELEVATION = 33.0 FEET
LENGTH = 60.0 FEET
NO. OF GRATINGS = 2
APPROX. INFILTRATION = 1 CUBIC FOOT PER SECOND



PRELIMINARY DRAINAGE PLAN - NORTH

SCALE IN FEET

0 50 100 200 300

Figure 11

DATE: 12/4/00

RFE

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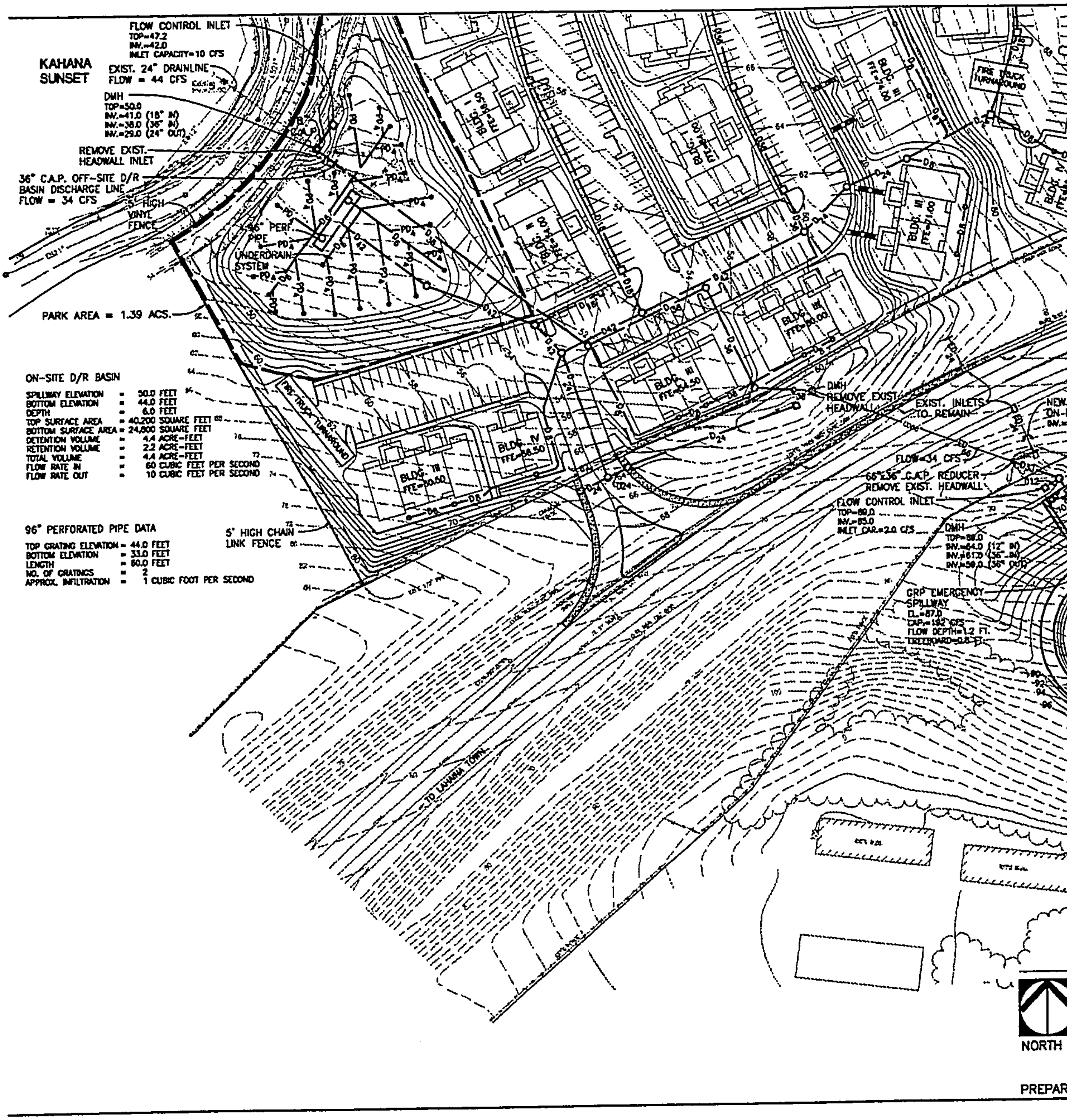
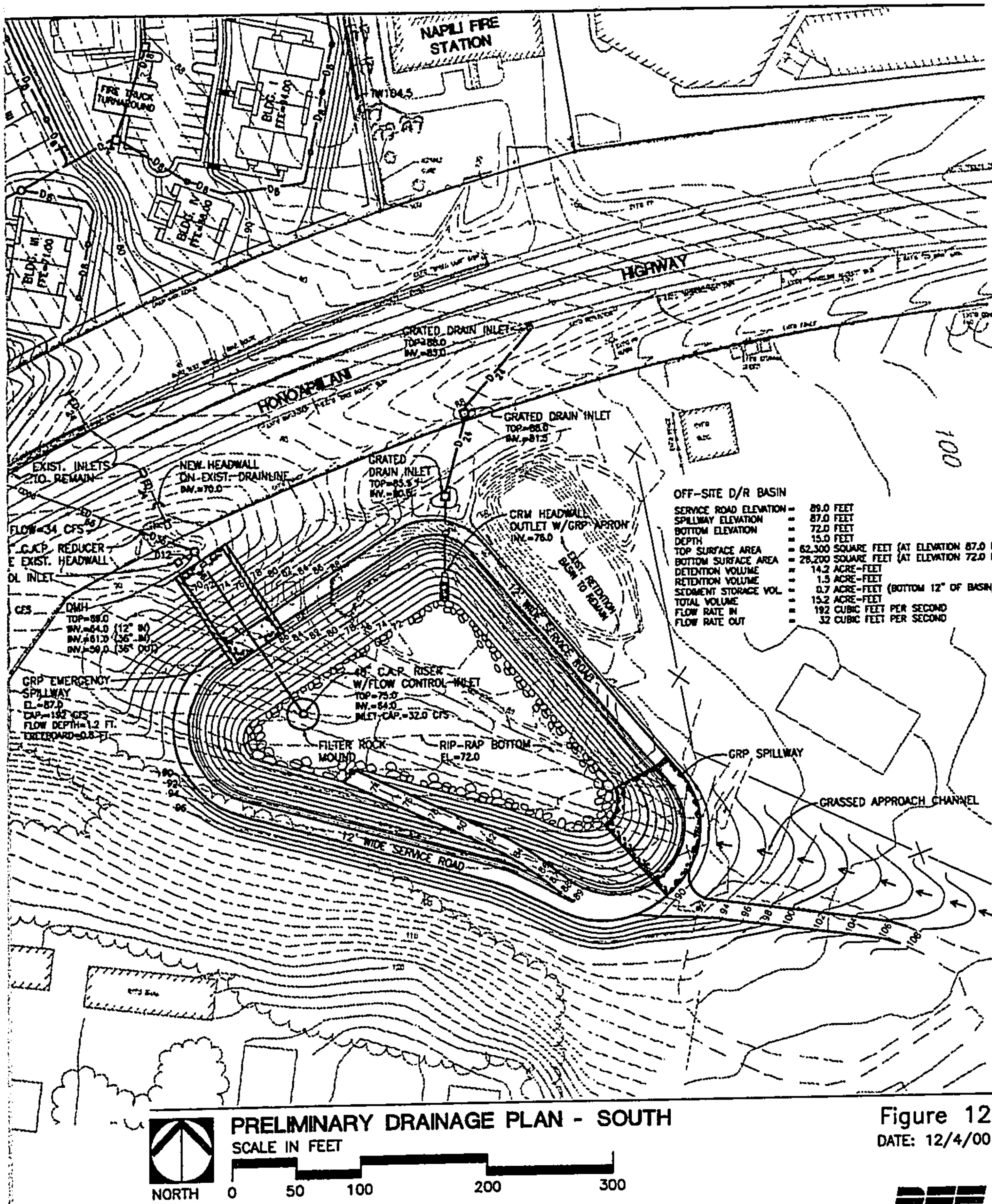

KAHANA
SUNSET
FLOW CONTROL INLET
TOP=47.2
INV.=42.0
INLET CAPACITY=10 CFS
EXIST. 24" DRAINLINE
FLOW = 44 CFS
DMH
TOP=50.0
INV.=41.0 (18" IN)
INV.=38.0 (36" IN)
INV.=29.0 (24" OUT)
REMOVE EXIST.
HEADWALL INLET
36" C.A.P. OFF-SITE D/R
BASIN DISCHARGE LINE
FLOW = 34 CFS
5' HIGH
VINYL
FENCE
96" PERF.
PIPE
UNDERDRAIN
SYSTEM
PARK AREA = 1.39 ACS.
ON-SITE D/R BASIN
SPILLWAY ELEVATION = 50.0 FEET
BOTTOM ELEVATION = 44.0 FEET
DEPTH = 6.0 FEET
TOP SURFACE AREA = 40,200 SQUARE FEET
BOTTOM SURFACE AREA = 24,600 SQUARE FEET
DETENTION VOLUME = 4.4 ACRE-FEET
RETENTION VOLUME = 2.2 ACRE-FEET
TOTAL VOLUME = 4.4 ACRE-FEET
FLOW RATE IN = 60 CUBIC FEET PER SECOND
FLOW RATE OUT = 10 CUBIC FEET PER SECOND
96" PERFORATED PIPE DATA
TOP GRATING ELEVATION = 44.0 FEET
BOTTOM ELEVATION = 33.0 FEET
LENGTH = 60.0 FEET
NO. OF GRATINGS = 2
APPROX. INFILTRATION = 1 CUBIC FOOT PER SECOND
5' HIGH CHAIN
LINK FENCE
FIRE TRUCK TURNAROUND
BLDG. I
BLDG. II
BLDG. III
BLDG. IV
DMH
REMOVE EXIST.
HEADWALL
EXIST. INLETS
TO REMAIN
FLOW=34 CFS
66"x36" C.A.P. REDUCER
REMOVE EXIST. HEADWALL
FLOW CONTROL INLET
TOP=69.0
INV.=65.0
INLET CAP.=2.0 CFS
DMH
TOP=69.0
INV.=64.0 (12" IN)
INV.=61.0 (36" IN)
INV.=59.0 (36" OUT)
GRP EMERGENCY
SPILLWAY
EL.=87.0
CAP.=192 CFS
FLOW DEPTH=1.2 FT.
FREEBOARD=0.8 FT.
TO LAHAINA TOWN
NORTH
PREPAR



PRELIMINARY DRAINAGE PLAN - SOUTH

Figure 12

DATE: 12/4/00

RFE

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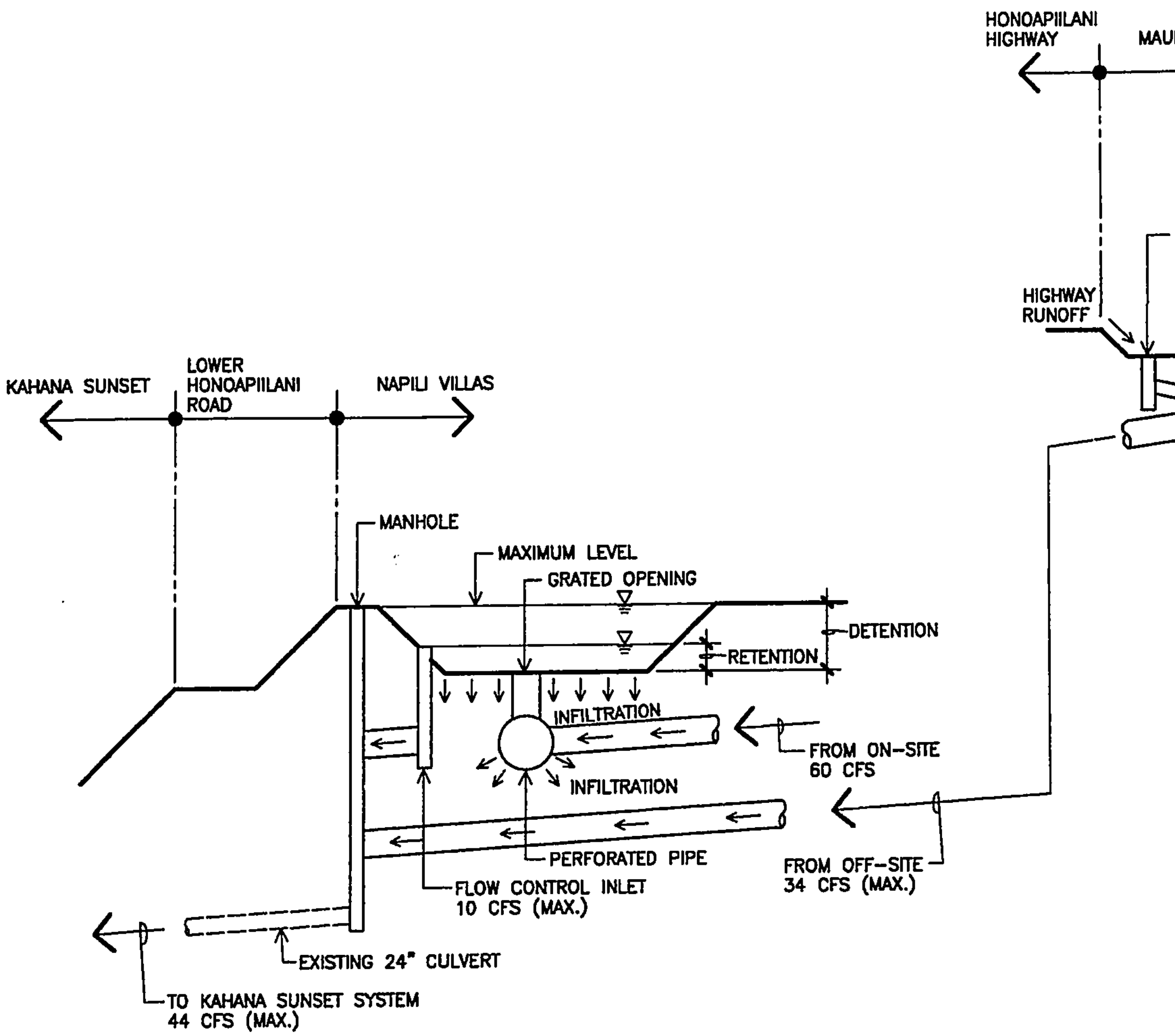
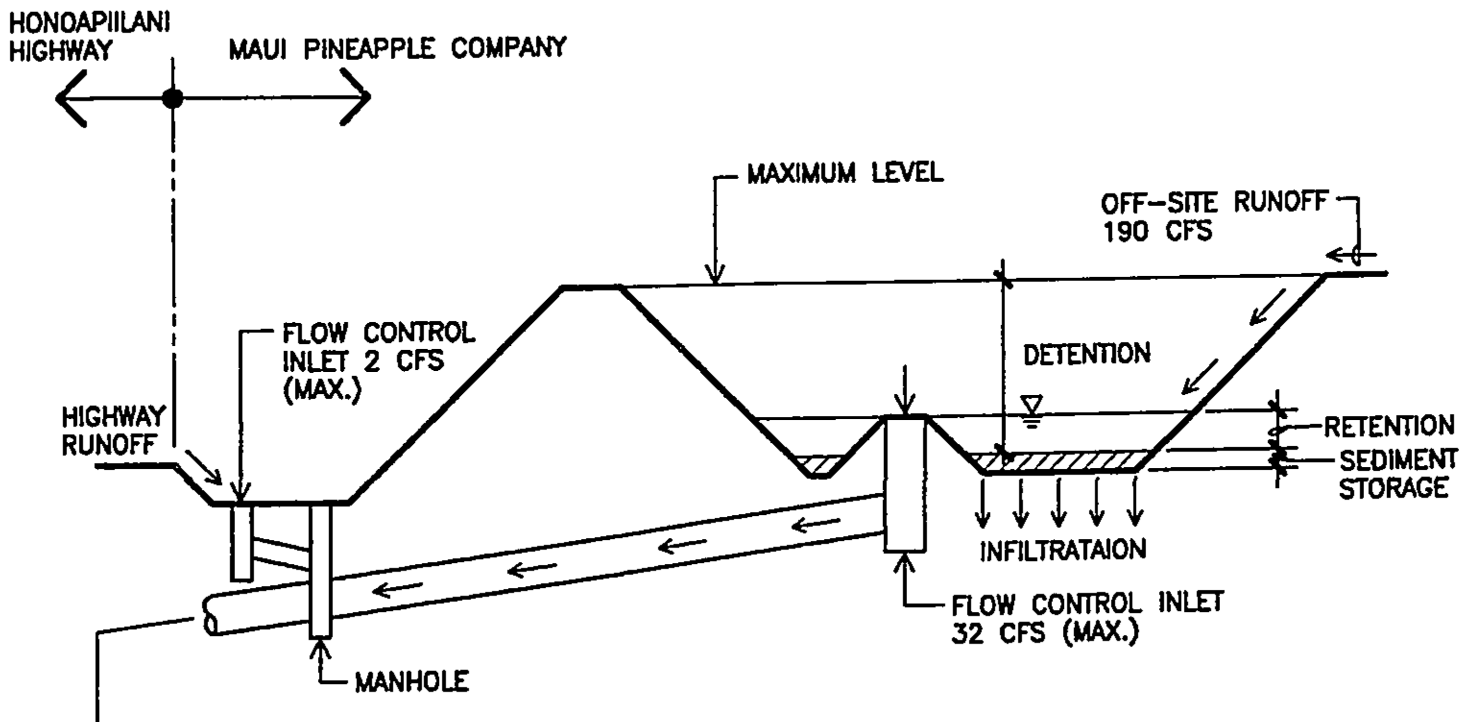


ON-SITE D/R BASIN

D/R

PREPAR



OFF-SITE D/R BASIN

D/R BASIN SCHEMATIC SECTIONS

Figure 13
DATE: 12/4/00

PREPARED FOR: GENERAL SERVICES, INC.

PREPARED BY: RONALD M. FUKUMOTO ENGINEERING, INC.

PRELIMINARY DRAINAGE COMPUTATIONS

A. RUNOFF CURVE NUMBER COMPUTATIONS

1. Drainage Area 2 - Present Conditions

Worksheet 2: Runoff curve number and runoff

Project Napili Villas By SCR Date 11-27-00

Location Napili, Maui, Hawaii Checked RF Date 11-30-00

Circle one: Present Developed Drainage Area 2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒acres ☐mi² ☐%	Product of CN x area
Kahana B	Brush - weed - grass mix. Site (Table 2.2c.) good	48			14.7	705.6
Kahana B	Highway R.O.W. Grass - good condition	61			2.5	152.5
Kahana B	Offsite Cul-De-Sac + Grass	78			0.50	39.0
Kahana B	Fire Station. Grass & Asphalt	78			0.37	28.86
				Totals =	18.1	925.96

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{925.96}{18.1} = 51.16$; Use CN = $\boxed{51}$

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2-yr	50-yr	
Rainfall, P (24-hour)	in	4.4"	10.0"	
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	0.51"	3.69"	

2. Drainage Area 2 - Developed Conditions

Worksheet 2: Runoff curve number and runoff

Project Napili Villas By SCR Date 11-15-00

Location Napili, Maui, Hawaii Checked RF Date 11-30-00

Circle one: Present (Developed) Drainage Area (2)

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	Fig. 2-3	Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Kahana B	Fully developed hard surf. (40% impervious)	98			6.65	651.70
Kahana B	Grass/landscaped	61			11.45	698.45
				Totals =	18.1	1350.15

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1350.15}{18.1} = 74.59$; Use CN = $\boxed{75}$

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2-yr	50-yr	
Rainfall, P (24-hour)	in	4.4"	10.0"	
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	1.97"	6.88"	

3. Drainage Area 3 - Present Conditions

Worksheet 2: Runoff curve number and runoff

Project Napili Villas By SCR Date 11-16-00

Location Napili, Maui, Hawaii Checked RF Date 11-30-00

Circle one: Present Developed Drainage Area 3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Kahana B	Pineapple Field contoured row, good condition	59			49.92	2945.28
	Table 27, Erosion/Sediment Control Guide for Hawaii, 3/87					
Kahana B	Maui Pine Baseyard Impervious	98			4.23	414.54
"	Maui Pine Baseyard Brush, weeds, grass: fair cond.	56			0.93	52.08
"	Impervious Developed Area SE of Baseyard Rd	98			2.08	203.84
"	Pervious Developed Area SE of Baseyard Rd	48			8.94	429.12
				Totals =	66.10	4044.86

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{4044.86}{66.10} =$ 61.19 ; Use CN = $\boxed{61}$

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2-yr	50-yr	
Rainfall, P (24-hour)	in	5.0"	11.7"	
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	1.37"	6.46"	

B. TIME OF CONCENTRATION

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Napili Villas By RF Date 11/26/00

Location ______ Checked ____ Date ____

Circle one: Present Developed Area 3

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB		
1. Surface description (table 3-1)			Cultivated Soils		
2. Manning's roughness coeff., n (table 3-1)			0.17		
3. Flow length, L (total L ≤ 300 ft)	ft		300		
4. Two-yr 24-hr rainfall, P_2	in		5.0		
5. Land slope, s 40/300	ft/ft		0.133		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.16	+	= 0.16

Shallow concentrated flow		Segment ID	BC	CD	
7. Surface description (paved or unpaved)			Unpaved	Unpaved	
8. Flow length, L	ft		470	2910	
9. Watercourse slope, s	ft/ft		0.020	0.070	
10. Average velocity, V (figure 3-1)	ft/s		2.3	4.3	
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.06 +	0.19	= 0.25

Channel flow		Segment ID			
12. Cross sectional flow area, a	ft^2				
13. Wetted perimeter, p_w	ft				
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s				
18. Flow length, L	ft				
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		— +	—	= —
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				0.41

Note: The time of concentration of the on-site area is approximately the same as the off-site area due to the travel time along the grassed shoulder of Honoapiilani Highway. Therefore T_c = 0.41 hour for all areas shall be used.

C. RAINFALL DATA

Obtain data from rainfall charts.

1. On-Site Area 2
   a. 2-year, 24-hour P = 4.4 inches
   b. 50-year, 24-hour P = 10.0 inches
2. Off-Site Area 3
   a. 2-year, 24-hour P= 5.0 inches
   b. 50-year, 24-hour P = 11.7 inches

D. RUNOFF

Determine runoff based on rainfall data and runoff curve number analysis.

1. On-Site Area 2 Present Conditions
   a. 2-year, 24-hour P = 4.4 inches; CN = 51; Runoff Q = 0.51 inch
   b. 50-year, 24-hour P = 10.0 inches; CN = 51; Runoff Q = 3.69 inches
2. On-Site Area 2 Developed Conditions
   a. 2-year, 24-hour P = 4.4 inches; CN = 75; Runoff Q = 1.97 inches
   b. 50-year, 24-hour P = 10.0 inches; CN = 75; Runoff Q = 6.88 inches
3. Increase Due to Development of Area 2
   a. 2-year, 24-hour increase = [(1.97 - 0.51)/12] x 18.1 acres = 2.2 acre-feet
   b. 50-year, 24-hour increase = [(6.88 - 3.69)/12] x 18.1 acres = 4.8 acre-feet
4. Off-Site Area 3
   a. 2-year, 24-hour P = 5.0 inches; CN = 61; Runoff Q = 1.37 inches
   b. 50-year, 24-hour P = 11.7 inches; CN = 61; Runoff Q = 6.46 inches

E. TR-55 GRAPHICAL METHOD COMPUTATIONS

1. On-Site Area 2 - Present Conditions

TR-55 GRAPHICAL DISCHARGE METHOD

Project : NAPILI VILLAS User:
County : MAUI State: HI Checked: ____
Subtitle: ON-SITE AREA 2 - PRESENT

Data: Drainage Area : 18.1 Acres
Runoff Curve Number : 51
Time of Concentration: 0.41 Hours
Rainfall Type : I
Pond and Swamp Area : NONE

Storm Number	1	2
Frequency (yrs)	2	50
24-Hr Rainfall (in)	4.4	10.0
Ia/P Ratio	0.44	0.19
Runoff (in)	0.51	3.69
Unit Peak Discharge (cfs/acre/in)	0.119	0.414
Pond and Swamp Factor 0.0% Ponds Used	1.00	1.00
Peak Discharge (cfs)	1	28

2. On-Site Area 2 - Developed Conditions

TR-55 GRAPHICAL DISCHARGE METHOD

Project : NAPILI VILLAS User:
County : MAUI State: HI Checked: ____
Subtitle: ON-SITE AREA 2 - DEVELOPED

Data: Drainage Area : 18.1 Acres
Runoff Curve Number : 75
Time of Concentration: 0.41 Hours
Rainfall Type : I
Pond and Swamp Area : NONE

Storm Number	1	2
Frequency (yrs)	2	50
24-Hr Rainfall (in)	4.4	10.0
Ia/P Ratio	0.15	0.07
Used	0.15	0.10
Runoff (in)	1.97	6.88
Unit Peak Discharge (cfs/acre/in)	0.443	0.480
Pond and Swamp Factor 0.0% Ponds Used	1.00	1.00
Peak Discharge (cfs)	16	60

3. Off-Site Area 3 - Present Conditions

TR-55 GRAPHICAL DISCHARGE METHOD

```
Project : NAPILI VILLAS                                 User:
County  : MAUI                   State: HI           Checked: ____
Subtitle: OFF-SITE AREA 3

  Data: Drainage Area          :  63    Acres
        Runoff Curve Number    :  61
        Time of Concentration:    0.41    Hours
        Rainfall Type          :  I
        Pond and Swamp Area    :  NONE
```

Storm Number	1	2
Frequency (yrs)	2	50
24-Hr Rainfall (in)	5	11.7
Ia/P Ratio	0.26	0.11
Runoff (in)	1.37	6.46
Unit Peak Discharge (cfs/acre/in)	0.351	0.473
Pond and Swamp Factor 0.0% Ponds Used	1.00	1.00
Peak Discharge (cfs)	30	192

F. TR-55 TABULAR METHOD COMPUTATIONS

1. Area 2 - Developed Conditions

TR-55 TABULAR DISCHARGE METHOD VERSION 1.11

Project : NAPILI VILLAS User: Date:
County : MAUI State: HI Checked: ____ Date: ________
Subtitle: ON-SITE AREA 2 - DEVELOPED

Total watershed area: 0.028 sq mi Rainfall type: I Frequency: 50 years

	Subareas
	AREA 2
Area(sq mi)	0.03
Rainfall(in)	10.0
Curve number	75
Runoff(in)	6.88
Tc (hrs)	0.41
(Used)	0.40
TimeToOutlet	0.00
Ia/P	0.07
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) AREA 2
9.0	4	4
9.3	6	6
9.6	8	8
9.9	13	13
10.0	19	19
10.1	31	31
10.2	49	49
10.3	60P	60P
10.4	59	59
10.5	47	47
10.6	36	36
10.7	29	29
10.8	24	24
11.0	17	17
11.2	14	14
11.4	12	12
11.6	11	11
11.8	11	11
12.0	10	10
12.3	10	10
12.6	9	9
13.0	8	8
13.5	8	8
14.0	7	7
14.5	6	6
15.0	6	6
15.5	6	6
16.0	5	5
17.0	5	5
18.0	5	5
20.0	4	4
24.0	3	3

P - Peak Flow

2. Area 3 - Developed Conditions

TR-55 TABULAR DISCHARGE METHOD VERSION 1.11

Project : NAPILI VILLAS User: Date:
County : MAUI State: HI Checked: ___ Date: ________
Subtitle: OFF-SITE AREA 3

Total watershed area: 0.098 sq mi Rainfall type: I Frequency: 50 years

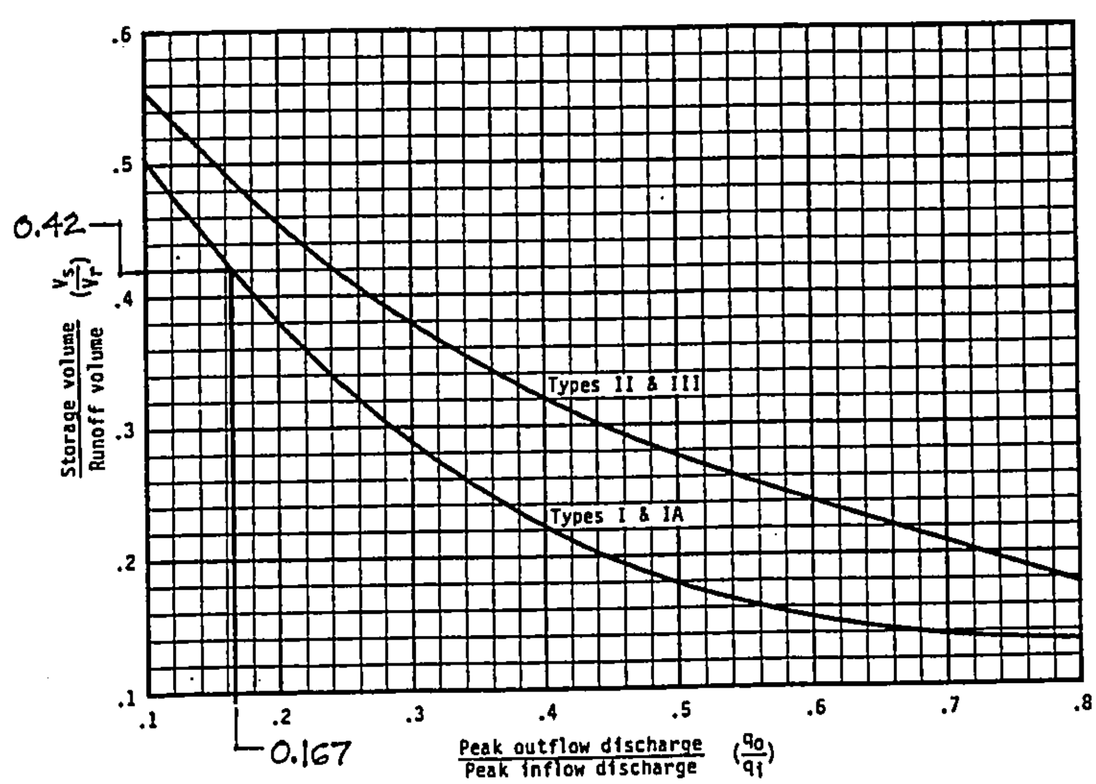
	Subareas
	AREA 3
Area(sq mi)	0.10
Rainfall(in)	11.7
Curve number	61
Runoff(in)	6.46
Tc (hrs)	0.41
(Used)	0.40
TimeToOutlet	0.00
Ia/P	0.11

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) AREA 3
9.0	14	14
9.3	19	19
9.6	25	25
9.9	40	40
10.0	58	58
10.1	97	97
10.2	155	155
10.3	193P	193P
10.4	190	190
10.5	153	153
10.6	117	117
10.7	94	94
10.8	77	77
11.0	57	57
11.2	46	46
11.4	41	41
11.6	37	37
11.8	36	36
12.0	34	34
12.3	31	31
12.6	29	29
13.0	28	28
13.5	25	25
14.0	23	23
14.5	20	20
15.0	19	19
15.5	19	19
16.0	18	18
17.0	17	17
18.0	17	17
20.0	14	14
24.0	9	9

P - Peak Flow

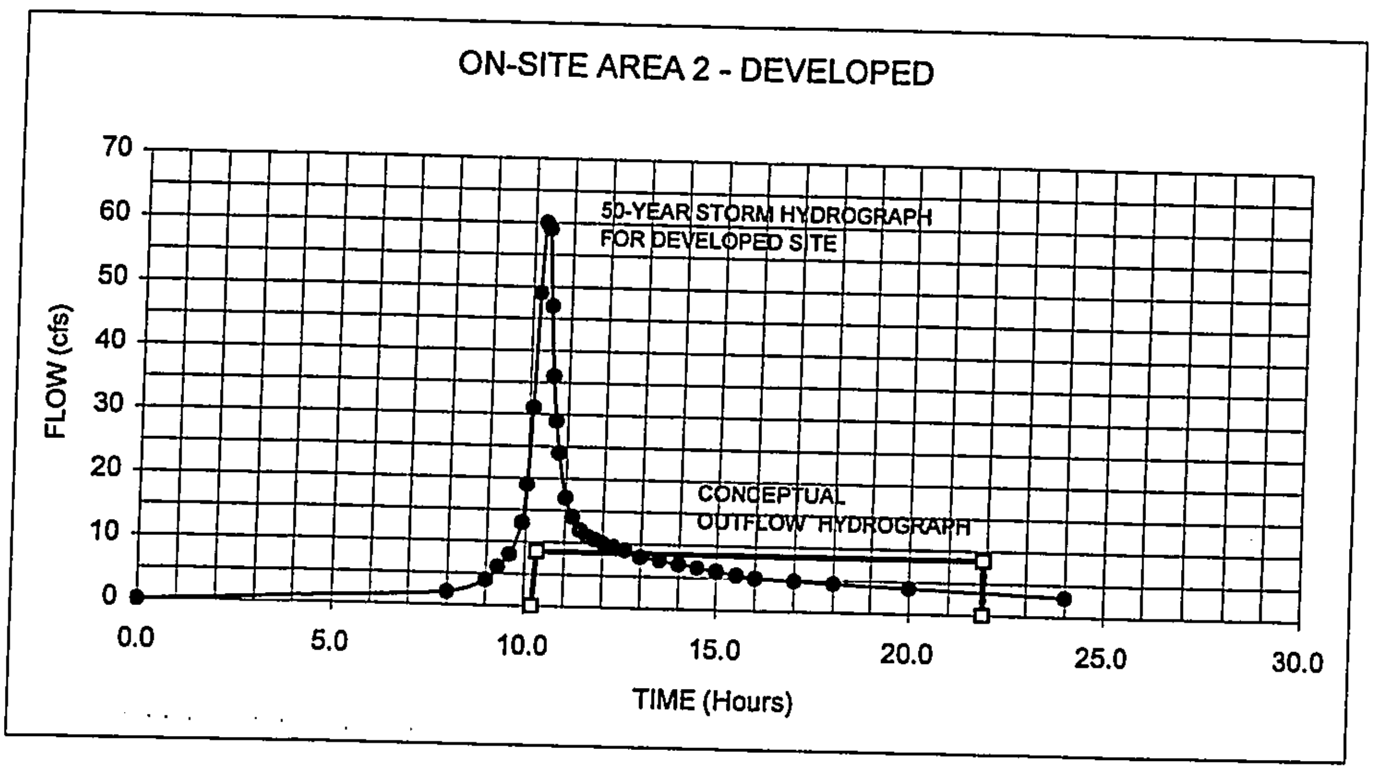
G. PRELIMINARY RETENTION BASIN SIZES

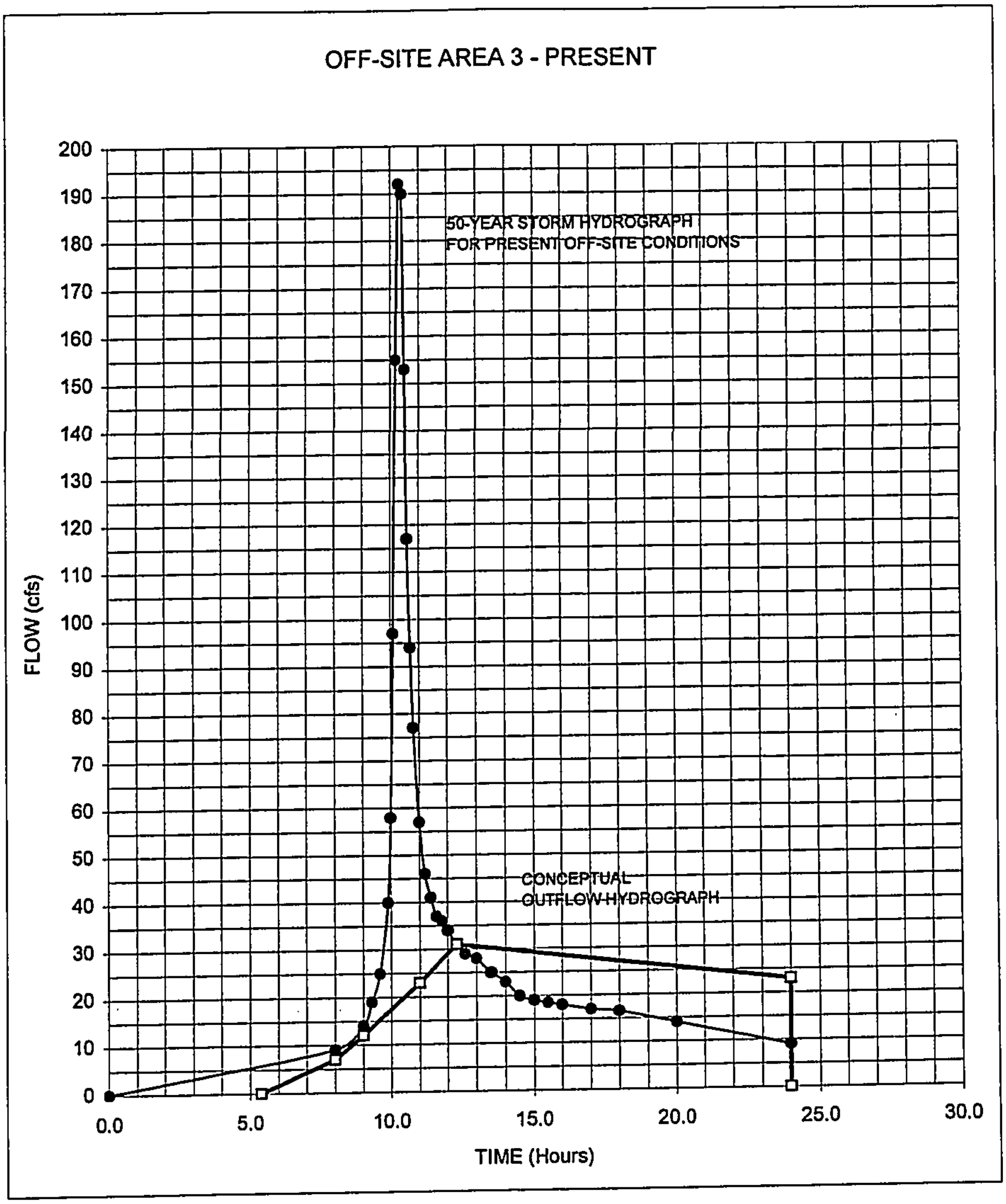
1. On-Site Basin
   a. Runoff Volume = V_r = (6.88/12) x 18.1 = 10.38 acre-feet
   b. Peak Inflow Discharge = q_i = 60 cfs
   c. Peak Outflow Discharge = q_o = 10 cfs
   d. q_o / q_i = 10/60 = 0.167
   e. V_s/V_r = 0.42
   f. Storage Volume = 0.42 x 10.38 = 4.4 acre-feet
2. Off-Site Basin
   a. Runoff Volume = V_r = (6.46/12) x 63.0 = 33.92 acre-feet
   b. Peak Inflow Discharge = q_i = 192 cfs
   c. Peak Outflow Discharge = q_o = 32 cfs
   d. q_o / q_i = 32/192 = 0.167
   e. V_s/V_r = 0.42
   f. Storage Volume = 0.42 x 33.92 = 14.2 acre-feet



H. PRELIMINARY HYDROGRAPHS

The following hydrographs for the on-site basin and the off-site basin are based on the TR-55 data provided in the previous sections. Each hydrograph shows the expected rate of flow versus time into the basin for the 50-year, 24-hour storm, including the peak flow rate. Each hydrograph also provides information on the volume of runoff versus time. The area under the hydrograph represents the volume of runoff. Each hydrograph also shows a conceptual outflow hydrograph for each basin. The maximum flow rate for each outflow hydrograph has been limited to the established allowable value. The outflow hydrograph also accounts for the retained portion of runoff that initially enters the basin. The final design of the outlet structure will affect the outflow hydrograph for each basin and may affect the size of the basin. The preliminary basin sizes, however, should not substantially change since they are conservative estimates of the final required sizes.




OFF-SITE AREA 3 - PRESENT
50-YEAR STORM HYDROGRAPH
FOR PRESENT OFF-SITE CONDITIONS
CONCEPTUAL
OUTFLOW HYDROGRAPH
FLOW (cfs)
TIME (Hours)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0.0
5.0
10.0
15.0
20.0
25.0
30.0

Appendix C

Traffic Impact Analysis Update

TRAFFIC IMPACT ANALYSIS UPDATE

Napili Villas

NAPILI, MAUI, HAWAII

August 2000

PARSONS BRINCKERHOFF

Over a Century of Engineering Excellence

TRAFFIC IMPACT ANALYSIS UPDATE

NAPILI VILLAS

Napili, Maui, Hawaii

August 2000

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I. INTRODUCTION

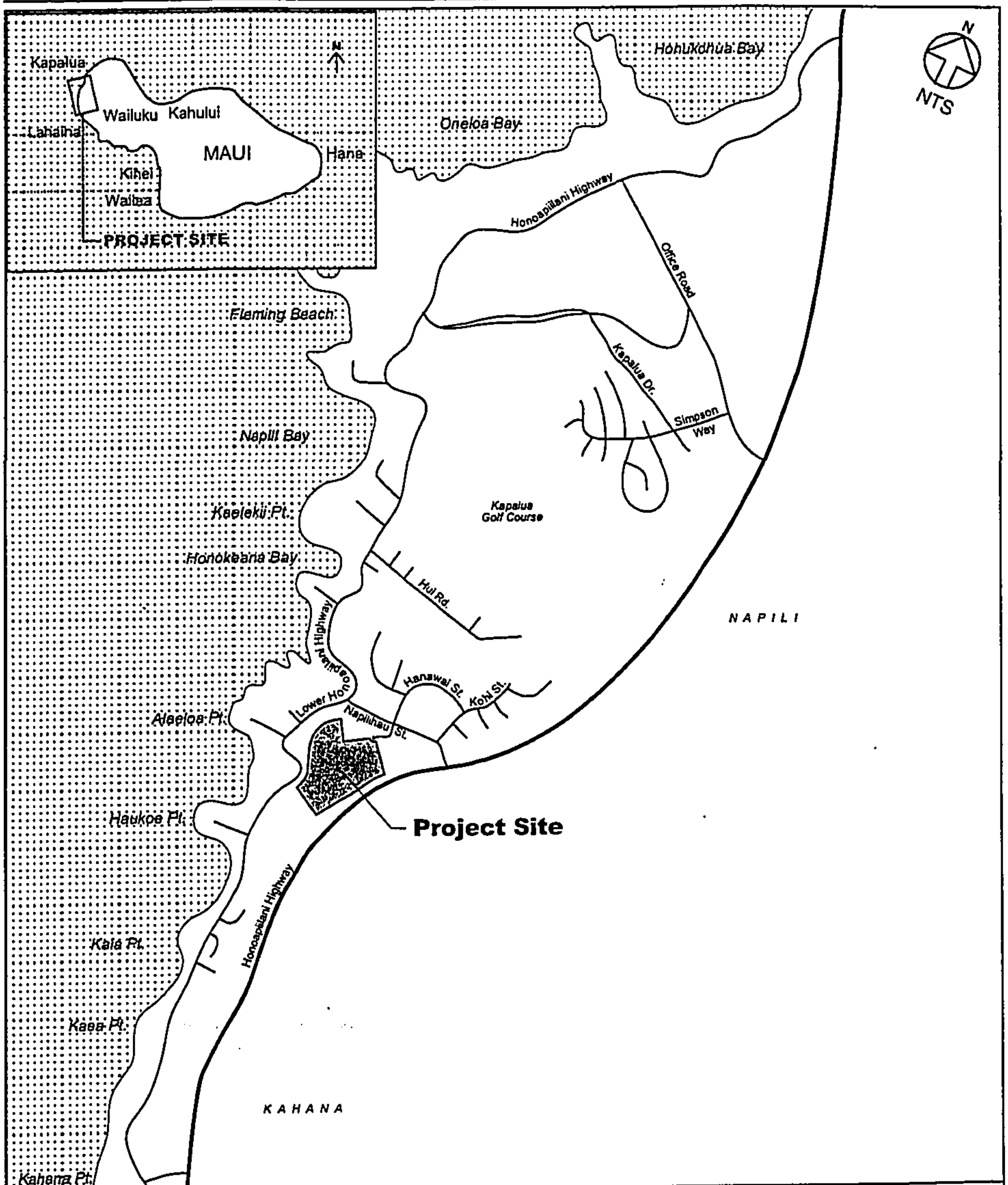
Napili Villas is located in Napili, Maui, Hawaii. This multi-phase development is located between Honoapiilani Highway and Lower Honoapiilani Road on the south side of Napilihau Street. Hanawai Street provides access from Napilihau Street to the development site. Figure 1 shows the project location and Figure 2 shows a conceptual site plan for the development.

The initial phase, called Napilihau Villages, was completed in 1998. It consists of 76 multi-family residential units. The balance of the site, referred to as Napili Villas, is now being developed. It is projected that Napili Villas will be developed in two phases: Phase 1 with 100 multi-family residential units and Phase 2 with the final 84 multi-family residential units. The total development, including the existing Napilihau Villages portion, will total 260 multi-family residential units.

During the rezoning process for original Napilihau Villages, the developer committed to certain traffic improvements. These traffic improvements included:

- participation in signalization and roadway channelization improvements of the Honoapiilani Highway/Napilihau Street intersection;
- roadway channelization improvements at the Napilihau Street/Hanawai Street intersection;
- roadway channelization improvements at the future right-in/right-out access on Honoapiilani Highway, south of Napilihau Street.

The roadway channelization improvements at the Honoapiilani Highway/Napilihau Street intersection have been completed and the traffic signal will be installed shortly. Roadway channelization improvements at the Napilihau Street/Hanawai Street intersection have been completed. Roadway channelization improvements at the future right-in/right-out access on Honoapiilani Highway will be included when the access is implemented. The future right-in/ right-out access is expected to be implemented with Phase 2 of the Napili Villas development.



LOCATION MAP

Figure 1

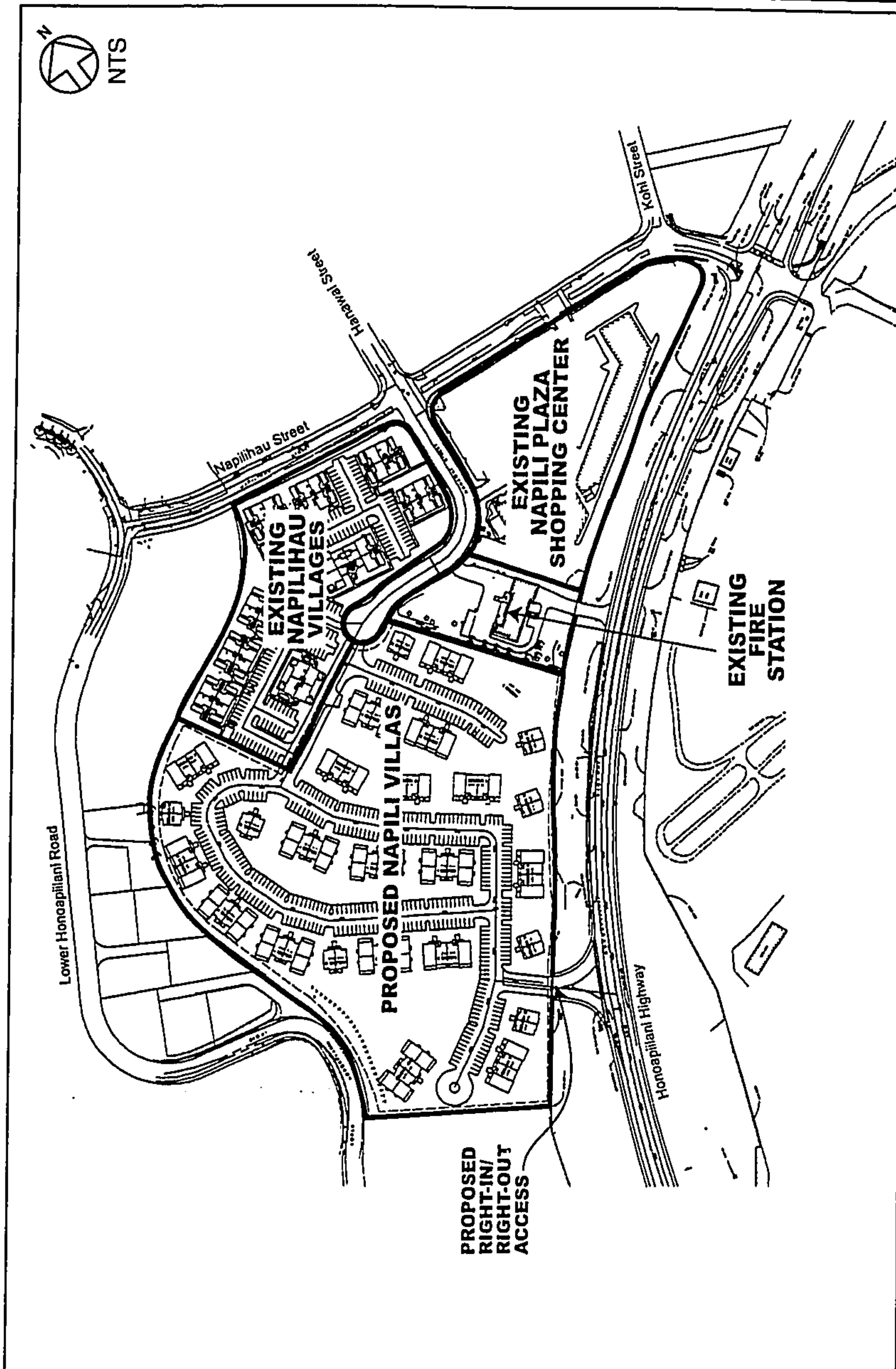


Figure 2

CONCEPTUAL SITE PLAN

A traffic impact assessment study was previously completed in February, 1998 by Austin Tsutsumi & Associates, Inc. This study confirmed that traffic generated by the Napili Villas development could be accommodated by the surrounding roadway system and recommended roadway improvements that were consistent with those committed to by the developer as part of the rezoning process.

This study report updates the previous traffic impact assessment study and focuses on the proposed Napili Villas part of the development. Using newly-conducted traffic counts and the benefits of having the existing Napilihau Villages occupied, traffic analyses were updated and used to review the sufficiency of the committed roadway improvements.

II. EXISTING CONDITIONS

A. EXISTING ROADWAY SYSTEM

Four roadways are of primary interest to this study:

- Honoapiilani Highway;
- Napilihau Street;
- Lower Honoapiilani Road;
- Hanawai Street.

Honoapiilani Highway is the principal arterial roadway in West Maui. It runs generally parallel to the coastline of Maui and provides the primary north-south mobility for the area. In the Napili area, it is a two-lane, undivided roadway with paved shoulders and turn lane channelization at most intersections. The highway currently forms an unsignalized intersection with Napilihau Street with STOP-sign control on Napilihau Street and the road to Maui Pineapple Company Baseyard approaches. Exclusive left and right turn lanes are provided on Honoapiilani Highway. Its posted speed limit is 45 miles per hour (mph).

Napilihau Street is a two-lane, collector roadway that is oriented in the mauka-makai direction. Part of it, along the frontage of Napilihau Villages, was improved as part of Phase 1 of the development. The roadway provides access to the Napili Plaza shopping center and adjacent residential community located on the north side of Napilihau Street. Napilihau Street is also a key route for vehicles moving between Lower Honoapiilani Road and Honoapiilani Highway. In fact, much of the traffic on Napilihau Street is involved in this type of movement. Napilihau Street intersects Honoapiilani Highway and Lower Honoapiilani Road as unsignalized intersections with STOP-sign control on Napilihau Street. Hanawai Street and Kohi Street intersect Napilihau Street at unsignalized intersections with STOP-sign control on those street approaches. The posted speed limit on Napilihau Street is 20 mph.

Lower Honoapiilani Road is a north-south, two-lane roadway oriented parallel to Honoapiilani Highway. It is a major collector roadway that provides access and traffic circulation to development along the West Maui coast between Honokowai and Kapalua. The roadway forms an unsignalized "T" intersection with Napilihau Street with STOP-sign control on Napilihau Street. Its posted speed limit is 20 mph.

Hanawai Street is a two-lane collector roadway oriented in the north-south direction. To the north, it provides access into a residential subdivision. To the south, it provides access to Napili Plaza shopping center, Napili Fire Station, and the existing Napilihau Villages. The intersection between Hanawai Street and Napilihau Street is an unsignalized "two-way stop" intersection with STOP-sign control on Hanawai Street. For the Hanawai Street approach from the south, a left/through lane and an exclusive right-turn lane are provided. The Hanawai Street approach from the north is not channelized but there is enough width to allow right-turning vehicles to bypass vehicles waiting to turn left or to proceed through the intersection. The posted speed limit is 20 mph.

The existing lane configurations at the intersections discussed are shown in Figure 3.

B. Existing Traffic Volumes

Manual turning movement traffic counts were conducted during the afternoon peak periods on Wednesday, August 2, 2000, and during the morning peak periods on Thursday, August 3, 2000, at the following intersections:

- Napilihau Street and Lower Honoapiilani Road;
- Napilihau Street and Hanawai Street.

Observations by counting personnel indicated a high level of construction-related traffic in the peak hour traffic stream at these intersections.

Turning movement traffic counts had been previously conducted at the Honoapiilani Highway/Napilihau Street intersection on Wednesday, May 25, 1999. These were adjusted to Year 2000 based on data from the counts at Hanawai Street and Lower Honoapiilani Road.

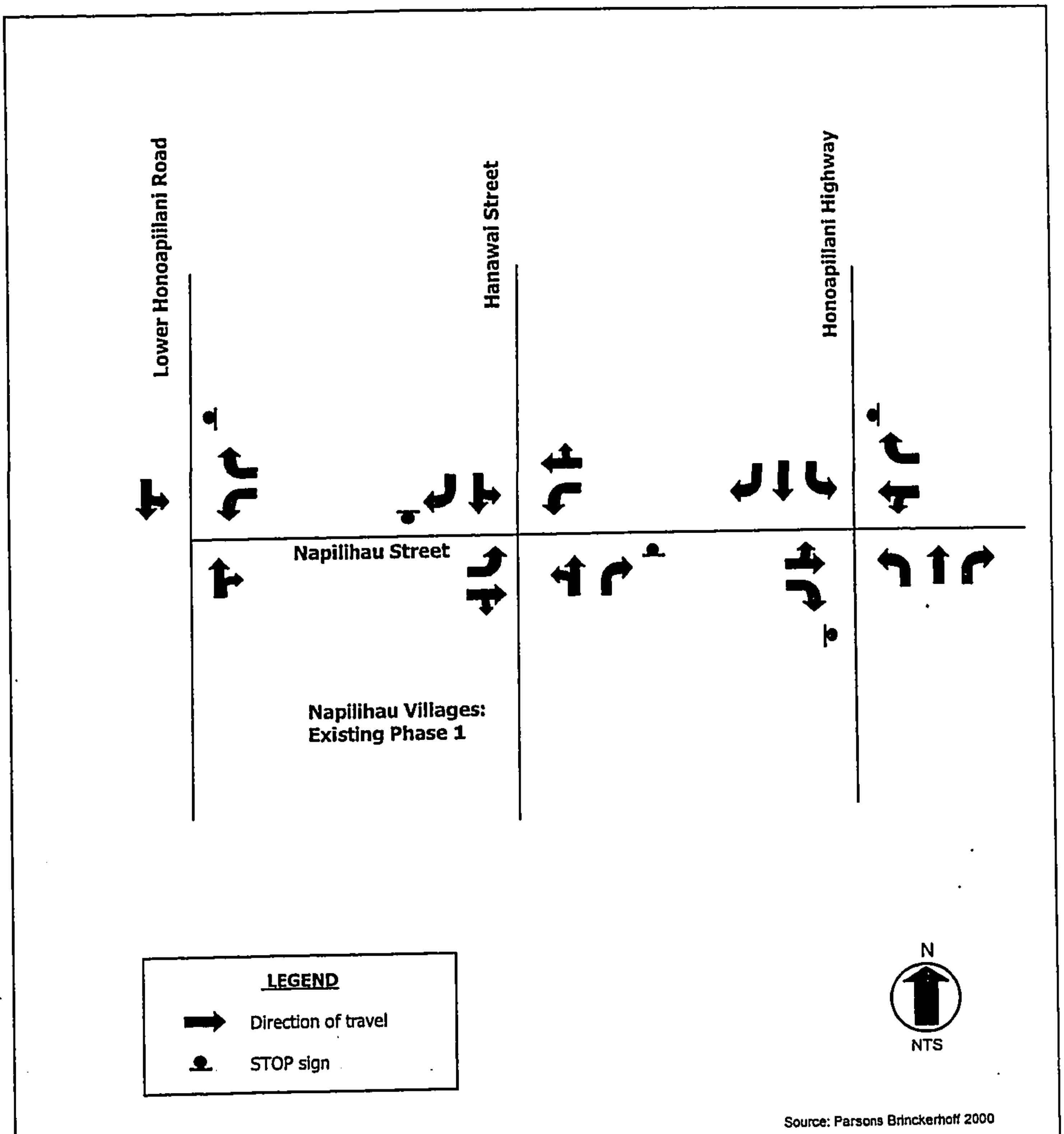


Figure 3
Existing Intersection Configurations

Seasonal traffic data collected as part of the West Maui Noise and Traffic Safety Study was used to adjust existing traffic to account for some schools not being in session. Based on conversations with the State of Hawaii Department of Education (DOE), it was determined that during the recent August, 2000 traffic counts, Lahaina Intermediate School was in session. Kamehameha III Elementary School and Lahainaluna High School were not in session. DOE currently provides one school bus for each school and each school bus makes one trip to Napili in the morning and one trip to Napili in the afternoon. The Lahaina Intermediate school bus was counted in the recent traffic count.

The morning and afternoon peak hours were found to occur from 7:15 to 8:15 AM and 3:45 to 4:45 PM.

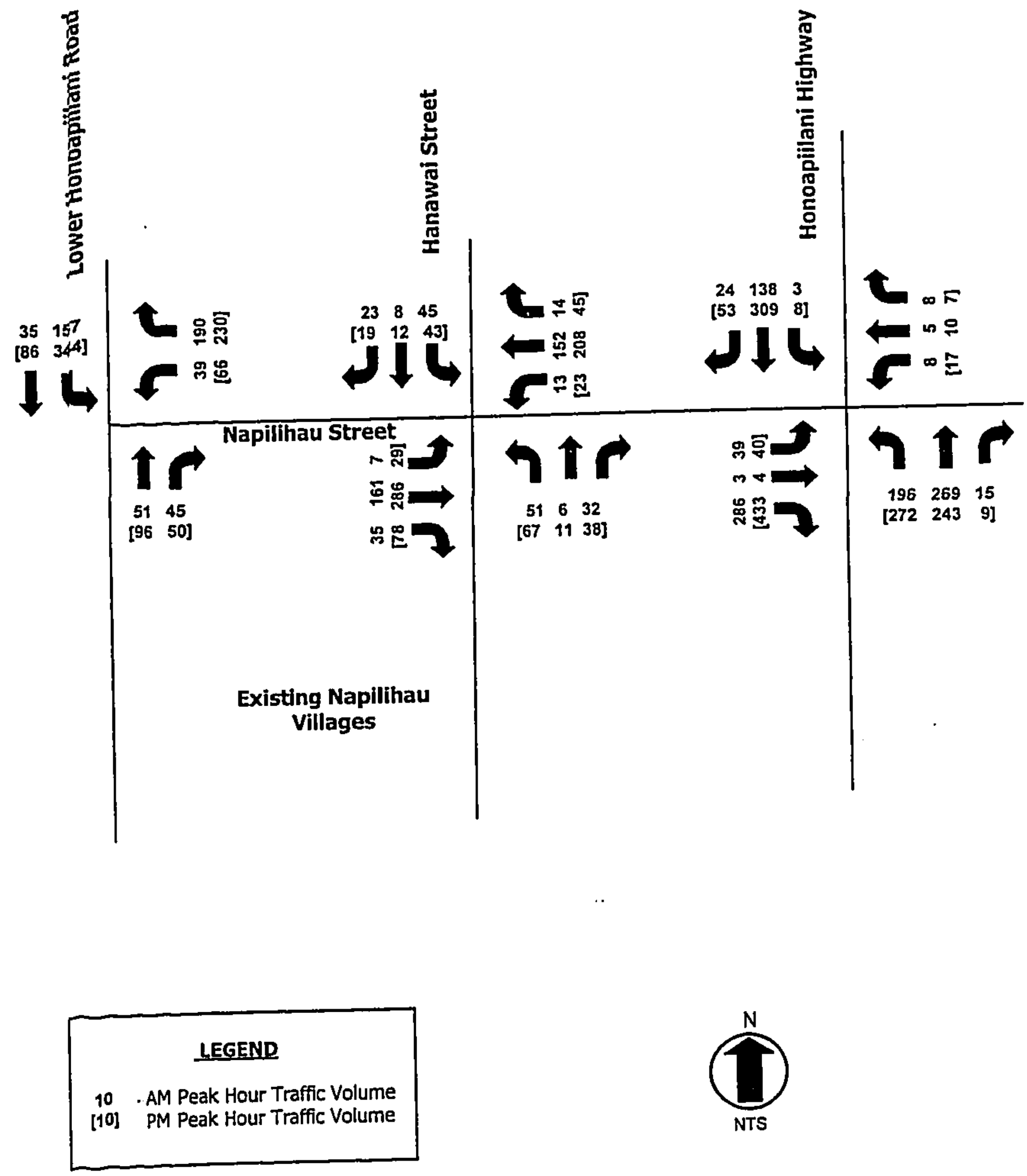
The existing traffic volumes are shown in Figure 4, and the traffic data are included in Appendix A of this report.

C. EXISTING INTERSECTION OPERATIONS

Traffic operations at each intersection were evaluated based on the existing roadway conditions and traffic volumes. All intersections were analyzed using the 1994 Highway Capacity Manual methodology for unsignalized intersections. Intersection operating conditions are expressed as the qualitative measure Level-of-Service (LOS). LOS is represented by a letter designation ranging from A to F. LOS A represents free-flow operating conditions, while LOS F represents congested conditions. LOS A through E are usually considered acceptable for peak hour conditions. More detailed LOS definitions are included in Appendix B.

Table 1 summarizes the results of the analysis of existing unsignalized intersections. As shown in Table 1, the overall intersection LOS at the intersection of Napilihau Street and Honoapiilani Highway operates acceptably in both peak hours (LOS A and LOS A), although left-turn traffic movements on the Napilihau Street and Baseyard approaches experience some delay. The small number of vehicles that attempt the left-turn movement allows the movement to operate under its theoretical capacity.

The Napilihau Street/Hanawai Street intersection operates well during both peak hours. All intersection approaches experience minimal delays.



Source: Parsons Brinckerhoff 2000

Figure 4
Existing Peak Hour Traffic Volumes

Table 1

Existing Conditions Level of Service
Unsignalized Intersections

Intersection	AM Peak Hour 7:15-8:15 AM		PM Peak Hour 3:45-4:45 PM	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Napilihau St/Honoapiilani Hwy				
Mauka-bound Napilihau Approach (LT)	C	10.6	C	13.3
Mauka-bound Napilihau Approach (RT)	A	4.3	B	8.0
Makai-bound Baseyard Approach	B	9.8	E	34.4
NB Honoapiilani LT to Napilihau	A	3.0	A	4.4
SB Honoapiilani LT to Baseyard	A	2.9	A	2.8
Napilihau Street/Hanawai Street				
NB Hanawai Street Approach	B	5.5	B	8.8
SB Hanawai Street Approach	B	5.6	B	8.8
Mauka-bound Napilihau LT to Hanawai	A	2.6	A	2.9
Makai-bound Napilihau LT to Hanawai	A	2.7	A	2.3
Napilihau St/Lower Honoapiilani				
Makai-bound Napilihau Approach (LT)	B	6.0	C	13.3
Makai-bound Napilihau Approach (RT)	A	3.4	A	3.9
SB Lower Honoapiilani LT to Napilihau	A	3.9	B	6.0

Note: NB= northbound, SB= southbound, EB= eastbound, WB= westbound, LT=left turn

The intersection of Napilihau Street and Hanawai Street operates well during both peak hours.

The intersection of Napilihau Street and Lower Honoapiilani Road also operates well during both peak hours (LOS A and LOS A), although the left-turn out of Napilihau Street onto Lower Honoapiilani Road experiences occasional delays during the peak hours.

The intersection of Napilihau Street and Honoapiilani Highway operates well. The left-turning movements out of the Napilihau Street and Baseyard approaches movements are calculated to experience delays during peak hours. However, the State of Hawaii Department of Transportation has procured a contractor to install a traffic signal at this intersection. The traffic signal is expected to be operational within a year.

III. FUTURE TRAFFIC CONDITIONS

The proposed Napili Villas residential development is the continuation of the existing Napilihau Villages development. Napili Villas is expected to be developed in two phases. The first phase is expected to be completed by Year 2002, while the second phase is expected to follow shortly after, by Year 2003.

The future traffic analysis therefore, addresses two time frames: Phase 1 (Year 2002) and Phase 2 (Year 2003). The Phase 1 time frame reflects the development of approximately 100 multi-family residential units and will utilize the existing access at Hanawai Street. Phase 2 will add an additional 84 multi-family residential units and will add an additional right-in/right-out access on Honoapiilani Highway, south of Napilihau Street.

Future traffic generated by the Napili Villas development will be estimated using the forecasting methodology of trip generation, trip distribution, and trip assignment. Future background traffic (traffic not associated with the proposed Napili Villas development) will be forecasted as a base level of future traffic, upon which the Napili Villas traffic is overlaid. Future intersection operations will be evaluated using signalized and unsignalized intersection capacity analysis methods documented in the 1994 Highway Capacity Manual for both future background and total (background plus project) traffic volumes.

A. TRIP GENERATION

Traffic generated by Phases 1 and 2 of the Napili Villas development were estimated using trip generation relationships documented the Institute of Transportation Engineers (ITE) publication entitled, Trip Generation, 6th Edition. The multi-family trip generation relationships under ITE Code 221 were used.

The resulting trip generation is shown in Table 2 with the phases itemized. Phase 1 is assumed to consist of 100 multi-family units, while Phase 2 is assumed to consist of 84 multi-family units.

Table 2
Trip Generation Summary

Land Use Type	No. of Units	Morning Peak Hour Enter	Morning Peak Hour Exit	Morning Peak Hour Total	Evening Peak Hour Enter	Evening Peak Hour Exit	Evening Peak Hour Total
Phase 1	100	10	40	50	41	21	62
Phase 2	84	8	33	41	34	18	52
Total	184	18	73	91	75	39	114

Note: Based ITE Trip Generation, 6th Edition. Land Use Category: 221

B. TRIP DISTRIBUTION

The traffic generated by Napili Villas was directionally distributed and assigned to the surrounding roadway network. Trips were distributed 10 percent to north Honoapiilani Highway, 65 percent to south Honoapiilani Highway south, 20 percent north on Lower Honoapiilani Road, and 5 percent to the south on Lower Honoapiilani Road. These distributions were applied to the trips generated, and the resulting Site-Generated assignments are shown in Figures 5 and 6 for Phases 1 and the Combined Phases 1 and 2, respectively.

C. FUTURE TRAFFIC VOLUMES WITHOUT NAPILI VILLAS

The Year 2002 and Year 2003 background traffic volumes were estimated by factoring existing traffic by annual growth rates estimated from 1997 *Hawaii State Department of Transportation (SDOT) Traffic Counts* at Station C-12-F (Honoapiilani Highway and Napilihau Street) and the Maui Long-Range Land Transportation Plan developed by the State of Hawaii Department of Transportation. Based on a review of these patterns, an average annual growth rate of 4 percent was assumed for Honoapiilani Highway and Honoapiilani Highway–oriented traffic movements.

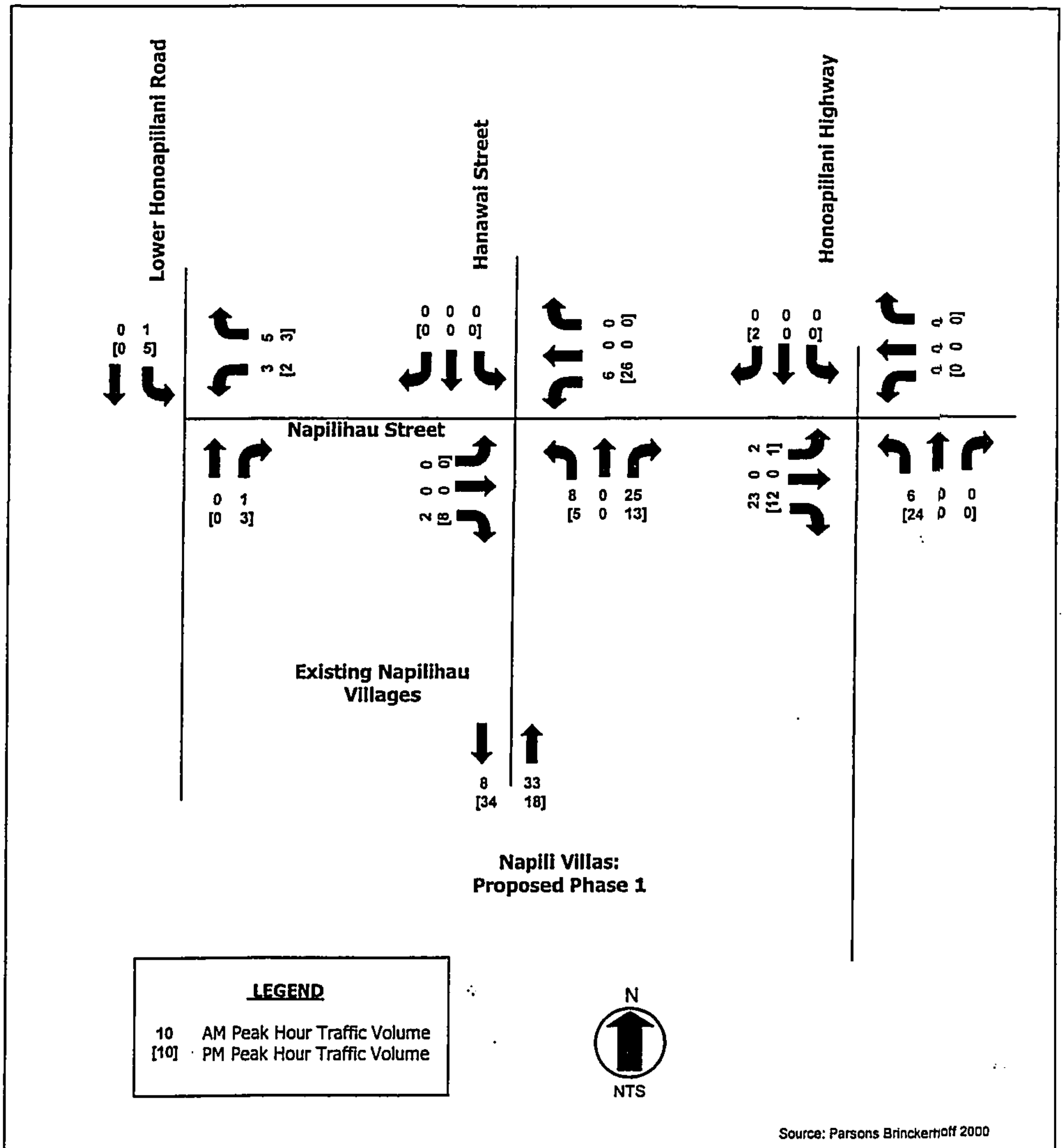
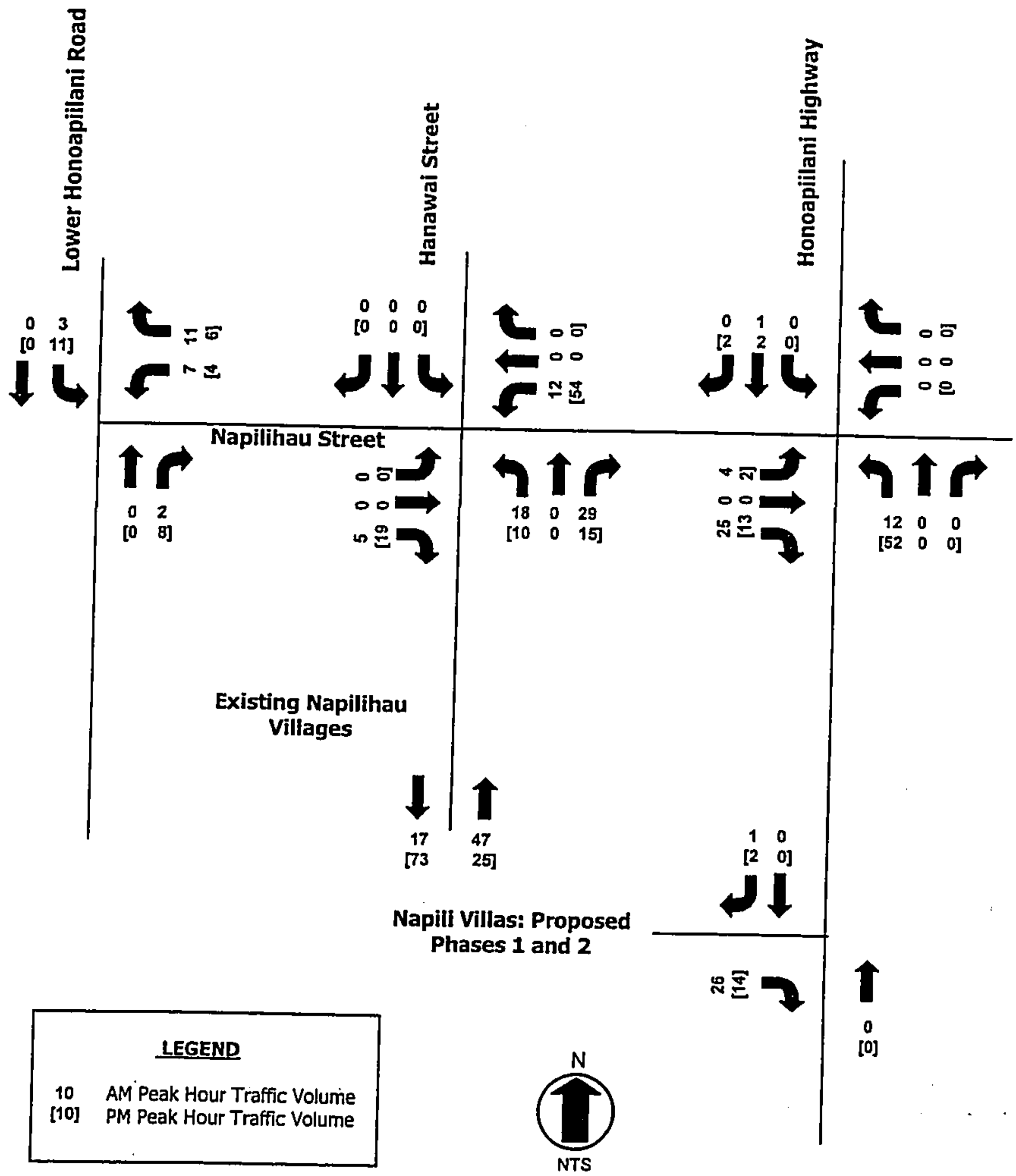


Figure 5
Phase 1 Generated Traffic Volumes



LEGEND

10 AM Peak Hour Traffic Volume
[10] PM Peak Hour Traffic Volume

Source: Parsons Brinckerhoff 2000

Figure 6
Phase 1 and 2 Generated Traffic Volumes

The resulting background peak hour traffic volumes for the Phase 1 (Year 2002) and Phase 2 (Year 2003) time frames are shown in Figures 7 and 8. They represent traffic growth that would occur without the development of the Napili Villas development.

D. TOTAL TRAFFIC

The site generated traffic was added to the future background traffic for each time frame to obtain the future peak hour traffic volumes with the Napili Villas. Figures 9 and 10 present the projected Phase 1 (Year 2002) and Phase 2 (Year 2003) Total AM and PM peak hour turning movement volumes. Phase 2 includes traffic from both Phase 1 and 2.

E. INTERSECTION OPERATIONS ANALYSIS RESULTS

The three study intersections were analyzed using projected traffic volumes both with and without the Napili Villas development. The 1994 Highway Capacity Manual methods for signalized and unsignalized intersections were used. Tables 3 and 4 summarize the resulting intersection operations without and with the Napili Villas development for Phase 1 and Phase 2, respectively. The analysis worksheets are in Appendix C.

As shown in both Tables 3 and 4, level of service (LOS) at the intersections evaluated along Napilihau Street will operate at LOS C or better, without or with the Napili Villas development. This is considered good intersection operation. The proposed right-in/right-out on Honoapiilani Highway is also projected to operate very well during both peak hours.

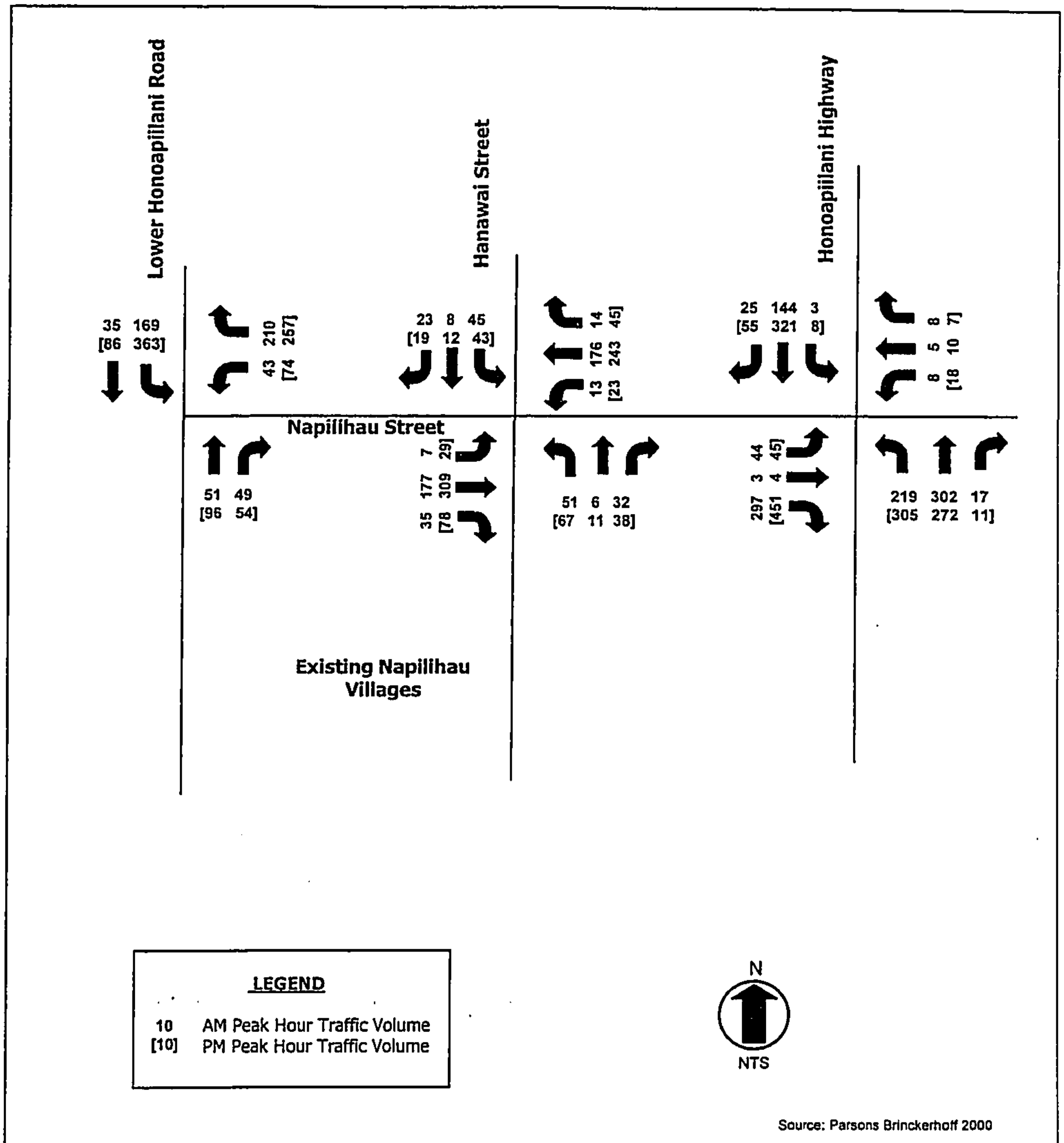
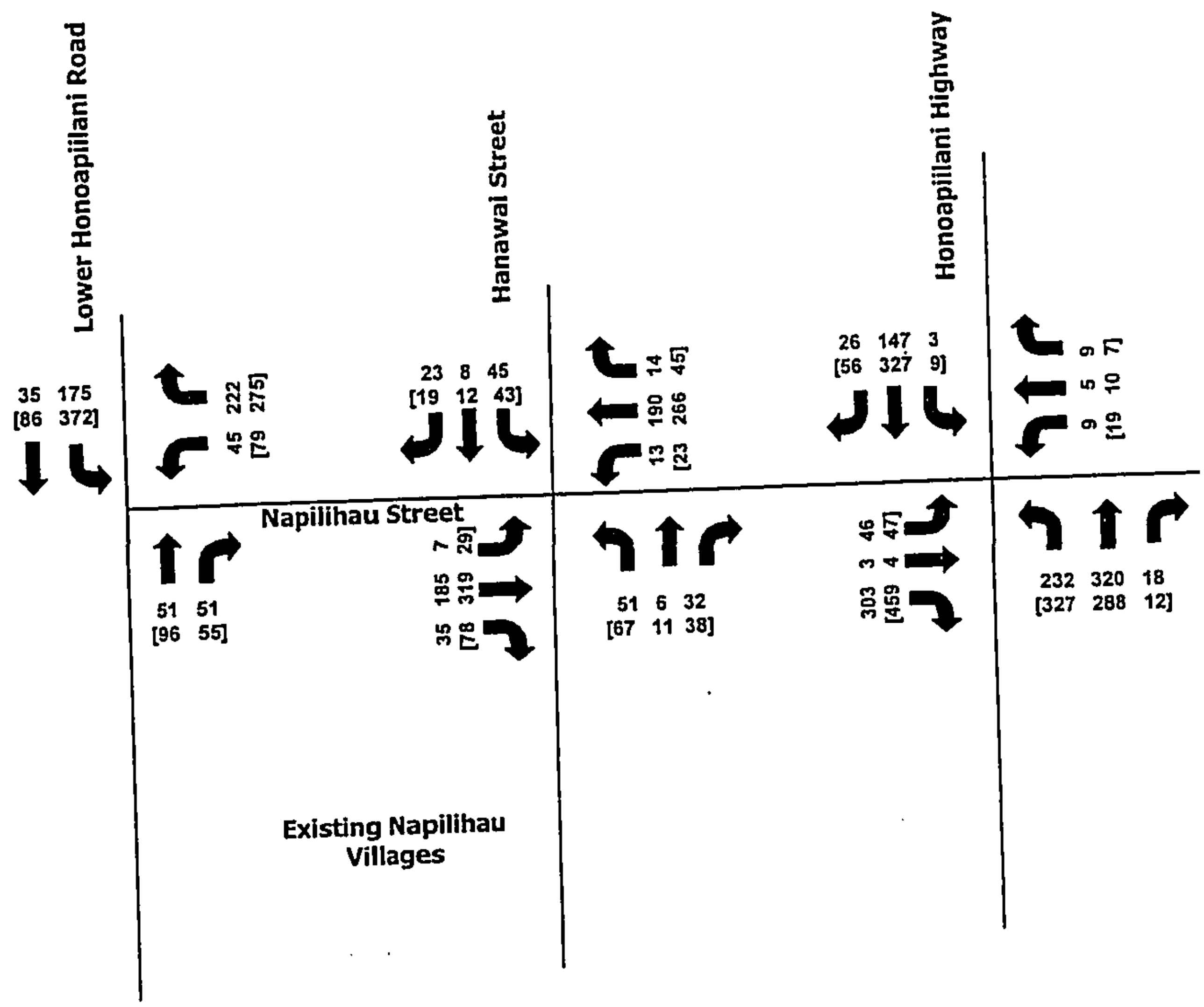


Figure 7
Year 2002 Peak Hour Traffic Volumes without Project



LEGEND

10 AM Peak Hour Traffic Volume
[10] PM Peak Hour Traffic Volume

Source: Parsons Brinckerhoff 2000

Figure 8
Year 2003 Peak Hour Traffic Volumes without Project

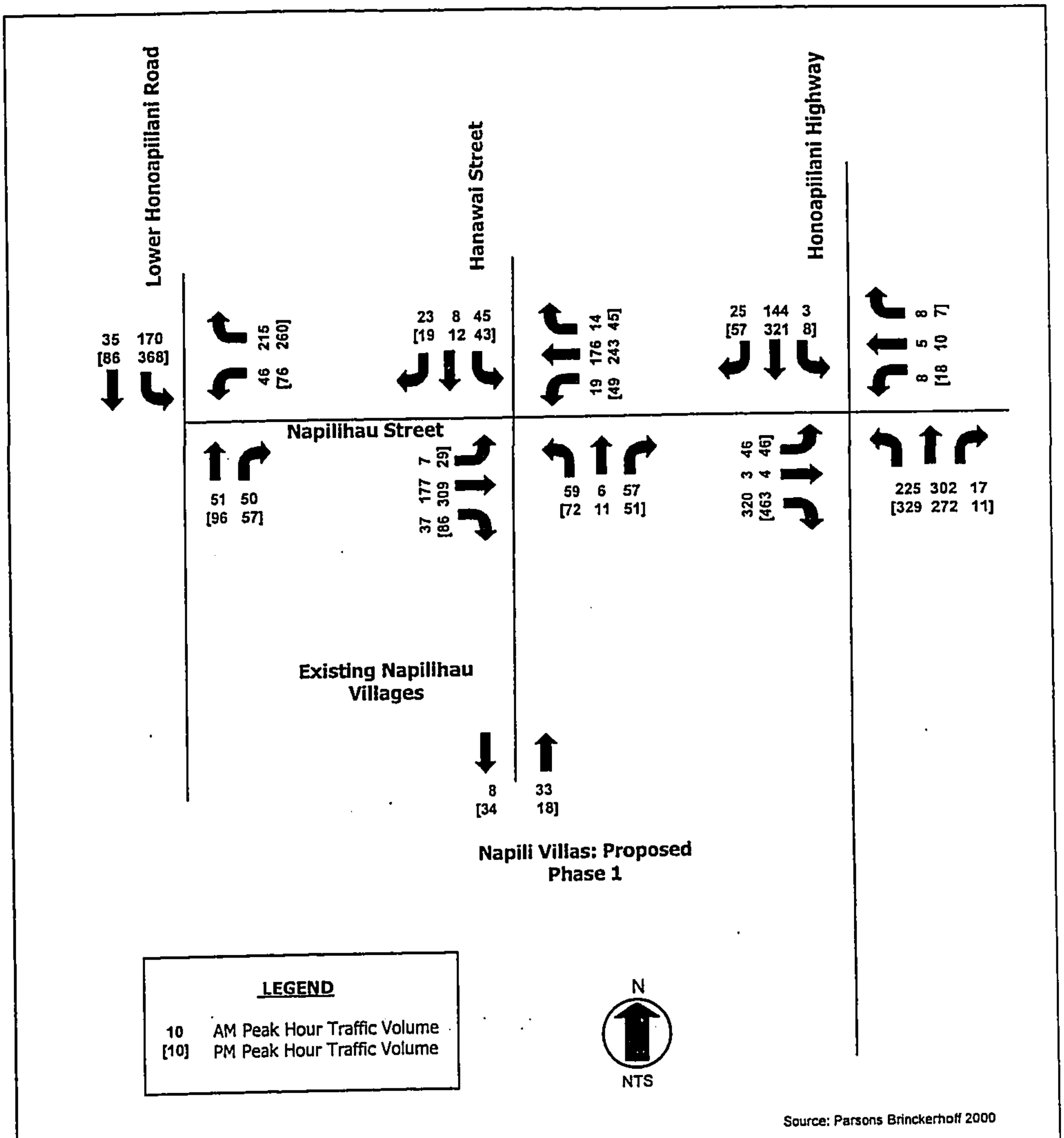


Figure 9
Year 2002 Peak Hour Traffic Volumes with Phase 1

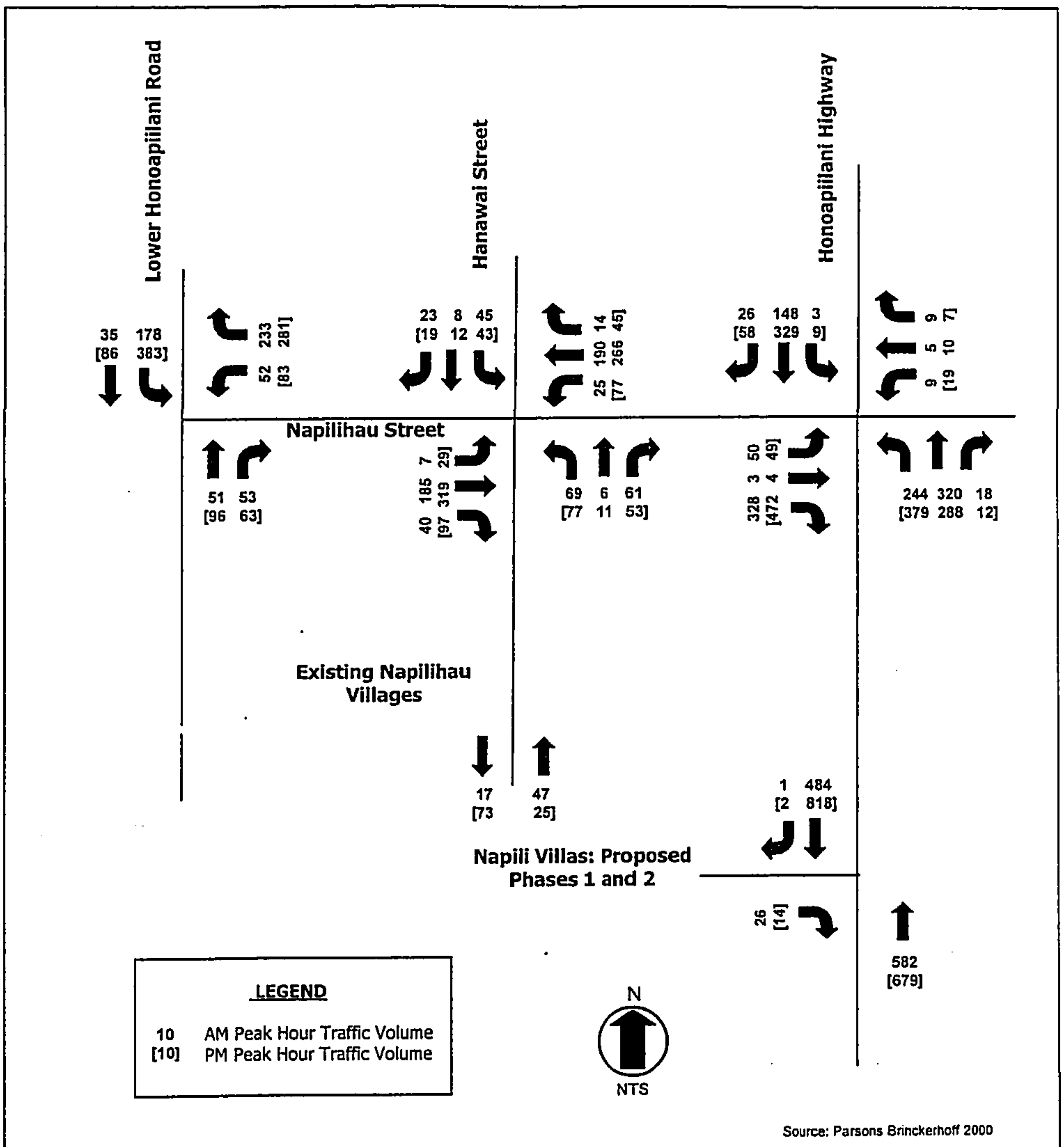


Figure 10
Year 2003 Peak Hour Traffic Volumes with Phases 1 and 2

Table 3

Phase 1 (Year 2002) Conditions Peak Hour Levels of Service Comparison of With and Without

Napili Villas Multi-Family Residential Development

Intersection	Without Project		With Project	
	AM (delay)	PM (delay)	AM (delay)	PM (delay)
Honoapiilani Highway/ Napilihau Street (Signalized)	**B (9.2)**	**B (11.0)**	**B (9.2)**	**B (11.2)**
Napilihau Approach	B (7.3)	B (7.9)	B (7.4)	B (8.0)
Maui Pineapple Baseyard Approach	B (14.8)	C (15.8)	B (14.8)	C (15.8)
NB Honoapiilani Approach	B (9.0)	B (10.6)	B (9.1)	B (11.2)
SB Honoapiilani Approach	B (13.1)	C (15.2)	B (13.1)	C (15.2)
Napilihau St./Hanawai St.				
NB Hanawai Approach	B (5.8)	B (9.7)	B(5.8)	C (10.2)
SB Hanawai Approach	B (6.0)	B (9.7)	B (6.3)	C (11.7)
Mauka-bound LT into Hanawai	A (2.6)	A (3.0)	A (2.6)	A (3.0)
Makai-bound LT into Hanawai	A (2.7)	A (3.4)	A (2.8)	A (3.5)
Lower Honoapiilani/ Napilihau				
Makai-bound Left Turn	B (6.3)	C (14.8)	B (6.3)	C (15.3)
Makai-bound Right Turn	A (3.5)	A (4.0)	A (3.6)	A (4.1)
SB LT to Napilihau Street	A (2.7)	A (3.5)	A (2.7)	A (3.6)

Note: NB- northbound, SB- southbound, EB- eastbound, WB- westbound
Delay is expressed as seconds per vehicle.

Table 4

Phase 2 (Year 2003) Conditions Peak Hour Levels of Service Comparison of With and Without

Napili Villas Multi-Family Residential Development

Intersection	Without Project		With Project	
	AM (delay)	PM (delay)	AM (delay)	PM (delay)
Honoapiilani Highway/ Napilihau Street (Signalized)	**B (9.3)**	**B (11.2)**	**B (9.4)**	**B (11.8)**
Napilihau Approach	B (7.3)	B (8.0)	B (7.5)	B (8.1)
Maui Pineapple Baseyard Approach	B (14.8)	C (15.9)	B (14.8)	C (15.9)
NB Honoapiilani Approach	B (9.1)	B (11.0)	B (9.3)	B (12.4)
SB Honoapiilani Approach	B (13.2)	C (15.3)	B (13.2)	C (15.3)
Napilihau St./Hanawai St.				
NB Hanawai Approach	B (6.0)	C (10.3)	B(6.0)	C (12.2)
SB Hanawai Approach	B (6.2)	C (10.2)	B (6.6)	C (12.4)
Mauka-bound LT into Hanawai	A (2.7)	A (3.1)	A (2.7)	A (3.1)
Makai-bound LT into Hanawai	A (2.7)	A (3.4)	A (2.8)	A (3.7)
Lower Honoapiilani/ Napilihau				
Makai-bound Left Turn	B (6.4)	C (15.7)	B (6.6)	C (16.9)
Makai-bound Right Turn	A (3.6)	A (4.1)	A (3.6)	A (4.2)
SB LT to Napilihau Street	A (2.7)	A (3.6)	A (2.7)	A (3.7)
Honoapiilani Hwy/RI/RO				
Right Turn onto Honoapiilani Hwy	NA	NA	A (3.6)	A (4.4)

Note: NB- northbound, SB- southbound, EB- eastbound, WB- westbound, NA=not applicable
RI/RO = right-in/right-out access, Delay is expressed as seconds per vehicle.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSION

Based on this traffic analysis, it is concluded that the traffic generated by the proposed buildout of the Napili Villas development can be accommodated by the surrounding roadway system. The roadway improvements previously committed to and being implemented by the developer are still valid and sufficient to accommodate the traffic generated by the development.

B. RECOMMENDATIONS

1. Site Access

Much of the site access improvements on Napilihau Street have been completed. The extension of Hanawai Street to provide access to the future Napili Villas was completed as part of the existing Napilihau Villages by the developer. The Napilihau Street/Hanawai Street intersection is channelized with exclusive left-turn lanes in Napilihau Street and a left/through and a right-turn lane on the northbound approach of Hanawai Street.

The frontage of the Napilihau Villages along Napilihau Street was improved by the developer with sidewalks and curb and gutter.

A future right-in/right-out access is planned as part of Phase 2 of the Napili Villas development. Discussions have been held with the State of Hawaii Department of Transportation (SDOT), and SDOT has concurred with the concept of the proposed access. Final SDOT approval for the access configuration is subject to review of the final design plans. The developer will bear the cost of this improvement.

2. Major Intersection Improvements

SDOT has procured a contractor to construct a traffic signal at the Honoapiilani Highway/Napilihau Street intersection. It is projected that by the completion of Phase 1 of the Napili Villas development, the traffic signal will be operational. The developer of Napili Villas participated in the cost of this improvement.

APPENDIX

Appendix A Traffic Count Data

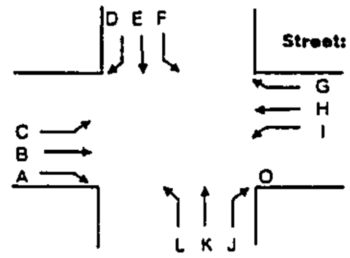
AM COUNT SHEET

Intersection: Honoapiilani/Napilihau

Date: 5/25/1999

By: -

Weather: -



Street: Honoapiilani

Street Napilihau

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
6:30 - 6:45	2	33	23	31	2	6	1	12	1	5	1	4	121	807
6:45 - 7:00	1	59	43	50	0	4	3	20	2	1	0	2	185	924
7:00 - 7:15	3	56	25	86	0	7	5	27	1	3	1	4	218	968
7:15 - 7:30	10	59	47	104	1	8	6	40	1	2	3	2	283	994
7:30 - 7:45	2	77	44	70	1	8	10	21	0	2	1	2	238	923
7:45 - 8:00	1	64	44	68	0	13	4	30	0	2	1	2	229	
8:00 - 8:15	2	69	61	44	1	10	4	47	2	2	0	2	244	
8:15 - 8:30	6	61	49	51	0	3	9	31	0	1	0	1	212	
Phf	0.400	0.831	0.851	0.788	0.500	0.692	0.625	0.738	0.500	0.750	0.500	0.625	Peak	Phf
7:00 - 8:00	16	256	160	328	2	36	25	118	2	9	6	10	968	0.855

Peak Hour

7:00 - 8:00

366 | 191

328 RIGHT | 2 THRU | 36 LEFT

Street: Honoapiilani

456 | 145

RIGHT 25
THRU 118
LEFT 2

160 LEFT
256 THRU
16 RIGHT

432 | 301

LEFT 10 | THRU 6 | RIGHT 9

20 | 25

Street: Napilihau

PARSONS BRINCKERHOFF

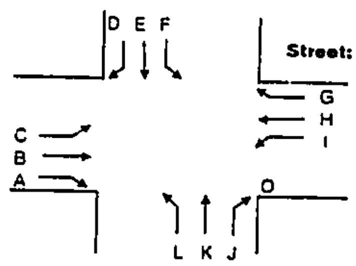
PM COUNT SHEET

Intersection: Honoapiilani/Napilihau

Date: 5/25/1999

By: -

Weather: -



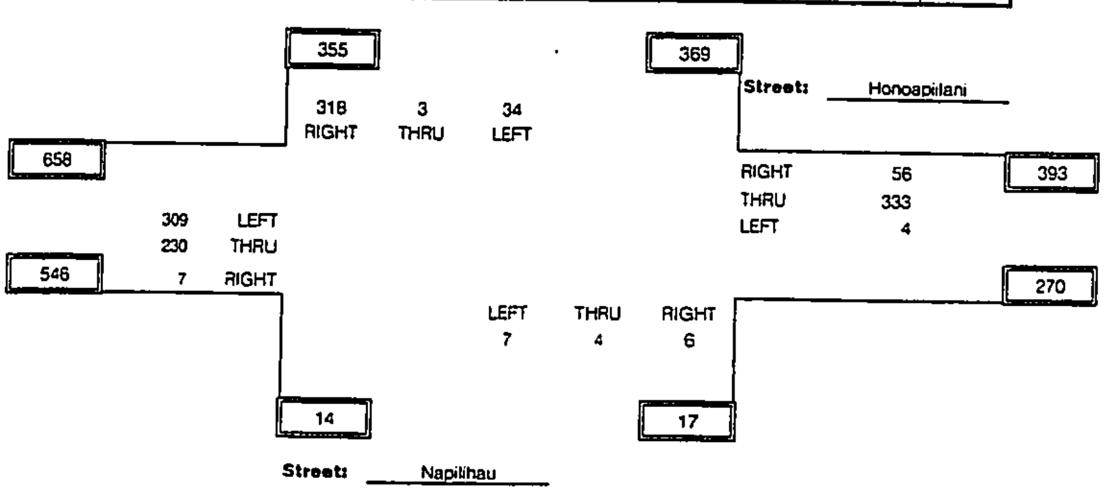
Street: Honoapiilani

Street Napilihau

TIME	A	B	C	D	E	F	G	H	I	J	K	L	Total Mvmt	Total Hour
3:30 - 3:45	2	62	68	92	3	6	11	61	3	4	2	7	321	1318
3:45 - 4:00	1	53	71	79	1	12	10	62	2	0	4	6	301	1293
4:00 - 4:15	3	63	70	87	0	14	12	72	1	0	4	2	328	1311
4:15 - 4:30	3	65	63	88	0	8	20	114	2	3	0	2	368	1284
4:30 - 4:45	0	48	90	62	1	7	11	74	0	1	0	2	296	1172
4:45 - 5:00	1	54	86	81	2	5	13	73	1	2	0	1	319	
5:00 - 5:15	0	57	75	81	0	12	12	63	0	0	0	1	301	
5:15 - 5:30	2	39	58	70	2	12	7	61	0	0	3	2	256	
Phf	0.583	0.885	0.858	0.903	0.375	0.607	0.700	0.730	0.500	0.500	0.250	0.875	Peak	Phf
4:00 - 5:00	7	230	309	318	3	34	56	333	4	6	4	7	1311	0.891

Peak Hour

4:00 - 5:00



PARSONS BRINCKERHOFF

Parsons Brinckerhoff Quade and Douglas
1001 Bishop Street Suite 3000
Honolulu, HI 96813

Site Code : 00000000
Start Date: 08/02/00
File I.D. : HANAWPM
Page : 1

Movement 1

	HANAWAI Southbound			NAPILIHAU Westbound			HANAWAI Northbound			NAPILIHAU Eastbound			
Start Time	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Total
2:30	4	1	9	14	39	2	5	0	14	7	44	2	141
2:45	3	1	14	8	52	9	10	1	14	20	45	3	180
Total	7	2	23	22	91	11	15	1	28	27	89	5	321
3:00pm	0	1	5	14	46	2	10	0	11	17	57	4	167
3:15	2	2	10	12	46	4	10	2	11	18	43	3	163
3:30	0	4	8	6	38	5	8	4	16	19	46	4	158
3:45	6	1	12	10	62	6	10	1	16	16	55	3	198
Hour Total	8	8	35	42	192	17	38	7	54	70	201	14	686
4:00pm	3	3	14	20	47	6	7	3	19	15	77	11	225
4:15	9	2	5	5	52	6	10	4	13	20	66	9	201
4:30	1	6	12	10	47	5	11	3	19	27	88	6	235
4:45	7	1	8	11	39	6	5	0	25	10	55	4	171
Hour Total	20	12	39	46	185	23	33	10	76	72	286	30	832
5:00pm	4	4	8	9	46	7	5	4	16	23	44	8	178
5:15	6	2	9	6	53	6	6	3	23	18	57	3	192
5:30	1	0	9	3	44	7	6	3	15	16	48	1	153
Total	11	6	26	18	143	20	17	10	54	57	149	12	523
Grand	46	28	123	128	611	71	103	28	212	226	725	61	2362
% of Total	1.9%	1.2%	5.2%	5.4%	25.9%	3.0%	4.4%	1.2%	9.0%	9.6%	30.7%	2.6%	
Apprch %	8.3%			34.3%			14.5%			42.8%			
% of Apprch	23.4%	14.2%	62.4%	15.8%	75.4%	8.8%	30.0%	8.2%	61.8%	22.3%	71.6%	6.0%	

Parsons Brinckerhoff Quade and Douglas
1001 Bishop Street Suite 3000
Honolulu, HI 96813

Site Code : 00000000
Start Date: 08/03/00
File I.D. : HANAWAM
Page : 1

Movement 1

	HANAWAI Southbound			ANAPILIHAU Westbound			HANAWAI Northbound			ANAPILIHAU Eastbound			
Start Time	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Total
6:30	2	0	8	4	23	0	4	0	6	2	31	1	81
6:45	3	1	13	3	24	2	6	2	9	13	28	3	107
Total	5	1	21	7	47	2	10	2	15	15	59	4	188
7:00am	4	2	11	3	24	2	4	0	15	7	35	1	108
7:15	6	3	12	5	35	6	9	0	14	11	33	0	134
7:30	10	2	16	3	34	2	6	2	8	7	36	2	128
7:45	5	1	11	5	53	4	8	4	14	12	53	5	175
Hour Total	25	8	50	16	146	14	27	6	51	37	157	8	545
8:00am	2	2	6	1	30	1	9	0	15	5	39	0	110
8:15	4	1	5	3	22	7	4	0	8	10	43	0	107
8:30	7	1	3	3	26	2	4	2	8	11	46	3	116
Total	13	4	14	7	78	10	17	2	31	26	128	3	333
Grand	43	13	85	30	271	26	54	10	97	78	344	15	1066
% of Total	4.0%	1.2%	8.0%	2.8%	25.4%	2.4%	5.1%	.9%	9.1%	7.3%	32.3%	1.4%	
Apprch %	13.2%			30.7%			15.1%			41.0%			
% of Apprch	30.5%	9.2%	60.3%	9.2%	82.9%	8.0%	33.5%	6.2%	60.2%	17.8%	78.7%	3.4%	

Parsons Brinckerhoff Quade and Douglas
1001 Bishop Street Suite 3000
Honolulu, HI 96813

Site Code : 00000000
Start Date: 08/03/00
File I.D. : HONOAAM
Page : 1

Movement 1

Start	HONOAPIILANI RD Southbound			NAPILIHAU Westbound			HONOAPIILANI RD Northbound			NAPILIHAU Eastbound			
Time	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Total
6:30	0	2	32	21	0	4	2	7	0	0	0	0	68
6:45	0	5	37	38	0	2	6	4	0	0	0	0	92
Total	0	7	69	59	0	6	8	11	0	0	0	0	160
7:00am	0	4	38	35	0	6	5	7	0	0	0	0	95
7:15	0	8	31	46	0	12	11	9	0	0	0	0	117
7:30	0	10	39	46	0	4	10	14	0	0	0	0	123
7:45	0	9	51	53	0	15	18	13	0	0	0	0	159
Hour Total	0	31	159	180	0	37	44	43	0	0	0	0	494
8:00am	0	8	36	45	0	8	6	15	0	0	0	0	118
8:15	0	12	43	26	0	8	12	17	0	0	0	0	118
8:30	0	10	48	36	0	5	6	16	0	0	0	0	121
Total	0	30	127	107	0	21	24	48	0	0	0	0	357
Grand	0	68	355	346	0	64	76	102	0	0	0	0	1011
% of Total	0.0%	6.7%	35.1%	34.2%	0.0%	6.3%	7.5%	10.1%	0.0%	0.0%	0.0%	0.0%	
Apprch %	41.8%			40.6%			17.6%						
% of Apprch	0.0%	16.1%	83.9%	84.4%	0.0%	15.6%	42.7%	57.3%	0.0%	0.0%	0.0%	0.0%	

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1001 Bishop Street Suite 3000
Honolulu, HI 96813

Site Code : 00000000
Start Date: 08/02/00
File I.D. : HONOAPM
Page : 1

Movement 1

	HONOAPIILANI Southbound			NAPILIHAU Westbound			HONOAPIILANI Northbound			NAPILIHAU Eastbound			
Start Time	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Rght	Thru	Left	Total
2:45	0	27	58	55	0	12	13	16	0	0	0	0	181
3:00pm	0	22	67	49	0	10	12	14	0	0	0	0	174
3:15	0	21	53	50	0	10	10	20	0	0	0	0	164
3:30	0	15	48	45	0	4	18	17	0	0	0	0	147
Hour Total	0	85	226	199	0	36	53	67	0	0	0	0	666
3:45	0	29	65	69	0	14	13	21	0	0	0	0	211
4:00pm	0	17	88	56	0	17	10	26	0	0	0	0	214
4:15	0	15	86	56	0	16	14	24	0	0	0	0	211
4:30	0	25	105	49	0	19	13	25	0	0	0	0	236
Hour Total	0	86	344	230	0	66	50	96	0	0	0	0	872
4:45	0	19	56	52	0	21	15	12	0	0	0	0	175
5:00pm	0	22	62	54	0	16	15	14	1	0	0	0	184
5:15	0	15	60	52	0	23	17	11	0	0	0	0	178
5:30	0	8	54	43	0	17	16	13	0	0	0	0	151
Hour Total	0	64	232	201	0	77	63	50	1	0	0	0	688
Grand	0	235	802	630	0	179	166	213	1	0	0	0	2226
% of Total	0.0%	10.6%	36.0%	28.3%	0.0%	8.0%	7.5%	9.6%	0.0%	0.0%	0.0%	0.0%	
Apprch %	46.6%			36.3%			17.1%						
% of Apprch	0.0%	22.7%	77.3%	77.9%	0.0%	22.1%	43.7%	56.1%	.3%	0.0%	0.0%	0.0%	