



EXECUTIVE CHAMBERS

HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

April 16, 1982

Mr. Roy R. Takemoto
Chairman
Environmental Quality Commission
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Takemoto:

I am accepting the environmental impact statement for Makena Road on Maui, based upon the recommendation of the Office of Environmental Quality Control. The document is satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. This environmental impact statement will be a useful tool in determining whether the action described therein should be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under applicable laws, and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect the proposing agency to weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by reviewers, provide a useful analysis of alternatives to the proposed action.

With warm personal regards, I remain,

Yours very truly,


George R. Ariyoshi

cc: Dept. of Public Works, County of Maui

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Makena Road

**REVISED
Environmental
Impact Statement**

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

REVISED
ENVIRONMENTAL IMPACT STATEMENT
FOR
MAKENA ROAD
Makena, Maui, Hawaii

Submitted By

Ralph Hayashi, Director
Department of Public Works

Prepared By

Environment Impact Study Corp.
Honolulu and Maui, Hawaii

and

Muroda and Associates, Inc.
Honolulu, Hawaii

February, 1982

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CORRECTION

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BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
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IMMEDIATELY FOLLOWING

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

REVISED
ENVIRONMENTAL IMPACT STATEMENT
FOR
MAKENA ROAD
Makena, Maui, Hawaii

Submitted By

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Summary

SUMMARY
MAKENA ROAD
REVISED
ENVIRONMENTAL IMPACT STATEMENT

Makena, Maui, Hawaii

PROPOSING AGENCY: Department of Public Works
County of Maui

ACCEPTING AUTHORITY: Mayor, County of Maui

CONTACT: Ralph Hayashi, Director
Department of Public Works
County of Maui
200 South High Street
Wailuku, Hawaii 96793

The County of Maui proposes to construct a two-lane, undivided road between the southern terminus of Wailea Alanui Drive and a point just north of Paako Point, south of Puu Olai. To be called Makena Road, it will span a distance of approximately 3.6 miles.

The objectives of the project are:

1. To provide a highway that will meet current and future transportation requirements of the region.
2. To promote motoring safety by eliminating the substandard conditions and hazards of the existing road.
3. To provide an easement for the extension of the Central Maui Water Transmission System.

The proposed project will be funded by the County and private land owners in the area, and the total cost is estimated at \$9.85 million in 1981 dollars. The project would be constructed in three increments. Increment I construction would commence in 1982; start-up times for Increments II and III have not been determined.

The climate in the project vicinity is among the driest in the state of Hawaii. The project area is located on the southwest slope of Haleakala, at elevations ranging from 10 to 40 feet above sea level. Throughout the area, slopes average 0.5 to 8 percent from the coastline to 120 feet in elevation and increase to 12 percent near 250 feet in elevation.

Soils along the road alignment are primarily the Makena Series, which consists of well-drained soils developed in volcanic ash. Generally, runoff is slow to medium and the erosion hazard varies from no hazard to moderate hazard. The project area is underlain by lavas of the Hana Volcanic Series, with outcroppings of newer aa and pahoehoe flows. Ground water beneath the project area consists of brackish basal water.

The proposed alignment passes through arid forests, rangeland, strand vegetation, and partially urbanized areas. No rare or endangered species of plants or animals were observed in the project vicinity. Several historical or

archaeological sites are known to exist in the project area, and field surveys were conducted to investigate them.

An existing, undivided dirt road provides access to the area from Wailea Alanui Drive to Cape Kinau and beyond. Potable water is piped to the residences in the area via a small extension from the Central Maui Water Transmission System. Potable water for Seibu's golf course clubhouse is supplied by a temporary line from Wailea. Electrical and telephone service is provided to the area, and the County provides refuse collection to residential areas. Cesspools are the primary method of wastewater disposal.

The existing population of the Kihei-Makena area (which also includes the Kula area) was 11,097 in 1980. In 1975, the major ethnic groups in the area were Caucasian, Hawaiian or part-Hawaiian, and Japanese.

The proposed project vicinity is designated as Agriculture, Urban, Rural, and Conservation by the State Land Use Commission. The area is designated for Open Space, Hotel, Apartment, Residential, and Park use by the Kihei General Plan.

The proposed road development will generate short-term primary impacts affecting air quality, noise levels, flora and fauna, water service, access and traffic, and the local economy. The adverse construction-related impacts will be mitigated by appropriate measures.

Long-term primary impacts resulting from the project include topographic alteration, loss of 30 acres of land from other potential use, impacts on air quality and noise levels, removal of some archaeological and historic sites, operating and maintenance costs, improved access to the Makena area, and facilitation of installation of the Makena segment of the Central Maui Water Transmission System.

Secondary impacts will primarily be associated with population growth and shoreline recreational resources. The proposed project may stimulate increased use of these resources, in turn, putting pressure on governmental agencies to provide structures and services.

Several alternatives have been investigated. They include "no action," alternative alignments, alternative transportation modes, and upgrading of the existing road. Present County policy favors building a new road, based on Alignment "C."

The construction materials, capital, energy, and labor involved in this project will be irreversibly and irretrievably committed. It is anticipated that the roadway will improve existing traffic conditions in this area of Kihei-Makena, enhancing traffic safety and improving access to the beaches.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200

Proposed Project

1

SECTION 1

DESCRIPTION OF THE PROPOSED PROJECT

I. INTRODUCTION

The the proposed project is located in the Kihei-Makena region on the island of Maui. The location is shown on Figure 1-1.

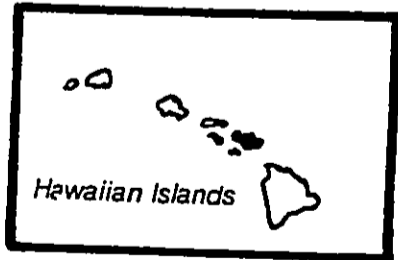
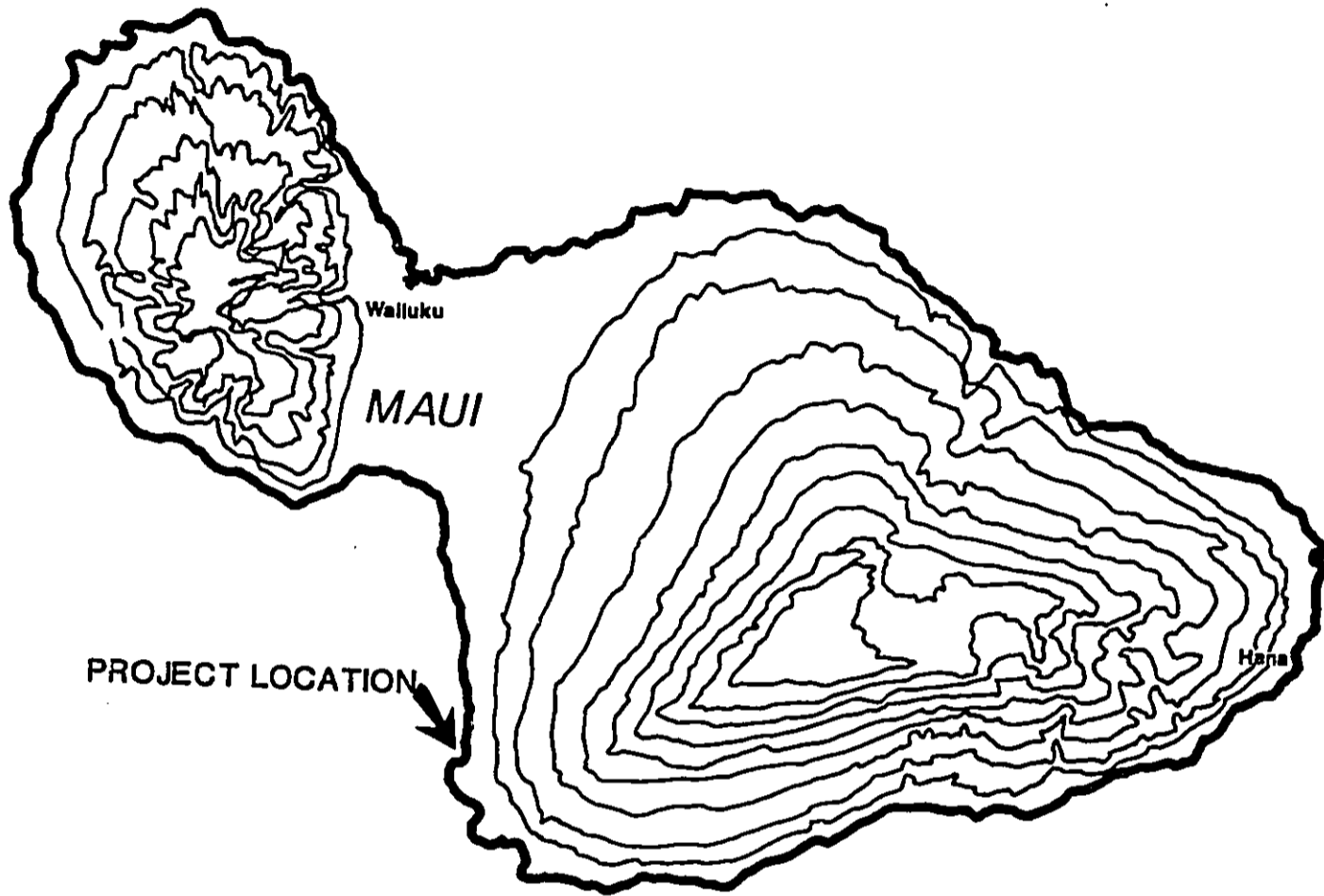
The County of Maui proposes to construct a two-lane undivided road between the southern terminus of Wailea Alanui Drive and just north of Paako Point, south of Puu Olai. To be called Makena Road, it will span a distance of approximately 3.6 miles. Refer to Figure 1-2.

The objectives of the project are:

1. To provide a highway that will meet current and future transportation requirements.
2. To promote motoring safety by eliminating the substandard conditions and hazards of the existing road.
3. To provide a location for the extension of the Central Maui Water Transmission System within the road right-of-way.

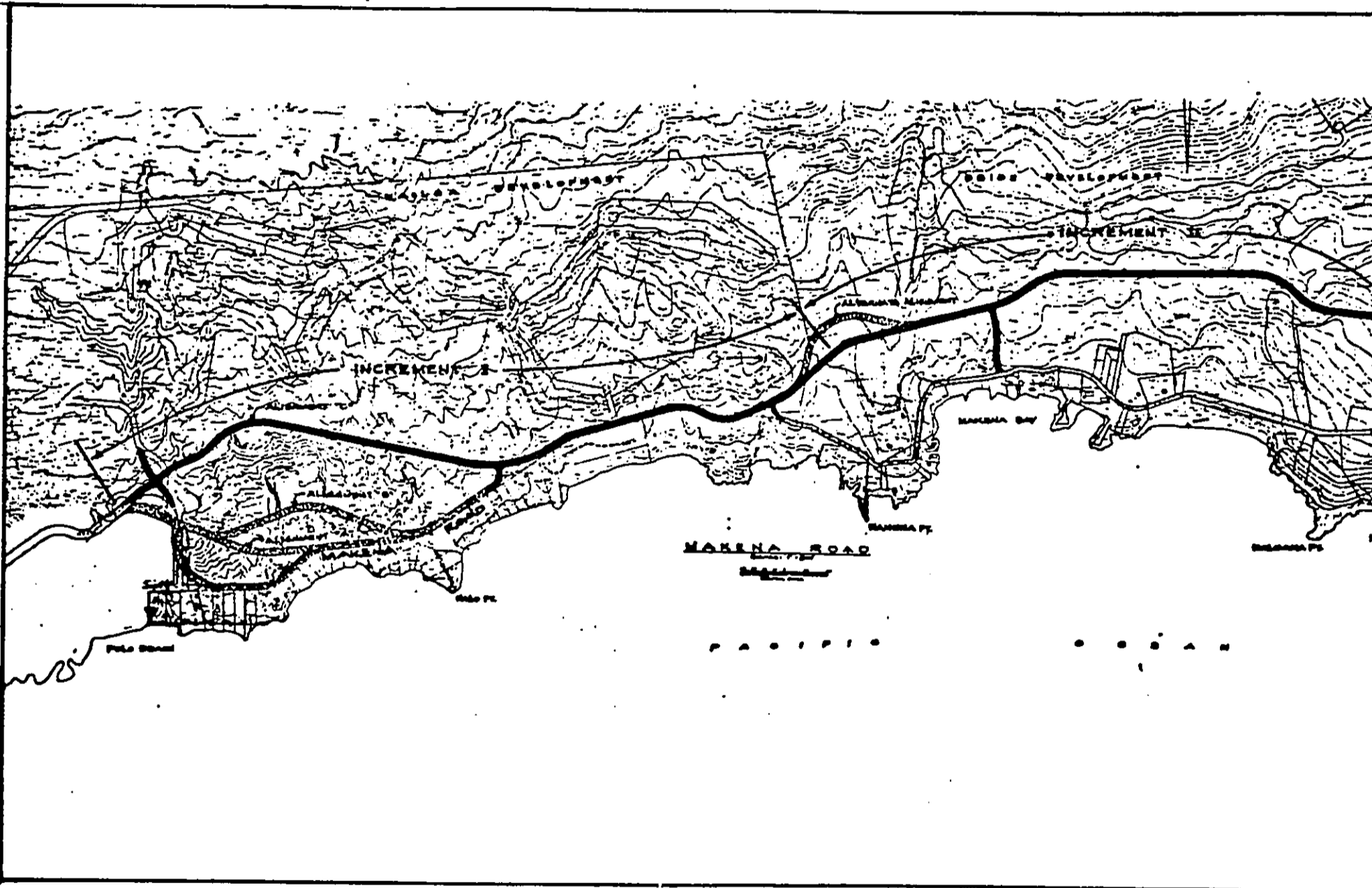
II. CHARACTERISTICS OF THE EXISTING ROAD

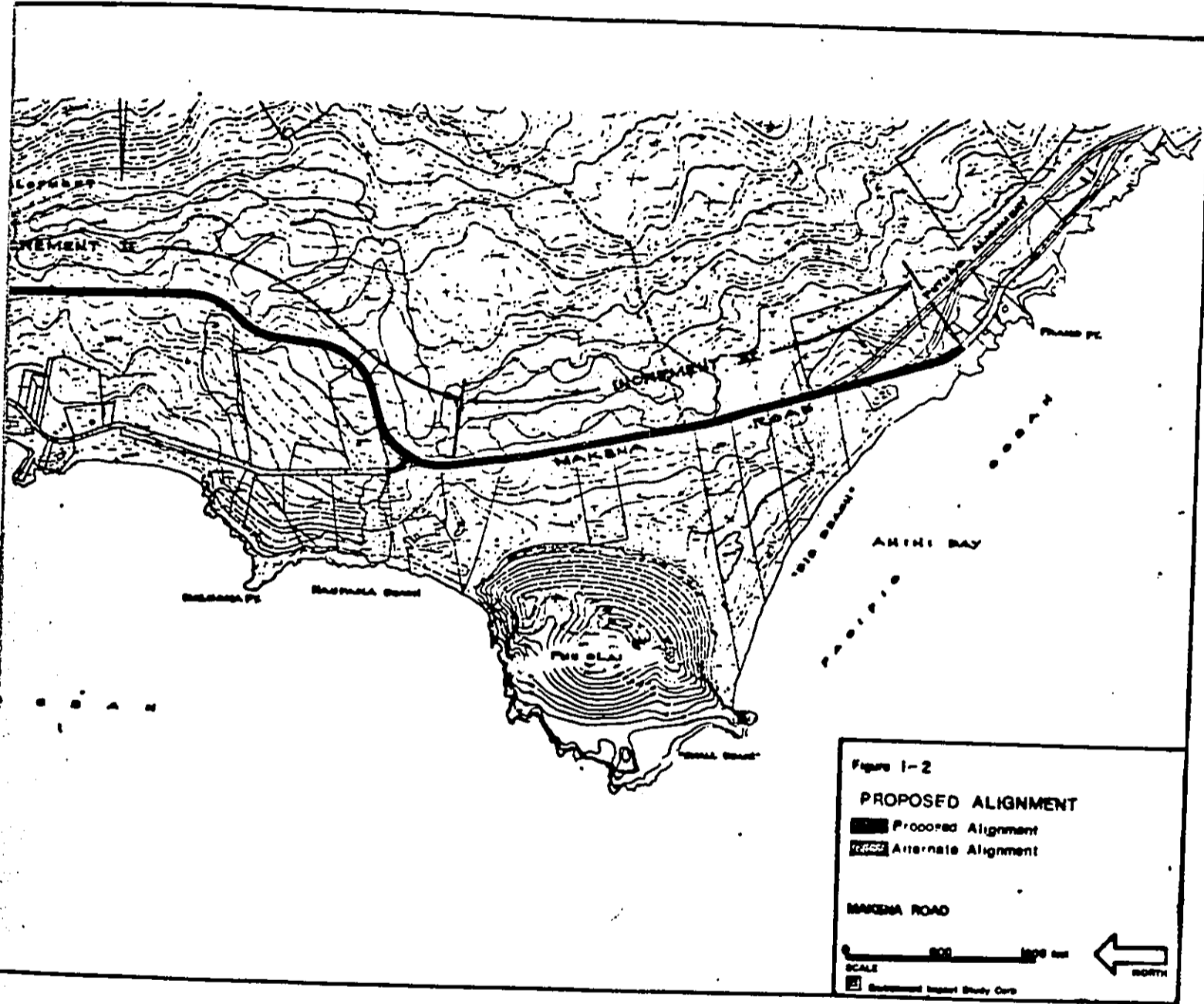
The existing road, Makena Road, is an undivided dirt road extending from Wailea Alanui Drive to Cape Kinau and beyond. Its slope ranges up to 12 percent and it varies considerably in width, straightness, flatness,



E.I.S.C.

LOCATION MAP
MAKENA ROAD
Figure 1-1





surfacing, and condition over its length. In some places it is 6-8 feet wide and in others 20 feet. For approximately one-third of its length it is covered with blacktop or an oil penetrant surface, for two-thirds it is gravelled. Where unsurfaced, the road is dusty due to the dryness of the area. Potholes and rutted sections are common occurrences. Other deficiencies include no shoulders, a lack of reflectorized road markers, a lack of guardrails and guardposts, and limited sightline distance.

Drainage is accommodated by natural landforms and channels. Runoff flows over the road into the ocean or is impounded by depressions along the coastline. In some sections, ponding results in quagmire conditions that render the road impassable at times of heavy rainfall.

III. CHARACTERISTICS OF THE PROPOSED ROAD

A. Alignment

The proposed Makena Road spans a distance of approximately 3.6 miles beginning from the sharp makai bound turn in Wailea Alanui Drive to just north of Paako Point. The alternate alignments investigated are shown in Figure 1-2. Alignment "C" is the recommended alignment. Some segments of the proposed alignment are located on the existing Makena Road, and some segments are mauka of it.

The recommended alignment generally conforms to that delineated on the Kihei General Plan except for approximately 4,300 feet from Wailea Alanui Drive where physiographic constraints or archaeological sites necessitated alignment alterations. The preliminary draft of the Maalaea-Kihei-Makena Community Plan presently being prepared indicates a road alignment similar to the proposed alignment (Alignment "C").

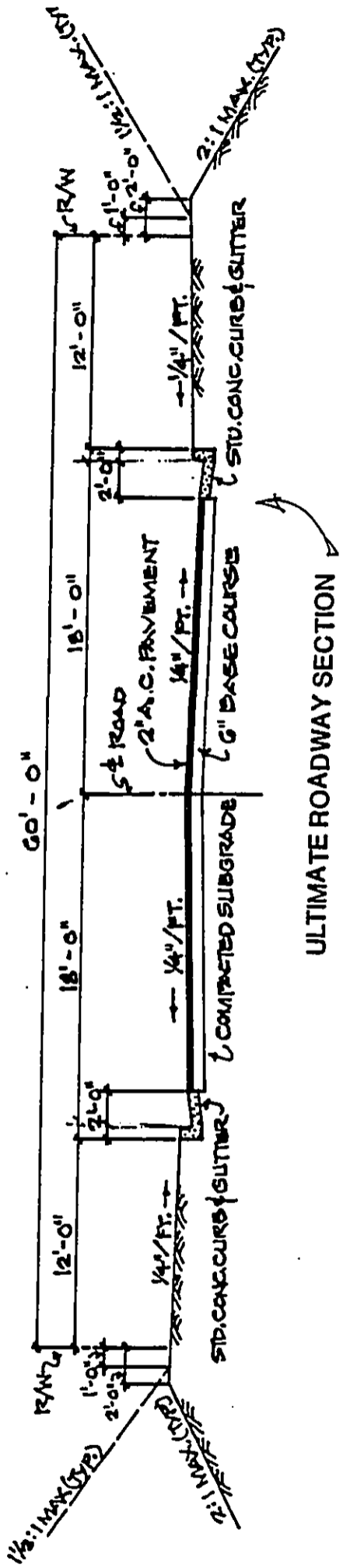
Access to the beaches from the main road will be via five connector roads to the existing Makena Road, as shown on Figure 1-2. The scope of this project includes neither the closing of the existing road nor improvements along the full length of the existing Makena Road.

B. Roadway

1. Design:

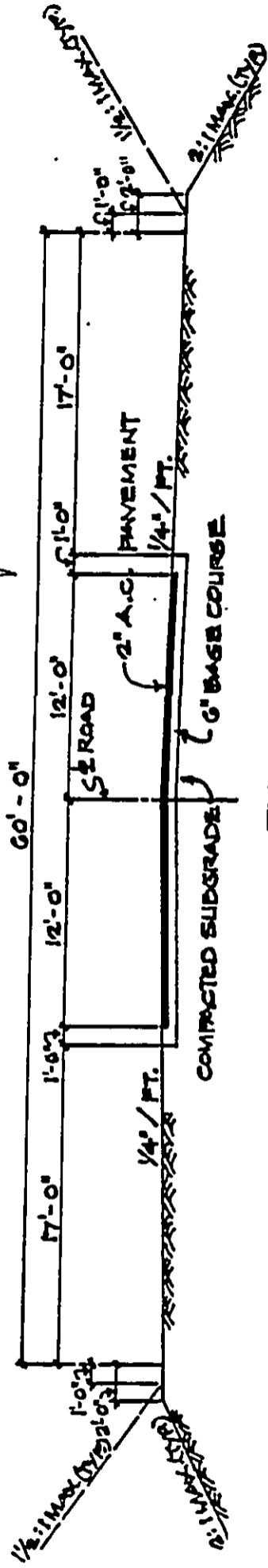
The proposed road, as shown on Figure 1-3, will consist of a 36-foot wide, two-lane, undivided road incorporating the following features:

- a. 60-foot right-of-way
- b. 18-foot wide paved lanes including curbs and gutters (10-foot traffic lane and 8-foot parking lane)
- c. 12-foot wide shoulders with 6 feet allocated for bikeways



ULTIMATE ROADWAY SECTION

PHASED ROADWAY SECTION
INCREMENT 1&3



TYPICAL SECTION 60 FT R/W ROAD

FIGURE 1-3

- d. A series of lined and unlined drainage ditches, culverts, catch basins, and drop intakes to accommodate water runoff
- e. Maximum grade of 10.05 percent

The connector roads will incorporate the following features:

- a. 40-foot to 44-foot right-of-ways
- b. 12-foot wide paved travel lanes with curbs and gutters up to connection point
- c. 6-foot to 8-foot wide shoulders
- d. Maximum grade of 12 percent

2. Operation:

The proposed facility will incorporate a number of operational features to enhance vehicle safety and efficiency. These features include:

- a. a design speed of 30 miles per hour
- b. 5 connector roads to beach areas with a design speed of 20 miles per hour
- c. reflectorized roadmarkers
- d. road shoulders

3. Traffic Projections:

The proposed road will be designed to accommodate a traffic volume in both directions of

2,000 vehicles per hour (vph) when fully developed. The 1990 projected trip generation for the evening peak hour is 970 vph. Also refer to Appendix E.

C. Drainage

A drainage system will be constructed to protect the road from surface runoff. The system includes a series of lined and unlined drainage ditches, culverts, catch basins, and drain lines installed alongside or beneath the road. Culverts (18 to 96 inches) and box drains will be inserted under embankments crossing natural drainageways. The system is sized to handle runoff from a 50-year, 6-hour storm for areas larger than 100 acres, and from a 100-year, 1-hour storm for acres smaller than 100 acres.

Runoff will be conveyed into natural depressions along the coastline which will be used as retention or infiltration basins to minimize discharge into near-shore waters. These natural depressions have functioned as retention ponds over the years. Water will be allowed to pond until it evaporates or percolates into the ground.

D. Other Improvements

Makena residents will not be displaced by the proposed action. In some instances the County may purchase portions of private property for the road right-of-way.

At this time, there are no plans to place electric and telephone lines underground within the road right-of-way. These services will continue to be provided by overhead wires on existing power poles along the existing Makena Road. Street lamps may be installed at a later date. The Makena segment of the Central Maui Water Transmission System will be installed along the proposed Makena Road alignment. Pipeline sizes along this segment will vary from 12- to 30-inch diameter pipes. The completion of this waterline segment will upgrade service to Makena residents by providing a reliable water source and increased volume and pressure for fire protection.

IV. PHASING AND FUNDING

The proposed project will be constructed in three increments, as shown in Figure 1-2. A summary of each increment is given in Table 1-1. Increment I construction will commence in 1982; start-up times for Increments II and III have not been determined.

The total cost for the proposed project is estimated at \$9.85 million in 1981 dollars. The construction of Increment I would await private financing by benefited properties or future County financing, whichever might occur first. No public funds have been appropriated to date.

Table 1-1
PROJECT PHASING AND FUNDING

<u>Increment</u>	<u>Construction Time (years)</u>	<u>Cost (1981 \$)</u>	<u>Length (miles)</u>	<u>Parameters</u>
I	1.5	4,199,000	1.4	From sharp curve in Wailea Alanui Drive to the Seibu development
II	1.5	4,500,000	1.4	Through the Seibu development to Puu Olai
III	1.0	<u>1,151,000</u>	<u>0.8</u>	Puu Olai to south of Paako Point
		\$9,850,000 +225,000	3.6	Alternate realignment at beginning of Seibu development

Seibu Hawaii, Inc., a major land owner in the area, will pay for that segment of the road which passes through its property. Federal or State monies are not involved in the project.

Pending availability of financing, Increments II and III may be constructed in phases, as shown in Figure 1-3.

V. USE OF PUBLIC LANDS

The County of Maui will allocate approximately 4.31 acres of public lands within existing public road rights-of-way or public easements to the project.

The State of Hawaii will allocate approximately 3.02 acres of public lands within existing public road rights-of-way and approximately 0.26 acres of other State lands to the project.

The proposed project will also be constructed within rights-of-way dedicated or to be purchased by the County as shown below:

<u>LANDOWNER</u>	<u>WIDTH OF RIGHT-OF-WAY</u>	<u>ACRES</u>
Wailea Land Company	60'	6.45
Seibu Hawaii, Inc.	60'	10.75
Ulupalakua Ranch	60'	0.39
Kellet, et.al.	60'	0.30

**Affected
Environment**

2

SECTION 2

DESCRIPTION OF THE AFFECTED ENVIRONMENT

I. INTRODUCTION

The island of Maui comprises a land area of 728 square miles, measuring approximately 33 miles at the widest point in a north-south direction and 58 miles in an east-west direction. The island can be divided into three main geographical areas: West Maui, East Maui, and Central Maui. Haleakala, a dormant volcano rising to an elevation of 10,025 feet, is the dominant feature of East Maui. A deeply dissected volcano rising to an elevation of 5,788 feet at Puu Kukui forms West Maui. Central Maui, an area of 270 square miles, is the flat isthmus between the East and West Maui land masses. As described in this statement and as shown in Figure 1-1, the project area is the Makena area between Wailea Point and Paako Point. In this statement, Kihei is often referred to rather than Makena. This is necessary because data for the project area were often inseparable from that of Kihei and because of the potential effects on the entire Kihei coast resulting from improvement of Makena Road.

II. PHYSICAL CHARACTERISTICS

A. Climate

The climate of the project area is among the

driest in the State of Hawaii. As can be seen in Figure 2-1, average annual rainfall varies from approximately 15 to 20 inches per year in the project area. Further north, in the Kihei area, rainfall is often under 10 inches per year, making this an area of extreme aridity.

The seasonal rainfall distribution at nearby Keawakapu Beach (Figure 2-2) shows a sharp rainfall peak during the winter months, when mean rainfall exceeds one inch per month. The April-October period, however, is generally very dry with rainfall under one-half inch per month. Most of the rainfall comes during sporadic winter storms, and it is not unusual for the area to experience several years of very dry weather when rainfall bearing winter storms fail to materialize.

Temperatures at Keawakapu Beach are generally hot, at least by Hawaii standards. Mean high temperatures in the summer months average near 90°F, while the minimum temperatures are in the mid to upper 60°'s. In the winter, temperatures oscillate between the low 80°'s and low 60°'s. Extreme high temperatures during the period 1951-1971 reached into the mid 90°'s, while minimum extremes were in the low 50°'s (Figure 2-3).

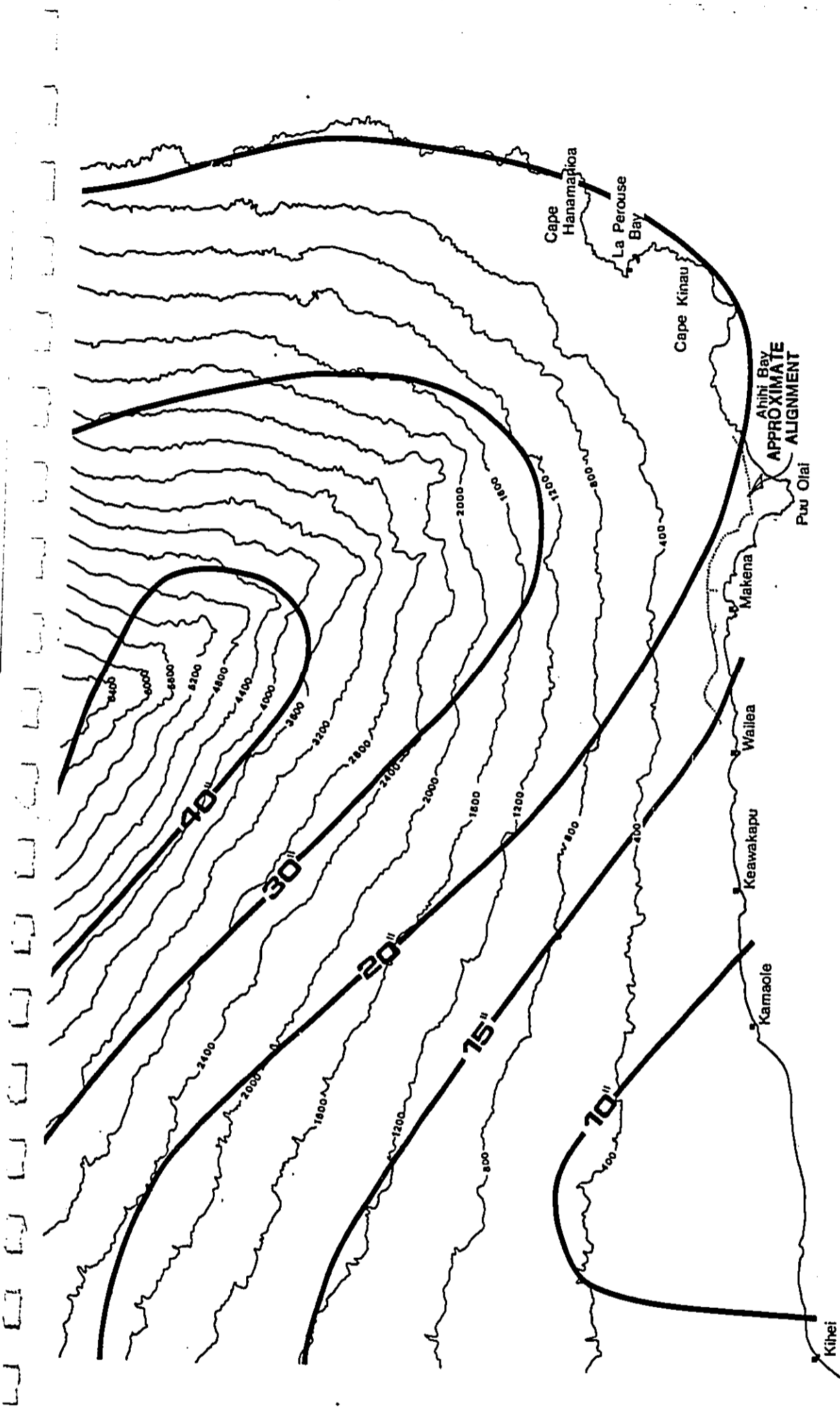


Figure 2-1

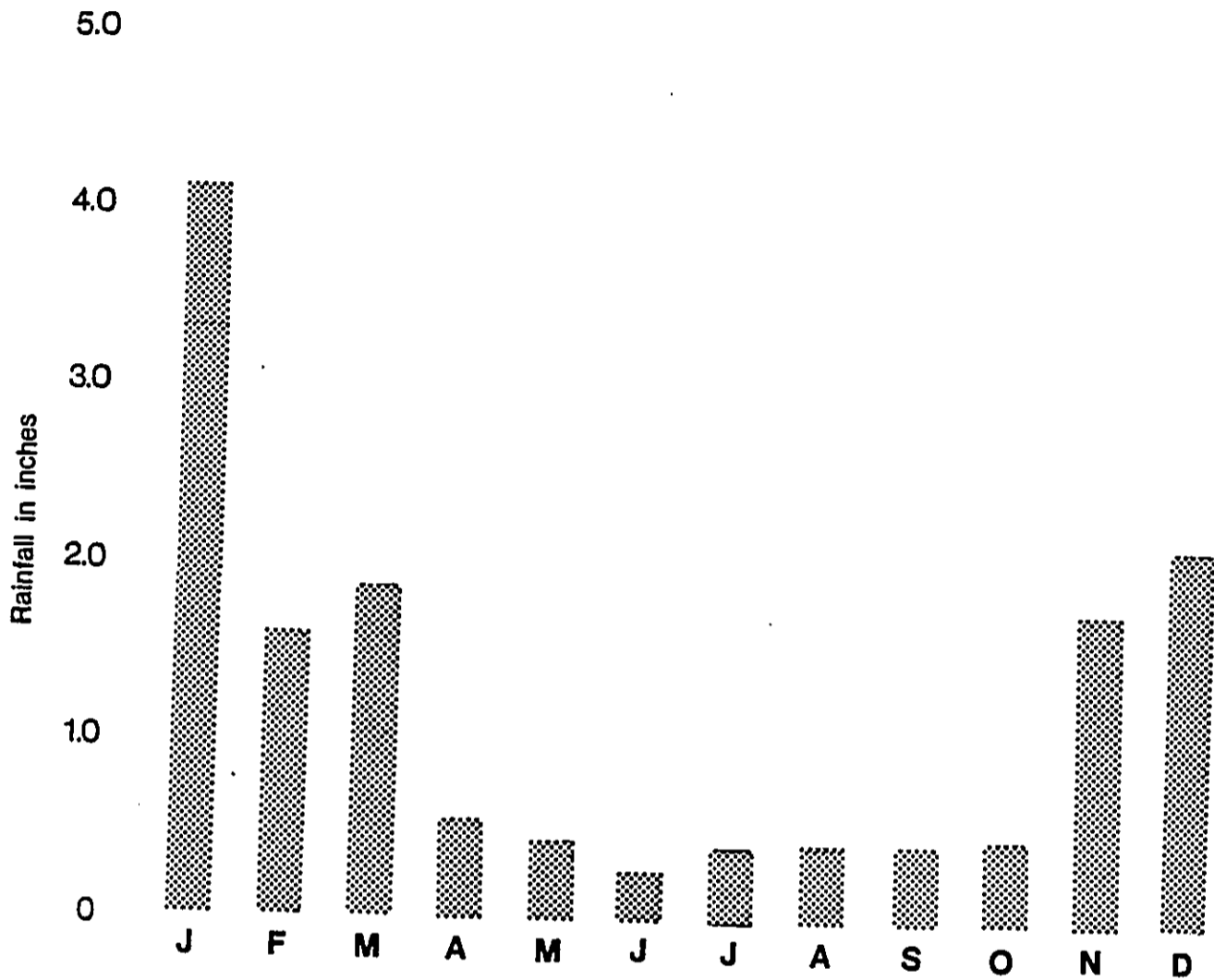
ISOHYETS

MAKENA ROAD

ENVIRONMENT IMPACT STUDY CORP.

KEAWAKAPU BEACH

Average monthly rainfall; period of record 1951-1971



Source: Saul Price, Division of Water and Land Development, Dept. of Land and Natural Resources, State of Hawaii

Figure 2-2

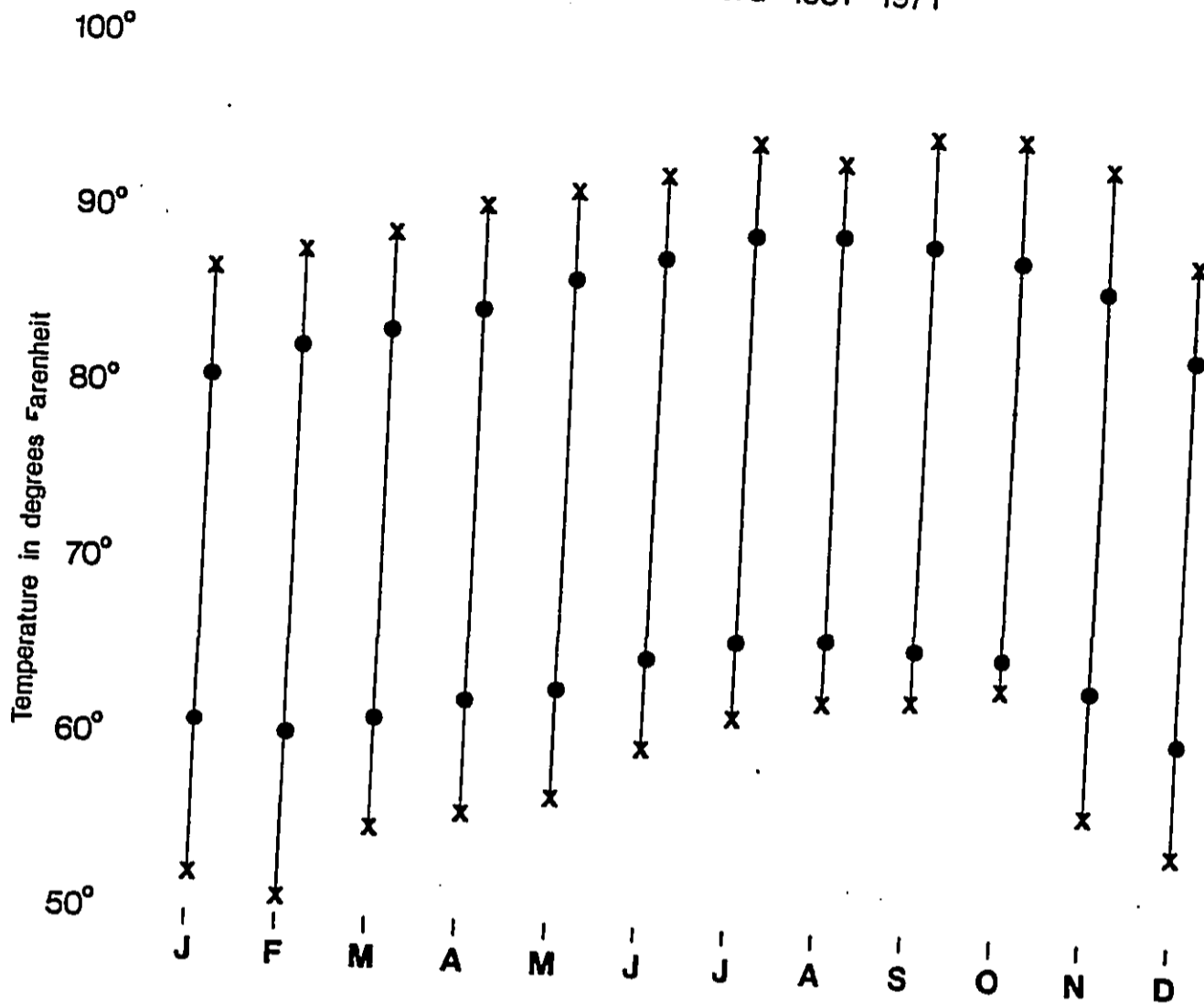
RAINFALL

MAKENA ROAD

ENVIRONMENT IMPACT STUDY CORP.

KEAWAKAPU BEACH

Temperature data, period of record 1951-1971



● Average monthly max and min temps during record period
 X Monthly temperature extremes during record period

Source: Saul Price, Division of Water and Land Development, Dept. of Land and Natural Resources, State of Hawaii

Figure 2-3
TEMPERATURE
 MAKENA ROAD

ENVIRONMENT IMPACT STUDY CORP.

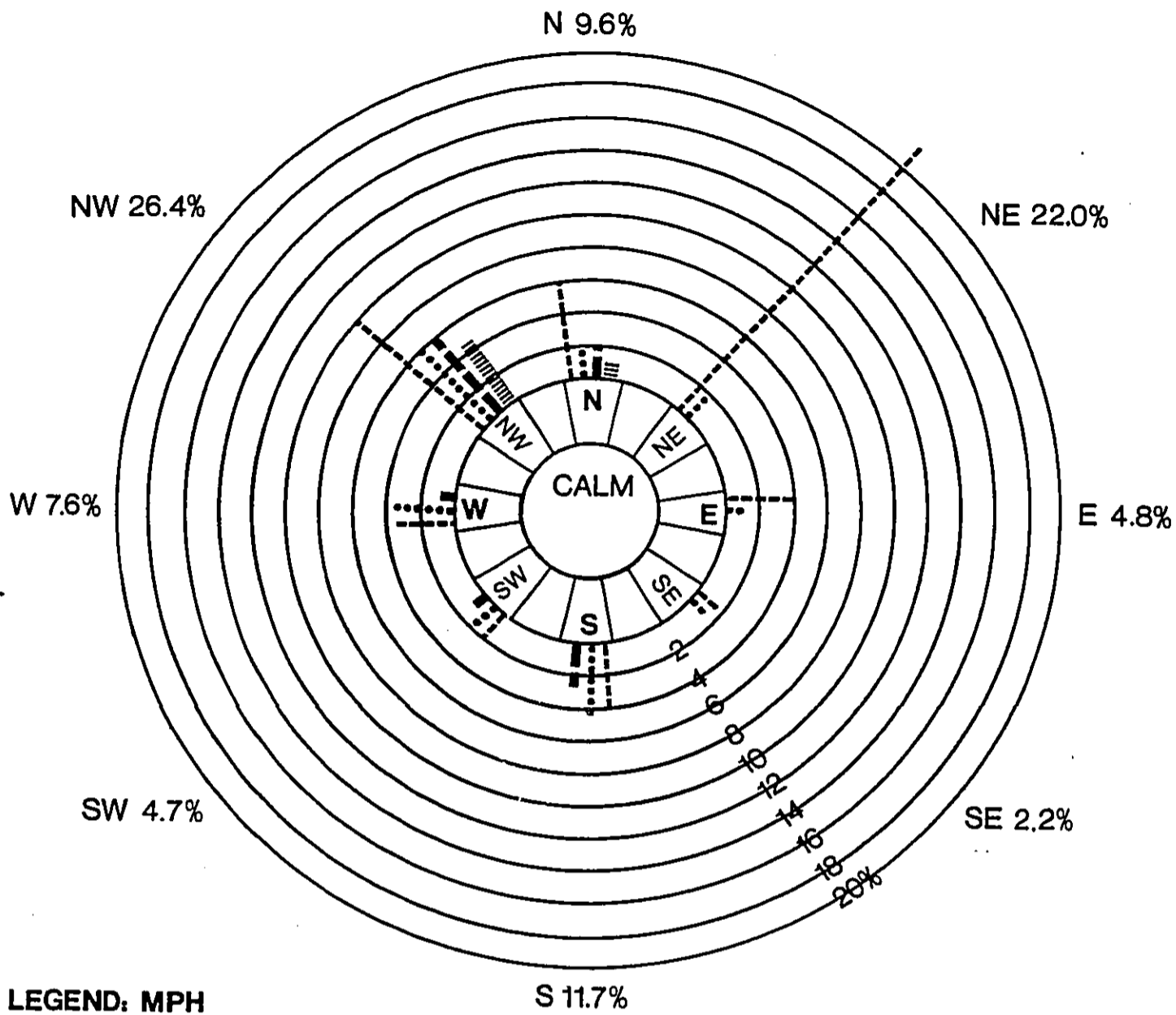
The Kihei-Makena region lies at the base of the central isthmus flanked by two mountain masses. As the trade winds squeeze between the mountain masses, their velocities increase (the so-called Venturi effect) above the normal velocities found in the Wailuku area. The wind fans out over Maalaea Bay, with the inshore segment blowing parallel to the Kihei coast. Along the shore, it meets the eddy current of the trades reflected along the southeast slopes of Haleakala. The resultant phenomenon is a system of unpredictable local winds from Kalama Park to Cape Kinau [2.1].

A windrose summarizing observations taken at Wailea during the period August-December 1959 is shown in Figure 2-4. As can be seen, the most common wind directions at the project site are from the northwest (26.4 percent of the time) and the northeast (22.0 percent of the time).

B. Topography

In general, the terrain between Makena Bay and Kanahena is of low relief, rising gently from sea level to approximately the 200-foot elevation. North of Makena Landing, the terrain is rugged and steep with many gulches.

Throughout the area, slopes average 0.5 to 8 percent from the coastline to the 120-foot elevation



LEGEND: MPH
 ----- 3.0 - 7.0
 8.0 - 18.0
 - - - - 19.0 - 24.0
 [Hatched] OVER 24.0

Wind Rose - Wailea
 Period of record:
 August - December 1959

Figure 2-4

WIND ROSE
MAKENA ROAD

ENVIRONMENT IMPACT STUDY CORP.

and increases to approximately 12 percent to the 250-foot elevation. Slopes in excess of 25 percent are encountered farther up the side of Haleakala at about the 800-foot elevation.

C. Geology

The project area is situated near the southwestern rift zone of Haleakala and contains volcanic rocks and substrate of the Kula and Hana Volcanic Series (Figure 2-5). Lava flows of the Kula Series consist mostly of basaltic andesite, andesite, basalt, and picritic basalt. This series is at least 2,500 feet thick near the summit of Haleakala and 50 to 200 feet thick near the coast [2.2]. The Hana Series overlies the Kula Series in and around the southwest rift zone. The lavas of the Hana Series consist primarily of olivine and picritic basalt, basaltic andesite, and andesite. In general, lava flows of the Hana Series are 100-200 feet thick except in canyons, where they are 1,000 feet thick or more.

Puu Olai, the most prominent physiographic feature of the area, is a tephra cone comprised of cinders, tephra, and thin layers of lava.

D. Hydrology

The following description of hydrologic conditions along the Kihei-Makena coastline is derived from Water for Kihei-Makena [2.3]. The western slopes

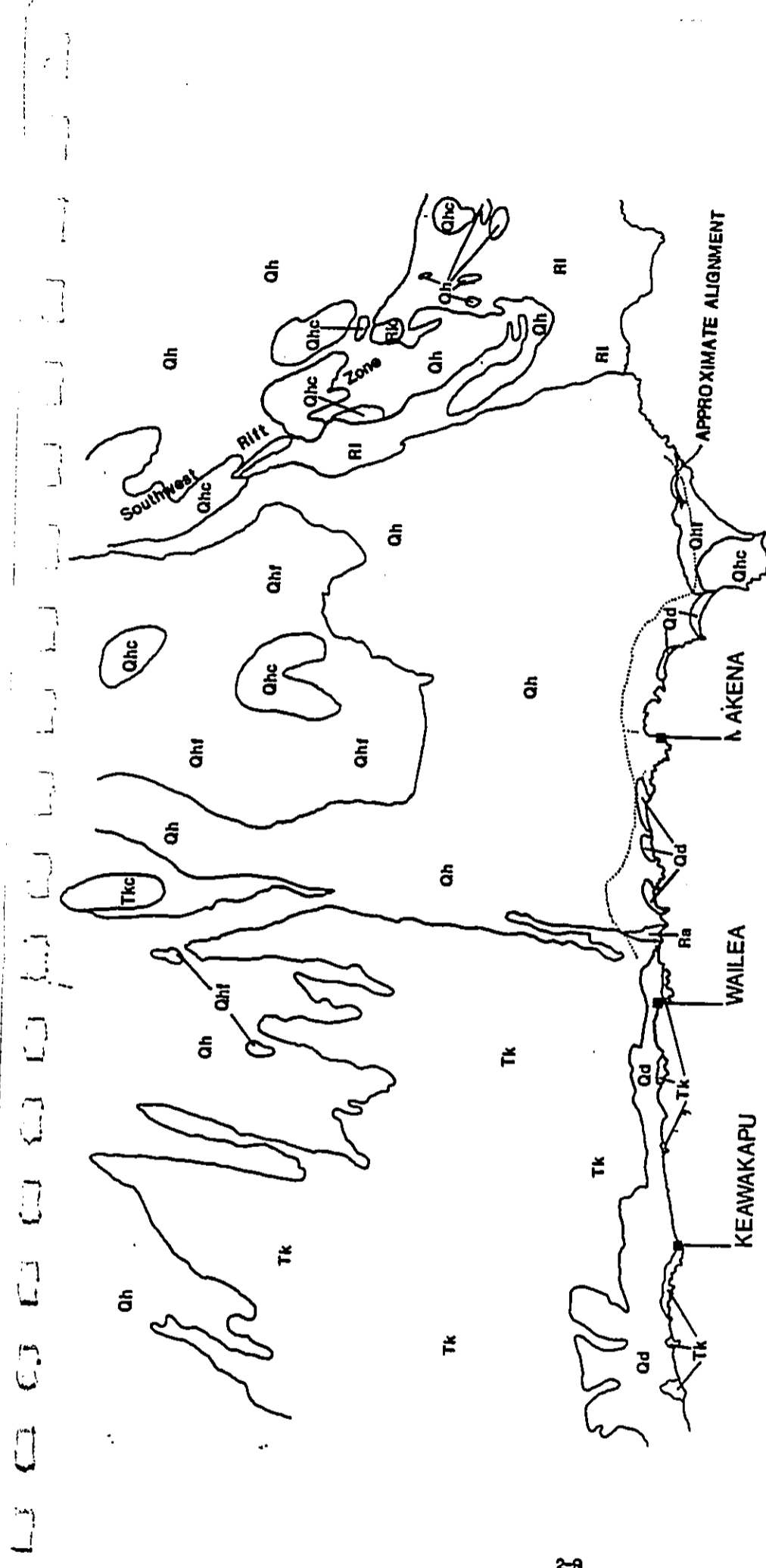


Figure 2-5

GEOLOGY

MAKENA ROAD



Environment Impact Study Corp.

LEGEND:

- Qd - Calcareous sand dunes
- Qh - Thin aa and pahoehoe flows of basalt containing large crystals of augite and or olivine
- Qhc - Cones of very permeable cinders
- Qhf - Deposits of red, yellow, and black friable permeable vitric ash and pumice
- Ra - Unconsolidated deposits of brown silt, sand, and gravel.
- RI - Two lava flows near Makena
- Rlt - Cinder cone and spatter cone at source of flows
- Tk - Flows of basalt, chiefly aa, fairly permeable, carrying perched water
- Tkc - Cones of partly consolidated and deeply weathered cinders, spatter and pumice, perching a few small springs

of East Maui, from Makena to Paia, have no perennial streams or significant surface runoff into the ocean. Ground water represents the only water resource. Rainfall averages 10 inches a year at Kihei to no more than 40 inches on the upper slopes of Haleakala. Simplified water budget estimates for unit strips one mile wide extending from shore to topographic divide indicate that rainfall averages 5 mgd at Makena and 10 mgd at Kihei, but that all of it returns to the atmosphere directly or indirectly by evapotranspiration, theoretically leaving no net balance for surface runoff or deep percolation to ground water.

Actually, recharge to ground water probably occurs, though undoubtedly it is too small to sustain any fresh basal water bodies in the coastal area between Kihei and Makena. Well data shows that the basal lens a mile inland from the coast between Kihei and Makena is brackish (500-600 parts per million chloride), very thin (1 to 3 feet) and chloride-sensitive to pumping. The chances of developing fresh basal water sources between Kihei and Makena are slim for distances less than two miles inland from shore (less than about 1200 feet elevation). High-level, dike-confined ground water is not known to occur and probably does not, for lack of heavy rainfall.

E. Soils [2.4]

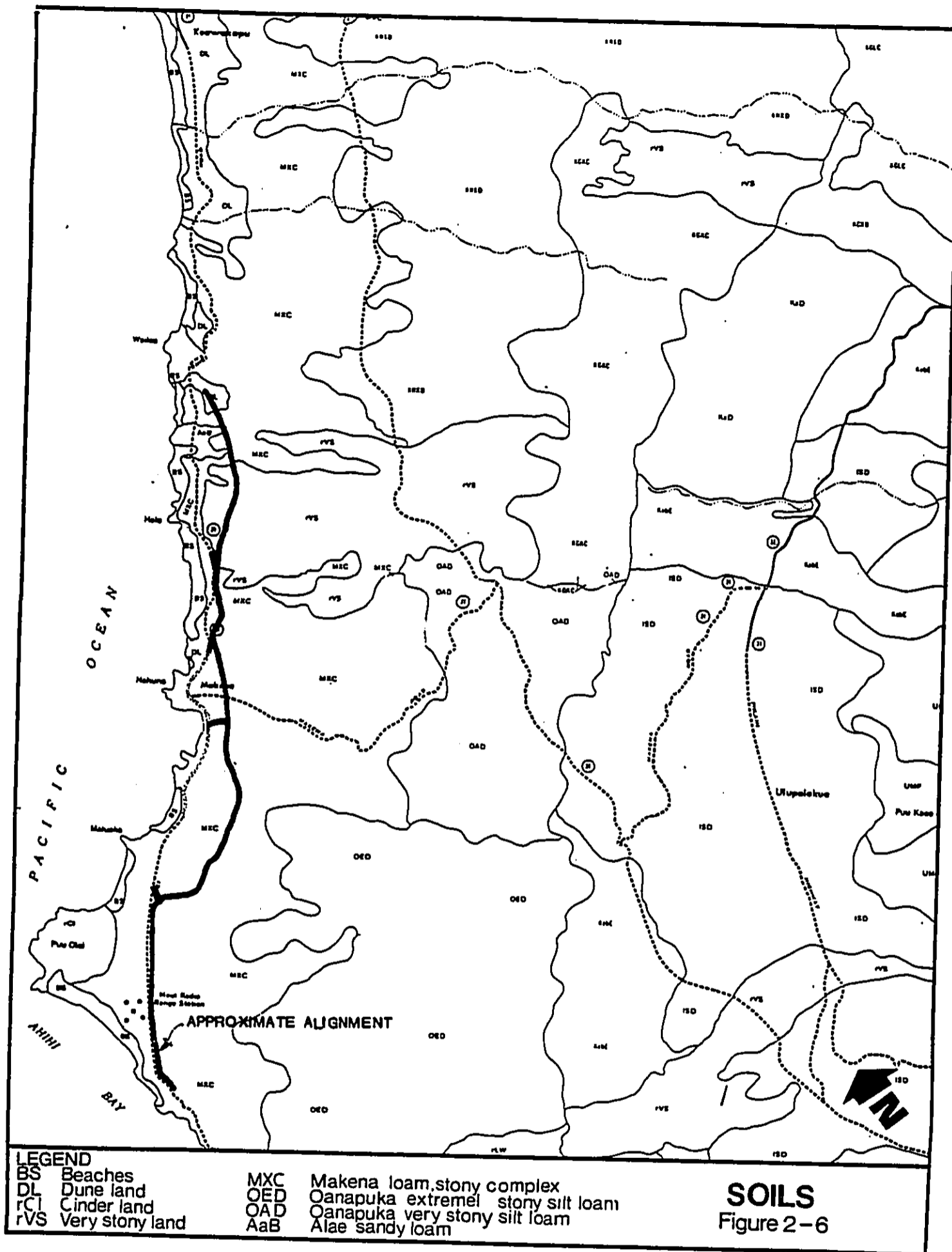
Soils within the project area belong to the Keawakapu-Makena Association. This association consists of well-drained, medium-textured soils developed in material weathered from volcanic ash. Keawakapu soils make up about 60 percent of the association and Makena soils about 40 percent. The soils are found on gently sloping to moderately steep lands.

Soil series found in the project area include the Makena, Oanapuka, and Alae Series as well as Beaches, Dune land, Very stony land, and Lava flows (Figure 2-6).

The predominant soil type along the road alignment is the Makena Series, which consists of well-drained soils developed in volcanic ash. They are gently to moderately sloping and are found from nearly sea level to an elevation of 500 feet. The soils of the Makena Series are used for pasture and wildlife habitat. Their suitability as a source of road fill is fair. The erosion hazard for the project area varies from no hazard to moderate hazard.

F. Drainage

A major drainage area extends from the 5,300-foot elevation of Haleakala down its southwestern slopes to sea level. Within this drainage area, there are



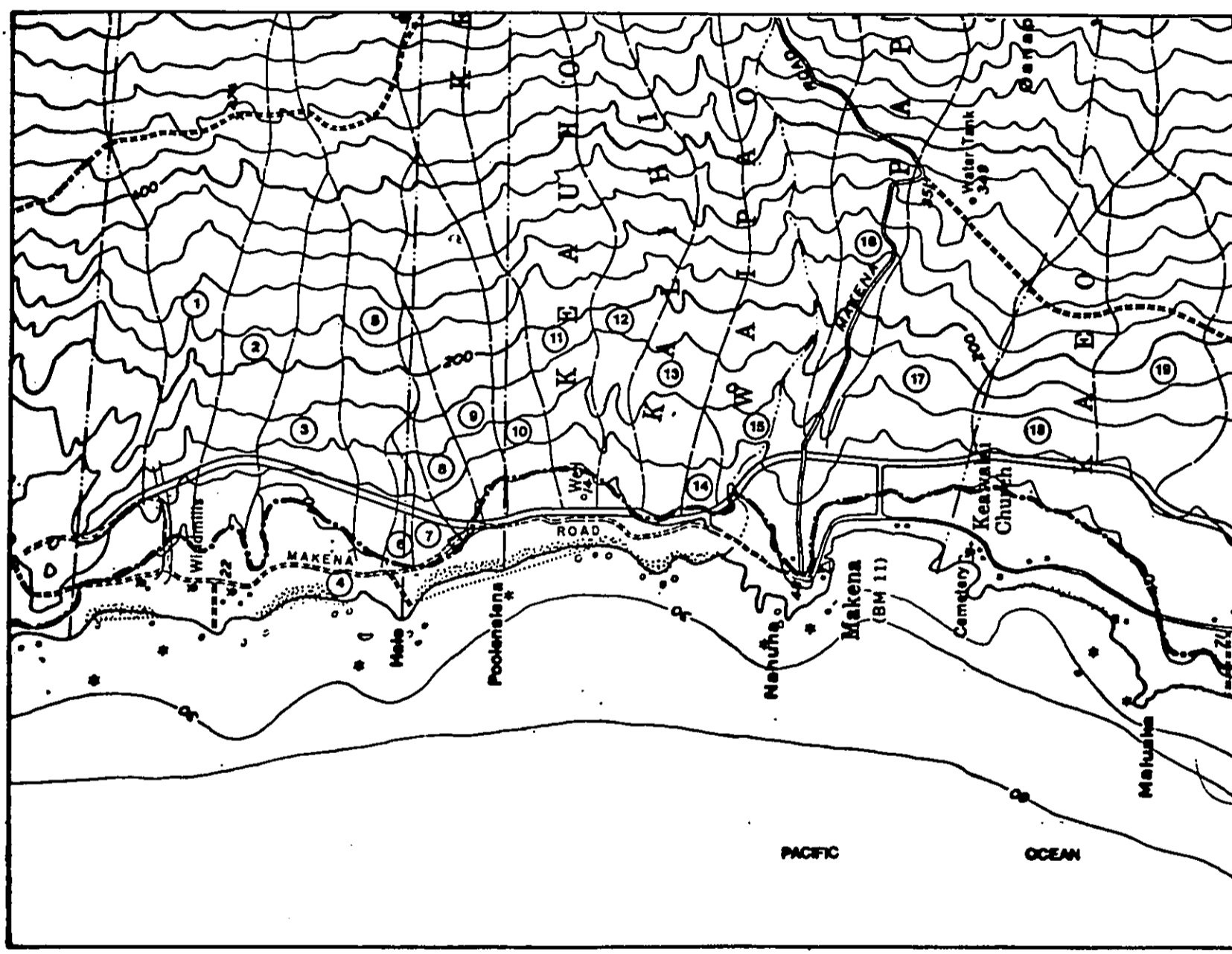
only two well-defined water courses, which are located south of Polo Beach and mauka of Nahuna Point and are dry throughout most of the year [2.5]. Storm runoff sheet flows toward the sea and generally settles in the low-lying coastal areas. In some areas storm water is discharged into the ocean, but for the most part, coastal sand dunes impound the water until it evaporates or infiltrates into the ground.

As shown in Figure 2-7, twenty-five smaller drainage basins encompassing approximately 1,000 acres have been delineated along the lower slopes of Haleakala in this area. There are no storm runoff records for this area; thus, estimates of runoff quantities were calculated for each basin based on a 50-year, 6-hour storm for areas larger than 100 acres, and a 100-year, 1-hour storm for areas smaller than 100 acres. These estimates are shown in Table 2-1.

G. Flood/Tsunami Areas

Historical data on tsunami inundation along the Makena coast from the waves of 1946 and 1960 show runup conditions at Makena of 11 feet and 10 feet, respectively. At Wailea, runup conditions for the same tsunamis were 7 feet and 9 feet, while at Paako (Ahihi Bay), the runup was 9 feet during both tsunamis [2.6]. These runup heights do not represent maximum runup heights which may be experienced.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



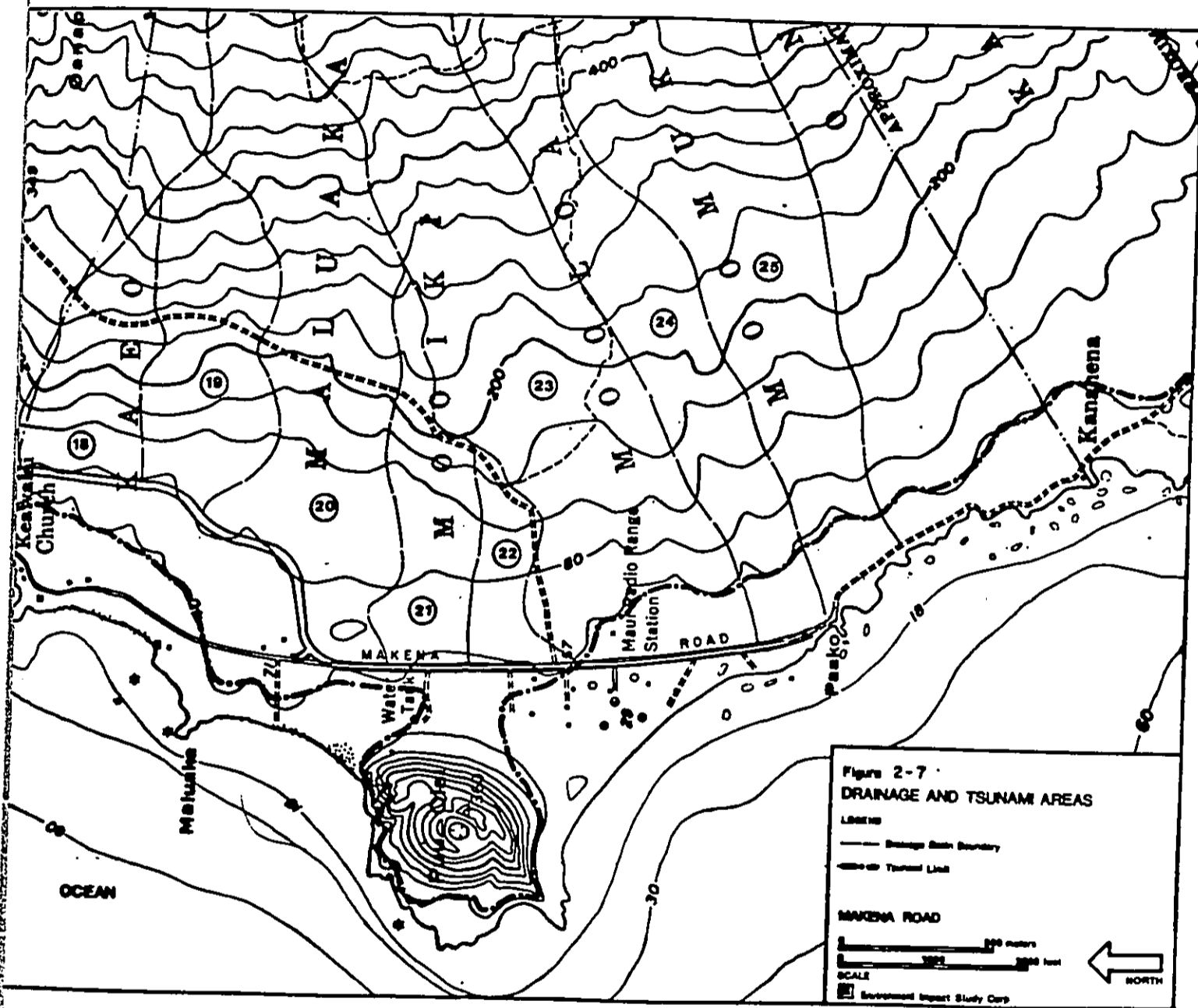


TABLE 2-1

ESTIMATED RUNOFF - WAILEA/MAKENA, MAUI

<u>BASIN</u>	<u>AREA (Acres)</u>	<u>A>100 Acs. RUNOFF (cfs)</u>	
		<u>50 YR., 6-HR. STORM</u>	<u>100 YR., 1-HR STORM</u>
1	1,979	1,756	-
2	66	-	86
3	61	-	79
4	1	-	<2
5	601	785	-
6	6	-	9
7	8	-	13
8	17	-	26
9	56	-	80
10	68	-	88
11	217	605	-
12	951	789	-
13	487	704	-
14	6	-	11
15	500	626	-
16	198	302	-
17	1,068	1,125	-
18	63	-	124
19	81	-	128
20	262	328	-
21	75	-	158
22	33	-	86
23	1,116	746	-
24	300	297	-
25	730	720	-

The tsunami inundation limit within the project area generally follows the 40-foot contour [2.7], as shown in Figure 2-7. The proposed road is situated in an area of minimal flooding, based on the Federal Insurance Administration's Flood Insurance Study.

H. Air Quality

Ambient air quality of the project area is affected primarily by dust and ocean salt spray. Fugitive dust is generated by vehicles traveling on Makena Road and Ulupalakua-Makena Road, and by unpredictable local winds along the coast. During periods of rough seas and high winds, ocean salt spray and fugitive dust blanket the coast, often extending mauka of Makena Road.

In recent years, more vehicles and persons have been venturing into the once remote Makena area despite the adverse conditions of Makena Road. As a result, the ambient air quality along Makena Road in this area has been affected to a minor degree by exhaust emissions from internal combustion engines and dust raised by vehicular traffic.

Several sites throughout the State are monitored for air quality, and a summary for 1980 is presented in Table 2-2. For Maui, sampling stations are located at Kahului and at Kihei. The Kahului site is located at the Kahului Shopping Center, in an area which

TABLE 2-2

SUMMARY OF AIR QUALITY SAMPLING STATIONS - 24 HOUR SAMPLING
1980

	Dept. of Health	Barbers Point	Pearl City	Kalihi Kai	Waikiki	Waimanalo	Kahului, Maui*	Kihel, Maui	Hilo, Hawaii	Honokaa, Hawaii	Lihue Kauai
PARTICULATE MATTER											
<u>Parameters</u>											
Period of sampling (mos.)	12	12	12	12	12	12	12	12	12	12	12
Number of samples	61	57	60	60	57	57	57	49	48	50	57
Range of values (ug/m ³)	23-103	29-158	22-93	29-106	20-116	10-90	25-143	18-158	10-84	10-49	16-98
Average of values (ug/m ³)	37	53	36	55	36	29	79	56	21	23	38
No. of times AQS** exceeded	1	2	0	1	1	0	10	3 (13%)	0	0	0
SULFUR OXIDES											
<u>Parameters</u>											
Period of sampling (mos.)	12	12	12	12	12	--	12	--	12	--	12
Number of samples	58	53	52	59	52	--	59	--	46	--	53
Range of values (ug/m ³)	<5-60	<5-10	<5-15	<5-5	<5-5	--	<5-406	--	<5-17	--	<5-5
Average of values (ug/m ³)	18	<5	<5	<5	<5	--	64	--	<5	--	<5
No. of times AQS** exceeded	0	0	0	0	0	--	16 (25%)	--	0	--	0

CARBON MONOXIDE

Site: Leahi Hospital, Kaimuki, Oahu

Parameters	Maximum 1-Hour Value
Period of sampling (mos.)	12
Number of samples	329
Range of values (ug/m ³)	0-3.5
Average of values (ug/m ³)	.6
No. of times AQS** exceeded	0

PHOTOCHEMICAL OXIDANTS

Site: Department of Health Building, Honolulu, Oahu

Parameters	Maximum 1-hour Value
Period of sampling (mos.)	11
Number of samples	295
Range of values (ug/m ³)	10-84
Average of values (ug/m ³)	8
No. of times AQS** exceeded	0

* National Primary Ambient Air Quality Standard of 365 ug/m³ for sulfur dioxide was exceeded once.

** Hawaii Air Quality Standards

Particulates - 100 ug/m³
Sulfur Dioxide - 80 ug/m³
Nitrogen Dioxide - 150 ug/m³
Carbon Monoxide - 10 mg/m³
Oxidants - 100 ug/m³

Source: [2.8]

includes Maui Electric Power Plant. The Kihei site is located at the Kihei Wastewater Reclamation Plant in a residential and rural community.

Results from the table show that Kahului and Kihei average the highest for particulate matter of the sites sampled. This may be partly due to the high wind conditions experienced between the West Maui mountains and Haleakala and because much of the area is in sugarcane, portions of which are denuded at any given time. Kahului also exhibits the highest values of sulfur oxides, primarily because of its proximity to Maui Electric Power Plant.

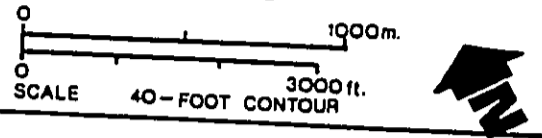
I. Ambient Noise Levels

Ambient noise readings were taken at 14 stations as shown in Figure 2-8. Noise data recorded at these stations are tabulated in Table 2-3. In general, the existing noise environment is dominated by nature - the surf along the shore, the wind, birds, and rustling trees. Noise along the shoreline varies between 35 and 65 dBA depending on surf conditions and distance from the surf. In areas mauka of Makena Road, noise levels vary between 30 and 48 dBA. Traffic noises on Makena and Ulupalakua Roads range between 40 to 73 dBA depending on location, type of vehicle, and vehicle speed.

PACIFIC

OCEAN

Figure 2-8
NOISE STATIONS
MAKENA ROAD



0 1000m.
0 3000 ft.
SCALE 40-FOOT CONTOUR

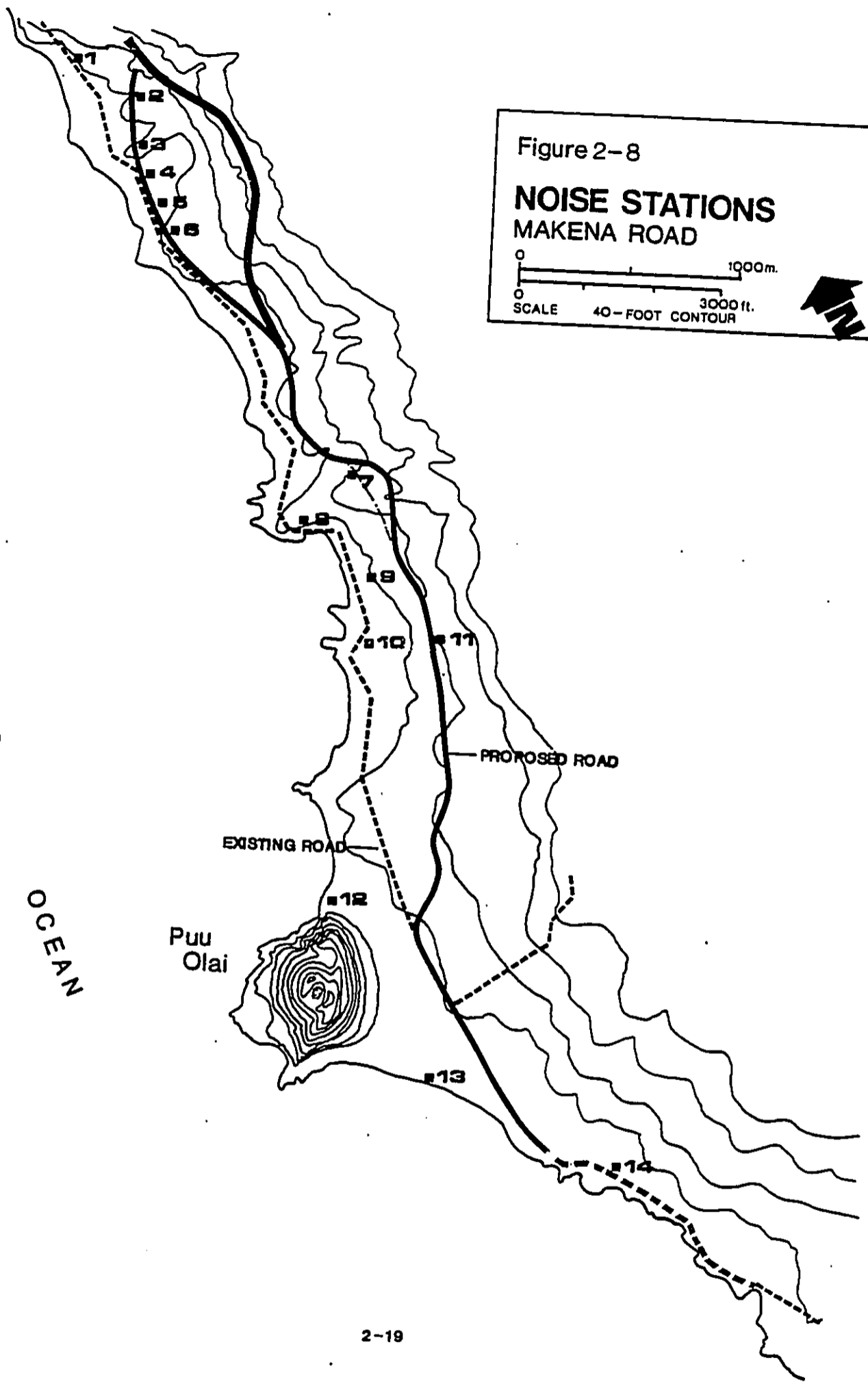


TABLE 2-3
NOISE READINGS

<u>STATION</u>	<u>LOCATION</u>	<u>dBA</u> <u>(Ambient)</u>	<u>TIME</u>	<u>PREDOMINANT</u> <u>SOUND SOURCE</u>	<u>dBA</u> <u>(Traffic)</u>
1	Wailea Alanui Drive and Makena Road	35-40	9:00 AM	surf, birds	60-66
2	Proposed road	42-48	9:20 AM	birds	—
3	10' off Makena Road		9:40 AM	surf, birds	—
4	Historic site	37-44	10:00 AM	birds, wind	—
5	Ridge above Historic site	37-48	10:30 AM	birds, wind	—
6	50' off Makena Road 400' from shoreline	33-44	12:00 PM	birds, surf	50-60
7	Proposed road 1000' from shoreline	30-38	8:40 AM	birds, surf	—
8	5' off Ulupalakua Road	35-40	1:00 PM	birds, surf, wind	—
9	Proposed road (near start)	30-37	9:35 AM	surf, birds, wind	—
10	10' off Makena Road	35-40	3:50 PM	surf	64-73
11	Proposed road mauka of Keawalai Church	30-35	10:35 PM	birds, wind	—
12	Beach, 150' from shoreline	41-57	3:30 PM	surf, birds	—
13	Beach, 150' from shoreline	45-64	1:10 PM	surf	—
14	10' off Makena Road	42-48	2:30 PM	surf	66-67

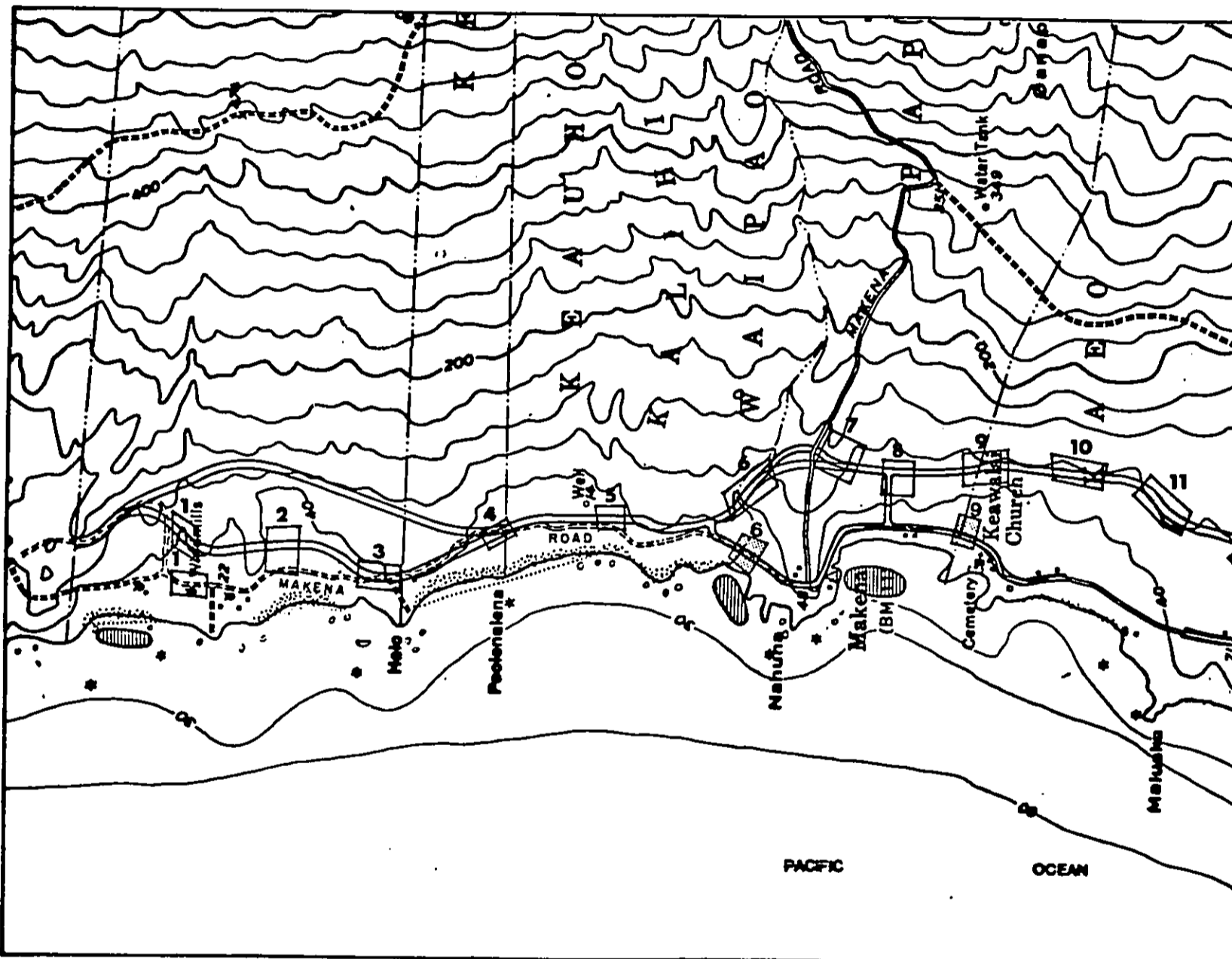
The County of Maui has no specific noise level controls; however, ambient noise levels recorded in the project area were well below noise standards given in Chapter 44B, Community Noise Control for Oahu, which was used for comparison only.

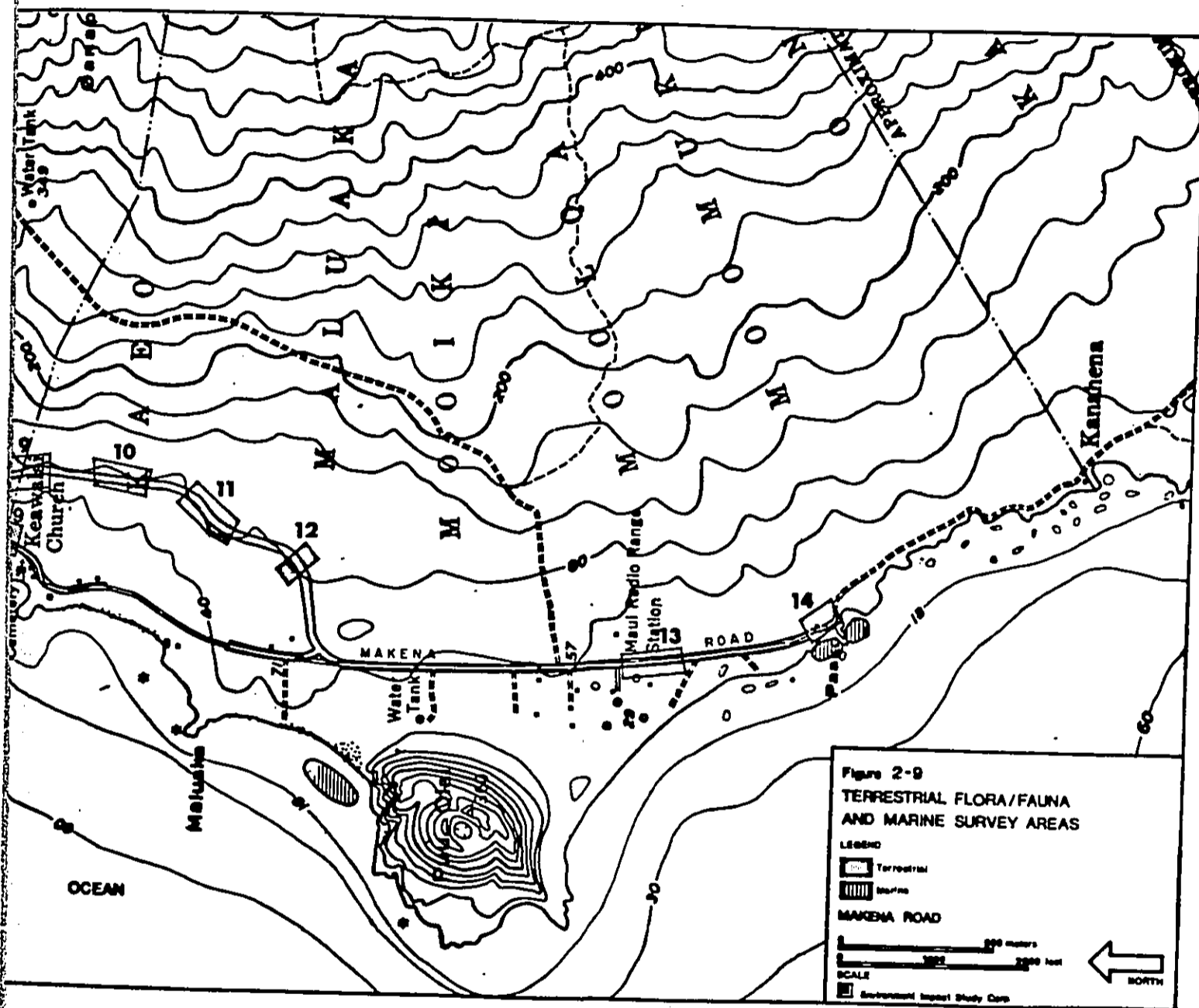
III. BIOLOGICAL CHARACTERISTICS

A. Terrestrial Flora and Fauna

A botanical survey was conducted along the proposed Makena Road alignment from Wailea Alanui Drive near Polo Beach to Paako Point. The proposed alignment was followed in its entirety using topographic reference points and surveying markers as guides. A total of 14 areas along the alignment were selected for detailed studies. Figure 2-9 shows the approximate location of each study area.

The survey was conducted during an extremely dry period which made identification difficult. Fruits, flowers, and seeds necessary for proper identification were scarce. The survey should be considered a reconnaissance, and the information presented was indicative only of conditions and species present in February and October, 1977. Species found in the project area during this survey are listed in Appendix A. Also listed in Appendix A are species observed during a subsequent survey conducted in March, 1980.





1. Flora

The proposed alignment passes through arid forests, rangeland, strand vegetation and partially urbanized areas. The following is a description of the vegetation types found in these areas.

a. Forests

The non-urbanized, forested portions of the study area can be classified as a kiawe (Prosopis pallida) forest formation with two sub-formations: the Moderate-dense and Open Kiawe Forest.

1. Moderate-dense Kiawe Forest

The kiawe trees in this forest are 15 to 25 feet high and grow relatively close together. The understory vegetation consists predominantly of exotic grasses such as buffelgrass (Cenchrus ciliaris), sandbur (C. echinatus), and sourgrass (Tricachne insularis). Common weeds and shrubs include spiny amaranth (Amaranthus spinosus), Spanish needle (Bidens pilosa), wild zinnia (Zinnia pauciflora), hairy merremia (Merremia aegyptia), hairy abutilon (Abutilon grandifolium), balsam apple (Mormordica

balsamina), koali (Ipomoea insularis) and 'ilima (Sida fallax).

2. Open Kiawe Forest

The open kiawe forest contains intermittent groves of trees with open areas dominated by grasses and weeds. The drought conditions present during the reconnaissance transformed the understory into a carpet-like layer of brown, dried vegetation. The most common understory species are buffelgrass, spiny amaranth, Spanish needle, wild zinnia, hairy merremia, balsam apple, and 'ilima. The open areas are also dominated by scattered growths of klu (Acacia farnesiana), wiliwili (Erythrina sandwicensis), koa-haole (Leucaena leucocephala), and panini (Opuntia megacantha). A large stand of endemic wiliwili, estimated at 50-70 trees concentrated within a one-acre plot, was noted in study area 11.

b. Open Rangeland

The open rangeland was heavily grazed by cattle (but now is not) and the ground vegetation was sparse. Most of the grasses

and weeds were closely cropped and unidentifiable. In study area 12, the endemic 'ihi (Portulaca cyanosperma) was commonly found. Kiawe and koa-haole are secondary in abundance as compared to the dense stands of panini.

c. Strand

Portions of the alignment near the coastline contain characteristic strand vegetation. Common strand vegetation includes kiawe, naupaka-kahakai (Scaevola taccada), beach morning glory (Ipomoea brasiliensis), and Australian saltbush (Atriplex semibaccata). Indian pluchea (Pluchea indica) can be found in areas where sufficient moisture exists.

d. Urban Areas

Urban areas along the proposed alignment contain most of the common species such as kiawe, koa-haole, 'ilima, and buffelgrass. A grove of hau (Hibiscus tiliaceus) is locally common at Paako Point. Exotic plantings such as bougainvillea (Bougainvillea sp.), bestill tree (Thevetia peruviana), plumeria (Plumeria sp.), banana (Musa sp.), and lilikoi (Passiflora edulis) are common around the residences in Makena.

2. Fauna

a. Mammals

The mammals recorded during the field survey were common, exotic species. Cats (Felis catus) and dogs (Canis familiaris) were found around human habitations and probably occur in the wild. One mongoose (Herpestes auropunctatus) was seen near Ulupalakua Road. Cattle (Bos taurus) were not observed during the survey, but their presence was indicated by tracks and droppings throughout the area. The roof rat (Rattus rattus) and the Polynesian rat (Rattus exulans) are probably present, although they were not recorded during the site survey. The most common mammal in the study area is the mouse (Mus musculus). Mice are commonly found near the houses along the Makena coastline and occasionally found in the uninhabited areas. A complete list of species is presented in Appendix A.

b. Avifauna

The distribution of birds in the study area was found to be directly related to the vegetation. The most abundant species are adapted to all areas and include cardinal

(Cardinalis cardinalis), mockingbird (Mimus polyglottos), barred dove (Geopelia striata), and white-eye (Zosterops japonica japonica).

The ricebird (Lonchura punctulata) was uncommon in the project area but this was probably due to drought conditions. Improved conditions would undoubtedly result in a significant increase for this commonly recorded species. In the kiawe forests and rangelands, the Indian gray francolin (Francolinus pondicerianus) is common and is easily recognized by its loud cry. Turkey (Meleagris gallopavo intermedia) and ring necked pheasant (Phasianus colchicus torquatus) were not seen but have been observed occasionally in the study area. Mynahs (Acridotheres tristis), house finches (Carpodacus mexicanus frontalis), and sparrows (Passer domesticus) are common near the urban and coastal areas. The Hawaiian owl (Asio flammeus sandwichensis) is probably present as it is present throughout Maui.

The golden plover (Pluvialis dominica fulva) and ruddy turnstone (Arenaria interpres) were observed at the mudflats near Big Beach and probably occur in greater

abundance during wetter seasons. Only one endangered bird, the Hawaiian stilt (Himantopus mexicanus knudseni), is known to frequent the mudflats and the lakes of Seibu Golf Course, but the drought and the resulting lack of water are probable reasons why it was not observed. This species is classified as "endangered" by the State Division of Fish and Game and by the U. S. Fish and Wildlife Service. Additional shorebirds and wetland species could probably be found during more favorable conditions. A complete list of species recorded during the survey or believed to be present in the area is presented in Appendix A.

B. Marine Ecosystem

Diving surveys were conducted during October 1976, to determine existing offshore conditions and to assess the probable impacts of storm runoff and sedimentation on marine organisms. Observations and data collection were limited to benthic organisms and reef-oriented fish that would be most affected by fresh water discharges. Station depths ranged from 1 to 7 meters positioned 10 to 150 meters off-shore. The stations are shown in Figure 2-9. Additional information was recorded during preliminary reconnaissance dives

covering large areas outside of the transect area. A complete inventory and number of species encountered is listed in Appendix B.

1. Polo Beach

The reef communities at Polo Beach were confined to rock outcroppings scattered along the bottom. These were only noted on the south end of the beach as the north end was predominantly sand. The survey of this region consisted of an observational swim through rather than an actual transect because of the lack of reef communities.

No live corals were found near shore and to about 20 meters off shore. Much of this area was covered by very fine sediments. The only benthic animal observed in this area was the garbage, or heart urchin, Tripneustes gratilla.

The most conspicuous coral was Pocillopora meandrina or rose coral. Small colonies of the encrusting coral Porites lobata were also very noticeable. Two species of Montipora were also often seen. Much of the substrates were covered by dead coral on which the red encrusting alga Porolithon grows.

Three species of algae were conspicuous in this outer area. These were Amansia, Lyngbya, and Halimeda. All of these, especially the

Amansia, were covered by a large amount of sediment.

The swim along the length of Polo Beach revealed very few fish species in comparison with the other study areas. Weke-'a'a (Mulloidichthys samoensis), manini (Acanthurus sandvicensis), and hinalea lauwili (Thalassoma duperreyi) were noted among rock outcrops throughout the southern half of the beach. Significant fish concentrations were not encountered until rock rubble was found at the extreme southern end of Polo Beach. Surgeonfish (Acanthuridae), butterfly fish (Chaetodontidae), wrasses (Labridae), and damselfish (Pomacentridae) were the most abundant species in this area.

2. Nahuna Point

Much of the area fronting the small beach was sand. The only solid substrates transectable were south of the beach. The transects lay perpendicular to shore and ranged from 1 to 6 feet in depth. The line was laid this way because of the presence of a rocky, "fingerlike" projection of land.

Coral covered 45.2 percent of the substrate comprising the reef community, but this percentage was indicative only of the reef finger. Coral

coverage elsewhere was extremely low with rose coral the most abundant. In deeper waters, the finger coral, Porites compressa, was common. Also present in high amounts was another coral of the Porites genus. Many dead coral heads of Pocillopora meandrina encrusted with the red alga Porolithon were observed. Fungia also appeared at the deeper end of the transect.

Two species of sea stars, Linckia diplex and Acanthaster planci, were found hidden among the coral.

The black urchin, Echinothrix sp., was found in high numbers in shallow water, although the data does not really show this due to many of them being out of the quadrat. The garbage urchin was found throughout the area. The bandit shrimp, Stenopus hispidus, was present under small ledges.

Fish species were found along a submerged lava ledge that extended out from the fingerlike projection of land. All species recorded here were observed along the transect line or within ten meters from the ledge. Manini, weke-'a'a, and uhu (Scarus dubius) were the most abundant species recorded.

3. Makena Bay

Much of the area was covered by a very large expanse of sand. Near the rocky shoreline no macro-organisms were recorded inhabiting this substrate. The bottom was covered by a very fine silt-like cover. The only reef community was located to the south of a round metal buoy anchored approximately 150 meters offshore. This "reef" area was a small patch, and thus only 5 quadrates were done across it. The other 5 ended in sand. The average depth was 20 feet (6m).

Total coral coverage for this reef area was 12 percent. Porites lobata was the coral with the highest cover. Antler coral (Pocillopora eydouxi) was present outside the transect, although it was not found in any of the previous sites.

Many types of algae were found here. The clubshape Neomeris, the calcareous Halimeda, and the wire-like Actinotrichia were present.

Very few urchins were seen; species recorded include Echinometra mathaei, Eucidaris metularia, and Heterocentrotus mammilatus. The sea star Linckia diplex was also noted. On some dead coral heads, the hydroid Pennaria was present.

Weke-'a'a was found occasionally along the silty sand bottom but in general the area was very desolate. The only species that appeared with some frequency were manini, kala (Naso unicornis), humuhumu (Rhinecanthus aculeatus), hinalea lauwili, maomao (Abudefduf abdominalis), and alo'ilo'i (Dascyllus albisella).

4. Naupaka Beach

This site consists of "banding" of the reef. There is a simple reef community in the surf zone. Farther out, there is a band of sand parallel to the beach. Beyond this sand area there is a very rich coral reef community and the survey was taken here. Total coral coverage was 58.4 percent, the highest percentage found during the study. Yellow-green encrusting masses of Porites lobata and the delicate finger coral, Porites compressa, covers much of the bottom. These two coral comprise 35 percent of the total substrate cover. Montipora verrilli and Porites sp. were fairly abundant. The alga Amansia was found growing in small tufts on much of the dead corals. The alga Halimeda was also present.

Five species of urchins were recorded. The garbage or heart urchin was the most abundant

type. Others that appeared were Echinometra mathaei, Eucidaria metularia, Echinothrix sp., and Heterocentrotus mammilatus.

Brittle stars were observed between the coral branches and below the coral heads. The pin cushion sea star Calcita was very obvious. Also present were the sea stars Linckia diplex and Linckia multifora.

The most abundant fish species in the surf zone and along the outer reef were palani (Acanthurus dussumieri), maiko (Acanthurus nigrofuscus), manini and uhu. Out along the reef edge and in the sand, schools of weke-'ula (Mulloidichthys auriflamma) and kumu (Parupeneus porphyreus) were the most abundant species present. The survey results reveal this to be the best area in terms of the number of species present and their abundance.

5. Paako Point (North Cove)

The transect line was stretched along the south side of the cove. The area around the transect line was mostly sand and the last 3 (three) quadrates covered a sandy area. Visibility in the nearshore area was poor due to the high sediment present.

The total coral coverage was very low (9.2 percent) with Pocillopora meandrina being the most abundant species. The only other coral with a high percentage of cover was the yellow-green Porites lobata.

The minute alga Tolypocladia sp. was present in and around the area of the transect. No other algae, except those of the littoral region, were present in observable abundance.

In the sand, two species of molluscs were found. The lanced auger (Hastula lanceata) and the flea cone (Conus pulicarius) were uncovered by the surge action of the waves.

The large sand deposits and the turbid conditions resulted in a lack of reef fish. No suitable habitats were found. Weke-'a'a was the most common species present, while surgeonfish, humuhumu-nukunuku-a-pua'a, butterfly fish, and goatfish (Mullidae) were among the few species commonly observed in some abundance.

6. Paako Point (South Cove)

The transect for this area ran parallel to shore for 100 meters at about a depth of 5 meters and continued north to an area 2 meters in depth. This transect gave a good representation of the substrate that was present. It progressed

from an area that was relatively barren to an area that was slightly richer in benthic life. The bottom for the first 50 meters was fairly flat. The second 50 meters consisted of a series of deep grooves running perpendicular to shore.

Coral coverage was 23.6 percent of the total bottom. Porites lobata had the highest single coral cover followed by Pocillopora meandrina. The red encrusting alga Porolithon was very noticeable.

Echinometra mathaei was abundant, with an average of 13 individuals per square meter. Also abundant was the black urchin Echinotrix sp. The pencil, or slate urchin, Heterocentrotus mammilatus was also present inside the transect area. The algae Lyngbya and Dictyota were observed.

Two species of cones were observed. No other mollusc species were recorded. In small caves and ledges, spiny lobster of various sizes were observed. Many lobster shells which could possibly be molts were found.

The abundance of habitats among the many crevices of the lava formations close to shore resulted in a large number of fish species in this area. The most abundant fishes were maiko,

na'ena'e (Acanthurus olivaceus), manini, hinalea lauili, maomao, and lauiliwili (Chaetodon miliaris). Sand deposits further offshore resulted in a sharp decrease in fish species. In these areas, weke-'a'a was the most common species.

IV. ARCHEOLOGICAL/HISTORICAL SITES

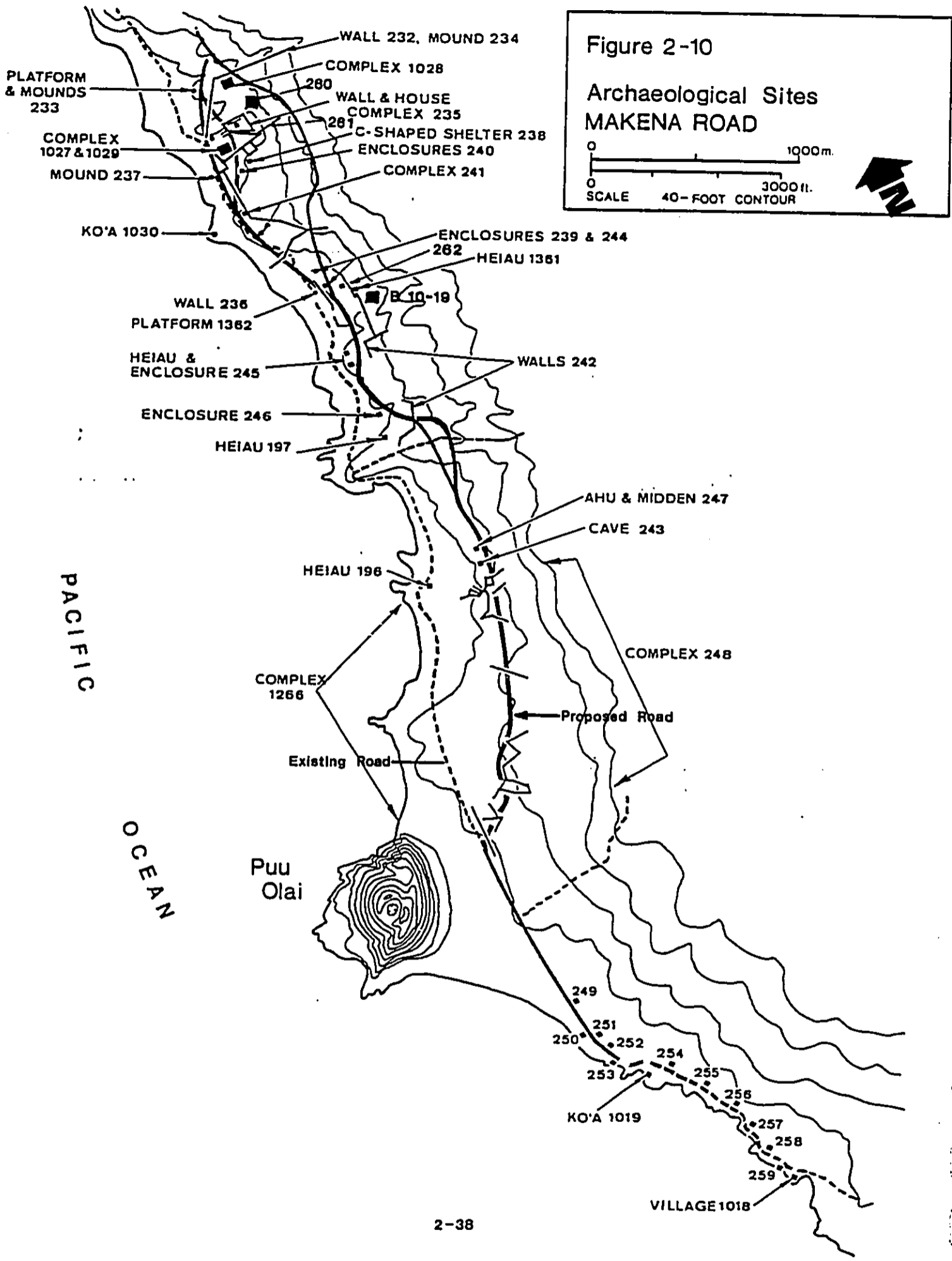
Eleven previously recorded archaeological sites are located in the vicinity of the proposed alignment. These are shown in Figure 2-10, and are indicated by underscored citations. A brief description of the sites is presented in Appendix C.

In addition, archaeological surveys of the proposed road and alternate alignments were conducted during March, 1977, November, 1977 and March, 1980 to determine if any unrecorded cultural sites were present along the proposed corridors [2.9], [2.10]. These studies identified a total of 32 additional cultural sites. Each is briefly described in Appendix C. Of the 43 recorded and unrecorded sites, fourteen sites will likely be impacted by the proposed road alignment. These sites and the archaeologist's recommendations (mititative measures) are discussed in Section 4.

V. SOCIOECONOMIC CHARACTERISTICS

A. Land Use

Most of the project area mauka of Makena Road was used as marginal grazing land by Ulupalakua Ranch



in the past. Presently, there are three existing 18-hole golf courses mauka of the road. Urban uses consist of approximately 30 to 40 residential units intermittently spaced along Makena Road between Polo Beach and Kanahena Point, with 180 residential condominium units under construction. The majority of these appear to be inhabited throughout the year, while the remainder are vacation beach houses which appear to be used infrequently.

In the northern portion of the project area, the Wailea Land Company is developing a 1,450-acre resort-residential community with up to 1,250 hotel units, and in the southern portion the Seibu Development Group is also planning a resort-residential area with 450 to 800 hotel units.

B. Population

1. Existing

The resident population of Kihei-Kula (Census Tracts 303 and 307) for the years 1970 and 1980 is given in Table 2-4. (The project site is located in Census Tract 303.) Population density for these areas is given in Table 2-5.

The Makawao Judicial District (which includes up-country Maui, Makena, and part of Kihei) has shown the greatest population growth rate on the island of Maui [2.11]. The relationship of this

TABLE 2-4
RESIDENT POPULATION - KIHEI-KULA
1970-1980 ^{4/}

<u>Census Tract</u>	<u>1970</u> ^{1/}	<u>1975</u> ^{2/}	<u>1980</u> ^{3/}
303 (Kula)	2,124		5,077
307 (Kihei)	<u>1,636</u>		<u>6,020</u>
<u>TOTAL</u>	3,760	9,347	11,097

^{1/} 1970 Census

^{2/} 1975 Census Update Survey, Maui County (breakout not available by Census Tract)

^{3/} 1980 Census

^{4/} Refer to the response letter to Mrs. Chris Kaoni, in Section 12 of the REIS, for additional information.

Sources: Survey and Marketing Services, Inc. 1976. OEO 1975 Census Update Survey, Maui County.

U.S. Department of Commerce, Bureau of the Census. 1972. 1970 Census of Population and Housing, Census Tracts, Final Report, Honolulu SMSA.

Department of Planning and Economic Development, State of Hawaii. March 18, 1981. The Population of Hawaii, 1980: Final Census Results. Statistical Report 143. Table 4.

TABLE 2-5
POPULATION DENSITY - KIHEI-KULA ^{1/}
1970-1980

<u>Census Tract</u>	<u>1970</u> ^{2/}	<u>1975</u> ^{3/}	<u>1980</u>
303	$\frac{2,124}{123,384.4} = .017$		$\frac{5,077}{123,384.4} = .041$
307	$\frac{1,636}{25,018.3} = .065$		$\frac{6,020}{25,018.3} = .241$
<u>ENTIRE AREA</u>	$\frac{3,760}{148,402.7} = .025$	$\frac{9,347}{148,402.7} = .063$	$\frac{11,097}{148,402.7} = .075$

^{1/} Persons per acre.

^{2/} Acreage from page 12 of Maui County Land Inventory Report: 1972. The Hawaii Urban Planning Information Center, State Department of Planning and Economic Development.

^{3/} Unavailable by Census Tract.

growth rate to the rest of the island, the rest of the County, and the State is shown in Table 2-6. During the period of April, 1970 to April, 1980, Maui County, as a whole, showed a population increase of 53.8 percent compared to a 45.0 percent for the County of Hawaii, 31.3 percent for the County of Kauai, and 25.3 percent for the State total.

2. Projected

The State Department of Planning and Economic Development (DPED) has requested that all agencies use the series II-F population projection, as it is updated, in order to establish a uniform population planning base. The March 1, 1978 revised population projection for Maui County in the year 2000 is 124,700 [2.12].

C. Demographic Characteristics

The data which follow were reported in the OEO 1975 Census Update Survey: Maui County [2.13]. This survey was not an enumeration of each person in Maui County but updated population characteristics through a sample survey of households. Makena was aggregated with Kula (Census Tract 303) and Kihei (Census Tract 307) into Survey District 27. Because the number of households in Makena is so small, and because their data is inseparable from that of the

TABLE 2-6

RESIDENT POPULATION OF THE STATE
AND OF MAUI COUNTY BY DISTRICT: 1970 TO 1980

<u>County and District</u>	<u>April 1, 1970</u>	<u>April 1, 1980</u>	<u>Percent change 1970-1980</u>
The State	769,913	965,000	25.3
Maui and Kalawao	46,156	70,991	53.8
Hana	969	1,423	46.9
Makawao	9,979	19,005	90.4
Wailuku	22,219	32,111	44.5
Lahaina	5,524	10,284	86.2
Lanai	2,204	2,119	-3.9
Molokai	5,089	5,905	16.0
Kalawao	172	144	-16.3

Source: Department of Planning and Economic Development, State of Hawaii. March 18, 1981. The Population of Hawaii, 1980: Final Census Results. Statistical Report 143. Table 3.

rest of this very large district, the data which follow refer to District 27 and can be considered representative of the vast majority of residents in the Kula-Kihei area.

The major ethnic groups in the area were Caucasian (48.9 percent), Hawaiian and part-Hawaiian (18.7 percent), and Japanese (14.1 percent). This compares to an island total of 21.3% Caucasian, 23% Hawaiian or part-Hawaiian, and 25.1% Japanese. Other major ethnic groups represented on the island of Maui include Filipino (15.3%) and Portuguese (4.4%).

The median age was between 30-34, and the sex ratio (males/100 females) was 105. Of adults over 25 years of age (5,687 persons), 78.3 percent had at least a 12th grade education. The unemployment rate for persons 16 years and older was 7.3 percent, as compared to a County total of 6.5 percent.

Mean annual family income was estimated at \$17,040 as compared to \$13,610 in 1970. The median annual family income was estimated at \$14,980 as compared to a 1970 figure of \$10,490.

D. General Economic Characteristics

The economy of Hawaii is small and limited in scale, as illustrated by the changes within the past 20 years. The main components of the State's economy have been sugar, pineapple and the military; however,

during the past decade, the service sector of the economy grew rapidly, reflecting tourist development and investment. The growth in the tourist industry has been accompanied by a relative decline in the agricultural sector and has altered the socio-economic framework of Hawaii.

During the 1960's, Maui County experienced significant economic progress, which brought it out of a prolonged slump era. The major factor influencing this surge of economy was the visitor industry, which contributed to promoting a healthy business community. The population began increasing with sufficient employment to satisfy the population needs. With the 1970's, planning became more important as an approach towards economic development. With this new awareness came high standards of design and environmental compatibility. Maui County has completed construction of a civic center, a new police and fire station, a County building, various housing projects, and necessary water projects.

A study conducted by the State Department of Labor and Industrial Relations covered the period from 1964 to 1975 [2.14]. Summaries of employment trends in the study areas containing Kihei and Makena for this period are presented as follows:

1. Haiku/Pauwela (Census Tracts 302-305):

This area, which includes Makena, showed Retail and Services being the primary industries, each representing about 28% of the 1975 employees. There were 896 employees, reflecting a decrease of 72.9% of persons employed between 1964 and 1975. The loss of employees was tremendous in Manufacturing (a loss of 2,007 employees) and in Agriculture (a loss of 636 employees) during this period.

2. Sprecklesville - Puunene (Census Tracts 306-313):

Kihei is located within this area. Agriculture, Retail Trades, Services and State Government were the leading employers in this area. The county seat and most of the industries are located here, with the exception of Services and Hotels. The 11,597 employees reflected a 66.3% increase between the years 1964 and 1975. A steep drop in employment of 34 percent was experienced in Food Processing.

It should be noted that most of the industries in these study areas are located outside of the Kihei-Makena area, although the tourism industry has been on the increase in Kihei.

Table 2-7 illustrates overall employment and unemployment trends for the island of Maui from 1970 through 1980. The data shows that there was a steady increase in unemployment from 1971 to 1976. The year 1977 showed a significant decrease in unemployment, which continued through 1980 [2.15].

Between December, 1980 and May, 1981, Maui County registered a slight decrease in the unemployment rate, going from 6.2 to 6.1%. Of the districts of Maui Island, in 1980, Hana had the lowest unemployment rate, at 1.6%, followed by Lahaina at 3.2%, Kahului at 4.7%, Makawao at 4.8%, Wailuku at 5.7%, and finally, Kihei at 7.0% [2.16].

VI. INFRASTRUCTURE

Public facilities and infrastructure are shown in Figure 2-11.

A. Water

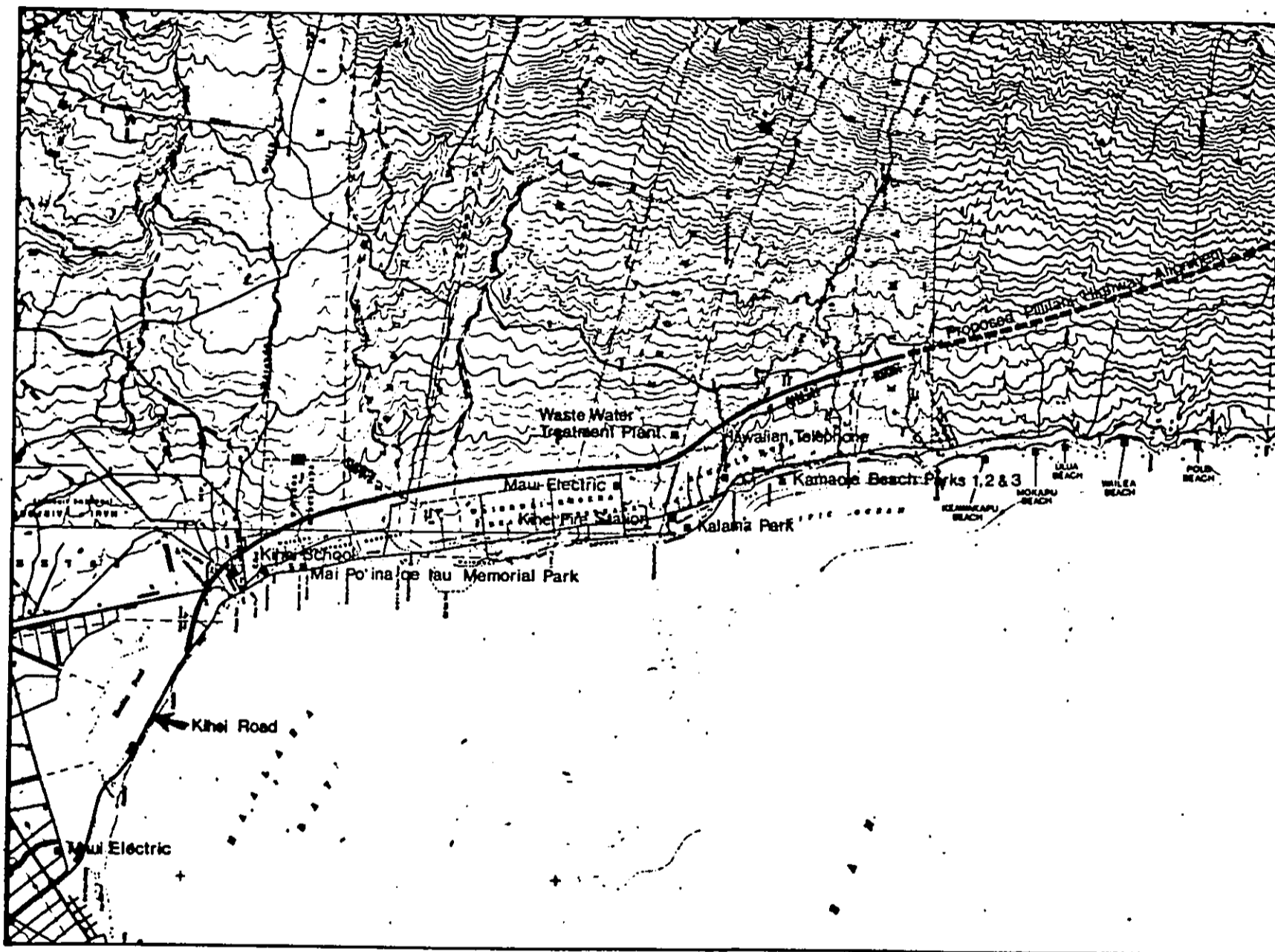
Potable water is piped to Makena through a small and inadequate extension from the Central Maui Water Transmission System.

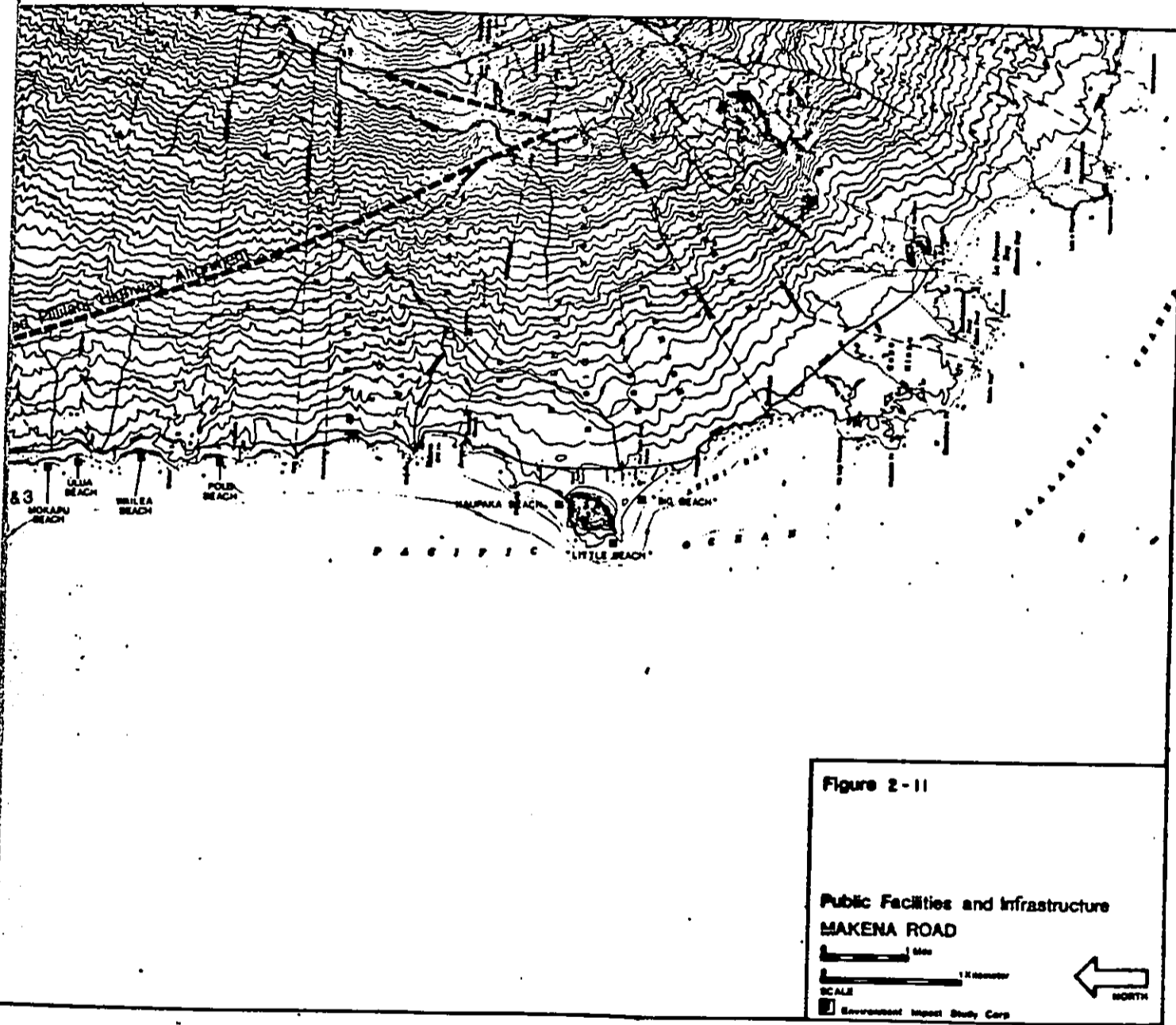
Potable water is transmitted to Kihei from the Mokuhanu and Waiehu Wells, through 36-inch, 30-inch,

TABLE 2-7
CIVILIAN LABOR FORCE
ISLAND OF MAUI
(1970-1980)

<u>YEAR</u>	<u>AVERAGE ANNUAL</u>		
	<u>EMPLOYED</u>	<u>UNEMPLOYED</u>	<u>% UNEMPLOYED</u>
1970	16,050	1,200	7.0
1971	16,770	1,450	8.0
1972	17,600	1,800	9.3
1973	18,650	1,750	8.6
1974	19,400	1,850	8.8
1975	21,100	2,100	9.0
1976	22,300	2,450	9.9
1977	24,400	1,850	7.0
1978	24,750	1,850	6.9
1979	25,650	1,550	5.7
1980	26,900	1,500	5.3

Source: [2.15]





and 18-inch transmission lines. In 1979, water consumption in Kihei-Makena was 1,072,075,000 gallons, or approximately 2.9 million gallons per day (mgd) [2.17]. The Central Maui Water Transmission System will continue to serve the Kihei-Makena area. At present, Seibu Hawaii, Inc. has a temporary water line connection to Wailea, with potable water coming from the Mokuhan and Waiehu Wells.

B. Access and Traffic

The project area is accessible by automobile via Kihei Road and Makena-Ulupalakua Road. The paved portion of Kihei Road from Mokulele Junction to Kamaole is approximately 20 feet wide with shoulders varying from 2 to 4 feet. The right-of-way width varies from 40 to 60 feet. Access is uncontrolled with numerous private driveways along the existing road. Grades are flat, ranging from 0-3 percent. The condition of the pavement is recognizably deteriorated, with numerous potholes [2.18]. In recent years, construction along the Kihei coast has resulted in an abnormal amount of truck traffic and congestion on the narrow road. At the north end of the Wailea development, Kihei Road terminates, and access to Makena is via Wailea Alanui Drive, which eventually returns to Makena Road at the south end of the Wailea development.

Makena-Ulupalakua Road, a 14-foot wide unpaved dirt road, links Makena and Kula.

Above Kihei, the State of Hawaii has completed Phase I of a paved, two-lane highway called the Piilani Highway, which will ultimately span 12.6 miles between the Mokulele-Kihei Road intersection (in Kihei) and the Makena Road-Kula Highway intersection. Phase I terminates 200 feet south of Kilohana Road. The highway represents the final segment of a paved all-points connector highway system between Kahului, Kula, Wailea, Olokena, and Kihei. It is also designed to alleviate traffic congestion on Kihei Road.

Traffic counts were conducted at two locations along Makena Road: 1) near Polo Beach, and 2) before Big Beach. The counts were manually recorded over a three-day weekend (February 19-21, 1977), and it is difficult to determine if the long weekend influenced the number of vehicles recorded. There are no previous official traffic counts available for comparison. The counts are summarized as follows:

1. Polo Beach End - During one hour, 9:15 to 10:15 a.m., Saturday, February 19, 1977, 35 cars entered Makena Road and 18 exited. Additionally, 8 cars entered the Polo Beach parking lot and 7 left. Seven cars turned around at the end of Wailea Alanui Drive and returned without entering Makena Road.

2. North of Big Beach - During a three-hour span, 9:00 a.m. to 12:00 noon, Sunday, February 20, 1977, 141 cars and 5 motorcycles passed in the direction of Big Beach, and 66 cars, 4 motorcycles, and 2 pedestrians passed in the opposite direction. Counts of passengers showed 420 people going in the direction of Big Beach and 177 people going in the opposite direction. Forty-one of those vehicles going in the opposite direction had previously been counted going in the direction of Big Beach. Table 2-8 shows the tabulation by quarter hour.

A recent traffic count on Kihei Road at its intersection with Auhana Road is shown in Table 2-9, along with the evening 1-hour peak count on Wailea Alanui Drive at two locations.

C. Liquid Waste

Wastewater from Kihei and Wailea is collected and transmitted to the County-operated Kihei Wastewater Reclamation Plant, mauka of Kamaole Homesteads. The sewerage area extends from the easterly end of Kealia Pond in North Kihei to the southern boundary of the Wailea development. Sewage is collected via a forced main system along Kihei Road and pumped

TABLE 2-8
TRAFFIC COUNTS

Makena, Maui ^{1/}

INTERVAL	IN THE DIRECTION OF BIG BEACH		IN THE OPPOSITE DIRECTION (Previously counted in direction of Big Beach)			
	CARS	PEOPLE	CARS	PEOPLE	CARS	PEOPLE
9:00 - 9:15	3	6	1	1		
9:15 - 9:30	4	9	5	12		
9:30 - 9:45	8	20	5	11		
9:45 - 10:00	13	28	3	10+	3	8
10:00 - 10:15	5	17	1	2		
10:15 - 10:30	7	18			1	2
10:30 - 10:45	21	69	1	4	2	4
10:45 - 11:00	19	59	1	1	7	17
11:00 - 11:15	16	45			3	7
11:15 - 11:30	15	47	2	9	12	25
11:30 - 11:45	21	59	2	4	7	28
11:45 - 12:00	<u>13</u>	<u>42</u>	<u>4</u>	<u>13</u>	<u>6</u>	<u>20</u>
TOTAL	145*	419	25++	67+	41	111

+ includes 5 motorcycles

* includes 2 pedestrians

++ includes 4 motorcycles

^{1/} Taken just north of Big Beach. In addition, south of Big Beach during one hour, 2:15 - 3:15 p.m., Saturday, February 19, 1977, 17 cars passed in the direction of Big Beach and 10 cars passed in the opposite direction

TABLE 2-9

24-HOUR TRAFFIC COUNT
KIHEI ROAD AT AUHANA ROAD
Kihei, Maui
April 4-5, 1979

<u>North Leg</u>	<u>Vehicles</u>
Northbound	7,824
Southbound	7,944
<u>South Leg</u>	
Northbound	7,016
Southbound	7,091

SOURCE: [2.19]

EVENING 1-HOUR PEAK COUNT
WAILA ALANUI DRIVE
Kihei, Maui
May, 1979

<u>At Wailea Iki Drive</u>	<u>Vehicles</u>
Northbound	160
Southbound	58
<u>At Existing Makena Road</u>	
Northbound	113
Southbound	46

SOURCE: Allan M. Voorhees and Assoc., Inc. May, 1979.
A Traffic Study for a Four-Parcel Development
in Wailea, Maui. Prepared for Wailea Develop-
ment.

uphill for secondary treatment. The plant has an approximate capacity of 4.0 mgd and present flow is about 2.5 mgd [2.20]. Treated wastewater is used to irrigate an experimental pasture site near the plant or disposed via injection wells. In addition, a portion of the reclaimed wastewater is used to irrigate Kalama Park.

Within the Makena area, cesspools are used for wastewater disposal [2.21].

D. Solid Waste

Once-a-week refuse collection is provided by the County for residential areas. For commercial areas, refuse is generally collected by private haulers. Solid waste is ultimately disposed of at a County-operated sanitary landfill.

E. Communication

Telephone service is provided through Hawaiian Telephone Company's Kihei central office. This office presently handles 8,198 telephones.

F. Power

Existing power generating facilities of Maui Electric Company (MECO) can produce a total of 99 megawatts (MW): 40 MW by the facility at Kahului Bay, and 59 MW by the diesel unit installation at Maalaea Bay.

The Kihei-Makena area obtains electric power from a 69 kilovolt transmission circuit loop extending from generating facilities at Kahului Harbor east to Kula, west to Wailea, then to Kihei and terminating at Maalaea Power Plant. Two substations are located on the leeward portion of the route. Electric power for Makena is provided via a 4,160 volt over-head line from the Wailea substation.

G. Public Facilities and Services

1. Schools

Kihei Elementary and Intermediate School is the only public school in the Kihei-Makena area. The 1979 enrollment at the school was 775 pupils in kindergarten through grade eight. Present capacity is 862 pupils [2.22]. Projected enrollment for 1980 through 1985 is shown in Table 2-10. Eight new classrooms are planned for completion in 1983. These can be converted into 10 classrooms to accommodate increasing enrollment.

2. Parks

Recreation areas in Kihei-Makena are centered at the beaches. The inshore waters and shoreline are used for swimming, snorkeling, body surfing, fishing, pleasure boating, sunbathing, picknicking, and camping. A small-boat launching ramp is located at Makena Landing with a new ramp planned in the vicinity of Keawakapu, Kihei.

TABLE 2-10

PROJECTED ENROLLMENT

KIHEI ELEMENTARY AND INTERMEDIATE SCHOOL

<u>YEAR</u>	<u>PROJECTED ENROLLMENT</u>
1980	837
1981	888
1982	939
1983	981
1984	1,030
1985	1,067

Source: [2.22]

Five improved beach recreation sites are located at the Wailea development. In addition, a tennis center and two golf courses are open to the public on a space available basis. Seibu Hawaii, Inc. has completed an 18-hole golf course and proposes to develop two beach parks, at Makena Landing and north of Maluaka Point.

A State Park is planned in the vicinity of the 1,238-acre Ahihi Bay-Cape Kinau Natural Area Reserve. The Park would include 14 miles of shoreline between Puu Olai and Kanaloa Point and encompass approximately 3,223 acres.

3. Fire Protection

A County fire station is located in Kihei near Kalama Park. Fifteen men are assigned to the station and 3-4 men are on duty during each watch [2.23]. Their equipment includes an American La France fire truck which can pump 1,250 gallons of water per minute (gpm) and an International mini-truck which can pump 250 gpm.

Response time from the Kihei fire station to any point in Kihei-Makena is estimated at 5-10 minutes. If additional back-up is needed, response time from the Wailuku fire station to the Kihei area is 15-20 minutes and to Wailea 20-25 minutes. These time estimates can vary according to traffic, weather, and time of day.

The fire department can and does call on the sugar companies to provide water tankers and bulldozers in the event their equipment cannot control large brush fires. The Department of Public Works also provides water tankers if the situation warrants the need.

4. Police Protection

Two beat officers are permanently assigned to the Kihei-Makena area. This area is located within the Wailuku District, where in 1980 the level of service was one officer per 314 people [2.24].

5. Hospitals and Emergency Services

Maui Memorial Hospital, located between Wailuku and Kahului, is the nearest major medical facility to the project area. Emergency facilities staffed by a physician are located at the Wailea Shopping Village. There are no nursing homes in the project area.

The Kihei-Makena area is also served by an ambulance service under contract to the County. The ambulance is stationed at Kihei Elementary School and at least two fully-trained paramedics respond to each call.

REFERENCES TO SECTION 2

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10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000

**Land Use Plans
Policies
Controls**

3

SECTION 3

THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS,
POLICIES, AND CONTROLS FOR THE AFFECTED AREAS

I. STATE

A. State Land Use Designation

Portions of the project area are designated as Agriculture, Conservation, Rural, and Urban by the State Land Use Commission (Figure 3-1). Portions of the proposed alignment which lie within the Agricultural District will not require a State Special Permit, as roadways are a permissible use [3.1]. Roadways are also permitted within Urban and Rural Districts.

B. Hawaii State Plan

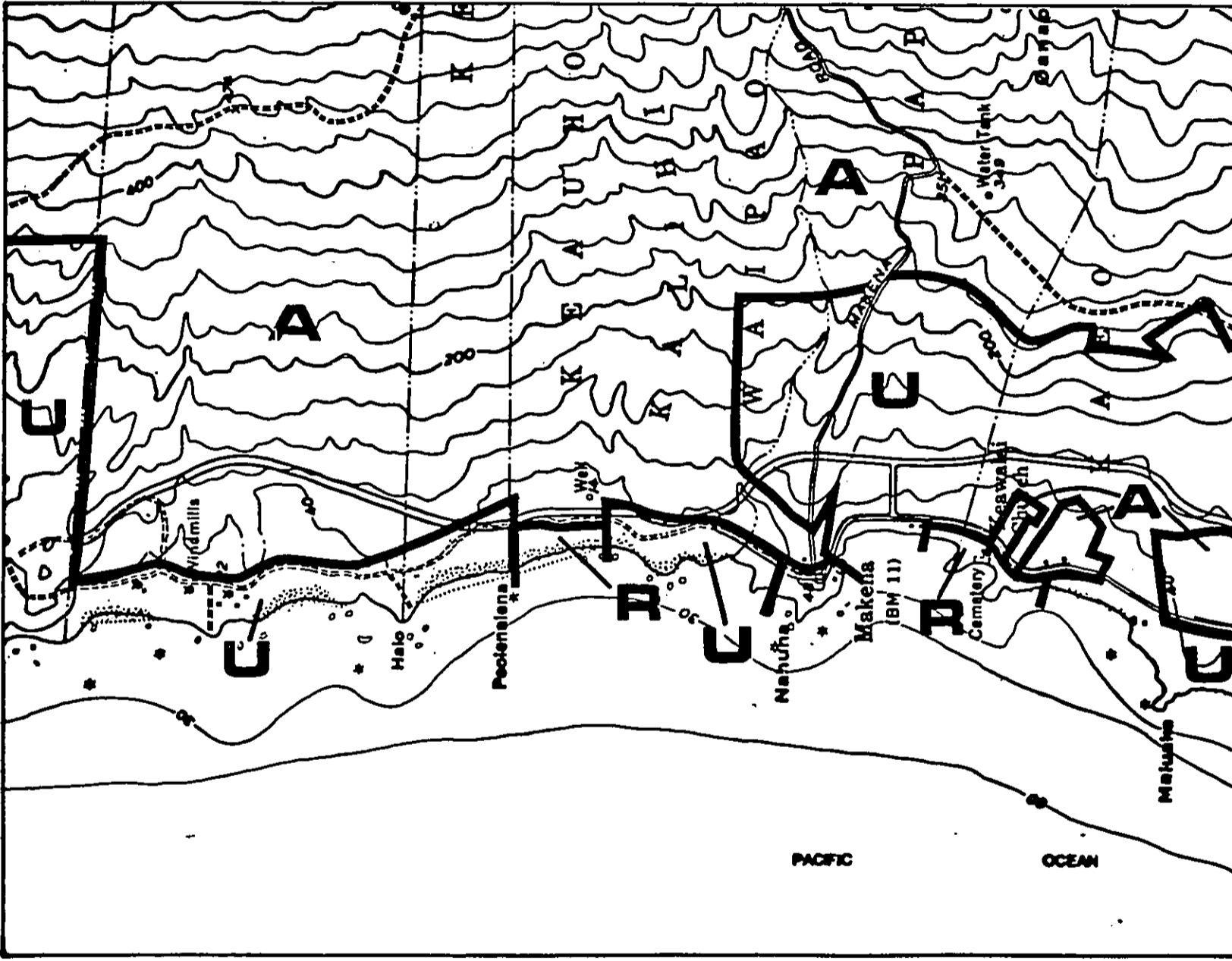
The Hawaii State Plan was adopted in May, 1978 [3.2]. Specific objectives and policies set forth cover the areas of population, the economy, the physical environment, facility systems, and socio-cultural advancement.

Objectives regarding "facility systems - transportation" are as follows:

Section 17(a):

"(1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods."

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



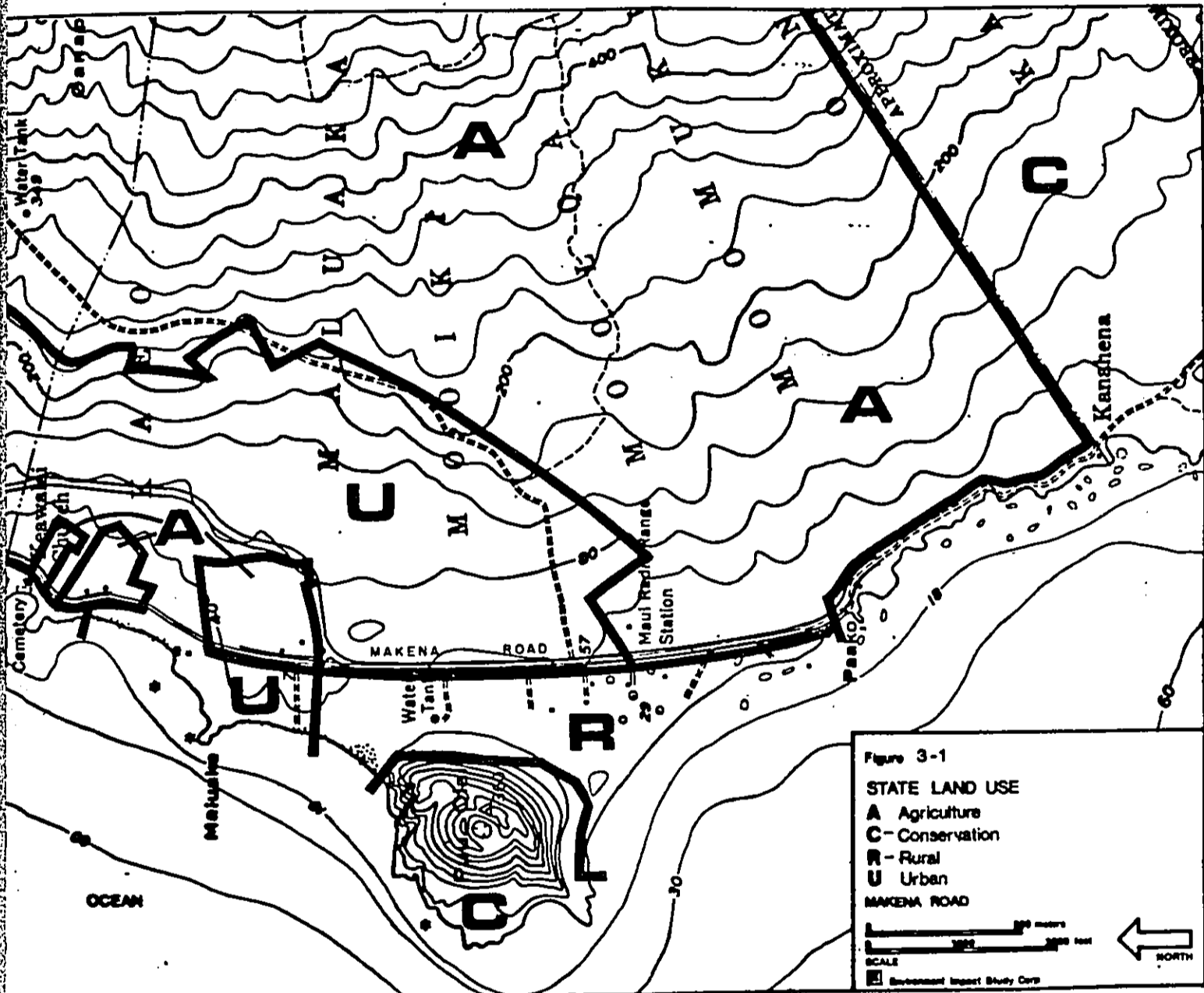


Figure 3-1
 STATE LAND USE
 A - Agriculture
 C - Conservation
 R - Rural
 U - Urban
 MAKENA ROAD
 SCALE
 Government Impact Study Corp

"(2) A statewide transportation system consistent with planned growth objectives throughout the State."

Policies which may relate to the proposed project are as follows:

Section 17(b):

"(1) Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter."

The proposed project will not conflict with this policy.

"(2) Coordinate state, county, federal and private transportation activities and programs toward the achievement of statewide objectives."

The proposed project will not conflict with this policy.

"(3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties."

The proposed project supports this policy, as the financial responsibility for the new road will be distributed among the participating governmental (County) and private parties.

"(6) Encourage the use of transportation systems that serve as a means of accommodating present and future development needs of communities."

The proposed project supports this policy.

"(9) Increase the ability of transportation systems to assist statewide economic growth and diversification."

By facilitating the development of the Makena area according to existing zoning, the proposed project will indirectly assist economic growth in the area.

"(10) Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment."

A new collector road for the Makena District was named in the long-range recommendations of the County-wide Transportation Planning Process for Maui County. The proposed project would meet this need.

C. State Functional Plans

State Functional Plans are being developed to provide specific direction in particular areas of the State Plan. These include functional plans on agriculture, housing, tourism, transportation, conservation land, education, energy, higher education, health, historic preservation, recreation and water resource development.

A Draft State Transportation Plan (transportation functional plan) has been released by the State Department of Transportation [3.3]. The only State highway planned for the vicinity of Makena Road is

the Piilani Highway, for which Phase I was recently completed.

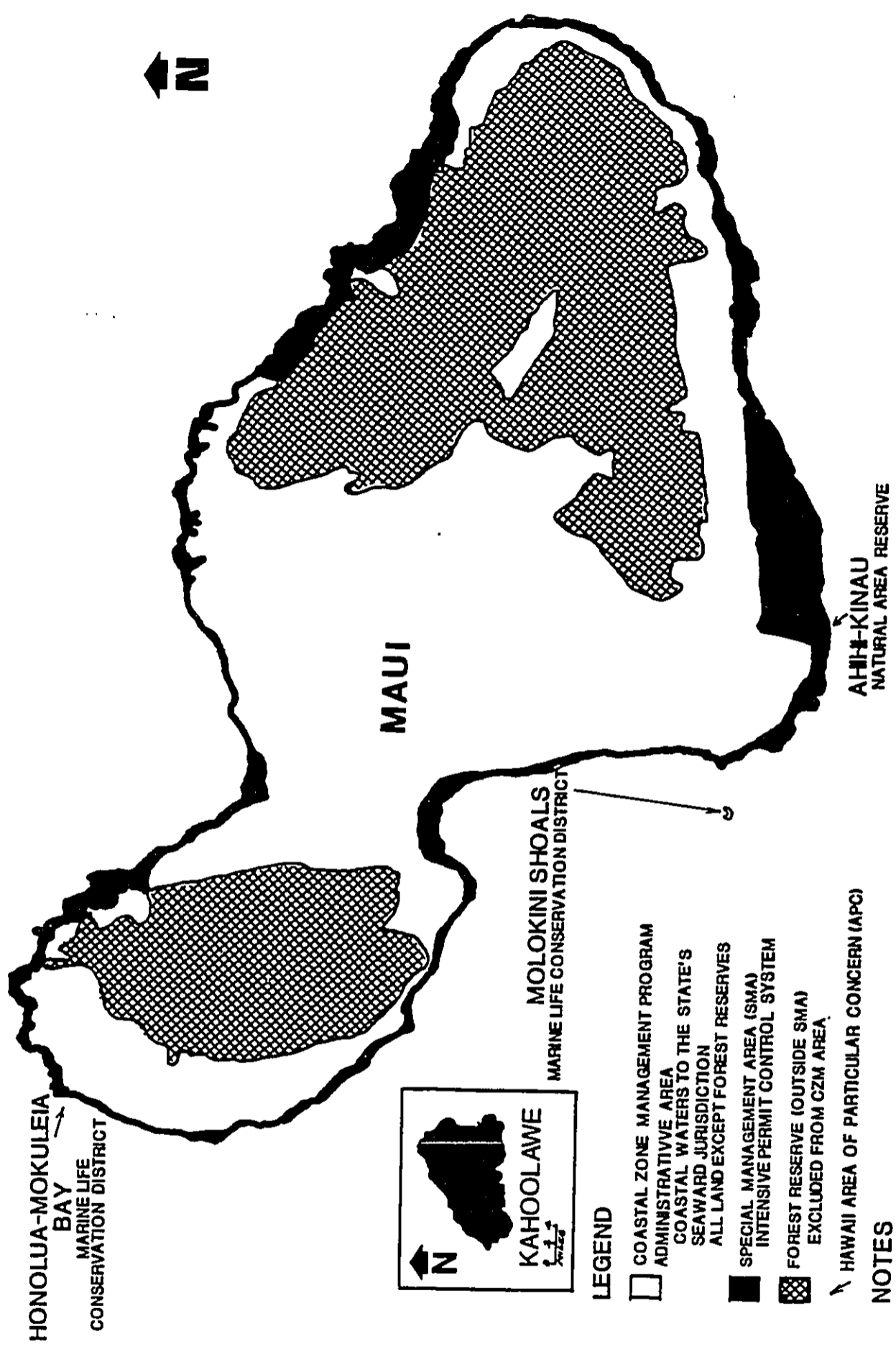
D. Coastal Zone Management Program [3.4]

All State lands, except those in State forest reserves and Federal lands, are within the Hawaii Coastal Zone Management (CZM) area (Figure 3-2). Hawaii's Zone Management Act of 1977 (Act 188, SLH 1977) was enacted as a result of the Federal Coastal Zone Management Act (CZMA), P.L. 92-583, which became law on October 27, 1972.

The Act authorized a Federal grant-in-aid program to be administered by the Secretary of Commerce, who in turn delegated this responsibility to the National Oceanic and Atmospheric Administration's (NOAA) Office of Coastal Zone Management (OCZM). The Coastal Zone Management Act of 1972 was substantially amended on July 26, 1976 (P.L. 94-370). The Act and the 1976 amendments affirm a national interest in the effective protection and development of the coastal zone, by providing assistance and encouragement to coastal States to develop and implement rational plans for managing their coastal zones.

When the State Legislature enacted the Hawaii Coastal Zone Management Act in 1977, it established basic policy to Guide State and County agencies in all actions affecting the State's coastal zone. Specially, the Act establishes objectives and policies for:

1. Provision and protection of recreational opportunities;



HAWAII CZM AREAS SUBJECT TO MANAGEMENT

Figure 3-2

- NOTES**
1. LANDS OWNED, LEASED, HELD IN TRUST OR OTHERWISE BY LAW SUBJECT SOLELY TO THE DISCRETION OF THE FEDERAL GOVERNMENT ARE EXCLUDED FROM THE CZM AREA.
 2. WHILE SHORELINE SETBACK AREAS ARE NOT SHOWN, THEY ARE NONETHELESS DESIGNATED AS APC

SOURCE: 3.4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

2. Protection and restoration of historic resources;
3. Improvement of scenic and openspace areas;
4. Protection of coastal ecosystems;
5. Provision for coastal-dependent economic uses;
6. Reduction of coastal hazards; and
7. Improvement of the review process involving development activities, including permit coordination and opportunities for public participation.

Act 188 stipulates the counties to amend existing shoreline special management areas (SMA's) to assure the counties' abilities to protect coastal ecosystems, to reduce coastal hazards, etc. But because the present SMA does not include all land areas required under the CZMA, the State established an inland administrative coastal management area (ACMA) boundary. This area includes the present SMA and all other land areas in the State, except those in State forest reserves and Federal lands.

Those lands in the SMA will be regulated by county-administered SMA permit system and those in the ACMA will be regulated by State agencies. Details of the SMA process are presented later in this section under subsection "II. County of Maui." The State system supplements the SMA permit system.

II. COUNTY OF MAUI

A. Proposed Goals and Objectives for Long-Range Comprehensive Plan for Maui County [3.5]

Because of the rapid economic growth experienced by Maui County in the 1960's came awareness of imperative planning for the county during the 1970's. This growth resulted in a higher standard of living, less poverty, increased availability of jobs, diversified economy, less crowding within homes, a higher percentage of home owners, and increased government services. Because of needed planning, a County Charter, effective January 1, 1977, ordered the Administration and the County Council to devise and adopt a County-wide General Plan.

Because of this mandate, this document, Proposed Goals and Objectives for a Long-Range Comprehensive Plan for Maui County, was prepared by the County Office of Economic Development and the Planning Department. Proposed goals and objectives stated in this particular document formulate basic guidelines used in the development of the proposed Maui County General Plan.

Portions of this document present recommendations for specific land use, identify geographic areas in the County and propose land uses to develop certain

characters. Such recommendations would help protect and balance the natural and social characteristics of the County. These recommendations recognize the Wailea-Makena area as a resort destination area.

B. The Maui County General Plan [3.6]

As previously stated, a County-wide Comprehensive General Plan was mandated by adoption of the Maui County Charter:

Sec. 8-8.4 GENERAL PLAN

"The purpose of preparing a 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 to set forth the desired sequence, patterns and characteristics of future development.

The general plan shall set forth the county's broad policies for long-range development of the county. It shall contain statements of the general, social, economic, environmental and design objectives to be achieved for the general welfare and prosperity of the people of the county through governmental action, county, state or federal. The statements shall include, but not be limited to, policy and development objectives to be achieved with respect to distribution of social benefits, the more desirable uses of land within the county and the most desirable population densities within the county."

As a result of the Charter and subsequent document, "Proposed Goals and Objectives for a Long Range Comprehensive Plan for Maui County," nine regional

groups submitted a proposed General Plan for the County. This plan was approved by the County Planning Commission and the Council of the County of Maui.

Of the many objectives and policies presented in the General Plan, those which appear to be the most applicable to the proposed project include:

Land Use Policies:

"I.B.3.1. Promote land use in accordance with the individual character of the various communities and regions of the County."

"I.B.3.4. Preserve significant historic sites."

Environment Policies:

"I.C.2.6. Evaluate all land based development relative to its impact on the ocean environment and ecology."

Visitor Industry Policies:

"II.B.1.2. Require that new developments bear their fair share of public utility costs."

Transportation Policies:

"IV.A.2.1. Ensure that transportation facilities are programmed to support planned growth."

The proposed project will be compatible with the policies listed above. In addition to the Maui County General Plan, the Kihei General Plan remains in effect. Details of this plan follow.

C. Kihei General Plan [3.7]

Prior to adoption of the Maui County General Plan, development of the respective communities within the County of Maui has been occurring within the framework of various general plans prepared and adopted for these specific areas. These general plans are basic policy documents setting forth the County's philosophy as to how growth in the various parts of the island will be shaped in the future. The major regions on the island of Maui encompassed by general plans include West Maui, Wailuku-Kahului, Maalaea-Kihei-Makena and Makawao-Kula-Pukalani. Although these plans have been prepared at different times, there are certain basic policy directions which are common to all. These include:

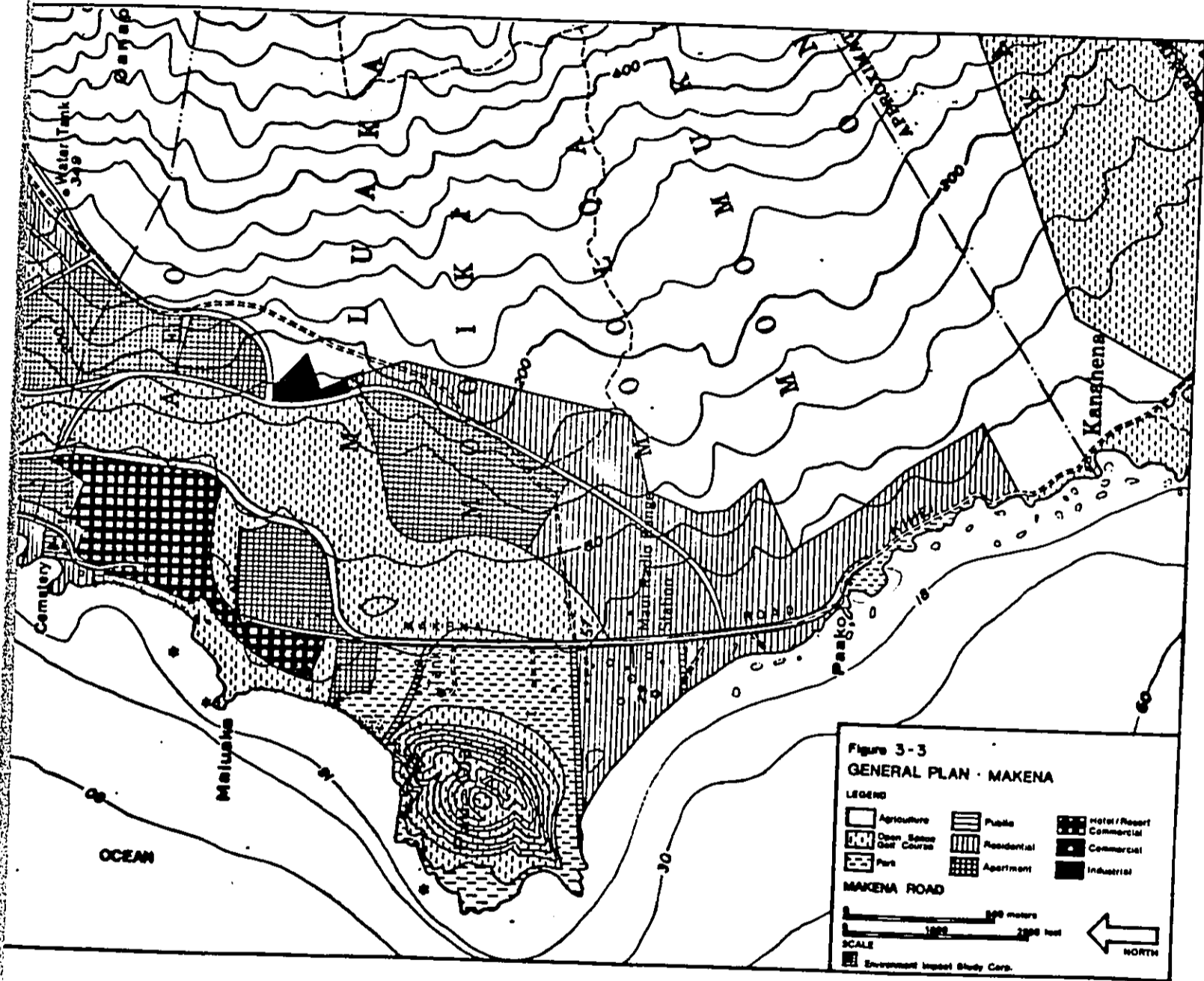
1. The desire to achieve a balanced economy which is not dependent upon any single employment generator.
2. Encouragement of diversified agriculture, including programs for agricultural parks, and agricultural education and training.
3. Maintaining primary agriculture, sugar and pineapple, as a vital segment of the County's economy.
4. Limiting major resort development to designated areas in West Maui and Kihei-Makena.
5. Maintaining the existing land use patterns for other areas in the County. (Wailuku-Kahului will continue as the primary commercial, industrial, financial, and governmental center of Maui, as well as a residential area.)

6. Requiring that development which does occur provide adequate open space, be aesthetically pleasing, and in harmony with Maui's environment.

Land uses in the project area are delineated by the Kihei General Plan* shown in Figure 3-3. The plan was prepared and approved by the County to guide the long-range development of the Kihei coast. It is, in effect, a policy document for determining the location and extent of development and the desired land use pattern for controlling development in Kihei.

The initial Kihei General Plan was permanently adopted by ordinance in 1971 to guide the long range development of the area between Maalaea Bay and La Perouse Bay. Within the 22 mile stretch of coastline are the communities of Maalaea, Kihei, Wailea, and Makena. The impetus for preparing a general plan was to insure the balanced and orderly growth of a sparsely developed area with the potential for becoming a major residential and resort community. The planners foresaw the economic potential of resort development to the Maui community and formulated a plan which would control this development and also preserve the region's most outstanding asset--22 miles of

* The 1970 Kihei Civic Development Plan has undergone several revisions and is now referred to as the Kihei General Plan. A comprehensive update of the Kihei General Plan was completed in November, 1975. A new Kihei-Makena Community Plan is presently being prepared for this area.



oceanfront with 13 miles of sandy beaches. Among the goals and objectives of the plan were:

1. Provide for the balanced and orderly development of the planning area, encouraging economic development which recognizes the long-range benefits of prudent land use allocations.
2. Preserve and enhance the natural beauty of the region as an economic and environmental resource.
3. Preserve and develop park lands and recreation resources for resident and visitor populations.
4. Develop and encourage high standards of design in public and private areas.
5. Provide an efficient and balanced transportation network for the movement of people and goods.
6. Stimulate the involvement of as many people as possible in the planning and development processes of the area.

The proposed project is one of several capital improvements that will enable implementation of the Kihei General Plan. The State's Piilani Highway, the Central Maui Water Transmission System, and the Kihei Wastewater Reclamation Plant are examples of other capital improvements.

D. Zoning and Land Use Controls

Maui County uses traditional zoning and subdivision controls to implement the desired land use policies delineated in the general plans. In addition, the County has initiated or implemented several

innovative programs to insure that County planning policies are carried out. These programs include:

1. Encouraging major projects to utilize the county's Planned Development Ordinance, which provides flexible controls on aesthetics, open space, and other amenities.
2. Establishing an Urban Design Review Board to provide professional input in reviewing development proposals.
3. Administering the Special Shoreline Management Area Rules and Regulations to provide for protection of coastal areas, together with visual and physical access to the shore.
4. Developing agriculture parks at Kula, and Hoolehua, Molokai, and providing for agriculture education and research with Pacific Basin regional implications.
5. Working together with private enterprise in the development and transmission of adequate water resources for all parts of the island.
6. Developing and enforcing anti-speculation measures for housing projects developed with the financial support of the public sector.

The use of these innovative programs in conjunction with traditional controls such as zoning, subdivision ordinances, and building codes represent actions by the County government to enhance the natural environment while providing for orderly, quality growth in Maui County.

E. Special Management Area

The Special Management Area (SMA) is a specific shoreline area under the overall jurisdiction of

the Coastal Zone Management Program. Act 188 stipulates that counties amend the shoreline Special Management Areas to assure the counties' ability to protect coastal ecosystems and reduce coastal hazards. Lands within the SMA area are regulated by a County-administered SMA permit process. The proposed project is within the SMA area and is therefore subject to such rules and regulations of the County of Maui Planning Commission, adopted pursuant to authority conferred by Chapter 205A, Hawaii Revised Statutes, as amended by Act 176, Session Laws of Hawaii 1975.

As part of an overall State policy, the objectives and policies of the Special Management Area shall be used by the authority (County of Maui) for the review of developments within the Area. Refer to Appendix G for a discussion in this regard.

REFERENCES TO SECTION 3

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- [3.3] Department of Transportation, State of Hawaii. Draft State Transportation Plan.
- [3.4] The U. S. Department of Commerce. Final Environmental Impact Statement and Proposed Coastal Zone Management Program for the State of Hawaii. Prepared by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration and the State of Hawaii Department of Planning and Economic Development.
- [3.5] County of Maui. 1977. Proposed Goals and Objectives for a Long Range Comprehensive Plan for Maui County.
- [3.6] County of Maui. June, 1980. The General Plan of the County of Maui.
- [3.7] Kihei General Plan. 1971, amended 1975. County of Maui.

Environmental Impacts

4

SECTION 4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATIVE MEASURES TO MINIMIZE THEIR IMPACT

I. INTRODUCTION

The construction of Makena Road is anticipated to generate "primary" and "secondary" environmental impacts.

Primary environmental impacts include short-term direct impacts limited to the duration of the project's construction and long-term direct impacts associated with the use of the highway, primarily impacts from traffic. In most instances, the impacts can be documented and appropriate mitigative measures taken to minimize them. A discussion of primary impacts is found in the first portion of this section.

Secondary impacts are indirect impacts resulting from implementation of the project. Secondary impacts include indirect impacts resulting from use of the road, and impacts resulting from development of the project vicinity. The latter item is difficult to accurately assess due to the uncertainty as to the rate at which development will proceed and its scope. In addition, impacts resulting from growth were discussed in the EIS prepared for the Seibu development, which was accepted by the County of Maui Planning Commission. Thus, secondary impacts relating to development will only be briefly discussed.

II. PRIMARY IMPACTS

A. Short-Term Impacts

1. Soil Loss (Severity Rating Number, H) [4.1]

Evaluation of the soil loss was conducted to determine if a significant environmental impact would occur. Based upon acceptable standards and calculations, no significant impacts are anticipated. Grassing will be the primary temporary and permanent erosion control measure. The following calculations for the increments are provided:

a. Increment I

1) Description

Sixteen (16) acres on Makena stoney loam (MXL); average slope 8% and 100 feet; grading to take place over a period of one and one-half years; and one-half of the graded area to be seeded immediately after completion of grading work.

2) Values of Equation Factors

F=4 Factor for drainage area directly below site

D=2 Factor for potential sediment damage to coastal waters

T=1.5 Grading period in years

A=16 Grading area in acres

$$E=RK(LS)(CP)$$

Soil loss rate in tons per acre
per year

R=175 Average year rainfall

K=0.32 Soil erodibility factor
for Makena Stony Loam

LS=0.992 Factor for length and
steepness of slope
combined

CP=0.75 Factor for protective
effect of ground cover

3) Calculations

$$E=RK(LS)(CP)$$

$$E=(175)(0.32)(0.992)(0.75)$$

E=41.664 tons of annual soil loss per acre

$$H=(2FT + 3D)AE$$

$$H=[(2)(4)(1.5)+(3)(2)](16)(41.664)$$

$$H=11,999.232= \text{Severity Rating Number}$$

4) Analysis

Since H is less than the standard
H=50,000, the maximum allowable con-
struction area time erosion rate, no
additional soil erosion control measures
will be required. Severity of soil loss
is minimal in relation to the standard.

b. Increment II

1) Description

Seventeen (17) acres on Makena
Stony Loam (MXL); average slope 8%

and 100 feet; grading to take place over a period of one and one-half years; and one-half of the graded area to be seeded immediately after completion of grading work.

2) Values of Equation Factors

F=4

D=2

T=1.5

A=17

$E=RK(LS)(CP)$

R=175

K=0.32

(LS)=0.992

(CP)=0.75

3) Calculations

$E=RK(LS)(CP)$

$E=(175)(0.32)(0.992)(0.75)$

E=41,664 tons of annual soil loss per acre

$H=(2FT + 3D)AE$

$H=[(2)(4)(1.5)+(3)(2)](17)(41.664)$

H=12,749.184 = Severity Rating Number

4) Analysis:

Since H is less than the standard H=50,000, the maximum allowable construction area time erosion rate, no

additional soil erosion control measures will be required. Severity of soil loss is minimal in relation to the standard.

c. Increment III

1) Description

Six (6) acres on Makena Stony Loam (MXL); average slope of 4% and 75 feet; grading to take place over a period of one year; and one-half of the graded area to be seeded immediately after completion of grading work.

2) Values of Equation Factors

F=4

D=2

T=1

A=6

$E = RK(LS)(CP)$

R=175

K=0.32

LS=0.357

CP=0.75

3) Calculations

$E = RK(LS)(CP)$

$E = (175)(0.32)(0.357)(0.75)$

E=14,994 tons of annual soil loss per
acre

$$H=(2FT + 3D)AE$$

$$H=[(2)(4)(1)+(3)(2)](6)(14.994)$$

$$H=1,259.496= \text{Severity Rating Number}$$

4) Analysis

Since H is less than the standard H=50,000, the maximum allowable construction area time erosion rate, no additional soil erosion control measures will be required. Severity of soil loss is minimal in relation to the standard.

2. Drainage

Since culverts will be installed at all major drainageways crossing the proposed road, no major impacts will be created during the construction of the road. No major drainage is anticipated to result for downstream property owners from the concentration of storm runoff at outlets of the various culverts crossing the road.

Surface runoff from the proposed road itself will be minimal and will create no major impacts to adjacent property owners.

3. Air Quality

Dust will be raised during grubbing, grading, excavation, backfilling operations, and by the movement of construction vehicles on improved and unimproved roads and other rights-of-way.

The arid condition of the project area and unpredictable local winds may influence the amount of dust raised. This atmospheric dust can be a nuisance problem for persons living close to construction sites and therefore control measures will be instituted. Fugitive dust will be controlled by sprinklers, water-wagons and/or other dust-palliative methods as required or needed. Roadways near construction sites will be periodically sprinkled to contain and control vehicular-generated dust.

Exhaust emissions can be expected from construction vehicles and equipment but are not anticipated to cause significant environmental problems. Control measures will be taken to minimize the discharges and will include the proper maintenance and operation of equipment to promote maximum efficiency and minimum level of discharge.

All activities will be conducted to minimize dust generation and will comply with the Air Pollution Control Regulations (Chapter 43) of the Department of Health.

4. Noise Levels

Noise will be audible during all phases of construction. The immediate impact is to

introduce an intrusive noise source into an environment dominated by sounds of nature. As one might expect, an increase in noise is more annoying if it occurs in a quiet environment as opposed to a noisy one. The sparse population in the project area suggests that construction noise will affect few people, primarily those residing near construction sites or passers-by exposed to construction noise. Since construction is carried out in discrete phases (i.e., clearing, excavating, etc.) and each phase uses different equipment, the noise output during each phase can be expected to diminish with time. In effect, the noisier equipment will be used early in construction, and less noisy equipment in the latter phases. Construction also will proceed incrementally along the proposed alignment, hence, noise disturbance will be temporary in any location.

Conventional construction equipment will be used, and noise generated will occur in the ranges presented in Figure 4-1. It is anticipated that blasting operations and use of pneumatic impact equipment may be necessary in some locations. When blasting, a State licensed "powder man" will be in charge of all blasting activities.

FIGURE 4-1
CONSTRUCTION EQUIPMENT NOISE RANGES

		NOISE LEVEL (dba) AT 50 FT					
		60	70	80	90	100	110
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	EARTH MOVING	COMPACTERS (ROLLERS)		H			
		FRONT LOADERS					
		BACKHOES					
		TRACTORS					
		SCRAPERS, GRADERS					
		PAVERS				H	
		TRUCKS					
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	MATERIALS HANDLING	CONCRETE MIXERS					
		CONCRETE PUMPS			H		
		CRANES (MOVABLE)					
		CRANES (DERRICK)				H	
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	STATIONARY	PUMPS	H				
		GENERATORS					
		COMPRESSORS					
IMPACT EQUIPMENT		PNEUMATIC WRENCHES					
		JACK HAMMERS AND ROCK DRILLS					
		PILE DRIVERS (PEAKS)					
OTHER		VIBRATOR					
		SAWS					

Note: Based on Limited Available Data Samples

Source: Noise From Construction Equipment and Operations
Building Equipment, and Home Appliances, EPA, 1971

Controlled charges and blasting mats will be used to minimize noise and to serve as a safety measure for construction workers. Blasting activities are not anticipated to generate sufficient ground-borne vibrations or noise levels that may adversely affect persons or structures.

General construction noise will be mitigated by limiting the hours of construction to between 7:00 a.m. and 3:30 p.m., five days a week. Noise can also be mitigated by the following measures:

- (1) quieting noisy equipment by properly installed and maintained mufflers;
- (2) replacing individual operations by less noisy ones;
- (3) selecting the quietest alternate pieces of equipment; and
- (4) providing enclosures for large, noisy stationary equipment.

5. Terrestrial Flora and Fauna

Construction activities will remove all vegetation and animal habitat within the proposed road corridor. However, the flora recorded along the corridor are, for the most part, introduced species widespread on Maui or elsewhere

in the State. The endemic and indigenous species recorded are common varieties and are not rare or endangered.

The stand of wili-wili trees noted in study area 11 will be flagged to prevent their destruction during construction.

The mammals and birds recorded during the survey are not endangered or threatened species. The road will affect some habitats but will not pass through any habitat considered critical for terrestrial fauna and avifauna.

The natural area along the alignment probably supports a maximum wildlife population and an influx of displaced species to an adjacent area will increase competition for food and territory. This increased competition will continue until the original population balance is attained.

6. Marine Ecosystem

Possible damage on the marine ecosystem from fresh water discharges and sedimentation is not anticipated to be significant. The climate of the project area is such that only periodic high-intensity storms will result in a discharge of fresh water into the ocean. Fresh water, being less dense, would float over the

heavier sea water and be diluted by ocean currents to a level that organisms could survive for extended periods.

As reported by Banner [4.2], the corals of Kaneohe Bay were killed down to a depth of a few feet after a severe rainstorm. The depth of coral growth in the areas surveyed for this project averaged over six feet. It is anticipated that at this depth the salt water will act as a buffer and coral growth will not be significantly affected by fresh water should a severe rainstorm occur.

Intertidal organisms are well adapted to fluctuations in salinity and should not be significantly affected by periodic fresh water discharges [4.3]. In at least two of the sites investigated, brackish water was noted and many algae and invertebrates were observed. Benthic organisms provide much of the food for fish and the deterioration of existing benthic conditions would result in a decrease in fish populations.

In general, the marine ecosystems of the various sites investigated are already adapted to high levels of sedimentation, and some marine organisms can withstand moderate sediment levels

[4.4]. Drainage channels and revegetation of surrounding areas (discussed under "Soil Loss" and "Drainage" above), should minimize or reduce the inflow of sediment. Existing conditions are such that uncontrolled drainage patterns are probably responsible for the erosion and subsequent silt deposition along the Makena coastline.

7. Economic

The immediate benefit of the proposed project will be an infusion of cash and the provision of jobs in the State, particularly in Maui County. The estimated \$9.85 million (in 1981 dollars) to be spent on the road may involve the purchase of some materials outside Hawaii, but it is anticipated that the major portion of this amount will be spent in purchasing labor and services within the State. These direct expenditures will provide direct tax revenues to the State, County and Federal governments.

Of the total \$9.85 million, approximately 35 percent, or \$3.45 million, will be spent for labor payroll and fringe benefits. Of that total, approximately 9 percent, or \$310,300 will be devoted to payroll taxes. An additional unknown amount can be expected in revenues from general

excise and gross income taxes paid by suppliers, subcontractors, and the contractor. These direct expenditures, particularly the amount spent in wages and salaries, will generate an increased demand for goods and services from construction workers and suppliers sharing in the project payments.

It is anticipated that most of the labor needed for the construction of the road will be hired from Maui County. This will be of substantial benefit to the economy of the County, not only because of the infusion of cash and the resulting stimulation of the purchases already discussed, but also because of the social benefits derived by providing additional jobs within the construction industry. Of the full construction costs of \$9.85 million, approximately 35 percent will be spent for labor, providing full time employment during the project for 10 to 50 workers.

8. Water

Significant adverse impacts on water supply are not anticipated. However, water service may be temporarily suspended when construction occurs along existing Makena Road. Affected residents will be properly notified.

9. Access and Traffic

During construction in areas where the proposed alignment deviates from the existing Makena Road, significant impacts on access and traffic are not anticipated. Construction vehicles will most likely gain access to the project vicinity via the new Piilani Highway, as far as Kilohana Drive. From Kilohana Drive to the project site, they must use Wailea Alanui Drive and the existing Makena Road.

Thus, motorists traveling on portions of these roads may be inconvenienced by the movement of large trucks and other vehicles during construction. The constant movement of construction vehicles, plus the narrowness of the road and "blind" curves, may pose traffic safety hazards. To mitigate potential hazards, the contractor will be responsible for notifying motorists of pending construction, posting construction warning notices or signs, and stationing flagpersons to divert traffic.

Movement of heavy equipment, grading, trenching and backfilling operations may necessitate the closing of Makena Road on a temporary basis. In these situations, temporary by-pass routes will be constructed around the section under construction.

10. Liquid Waste

Significant adverse impacts on wastewater disposal are not anticipated. Portable restrooms will be provided for construction workers.

11. Solid Waste

Significant adverse impacts on solid waste disposal are not anticipated. The contractor will ensure that construction refuse and debris are properly disposed of at a County-operated sanitary landfill.

12. Communication and Power

Significant adverse impacts on telephone service or electrical power are not anticipated.

13. Public Facilities and Services

Significant adverse short-term impacts on public facilities and services such as schools, parks, police and fire protection, and hospitals or emergency services are not anticipated. If necessary, night-time security for baseyards, materials, and construction equipment stored along the route will be provided by the contractor.

B. Long-Term Impacts

1. Topography

A maximum 100-foot wide corridor along the main road and a maximum 75-foot wide corridor along the connector roads will be grubbed of

all vegetation. Grading, excavating, and fill activities will disturb soil regimes, alter natural landforms, remove vegetation, and raise dust. Cobbles and boulders encountered during excavation will be removed by bulldozing or blasting. Approximately 111,800 cubic yards of soil will be excavated and 119,000 cubic yards will be required for embankments across gulches, depressions, and drainage ways. Fill will be obtained from within the project area and/or from off-site borrow pits. The cut and fill areas will be recontoured to meet the final design slopes and road elevations.

Drainage works will be constructed at the same time as the road with similar landform alterations. All activities will comply with the County Grading Ordinance (Chapter 24) relating to grubbing, grading, and dirt stockpiling.

2. Soils

Based largely on soil quality, the State Department of Agriculture has designated Agricultural Lands of Importance to the State of Hawaii. In the vicinity of the proposed project, the lands are not classified as being of importance [4.5].

Construction of the proposed road would require approximately 30 acres of land. However,

this is not considered a significant adverse effect due to the relatively small area involved and the fact that this land presently is not being used for agricultural purposes.

3. Soil Loss

Soil loss along the roadway alignment following completion of the road is not viewed as a significant environmental impact. All cuts and fills and other erodable surfaces will be stabilized through roadside grassing and other slope stabilization methods as required, to minimize potential erosion.

4. Drainage

Since culverts will be installed at all major drainageways crossing the proposed road, no major long-term impacts are anticipated. The roadway was designed with the intent of no diversion or intensification of flow. Thus, the natural drainage system will not be sustaining flows significantly greater than at present.

Surface runoff from the proposed road itself will be minimal and will create no major impacts to adjacent property owners.

5. Flood/Tsunami Areas

Flood Insurance Rate Maps by the U.S. Army Corps of Engineers, updated in June, 1981 for

Maui County and the National Flood Insurance Program, indicate flood hazard and tsunami areas which are primarily makai of the tsunami line shown on Figure 2-7. The major exception is the start of the proposed road, where the 100-year flood hazard area (Zone A4) is shown extending mauka past the road into drainage area number one. This condition was incorporated into the roadway design and no significant impacts are anticipated.

6. Air Quality

Dust generation, which is a constant problem on the existing road, will be significantly reduced. The cuts and fills required for the new road will be grassed, thus precluding dust generation from exposed areas.

Vehicle emissions from traffic using the road will also be a direct, long-term impact of the project. A screening analysis was performed in accordance with EPA-approved methods to determine whether the project will have a significant impact on local air quality [4.6]. Results are discussed in Appendix E. Based on the calculations for carbon monoxide (CO) emissions, no significant impact is anticipated on air quality.

7. Noise Levels

Noise level predictions were made for several locations along the existing road and along the proposed alignment. Results are discussed in Appendix F. Based on the predictions, no significant impacts are anticipated on residences along the existing road or on wildlife along the proposed road.

8. Terrestrial Flora and Fauna

No significant long-term primary impacts are anticipated on terrestrial flora and fauna as a result of the proposed project.

9. Marine Ecosystems

For reasons previously discussed under "Short-Term Impacts", no significant long-term primary impacts are anticipated on marine ecosystems in the project vicinity.

10. Archaeological/Historical

As discussed in Section 2 and Appendices C and D, several archaeological or historic sites and complexes are located along the proposed road and its alternate alignments. Those which would be impacted by the proposed alignment (Alignment "C"), are discussed below. Those which would be impacted by the alternate alignments are discussed in Section 6.

Impacts and mitigative measures are as follows:

<u>Site/Complex</u>	<u>Discussion</u> [4.7], [4.8], [4.9]
1028	Fourteen features make up this complex. The proposed alignment will impact about the upper 20% of this complex, including two features. Features 1028-12 and 1028-13 would be destroyed with this alignment, so salvage excavations of these features were conducted in May, 1980. These excavations, described in detail in Appendix D, completed the archaeological work required for the portion of Site 1028 impacted by the proposed Makena Road.
261	The portion of Site 261 to be impacted by the proposed alignment consists of a single historic cattle wall without other contributing features. It is thus recommended that no further archaeological work need be done for this feature. However, great care should be taken during construction work in the vicinity of this feature as potentially significant archaeological features exist both mauka and makai of this feature.
241	The portion of this complex which crosses the proposed alignment is probably an historic cattle wall. No recommendations are given.
242	This historic cattle wall would be impacted by the proposed alignment. No further archaeological work is required for this site; however, construction should be limited to the immediate area of the alignment.

- 239 This enclosure may be impacted by the proposed alignment. It is recommended that the site be mapped in detail and tested.
- 244 This enclosure may be impacted by the proposed alignment. It is recommended that this site be mapped and that any further work be evaluated on the results of mapping.
- 1362 The mauka wall of this platform may be impacted by the proposed alignment. After finalization of construction plans, the plans will be reviewed by archaeologists to determine appropriate mitigative measures for this site.
- 236 This historic cattle wall would be impacted by the proposed alignment. No further archaeological work is required for this site.
- 248 These are historic features associated with cattle ranching; thus, no recommendations for further work are offered for the majority of the sites. However, subsequent archaeological work in the vicinity revealed two sites worth preserving. Please refer to the letter of response to Mr. Bertell D. Davis, in Section 12 of the REIS.
- 249-253
(inclusive) One or more of these sites may be impacted by the proposed alignment, depending on the ultimate length and width of the road. All of these sites are either located within or very close to the proposed alignment. (Refer to Appendix C for a discussion of these

sites.) Few archaeological maps exist for this portion of the Makena Coast, thus, it is recommended that an intensive archaeological survey be conducted along the alignment from Station 152+00 south to the last station of the proposed road, or to Station 205+00 (projected), whichever occurs first.

This survey should entail, but not necessarily be limited to, the precise transit location of salient features along the corridor; detailed mapping of individual cultural features within each complex; written description with reasonably complete photo documentation of structural and other remains observed during the course of fieldwork; and selective test excavations for preliminary evaluation of the archaeological potential for the sites under consideration.

It is anticipated that more extensive salvage excavations of selected features in this area may be necessary before work on road improvement begins. To what extent and which sites these excavations would involve must await completion of the survey and evaluation of the field data.

In summary, no significant adverse impacts are anticipated on Sites 1028, 260, 261, 262, 241, 242, 1361, 245, 246, 247, 243, or 248. A recommendation of "no further work" means the sites are not of sufficient significance to preserve. Additional discussion of site interpretation may be found in Appendix C, part V.

Sites 239, 244, 1362, 236, and 249-253 will most likely be impacted, but the significance of these impacts is unknown at the present time. Further investigations to specify impacts and mitigative measures will be conducted prior to construction of Increments II and III. Please refer to the letter of response to Mr. Bertell D. Davis, in Section 12 of the REIS for further information.

11. Land Use

For approximately 1/3 of its length, the proposed road will follow the existing Makena Road. The remaining 2/3 (approximately 30 acres) will require the conversion of open space, primarily marginal grazing lands, to a public roadway. This is not considered to be a significant adverse effect.

12. Social

Significant long-term primary impacts are not anticipated on social characteristics. The proposed alignment will not displace any existing residents along its length. While land acquisition for the right-of-way will be necessary in some locations, most is vacant ranch or scrub land. In these instances, property owners will be compensated by the County.

13. Economic

Long-term impacts would include normal maintenance and operating costs. It is anticipated that very little maintenance will be required initially.

14. Water

The primary long-term impact on water will be to allow the installation of the Makena segment of the Central Maui Water Transmission System. Completion of this water line will upgrade service to Makena residents by providing a reliable water source and by providing increased flow for fire protection.

15. Access and Traffic

The existing, substandard Makena Road does not provide a safe and reliable transportation link within the project area. The area served by the existing road is already heavily used by people living in the area, as well as people seeking recreation along the shoreline. The new road would improve access by eliminating road hazards, increasing traffic speed and reducing travel time. This will not only benefit local traffic, but also emergency services, by providing for faster response time by fire, police, and ambulance vehicles.

The sharp makai-bound turn near the terminus of Wailea Alanui Drive will be by-passed, as well as the sharp turns, narrow roadway segments, and "blind" curves along the existing road. Safety features such as road shoulders and reflectorized roadmarkers will be provided.

The road will have a design speed of 30 miles per hour. The posted speed limit will be determined by the County and could be higher (e.g., 40 mph) than the design speed. Lower speed limits may be posted where necessary for motorist and pedestrian safety. Concomitant with traffic speed, travel time through the project area should be reduced. Projected traffic levels on the new road are shown in Table 4-1. Additional projections are presented in Appendix E.

III. SECONDARY IMPACTS

A. Land Use

Construction of necessary infrastructure such as the proposed project and the extension of the Central Maui Water Transmission System will facilitate development in the vicinity of the project, as provided for by the Kihei General Plan and County zoning. Impacts associated with development of the Seibu property were presented in the EIS for the Seibu Makena Master Plan, which was approved by the Maui County Planning Commission on May 28, 1975.

TABLE 4-1
MAXIMUM PROJECTED TRAFFIC LEVELS

EVENING PEAK HOUR

PROPOSED MAKENA ROAD

<u>VEHICLE MIX</u>	<u>VEHICLES PER HOUR</u>	
	<u>YEAR 1990</u>	<u>DESIGN YEAR</u> ^{1/}
Automobiles	951	1,960
Heavy trucks (or buses)	<u>19</u>	<u>40</u>
	970 ^{2/}	2,000

^{1/}Year traffic will reach design volume (unknown).

^{2/}Volume entering - 540
 Volume exiting - 430

Source: Muroda and Associates, Inc.

Portions of the proposed road, totalling 2,030 feet in length, are outside of either Wailea or Seibu properties. Ownership of these portions is as follows:

<u>Ownership</u>	<u>Length (feet)</u>	<u>State Land Use</u>	<u>County General Plan</u>
State	1,630	Urban & Agriculture	Residential & Agriculture
Ulupalakua Ranch	200	Urban	Agriculture
Kellet et al	200	Agriculture	Apartment

Implementation of the proposed project may serve as a stimulus for owners to apply for changes in land use in the vicinity of the new road. Whether such changes would be approved by the State and County is unknown at the present time.

As a result of planned development, it is anticipated that Wailea and Seibu lands will continue to be developed in accordance with existing zoning, land values will increase, and improvements to real property will expand the County's tax base. These impacts will not occur simultaneously, but will be extended over the time span for development and will also depend on external conditions, such as economic conditions and changes in County policy. For example, the Kihei General Plan, or proposed Kihei-Makena Community Plan, will largely determine changes in land use.

B. Socio-Economic

The proposed project is one of several infra-structural improvements which will be required for development of the areas discussed above to proceed according to existing zoning. To the extent with which it allows this development, it can be said to indirectly impact social and economic characteristics of the project vicinity.

It is difficult to quantitatively assess both social and economic impacts. Both types of impacts are casually interrelated and an effect on one can affect the other. Environmental Impact Statements for the proposed Seibu Development at Makena [4.3] and the Central Maui Water Transmission System [4.10] (accepted by the Governor on January 12, 1977) discussed potential secondary economic impacts that could be expected in Kihei as a result of implementing the respective projects. Although prepared for different types of projects, both statements discuss economic benefits as measured by employment and employment types, value of new construction, personal consumption expenditures, government revenues, and cost-benefit ratios. Rather than following this approach and generating another set of quantitative economic projections, this section outlines potential economic trends.

This does not suggest that measuring economic impacts in dollars is unimportant; only that it is not critical to this discussion.

Social changes arising from development are related to many variables which are difficult to quantify and for which no data is readily available. Hence, precise prediction of these changes is not possible. However, some generalizations about anticipated impacts can be made even when the exact nature or extent of the change cannot be predicted. Within these limitations, the following discussion attempts to highlight several existing social and economic conditions which are likely to change as a result of development.

The most visual indicator of social change will be the presence of more people. Population projections in this EIS are projected to a 1985-1995 time horizon. The projections are based on the estimated number of visitors to Hawaii by 1985 (a portion of which will visit Maui) and recent estimates of the number of residents in the Kihei planning area.

1. Visitor Projections

The number and type of visitor facilities constructed in the Kihei-Makena area, and new housing for residents working in the resort-related facilities, will depend to a degree on the expected increase in the number of visitors

to Maui, and on their length of stay. The island of Maui has become an increasingly popular visitor destination area for first-time visitors, return visitors, and Hawaii residents, as more resort areas have been developed.

While Oahu remains a destination island for about 85% of all of Hawaii's visitors, those who do travel to one or more neighbor islands have shown a consistent tendency to include Maui on their itinerary, as indicated in Table 4-2.

The Task Force on Alternative Economic Futures' conservative estimate indicated that the total number of visitors to Hawaii could reach 5 million per year by 1985, which implies an increase of about 6% per year. A similar projection of 4.7 million visitors per year was accepted as reasonable by the Tourism Planning Advisory Committee in their January, 1976 report, implying an annual rate increase of about 5.5%. Most recently, the State Tourism Study estimated total annual visitors at 4,608,000 by 1985 [4.11], with an annual growth rate of about 5%.

According to expressed intentions of visitors to Hawaii to only visit Maui, at least 1,379,035 westbound visitors visited Maui during 1978, or

TABLE 4-2

PERCENTAGE DISTRIBUTION OF INTENDED VISITS

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Oahu Only	33.2	30.0	30.7	29.8	29.0
Neighbor Islands Only	7.7	9.3	10.3	13.1	14.8
Kauai	(33.5)	(34.0)	(32.2)	(31.1)	(31.7)
Hawaii	(41.1)	(41.2)	(37.6)	(35.0)	(34.3)
Maui	(47.3)	(50.1)	(51.3)	(52.9)	(53.2)
Oahu and Neighbor Islands	<u>59.1</u>	<u>60.7</u>	<u>59.0</u>	<u>57.1</u>	<u>56.2</u>
	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Hawaii Visitors Bureau, Annual Research Report,
1974, 1975, 1976, 1978.

51% of the total westbound visitors to Hawaii responding to the Visitors Bureau Basic Data Survey [4.12].

If Maui were to continue to receive about the same percentage of visitors through 1985, the State Tourism Study estimates the number of tourists per year would be approximately 2,363,000.

The length of stay for Maui's visitors is anticipated to decrease from 3.53 days in 1975 to 3.46 days by 1985 [4.13]. This is due to the increasing proportion of "Japanese" and "Canadian and other" visitors, both groups of which have shorter average lengths of stay than visitors from the mainland U.S.

This would mean annual visitor days for Maui would total approximately 8,175,980 in 1985. These annual visitor days would mean an average number of visitors per day of approximately 22,400 by the year 1985. (The State Tourism Study estimates 22,500 visitors per day).

In February, 1979, there were 3,084 visitor units existing in the "Kihei-Maalaea-Wailea" area, with 1,137 proposed [4.14]. This compares with 8,941 existing and 2,968 proposed units for the island of Maui. Assuming the first phase of

visitor development in Makena is completed by 1985 (1,200 hotel rooms*), the Kihei-Maalaea-Wailea-Makena total in that year would be approximately 5,421 hotel rooms.

Adding the Makena units to the total existing and projected total for Maui would yield 13,109 hotel rooms by 1985. This is similar to the 13,300 rooms projected for Maui in 1985, according to the State Tourism Study [4.15].

Thus, the Kihei-Makena region would contain about 41% of the hotel units on Maui. Assuming the area would correspondingly contain approximately 41% of the daily visitors to Maui in 1985, roughly 9,184 to 9,225 visitors per day would be expected in the region by that year.

Assuming an annual growth rate of 5% per year, the number of visitors per day on Maui in 1995 would be approximately 36,600. Assuming the Kihei-Makena region would still support 41% of these visitors, one may project a visitor population of 15,000 in the area in 1995.

The anticipated increase in the visitor population will make their presence on Maui

*This is the maximum number of rooms possible, based on the Seibu Makena Master Plan EIS. At present, it is anticipated that only 450 rooms will be completed.

more noticeable. However, the development of specific resort areas with appropriate visitor-orientated facilities to service the visitors, such as that at Wailea-Makena and Kapalua, should continue to minimize their visibility in those areas of Maui not specifically devoted to visitors.

2. Resident Population Projections

Population growth in the Kihei planning area is difficult to project due to the various factors affecting the pace of development. Recent 1980 census data indicate the present resident population of Kihei to be approximately 6,020 persons [4.16]. This is an increase of about 600 persons per year since 1975. Assuming this rate continues through 1985, there would be approximately 9,020 residents in the area at that time.

During the 1975 update of the Kihei General Plan, the County Planning Department projected a 1995 population of 13,000 residents, based on existing land use and zoning. The Makena area has the potential for an additional 10,110+ residents, based on the proposed Seibu development (assuming 477 single-family homes at 3.2

persons per home and 4,292 condominiums at 2 persons per condo*).

Thus, the Kihei-Makena 1995 resident population may actually approach 23,110 persons, assuming that an accelerated program for construction of primary visitor facilities, housing and commercial and industrial developments will take place by 1995. This figure compares favorably with the proposed Kihei-Makena Community Plan, which proposes that the County "use a projected resident population of 22,900 persons over the next 20 years [to year 2000] as a guideline for planning."

3. De Facto Population Projection

On the basis of the above assumptions, the 1985 de facto population (residents and visitors) of Kihei-Makena is projected to be approximately 18,245 persons, based on 9,020 residents and 9,225 visitors. This compares with an estimated 1985 de facto population on Maui of approximately 103,900, based on 81,400_± residents [4.17] and 22,500_± visitors [4.18].

*This is the maximum number of units possible, based on the Seibu Makena Master Plan EIS. At present, it is anticipated that only 128 single family units and 421 apartment units will be completed.

The 1995 de facto population of Kihei-Makena would be approximately 38,110 persons, based on 23,110 residents and upwards of 15,000 visitors. In comparison, the Water Master Plan for the County of Maui (1971) projected a total 1990 population of 36,357 for this area [4.19].

4. Projected Changes

As a result of population increases and the impending urbanization of the area, the following changes may be anticipated in the Kihei-Makena area:

Employment/Income:

- a. More persons may enter the labor force at a younger age.
- b. The number of women in the labor force may increase as wives (or mothers) enter the labor force. This would result in alterations in traditional family roles in which the woman's role is that of housewife and mother.
- c. The number of working couples may increase.
- d. Household incomes may increase.
- e. Increases in household income and purchasing power (disposable income) may enable families to engage in activities which were

formerly not an option to them because of limited income.

Housing/Services:

- a. The availability of housing types may increase.
- b. The cost of purchasing or renting a home may increase.
- c. Long-time residents adjacent to new developments may have to vacate or alter their homes as a result of various urban pressures, such as increased property taxes and strict enforcement of zoning, building, and health regulations.
- d. The need for government facilities and services will increase. These may include recreation areas, organized recreation activities, and health care services. For example, further shoreline development may hinder public access for beach camping, increasing the need for government provision of such areas. (Refer to discussion under "Infrastructure," below).
- e. The number of absentee homeowners will increase. Many dwelling units will be purchased for use as vacation homes and

will be occupied only during part of the year, or will be available for rent for part of the year.

Behavioral

- a. Crime may increase.
- b. Increased social pathology or alienation may be expected.
- c. Exposure to a variety of new cultures and ethnic groups by residents and visitors may result in beneficial or adverse effects.
- d. Traditional family roles may be altered.
- e. Lifestyles may change. Acceptance or rejection of these changes will depend on ascribed or achieved family and cultural values.

Economic

- a. Land values may increase.
- b. Property taxes may increase.
- c. County and State revenues will increase.
- d. The visitor industry will assume a more dominant role in Maui's economy.
- e. New job opportunities will be created in the visitor industry, construction industry, service occupations, and other sectors of the economy.
- f. Unemployment may be reduced.

- g. Agriculture and diversified agriculture lands will not be removed from production in significant amounts.
- h. Commercial activities will increase with the emphasis on visitor-oriented retail outlets, which will provide outlets for locally manufactured products.
- i. There may be an increased demand for locally grown agricultural products.

C. Infrastructure

As previously mentioned, the proposed project is one of several capital improvements proposed to implement the desired objectives of the Kihei General Plan. In order to accommodate anticipated future development, both the State and County have embarked on capital improvement programs geared to supplement or upgrade existing facilities. A description of planned or already operational improvements are presented below. They will help to mitigate impacts on these services.

a. Water

The Central Maui Water Transmission System will transmit sufficient quantities of water to meet the future needs of the Maalaea-Kihei-Makena region. These quantities are estimated at 18.48 million gallons per day (mgd) by 1990 and 26.39 mgd by the year 2000 [4.20].

b. Highways

The new Piilani Highway, which will ultimately provide a continuous transportation link between Central Maui and the Kula area, will serve planned developments in the region and alleviate traffic congestion on Kihei Road.

The design capacity of the Piilani Highway is 13,600 vehicles per day in 1997, or 1,360 vehicles per hour [4.21].

c. Wastewater

The new municipal wastewater reclamation plant at Kihei has an initial design capacity of 4 mgd. The facility can be expanded to accommodate future loads and will eventually collect and treat all sewage from Maalaea to Wailea. A complete wastewater collection, treatment and effluent disposal system will be provided by Seibu to serve the Makena area.

d. Solid Waste

Solid waste generation is anticipated to increase as population increases. By 1990, refuse on the order of 176 tons per day may be generated in the Kihei-Makena area [4.22].

A secondary impact of increased solid waste will be on waste disposal. The existing Waikapu sanitary landfill will reach its capacity within 1.5 years and other landfill sites will have to be obtained if sanitary landfilling continues as the primary disposal mode. The County is currently studying alternative sites for use as sanitary landfills, as well as alternative solid waste disposal methods.

e. Communication

Future development will warrant expansion of Hawaiian Telephone Company's Kihei central office. New lines will be added to the Kihei central office as necessary, as part of Hawaiian Telephone Company's capital improvements program for Maui County.

f. Power

As Maui's population increases, so will the need for electrical power. Maui Electric Company (MECO) anticipates it will be able to increase capacity enough to meet future power requirements.

g. Schools

Enrollment estimates for the Kihei-Makena region assume that 50-70 percent

of the future housing units will be resort-oriented with a subsequent minor impact on the school population.

It is estimated that projected enrollment will exceed existing capacity in 1981. However, new classrooms will be constructed up to a total of eight by 1983. These can be converted to 10 classrooms, if necessary, and will be adequate to accommodate enrollment past the year 1985.

h. Parks and Recreation Facilities

Kihei-Makena's beaches are the primary recreational resources of the region and are extensively used by residents and visitors. In planning for the development of Kihei-Makena, the County has improved or upgraded existing facilities, provided new facilities, and has required developers to provide public access to the beaches. For example, in the Wailea development, access, walkways, and parking lots at five locations have been provided and dedicated to the County of Maui.

In Makena, public access and beach parks have been planned for. It is anticipated

that use of the beach parks will increase as a result of improved access, urbanization, and population increases.

As mentioned earlier, a State Park is planned for Makena-LaPerouse. The first phase of the plan calls for development of recreational areas, including camping, around Puu Olai, Naupaka and "Little" and "Big" Beaches. State acquisition of land around these beaches would secure the beaches for public use in perpetuity.

The State has already purchased more than 110 acres of land near Puu Olai, including the area known as "Little Beach" and a parcel of land between the base of Puu Olai and Makena Road [4.23].

i. Police, Fire, and Emergency Services

Population increases in the project area will create a need for greater police and fire protection. The new Central Maui Water Transmission System will supply enough water to sustain sufficient fire flows. As further development takes place, additional fire personnel and equipment will be required.

An increase in police service to the area will also be required. Generally, as densities in an area increase, so does crime. Based on existing trends as reported by the Maui County Police Department, theft may become an increasing problem in the coming years. Increases in such crimes will warrant additional personnel and beat routes. In addition, police and fire personnel can be expected to engage in more sea rescue operations than is presently the case.

Implementation of the proposed project will speed access to the existing residences of Makena, thereby shortening the response time of fire, police and emergency medical services. This can be considered a positive secondary impact on these services.

REFERENCES TO SECTION 4

- [4.1] Department of Public Works, City and County of Honolulu. November, 1975. Soil Erosion Standards and Guidelines.
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- [4.3] Neighbor Island Consultants. 1974. Seibu Makena Master Plan Environmental Impact Statement. Hilo, Hawaii.
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- [4.9] Bordner, Richard M. 1980. Archaeological Excavations (Salvage) of Features 1028-12 and 1028-13 for the Proposed Makena Road. Palauea, Honua'ula, Maui, Hawaii. Prepared for Environment Impact Study Corporation.
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- [4.12] Hawaii Visitors Bureau. 1978. Annual Research Report. Table 18.
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- [4.14] Op. Cit. [4.12]. Table 26.
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- [4.16] Department of Planning and Economic Development. March 1, 1978. Revised Population and Economic Projections, 1975-2000. Series II-F projections.
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- [4.19] Norman Saito Engineering Consultants, Inc, CH2M Hill Inc., and Dr. Harold T. Stearns. 1974. Central Maui Water Study for the Development of Sources, Transmission Lines, and Storage Reservoirs.
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Hawaii State Plan for Solid Waste Recycling.
- [4.22] Division of State Parks, Department of Land and
Natural Resources, State of Hawaii. April,
1981. Personal communication.

**Adverse
Environmental
Effects**

5

SECTION 5

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS
WHICH CANNOT BE AVOIDED

No significant long-term environmental impacts will result from the implementation of the proposed project. There will be minor short-term construction impacts, most of which can be mitigated through commonly used mitigative measures. These include ensuring that all vehicles and equipment are equipped with mufflers to minimize noise, and also limiting construction hours, so as not to disturb local residents during the evening and early morning hours.

The potential impact on air pollution will be handled by using water or other dust pallatives to prevent excessive dust problems for residents and other people in the vicinity. During construction of the road, the residents and other people using the existing road will not be unduly inconvenienced by excluding their use of the road, however, there may be short periods of time when only one-way traffic is provided.

When the water line is installed and individual hook-ups provided, there will be a temporary curtailment of water service. This should last no longer than one day for any given household. Prior to the curtailment of water, the individuals will be notified.

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Alternatives

6

SECTION 6

ALTERNATIVES TO THE PROPOSED ACTION

I. NO ACTION

A "no action" alternative will result in a continual deterioration of the existing substandard Makena Road. This is unacceptable for the current and projected use of the road. Immediate action is required to improve access to the beaches, to reduce existing road hazards and, secondarily to provide a reliable water source for the Makena residents.

II. ALTERNATIVE ALIGNMENTS

Alternative alignments for the entire road were not evaluated. The proposed alignment generally conforms to that delineated by the Kihei General Plan except where physiographic constraints, archaeologic sites, and/or prudent engineering practice necessitated alignment alterations.

In addition to the recommended alternative, Alignment "C", two other alternatives were considered for connecting Wailea Alanui Drive with Kihei Road. Refer to Figure 1-2. The selected alternative (the farthest mauka) minimizes impacts on archaeological sites, maximizes motoring safety by eliminating the sharp makai bound turn at the end of Wailea Alanui Drive, and is the least-cost alternative in terms of highway design and drainwork construction.

The two alternative alignments at the northern end of the road are discussed below.

A. Alignment "A"

Alignment "A" is located slightly mauka of the existing road. Archaeologic sites are described in Appendix C. Impacts and mitigative measures (recommendations) are as follows:

<u>Site/Complex</u>	<u>Discussion</u> [6.1], [6.2]
Site 232	Since these are historic cattle walls, no further work is recommended for this site.
Site 235	A portion of the walls at this site cross Alignment "A". It is recommended that the complex be mapped in detail and tested to determine the function and, if possible, the temporal relationship to the various features.
Site 240	Two enclosures are located within the alignment and would be destroyed during construction. It is recommended that they be mapped and, if warranted upon further inspection, that they be tested to clarify the nature of their use.
Site 241	Features A and B may lie within this alignment. It is recommended that this site be mapped in detail and that any further work be evaluated upon completion of the map.
Site 261	Stone cattle walls at this site cross Alignment "A". If determined to be solely historic walls, no further work is recommended.

Site/Complex

Discussion [6.1]

- | | |
|-----------|--|
| Site 1027 | Palauea Cattle Pen extends across this alignment. |
| Site 1029 | Palauea Heiau Complex extends across this alignment. |

In addition to the sites described above, continuation of the road after this alternate would impact sites 244 through 253, as would Alternate Alignment "C" (refer to Page 4-22).

B. Alternate Alignment "B"

Alignment "B" is located both slightly mauka and makai of the existing road. Archaeologic sites along it are described in Appendix C. Impacts and mitigative measures (recommendations) are as follows:

Site/Complex

Discussion [6.1]

- | | |
|----------|---|
| Site 232 | This historic cattle wall parallels the mauka side of alternative Alignment "B". No further work is recommended for this site. |
| Site 233 | Three features are located along the makai side of this alternate. It is recommended that they be tested to determine if burials are present. |
| Site 234 | This mound is located in the alignment and should be tested to determine if burials are present. |

Site/Complex

Discussion [6.1]

- Site 237 This mound is located along the makai side of the existing road in alternative Alignment "B". It should be tested to determine if burials are present.
- Site 241 The walls at this site are within alternative Alignment "B". If not determined to be historic, they should be mapped in detail along with the rest of the site.
- Site 1027 Palauea Cattle Pen crosses this alignment.
- Site 1029 Palauea Heiau Complex extends across this alignment.

In addition to the sites described above, continuation of the road after this alternate would impact sites 244 through 253, as would Alternate Alignment "C" (refer to page 4-22).

Both Alternate Alignments "A" and "B" would be more costly than "C", due to the need for additional drainage work. This is because the alignments are closer to the shoreline and existing residences.

Flora and fauna recorded along Alternate Alignments "A" and "B" are, for the most part, introduced species. The endemic and indigenous species recorded are common varieties and are not rare or endangered.

During construction, the noise impact on those residences on Kihei Road, between Wailea Alanui Drive and

Halo Point, would be greater than with Alignment "C", because Alternate Alignments "A" and "B" are closer to said residences. However, after completion, predicted L10 noise levels would be close to existing peak levels (refer to Appendix E). Predicted L50 noise levels would be below or close to the Federal maximum acceptable noise levels.

Either Alignment "A" or "B" could accommodate the Central Maui Water Transmission Line within the alignment.

A third alternative alignment, described as Alignment "C1" in Appendix C, was also considered. It was slightly makai of the proposed Alignment "C" and would have resulted in destruction of up to 40% of Site 1028, as well as other impacts. For this reason, it was rejected and the proposed Alignment "C" was investigated.

In addition to the two alternative alignments at the beginning (northern end) of the proposed road, two alternative alignments were considered where the proposed road would cross the existing Maken-Ulupalakua Road, one mauka and one makai. Both alternative routes would cross Site 242, which consists of historic cattle walls. No further archaeological work is recommended for this site [6.1], [6.3]. The makai alternative is presently the preferred alignment in this area.

III. ALTERNATIVE TRANSPORTATION MODES

Alternative transportation modes for Maui County were evaluated in a recent study [6.4]. According to the study,

the island of Maui currently has five sources of public transportation directed toward residents. These are:

- Taxi Service. There are 11 taxi companies with a total of 147 vehicles providing service on Maui.
- Shuttle to Kaanapali. Two tour bus companies are currently providing commuter service between Wailuku and Kaanapali, one trip each direction per day.
- The hotels in the Kaanapali area are providing a local shuttle between Kaanapali and Lahaina for employees.
- The Maui Economic Opportunity, Inc. is providing bus service to the elderly population with planned organized runs.
- There are approximately 35 school buses in service on Maui, all private operators under contract to DOT.

The transit program recommended by the study was that no new transit services be provided in Maui County. It was further recommended that the County continue to participate in the existing transit for the elderly and handicapped, that the five-year improvement program be designed to replace existing vehicles and improve the quality of existing service, and that no expansion of fleet-size or service area take place during the five-year improvement period.

IV. UPGRADE EXISTING ROAD

An alternative which was initially considered but ultimately rejected was to upgrade the existing road. This

road presently has a right-of-way 40-60 feet wide. In order to upgrade the road to the design capacity necessary, the following items would need to be accomplished (in addition to the roadwork):

1. Acquire additional right-of-way lands for those portions which are presently less than 60 feet wide.
2. Acquire or exchange properties for additional rights-of-way to improve horizontal sight distance.
3. Acquire additional rights-of-way or obtain permission from abutting property owners to grade the roadsides in order to improve vertical sight distance. Estimated construction cost for only the additional excavation would be \$500,000.
4. Construct retaining walls along rights-of-way to improve sight distance, and in areas where grading beyond the right-of-way is not feasible. Estimated construction cost would be \$400,000.
5. Grade driveways to abutting smaller properties to provide vehicular access. Estimated construction cost would be \$25,000.
6. Additional channelization of drainage ways along the ending portion of existing walls along Wailea Alanui Drive in the vicinity of Polo Beach. Estimated construction cost would be \$300,000.
7. Obtain drainage easements across smaller parcels to carry storm run-off. Estimated construction cost of additional drainage structures and channels would be \$600,000.
8. Construct temporary roads to provide vehicular access during construction. Estimated construction cost would be \$150,000.

All of the work listed above would impact certain homeowners who presently live adjacent to the road.

The difficulty of working exclusively along an existing road with existing traffic would add to the cost of construction. To upgrade the existing road, the estimated construction cost would be \$11,940,000. This is an additional cost of \$2,090,000. A brief breakdown of this cost is presented above. In addition to the eight items listed, additional roadwork would cost approximately \$115,000.

In addition, other impacts would be associated with this alternative. Based on existing archaeological studies, several sites along the existing road would be impacted. Further studies along the full length of the road might well reveal additional sites which would be impacted by widening the alignment. The known sites which would most likely be impacted are as follows (with any existing recommendations):

<u>Site/Complex</u>	<u>Discussion</u>
1029	Palauea Heiau complex may extend westward to the existing road.
1362	Papa'anui Platform is makai of the road and would likely be within the alignment if the road is upgraded.
196	Kalani Heiau is mauka of the road and may be within the alignment.
236	This historic wall was built against the Papa'anui Platform. No further work is recommended for this site.
237	This mound is located along the makai side of the existing road. It should be tested to determine if burials are present.

244

This site may have been a fishing shrine. It is recommended that the site be mapped and that any further work be evaluated based on the results of the mapping. It is mauka of the road and would likely be impacted if the road is upgraded.

262

This site is of sufficient size to have been a men's house. It should have extensive testing for sub-surface remains to determine feature function and age.

As with Alignment "C", sites 249-253 would most likely be impacted, but the significance of these impacts is unknown at the present time. Further investigations to specify impacts and mitigative measures would have to be conducted.

In summary, more work would be required at several sites before any conclusions could be drawn as to ultimate impact of widening the existing road on archaeological sites.

Flora and fauna recorded along portions of the existing alignment are, for the most part, introduced species. The endemic and indigenous species recorded are common varieties and are not rare or endangered.

During construction, the noise impact on existing residences on Kihei Road would be greater than with Alignment "C". After completion, predicted L10 noise levels would be close to existing peak levels, however, predicted

L50 noise levels would be substantially greater than existing levels, and in many cases, would exceed the Federal maximum acceptable noise levels (refer to Appendix F).

The Central Maui Water Transmission Line could be placed within the alignment of the existing road. However, this would result in somewhat greater construction and maintenance costs than installing the line with the proposed new road.

REFERENCES TO SECTION 6

- [6.1] Davis, Bertell D. and Richard M. Bordner. June, 1977. Archaeological Reconnaissance of the Makena Coast Road Realignment, Honua'ula, Island of Maui. Prepared by Archaeological Research Center Hawaii, Inc. for Environment Impact Study Corp.
- [6.2] Davis, Bertell D. and Richard M. Bordner. November, 1977. Archaeological Reconnaissance of the Proposed Realignment of the Makena Coast Road - Mauka Alternate, Honua'ula, Maui Island. Prepared by Archaeological Research Center Hawaii, Inc. for Environment Impact Study Corp.
- [6.3] Bordner, Richard M. April, 1980. Archaeological Reconnaissance of the Proposed Realignment of the Makena Coast Road. Update of Alignment "C". Prepared for Environment Impact Study Corp.
- [6.4] Voorhees, Alan M. and Associates. 1976. A Short-Range Transit Study for Maui County. Prepared for County of Maui and State of Hawaii. Honolulu, Hawaii.

**Short
Term Uses - Long
Term Productivity**

7

SECTION 7

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S
ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT
OF LONG-TERM PRODUCTIVITY

Construction of the proposed Makena Road will provide the public and emergency services with a safe, all-weather road, and will improve access to the beaches. The entire road length is approximately 3.6 miles and will not have a significant adverse impact on vegetation or wildlife. Also, the alignment chosen ("C") will have the least impact on archaeological sites. The road shoulders allocated for bikeways will also provide the public with alternative recreational pursuits.

The installation of a new water line within the road alignment will provide the residents with a reliable water system to meet domestic needs and fire protection, which are both presently substandard.

Since no significant impacts on biological resources are anticipated, no loss of long-term productivity is expected. However, long-term benefits will occur for the residents.

**Commitment
of Resources**

8

SECTION 8

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction of Makena Road will involve the commitment of capital, labor, raw materials, and energy. Land (60-foot right-of-way) will also be committed for the length of the road and its use will be limited to transportation purposes. Landform alterations and vegetation removal during construction are necessary to implement the proposed action. Although these physiographic and botanical resources will be altered, landform alterations are not expected to remove important soil resources nor significantly affect existing drainage patterns in the area; and no threatened or endangered plant or animal species will be affected by the proposed project. Construction of Increments I and II of the proposed project will not entail destruction of any significant archaeological or historic sites which have not already been, or are to be, mitigated through salvage. Construction of Increment III will be preceded by further archaeological investigations to specify significance and mitigate impact.

**Government
Policies to Offset
Adverse Effects**

9

SECTION 9

AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF
GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE
ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTIONS

As indicated in Section 4, Anticipated Environmental Impacts and Mitigative Measures to Minimize Adverse Impacts, most of the adverse impacts are short-term and related to construction activities. Those impacts which are long-term are primarily secondary, or indirect, and are related to the potential for population growth and increased commitment of governmental funds and actions for supporting infrastructure, such as shoreline recreation facilities.

Presently, governmental policy and plans include purchase of land for the Makena - La Perouse State Park. The Legislature has also allocated State funds for construction of initial park facilities. The use of these funds is pending right-of-entry or purchase of the desired land.

Approvals

10

SECTION 10

LIST OF NECESSARY APPROVALS*

STATE

Department of Transportation, Highways Division - Review
of plans

Department of Land and Natural Resources - Review of plans

Department of Health - Review of plans

COUNTY

Grading Permit

Grubbing Permit

Stockpiling Permit

SMA Permit

Designation on the Kihei-Makena Community
Development Plan

* Status: No action has been taken to date on any of the
approvals or permits.

**Organizations
and Persons
Consulted**

11

SECTION 11

ORGANIZATIONS AND PERSONS CONSULTED
DURING THE NOP PROCESS

Environmental Assessment/NOP Preparation

STATE

Department of Planning and Economic Development

Department of Land and Natural Resources

Department of Transportation

COUNTY

Office of the Mayor

Department of Water Supply

Planning Department

NOP Review Period Respondents

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David I. Nagamine	11-7
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Wailea Development Company	11-9

245 North Kukui Street, Honolulu, Hawaii 96817, Telephone (808) 537-5966

AMERICAN LUNG ASSOCIATION of Hawaii

March 6, 1978

Mr. Wayne Uemae
Director of Public Works
County of Maui
200 South High Street
Mailuku, Hawaii 96793

Dear Mr. Uemae:

Subject: Makena Road, Maui

Thank you for forwarding a copy of the EIS Preparation Notice for the proposed Makena Road project. We have reviewed the document and have the following suggestions for analyzing the air quality impact of the project.

We recommend that as a first step a screening analysis be performed in accordance with the methods described in a recent EPA publication. This will provide an early indication as to whether the project will have a significant impact on local air quality, at least with regard to carbon monoxide (CO) which is generally the most prevalent pollutant associated with transportation facilities. As a minimum, the screening should be applied to existing conditions and project conditions both with and without the project. If the screening indicates problems, e.g., violations of the State's 1-hour or 8-hour CO standards, then more detailed analysis would be required.

If we can be of any further assistance to you or your consultants, please do not hesitate to contact us.

Sincerely,

James W. Morrow
James W. Morrow, Director
Environmental Health

JWM:ct

cc: Mr. Richard O'Connell, OEQC

U.S. Environmental Protection Agency. Guidelines for Air Quality Maintenance and Planning and Analysis, Volume 9: Evaluating Indirect Sources (EPA 450/4-75-001), January, 1975

Christmas Seal Eight (B. Astoria, Employment, Air Pollution)

COPY

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
MAILUKU, MAUI, HAWAII 96793

March 13, 1978

Mr. James W. Morrow, Director
Environmental Health
American Lung Assoc of Hawaii
245 North Kukui Street
Honolulu, HI 96817

Dear Mr. Morrow:

Subject: Makena Road, Maui

By copy of this letter, our consultant will be apprised of your suggestion on air quality considerations for the EIS preparation.

As a "consultant party" you will be contacted by the consultant and this concern as well as any other may be taken up at that time.

Your continued interest in this project is appreciated.

Very truly yours,

Wayne Uemae
WAYNE UEMAE
Director of Public Works

cc: Muroda & Assoc w/hr ✓

MAR 15 1978
DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

COPY

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
WAILUKU, MAUI, HAWAII 96753

February 7, 1978

Mr. Wallace Gilroy
P. O. Box 752
Kihei, Maui, HI 96753

Dear Mr. Gilroy:

We acknowledge your personal request to be a "consulted party" in the preparation of the Environmental Impact Statement for Makana Road, Maui.

We understand that you have been provided a copy of the ZIS preparation notice.

Very truly yours,

WAVNE UEMAE
Director of Public Works

cc: Huroda & Assoc w/copy of request

SPM/ly
WAVE 2-6-78

Makana Rd EIS - following requested to be consulted party for same:

Mr. Wallace Gilroy (contractor)
P. O. Box 752
Kihei, Maui, HI

Tel: 879-1777

FEB 10 1978

HAWAIIAN MARINE

CONSULTANTS

CHARTERS

February 15, 1978

Mr. Wayne S. Uemae, Director
Department of Public Works
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Uemae:

This letter is to advise you that I would like to become a consulted party in the development of an environmental impact statement for the realignment of the Makena Road.

It is my understanding that by making this request I must be consulted and kept advised of the development of the project.

Sincerely yours,

Rick Gaffney
Rick Gaffney
Marine Specialist

RG:ss

OCEAN RECREATION AND PLANNING • MARINE PHOTOGRAPHY • UNDERWATER SERVICES
P O BOX 1855 WAILUKU, MAUI, HAWAII 96793

C O P Y

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
WAILUKU, MAUI, HAWAII 96793

February 22, 1978

Mr. Rick Gaffney
Hawaii Marine
P. O. Box 1855
Wailuku, Maui, HI 96732

Dear Mr. Gaffney:

Re: Makena Road EIS

We acknowledge your request to be a consulted party for the preparation of the Environmental Impact Statement for the Makena Road project.

Enclosed for your information and use is the EIS preparation notice.

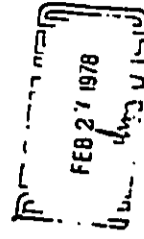
In explanation to your understanding as stated in your letter, consulted party status is applicable only as it relates to the requirements of Chapter 343 HRS and the EIS Rules and Regulations of the Environmental Quality Commission.

Very truly yours,

WAYNE UEMAE
Director of Public Works

Encl.

cc: Muroda & Ass w/request



COPY

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
WAILUKU, MAUI, HAWAII 96793

March 13, 1978

Mr. David I. Nagamine
2432 Hyrtle Street
Honolulu, HI 96816

Dear Mr. Nagamine:

Subject: EIS Preparation Notice
Hakena Road

We're sorry but we cannot send you a copy of the Preparation Notice because we do not have any more available copies here on Maui.

By a carbon copy of this letter we are informing our consultant, Muroda & Associates of your request and authorizing them to send you a copy if available.

You may wish to follow up with them by phoning 531-5959.

Very truly yours,

WAYNE UEMAE
Director of Public Works

cc: Muroda & Assoc's w/request ✓

MAR 15 1978



March 6, 1978

Mr. Wayne S. Uemas, Director
Department of Public Works
County of Maui
260 South High Street
Wailuku, Hawaii 96793

Dear Mr. Uemas:

Subject: EIS Preparation Notice for "Hakena Road" Project

Please send me a copy of the subject preparation notice. I do not wish to be consulted in preparation of the project EIS. The preparation notice is only for my information.

Thank you very much.

Sincerely yours,

David I. Nagamine
David I. Nagamine

Address to: Mr. David I. Nagamine
2432 Hyrtle Street
Honolulu, Hawaii 96816

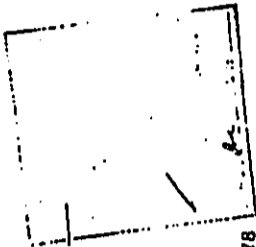
RECORDED

1978

DEPARTMENT OF PUBLIC WORKS
1655 W. O'HEA



Wailea Development Company
 872 E. King St., Honolulu, Hawaii 96813
 Phone: (808) 525-6421



January 31, 1978

Mr. Wayne S. Uemae, Director
 Department of Public Works
 County of Maui
 200 South High Street
 Wailuku, Hawaii 96793

Subject: Makana Road Project

Dear Mr. Uemae:

We read with interest the report on Maui County's proposed Makana Road construction project in the "EQC Bulletin" of January 23. Please be advised that Wailea Development Company wishes to be a consulted party on this project. Mr. Wendell F. Brooks, Jr., General Manager of Wailea Development Company, will be working on this matter. His address is: Suite 250, 33 Lono Avenue, Kahului, 96732, phone number 877-5725.

Thank you for your attention to this request.

Very truly yours,

WAILEA DEVELOPMENT COMPANY
 By Wailea Land Corporation
 Managing Joint Venturer

Richard H. Cox

Richard H. Cox
 Vice President

RHC/bn

cc: W. F. Brooks
 EQC

A SERVICE OF WASHINGTON CONSULTANTS, INC. 1000 17th St., N.W., Washington, D.C. 20036

dm
 NT

**EIS
Review Period**

12

SECTION 12

ORGANIZATIONS AND PERSONS CONSULTED
DURING THE EIS REVIEW PROCESS

The following list includes organizations to whom the EIS was sent during the review period. Those with an asterisk are those from whom comments were received. The comments and their responses follow this list.

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United States
Department of
Agriculture

Soil
Conservation
Service

P. O. Box 50004
Honolulu, Hawaii
96850

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SABUKEI MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
288 SOUTH HIGH STREET
MAILURU, MAUI, HAWAII 96753

DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
Cable Enticement
Water Management

October 21, 1981

RECEIVED
OCT 23 11 44 AM '81
OFFICE OF THE MAYOR

Honorable Hannibal Tavares
Mayor, County of Maui
200 South High Street
Mailuku, Hawaii 96793

Dear Mayor Tavares:

Subject: Environmental Impact Statement for Makena Road

We have reviewed the subject environmental impact statement and have no comments to make.

Thank you for the opportunity to review this document.

Sincerely,

Jack P. Kanalz

JACK P. KANALZ
State Conservationist

cc: Environmental Quality Commission, Honolulu, HI
Department of Public Works, County of Maui, HI

Mr. Jack P. Kanalz
State Conservationist
U.S. Department of Agriculture
Soil Conservation Service
Post Office Box 50004
Honolulu, Hawaii 96850

Dear Mr. Kanalz:

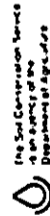
SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

Ralph Hayashi
RALPH HAYASHI
Director

AU:cc



The Soil Conservation Service
is an agency of the
Department of Agriculture

SOCS-1
10-79



United States Department of the Interior

RECEIVED
FISH AND WILDLIFE SERVICE
100 ALA MOANA BOULEVARD
PO BOX 50187
HONOLULU, HAWAII 96850

OCT 13 11 51 AM '81

ES
Room 6307
OCT 8 1981

Mayor Hannibal Tavares
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Re: EIS, Hakena Road
County of Maui, Hawaii

Dear Mayor Tavares:

We have reviewed the subject Environmental Impact Statement (EIS) and offer the following comment. Fish and wildlife concerns are adequately addressed in the EIS; therefore, we have no additional comments at this time. We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka
Ernest Kosaka
Project Leader
Office of Environmental Services

cc: INES
IDF&G
EPA, San Francisco
DPW, County of Maui

October 29, 1981

Mr. Ernest Kosaka
Project Leader
Office of Environmental
Services
Fish and Wildlife Service
U.S. Department of the
Interior
Post Office Box 50166
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

SUBJECT: HAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

RALPH HAYASHI
Director

AUicc



Save Energy and You Serve America!



AGENCIJA
 United States Department of the Interior
 Office of Hawaiian Affairs
 Water Resources Division
 PO Box 50166
 Honolulu, Hawaii 96850

October 8, 1981

Mayor Hannibal Tavares
 County of Maui
 200 South High Street
 Maui, Hawaii 96793

RE: Makana Road, Makana, Maui

Dear Sir:

The U.S. Geological Survey has reviewed the above subject matter environmental impact statement and has no comments to contribute.

Benjamin L. Jones
 Benjamin L. Jones
 District Chief

cc: Department of Public Works, County of Maui
 Environmental Quality Commission, Honolulu, Hawaii (w/ enc. EIS)

October 29, 1981

Mr. Benjamin L. Jones
 District Chief
 Water Resources Division
 U.S. Department of the
 Interior, Geological
 Survey
 Post Office Box 50166
 Honolulu, Hawaii 96850

Dear Mr. Jones:

SUBJECT: MAKANA ROAD
 ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of
 no comments regarding the proposed project.

Sincerely,

RALPH HAYASHI
 Director

AD:cc



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96826

PODED-PV

Honorable Hannibal Tavares
Mayor of the County of Maui
200 South High Street
Maui, HI 96793

27 October 1981
RECEIVED
OCT 28 10 43 AM '81
OFFICE OF THE MAYOR

Dear Mayor Tavares:

Thank you for the opportunity to review the Environmental Impact Statement for Makana Road, Maui, Hawaii, sent to us on 5 October 1981. Based on our review, we provide the following comments.

- a. A Department of the Army permit is not required for this project.
- b. All of the 3.6 miles of the proposed Makana Road alignment is situated in an area of minimal flooding, or Zone C designation according to the Federal Insurance Administration's Flood Insurance Study for the Island of Maui. A portion of the alternate alignment will cross the Kihel Gulch No. 4 flood plain or 100-year riverine flooding area of Zone A4 designation (Incl 1).

Sincerely,

Alsur Cheung
ALSUR CHEUNG
Chief, Engineering Division

1 Incl
As stated

CF:
Department of Public Works
County of Maui
200 South High Street
Wailuku, HI 96793

EXPLANATIONS OF ZONE DESIGNATIONS

EXPLANATION

- A Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
 - A0 Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
 - A1 Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
 - A1-A200 Areas of 100-year flood, base flood elevations and flood hazard factors determined.
 - A39 Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
 - B Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
 - C Areas of minimal flooding. (No shading)
 - D Areas of undetermined, but possible, flood hazards.
 - V Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
 - W-700 Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.
- The materials indicate the magnitude of difference between the 100-year and 500-year flood elevations. For materials between 1-20, the difference is one half the value; for values greater than 20, the difference is 10 less than the materials shown. This information is used in establishing insurance rates.
- 100-year standard of elevation elevation line, with elevation in feet above mean sea level

HANUMBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, JR. D.
County Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
500 SOUTH HIGH STREET
WAILUHU, MAUI, HAWAII 96793

DIVISIONS
Engineering
Highway Construction
and Maintenance
Lands Use and
Cultural Resources
Waste Management

November 16, 1981

Mr. Kisuk Cheung, Chief
Engineering Division
U.S. Army Engineering District,
Honolulu
Department of the Army
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

SUBJECT: HAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and have the following response to your comments:

- a. We concur with this comment.
- b. We concur with this comment and will incorporate the information into the EIS.

Sincerely,

R. Matsuo
RALPH HAYASHI
Director

1CC

HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002A:CG
SER 2043
15 OCT 1981

The Honorable Hannibal Tavares
Mayor of Maui
200 South High Street
Maui, Hawaii 96793

Dear Mayor Tavares:

Environmental Impact Statement
Makana Road, Maui

The Environmental Impact Statement for the proposed Makana Road, forwarded by the Environmental Quality Commission, has been reviewed and the Navy has no comments to offer. By copy of this letter, per the Commission's request, the subject EIS is being returned.

The opportunity to review the subject EIS is appreciated.

Sincerely,

M. M. DALLAM
CAPTAIN, CEC U. S. NAVY
FACILITIES ENGINEER
BY DIRECTOR OF THE COMMANDER

Copy to:
Department of Public Works
County of Maui
State EQC (w/ EIS)

October 29, 1981

Captain M.M. Dallam
Facilities Engineer
Headquarters, Naval Base
Pearl Harbor
Box 110
Pearl Harbor, Hawaii 96860

Dear Captain Dallam:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

RALPH HAYASHI
Director

AD:cc



DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII
FORT SHAFTER, HAWAII 96818

REPLY TO
ATTENTION OF:

APZV-EHE-E

Honorable Hannibal Tavares
Mayor of County of Maui
200 South High Street
Maui, Hawaii 96793

22 OCT 1981
OCT 23 11 47 AM '81
OFFICE OF THE MAYOR

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
288 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

DIVISIONS
Engineering
Programs Construction
and Maintenance
Land Use and
Census Administration
Water Management

November 5, 1981

Dear Mayor Tavares:

The Environmental Impact Statement (EIS) for Makana Road, Makana, Maui, Hawaii has been reviewed and we have no comments to offer. There are no Army installations or activities in the vicinity of the proposed project.

Sincerely,

Ralph A. Hight
RALPH A. HIGHT
COL, EN
Director of Engineering and Housing

Copy furnished:

Department of Public Works
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Colonel Adolph A. Hight, EN.
Director of Engineering
and Housing
Headquarters, U.S. Army
Support Command, Hawaii
Fort Shafter, Hawaii 96858
Attention: APZV-EHE-E

Dear Colonel Hight:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

Ralph Hayashi
RALPH HAYASHI
Director

AU:cc



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR BASE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96853

REPLY TO: DEEV (Mr. Yamada, 449-1831)
ATTN: OF:

SUBJECT: Makana Road Environmental Impact Statement

TO: Honorable Hannibal Tavares
Mayor of County of Maui
200 South High Street
Maituku, HI 96793

1. This office has reviewed the subject EIS and has no comment to render relative to the proposed project.
2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the document.

Ross W. J. Lum
ROSS W. J. LUM
Dep Dir of Civil Engineering

Cy to: Department of Public Works
County of Maui
200 South High Street
Maituku, HI 96793

28 OCT 1981
RECEIVED
9 55 AM '81
OFFICE OF THE MAYOR

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
City of Public Works
JACK MATSUO, Ph.D.
Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
MAITUKU, MAUI, HAWAII 96793

November 5, 1981

Mr. Ross W. J. Lum
Deputy Director of Civil Engineering
Headquarters 15th Air Base Wing (PACAF)
Department of the Air Force
Hickam Air Force Base, Hawaii 96853

Attention: DEEV (Mr. Yamada, 449-1831)

Dear Mr. Lum:

SUBJECT: MAKANA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

Ralph Hayashi
RALPH HAYASHI
Director

AU:cc

GEORGE R. ABIYOSHI
GOVERNOR



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
P. O. Box 22159
Honolulu, Hawaii 96822

October 30, 1981

JACK K. SUWA
CHAIRMAN, BOARD OF AGRICULTURE

RECEIVED
Nov 4 10 34 AM '81
OFFICE OF THE MAYOR

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
245 SOUTH HIGH STREET
HAILUHU, MAUI, HAWAII 96733

November 16, 1981

DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
Code Enforcement
Waste Management

MEMORANDUM

To: Mayor Hannibal Tavares
County of Maui
Subject: Environmental Impact Statement
Makana Road Trk: 2-1
Makana, Maui

The Department of Agriculture has reviewed the subject Environmental Impact Statement and does not have any comments to offer.

Thank you for the opportunity to comment.

Jack K. Suwa
JACK K. SUWA
Chairman, Board of Agriculture

cc: Department of Public Works
County of Maui

Mr. Jack K. Suwa, Chairman
Board of Agriculture
Department of Agriculture
State of Hawaii
Post Office Box 22159
Honolulu, Hawaii 96822

Dear Mr. Suwa:

SUBJECT: MAKANA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

A. Matsuo
RALPH HAYASHI
DIRECTOR

AU:CC

"U.S. Department of Agriculture Products"



RECEIVED
 STATE OF HAWAII
 DEPARTMENT OF HEALTH
 HONOLULU, HAWAII

October 8, 1981

October 29, 1981

MEMORANDUM

To: Honorable Mayor Hannibal Tavares
 County of Maui

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Makena Road,
 Makena, Maui

Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we do not have any objections to this project.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Melvin K. Koizumi
 MELVIN K. KOIZUMI

cc: Office of Environmental Quality Control
 Dept. of Public Works, Maui

Mr. Melvin K. Koizumi
 Deputy Director of Health
 Department of Health
 Post Office Box 3378
 Honolulu, Hawaii 96801

Dear Mr. Koizumi:

SUBJECT: MAKEHA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

RALPH RAYASHI
 Director

AUScc

DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
Cadastral Management
Wildlife Management



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

100 SOUTH HIGH STREET
HAILUKU, MAUI, HAWAII 96793

January 22, 1982

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works

MISSOURI OIL COMPANY
Hawaii Oil & Gas, Inc., 1000-15
EDGAR A. HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 931
HONOLULU, HAWAII 96808

November 12, 1981

Honorable Hannibal Tavares
Mayor of Maui County
200 South High Street
Wailuku, HI 96793

Dear Mayor Tavares:

We have reviewed the EIS for the new Makena Road.

The EIS points out that the project will destroy a number of archaeological sites and recommends mitigative measures. We concur with the recommendations. In addition, an intensive archaeological survey should be made of the road from station 152+00 to station 205+00. The survey is likely to show a need for archaeological excavations.

We view the road as being of potential public benefit by enhancing public access to the shoreline. Public access to the shoreline in this area is vitally important and should not be reduced in any way.

Pollution of the shoreline because of road construction is also of concern. Although there is little rain and soils are well drained, we note that there is a current problem with "red water" following storms and that soils of the area have medium erosion potential. We are concerned that runoff from construction sites will carry off sediment, petroleum products and construction materials unless precautionary measures are taken. We support measures advanced by the EIS such as revegetating bare soils and directing stormwater to detention and infiltration basins. In addition, we suggest limiting site work to seasons other than winter when storms are most likely to occur.

Sincerely,

Susumu Ono
SUSUMU ONO, Chairman
Board of Land and Natural Resources

Mr. Susumu Ono
Chairman
Board of Land and Natural Resources
Department of Land and Natural Resources
Post Office Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments:

Paragraph 1: When construction plans are available for Increment III of the proposed road, it will be possible to specify which archaeological sites in the area will be impacted. At that point, a surface survey will be conducted (as described on page 4-22 of the EIS) to determine the extent of any other necessary mitigative measures.

Paragraph 2: The scope of this project includes neither the closing of the existing road nor improvements along the full length of the existing Makena Road. The proposed road would connect to the existing road in five locations, and any future alteration to the existing road would be a separate question.

Paragraph 3: We appreciate your support of mitigative measures advanced for impacts associated with surface runoff. Please be assured that every effort will be made to schedule site work during seasons other than winter.

Sincerely,

Ralph Hayashi
RALPH HAYASHI
Director

AU:cc

RECEIVED
NOV 18 11 03 AM '81
OFFICE OF THE MAYOR



**DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT**

Lawrence Building 200 South King St. Honolulu, Hawaii - Mailing Address P.O. Box 2359 Honolulu, Hawaii 96804

GEORGE R. ARYOSHIMA
Commissioner
INDRIO LONG
Deputy
FRANK S. BARNES
Deputy

HANNIBAL TAVARES
Mayor
GAILLYN HAYASHI
Director of Public Works
SAMUEL MATELO, Ph.D.
County Director of Public Works



**COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS**

200 SOUTH KING STREET
WAILUKU, MAUI, HAWAII 96793

November 3, 1981

The Honorable Hannibal Tavares
Mayor
County of Maui
200 South King Street
Wailuku, Maui, Hawaii 96793

Dear Mayor Tavares:

Subject: Makana Road Environmental Impact Statement, Makana, Maui
Our staff has reviewed the Environmental Impact Statement for the subject project and has no comments to this project at this time.

We thank you for affording us the opportunity to comment on the proposed project.

Sincerely,

Hideto Kono

cc: Department of Public Works
County of Maui

November 16, 1981

Mr. Hideto Kono, Director
Department of Planning
and Economic Development
State of Hawaii
Post Office Box 2359
Honolulu, Hawaii 96804

Dear Mr. Kono:

SUBJECT: MAKEWA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

RALPH HAYASHI
Director

AU:cc

NOV 16 1981

GEORGE R. JAYO JR.
COUNCILOR



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING

October 20, 1981

Mayor Hannibal Tavares
County of Maui
200 South High Street
Mailuku, Maui, Hawaii 96793

Gentlemen:

Subject: Makena Road Environmental Impact Statement
The Hawaii Housing Authority has reviewed the EIS for the construction of the Makena Road and has no specific comments to offer relative to the proposed action. The Authority is, however, highly supportive of this action as the Makena Road will improve transportation conditions necessary for future housing developments in the area.

Thank you for the opportunity to comment on this matter.

Sincerely,

Franklin Y. K. Sunn
FRANKLIN Y. K. SUNN
Director

cc: Department of Public Works
County of Maui
200 South High Street
Mailuku, Maui, Hawaii 96793

FRANKLIN Y. K. SUNN
DIRECTOR
RICHARD PACHANAWAN
DEPUTY DIRECTOR
ALFRED L. BUCKA
DEPUTY DIRECTOR

RECEIVED
OCT 25 10 34 AM '81
OFFICE OF THE MAYOR

HANNIBAL TAVARES
MAYOR
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

100 SOUTH HIGH STREET
MAILUKU, MAUI, HAWAII 96793

November 5, 1981

Mr. Franklin Y.K. Sunn, Director
Department of Social Services
and Housing
State of Hawaii
1390 Miller Street
Honolulu, Hawaii 96813

Dear Mr. Sunn:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

Ralph Hayashi
RALPH HAYASHI
Director

AU:cc



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
100 HALEKUPALEA ST.
ROOM 301
HONOLULU, HAWAII 96813

Melvin Koizumi
Deputy Director
TELEPHONE NO.
548-9115

Mr. Ralph Hayashi
Department of Public Works
County of Maui
200 South High Street
Mailuku, Hawaii 96793

November 4, 1981

Dear Mr. Hayashi:

Subject: Environmental Impact Statement for Makena Road, Maui
We have reviewed the subject statement and offer the following comments:

The summary states that the Mayor of Maui County is the accepting authority for this statement. This is partially correct. Since the use of state lands are proposed (page 1-11) the Governor will be the final accepting authority for the revised statement. Acceptance by the Mayor would be first to be followed by submittal to this Office for processing for the Governor's acceptance.

There is an inadequate discussion of the need for this project. The discussion should include past and present traffic counts and accident data to support the stated objectives of the project. Projections of future traffic should be provided and should include how these figures were derived. Any cost-benefit analysis should also be included. A reason should be given for the proposed eighteen foot wide lanes and not of a shorter width.

The future status of the present alignment of Makena Road should be discussed.

Please explain what environmental compatibility is being referred to on page 2-15.

Page 3-3. There should be a discussion on how the project relates to the listed State Plan policies.

Mr. Ralph Hayashi
November 4, 1981
Page 2

Page 3-15. A discussion is necessary on how the project conforms to the objectives and policies of the Coastal Zone Management Act. This will permit the use of this statement in its revised form, in the SHM permit process.

Page 4-1. The second sentence should end as follows, "... primarily impacts from traffic."

The EIS Regulations require that secondary impacts shall be thoroughly discussed. The discussion shall include the changes in population, their patterns and growth upon the resource base, including land use, water and public services of the area in question.

We do not concur with the statement that these impacts are "... difficult to accurately assess due to the uncertainty as to the rate at which development will proceed and its scope." Further, the EIS Regulations require the statement to be a self-contained document without the need for undue cross-reference. We will not consider the document adequate unless the above major concerns are addressed in sufficient detail.

Page 4-19. Please describe how the grassed areas will be watered to insure growth and in order to control what may be a significant dust problem.

Page 4-20. There is no information provided to substantiate the statements regarding terrestrial flora and fauna and marine ecosystems. Future growth of the area dependent upon this project may very well create significant secondary impacts.

Page 4-26. The statement, "The proposed project will have minor secondary impacts," is unsubstantiated and should be amended to reflect our concerns stated above regarding secondary impacts from such projects as Seibu-Makena.

Alternatives to the proposed actions should include an evaluation sufficiently detailed to allow for the comparative evaluation of environmental benefits, costs and risks of the proposed action and each responsible alternative.

Page 10-1. A detailed list of the specific approvals and their status should be included in this section.

The EIS Regulations allow the accepting authority or his authorized representative to consider responses received after the fourteen day response period. This Office will exercise that option and will consider responses after the fourteen day period.

Mr. Koizumi

-2-

Jan. 22, 1982

Paragraph 4: The concept of environmental compatibility refers to designing and siting projects so as to reduce adverse impacts on the physical environment. (p. 2-45)

Paragraph 5: The Revised EIS will include discussion of how the project relates to the State Plan policies listed on page 3-3 of the EIS. (p. 3-3)

Paragraph 6: The Revised EIS will include discussion of how the project conforms to the Coastal Zone Management Act (Chapter 205A, HRS). (p. 3-15)

Paragraph 7: The second sentence on page 4-1 will be revised as suggested. (p. 4-1)

Paragraphs 8 and 9: Construction of necessary infrastructure, such as the proposed project and the extension of the Central Maui Water Transmission System, will facilitate development in the vicinity of the project, as provided for by the Kihel General Plan and County zoning. Additional secondary impacts will be addressed in the Revised EIS.

Paragraph 10: During the construction phase, the contractor will be required to water and maintain, by any means available, all grassed areas until full growth. (p. 4-19)

Paragraph 11: For reasons discussed on pages 4-10 through 4-13, no significant short-term or long-term primary impacts are anticipated on terrestrial flora and fauna or marine ecosystems in the project vicinity. (p. 4-20)

Future growth of the area is not entirely dependent upon the County installing its portion of this road. The surrounding developments will fund and install their portions of the road independently, as has already been done for a portion of the road within Seibu property. However, secondary impacts of the entire road will be included in the Revised EIS, in addition to those stated in the EIS.

Paragraph 12: Please refer to the response to paragraphs 8 and 9, above. (p. 4-26)

Paragraph 13: This comment will be considered during preparation of the Revised EIS.

Mr. Koizumi

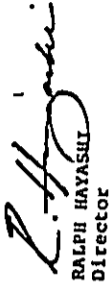
-3-

Jan. 22, 1982

Paragraph 14: A list of the specific approvals and their status, if known, will be included in Section 10. (p. 10-1)

Paragraph 15: Thank you for notifying us of this decision. The Mayor's office has also exercised the option to consider responses after the fourteen day response period.

Sincerely,


RALPH HAYASUI
Director

AU:cc

GEORGE A. JAYCOCK
Superintendent



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2108
HONOLULU, HAWAII 96804

2141 of the Superintendent

October 13, 1981

Honorable Hannibal Tavares
Mayor, County of Maui
200 South High Street
Maui, Hawaii 96793

Dear Mayor Tavares:

SUBJECT: Environmental Impact Statement
Makena Road

This is to acknowledge receipt of the subject EIS for our review. We have no comments to offer at this time on the Makena Road project.

Thank you for the opportunity to comment on the EIS.

Sincerely,

Charles G. Clark
CHARLES G. CLARK
Superintendent

cc: Maui District
Mr. James E. Edington
Mr. Edward Matsushige
Dept. of Public Works, County of Maui

CGC:HL:j1

RECEIVED

OCT 19 1981
DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

AN EQUAL OPPORTUNITY EMPLOYER

October 29, 1981

Mr. Charles G. Clark
Superintendent
Department of Education
State of Hawaii
Post Office Box 2360
Honolulu, Hawaii 96804

Dear Mr. Clark:

SUBJECT: MAVENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

RALPH HAYASHI
Director

AU:cc

GEORGE R. AITOSHII
GOVERNOR



STATE OF HAWAII
ENVIRONMENTAL QUALITY COMMISSION

Chairman
Joan Kodani
Executive Secretary
TELEPHONE NO.
808/544-5315

RECEIVED

OCT 15 1981
DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

510 HALEKUNA ST.
ROOM 201
HONOLULU, HAWAII 96813
October 5, 1981

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) that was prepared pursuant to Chapter 343, Hawaii Revised Statutes and the Rules and Regulations of the Environmental Quality Commission:

Title: Makana Road
Location: Makana, Maui
Classification: Agency Action
Your comments or acknowledgment of no comments on the EIS are welcomed. Please submit your reply to the accepting authority or approving agency:
Mayor Hannibal Tavares
County of Maui
200 South High Street
Maui, HI 96793

Please send a copy of your reply to the proposing party:

Department of Public Works
County of Maui
200 South High Street
Mailuku, Hawaii 96793

Your comments must be received or postmarked by November 7, 1981.
If you have no further use for this EIS, please return it to the Commission.

Thank you for your participation in the EIS process. 81:1016
State Energy Office has no comments.

Ed Greaney
Acting Manager

October 29, 1981

Mr. Ed Greaney
Acting Manager
State Energy Office
Department of Planning and Economic Development
State of Hawaii
335 Merchant Street
Room 110
Honolulu, Hawaii 96913

Dear Mr. Greaney:

SUBJECT: MAKANA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS and statement of no comments regarding the proposed project.

Sincerely,

RALPH HAYASHI
Director

AD:cc



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7981

Office of the Director

Mayor Hannibal Tavares
County of Maui
200 South High Street
Wailuku, Hawaii 96893

Dear Mayor Tavares:

Review of
Draft Environmental Impact Statement
Makena Road
Makena, Maui

The Makena Road project proposes to provide appropriate access, improve safety and eliminate hazardous conditions as well as providing an easement for the extension of the water system. There are, however, a number of issues which are inadequately addressed in the EIS and areas of significant environmental concern which have been identified by our reviewers: Richard Mayer, Maui Community College; Robert Rowland, Urban and Regional Planning; Jacquelin Miller and Diana Shepherd, Environmental Center.

SECTION 4. ANTICIPATED ENVIRONMENTAL IMPACTS MITIGATIVE MEASURES TO MINIMIZE THEIR IMPACTS

I. INTRODUCTION

The introduction to the Environmental Impacts section (page 4-1) of this Environmental Impact Statement raises a point of critical significance to the determination of adequacy of this document to meet existing state environmental law, that of the address of secondary impacts.

The latter item [secondary impacts] is difficult to accurately assess due to the uncertainty as to the rate at which development will proceed and its scope. In addition, impacts resulting from growth were discussed in the EIS prepared for the Seibu development, which was accepted by the County of Maui Planning Commission. Thus, secondary impacts relating to development will only be briefly discussed.

AN EQUAL OPPORTUNITY EMPLOYER

Mayor Hannibal Tavares

-2-

November 6, 1981

Section 1:42(e) of the State of Hawaii Environmental Quality Commission
Environmental Impact Statement Regulations states:

Consideration of all phases of the action and consideration of all consequences on the environment; secondary or indirect, as well as primary or direct shall be included. The interrelationships and cumulative environmental impacts of the proposed action and other related projects shall be discussed in the EIS. It should be realized that several actions, in particular those that involve the construction of public facilities or structures (e.g., highways, airports, sewer systems, water resource projects, etc.) may well stimulate or induce secondary effects. Such secondary effects may be equally important as, or more important than, primary effects, and shall be thoroughly discussed to fully describe the probable impact of the proposed action on the environment.

Even though secondary impacts resulting from development of the project may be difficult to accurately assess, they need to be comprehensively discussed at some level of expertise. The Environmental Impact Statement Regulations of the State of Hawaii, Sub-Part E, 1:42c, state "Proposing agencies and applicants shall also identify, where appropriate, population and growth characteristics of the affected area and any population and growth assumptions used to justify the action and determine secondary population and growth impacts resulting from the proposed action and its alternatives." Sub-Part E, 1:42c is applicable to the proposed development and as such the subject has not been adequately addressed in the Draft EIS. Techniques for estimating the population and growth generating potential of this road improvement can be applied given the known area of land already zoned for urban uses and the public knowledge of the development plans of land owners in the Makena area.

The citation of the Seibu-Makena EIS for secondary impact analysis is inappropriate. The Seibu-Makena EIS was prepared under the Governors executive order and its content does not meet current Chapter 343 requirements or EQC, EIS Regulations. Furthermore, serious objections were raised at the time of the review of that document as to the review procedures and particularly the adequacy of its address of the secondary socio-economic impacts that would result from that project. A copy of the review of the Seibu-Makena EIS prepared and submitted by the Environmental Center in 1975 is included as Attachment A of these comments for your information.

RECEIVED
NOV 10 11 02 AM '81
OFFICE OF THE DIRECTOR
NOVEMBER 6, 1981
RE:0338



University of Hawaii at Manoa

Environmental Center
Maile Bldg. 10 • 2540 Maile Way
Honolulu, Hawaii 96822
Telephone (808) 948-7261

Office of the Director

May 30, 1975

MEMORANDUM

TO: Richard E. Harland
FROM: Doak C. Cox
RE: Review of Responses to the Environmental Center
Comments on the Seibu Makena Master Plan DEIS

We have reviewed the responses to the comments we prepared on the Seibu Makena DEIS and find that many of our concerns and those presented by other agencies and private groups were inadequately addressed. In addition discrepancies in figures are not explained, for example, the water usage of 4.0 mgd is cited as based on a population of 17,784 persons (pg. 28 of response), as contrasted with the "ultimate population generated by the proposed project" of 11,037 persons (pg. 48). In discussing the inadequacy of the response by Seibu Real Estate Company with Helene Takemoto of your office we have learned that the Maui Planning Commission has accepted the Seibu-Makena EIS, as of May 28, 1975 just 1 day after we received our copy of their response to our comments.

We believe that objections should be voiced to the Maui Planning Commission on the method of handling this EIS. The lack of review time on the DEIS created an unwarranted hardship on our reviewers and the acceptance of the final EIS prior to providing any opportunity for further reply by the reviewers to the inadequate responses to the comments shows a lack of intent by the Maui Commission, to objectively evaluate this project.

We are hopeful that the new EIS Rules and Regulations will effectively inhibit future action of this type and that within the time limits set forth in the Rules and Regulations, approving agencies will consider follow-up comments to their responses.

Doak C. Cox
Doak C. Cox, Director

cc: Maui Planning Commission



University of Hawaii at Manoa

Environmental Center
Maile Bldg. 10 • 2540 Maile Way
Honolulu, Hawaii 96822
Telephone (808) 948-7261

Office of the Director

April 30, 1975
RE: 0161

Maui Planning Commission
County of Maui
Mailuku, Maui, Hawaii 96793

Gentlemen:

Proposed Seibu-Makena Development
Draft Environmental Impact Statement

The Environmental Center review of the above cited DEIS has been prepared with the assistance of Charles Lamoureux, Botany Department; Tamotsu Sahara, Physical Planning and Construction Office; Glenn Shepherd, Maui Community College; David Tuggle, Anthropology Department; Jerry Johnson, Jacquelin Miller and Richard Scudder, Environmental Center.

The review of the environmental impacts concerning waste disposal, water quality and sewage will be undertaken by Reginald Young of the Water Resources Research Center and will not be covered specifically by the Environmental Center.

General comments

Perhaps the most recurring question raised by each of our reviewers in their evaluation of this draft environmental impact statement deals with the overall socio-economic consideration of this project. The overall estimate of population growth for Maui and the apparent environmental impact for this area seems overwhelming. The DEIS clearly elucidates the probable destruction of archaeological and historical sites; the destruction of the existing social systems, the apparently unavoidable erosional impact, the dangers of flooding to residents of the flood plain, and finally the effect of the entire development on recreational facilities. It is important that the evaluation of the total plan be carefully weighed and perhaps given greater emphasis than our specific comments. Is this project, in fact, in the best interest of the County and the State? We can point out in general terms the possible specific environmental impacts, but what is critical is the overall plan and whether these possible impacts are worth the price of the potential economic gains.

pg. III-1

Tax map keys are given for the various parcels involved in this development. Unfortunately, the tax map keys are not found on figure 3 or any of the other maps of the DEIS. We assume that the small parcels mentioned as being under

April 30, 1975

consideration for future inclusion into the project are those designated by the letter P on figure 3. Is this correct? Does this development include all of the beachfront property in the area shown in figure 3 as the Hakana landing area? We note two locations for public beach access on figure 3, however, it is not clear if any other public access will be provided to the remaining shoreline areas.

Pg. III-4

Who will bear the cost of the development or installation of utilities such as water supply, sewage treatment, underground street lighting, telephone and electric power and cable TV systems as indicated in this paragraph?

Pg. III-8

We note that the existing alignment of the Kihel Road through the project site will be discontinued for through traffic by terminating that portion of Kihel Road at both ends of the hotel site. How will this discontinuation of the existing road affect the present local residents? Mention is made of three beach access points within the development. The third access point is cited as beach frontage south of Puuolai. We note on Figure 3 this beach frontage is presently shown as private property and is not within the development plan, thus we assume there are in fact only two access routes to the beach, the Hakana landing area and the pedestrian right of way adjacent to the hotel site. How will this presumably more restrictive access affect the usage of this beach by the present local residents?

Although the wastewater sewage disposal system will be covered in more detail by the Water Resources Research Center, we do wish to comment specifically on the matter cited on pg. III-11, which indicates that the effluents from the treatment plant will be pumped to storage lagoons located within the golf courses and utilized for irrigation. Will the estimated capacity of the storage lagoons and the amount of water needed for irrigation be adequate to accommodate the amount of effluent generated by the project? Is there any anticipation or provision for possible offshore disposal of effluent? We would appreciate a further description of permeable asphaltic concrete pavements and roof top ponding as cited on pg. III-11. We are not familiar with these "on-site storage" methods.

Pg. III-12

We were pleased to see that all street lighting, telephone and electric systems will be installed underground. We suggest that other types of TV reception systems such as a centralized repeater station might be evaluated in addition to the proposed cable installation.

Pg. III-10

We note that the maximum water demand per day is cited as 4,239 million gallons for the proposed development. What population was used in deriving this estimated figure?

April 30, 1975

Pg. III-13

In the first phase of development approximately 3,000 dwelling units will be constructed. Assuming that some of these units are occupied by families, we assume that the school development site in the area will proceed concurrently with the first phase. Has the Department of Education been apprized of this development and the selected site and facilities that will be available? Does the Department of Education have any suggestions or reservations about the location of the proposed facilities? We note that 30.1 acres has been set aside for the school site. We assume that this will be sufficient for both an intermediate and an elementary school. Is the intent to include also a high school in this area? How far away are the existing schools and will bussing be necessary? Will the existing high school and/or intermediate school facilities be adequate to accommodate the number of students coming from this development?

Pg. IV-14

The description of the total drainage basin for the drainage area is given as 6,650 acres of which only approximately 1,000 acres are within the project site. We note, however, on pg. III-1 that only 1020.733 acres are in the total development. Therefore we assume that only 20 acres are not in the drainage basin area (1020.733 - 1000 = 20.733 acres). It would appear from the information given on drainage and storm runoff that the potential flood hazard for this area is great and may be considered of serious environmental concern.

Pg. IV-17

A report from the State Department of Transportation dated 1971 is cited as indicating the estimated number of vehicles per day for the proposed project. However, we note earlier on pg. III-1 that the proposed project land was acquired by the Seibu Real Estate Company in January of 1974. We assume therefore that the Department of Transportation traffic study was not based on this proposed project. On what was the Department of Transportation study based?

The discussion of potential availability of surface water on this and the following page indicates that water requirements for the development are perhaps the most serious deficiency in the entire plan.

The estimated cost of the design and construction of the water transmission system is 11 million dollars. The derivation of these funds includes 4 million dollars from the Haul Board of Water Supply to be reimbursed by set fees for each hotel or multi dwelling unit hook-up in the Kihel-Hakana area, and 7 million from the Wailea Land Corporation and SHFL. This 7 million is to be repaid to HLC and SHFL by the HHS "from normal revenues derived from the system supplying the Maalaea, Kihel, and Hakana areas." Does this mean that present residents will be required to assist in paying for a water transmission system required by this development?

Pg. IV-19

The wastewater treatment plant for the Wailea development is not a part of the Hakena area development. Relevance to the proposed Hakena project is not indicated.

Pg. IV-20

Will a new substation be required for power to the Hakena area? This section on power and communication seems to direct its attention toward the Wailea resort area, not the proposed development at Hakena.

Pg. IV-26

The discussion on tsunami inundation should be carefully evaluated. Runup heights and magnitudes for tsunamis generated in the Alaskan region are estimated to be 7.3 feet at Hakena. This does not represent maximum runup heights which may be experienced. Historical data indicates runup heights at Hakena of 11 feet and 10 feet respectively from waves of the 1946 and 1960 tsunamis. The citation of the 7.3 foot runup has little relevance to the discussion of this development. Undoubtedly more important than tsunami runup is the indication in the draft EIS of the effects of intense Kona storms. If the recorded historic tsunami runup has been 11 feet and the conversations with David Lono indicate that intense Kona storms may exceed tsunami inundation, we can assume that flood waters from Kona storms exceed 11 feet. We assume that this long time resident is speaking from experience, hence perhaps the 25 or 50 year frequency. The 75 or 100 year frequency is assumed to be significantly greater than 11 feet.

Pg. IV-35

In the section on sand transport, what is meant by the sentence "in the absence of surface, littoral currents cannot be generated."

Pg. IV-39

We assume that one of the two columns labeled Total Coliform in Table 4 is actually Fecal Coliform. The correct title should be inserted in the Final EIS.

Pg. IV-43-66

In general the description of the terrestrial ecology of the project site seems quite adequate. The data presented on plants and animals in the area are accurate and the discussion of potential impact and mitigating measures reflect a good knowledge of the terrestrial biology of the area. There are a few minor typographical errors and incorrect spellings of plant names. In Appendix A-1 (pg. A-1) Sida fallax and Maltheria americana are not endemic species but indigenous species. *Hesperochimida argentea* is not indigenous but exotic. The scientific name of *Hapaka kahakai* is *Scaevola taccada*.

Pg. IV-67-97

The section on marine ecology is quite complete and detailed. The survey methods are believed to be adequate to describe the flora and fauna present. We note that the surveys included stations actually south of the projected site

Pg. IV-110

and were not restricted to the area immediate adjacent to and offshore from the development.

The list of tax map keys and approximate acreage per individual parcels given on this page does not match the list given on pg. III-1. There seems to be an addition of 8.759 acres for tax key 2-1-06-27. Which list is correct?

Pg. IV-121

Why was 1972 chosen as the final date to match the most recent visitor bureau publication pertaining to visitors on Maui?

Pg. IV-134

There are many grammatical errors primarily in the form of word omissions throughout the text. A typical example is found in the last sentence of this page which is not complete.

Pg. IV-121 to IV-152

The section on socio economic characteristics of the area is quite complete, however the relevance of these detailed socio-economic summaries of the various types of individuals to the environmental impact on the area would be helpful.

Pg. V-1-V-64

It would appear from the foregoing report that one of the most serious environmental impacts generated by this proposed development will be in the socio-economic area which is omitted from the list of potential impacts cited on this page.

We note in each case where the environmental impact has been discussed with associated recommendations that the recommendations are "that the developers should" do a certain item. Does this mean that they may or may not undertake the studies at their own discretion?

Pg. V-4

From the earlier materials presented, we assume that a very large portion of the area suggested for development is in a flood plain area. Earlier discussion had indicated that floods in excess of 11 feet above sea level are known from historic records. At this stage in the project's development, we do not have any data or information as to the location of the buildings. We assume however that structures will be built in these flood plain areas. We note on pg. V-9 that there is a potential 420% increase in the runoff rates of the project site resulting from the development. The inability of the present "natural" deposition

Pg. V-54
of runoff to accommodate this increased expected runoff is recognized. Other methods of dispersion such as ocean outfall, seepage ponds, dry wells, and pond holding areas are suggested as methods to handle the estimated 500 acre feet of runoff produced by a 50 year storm. The environmental impact of these suggested "other methods of dispersion" may be extremely great, thus it is difficult to evaluate the environmental impact of the drainage problem without knowing what specific methods will be required. Recognition of potential soil loss/erosion problems expected during construction are mentioned in the draft EIS. We raise the question, however, as to why the items listed on pg. V-12 as occurring during construction should be permitted. Surely the impacts resulting from soil loss could be minimized by requiring proper attention during construction to the four items cited. The secondary effects of sediment discharge into the marine biological communities in addition to the primary soil loss impact are significant.

Pg. V-56
30 acres is not an adequate figure if one must develop all three school facilities--elementary, intermediate and high. Further having all three school facilities on one campus may not be in the best interest of the students nor in keeping with the policies of the Department of Education.

Pg. V-58
Where would the housing for employees of the project be located? How many units are anticipated. Will they be rented by the developer to the employees or will they be available for purchase? What is the estimated purchase price in the latter case.

Pg. VI 1-8
The "other development alternatives" were discussed briefly. A more specific discussion of alternatives should be included in the final EIS.

We appreciate the opportunity to comment on this DEIS.

Yours very truly,
Jeffrey H. Johnson
Jeffrey H. Johnson
Acting Director

cc: DEQC

Pg. V-34
The impact of fine sediments on the nearshore coastal areas should be considered of major importance. Fine sediments reduce water clarity, reduce light penetration thus affecting the growth of coral. The deposition of sediment can cause clogging of the coral polyps and death.

Pg. V-50
The impact of this project on archaeological resources is clearly stated -destruction of numerous prehistoric and historical archaeological sites which are situated within the project site. The sites in this area have not been evaluated by the Hawaii Historic Places Review Board so they are under no legal protection and have received no recognized State evaluation. The survey which has been conducted by the Bishop Museum was a rapid and superficial one. Sites were not recorded in detail, approximate counts were taken, and an attempt has been made to follow up the Museum's recommendation for further survey and excavation as indicated in Section 4. Both surveys and test excavation in the area should be evaluated by the Hawaii Historic Places Review Board. The sites should be divided into those to be salvaged and then destroyed and sites to be preserved and incorporated into the development. It should be remembered that every archaeological site is a non-renewable and unique resource. Unlike many living things of natural features, the value of many sites can be salvaged by research and sites themselves destroyed. These kinds of sites can not stand in the way of the development but they do require money. Other sites should be preserved totally. Developments should be responsible for both.

Pg. V-52
In this section on general uses of the study area the point is made that a number of families residing makai of the project site would move from their homes prior to the completion of construction. Why would they move?

12-30

HANHIEAL TAVARES
Mayor
RALPHI HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
288 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

DIVISIONS
Engineering
Programs Construction
and Maintenance
Land Use and
Coastal Management
WMA Management

Mr. Cox

-2-

Jan. 22, 1982

and County of Honolulu, November, 1975. These are the current guidelines used to determine whether additional erosion control will be required.

Since the Severity Rating Number, H, for each of the segments of the road is well below the standard Severity Rating Number of 50,000, the severity of soil loss has been determined to be minimal in relation to the standard. Grassing will be the primary temporary and permanent erosion control measure.

Construction of the portion of Makena Road in Seibu's property experienced soil erosion problems in only one area, an existing drainage way located at the north end of the segment. The road alignment itself, during several heavy rain storms, held up with only minimal soil loss.

B. Water.

The present water supply is discussed in the EIS on pages 2-47 and 2-50. A portion of this is in error. Potable water is no longer piped to Makena from the Kula system, rather, it is supplied by a small and inadequate extension from the Central Maui Water Transmission System. Additional discussion of supply and usage will be included in Section 4 of the Revised EIS.

B. Long-term Impacts

Archaeologic and historic sites within the proposed roadway alignment are not of sufficient importance to warrant relocation and restoration. The sites have been mapped and/or salvaged and will therefore be demolished upon construction of the roadway. Archaeologic and historic sites which are adjacent to the proposed alignment will be protected by provisions in the construction specifications. The sites adjacent to the road will be flagged and protected from impact. Please refer to the response to item II.A.2.

Mr. Doak C. Cox, Director
Environmental Center
University of Hawaii at Manoa
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822
Attention: 0338

Dear Mr. Cox:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments:

I. INTRODUCTION

Additional secondary impacts will be addressed in the Revised EIS.

II. PRIMARY IMPACTS

A. Short-term Impacts

2. Drainage.

After finalization of construction plans, prior to approval by the County, the plans will be reviewed with regard to drainage impacts on archaeological sites.

6. Marine Ecosystem

Calculations in Section 4, Part II.A., of the EIS were based on the Soil Erosion Standards and Guidelines, Department of Public Works, City



University of Hawaii at Manoa

Department of Anthropology
Ponics Hall 346 • 2424 Mālie Way
Honolulu, Hawaii 96822

19 November 1981

Dr. Jacquelin Miller
Environmental Center
University of Hawaii-Manoa
Crawford Hall 317
2550 Campus Road
Honolulu, Hawaii 96822

SUBJECT: Environmental Impact Statement, Makana Road, Maui

Dear Dr. Miller:

This letter is to follow up our conversation of 6 November regarding archaeological resources along the proposed road corridor at Makana, Maui. It may not be possible to incorporate these more detailed comments into your written review of the above EIS at this time. However, in my opinion they should be made a matter of record. I am therefore also submitting my comments to the State Historic Preservation Office and to the Maui County Department of Public Works.

To begin with, relocating a section of the proposed road alignment (Alternate C, 1980) farther inland combined with archaeological excavation of cultural features remaining within the impact area (EIS, Appendix B) has substantially reduced negative effects on the prehistoric Palaua Settlement Complex. The proposed action (EIS, pp. 4, 20-4, 27) regarding Sites 241 and 242 also seems appropriate given the nature of these remains. And further, citing the need for detailed survey and archaeological testing of Sites 249-259 along the southern end of the proposed alignment is a point well taken.

But I cannot concur with statements in the EIS regarding Site 248 or Site 261. Nor can I agree with assessments, implied by omission, of Sites 239, 244, 246, 260, 262, and 1761. Moreover, I am most concerned with the apparent incompleteness of the "supporting documents" attached to the EIS (Appendix C - Archaeological and Historical Sites). Specifically...

1. From two major reconnaissance reports (Davis and Borden June 1977 and November 1977) the information provided in the appendix is limited primarily to descriptions of the archaeological remains. Recommendations offered by the archaeologists are not fully presented, and discussions of interpretation and significance are deleted entirely. Relevant information for interpretation and be affected may be excerpted for inclusion in the main text of the EIS, but the consultants' reports which are appended as supporting documentation should be presented in their entirety. Indeed, in my experience this has generally been the rule with such agencies as the US Army Corps of Engineers or the

Jacquelin Miller, Environmental Center
EIS, Makana Road, Maui - Review
19 November 1981

-2-

State Department of Planning and Economic Development. To offer only abbreviated versions of the original consultants' reports leaves subsequent reviewers questioning on what basis stated (or implied) mitigative actions were determined.

2. Regarding Site 248: "These are historic features associated with cattle ranching; thus, no recommendations for further work are offered" (EIS, p. 4, 21).

This statement is true in part; however, the Davis and Borden report also noted that other features of archaeological interest were located along the proposed road corridor in this area (EIS, pp. 0.12-0.13). At the time of the reconnaissance the center line of the road had not been surveyed making it impossible to determine which of the many features in the 248 complex would be affected. Furthermore, the fieldwork was a reconnaissance level survey mainly to determine presence or absence of archaeological remains in or near the project area. Information for assessing potential significance of individual features within the complex is therefore limited. Because of these limitations, to recommend that further archaeological work is not needed on the assumption that all of the features in Site 248 are associated with cattle ranching is unacceptable.

3. Regarding Site 261: "The portion of Site 261 to be impacted... consists of a single historic cattle wall without other contributing features. It is thus recommended that no further archaeological work need be done for this feature. However, great care should be taken during construction... as potentially significant archaeological features exist both south and east of this feature" (EIS, p. 4, 21).

The archaeological site locator maps provided in the EIS (pp. 2, 38 and C.15) are not very clear, but the proposed Alternate Alignment C appears to follow the 120-140 foot contours. This places the roadway through the middle of Site 261 on rather steep ground; average slope approximately 18 percent. The road will be 60 feet wide including graded shoulders when completed, but how much wider the impact zone may be because of the sloping terrain is not stated. As such, I can only anticipate that the three or four archaeological features immediately adjacent to the corridor will be adversely impacted by construction.

4. The situation discussed above regarding Site 261 is still, if not more accentuated, at Site 260. This large enclosure-platform sits at the end of a narrow steeply sloping ridge; average slope approximately 30 percent. According to the maps in the EIS, the roadway will likely pass through or immediately up hill of the site. Either way, it must be expected that the wider impact zone will include this site; yet this contingency is not addressed in the EIS.

5. Although the situation regarding Sites 239 and 246 may not be quite as serious as that discussed above, reliable determination cannot be made on the basis of the maps provided in the EIS. However, in my opinion, adverse effects appear inevitable at Sites 244, 262 and 1761. At the time of the reconnaissance survey the south end of Alternate Alignment C passed between Sites 244 and 262. These two sites are only about 100 feet apart. It is therefore rather unlikely

AN EQUAL OPPORTUNITY EMPLOYER

Jacquelin Miller, Environmental Center
EIS, Makena Road, Maui - Review
19 November 1981

-3-

that a 60-foot wide roadway could be constructed between these two sites without disturbing them. If, on the other hand, the alignment passes to the inland of Site 262, as shown in the archaeological map in the EIS, then the roadway will very likely pass through Site 1361. Again, the main problem is with the clarity of the maps. In this case there is an obvious error since the map shows Site 262 as being located directly north of Sites 239 and 244 when in fact it is located to the east of Site 244.

In light of the preceding comments, I submit that the archaeological sections of the EIS are ambiguous, incomplete, and therefore unacceptable in their present form. As such, I offer two possible alternatives for consideration at this time.

1. Immediate salvage excavation of the archaeological sites discussed in this review. If this option is selected, all archaeological fieldwork should be completed prior to construction of the road.
2. Rather than immediate salvage excavations, further planning may be effective. In this case, final recommendations should be deferred until the engineering has been completed and the construction plans are available for evaluation. Only at that time can it be adequately determined whether avoidance of the archaeological sites is a feasible approach for mitigating adverse impacts.

Thank you for this opportunity to review the Makena Road EIS. If there are any questions regarding these comments or any other aspects regarding cultural resources in the project area, please do not hesitate to contact me.

Sincerely,

Bertell D. Davis

Bertell D. Davis
Archaeologist

cc: State Historic Preservation Office
Maui County Department of Public Works

HANNIBAL ZAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MAISLOU, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
288 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

January 22, 1982

Mr. Bertell D. Davis
Department of Anthropology
University of Hawaii
Porteus Hall 346
2424 Maile Way
Honolulu, Hawaii 96822

Dear Mr. Davis:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

1. The length of the archaeological reports precludes including them in their entirety.
2. Subsequent to the archaeological work conducted for the proposed road, further work was undertaken by Bishop Museum for Seibu Hawaii, Inc. This work encompassed the area containing Site 248 and resulted in recommendations for preserving two sites: BH78-208 and BH78-217 (Cordy, Ross, November, 1978. Archaeological Survey and Excavations at Makena, Maui. Third Increment, Seibu Golf Course. Bernice P. Bishop Museum.) Based on preliminary engineering plans, the first of these two sites will not be impacted by the proposed road. The second may be impacted, however, minor changes can be made in the roadway alignment to avoid damage to the site. Every effort will be made to avoid impact to these two sites.

DIVISIONS
Engineering
Public Construction
and Maintenance
Land Use and
Civic Improvement
Waste Management

Mr. Davis

-2-

Jan. 22, 1982

3. The proposed road will cross Site 261 at about the 128-134 foot contours, based on preliminary engineering plans. As stated on page 4-16 of the EIS, a maximum 100-foot wide corridor will be grubbed along the road. In the vicinity of Site 261 the corridor will be 75-feet, however, and will pass through a single historic cattle wall. No other features will be impacted. Adjacent features will be flagged.

4. The proposed roadway will pass about 90 feet up-hill of Site 260, with the area off impact about 75-80 feet from the site. Site 260 will not be impacted by construction, nor is it anticipated that it will be impacted by runoff.

5. The proposed road will pass makai of Site 239 and between Sites 244 and 1362, according to preliminary engineering plans. Corners of Sites 239 and 244 may be impacted, as may the mauka wall of Site 1362. If impact to these sites cannot be avoided, they will be mapped and/or salvaged. Neither Sites 262, 1361, nor 246 will be impacted, each being 40 feet or more from the zone of impact. You are correct in stating that Site 262 is east of Site 244, and the maps will be corrected.

In regard to your recommendations, we offer the following response:

1. Any further salvage work will be conducted prior to construction of the road.
2. Any further salvage work will take place upon completion of the engineering and construction plans for the road.

Sincerely,

RALPH HAYASHI
Director

AU:cc

Mayor Hannibal Tavares - 2 - October 20, 1981

Also the second paragraph needs correction since Kihei water is supplied from both Mokuhanu and Waiehu Wells via 36-, 30- and 18-inch transmission lines.

Sincerely,

William S. Haines
William S. Haines, Director
Department of Water Supply

WSH/ao
cc: Ralph Hayashi, Director, Department of Public Works

RECEIVED
OCT 23 3 54 PM '81
OFFICE OF THE MAYOR



DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P. O. BOX 1109
WAILUKU, MAUI, HAWAII 96793

October 20, 1981

Mayor Hannibal Tavares
County of Maui
200 South High Street
Wailuku, HI 96793

Dear Mayor Tavares:

Subject: Environmental Impact Statement - Makena Road

My staff has reviewed the subject Environmental Impact Statement received from the Environmental Quality Commission for our comments by transmittal dated October 5, 1981. We have only the following recommended corrections:

Page 1-1, I. Introduction: The third objective states that construction of the road will provide an "easement" for the extension of the Central Maui Water Transmission. Technically, an easement will not be required, provided that the road right-of-way will belong to the county. Therefore, it is suggested that objective 3 be reworded as follows:

"to provide a location for the extension of the Central Maui Water Transmission System within the road right-of-way."

Page 2-47, VI. Infrastructure: The first paragraph should be revised since Makena is no longer being supplied from the Kula System. Instead it is supplied by a small and inadequate extension from the Central Maui System.

"B. Water All State Fund Act"

HANIMBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
Census Enforcement
Waste Management

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
388 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793
November 16, 1981

Mr. William Haines, Director
Department of Water Supply
County of Maui
Post Office Box 1109ng and
Wailuku, Maui, Hawaii 96793

Dear Mr. Haines:

SUBJECT: HAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and have the following response to the recommended corrections:

Page 1-1 We concur with this comment and will revise the EIS accordingly.

Page 2-47, We concur with this comment and will revise the EIS accordingly.

Sincerely,

A. Matsuo
RALPH HAYASHI
Director

:cc

MAUI PLANNING COMMISSION
Ralph Taylor, Chairman
Mary Caherty, Vice Chairman
Marilyn Chong
Marilyn Chong
Stanley Chong
Linda Wheeler
Wesley Wang
Ralph Taylor, Esq. Clerk
William Huhua, Esq. Clerk



COUNTY OF MAUI
PLANNING DEPARTMENT
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793
November 5, 1981

Honorable Hannibal Tavares
Mayor
County of Maui
Wailuku, Maui 96793
Dear Mayor Tavares:

Re: Environmental Impact Statement (E.I.S.) for Makena Road
Road
We have reviewed said E.I.S. for Makena Road and have the following comments:

A. County General Plan. The existing Kihei General Plan Map delineates the alignment of Makena Road along the existing right-of-way except for the area through the Seibu development which has been realigned. The proposed Alignment "C" follows the existing general plan except for the area between Wailea Resort Phase I and the beginning of the Seibu development.

In addition the Maalaea-Kihei-Makena Citizens Advisory Committee for the County-Wide Community Plan Study favored Alignment "C" provided, however, that the existing Makena Road Right-Of-Way remains a through road.

B. Environmental Impacts.

1. Drainage. The E.I.S. states that "no major long-term impacts are anticipated" on the adjacent and downstream properties. However, based on the information presented we are unable to determine whether the existing natural drainage system is adequate to accommodate the intensified flows resulting from Realignment "C".
2. Archaeological/Historic Sites. The E.I.S. indicates that two (2) features of Site/Complex 1028 would be eliminated by proposed Alignment "C". Although salvage excavations have been conducted at both features, a conclusive determination has not been made as to the importance of the features and whether they should be preserved, relocated or allowed to be eliminated. Further clarification should be made as to the archaeological/historic importance of the features and the specific action that should be taken.

HANNIBAL TAVARES
Mayor
TOSHIEHAWA
Planning Director
CHRISTOPHER L. HART
Deputy Planning Director

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Nov 6 9 18 AM '81
OFFICE OF THE MAYOR

Letter - Mayor Tavares
Re: Makena Road E.I.S.
November 5, 1981
Page 2

Furthermore, for additional reference and clarification, the original survey data done in 1977 and 1980 should be included as part of the E.I.S. Document.

Relative to Sites 249-259, it is felt that sufficient data has not been collected to determine the archaeological/historic importance of these sites. Therefore, prior to the final selection of the proposed realignment route between Puu Olai and Cape Kinau an evaluation and determination should be completed.

3. Social. The E.I.S. indicates that the proposed alignment will not impact the existing residents in terms of land acquisition, however, the report does not evaluate the impacts that will occur should there be increased development in the Makena area resulting from the implementation of the proposed alignment.

4. Shoreline Resources. The E.I.S. states that "the proposed project may stimulate increased use" of the shoreline recreational resources. The report should address the fact that the County of Maui and the State of Hawaii have shoreline recreation plans to ensure continued public access as well as safe expanded use of the shoreline recreational resources by a broader cross section of Maui residents and visitors.

Thank you for the opportunity to review and comment on the Makena Road Environmental Impact Statement. If further clarification is required please contact Ms. Colleen Taguchi of this office.

Very truly yours,
TOSHIEHAWA
Planning Director

ct:CT

cc: Ralph Hayashi, Public Works Director
Chris Hart, Deputy Planning Director
Colleen Taguchi, Planner

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

DIVISIONS
Engineering
Highways Construction
and Maintenance
Land Use and
Coastal Management
Waste Management

Mr. Ishikawa

-2-

Jan. 22, 1982

January 22, 1982

Mr. Toshio Ishikawa
Planning Director
Planning Department
County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793

Dear Mr. Ishikawa:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

A. We concur with the first comment, as discussed on page 1-5 of the EIS.

The scope of this project includes neither the closing of the existing road nor improvements along the full length of the existing Makena Road. The proposed road would connect to the existing road in five locations, and any future alteration to the existing road would be a separate question.

B.1. The roadway was designed with the intent of no diversion or intensification of flow. Thus, the natural drainage system will not be sustaining flows significantly greater than at present.

2. Since only the very mauka margin of Complex 1028 will be impacted and since this impact has been mitigated by salvage, it was determined that the features should be allowed to be eliminated.

Where it is recommended that no further work is necessary (pp. 4-20 to 4-22), it was implied that the features were not of significant importance and would be allowed to be eliminated. This will be clarified in the Revised EIS.

The bulk of the original survey data conducted in 1977 and 1980 is included in the EIS in Appendices C and D, and recommendations are included in Sections 4 and 6.

We concur with your last comment (Sites 249-259) and, as stated on p. 4-23, further investigations and mitigative measures will be conducted.

3. Secondary social impacts will be addressed in the Revised EIS.

4. We concur with this comment and will incorporate the suggested information into the Revised EIS, to supplement the discussion presented on pp. 2-36, 2-58, and 4-27.

Sincerely,

RALPH HAYASHI
Director

AU:cc

RECEIVED
NOV 9 11 00 AM '81
MAIL ROOM 56193

Hahana Road (Haul)

November 6, 1981

Office of Environmental Quality Control
550 Mahanuihi Street
Honolulu, Hawaii 96813

Dear Sir:

Subject: Hahana Road EIS

We have reviewed the subject EIS with particular attention to those portions addressing air quality impact, and our detailed comments are attached. Thank you for providing a copy of the EIS for our review.

Sincerely yours,

James H. Harris

James H. Harris
Director
Environmental Health

JHH:jh
CZ/140
Enc.

cc: Dept. of Public Works, Haul

11/6/81

1. Page 2-7: The wind rose presented covers only a portion of one year, i.e., Aug-Dec 59. This is a rather limited data base on which to make decisions concerning probabilities of wind directions/forces and pollutant concentrations. We have enclosed a compilation of wind data for a 2-year period (Jan 73 - Dec 74) from a civil station at Kawaiaupu Beach in order to expand that data base.
2. Pages 2-16 - 2-18: Additional air quality data for the south side of Haul are being collected by the Haul Electric Company (HECO) in the vicinity of their Waialae facility. This data should be available through the State Department of Health.
3. Pages 4-6 - 4-7: No mention was made of the increased emissions resulting from traffic delays caused by construction vehicle movement on the existing roads.
4. Page 4-19: The EIA analysis procedure cited was not the procedure cited in Appendix E where the actual analysis was described. It appears that the older, superceded procedure was used.
5. Appendix E:
 - a. As noted above, the cited source is different than the source cited in Section 4. of the EIS.
 - b. The INTRODUCTION describes the method in the older source suggesting that the superceded method was in fact used.
 - c. The section titled "CALCULATION OF CALIBRATION (OR) CALCULATIONS" does not show any calculations nor any input data so that a reviewer could adequately review the work. Only results are reported.
 - d. The intersections numbered 1 thru 5 are not associated with actual intersection, and there is no figure showing the actual positions of the receptor locations.
 - e. No traffic volumes or directional splits are indicated.

Makena Road (Haui)
 11/6/81
 Page 2

STATION
 No. 1110

WIND DATA
 MAJORITY: 28793

Station: Keaukapu Beach, Haui (civil station)
 Time of Observations: 0750, 1350, 1950 LST
 Period of Record: January, 1973 - December 1974

DATA EVALUATION

Number of observations (0750): 675
 Number of observations (1350): 641
 Number of observations (1950): 572

The data was assigned direction according to the following convention:

N - 350, 360, 010°	S - 170, 180, 190°
NE - 020 - 070°	SW - 200 - 250°
E - 080, 090, 100°	W - 260, 270, 280°
SE - 110 - 160°	NW - 290 - 340°

- e. If, as it appears, the suppressed method was used, then the CO estimates would be significantly underestimated because the motor vehicle emission factors have increased significantly since 1975 as a result of field testing of in-use vehicles over the past 6 years.
- f. The comment that "The allotment of 12% trucks, however, should adequately account for visitor touring buses" is incorrect since the 12% trucks referred to in the EPA publication are all light-duty trucks and virtually all gasoline-powered, while the tour buses are virtually all heavy-duty diesel-powered vehicles with different emission characteristics.
- g. No attempt was made to determine the probability or frequency of occurrence of meteorological conditions capable of producing the maximum CO concentrations reported.
- h. The 1978 vehicle registration data for Oahu which comprise about 74% of all registered vehicles in the State, indicate that Hawaii has a slightly older age distribution than the national average and thus has higher average emission rates.
- i. Because of the relative stringency of the 8-hour standard (5 mg/m³), it is this standard rather than the 1-hour standard which is often most likely to be exceeded. As noted in the file (p. B-5), "traffic in such an area should be more intense out throughout the day..." An analysis of maximum 8-hour concentrations would have been indicated.

JH/MS
 C/779

Keawakapu Beach, Maui
Jan 73 - Dec 74

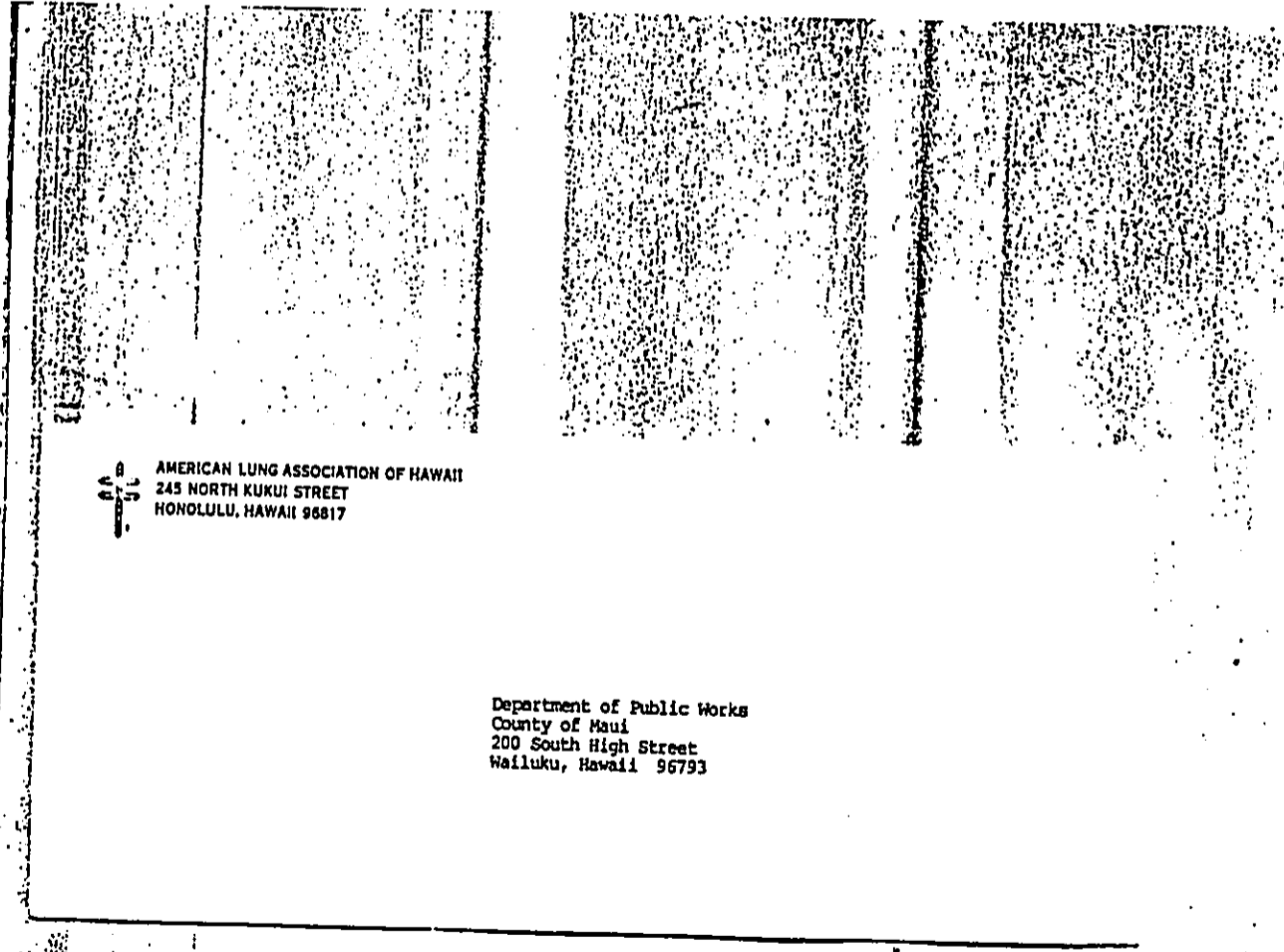
ANNUAL WIND ROSE

Frequency Distribution

Speed (knots)

Direction	0 - 3	4 - 7	8 - 12	13 - 18	19 - 24	>24	All Speeds
N	0.0000	0.0323	0.0085	0.0074	0.0011	0.0000	0.0493
NE	0.0000	0.0461	0.0079	0.0011	0.0000	0.0000	0.0551
E	0.0000	0.0069	0.0005	0.0000	0.0000	0.0000	0.0074
SE	0.0000	0.0429	0.0032	0.0011	0.0005	0.0000	0.0477
S	0.0000	0.0403	0.0318	0.0090	0.0032	0.0000	0.0843
SW	0.0005	0.0646	0.0392	0.0106	0.0011	0.0000	0.1160
W	0.0000	0.0392	0.0254	0.0016	0.0000	0.0000	0.0662
NW	0.0969	0.0784	0.0477	0.0440	0.0106	0.0000	0.2776
All directions:	0.0974	0.3507	0.1642	0.0748	0.0165	0.0000	0.7036

Frequency of calms distributed above = 0.2966



AMERICAN LUNG ASSOCIATION OF HAWAII
245 NORTH KUKUI STREET
HONOLULU, HAWAII 96817

Department of Public Works
County of Maui
200 South High Street
Wailuku, Hawaii 96793

MANNHEAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
268 SOUTH HIGH STREET
WAILUKU MAUI, HAWAII 96793

January 22, 1982

Mr. James W. Morrow
Director
Environmental Health
American Lung Association
of Hawaii
245 North Kukui Street
Honolulu, Hawaii 96817

Dear Mr. Morrow:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

1. and
2. Thank you for information provided in your letter regarding wind data from Keaukapu Beach, Maui and MECO. We will take the data into consideration. However, we feel the calculations have incorporated the "worst case" conditions, i.e., less than one meter per second going parallel to the roadway. For this reason, we feel that the calculations reflect conservative estimates of one hour CO concentrations. Because much of the roadway is a new alignment, little disruption is anticipated to the existing traffic flow. The only construction that will effect existing roadways will be at intersecting points to the existing roadway. Adequate detouring and traffic direction should not significantly interrupt free-flow traffic along the roadway.
- 3.

DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
Cemetary Enclosures
Waste Management

Mr. Morrow

-2-

Jan. 22, 1982

4. The new EPA analysis procedure cited in Section 4 (page 4-19) was obtained just prior to the printing of the EIS. It was hoped that there would be enough time to insert new data into the EIS, based on this procedure. However, there was not. As you correctly surmise, the data from the older procedure was retained and the reference on page 4-19 is incorrect. The correct reference is given in Appendix E, on page E-1.

5.a. & b. Refer to response to #4.

5.c. Calculations may be obtained from EISC for your review.

5.d. Figures will be incorporated to show the actual positions of the receptor locations.

5.e. Traffic volumes and directional movements will be indicated on the figures.

5.f. The "built-in" 1975 emission correction factors were used in the calculations, not those adjusted for 1990. Thus, the CO projections are actually very conservative.

5.g. The statement, "the allotment of 124 trucks, however, should adequately account for visitor touring buses" was intended to include a conservative estimate for touring buses because such are diesel-powered, and would therefore have lower CO emissions than gas-powered trucks. In addition, very few buses are actually anticipated for this area (approximately 2% of traffic volume).

5.h. At each of the intersections, the "worst case" receptor is located on the northwest corner. Therefore, winds coming from the southeast would result in maximum CO concentrations at these receptors. Based on the frequency distribution of wind at Keaukapu Beach, wind from the southeast may be expected approximately 5% of the time. Thus, "worst case" conditions may be expected relatively infrequently.

Mr. Morrow

-3-

Jan. 22, 1982

5.i.

Although the State of Hawaii may show a slightly older age distribution of registered vehicles compared to the national average, it is not felt that this average is comparable to what will be represented for the project area. Because this area will eventually primarily be a resort and visitor oriented area, most of the vehicles are expected to be late model compact rental vehicles. For this reason, it is expected that the overall emission rate due to such vehicular distribution is expected to be even lower than calculated.

5.j.

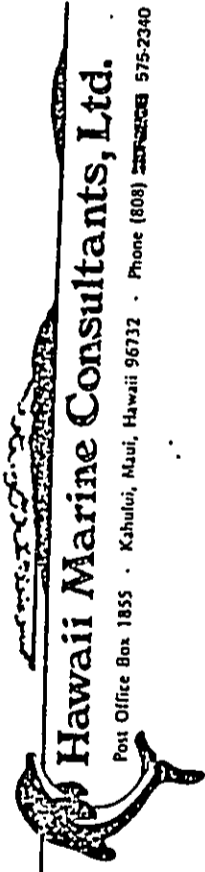
An analysis of maximum 8-hour concentrations will be included in the REIS.

Sincerely,

R. Hayashi
RALPH HAYASHI
Director

AU:CC

12-44



Hawaii Marine Consultants, Ltd.

Post Office Box 1855 · Kihului, Maui, Hawaii 96732 · Phone (808) 575-2340

The Honorable Hannibal Tavares
Page Two
October 22, 1981

and Page 1-10 lists Increment I as running "from sharp curve in Wailea Alanui Drive to the Seibu Development". Who benefits from that? The people of the County of Maui? No, Seibu does, and not only that--the people of the County of Maui are being asked to pay part of the construction cost of Increment I.

2. Private landowners should finance all of the construction of any improvement which is primarily designed for their benefit.

3. Page S-4 lists many long-term primary impacts, none of which is the loss of access to a significant portion of the public beaches now accessible to the people of Maui. That is a primary long-term impact and it must be dealt with in the plan.

4. To add insult to omission, the EIS goes on to state that one of the secondary impacts is the possible stimulation of "increased use of the shoreline recreational resources." Fact does not support that claim. Kaanapali and Wailea are good examples of the decline in public use of beaches which are primarily resort-oriented by the people who once used them. Again, the report seems to totally ignore the fact that the present form of public use will be destroyed by eliminating complete access by campers and fishermen. If there is evidence that a new user group will be stimulated into increased use of the resource, that evidence is not presented in the EIS:

5. In a final blow to honesty and good sense, the EIS Summary pages end with the preposterous claim that the new road will actually "improve access to the beaches." The argument could be fairly made that the proposed roadway, with appropriate beach access rights-of-way, would improve access to some of the beaches, but to say flatly "improving access to the beaches" is to couch the statement in dishonesty.

6. Page 2-37 begins the listing of the "socioeconomic characteristics" of the area in question. It fails to discuss those characteristics with regard to beach use in the area. This is a major omission, especially considering the fact that on Page 2-56 under the subhead, "Parks," there is the statement "[R]ecreation areas in Kihei-Makena are centered at the beaches." The beaches in the area are therefore a major socio-economic factor:

7. Page 3-15 reminds the reader (and should have reminded the writer) that State policy under the Coastal Zone Management program "shall be the maintenance, restoration and enhancement of the overall quality of the coastal zone environment,

October 22, 1981

The Honorable Hannibal Tavares
Mayor, County of Maui
County Office Building
200 S. High Street
Wailuku, Hawaii 96793

Dear Mayor Tavares:

I have had an opportunity to review the recently released Environmental Impact Statement for Makena Road and would like to make a number of comments relative to its content, viability and conclusions.

To start with, I'd like to offer some general comments about the EIS as a whole. My later comments will deal with specific weaknesses of the work.

First off, the EIS attempts to cover up the well-documented fact that the proposed new Makena Road is something that Seibu needs to further their development plans. The report seems to imply that the County of Maui sees some great need for this road, solely and completely to meet the needs of the present population of the area and the County. Nothing could be further from the truth! Seibu wants and needs the road and it is being proposed by the County to meet that need.

Secondly, the report totally ignores the fact that the new road will eliminate public access to vast stretches of the coastline presently accessible via the present road. This is a major impact of the proposed new road and it is virtually ignored in the EIS, despite its substantial socio-economic impact.

Specifically, I would point out the following:

1. Page S-1 lists the objectives of the project but leaves out the certain objective of providing access to the Seibu development. Let's call a spade a spade! Page S-2 indicates the proposed project is planned for construction in three increments

including but not limited to, its amenities and aesthetic values, and to provide adequate public access to publicly owned or used beaches, recreation areas and natural reserves." The new road may provide greater public access to some beaches but the report does not promise when or how. At the same time, it is readily apparent that the new road will limit public access to a number of beaches and recreation areas presently in use, in direct violation of State policy within the Special Management Area.

8. Page 4-1 attempts to make light of the secondary impacts and closes by saying that they will only be briefly discussed. The secondary impacts of the construction of Hakana Road are vast, important and must be discussed in detail for the EIS to be viable.

9. Page 4-6 discusses drainage and maintains that there will be no major impact or drainage problem during construction. The fact that there could be a major drainage problem during winter construction, causing tremendous run-off into the ocean and consequent major environmental impact, is totally ignored in this part of the EIS.

10. Page 4-11 makes the statement that "[p]ossible damage on the marine ecosystem from fresh water discharges and sedimentation is not anticipated to be significant." A proper EIS would anticipate potential damage to that ecosystem and move to mitigate it completely. This statement is one of those that in and of itself virtually invalidates the entire report as a proper Environmental Impact Statement.

11. On Page 4-20, the prematurely dismissed short-term impacts on the marine ecosystem are then used to eliminate any need for discussion of long-term primary impacts. There are numerous potential long-term primary impacts which can be anticipated as a result of the construction of the proposed Hakana Road. They must be considered, included and listed before this report can be considered complete and proper, or the road can be constructed.

12. On page 4-23, the authors of the EIS once again eliminate any need for discussion of the significant long-term primary impacts on the social characteristics of the area by saying none are anticipated. There are numerous social impacts that are clearly present in any closing off of well-used, well-loved, public shoreline recreation areas. These primary impacts must be noted and dealt with, or the EIS is incomplete and inadequate.

13. Page 4-26 makes light of the secondary environmental impacts by calling them "minor." The elimination of access to shoreline recreation areas is not "minor," nor is the impact of the [unsubstantiated] increased use of the resources continually projected by the EIS. These are major impacts that must be detailed and elaborated upon:

14. The discussion of alternatives to the Seibu Road plan proposed by the authors of the EIS is laughable in its attempts to negate those alternatives. Page 6-6, which lists the reasons that upgrading of the present road should be rejected as a viable alternative uses many of the same arguments used to support the proposed new road as reasons that the existing road cannot be upgraded. Further, the many positive environmental, socio-economic and immediate access reasons for upgrading the present road are not discussed at all. It is plain that the author of the EIS is attempting to discount a viable alternative (probably a better alternative) than the construction of the proposed new road, and that is the upgrading of the present coastal highway.

15. Page 7-1 slips into unsupported conclusions once again with two half-truths: First, "and will improve access to the beaches," which is totally unsubstantiated, and distorting of the fact that the new road will eliminate access to many beaches; and second, "the alignment chosen will have the least impact on archaeological sites." Not so. Upgrading the present road would have the least impact on archaeological sites.

16. A point must be made that the significant archaeological finds in the area of the proposed road indicate a strong history of fishing in the area, and yet, nowhere in the EIS are the possible impacts on today's fishing lifestyle on all the presently accessible beaches mentioned or discussed.

17. Last but not least, the offshore survey used to determine the "limited environmental impact on surrounding waters" is grossly inadequate for that kind of a determination. Standard offshore survey techniques with some modification were used on two days--over five years ago! That extremely limited analysis is used to determine that there will be little or no long or short-term impact on the offshore waters as a result of the development of a 3.6 mile long, 60 feet wide swath across a coastal environment. On the face of it, that determination is absurd. The report deals at length with the

The Honorable Hannibal Tavares
Page Five
October 22, 1981

variety of mollusks found in the midden of the various archaeological sites, and yet, makes no attempt to determine the potential impact on those same species by potentially heavy siltation and run-off caused by both construction and by the completion of the proposed road.

To serve the purpose for which it is intended, the Environmental Impact Statement for Makana Road must be thoroughly reviewed, amended, corrected and rewritten. In its present form, it is grossly inadequate and is a real injustice to the people of the County of Maui. I would urge you to return the document to its authors and request a complete revision dealing with those inadequacies, inconsistencies and distortions which I have listed here.

One further note: It is distressing to be forced into a position of having to review documents of this kind which are obviously written to meet a certain point of view, goal and purpose, with wanton disregard for the interests of the community as a whole. Further, the consultant is well-paid and given years to prepare these documents, and those of us with the time and inclination to review them are forced to drop whatever we are doing and digest and report back on them in a matter of days.

I look forward to your complete review and rejection of the EIS for Makana Road and some attempt by the County of Maui to meet the best interests of the community regarding access to the Makana area.

Sincerely yours,

[Signature]
CAPTAIN RICK GAFFNEY

RG:smf
CC: The Honolulu Advertiser (Maui Bureau)
The Maui News
Maui County Council

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL KATSUDO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
388 SOUTH HIGHWAY STREET
WAILUKU, MAUI, HAWAII 96793

January 22, 1982

Captain Rick Gaffney
Hawaii Marine Consultants, Ltd.
Post Office Box 1855
Kahului, Maui, Hawaii 96732

Dear Captain Gaffney:

SUBJECT: HAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and have the following response to your comments.

Your general comment that, "the EIS attempts to cover up the well documented fact that the proposed new Makana Road is something that Seibu needs to further their development plans," is incorrect. The Seibu development is not dependent on the proposed Makana Road project. Furthermore, the road and the Seibu development are two separate issues and the impact statement primarily deals specifically with the road.

Your second general comment on the elimination of public access to vast stretches of the coastlines is also invalid. Providing public access to the beaches has been and will continue to be, implemented by the County.

The following responses are provided to your specific comments:

If the Ahiki-Kinou Natural Area Reserve is interpreted for its natural values and the historic sites around La Perouse are interpreted for their cultural values, then visitors may also be expected to go there. Beyond La Perouse, however, it is expected that residents will be the primary users. The visitors will probably be those who are staying in Kihei-Maalea, since visitors tend to stay near facilities provided by the resort. The residents, on the other hand, will probably come from as much as an hour to hour-and-a-half drive inland, originating mainly in the Kula-Makawao, Wailuku, Kahului, Paia, Kihei areas."

We agree that the proposed project will provide access to the Seibu development, other developments in the area, and residents of the area (permanent or temporary). Listing each and every one of these developments or residents, serves no useful purpose.

Construction of the entire road length is desirable, but due to cost constraints, the road construction must be phased. It is a general practice to start construction from the end connecting to a major existing road and continuing onward as is proposed in Phase I. It serves no useful purpose to start from Phase III and work backwards toward Phase I.

As for County funds being partially used for the construction of the road, this is a policy decision made by elected officials. At the present time, there are no public funds appropriated for this project. Also, please refer to our response to Comment Number 2.

As stated on page 1-9 of the EIS, financing of Increment I will be by private financing, including Seibu Hawaii, Inc. Our policy is, in general, in agreement with you; that private land owners should finance the construction of segments which are directly beneficial to the land owners.

Your comment that access to a significant portion of the public beaches will be lost is not true. The County and State have shoreline recreation plans to ensure continued public access to the shoreline recreational resources. In addition, the scope of this project does not include the closing of the existing road.

Please refer to response number 3 above. In addition, the recreational plans for the shoreline resources envision the continued and expanded use of these resources by a broader cross-section of Maui residents as well as visitors. For example, the Makana-La Perouse State Park Plan Supplement, indicates that Big Beach and Little Beach will attract visitors as well as residents.

1. Please refer to response number 3, above.
2. According to the State Comprehensive Outdoor Recreation Plan (SCORP), there are five beach parks in Kihei. They total some 55 acres, of which 15.14 acres consist of beaches. These beaches were deemed adequate by SCORP to meet the swimming and sunbathing needs of the area until at least 1990. Subsequent to the SCORP publication, five more parks were added in the Wailea development and dedicated to the County. In addition, there are two existing parks in the Makana area - Puu Oia State Park (26.9 acres) and Ahiki-Kinou NAR (2,000 acres). Seibu Hawaii, Inc. proposes to develop two more beach parks, one at Makana Landing and one north of Maluaka Point.
3. The scope of this project includes neither the closing of the existing road nor improvements along the full length of the existing road. The proposed road would connect to the existing road in five locations, and any future alteration of the existing road would be a separate question.
4. Additional secondary impacts will be addressed in the Revised EIS.
5. Calculations in Section 4, Part II.A., of the EIS were based on the Soil Erosion Standards and Guidelines, Department of Public Works, City and County of Honolulu, November, 1975. These are the current guidelines used to determine whether additional erosion control will be required.

Capt. Gaffney

-4-

Jan. 22, 1982

Since the Severity Rating Number, H, for each of the segments of the road is well below the standard Severity Rating Number of 50,000, the severity of soil loss has been determined to be minimal in relation to the standard. Grassing will be the primary temporary and permanent erosion control measure.

Construction of the portion of Makena Road in Seibu's property experienced soil erosion problems in only one area, an existing drainage way located at the north end of the segment. The road alignment itself, during several heavy rain storms, held up with only minimal soil loss.

10. Based on the information presented in response Number 9, sedimentation is not anticipated to be significant.

11. Long-term primary impacts on the marine ecosystem, such as those resulting from run-off and sedimentation, are not anticipated to be significant because they would be less than the short-term impacts.

12. Please refer to response Number 7, above.

13. Additional secondary impacts will be addressed in the Revised EIS.

14. To make the existing road into a major secondary road would result in higher costs and would impact several landowners. It could be developed to lesser standards (with a lower speed limit), but such a road would not meet the objectives of this project.

15. Based on existing archaeological studies, several sites along the existing road would be impacted if this road were upgraded. Further studies along the full length of the road might well reveal additional sites which would be impacted by widening the alignment. The known sites which most likely would be impacted will be addressed in the Revised EIS.

Capt. Gaffney

-5-

Jan. 22, 1982

16. The proposed project is not anticipated to directly effect "today's fishing lifestyle." Please refer to response Number 7, above. Indirect (secondary) impacts will be addressed in the Revised EIS.

17. Please refer to response Number 9, above. As you noted, the marine survey techniques used were "standard offshore survey techniques," and are considered acceptable.

Sincerely,



RALPH HAYASHI
Director

AU:cc

Attachments

RECEIVED

NOV 6 2 29 PM '81

MAUI GROUP - HAWAII CHAPTER
SIERRA CLUB
P. O. Box 416
Maui, Maui, Hawaii 96708

OFFICE OF THE PLANNING

November 5, 1981
Comments on Draft Environmental Impact Statement, Maikona Road, Maui.

-Summary of most significant deficiencies:

1. The study fails to acknowledge that the road is being realigned and improved to facilitate resort development along the shoreline. It minimizes or ignores the effects of downstream storm runoff resulting from consolidation and channelization of drainways.
2. It implies that natural shoreline barriers and ponding areas will remain undisturbed by intensive shoreline development.
3. Conclusions drawn from 2 and 3 above are then used to support the further conclusion that there will be no significant effects from sedimentation on the near-shore marine ecosystems.
4. Although admitting that further archaeological studies are needed to determine and mitigate effects on sites located within a portion of the study area, release of the incomplete impact statement at this time indicates that a blank check is to be signed, accepting the studies and their conclusions before the fact.
5. Although at least three cases are now in either litigation or supreme court appeal involving public efforts to protect the coastal zone of Maikona, the study fails to acknowledge broadly based public sentiment to retain full, unrestricted access to the Maikona shoreline. Providing restricted and inconvenient access does not mitigate these major sociological impacts.

Deficiencies 1, 5 and 6 above involve omissions and will not be discussed further. Unless they are properly addressed, and then subjected to a period of public and agency comment, the EIS should be considered invalid.

Evidence for 2 and 3 are replete within the impact statement. The present drainage is described in statements on pages 3-2 and 1-4. This "natural" drainage is to be replaced by 119,000 cubic yards of fill for embankments across gulches, depressions and drainage ways (4-17). The resulting storm runoff consolidation will flow through culverts up to eight feet in diameter (1-8) and conveyed in lined and unlined drainage ditches. Along the shoreline, this runoff (up to 1,756 cubic feet per second or approximately 46,000,000 gallons per hour for one basin) is supposed to be held in ponds behind natural barriers. The pond areas are not delineated in the impact statement and are unlikely to exist after the shoreline has been developed. Although the study makes repeated reference to a pattern of intensive storms, data for a simplified water budget and for soil erosion hazards are derived from rainfall averages. Conclusions based on these are therefore erroneous.

Because impacts of sedimentation on near-shore ecosystems have been based on the erroneous conclusions described above, those impacts remain to be seriously addressed.

Maui Group, Sierra Club - comments on Maikona EIS, page 2.

This draft Environmental Impact Statement is so superficial, incomplete and misleading as to be unworthy of complete analysis. To quote from the stated objectives of Coastal Zone Management, which emphasize shoreline protection and restoration, as a rationale for accommodating a major resort development in an undeveloped area, strains our credibility. Statements that the moving of a public roadway a thousand feet or more south provides better access to the shoreline are an outrage. Mauians have already experienced similar situations at Kaanapali, Hailea and Kapaloa, so that argument has already been totally discounted. That the public is expected to be a willing partner, through expenditures, land use, and the exchange of near-shore land for less valuable mauka land, is to imply an insulting level of gullibility. "Public policy" does NOT support this project in the manner implied in the EIS. The Maui County Council, a representative body which makes public policy, has yet to be heard on this issue in expressing current attitudes on shoreline development. The adoption of plans several years ago, when the expansion of the tourist industry was considered desirable, is not necessarily a reflection of present attitudes and policies.

Because the Draft EIS admits in 4-23 and elsewhere that submission of the document for review has preceded completion of archaeological studies, the draft in its present form should be rejected. Only a reasonably complete EIS can fulfill the intention of the law.

Submitted by

John Rose, II

Maui Group Chairman, Sierra Club
for the Executive Committee

HANNIBAL FAVARES
Mayor

RALPH HAYASHI
Director of Public Works

SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
288 SOUTH HIGH STREET
HAILUO MAUI HAWAII 96703

January 22, 1982

Mr. John Bose II
Chairman
Maui Group-Hawaii Chapter
Sierra Club
Post Office Box 416
Haiku, Maui, Hawaii 96708

Dear Mr. Bose:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

1. Construction of necessary infrastructure, such as the proposed project and the extension of the Central Maui water transmission system, will facilitate development in the vicinity of the project, as provided for by the Kihel General Plan and County zoning. Additional secondary impacts will be addressed in the Revised EIS.
2. The roadway was designed with the intent of no diversion or intensification of flow. Thus, the natural drainage system will not be sustaining flows significantly greater than at present. For this reason, drainage channels have not been required on the downstream side of the culverts.
3. The impacts associated with this project are based on the existing environment. Impacts on shoreline barriers and ponding areas due to future development would be outside of the scope of this EIS.
4. Calculations in Section 4, Part II.A., of the EIS were based on the Soil Erosion Standards and Guidelines, Department of Public Works, City and County of Honolulu, November, 1975. These are the current

DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
Coastal Engineering
Water Management

Mr. Bose II

-2-

Jan. 22, 1982

guidelines used to determine whether additional erosion control will be required.

Since the Severity Rating Number, H, for each of the segments of the road is well below the standard Severity Rating Number of 50,000, the severity of soil loss has been determined to be minimal in relation to the standard. Grassing will be the primary temporary and permanent erosion control measure.

Construction of the portion of Makena Road in Seibu's property experienced soil erosion problems in only one area, an existing drainage way located at the north end of the segment. The road alignment itself, during several heavy rain storms, held up with only minimal soil loss.

5. When construction plans are available for Increment III of the proposed road, it will be possible to specify which archaeological sites in that area will be impacted. At that point, a surface survey will be conducted (as described on page 4-22 of the EIS) to determine the extent of any other necessary mitigative measures.

When the destruction of such sites is unavoidable, it is common archaeological practice to, mitigate or negate such destruction through research and recovery of the valuable data contained in the site. Data recovery can consist of general area mapping, detailed site mapping, and/or excavation and salvage, depending on the importance of the site. Completion of an appropriate data recovery plan concludes an agency's data recovery responsibilities. This is common policy, both in Hawaii and at the national level.

6. The scope of this project includes neither the closing of the existing road nor improvements along the full length of the existing Makena Road. The proposed road would connect to the existing road in five locations, and any future alteration to the existing road would be a separate question.

Regarding drainage, the use of rainfall averages is standard practice. Please refer to response number 4., above.



Ulupalakua Ranch, Inc.

ULUPALAKUA, MAUI, HAWAII 96790

RECEIVED
OCT 20 10 50 AM '81
OFFICE OF THE MAYOR

October 26, 1981
Mayor Hannibal Tavares
County of Maui
200 South High Street
Maui, HI 96793

Re: Environmental Impact Statement
Makana Road

Dear Sirs:

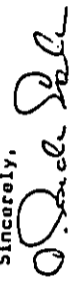
Ulupalakua Ranch, Inc. is not directly involved in the proposed Makana Road and the construction of the road will not benefit nor adversely affect the ranch.

In reviewing the Environmental Impact Statement several errors were noted which could stand correction.

Page 5-3: The residences in the area are not served by the Kula Water Transmission System but are served by "temporary" lines running from Maui Meadows. The present is inadequate to meet the present residential demand and it is necessary for the Board of Water Supply to deliver water by truck on a daily basis.

Page 2-24: The open rangeland is not heavily grazed by cattle. All cattle have been removed from the subject area with the result that an understory of dry grass has built up along the proposed road alignment. During dry periods a fire hazard will exist along the roadway and the county should take action to reduce the present and future fire hazard.

Page 2-28: The Hawaiian stilt (Himantopus mexicanus knudseni) an endangered species, does frequent the area and can be observed near the lakes on the Seibu Makana Golf Course.

Sincerely,

C. Pardee Erdman
President
Ulupalakua Ranch, Inc.

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUO, Ph.D.
Deputy Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
HAILURU MAUI, HAWAII 96790

November 24, 1981

Mr. C. Pardee Erdman, President
Ulupalakua Ranch, Inc.
Ulupalakua, Maui, Hawaii 96790

Dear Mr. Erdman:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and have the following response to the recommended corrections:

Page S-3 We concur with this comment and will revise the EIS accordingly.

Page 2-24 Current rangeland conditions will be incorporated into the EIS. While not foolproof, the proposed design cross-section (Figure 1-3, page 1-6) indicates an 18 foot wide shoulder area on both sides of the pavement.

This shoulder area, under normal maintenance practices, must be kept clear to provide for traffic flow and safety. This clear requirement also indicates that heavy growth would not be allowed and any vegetation would be kept close cropped with the secondary benefit of mitigating future fire hazards.

In addition, highly improved access to the general area for fire fighting equipment will be enhanced.

DIVISIONS
Engineering
Regulatory Construction
and Maintenance
Land Use and
Costs Enforcement
WASTE MANAGEMENT

Nov. 24, 1981

-2-

Mr. Erdman

Page 2-28 This information will be incorporated into the EIS.

Sincerely,

A. Matsuo
RALPH HAYASHI
Director

AU:cc

DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
City Enforcement
Water Management



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

January 22, 1982

Mr. Pardee Erdman, President
Ilakua Ranch, Inc.
Ilakua, Maui, Hawaii 96790

Mr. Erdman:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We were forwarded a copy of your letter to Mr. Tacadol,
December 10, 1981, regarding Makena Road. Your
letter is well taken, and the letter will be appended to
Makena Road Environmental Impact Statement.

Sincerely,
Ralph Hayashi
RALPH HAYASHI
Director

IS
BY
L.O.
WORKS

RECEIVED
DEC 14 11 19 AM '81
OFFICE OF THE MAYOR

DE 1
WAILUKU 96793

December 10, 1981
Mr. Rogelio Tacadol
Planning Commission
County of Maui
Maui, Hawaii 96793

Dear Sir:

Re: Kihel - Zekena Community Plan
Makena Road

As a member of the Steering Committee of the Kihel
Civic Development Plan (72) in 1965, I would like to
comment on the issue of the relocation of the Makena
Road.

In preparing the plan for Zekena, we made a decision
to realign the road behind Maluaka Beach (Seibu Beach) not
only because of the proposed hotel zone but also because
of the flooding problem. The present roadway is located in
a low lying area behind a large sand dune and after every
rain storm the road is flooded and becomes impassable. The
only drainage solution would have been to breach the large
sand dune and this was not an acceptable solution 12 years
ago and it is not acceptable today. It was therefore decided
that in the interest of road planning the roadway should be
relocated.

The realignment of the road now seems to have become
a political issue rather than a planning decision. However,
it would be a serious planning mistake to leave the road
in a flood area, especially since in its present location
there is no view either north or south.

The argument that movement of the road north would
limit beach access does not seem to be a valid one. There is
presently no access to Seibu Beach and most of the public
uses beach access (e.g., swimming, surfing, etc.) from the
public beach (Seibu Beach). There are road lands along a street
a realignment would be made to provide access to the beach.
It is my hope that the community will reach a decision
based on the merits of the relocation.

Sincerely,
C. Pardee Erdman
C. Pardee Erdman

RECEIVED
PLANNING DEPARTMENT
NOV 3 1981
MAIL ROOM
MAIL ROOM
MAIL ROOM

James S. Campbell
Makena, Maui
November 3, 1981

County Public Works Department
Page Two
November 3, 1981

County Public Works Department
County of Maui
Wailuku, Maui, Hawaii 96793

Re: Environmental Impact Statement
For Makena Road

Gentlemen:

I have had the opportunity to review your Environmental Impact Statement for the Makena Road, and have the following comments to make.

There are few people who presently live along the existing makai Makena Road. We have a beach house on this road and I can assure you on busy days, especially when tourism is heavy, that the road is noisy, dusty and dangerous. I live close to the Makena Landing, makai of the road, and my children often walk to Chang's Beach to swim, or over to the Landing and the road in this particular area is very dangerous. Visibility is bad and it is not safe to walk along.

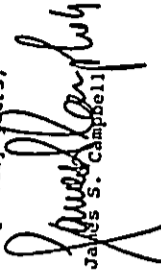
Most of the traffic that comes through Makena is on the way to Big Beach or Small Beach, and a lot of this traffic travels at an excessive rate of speed. I think it would serve no useful purpose to have two roads to Big Beach; one mauka and one makai. I think it would be in the best interest of all of the people of Maui to take the existing Makena Road and break it in two or three places, so as to encourage the thru traffic to take the realigned road. I have heard some people who purport to be friends of Makena

say that they feel that the road should be left the way it is, but by and large, these are people who do not live on the Makena Road. These people are more involved in trying to deprive Seibu of an orderly development than they are in the safety of the people who live and walk along the Makena Road.

For the reasons set forth above, I feel that it would be in the best interest of the County to allow the realignment of the road up mauka and to break the makai road a various points with access down to the makai properties from the new realigned road.

Thank you very much for your consideration.

Very truly yours,


James S. Campbell

MANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MARTELLO, Ph. D.
Deputy Director of Public Works



DIVISIONS
Engineering
Highway Construction
and Maintenance
Land Use and
Cobalt Enhancement
Waste Management

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU MAUI, HAWAII 96793

December 7, 1981

Mr. James S. Campbell
Makana, Maui, Hawaii 96753

Dear Mr. Campbell:

SUBJECT: MAKANA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

We concur that the existing road is dusty, has poor visibility, and lacks shoulders for bicycles or pedestrian use. However, the scope of this project includes neither the closing of the road, nor improvements along the full length of the existing Makana Road. The proposed road would connect to the existing road in five locations, and any future alteration of the existing road would be a separate question.

Sincerely,

R. Hayashi
RALPH HAYASHI
Director

AU:CC

UNCOMBINED
PUBLIC WORKS

Nov 3 2 19 PM '81

Judge Betsy Fitzgerald Rahn (Ret)
Municipal Court
Wahala Creek, California 9438
20-3 Puailima Pl.
Lahaina, Maui, HI 96761

640 Ypsilanti Valley Road
P.O. Box 5128
Telephone (415) 854-6772

November 5, 1981

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MATSUDA, JR. D.
County Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

300 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96791

December 7, 1981

DIVISIONS
Engineering
Property Construction
and Maintenance
Land Use and
Coping Enforcement
Waste Management

Re: Makena Road Changes

Gentlemen:

My husband and I have been property owners on Maui for thirteen years and we spend a good deal of time on Maui. We have been particularly impressed by the lovely views of beautiful coastline from roads which wind along near the shores, and the little parks along the way. These are among the very nicest things of Maui available to all, tourist and Kamaaina alike.

When Wailea was developed, we were saddened that the shore road south of Kihei was dead ended. It was a beautiful drive past lovely homes. It may still be, but very few see it any more. Therefore, I was concerned to hear that there was a proposal to close off access to the Makena Road and make it available only as cul-de-sacs from a higher level highway. This would result in a considerable inconvenience to people residing on Makena Road, as well as depriving the people of Maui and visitors to Maui of the privilege of driving along a particularly beautiful stretch of coastline.

I can understand the need for a new, high-speed road higher on the Mauka side to give better access to the Seibu development. But that should not be allowed to interfere with the present Makena Road. The people living on Makena Road have already put up with much inconvenience because of the deplorable condition of the road. To require them to put up with more inconvenience--and a long way around to come and go to their homes or to see a neighbor, would be unconscionable--as well as an unnecessary deprivation to the general public.

I strongly urge the Department of Public Works to approve the proposal to keep the Makena Road open and to improve the surface.

Thank you for your consideration.

Sincerely,
Betsy Fitzgerald Rahn
Betsy Fitzgerald Rahn

BFR:abs

Judge Betsy Fitzgerald Rahn (Ret)
20-3 Puailima Place
Lahaina, Maui, Hawaii 96761

Dear Mrs. Rahn:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

The proposed project does not involve closing off access to the existing Makena Road, nor does it involve improvements along the full length of the existing road. Rather, the proposed road would connect to the existing road in five locations, and any further alteration of the existing road would be a separate question.

Sincerely,

R. Hayashi
RALPH HAYASHI
Director

AU:cc

DIVISIONS
Engineering
Regulatory Construction
and Maintenance
Land Use and
Coastal Erosion
Waste Management



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
388 SOUTH HIGHWAY STREET
WAILUKU MAUI HAWAII 96753

December 7, 1981

Ms. Nancy M. Alueta
361 Molokai Home Street
Kahului, Maui, Hawaii 96753

Dear Ms. Alueta:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

The proposed road will result in improved access to the entire Makena area, especially the beaches near Puu Olai. Both residents and visitors may be expected to use the proposed road and beaches.

For example, the Makena-La Perouse State Park plan Supplement indicates that Big Beach and Little Beach will attract visitors as well as residents. If the Ahiki-Kinai Natural Area Reserve is interpreted for its natural values and the historic sites around La Perouse are interpreted for their cultural values, then visitors may also be expected to go there. Beyond La Perouse, however, it is expected that residents will be the primary users. The visitors will probably be those who are staying in Kihei-Maialaea, since visitors tend to stay near facilities provided by the resort. The residents on the other hand, will probably come from as much as an hour to hour-and-a-half drive inland, originating mainly in the Kula-Makawao, Wailuku, Kahului, Paia, Kihei areas."

The scope of this project includes neither the closing of the existing road, nor improvements along the full length of the existing Makena Road. The proposed road would connect to the existing road in five locations, and any future alteration of the existing road would be a separate question.

Sincerely,
R. H. Tavares
RICHARD HAVAS
Director

AU:cc

HANNIBAL TAVARES
Mayor
RALPH HAVAS
Director of Public Works
SAMUEL MATSUDA, Ph.D.
Deputy Director of Public Works

RECEIVED
NOV 9 11 41 AM '81
OFFICE OF THE MAYOR
Honolulu, HI, 96720
November 6, 1981

The Honorable George Ariyoshi
State Capitol
Honolulu, HI, 96813

Dear Governor Ariyoshi:

This is in response to the Environmental Impact Statement about Makena Road, Makena, Maui. The big, thick log support is indeed impressive and rather overwhelming for most of us laypersons. However, between the big logs are trees such as "secondary impacts include impacts resulting from development of the project vicinity" which may really mean tourist development and hotels, etc. These activities will directly benefit from a better road at the higher elevation. It also states "improved access to the beaches". For whom? The tourists and hotel guests may get better access, but the local people will not. The Maui residents who like to get away for a weekend with the 4-wheel drive, the tents, fishing poles and kids will not benefit.

Over, and over, surveys of the local residents of Maui show they do not want development of the Makena area; no Makena Surf, no Seitu. They want some areas for camping like in the "good old days". Unfortunately, the good old days will never come back. Fourteen years ago when we moved back to Maui from Molokai, we camped "down in the boonies" of sea-rapu near where Acaole III Park is now. Progress gradually forced us to move down to "Obake Bay" area for our fishing and camping weekends. Then we started and we dutifully got permits from A&E so we could continue camping in spite of the development. Finally, there was no road access except by walking and now our Obake Bay is glamorous Polo Beach. We moved on to a place in Makena commonly called Chango's Beach, hoping to finally be able to camp in peace. Aha, that is now being bulldozed for the infamous Makena Surf. There are still big and little beaches and Puu Olai, but some local families object to the frequent display of nudity, and camping on the side of the red hill is quite uncomfortable.

Most local people are sympathetic to the residents of the Makena area and their need for an improved road. We agree the present road needs some resurfacing and even redesigning in places. What we do object to is the obvious moving of the road to serve the hotel developers, and thereby eventually closing the lower road and keeping local campers and fishermen from reaching the few remaining areas left in Makena.

Sincerely,
Nancy M. Alueta
Nancy M. Alueta
Dept. of Public Works,
County of Maui

MAALAEA/KIHEI/MAKENA CITIZENS ADVISORY COMMITTEE

Mayor Hannibal Tavares
County of Maui

November 5, 1981

SUBJECT: COMMENTS ON EIS FOR MAKENA ROAD PROPOSAL DATED SEPTEMBER, 1981
RECEIVED
NOV 10 1981
OFFICE OF THE COUNTY ENGINEER

Dear Hannibal:

Please be advised that the Maalaea/Kihei/Makena Citizens Advisory Committee is in agreement with the subject EIS, provided that it is officially assured that the existing Makena Road will be continued and will not be cut at any point to accommodate the new road or the Seibu development.

If this is not acceptable, the Committee strongly recommends that the proposed new road be abandoned and that the County and the developers involved expend their efforts and funds toward improving and maintaining the existing Makena Road.

The Committee feels that to place gaps and cul-de-sacs in the existing road would greatly reduce the public's access to their beaches and would definitely not be acceptable. So-called "Beach Accesses" are in no way an acceptable substitute, either to the residents of Kihei or to the people of Maui.

The Committee found that very strong feelings exist in regard to the above throughout our island. The contrary feelings expressed by a few property owners who stand to benefit from the cutting of the present road should be disregarded, the Committee feels.

The exact Resolution adopted by the Committee was worded as follows: "This committee goes on record as accepting the proposed new route of the road from Mailea to Makena as shown in the EIS report as Alternate 'C' except that we require along with this approval that the route of the existing road, and the existing roadway, be maintained with no gaps." Statements to the effect that the route of the proposed new road should be considered as a separate item without regard to what happens to the existing road would definitely not be an acceptable substitute to what the Committee is asking.

Very truly yours,

William E. Maschal
William E. Maschal, Chairman

Copy to Ralph Hayashi, Director,
Department of Public Works

HANNIBAL TAVARES
Mayor
RALPH HAYASHI
Director of Public Works
SAMUEL MARTELLO, Ph. D.
County Director of Public Works



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
100 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

December 7, 1981

Mr. William Maschal, Chairman
Maalaea/Kihei/Makena Citizens
Advisory Committee
532 Kupulau Street
Kihei, Maui, Hawaii 96753

Dear Mr. Maschal:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

We appreciate your support of Alternate "C", however, the scope of this project includes neither the closing of the existing road nor improvements along the full length of the existing Makena Road. The proposed road would connect to the existing road in five locations, and any future alteration of the existing road would be a separate question.

Sincerely,

Ralph Hayashi
RALPH HAYASHI
Director

AU:cc

Mayor Hannibal Tavares
November 4, 1981
Page 2

B. "TO PROMOTE MOTORING SAFETY BY ELIMINATING THE SUBSTANDARD CONDITIONS AND HAZARDS OF THE EXISTING ROAD."

Again, this is not a valid objective. In fact, this has nothing to do with a new highway. The solution to this objective would be to improve the existing road at Makena. It makes more sense to maintain or repair what you already have:

C. "TO PROVIDE AN EASEMENT FOR THE EXTENSION OF THE CENTRAL MAUI WATER TRANSMISSION SYSTEM."

Again, this is not a valid objective - because on July 1, 1981, while appearing before the County Council's Committee on Land Use, Maui County Public Works Director, Ralph Hayashi, stated that the water line could be put in parallel to the existing Makena Road.

Although these misleading objectives as stated are sufficient reason to reject this EIS, I will go through a few more specific quotes from the EIS.

2.) On page S-2 it states that "The proposed project will be funded by the County and private land owners in the area. No more of the taxpayers' money should be spent for this new road when the prime beneficiaries will be the developers. This was also stated by Mayor Tavares on July 2, 1981 - who pointed out Wailea paying for the road through their resort."

3.) On page 1-1 it states "The existing road, Makena Road, is an undivided dirt road." It is not entirely a dirt road, parts are gravelled and other parts are blacktopped.

4.) On page S-4 it states that there will be "removal of some archaeological and historic sites." This will be completely unacceptable and in violation of the law. Also, acceptance of the road alignment, when sites 249-259 have not even been adequately surveyed and their specific impacts not addressed, should not be permitted. (See pages 4-22 and 4-23.)

5.) On page S-4 it states that the project will provide "improved access to the Makena area." But access will be impacted, specifically in the area where Seibu proposes to cut off the existing Makena Road. Even with access roads coming down from the main highway, it will mean a major change in the public's right to transit along the shoreline, as defined by law in HRS Chapter 115-1. That law states that "the right of access to Hawaii's shorelines includes the right of transit along the shoreline."

People to Save Makena
P.O. Box 314
Lahaina, Hawaii 96761
(808) 661-3537

November 4, 1981

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OFFICE OF THE CLERK

Mayor Hannibal Tavares
County of Maui
200 S. High Street
Wailuku, Hawaii 96793

Dear Mayor Tavares,

I have reviewed the draft of the Makena Road Environmental Impact Statement, and now wish to submit the following comments.

I feel that it is a very weak and misleading document. The ultimate success of an EIS depends on its honesty and factualness. The consultants who prepared this EIS effectively covered up the primary reason as to why this proposed Makena Road is needed in the first place - which is to facilitate Seibu's and other developers' plans for developing the Makena area.

I will now substantiate this opinion by referring to specific points in the EIS.

1.) On page S-1 the three basic objectives of the project are listed:

A. "TO PROVIDE A HIGHWAY THAT WILL MEET CURRENT AND FUTURE TRANSPORTATION REQUIREMENTS OF THE REGION."

This is not a valid objective. There is no current public need for a new highway. The EIS itself states on page 2-42 that "because the number of households in Makena is so small - they are compelled to use population data from the Kula and Kihel districts, which also includes the Haiku, Pauwela, Sprecklesville and Puunene areas! Nowhere in the EIS is the current population of Makena stated."

The increase in population will be largely due to Seibu's own private development. On page 2-39 the EIS states that "Seibu is planning a resort-residential area with 450-800 hotel units." But for some reason, the EIS fails to mention that in 1975 an EIS previously submitted by Seibu described a community of 1,200 hotel rooms, 4,292 condominiums, 277 homes, a golf course, and a large shopping center. Implying that the current population of Makena needs this new \$9.85 million highway is an outright fallacy. Also, if current court litigation forces Seibu to drop its plans, what would then be the reason for the highway?

Mayor Hannibal Tavares
November 4, 1981
Page 3

By building a new highway as far up as 1,500 feet from the shoreline and not maintaining the existing road - that will be effectively discouraging the public from using the lower road.

6.) On page 1-9 (also 4-24 and 7-1) it is stated that the waterline, upon completion, "will upgrade service to Makena residents." This is stated all these times with no references made as to the major Makena beneficiary - Seibu. Why?

7.) On page 6-6 it is stated that to upgrade the existing road it would cost approximately \$11,940,000. There is nothing to back up this highly doubtful figure. Also, in discussion of upgrading the existing road, all of the negative points are brought up, but not one positive point. Positive points such as the existing road would be the alternative which would have the least impact on archaeological and historical sites; that the water transmission line could be accommodated on the existing road; that improving the existing road would actually improve the public's beach access, particularly fishermen and campers.

8.) On page 1-8 (and 2-13) it states that "Runoff (waters) will be conveyed into natural depressions along the coastline which will be used as retention or infiltration basins to minimize discharge into near-shore waters." This is a totally inadequate way of dealing with this problem, especially because as future development along the shore takes place, these natural depressions could be lost. In 1975, the Natural Area Reserve System Commission report on Seibu's EIS stated that runoff from the development in the Makena area could radically transform the "most important inshore marine area known in Hawaii, the Ahiki-Kinaiu Area Reserve."

I hope that the above comments are taken into consideration and that the protection of the Makena area will be given serious thought.

Aloha Aina,

Chris Kaoni

Mrs. Chris Kaoni
President, People to Save Makena

HANNIBAL TAVARES
Mayor

RAJUN HAVASHE
Director of Public Works
SARACEL MATSUD, Ph. D.
County Director of Public Works



DEPARTMENT OF PUBLIC WORKS

800 SOUTH HIGH STREET
HAILUHU, MAUI, HAWAII 96793

January 22, 1982

Mrs. Chris Kaoni, President
People to Save Makena
Post Office Box 314
Lahaina, Maui, Hawaii 96761

Dear Mrs. Kaoni:

SUBJECT: MAKENA ROAD
ENVIRONMENTAL IMPACT STATEMENT

We appreciate your review of the EIS, and offer the following response to your comments.

1.-A: In 1979 there were 28 general and agricultural water meters being served in the Makena Area. Assuming these are the total households in the area, and assuming an average of 3.2 persons per household, the population of Makena may be currently estimated at approximately 90 people.

Construction of necessary infrastructure, such as the proposed project and the extension of the Central Maui Water Transmission System, will facilitate development in the vicinity of the project, as provided for by the Kihei General Plan and County zoning. Additional secondary impacts, such as population growth, will be addressed in the Revised EIS.

1.-B: The County feels that the objective of promoting motorway safety is a valid objective. This objective can be attained by building a new road or by other alternatives, as discussed in Section 6 of the EIS. At the present time, the County is considering building a new alignment.

Ms. Kaoni

-2-

Jan. 22, 1982

- 1.-C: You are correct in stating that the water line could be put within the alignment of the existing road. However, this would result in greater construction and maintenance costs and greater traffic disruption than installing the line with the proposed new road.
2. As stated in the EIS, present County policy is to have the surrounding developers pay for that portion of the road which passes through their property. While a portion of the road would be funded by the County, no appropriation for such has been made to date.
3. We concur that the existing road is not entirely a dirt road. However, the portions which are black-topped are few and far between and generally in a state of disrepair.
4. We are unaware of any law which makes a blanket statement to the effect that removal of the historic or archaeological sites is completely unacceptable. In fact, when the destruction of such sites is unavoidable, it is common archaeological practice to mitigate or negate such destruction through research and recovery of the valuable data contained in the site. This is particularly true for smaller sites where there will be only marginal disturbance by construction along one edge, and where there will be minor disruption of the surface of an archaeological site whose primary valuable information lies in sub-surface deposits. Data recovery can consist of general area mapping, detailed site mapping, and/or excavation and salvage, depending on the importance of the site. Completion of an appropriate data recovery plan concludes an agency's data recovery responsibilities. This is common policy, both in Hawaii and at the national level.
5. The scope of this project includes neither the closing of the existing road nor improvements along the full length of the existing Makana Road. The proposed road would connect to the existing road in five locations, and any future alteration to the existing road would be a separate question.


Ms. Kaoni

-3-

Jan. 22, 1982

6. The extension of the Central Maui Water Transmission System has been designed to accommodate both existing and future development, as provided for by the Kihei General Plan and County zoning.
7. A brief breakdown of the cost estimates, for upgrading the existing road, will be provided in the Revised EIS.
Based on existing archaeological studies, several sites along the existing road would be impacted if this road were upgraded. Further studies along the full length of the road might well reveal additional sites which would be impacted by widening the alignment. The known sites which most likely would be impacted will be discussed in the Revised EIS. Also refer to response 1.-C.
8. The impacts associated with this project are based on the existing environment. Impacts on shoreline barriers and ponding areas due to future development would be outside the scope of this EIS.

Sincerely,


RALPH HAYASHI
Director

AU:cc

Appendices

APPENDIX A

APPENDIX A
TERRESTRIAL FLORA AND FAUNA

1. SURVEY METHODOLOGY

First Survey

A biological field survey was conducted in February, 1977 to inventory the flora and fauna, search for possible rare and endangered plants, and note areas of potential environmental problems or concerns.

The survey was conducted along a four mile route extending from Wailea Alanui Drive near Polo Beach to Paako Point. The proposed alignment was walked in its entirety using topographic reference points and surveying markers as guides. Fourteen areas along the alignment were selected for detailed studies. These areas are shown in Figure 2-9, in Section 2 of this EIS.

Aerial photographs and existing literature were used to gain additional information about the project area. Ripperton and Hosaka (1942), Jones and Stokes (1973), and environmental impact statements and biological surveys prepared by Neighbor Island Consultants (1975) and Environment Impact Study Corporation (1976) contained information about the project area.

The survey was conducted during an extremely dry period and emergency drought measures were in effect. The project

area is naturally arid but the existing conditions made identification even more difficult. Fruits, flowers, and seeds necessary for proper identification were scarce. The survey should thus be considered a reconnaissance and the information presented indicative only of conditions and species present at that time.

Second Survey

A biological reconnaissance was conducted along an alternate of the proposed Makena Road alignment on October 15, 1977 by personnel from Environment Impact Study Corporation. Prominent topographic reference points were used as guides since the exact alignment was not surveyed and marked previously. Flora and fauna along the approximately one mile alternate route were recorded. In addition, two sites along the connector roads were selected for detailed studies, labeled 6' and 9' on Figure 2-9.

a. Flora

The existing conditions were not suited for a comprehensive botanical survey because of the extremely dry condition of the vegetation. Fruits, flowers and leaves necessary for identification were lacking on most species. Surveys taken under more favorable conditions might yield additional species.

The area along the alignment is an open kiawe forest consisting of scattered kiawe (Prosopis pallida)

trees and an understory consisting primarily of buffelgrass (Cenchrus ciliaris), spiny amaranth (Amaranthus spinosus), Spanish needle (Bidens pilosa), wild zinnia (Zinnia pauciflora) and hairy merremia (Merremia aegyptia).

Two endemic species were recorded during this survey. These species are Capparis sandwichiana var. zoharyi and wiliwili (Erythrina sandwicensis). These species are not listed on the Federal Register of proposed rare and endangered species.

b. Fauna

The extremely dry conditions noticeably affected the faunal community as sightings were not as frequent as during previous surveys. The indigenous American golden plover or kolea (Pluvialis dominica fulva) was the only native species recorded. They were common on the golf course areas above the alignment. Other prominent exotic species included the cardinal (Cardinalis cardinalis), barred dove (Geopelia striata), lace-necked dove (Streptopelia chinensis), white-eye (Zosterops japonica), ricebird (Lonchura punctulata) and francolin (Francolinus pondicerianus).

Mammalian wildlife recorded were exotic species. These species included cat (Felis catus), dog (Canis familiaris), mongoose (Herpestes auropunctatus), and

mouse (Mus musculus). Mouse burrows were noted throughout the project area. Goat (Capra hircus) bones suggested that this species is also present along the alignment.

The bird and mammal species discussed in this section are indicative only of species sighted during this particular survey. A more detailed survey during more favorable conditions and for a longer period might yield additional species.

c. Critical Habitat

The area along the alignment is not believed to contain critical habitat for any species of flora or fauna. The species recorded from this area are common to adjacent areas and other areas on Maui.

Third Survey

A biological reconnaissance was conducted along the mauka alternate of the proposed Makena Road alignment on March 12, 1980 by personnel from Environment Impact Study Corporation. Prominent topographic reference points were used as guides since the exact alignment was not surveyed and marked previously. Flora and fauna along the alternate were recorded. One area was selected for detailed study, labeled 2' on Figure 2-9.

a. Flora

Existing conditions were suited for a botanical survey, as spring rains had resulted in excellent growing conditions. Fruits, flowers and leaves necessary for identification were available for most species.

The area along the alignment is an open kiawe forest consisting of scattered kiawe (Prosopis pallida) trees and an understory consisting primarily of buffelgrass (Cenchrus ciliaris), spiny amaranth (Amaranthus spinosus), Spanish needle (Bidens pilosa) wild zinnia (Zinnia pauciflora) and balsam pear (Mormordica charantia).

One endemic species was recorded during this survey: wiliwili (Erythrina sandwicensis). This species is not listed on the Federal Register of proposed rare and endangered species.

b. Fauna

The indigenous American golden plover or kolea (Pluvialis dominica fulva) was the only native species recorded. A few individuals were seen on the golf course areas above the alignment. Other prominent exotic species included the cardinal (Cardinalis cardinalis), barred dove (Geopelia striata), lace-necked dove (Streptopelia chinensis), ricebird (Lon-

chura punctulata) and francolin (Francolinus pondicerianus).

Mammalian wildlife recorded were exotic species. These species included the mongoose (Herpestes auro-punctatus) and mouse (Mus musculus). Mouse burrows were noted throughout the project area.

The bird and mammal species discussed in this section are indicative only of species sighted during this particular survey.

c. Critical Habitat

The area along the alignment is not believed to contain critical habitat for any species of flora or fauna. The species recorded from this area are common to adjacent areas and other areas on Maui.

2. SUMMARY OF FLORA NOTED

Families are listed alphabetically within each of two groups: Monocotyledonae and Dicotyledonae. Genera and species are arranged alphabetically. The scientific as well as common names for the Angiosperm species which appear in this checklist are taken from St. John (1973). Common Hawaiian names used in the checklist are in accordance with St. John (1973).

For each species the following information is provided:

1. Scientific name.
2. Vernacular name, when commonly used, or Hawaiian name when known.

3. Status of the species. The following symbols are employed:

- E endemic to the Hawaiian Islands
- I indigenous (native) in the Hawaiian Islands but also occurring naturally elsewhere
- X an exotic species of recent introduction to Hawaii
- P a species presumed to be of Polynesian introduction

4. Relative abundance of the species within the study area sites. The following symbols and explanations are employed:

- A abundant, a major vegetation component
- C common, widely distributed in an area in large numbers
- O occasional, widely distributed in an area
- U uncommon, seen several times in an area
- R rare, seen only one or two times within the study site. Note that this means the species is rare only within the particular study site, but may not be rare outside the study area.

MAKENA ROAD

SUMMARY OF FLORA NOTED
(10-15-77)

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
MONOCOTYLEDONAE		
GRAMINEAE		
<u>Cenchrus ciliaris</u>	buffelgrass	exotic
<u>Eleusine indica</u>	wiregrass	exotic
<u>Tricachne insularis</u>	sourgrass	exotic
DICOTYLEDONAE		
AMARANTHACEAE		
<u>Amaranthus spinosus</u>	spiny amaranth	exotic
CACTACEAE		
<u>Opuntia megacantha</u>	panini	exotic
CAPPARACEAE		
<u>Capparis sandwichiana</u> var. var. <u>zoharyi</u>		endemic
COMPOSITAE		
<u>Bidens pilosa</u>	Spanish needle	exotic
<u>Zinnia pauciflora</u>	wild zinnia	exotic
CONVOLVULACEAE		
<u>Merremia aegyptia</u>	hairy merremia	exotic
CUCURBITACEAE		
<u>Cucumis dipsaceus</u>	wild cucumber	exotic
LABIATAE		
<u>Leonotis nepetaefolia</u>	lions-ear	exotic
LEGUMINOSAE		
<u>Acacia farnesiana</u>	klu	exotic
<u>Desmanthus virgatus</u>	slender mimosa	exotic
<u>Erythrina sandwicensis</u>	wiliwili	endemic
<u>Leucaena leucocephala</u>	koa-haole	exotic
<u>Prosopis pallida</u>	kiawe	exotic
MALVACEAE		
<u>Abutilon grandifolium</u>	hairy abutilon	exotic
<u>Sida fallax</u>	'ilima	indigenous
SOLANACEAE		
<u>Nicandra physalodes</u>	apple-of-Peru	exotic
STERCULIACEAE		
<u>Waltheria americana</u>	hi'aloa, 'uhaloa	indigenous

MAKENA ROAD
SUMMARY OF FLORA NOTED
(3-12-80)

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
MONOCOTYLEDONAE		
GRAMINEAE		
<u>Cenchrus ciliaris</u>	buffelgrass	exotic
<u>Eleusine indica</u>	wiregrass	exotic
DICOTYLEDONAE		
AMARANTHACEAE		
<u>Amaranthus spinosus</u>	spiny amaranth	exotic
CACTACEAE		
<u>Opuntia megacantha</u>	panini	exotic
COMPOSITAE		
<u>Bidens pilosa</u>	Spanish needle	exotic
<u>Verbesina encelioides</u> (Cav.) B. & H. ex Gray	golden crown-beard	exotic
<u>Zinnia pauciflora</u>	wild zinnia	exotic
CONVOLVULACEAE		
<u>Ipomoea cairica</u> (L.) Sweet	koali	indigenous
CUCURBITACEAE		
<u>Cucumis dipsaceus</u>	wild cucumber	exotic
<u>Mormordica charantia</u> L.	balsam pear	exotic
LABIATAE		
<u>Ocimum basilicum</u> L.	basil	exotic
LEGUMINOSAE		
<u>Erythrina sandwicensis</u>	wiliwili	endemic
<u>Indigofera suffruticosa</u> Mill.	indigo	exotic
<u>Leucaena leucocephala</u>	koa-haole	exotic
<u>Prosopis pallida</u>	kiawe	exotic
MALVACEAE		
<u>Sida fallax</u>	'ilima	indigenous
SOLANACEAE		
<u>Lycopersicon exculentum</u> Mill.	tomato	exotic
<u>Nicotiana glauca</u> Grah.	tree tobacco	exotic
STERCULIACEAE		
<u>Waltheria americana</u>	hi'aloa, 'uhaloa	indigenous

3. SUMMARY OF AVIFAUNA AND MAMMALS NOTED

Families are listed alphabetically under avifauna and mammals. Genera and species are arranged alphabetically. For each species the following information is provided:

1. Scientific name.
2. Vernacular name, when commonly used, or Hawaiian name when known.
3. Status of the species. The following symbols are employed:

E endemic to the Hawaiian Islands

I indigenous (native) in the Hawaiian Islands but also occurring naturally elsewhere

X an introduced species to Hawaii .

4. Relative abundance of species within the study area sites. The following symbols and explanations are employed.

A abundant, a major species

C common, widely distributed in an area in large numbers

O occasional, widely distributed in an area

U uncommon, seen several times in an area

R rare, seen only one or two time within the study site. Note that this means the species is rare only within the particular study site, but may not be rare outside the study area.

In addition to the above symbols, P is used to indicate species which are probably present but were not actually recorded during the survey. These species are identified from previous studies or by distinct signs such as tracks or droppings

MAKENA ROAD
SUMMARY OF AVIFAUNA NOTED
(10-15-77)

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
<u>CHARADRIIDAE</u>		
<u>Pluvialis dominica</u> <u>fulva</u>	American golden plover, kolea	indigenous
<u>COLUMBIDAE</u>		
<u>Geopelia striata</u> <u>Streptopelia chinensis</u>	barred dove lace-necked dove	exotic exotic
<u>FRINGILLIDAE</u>		
<u>Cardinalis cardinalis</u> <u>Carpodacus mexicanus</u> <u>frontalis</u> <u>Lonchura punctulata</u> <u>Passer domesticus</u>	cardinal house finch ricebird sparrow	exotic exotic exotic exotic
<u>MIMIDAE</u>		
<u>Mimus polyglottos</u>	mockingbird	exotic
<u>PHASIANIDAE</u>		
<u>Francolinus</u> <u>pondicerianus</u>	Indian gray francolin	exotic
<u>STURNIDAE</u>		
<u>Acridotheres tristis</u>	mynah	exotic
<u>ZOSTEROPIDAE</u>		
<u>Zosterops japonica</u>	white-eye	exotic

MAKENA ROAD
SUMMARY OF MAMMALS NOTED
(10-15-77)

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
BOVIDAE		
<u>Capra hircus</u>	goat	exotic
CANIDAE		
<u>Canis familiaris</u>	dog	exotic
FELIDAE		
<u>Felis catus</u>	cat	exotic
MURIDAE		
<u>Mus musculus</u>	mouse	exotic
VIVERRIDAE		
<u>Herpestes auropunctatus</u>	mongoose	exotic

MAKENA ROAD
 SUMMARY OF AVIFAUNA NOTED
 (3-12-80)

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
CHARADRIIDAE <u>Pluvialis dominica</u> <u>fulva</u>	American golden plover, kolea	indigenous
COLUMBIDAE <u>Geopelia striata</u> <u>Streptopelia chinensis</u>	barred dove lace-necked dove	exotic exotic
FRINGILLIDAE <u>Cardinalis cardinalis</u> <u>Carpodacus mexicanus</u> <u>frontalis</u> <u>Passer domesticus</u>	cardinal house finch sparrow	exotic exotic exotic
MIMIDAE <u>Mimus polyglottos</u>	mockingbird	exotic
PHASIANIDAE <u>Francolinus</u> <u>pondicerianus</u>	Indian gray francolin	exotic
ZOSTEROPIDAE <u>Zosterops japonica</u>	white-eye	exotic

MAKENA ROAD

SUMMARY OF MAMMALS NOTED
(3-12-80)

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
MURIDAE		
<u>Mus musculus</u>	mouse	exotic
VIVERRIDAE		
<u>Herpestes auropunctatus</u>	mongoose	exotic

REFERENCES TO APPENDIX A

- Environment Impact Study Corp. 1976. Central Maui Water Transmission System Revised Environmental Impact Statement.
- Jones and Stokes Association. 1972. Hawaii Fish and Wildlife Plan, Vol. 1. State Department of Land and Natural Resources, Division of Fish and Game. Honolulu, Hawaii.
- Neighbor Island Consultants. 1975. Seibu Makena Master Plan Revised Environmental Impact Statement.
- Ripperton, J. C. and E. Y. Hosaka. 1942. Vegetation Zones of Hawaii. Hawaii Agric. Exp. Sta. Bull. No. 89: 1-60.
- St. John, H. 1973. List and Summary of the Flowering Plants in the Hawaiian Islands. Pacific Tropical Botanical Garden Memoir No. 1. Lawai, Kauai.

APPENDIX B

APPENDIX B
MARINE SURVEY

1. SURVEY METHODOLOGY

Diving surveys were conducted on October 22-24, 1976, to determine existing offshore conditions and to assess the probable impacts of storm runoff and sedimentation on marine organisms. Observations and data collection were limited to benthic organisms and reef-oriented fish that would be most affected by fresh water discharges. Station depths ranged from 1 to 7 meters (m.), positioned 10 to 150 meters offshore.

Drainage areas were located from maps provided by the consulting engineer. Divers using snorkeling equipment swam out from shore and did a thorough reconnaissance of the area to locate the best possible transect areas. Sites were marked with an inner tube anchored to the bottom. A hundred meter 1/2-inch diameter nylon line was stretched over the bottom and anchored in place at every five meters. Transect line techniques were not used at Polo Beach because of the lack of reef areas. Reef habitats were chosen because of the abundance of marine organisms which represented optimum components of the area. After transect sites were located, the divers donned SCUBA equipment to conduct an underwater baseline survey. Fish species within

3 m. on either side of the transect line were recorded. Coral, urchins, algae and substrate types such as rock, sand and rubble were recorded using the quadrat method. All observations were recorded on 9" x 12" x 1/8" plexiglass underwater writing slates.

The diver recording fish species proceeded initially, followed by a diver using the quadrat method in surveying the benthic organisms. The diver recording fish species would then return over the same route to recheck initial findings and to add new species previously unrecorded.

Benthic organisms were surveyed using a plastic frame one meter on each side subdivided by wires at 16.5 centimeter (cm.) intervals into 25 parts of equal intersection. The quadrat was placed at 10 m. intervals along the transect and the information recorded. All species of coral, algae, and substrate types which fell under the 25 intersection points were recorded. A total of 250 points were recorded per transect. A macro-invertebrate count was also taken within the meter square. Organisms which did not fall under a point of intersection or within the meter square for invertebrates were recorded as present only.

Explanation of Transect Tables

The numbers which are listed in columns 1 through 10 are the points which are represented by a specific

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type of cover. Numbers 1 through 10 represent the quadrates (10 quadrates total). The column labeled "Total" shows the number of points, out of a total of 250, that a substrate covers for the whole transect.

For example, PAAKO POINT (SOUTH COVE):

Under quadrate 9, you will find 4 points of the coral Montipora verrilli. In no other quadrate does this species appear; thus, the total for the line is 4 points.

The substrate cover has a total of 250 points, whereas the macro-invertebrate count is dependent on how many were present. All the values given in the substrate coverage section are part of the 250 points possible per transect line. The ratio or make-up of the 250 points is variable from site to site, but all add up to 250 points.

The fish count for each study site and the percentage of each species to the total number of fish present is also given in the tables. Data for lobsters and octopi are included in this section and not under macro-invertebrates because the divers noting fish species recorded them. Slight disturbances caused them to hide quickly, and the divers recording substrate and macro-invertebrates did not note these species.

A summary of percent coverage by substrate groups is given in the following table. Transect data of substrate

and macro-invertebrates are presented next, followed by transect data of fish species. A total of six transects were investigated, the locations of which are shown on Figure 2-9, in Section 2 of this EIS.

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SUMMARY

PERCENT COVERAGE BY SUBSTRATE GROUPS

<u>GROUP</u>	<u>SITE</u>					
	<u>1*</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
CORAL		45.2	58.4	12.0	9.2	23.6
ALGAE		0.4	1.6	3.2	0.4	1.2
ENCRUSTING ALGAE			1.2	2.0	16.0	26.4
DEAD CORAL		34.8	34.8	5.2	13.2	22.8
SAND			4.0	58.8	56.0	
RUBBLE		4.0				5.2
ROCK					5.2	20.8
SEDIMENT		<u>15.6</u>		<u>18.8</u>		
TOTAL		100.00	100.00	100.0	100.0	100.0

*Data not applicable.

Calculation of Percent Coverage

All percent cover was derived by taking the total number of points of a specific type of cover or common group, i.e., coral, algae. This number was then divided by 250, which is the total number of points per transect line. (There were 25 points at each of the 10 places the quadrat was placed down). The number obtained was multiplied by 100 to get a percent coverage.

For example, PAAKO POINT (SOUTH COVE):

Dead coral accounts for 57 points. Thus:

$$57 - 250 = .228 \quad \text{so}$$

$$.228 \times 100 = 22.8\% \text{ dead coral cover}$$

APPENDIX B

TRANSECT DATA

OBSERVED SUBSTRATE AND MACRO-INVERTEBRATES

(1) POLO BEACH*

Substrate

Montipora verrilli

Montipora verrucosa

Montipora flabellata

Pocillopora meandrina

Pocillopora damicornis

Porites lobata

Porites compressa

Porites sp.

Palythoa sp.

Family Corallinaceae

Amansia glomerata

Lyngbya

Macro-invertebrates

Tripneustes gratilla

Echinothrix sp.

Echinometra mathaei

Conus pulicarius

* Transect line techniques were not used at Polo Beach due to the lack of reef areas.

TRANSECT DATA

OBSERVED SUBSTRATE AND MACRO-INVERTEBRATES

(2) NAHUNA POINT

<u>Substrate</u>	<u>Quadrat</u>										<u>Total</u>	<u>Present Only</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>		
<u>Montipora verrilli</u>				1					2		3	
<u>Montipora verrucosa</u>	4		3				3				10	
<u>Montipora flabellata</u>												X
<u>Pocillopora meandrina</u>	2	3	3	1	4		6	6	5	5	35	
<u>Pocillopora damicornis</u>												X
<u>Porites lobata</u>	2			3	4	1			2	2	14	
<u>Porites compressa</u>				5		4					9	
<u>Porites sp.</u>	5	5	4		5	9	3	5	6		42	
<u>Pavona varians</u>												X
<u>Fungia sp.</u>												X
<u>Palythoa sp.</u>												X
Dead coral	7	8	5	10	9	3	8	14	6	17	87	
Rubble						3	2		4	1	10	
Sediment	5	9	9	5	3	5	3				39	
<u>Lyngbya</u>			1								1	
<u>Halimeda</u>												X
											250	
<u>Macro-invertebrates</u>												
<u>Echinometra mathaei</u>							4				4	
<u>Tripneustes gratilla</u>		2	1	2				3	1		9	
<u>Echinothrix sp.</u>							6	4	5		15	
<u>Linckia diplex</u>	4	3									7	
<u>Acanthastor planci</u>												X
<u>Stenopus hispidus</u>												X

TRANSECT DATA

OBSERVED SUBSTRATE AND MACRO-INVERTEBRATES

(3) NAUPUKA BEACH

<u>Substrate</u>	<u>Quadrate</u>										<u>Total</u>	<u>Present Only</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>		
<u>Montipora verrilli</u>	1			1	2			2			6	
<u>Montipora verrucosa</u>			1			1	1			1	4	
<u>Montipora flabullata</u>												X
<u>Pocillopora meandrina</u>	2					2					4	
<u>Pocillopora ligulata</u>				1							1	
<u>Pocillopora damicornis</u>					1						1	
<u>Porites lobata</u>	3	1	15		4	4	1	5	1	4	38	
<u>Porites compressa</u>	11	10	2		3	10	7	3	2		50	
<u>Porites sp.</u>	1	4		8	5		10	12		4	42	
<u>Palythoa sp.</u>												X
Dead coral	7	10	5	9	7	6	4	13	10	16	87	
Sand			2	3	1	2		2			10	
Family <u>Corallinaceae</u>				3							3	
<u>Amansia</u>							2				2	
<u>Halimeda</u>					2						2	
<u>Lyngbya</u>												X
											250	
<u>Macro-invertebrates</u>												
<u>Echinometra mathaei</u>				4		4			7		10	
<u>Echinometra oblonga</u>												X
<u>Tripneustes gratilla</u>				8		2	1	4		8	23	
<u>Eucidaris metularia</u>									2	3	5	
<u>Echinothrix sp.</u>												X
<u>Ophiuroidea</u>						3		2			5	
<u>Linckia diplex</u>												X
<u>Linckia multifora</u>	1		1								2	
<u>Calcita</u>												X

TRANSECT DATA

OBSERVED SUBSTRATE AND MACRO-INVERTEBRATES

(4) MAKENA BAY

<u>Substrate</u>	<u>Quadrate</u>										<u>Total</u>	<u>Present Only</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>		
<u>Montipora verrilli</u>				1							1	
<u>Montipora verrucosa</u>		1			1						2	
<u>Montipora flabellata</u>												X
<u>Pocillopora meandrina</u>												X
<u>Pocillopora molokensis</u>					2						2	
<u>Porites lobata</u>		5	1	2	2						10	
<u>Porites compressa</u>												X
<u>Porites sp.</u>		3	12								15	
<u>Dead Coral</u>		4		5	4						13	
<u>Palythoa sp.</u>												X
<u>Sarcothelia sp.</u>												X
<u>Family Corallinaceae</u>				5							5	
<u>Actinotrichia</u>												X
<u>Lyngbya</u>		8									8	
<u>Halimeda</u>												X
<u>Padina</u>												X
<u>Neomeris</u>												X
<u>Sand</u>	17	3			2	25	25	25	25	25	147	
<u>Sediment</u>			9	12	12	14					47	
											250	
<u>Macro-invertebrates</u>												
<u>Heterocentrotus mammilatus</u>												X
<u>Echinometra mathaei</u>			1	5	1						7	
<u>Eucidaris metularia</u>				4	2						6	
<u>Linckia diplex</u>			1	4	1						6	
<u>Tripneustes gratilla</u>				1	1						2	

TRANSECT DATA

OBSERVED SUBSTRATE AND MACRO-INVERTEBRATES

(5) PAAKO POINT (NORTH COVE)

<u>Substrate</u>	<u>Quadrat</u>										<u>Total</u>	<u>Present Only</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>		
<u>Montipora verrilli</u>												X
<u>Montipora verrucosa</u>												X
<u>Pocillopora meandrina</u>	2		2			4	5				13	
<u>Pocillopora damicornis</u>						2					2	
<u>Porites lobata</u>		2	2		1	2					7	
<u>Porites sp.</u>	1										1	
Dead coral	8		4		7	8	6				33	
Bare Rock	13										13	
Sand	1	17	12	20	7	4	4	25	25	25	140	
Family <u>Corallinaceae</u>		6	5	3	10	6	10				40	
<u>Rhodophyta</u>				1							1	
<u>Tolypiocladia</u>												X
											250	
<u>Macro-invertebrates</u>												
<u>Echinometra mathaei</u>	2	1			2		3				8	
<u>Echinometra oblonga</u>	1				2		1				4	
<u>Echinothrix</u>	2		1			8	1				12	
<u>Tripneustes gratilla</u>					1	1					2	
<u>Heterocentrotus mammilatus</u>	1					1					2	
<u>Ophiuroidea</u>	1						3				4	
<u>Hastula lanceata</u>												X
<u>Conus pulicarius</u>												X

TRANSECT DATA

OBSERVED SUBSTRATE AND MACRO-INVERTEBRATES

(6) PAAKO POINT (SOUTH COVE)

<u>Substrate</u>	<u>Quadrat</u>										<u>Total</u>	<u>Present Only</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>		
<u>Montipora verrilli</u>										4	4	
<u>Montipora verrucosa</u>												X
<u>Pocillopora meandrina</u>			4		2	3	2			2	13	
<u>Porites lobata</u>	2	3		4	5	2	2	1	6	4	28	
<u>Porites compressa</u>										1	1	
<u>Porites sp.</u>			1						1		2	
<u>Pavona varians</u>				2		1	3				6	
<u>Pavona explanulata</u>							2				2	
<u>Leptastrea bottae</u>		1									1	
<u>Psammocora verrilli</u>									2		2	
<u>Psammocora stellata</u>												X
<u>Palythoa sp.</u>												X
Dead coral	6	8	7	6	9	7	6	6		2	57	
Rock	12		5	9	2		6		6	12	52	
Rubble		6			5		2				13	
<u>Lyngbya</u>							2				2	
<u>Dictyota sp.</u>				1							1	
Family <u>Corallinaceae</u>	5	7	8	3	3	12		13	4	6	66	
											250	
<u>Macro-invertebrates</u>												
<u>Echinometra mathaei</u>	27	24	30	5	10	4	6	5	10	9	130	
<u>Echinometra oblonga</u>			1		2			2		1	6	
<u>Echinothrix sp.</u>		3		2	3		2	1		2	13	
<u>Heterocentrotus mammilatus</u>												X
<u>Ophiuroidea</u>				10	2	3	4	3		2	24	

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Scientific Name	Common Name	T1	T2	T3	T4	T5	T6	1	2	3	4	5	6
<u>Canthigasteridae</u>													
<u>Canthigaster epilamprus</u>	Puu olai			6			1			1.33			0.24
<u>Canthigaster jactator</u>			3				2			0.67			0.49
<u>Carangidae</u>													
<u>Caranx ignobilis</u>	Papio						1						0.24
<u>Scorpaenidae sancti-petri</u>	Lae		2	1				0.88	0.22				
<u>Chaetodontidae (Butterfly fishes)</u>													
<u>Chaetodon auriga</u>				2		5	1					2.76	0.24
<u>Chaetodon fremblii</u>	Kapuhali	2	2	15		2	8	0.88		0.44		1.11	1.94
<u>Chaetodon lunula</u>	Kikaka'pu			6			1			3.33			0.24
<u>Chaetodon millaris</u>	Lauwiliwili	8	6	19	2	5	15	2.63	4.22	2.30		2.78	3.64
<u>Chaetodon ornatissimus</u>	Lauhau	6	8	5		6	6	4.65	3.51	1.11		3.33	1.46
<u>Chaetodon unimaculatus</u>	Kikaka'pu	15	1	3	3	8	6	11.63	0.44	0.67	3.45	4.45	1.46
<u>Chaetodon unimaculatus</u>			10	7		1	2	4.39	1.56			0.56	0.49
<u>Cirrhitidae (Hawkfishes)</u>													
<u>Cirrhitus alternatus</u>	Po'o-paa	2	3	10	1	1	5	1.55	1.32	2.22	1.15	0.56	1.21
<u>Paracirrhites arcatus</u>	Piliiko'a						1						0.24
<u>Paracirrhites cinctus</u>	'O'opu-kaha'ha'i						7			0.44			1.70
<u>Paracirrhites forsteri</u>	Ulu piliiko'a		1	5			2	0.44	1.11				0.49
<u>Dicentridae (Porcupine fishes)</u>													
<u>Dicentrus hystrix</u>	'O'opu-kawa									0.44			
<u>Blenniidae (Squirrelfishes)</u>													
<u>Blennius diadematus</u>	Ala-'ihi kalaloo												
<u>Blennius lacteocinctus</u>	Ala-'ihi			6			3			1.33			0.73
<u>Blennius lewini</u>	'U'u, mepachi			4			8			0.89			1.94
<u>Blennius argenteus</u>	'U'u, mepachi												
<u>Kuhliidae</u>													
<u>Kuhlia sandvicensis</u>	Alolehole						10						2.43

Scientific Name	T1	T2	T3	T4	T5	T6	1	2	3	4	5	6
<u>Labridae (Wrasses)</u>												
<u>Ceptropus varius</u>	5	1	2		1	6	3.88	0.44	0.44		0.56	1.46
<u>Thalassoma lilloi</u>	10	10	19	2	6	5	7.75	4.39	1.33	2.30		1.21
<u>Thalassoma chrysiceps</u>		6	10	1	6	28		2.63	4.22	5.75	3.33	6.80
<u>Thalassoma fuscum</u>	3		5	1	2	10			2.22	1.15		0.49
<u>Thalassoma unireostigma</u>												
<u>Muraenidae</u>												
<u>Leurogobius sp.</u>												
<u>Mullidae (Coatfishes)</u>												
<u>Mullidichthys auriflamma</u>		6	5	2	7	4		2.63	1.11	2.30	3.89	0.97
<u>Mullidichthys sarzensis</u>	11	32		9	17	3		2.63				0.73
<u>Parupeneus bifasciatus</u>			2	1	9	19	8.53	14.04		10.35	9.45	4.61
<u>Parupeneus chrysoides</u>			2	1	2	7			0.44		5.00	1.70
<u>Parupeneus multifasciatus</u>		11	18	2	6	3		4.83	4.00	1.15	1.11	0.73
<u>Parupeneus pleurostigma</u>	1					15				2.30	3.33	3.64
<u>Pomacentrus karyocentrus</u>	6	5	9	3	6	15	0.24	2.19	2.00	3.45	3.33	3.64
<u>Pomacentrus karyocentrus</u>			4			2	4.65	0.89				0.49
<u>Muraenidae (Moray Eels)</u>												
<u>Echinops zebra</u>	1		2			1	0.78		0.44			0.24
<u>Gymnothorax javanarginatus</u>						1						0.24
<u>Gymnothorax undulatus</u>			2			1			0.44			0.24

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APPENDIX C

APPENDIX C
ARCHAEOLOGICAL AND HISTORICAL SITES
PROPOSED MAKENA ROAD

I. Previously Recorded Sites

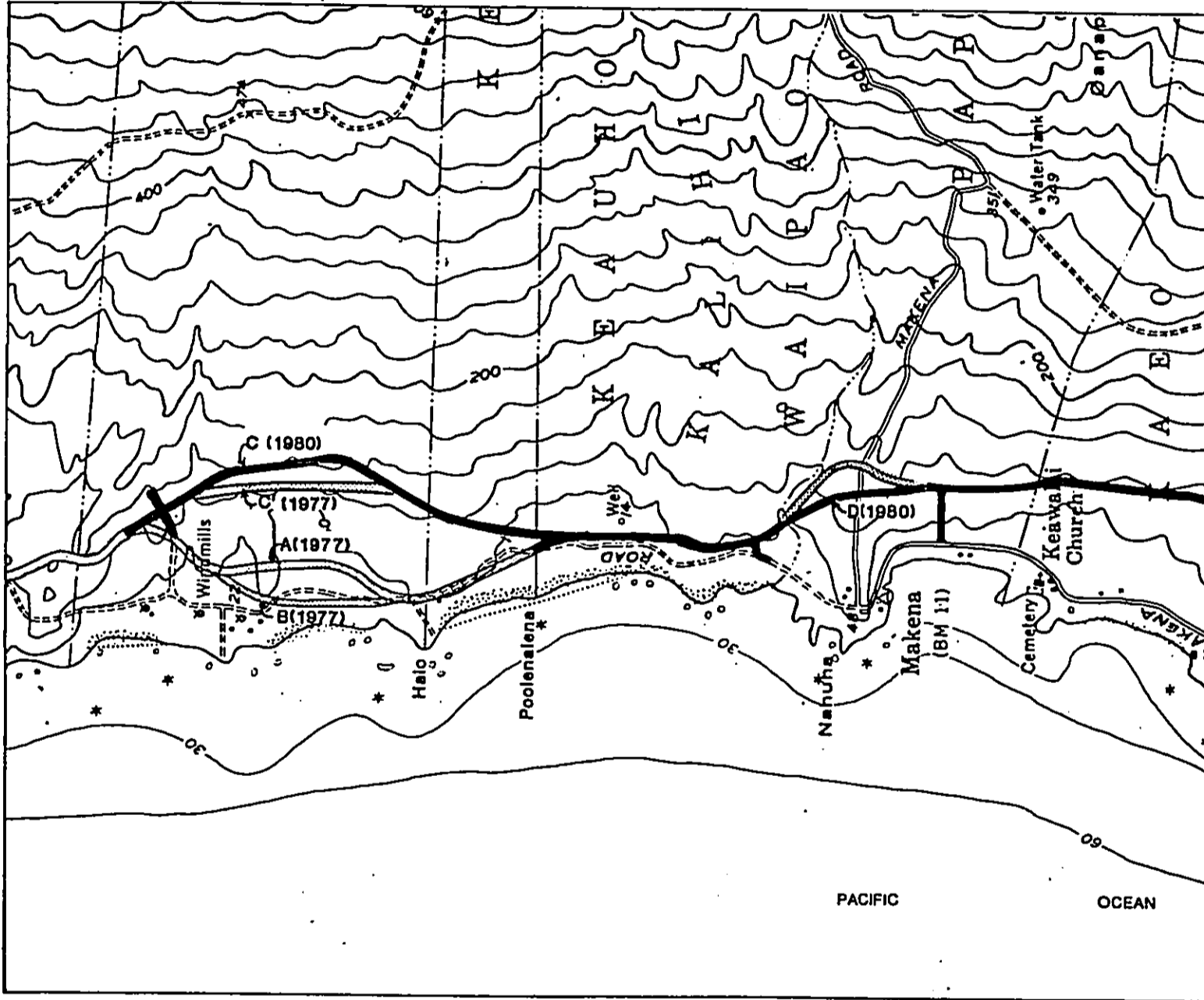
Eleven previously recorded archaeological sites are located along the proposed corridor (Davis and Bordner, 1977). Briefly, from north to south, these are described below. Abbreviations and Hawaiian terms used in the discussion are defined on page C-28. Refer to Figure C-1 for locations of the alternate alignments and Figure C-2 (page C-15) for the archaeological sites.

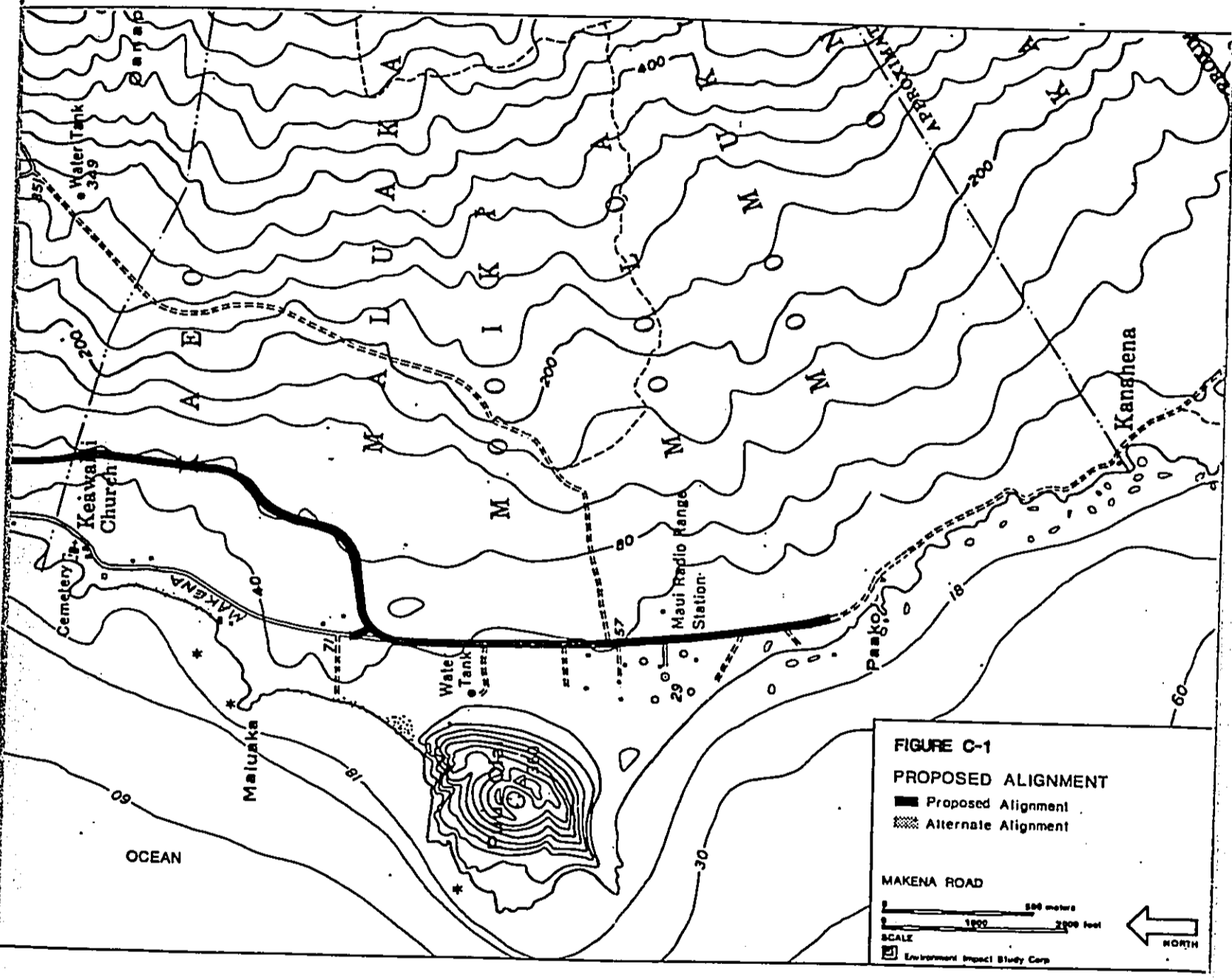
- Site 1028* - Palaeua Landing Complex (Kirch 1970, 1971) located in the ahupua'a of Palaeua c. 30 m. (100 ft.) mauka of Station 8+00.**
- Site 1029 - Palaeua (Heiau) Complex (Kirch 1970, 1971) also located in Palaeua between Alternate alignments A and B at Station 20+00.
- Site 1027 - Palaeua Cattle Pen (Kirch 1969:9) located in Palaeua extending across Alternate Alignments A and B at Station 21+00.
- Site 1030 - Halo Point Ko'a (Sterling n.d.) also located in Palaeua; although this site is well makai of the present study area, it has been included for completeness.

*All site numbers used in this report are State Historic Register accession numbers. Each site number is unique for the region and is prefixed by the code 50-50-14-, designating the State of Hawaii (50), the Island of Maui (50) and the Mākena region, covered by the Mākena Quadrant (14) of the U.S.G.S. topographic series.

** Station numbers refer to engineering markers.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100





- Site 1362 - Papa'a-nui Platform (Kirch 1969:10) located in the ahupua'a of Keauhou at Station 45+50.
- Site 1361 - Papa'a-nui Heiau (Kirch 1969:10) also located in Keauhou c. 65 m. (213 ft.) mauka of Station 48+00.
- Site 197 - Pōhaku-nā Heiau (Walker 1931:268) located in the ahupua'a of Papa'a-nui; this site is makai of the study area.
- Site 196 - Ka-lani Heiau (Stokes 1916; Walker 1931:267) located in the ahupua'a of Ka'eo, also makai of the study area.
- Site 1266 - Mākena Complex (Bernice P. Bishop Museum File, n.d.) located in the ahupua'a of Ka'eo and Maluaka, outside the study area on the makai side of the existing coast road.
- Site 1019 - Pa'ako Point Ko'a (Walker 1931:102-103) located in the ahupua'a of Mo'omoku on the makai side of the existing road at approximately Station 185+00 (projected).
- Site 1018 - Ma'ona-ka-la Village (Emory and Hommon 1972:53-57) located in the ahupua'a of Kanahena on the coast just beyond the end of the project corridor.

In addition to the above, approximately 265 historic and prehistoric cultural features have been recorded in the ahupua'a of Maluaka, Mo'oiki and Mo'oloa (Clark, 1974). Of these, an estimated 10 sites, most of which appear to be historic, are located in the general vicinity of the corridor from Ulupalakua Road to Puu Olai. It is uncertain just which of these remains may be impacted by the proposed alignment.

II. Archaeological Reconnaissance, March, 1977

An archaeological survey was conducted during March, 1977 to determine if any unrecorded cultural sites were present along the proposed Makena Road alignment, including Alternates A and B. This study identified 17 additional cultural sites along the proposed alignment between Wailea Alanui Drive and Puu Olai. Another 11 archaeological complexes were located in the area from Mo'oiki ahupua'a south to Kanahena ahupua'a. In the following, the 17 sites located in the northern portion of the project area will be described briefly. Mauka or makai references are relative to the center line of the alignment(s).

Site 232: Wall. This is a large, well-constructed core-filled wall of aa clinker c. 50 cm. (20 in.) wide and averaging 125 cm. (49 in.) high. The wall parallels the mauka (inland) side of the corridor in Alternate Alignment B. The north end of the wall dog-legs mauka for c. 325 m. (1,050 ft.) following along the edge of a "large" gully on the north side of Site Complex 1028. A large wall section of the same construction and proportions follows along the same gully farther inland (Site 200, Walton 1972:10). It is probable that these are sections of the same wall and that it was associated with historic ranching in the region.

Site 233: Platform and Mounds. Three features are located on the makai boundary of the corridor. The first is a small platform of stacked aa measuring 2.5 X 5 m. (8 X 16

ft.) by c. 50 cm. (20 in.) high. The two mounds are c. 1 X 2.5 m. (3 X 8 ft.) and c. 2 X 3 m. (6 X 10ft.); both are of stacked aa to a height of 40-50 cm. (16-20 in.). Rock mounds of this sort frequently contain human burials.

Site 234: Mound. This mound, also constructed of stacked aa, is located at the south end of Wall 232 in Alternate Alignment B. It measures 3 m. (10 ft.) in diameter and stands c. 100 cm. (39 in.) high.

Site 235: Wall and House Complex. This is an extensive complex of enclosure walls, or possibly boundary or cattle walls, which may be associated with Site Complex 1027, along with what appear to be two smaller house enclosures. The first of the smaller enclosures (Feature A) is a roughly rectangular structure c. 4 X 8 m. (14 X 26 ft.) located 25 m. (82 ft.) mauka of Alternate Alignment A. The second enclosure (Feature B) is c. 7 X 8 m. (23 X 26 ft.) and apparently adjoins one of the larger walls c. 80 m. (262 ft.) mauka of Alternate Alignment A. In addition to shell midden found in both features, fragments of branch coral, water-worn coral, and basalt pebbles (possibly 'ili'ili paving) were found in Feature B, indicating that these may have been house sites. As for the larger walls, most are of rather crudely stacked aa; however, size, construction, and overall "quality of appearance" varies greatly, so that not all of these features may be contemporaneous.

Site 236: Wall. This site includes several sections (cut by recent bulldozer activity) of a north-south trending wall along the makai side of the corridor. It is a historic wall of core-filled construction and probably associated with cattle ranching (Kirch, 1969:10). The wall was built against the Papa'a-nui Platform, Site 1362.

Site 237: Mound. This mound of stacked aa, c. 3 m. (10 ft.) by c. 75 cm. (30 in.) high, is located on the makai side of the existing road in Alternate Alignment B.

Site 238: C-Shaped Shelter. This feature is located c. 25 m. (82 ft.) mauka of Alternate Alignment A. It measures c. 2 m. (7 ft.) in diameter and is constructed of stacked aa clinker to a height of 30 cm. (12 in.). No midden or other surface remains were seen.

Site 239: Enclosure. This site is located 30-40 m. (100-131 ft.) mauka of the corridor. It is a small, c. 1.5 X 2 m. (5 x 7 ft.), structure built on a low artificial terrace against the north bank of a shallow wash. The back (north) wall of the enclosure stands c. 75 cm. (30 in.) high and serves as a retaining wall against loose materials sliding down the bank of the wash. The terrace is a narrow, levelled area extending c. 6 m. (20 ft.) to the southeast (mauka) from the enclosure. It is faced with stacked aa and raised an average of 45 cm. (18 in.) on the downslope side. The site is in generally poor condition and no midden

nor other surface remains were found in the enclosure or on the terrace. Based on the size of the enclosure and its association with an artificially terraced area, it is possible that this may have been a house site with an adjoining garden patch.

Although no surface remains were found with the above features, an area of bulldozer disturbance c. 20 m. (66 ft.) to the southwest (makai) of the enclosure produced two well-made basalt plummet sinkers from the rubble.

Site 240: Enclosures. Two square enclosures of stacked aa clinker are located on a low ridge in Alternate Alignment A. The larger structure (Feature A) is out on the ridge and opens to the southwest; the smaller structure (Feature B) is just down behind the ridge c. 3 m. (10 ft.) to the south and opens to the south. The enclosures measure c. 2.5 m (8 ft.) square and c. 2 m. (7 ft.) square respectively and both are stacked to c. 110 m (43 ft.) in height. Several water-worn basalt rocks were found immediately mauka of the site. No midden or other surface debris was seen in these features.

Site 241: Wall and Enclosure Complex. This site is a complex of two generally north-south trending walls, a lava-tube shelter, and small stone platform. Both walls parallel the mauka side of Alternate Alignment B. The mauka wall is c. 40 m. (131 ft.) from the corridor and is of

substantial core-filled construction c. 60 cm. (24 in.) wide by c. 125 cm. (49 in.) high. It is probably a historic cattle wall since it abuts a cattle enclosure with a watering trough (part of Site Complex 1027) at the north end and the wall angles off, continuing inland out of sight. The makai wall is only c. 18 m. (59 ft.) from the corridor. This is much cruder in construction, being of stacked aa clinker only one or two courses wide and varying in height from 50-75 cm. (20-30 in.).

The lava-tube shelter (Feature A) is formed by a small overhang c. 3 m. (10 ft.) deep with an average ceiling less than 100 cm. (39 in.) high. There is a fair deposit of sediments on the floor, including some shell, sea urchin and coal midden. The shelter is located in the north face of a lobe of pahoehoe lava across the corridor. The entrance is c. 12 m. (39 ft.) mauka of Alternate Alignment A.

The platform (Feature B) is located c. 6 m. (20 ft.) mauka of the corridor. It measures c. 5 X 6 m. (16 X 20 ft.) and is constructed of stacked aa c. 75 cm. (30 in.). The makai wall was apparently built against or abuts the makai side of this platform. Moreover, the remains of what appears to be a low collapsed wall were found around the edges of the platform. A considerable amount of coral was also found mixed in this debris, suggesting that the platform could have been a ko'a, or fishing shrine. It

further suggests that the makai wall, if directly associated with the platform, may also be prehistoric.

Site 242: Walls. This site includes various sections of what are apparently historic cattle walls located along the mauka side of the corridor. The remaining sections are all of core-filled construction and are probably part of the same north-south system of walls which undoubtedly included Site 232, 1027, 241, and 236.

Site 243: Lave-tube Shelter Cave. This site is located south of the Mākena - 'Ulu-pala-kua Road c. 23 m. (75 ft.) makai of the corridor. Compared with most of the other sites, this and Site 247 (see below) is situated rather far from the coast, c. 350 m. (1,148 ft.). It is a shelter cave formed by an overhang of a pahoehoe lava-tube measuring c. 3 m. (10 ft.) across the front by c. 1.2 m. (4 ft.) deep with an average ceiling of less than 100 cm. (39 in.). A fair deposit of sediment containing some shell, sea urchin, and coral midden was found on the floor and extended out the front of the cave. The center portion of the ceiling has collapsed, limiting the floor area available for testing.

Site 244: Enclosure. This site is located c. 3 m. (10 ft.) mauka of the corridor. It is a moderate-size structure c. 7 m. (23 ft.) square with, for its size, rather substantial constructed core-filled walls c. 100

cm. (39 in.) thick. Fragments of coral were found on the floor and in the walls of the enclosure. This site is apparently associated with the Papa'a-nui Platform (Site 1362) c. 34 m. (111 ft.) makai and the Papa'a-nui Heiau (Site 1361) which is c. 107 m. (351 ft.) to the southeast. The function of this feature is uncertain, but the apparent inclusion of coral into the construction of the walls and the seeming association of the structure with the platform and the heiau (temple) suggests that it may have served as a ko'a, or fishing shrine.

Site 245: Heiau and Enclosure. Two large, adjoining platform-terraces (Feature A) are located on a ridge c. 40 m. (131 ft.) makai of the corridor. The two levels of the structure extend mauka-makai c. 46 m. (150 ft.) end-to-end along the spine of the ridge and are c. 15 m. (49 ft.) wide. Both sections are faced with stacked aa clinker on three sides. The downhill end of each level is raised c. 1.5 m. (5 ft.). There is also a free-standing stacked wall c. 1.5 m. (5 ft.) high at the rear (mauka end) of the upper level. Remnants of 'ili'ili paving were found on both levels, with fragments of large cowrie (Cypraea sp.) shell scattered about the upper level. In addition, two "watermelon-sized" water-worn basalt beach stones were also found together on the upper level; and it is possible that these may represent pohaku 'aumakua (Buck

1964:496). As such, and because of its overall size and rather substantial construction, this feature has been provisionally identified as a heiau, or temple.

The enclosure (Feature B) is located on another ridge c. 40 m. (131 ft.) to the south and c. 30 m. (100 ft.) makai of the corridor. This structure measures c. 9 X 11 m. (30 X 36 ft.) and is constructed of stacked aa c. 60 cm. (20 in.) high. Apparently associated with the enclosure, a pebble pavement c. 10 m. (33 ft.) in diameter is situated immediately in front (makai) of the structure, and a low, piled ahu, or rock mound, c. 3 m. (10 ft.) in diameter by c. 50 cm. (20 in.) high is located c. 15 m. (49 ft.) to the southeast. The enclosure was previously identified by Hommon (1976).

Because of the general proximity of the two features, the "heiau" and the enclosure are tentatively listed as a single site complex. The potential significance of this site cannot be underestimated, particularly since the "heiau" (Feature A) appears to still be structurally intact. Although it is beyond the proposed realignment, access to this site will be substantially increased with the completion of the new road behind the site and the expanded use of the fine beach area below. Although this impact may be indirect, it will increase considerably the opportunity for disturbance of the site by the curious or by vandals.

Site 246: Enclosure. This is a quite large, high-walled enclosure located c. 12 m. (39 ft.) makai of the corridor. It measures c. 5 X 8 m. (16 X 26 ft.) and is constructed with heavy core-filled walls c. 100 cm. (39 in.) averaging 1.8 m. (6 ft.) high all around. There is no doorway in the walls, nor was any midden or other debris seen in or around the enclosure.

Site 247: Midden Deposit and Ahu. Both features are located c. 53 m. (174 ft.) makai of the corridor at c. 85 m. (279 ft.) north of the shelter cave Site 243. The ahu (rock mound) is stacked aa c. 1.5 m. (5 ft.) in diameter by c. 30 cm. (12 in.) high. The midden deposit is mostly broken shell with some sea urchin and coral fragments scattered over a 3-4 meter (10-13 feet) area.

Site Complex 248: Walls, Enclosures and Platform. On both sides of the corridor is an extensive aggregate of boundary walls, cattle walls, enclosures, stock pens, and other apparently historic features undoubtedly associated with the recent utilization of the area for cattle ranching. In addition, the extensive remains of an abandoned (date uncertain) homestead with a collapsed wooden house and related structures are located in the vicinity.

As previously mentioned, in an earlier reconnaissance conducted by Clark (1974) 10 archaeological sites were identified in the general vicinity of the present corridor.

In general, it cannot be determined which of the features recorded by the present study are also those identified previously by Clark without more detailed information on site location. However, two sites do compare favorably with Clark's report. The first is a circular enclosure c. 6 m. (20 ft.) in diameter and built of aa clinker c. 100 cm. (39 in.) high. This is located c. 5 m. (16 ft.) mauka of the corridor. The second site is a large, well-built platform of aa measuring c. 5 X 6 m. (16 X 20 ft.) and raised c. 50 cm. (20 in.). What appeared to be the remains of 'ili'ili paving were found on the platform. This site is located c. 20 m. (66 ft.) makai of the corridor.

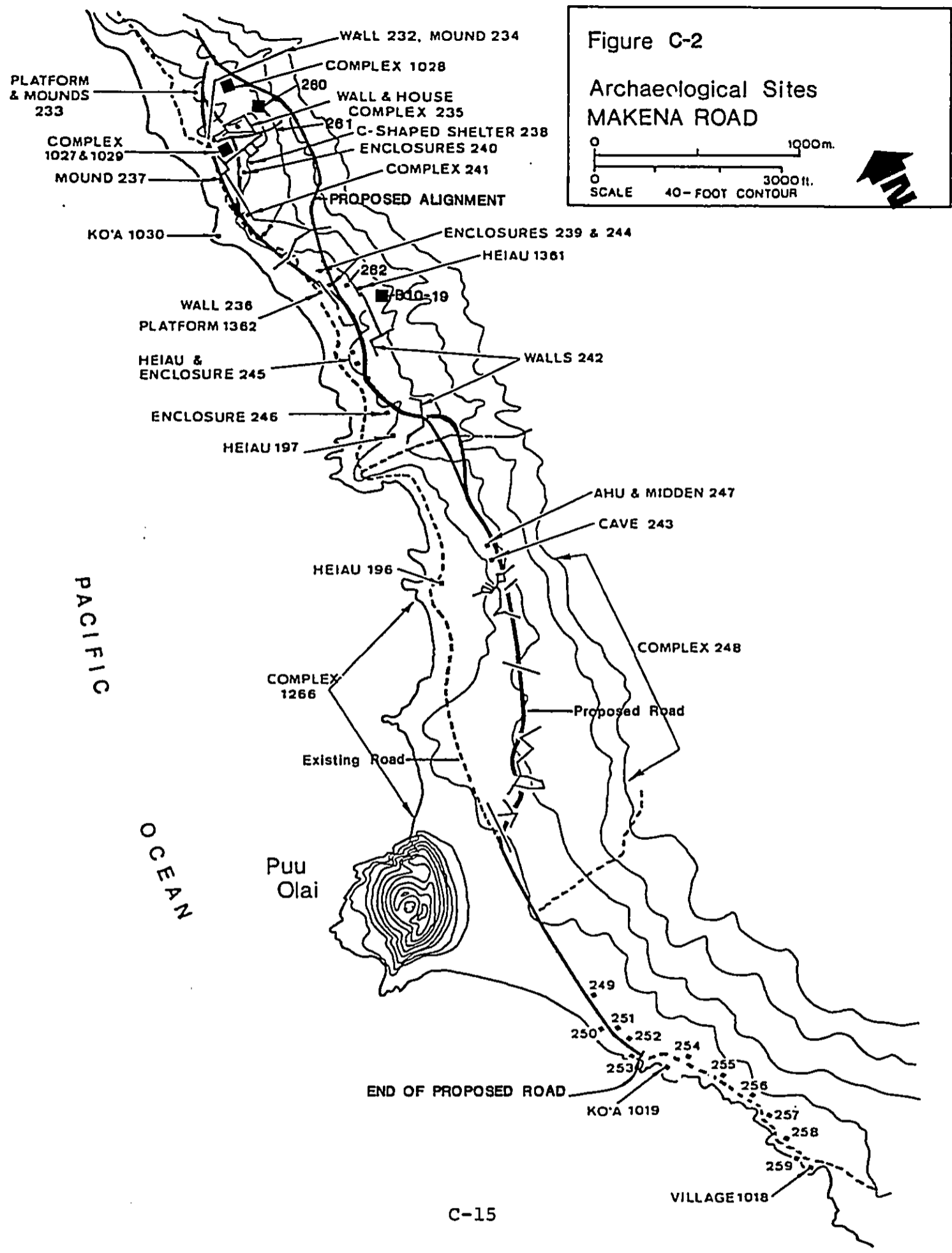
These sites were previously designated by the Bernice P. Bishop Museum site numbers, B8-74 and B8-48(?) respectively (Clark 1974:16,20). Three other previously recorded sites not found by the present study are of possible concern: two habitation enclosures and another large platform. These sites were designated by the Bishop Museum as B8-42, B8-43, and B8-47, respectively. These sites should be relocated and, together with the two above, examined and re-evaluated.

Finally, the 11 site complexes located in the southern portion of the project area are described below. For the moment, these remains will be treated under the general

category of "site complex". This is largely because previous work in the area, and the time available for the present study, was limited and individual site boundaries have not yet been determined. To date, the Pa'ako Point Ko'a (Site 1019) is the only previously known site along this section of the corridor. Ma'ona-ka-la Village (Site 1018) at Ahihi Bay in Kanahena had been recorded earlier, but it lies beyond the end of the proposed road project. Refer to Figure C-2. There are no archaeological maps, as such, for this approximately 1.4 kilometer (0.87 mile) portion of the Mākena coast.

Site Complex 249: Enclosures. This is a pair of large, high-walled enclosures generally oriented mauka-makai and sharing common walls along the mauka (southeast) side. The combined structure measures c. 10 X 15 m. (38 X 49 ft.) with core-filled walls c. 150 cm. (59 in.) high. Two low terraces faced with aa clinker are situated on the makai side of the enclosures, and a pair of lava-bubble shelters are located to the south. Scattered fragments of coral and shell midden, and remnants of 'ili'ili paving were found inside the enclosures and out on the terraces. This complex is located c. 5 m. (20 ft.) mauka of the road.

Site Complex 250: Village. Located between the existing road and the beach is an extensive complex of badly



collapsed structures including wall segments, enclosures, platforms, pavements, and possible house sites. Coral fragments and shell midden was scattered throughout. A large amount of brown bottle-glass, larger fragments of which indicate predominantly seamless bottles, were also found in various "dumps". This complex has been tentatively identified as a "village" and may be comparable to other settlements recorded along the Mākena coast in Palauea (Site 1028), in Kanahena (Site 1018), and at La Perouse Bay (Site 1385).

Site Complex 251: Platform-terrace, Enclosure and Shelters. This is a cluster of features situated on a bluff c. 20 m. (66 ft.) mauka of the road. The major structure (Feature A) is a natural outcrop stabilized with aa-clinker facing on three sides forming a platform oriented mauka-makai c. 6 X 9 m. (20 X 30 ft.) and raised c. 100 cm. (39 in.) on the downhill end. There is a lava-bubble at the mauka end. The north-half of the bubble has split off and the platform continues back along that side as a terrace c. 2 X 8 m. (7 X 26 ft.). The entire floor of the structure is paved with 'ili'ili; a large amount of coral and shell midden is also scattered about. Pieces of leather, fragments of black bottle-glass (seamless), and a section of calabash were found under the overhang of the lava-bubble. From its concentration, it

is certain that this is a prehistoric feature, possibly a heiau or a very-well preserved house site, which had been reused in historic times.

Two C-shaped shelters (Feature B) are located on the same bluff 2-3 m. (7-10 ft.) makai of the platform-terrace. Both are of stacked aa c. 2 m. (7 ft.) in diameter by 50-75 cm. (20-30 in.) high, and both are open to the north.

A small platform (Feature C) of stacked aa measuring c. 2 m. (7 ft.) square, and an enclosure (size not recorded, probably historic pen) are located on a low-lying flat below the other features.

Site Complex 252: Shelters and Platform. A pair of C-shaped shelters (Feature A) c. 2 m. (7 ft.) in diameter are located on a rise of ground mauka of the road. Feature B is a stone platform just behind (mauka) the shelters. 'Ili'ili paving, coral, and shell midden were found with the platform; midden was also found in the shelters.

Site Complex 253: Enclosures. A large enclosure oriented mauka-makai c. 4 X 5 m. (13 X 16 ft.), with interior stone alignments parallel to the short side, is located makai of the road. A smaller enclosure c. 1.2 X 1.5 m. (4 X 5 ft.) is located nearby. Shell and coral midden was found in both features.

Site Complex 254: Enclosures. This is an extensive aggregate of structures mauka of the road. The major

feature of this group is a large, high-walled, two-room enclosure (Feature A) c. 20 m. (66 ft.) from the road. The outer walls measure c. 17 X 35 m. (56 X 115 ft.) and are c. 120 cm. (47 in.) high by 50-100 cm. (20-39 in.) thick. 'Ili'ili paving was found on the floor of the interior room, and coral and shell midden was generally scattered about. A second enclosure (Feature B) measuring c. 10 X 20 m. (33 X 66 ft.) is located c. 18 m. (59 ft.) to the south.

Site Complex 255: Platform, Enclosure and Well.

This feature is located on the mauka side of the road. The platform (Feature A) is a natural feature with stacked aa facing and rubble fill to even out the contours. Shell midden was found scattered about the platform. Feature B is what appears to be a brackish-water well c. 20 m. (66 ft.) to the north near the road. A small enclosure of stacked aa walls, also incorporating a natural outcrop, is located just mauka of the well. Midden with shell and fishbone was found in this enclosure.

Site Complex 256: Platform and Enclosures. A platform of stacked aa and a small enclosure are located on the mauka side of the road. Coral and shell midden was found in both features. A second enclosure is located c. 15 m. (50 ft.) to the north. The inside of this feature has an earth floor, but is otherwise unpaved. Some coral was found on the floor.

Site Complex 257: Platform-Terrace. This is a large structure utilizing a natural formation as the major component of construction. Walls of stacked aa with rubble fill even out the natural contours. Various apparently historic walls form a large, irregular enclosure about the platform, but do not seem to be directly associated with it. This site is located on the mauka side of the road.

Site Complex 258: Enclosure. Located on the mauka side of the road is an enclosure of stacked aa walls with shell midden and 'ili'ili paving throughout.

Site Complex 259: Enclosure and Shelter. A lava-bubble shelter is located c. 5 m (16 ft.) makai of the road. A low wall of stacked aa partially encloses a small area fronting the shelter on the north and makai sides. This wall may possibly be only a windbreak protecting the entrance to the shelter. Fragments of coral and shell midden were found on the floor of the shelter, behind the enclosing wall and scattered about the area beyond.

In addition to the features described in the foregoing, numerous historic wall sections paralleling the road or running mauka-makai, cattle enclosures, and smaller pens were observed all along this portion of the alignment.

III. Archaeological Reconnaissance, November, 1977

An archaeological survey was conducted during November, 1977 to determine if any unrecorded cultural sites were

present along proposed Alternate "C¹" of the Makena Road. This study identified four additional sites, which are described below.

Site 260: Platform. This site is located immediately south of the Palauea Landing Complex (Site 1028) about 6 m. (20 ft.) east of Station 14+50 (projected). It is built on the end of an east-west trending spur of high ground.

The platform is somewhat of a trapezoid shape, built to provide a larger level area on the rather narrow ridge-line. It is a substantial structure, partially enclosed on the north and east sides by low, heavy walls of core-filled construction 50 cm. (20 in.) or more high and 100 cm. (39 in.) thick. A short section of the north wall extends onto the platform floor marking off a small area in the northeast corner. The top of the south wall is flush with the platform floor and raises that side of the structure 30-50 cm. (12-20 in.) above the descending hillside. The diagonal northwest wall has largely fallen away down the steep hillside, but remnants show this side of the platform to have been at least 30 cm. (12 in.) higher than the ground outside. At the southwest and southeast corners of the structure, the walls are widened and raised above the floor level, forming two small, triangular "platforms."

A stone-paved platform c. 3 x 4 m. (10 x 13 ft.) abuts the center of the south wall outside the main structure, and a small enclosure c. 2 x 3 m. (7 x 10 ft.) is built into the east wall. Possible remnants of 'ili'ili paving, coral fragments, and shell midden, including Conus, Cypraea and Nerita, was scattered over the main floor of the structure.

Situated on a prominent ridgeline, this site affords a commanding view of the Palauea Heiau Complex (Site 1029) to the southwest below. Under prehistoric vegetation conditions, Site 1028 would also have been clearly in view to the north. Considering the size of this structure when in good repair, it must also have been quite visible from these sites. As such, the platform may possibly have been a heiau or other similarly important feature within the overall Palauea settlement.

Site Complex 261: Enclosure, Platform-Terraces, Walls, etc. This complex of apparently both prehistoric and historic features is located on the next ridgeline south of Site 260, and almost directly above Palauea Heiau (Site 1029), which is clearly visible from Feature F of this complex. The sited area extends for approximately 60 m. (200 ft.) east from the alignment between Stations 16+50 and 20+00 (projected).

The site complex includes several large (c. 120 cm.

high x c. 75 cm. wide [48 x 30 in.]) stone cattle walls of both core-filled and multiple stacked construction. The walls are generally mauka-makai. One section continues makai below the site to join with similar walls previously recorded in Site Complexes 235 and 1027 (the Palauea Cattle Pen). Eight additional features, most of which appear to be prehistoric, complete the inventory in this complex.

Feature A is a large box-U structure c. 6 x 7 m. (20 x 23 ft.) and opening to the west. The walls are core-filled stone construction 100-130 cm. (39-51 in.) thick and 75 cm (30 in.) high. Historic cattle walls abut the northwest and southeast corners. The southeast corner of the structure is built with a vertical 45°-chamfer where an elevated ramp (Feature B) cuts through the abutment of the cattle wall and the larger structure. It seems likely that this feature is contemporaneous with the cattle walls and that it may also have been associated with ranch activities.

Feature C is an ahu of a'a clinker, c. 3 m. (10 ft.) in diameter and 50 cm. (20 in.) high. This was the only such feature in Site 261, and therefore does not seem to have served an agricultural function such as the terrace (Feature G) downhill. The function of this ahu remains uncertain, but the possibility that it may be a burial mound must be considered.

Feature D is an enclosure formed by two stone walls built against a rock outcrop. Both walls are about 8 m. (26 ft.) long and, although badly deteriorated, were about 75 cm. (30 in.) wide by 35+ cm. (14 in.) high. The interior of the enclosure was an earthen floor with loose, scattered stone. No midden was seen on the surface; however, this is tentatively considered to be prehistoric feature.

Downhill from these features the grade becomes quite steep. Two platform-terraces are built against the hillside. Feature E measures 3 x 6 m. (10 x 20 ft.) and stands c. 130 cm. (51 in.) high on the downhill side. The surface is "paved" with small pieces of a'a. Feature F is a larger structure measuring 4 x 10m. (13 x 33 ft.) and standing 100-150 cm. (39-59 in.) high on the downhill side. It has an earthen floor which seemed to be rather clear of rocks. No midden was found in either structure. Although the rock-free dirt floor of the larger structure may suggest use as a planting area, the same cannot be said of the other. Despite the lack of midden, similar features elsewhere have proven to be house sites. These features are therefore tentatively identified as habitation platforms.

Feature G, however, does appear to have had an agriculture function. It is a rather large, 10 x 10 m. (33 x 33 ft.), area of loose, granular sediments "terraced"

behind stone retaining walls c. 40 cm. (16 in.) high. The entire surface has been cleared of larger rocks.

Feature H is a C-shaped shelter of stacked a'a clinker at Station 20+00 (projected). It measures c. 2.5 m. (8 ft.) in diameter, stands 80 cm. (31 in.) high and opens to the west or southwest.

Site Complex 262: Enclosure, Platforms, Walls, etc. This apparently prehistoric complex of habitation and agriculture features is located 15-30 m. (50-100 ft.) east of Alternate Alignment C between Stations 43+00 and 45+00 (projected).

To the north, the site is bounded by a dry wash which opens out to a wide alluviated flat c. 30 x 30 m. (100 x 100 ft.) of largely loose, granular sediments. The flat (Feature C) is generally clear of rocks, suggesting a probable agricultural function. The flat is otherwise unmodified; if there had been a retaining wall holding the sediments, it is no longer in evidence.

Feature A is a large, low-walled enclosure built on a slight rise of ground. It measures 11 x 15 m. (36 x 49 ft.) with walls c. 30 cm. (12 in.) high and 100 cm. (39 in.) wide. The south wall, however, is built on a steeper slope and is 130 cm. (51 in.) wide and stands 175 cm. (69 in.) high at the southwest corner. All the walls are core-filled construction. The floor of the

enclosure is earth and loose, scattered stone. No midden was seen on the surface.

Feature B is a large, platform-terrace formed by a core-filled stone wall 34 m. (112 ft.) long, 100 cm. (39 in.) wide and standing 30 cm. (12 in.) high. A triangular, stone-paved platform c. 4 x 9 m. (13 x 30 ft.) abuts the downhill side of this wall and is c. 100 cm. (39 in.) high above the ground at the northwest corner. From here, the ground slopes sharply away to more than 2 m. (6 ft.) below the level of the platform. The main level of the platform-terrace measures 4 x 18 m. (13 x 59 ft.) The area adjacent to the triangular platform is paved with stone; the rest of the floor is dirt cleared of larger stones. A stone alignment c. 30 cm. (12 in.) high forms the inland side of the feature. Again, no midden was seen on the surface.

Feature D is a low, amorphous rock mound of unknown function.

Much of the surrounding terrain to the east, south and west has been bulldozed clear for Alternate Alignment A of the proposed road corridor and for the construction of a new golf course. However, several major archaeological features have survived nearby.

Site B10-19 - (Bishop Museum number, no State number known). Identified as possibly a large pahale or stone-walled house enclosure

(Cleghorn 1976a:30) is located 91 m. (300 ft.) to the southeast.

- Site 1361 - Papa'a-nui Heiau (Kirch, 1969:10) is located 46 m. (150 ft.) to the south.
- Site 1362 - Papa'a-nui Platform (Kirch, 1969:10) is located 46 m. (150 ft.) to the southwest.
- Site 244 - Identified as a possible ko'a or shrine (Davis and Bordner, 1977:17) is located 30 m. (100 ft.) to the southwest.

In addition, an extensive complex of house enclosures, platforms, ahu, walls and so on had been recorded in the present golf course area to the immediate south of Site B10-19. Excavations conducted in this complex and at Site B10-1 and B10-3 farther to the south (Cleghorn, 1976a, 1976b) clearly demonstrated prehistoric occupations, which, together with the proximity of the Papa'a-nui Heiau (Site 1361) generally supports the inferred prehistoric date for Site Complex 262, and suggests that it is part of the same settlement.

Site 263: Wall. This is a large, core-filled stone wall c. 150 cm. (59 in.) high and c. 75 cm. (30 in.) wide. It extends some 61 m. (200 ft.) mauka-makai, crossing Alternate Alignment C at Station 24+50 (projected). This is considered to be a historic cattle wall.

IV. Archaeological Reconnaissance, March, 1980.

An archaeological survey was conducted during March, 1980 to determine if any unrecorded cultural sites were

present along proposed Alternate Alignments C or D. Two sites are located within proposed Alternate Alignment C. The first is the previously mapped and discussed Bishop Museum Site Complex 1028. The upper structures of the complex, specifically the gulch boundary wall and two C-shape habitation structures, are located within the boundaries of the new alignment. As this site extends up to the present limits of hole fourteen of the Wailea Golf Course, there appears to be no feasible way that the proposed alignment could avoid impacting the upper portion of the site complex (Bordner, 1980).

The second site consists of the mauka extension of Site 261. Within the new alignment, only the historic cattle walls were visible, though there appear to be several features further mauka of the alignment; specifically, a C-shape and possible agricultural terrace features. However, the proposed road alignment will not impact these structures.

One archaeological site is located within Alternate Alignment D, which crosses Ulupalakua Road. It is a portion of the previously discussed Site 242, a historic cattle wall. The rest of this alignment appeared clear of archaeological remains.

V. INTERPRETIVE DISCUSSION (Davis and Bordner, Nov. 1977)

A. Settlement Patterns

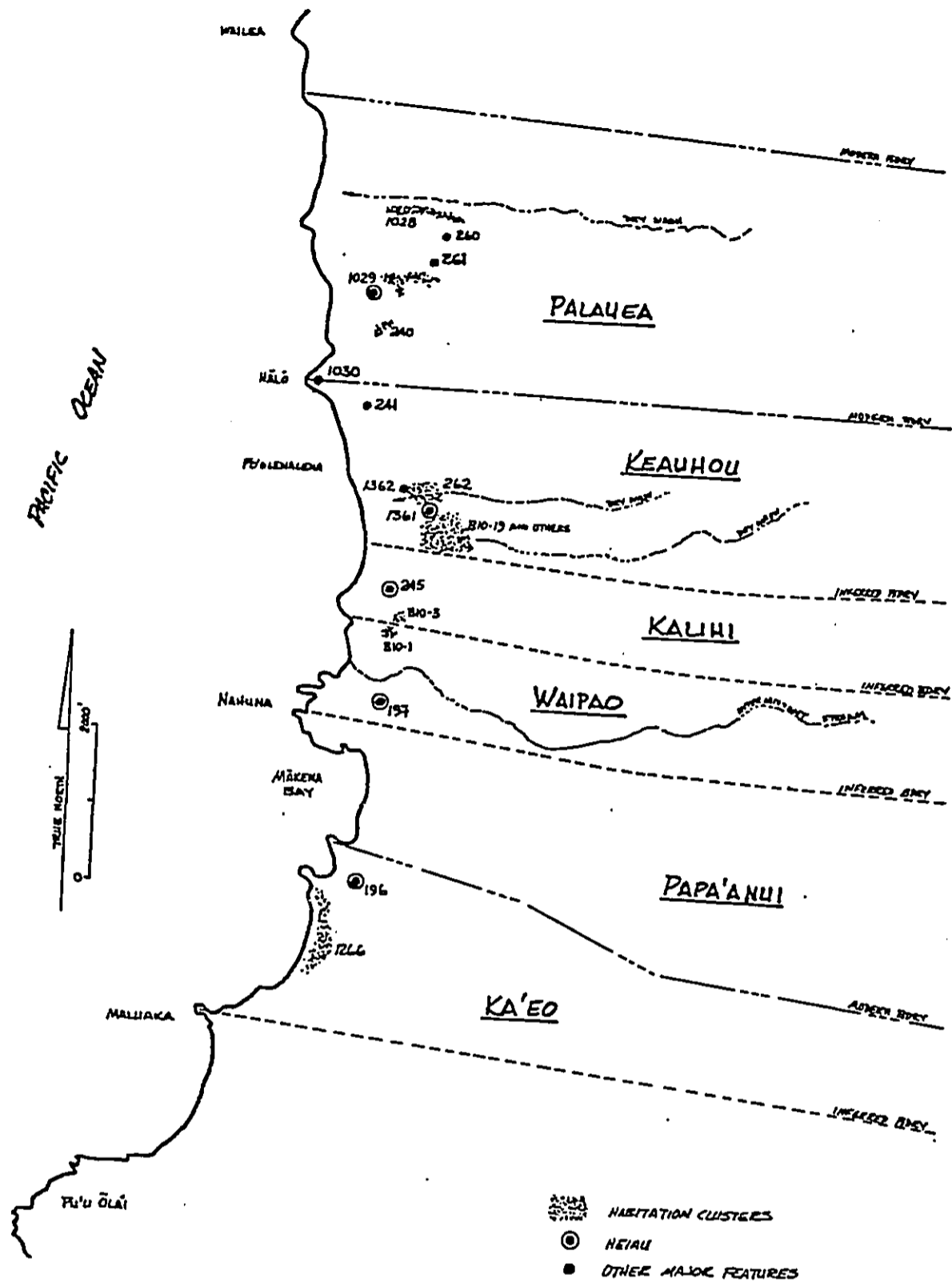
Several extensive investigations, including the present study, have now been completed in coastal Makena. The results of these studies have been to locate, map and salvage various prehistoric settlement complexes in Palauea, Keauhou, Kalihi and Waipao, and the Palauea Heiau Complex. In addition, several feature clusters and individual structures have been recorded from Wailea to Makena Bay. Although perhaps too early for anything but cautious speculation, there does seem to be an emerging pattern of feature distribution along this portion of the Makena coast.

Archaeological base maps presented in earlier reports show three ahupua'a land divisions from Wailea to Makena. North to south, these are Palauea, Keauhou and Papa'a-nui. The approximate boundary lines for these units on the base maps compare with those shown on U.S.G.S. topographic maps of the region. The Indices of Land Commission Awards (1929), however, lists five ahupua'a: Palauea, Keauhou, Kalihi, Waipao and Papa'a-nui. The U.S.G.S. maps, in fact, do label the two additional units within the red-lined boundary of Papa'a-nui, but without any sub-boundaries indicated. Moreover, a second Keauhou is also shown

between the northern red-lined boundary of Papa'a-nui and the approximate location of Kalihi.

For the purpose of the present discussion, let it be assumed that the boundary between Keauhou and Papa'a-nui, as shown on these maps, is in error, and, that the boundary should be correctly placed between the second (southern) Keauhou and Kalihi. With the map redrawn this way (see Figure C-3), the distribution of the sites in the region begins to assume a sense of order.

Taken together, Sites 235, 260, 261, 1028, and 1029, along with miscellaneous single features, comprise what may be inferred to have been part of a functionally integrated coastal settlement. The large heiau in Complex 1029 would then have served as the major feature or focus of this aggregate. The whole settlement area extends no more than 450 m. (1475 feet) inland from the coast and is centrally located between the northern and southern boundaries of Paluaea ahupua'a. The south boundary meets the sea at Halo Point. Site 1030, previously indentified as a ko'a, or fishing shrine, is located on this boundary at the coast. If the pattern for the relative location of "major" ritual structures and habitation features at Lapakahi (Tuggle and Griffin, 1973: 23-27) and at Kaloki (Tainter and Cordy, 1977:100-105),



SETTLEMENT AGGREGATES AND SUGGESTED AHUPUA'A BOUNDARIES, MĀKENA COAST, HONUA'ŪLA, EAST MAUI.

FIGURE C-3

Hawaii Island may serve as an analog here, then this structure may more properly be designated an ahupua'a. These were the alters marking the boundary of the land divisions of that name and which were the foci of the annual Makahiki rituals.

A similar structure has not been recorded for the posited boundary between Keauhou and Kalihi. However, Sites 244, 262, 1361, 1362, B10-19 and other associated features do form an aggregate comparable to that in Palauea. Here again, the large heiau (Site 1361) is seen as the focal point of the coastal settlement in Keauhou ahupua'a.

If the boundaries of Kalihi and Waipao are similarly extended, the the possible heiau (Site 245) and the Pohaku-na-haha Heiau (Site 197) would be located within these divisions respectively. At present, however, there are few structural remains documented for this area that would be comparable to those in Palauea and Keauhou. Only two habitation clusters have been recorded: B10-1 in Waipao and B10-3 in Kalihi.

As for Papa'a-nui ahupua'a, although a reconnaissance was done above Makena Bay, little detailed information has been accumulated to make any satisfying statements.

B. Residential Groups

Another aspect of this settlement pattern is residential groupings within the aggregated settlements. Since archaeological features are the physical remains of culturally patterned behavior, the definition of residential groups should provide information on social organization.

Based on their work with local informants in Ka'u, Hawaii Island, during the 1930's, Handy and Pukui (1972:1-14) described a model of Hawaiian social organization as it was known to the elders of the various families. The fundamental unit of this organization was the ". . . dispersed community of 'ohana, or relatives by blood, marriage and adoption" (Handy and Pukui, 1972:2). Within the dispersed community, the minimal residence group was defined to be the kauhale, or household. Although just what constituted the household is never clearly stated, it would seem, albeit based on rather "recent" recollection, that the household was usually comprised of more than a single nuclear family. That is, the kauhale contained several nuclear families residing in individual habitation structures (hale noa, sleeping houses) associated with a substantially larger men's house (mua) and possibly other functionally

specific structures. What apparently was not included among the features of the kauhale were those specifically religious or political in nature.

The division of household features was based on the kapu system, operating especially between the sexes, and which may have been a relatively late development in prehistoric Hawaiian society. However, on considering the dates obtained from Sites 1028 and B10-1, this model is nevertheless useful in examining possible residential groups within the aggregated settlements under discussion.

The following two sections will summarize and examine the data and interpretations from Kirch (1971) for Palauea and from Cleghorn (1976a) for Keauhou.

1. Palauea Landing Complex, Site 1028.

Fourteen features make up this settlement complex, nine of which were preliminarily as habitation structures. These include a large rectangular enclosure with an internal platform, 'ili'ili paving, and coral incorporated into the stone construction; two smaller stone-walled enclosures; and six C-shaped structures. None of these features bespeak other than domestic and economic activities.

In terms of size, construction and material content, including midden and artifactual remains, the large enclosure conforms well with the criteria for a men's house, or mua. Excavation in one of the smaller enclosures indicates that it is likely an individual residential feature, or sleeping house (hale noa). The second enclosure was not excavated. Tests in the C-shapes showed that the two larger structures were also residential features, and that the four smaller ones were most probably storage units, particularly since they were apparently paired with the residence structures.

Kirch, (1971:83-84), has suggested that this somewhat nucleated cluster of habitation features may very well represent a kulana-kauhale. This expression, however, is used by Handy and Pukui, (1972:7) to designate a group of kauhale comprising a village. Nevertheless, there seems to be no question that Site 1028 is a good example of a household.

2. Keauhou Settlement Complex, Site B10-19 and Others.

In addition to the large, stone-walled enclosure, Site B10-19, four site complexes were mapped at Keauhou: Sites B10-21, B10-22, B10-23 and

B10-24. A total of 65 features were identified, including large enclosures, small enclosures, C-shapes, platforms, terraces, walls and ahu. Test excavations were conducted in only three features of Site B10-21. The tests indicated that a small enclosure was a residential feature, and that two C-shapes were likely storage facilities as those in Palauea.

These preliminary results may be taken further, however, using the same criteria of feature size, construction and structural materials as at Palauea (Kirch 1971:82). Twenty-one features can be described as habitation and/or storage structures. It was suggested that Feature B10-19 was a pahale, or large, walled house enclosure. However, on re-examination, this structure, along with Feature B10-22-10 and possible B10-24-1, conforms best with the criteria for men's houses. Eight smaller enclosures fall within the parameters for sleeping houses, and the remaining ten structures all appear to be storage features.

The household complex in Palauea was quite discrete, since all the features were located on a single, narrow ridgeline. At Keauhou, the

units are not so clearly separated. Analysis of residential groups at 'Anaeho'omalu, Hawaii Island (Tainter and Cordy, 1977:107-109), shows that even with relatively close proximity, there is nevertheless a degree of social space between groups which can be seen in the location of different classes of structures. Thus, at least two residential groups can be differentiated from each other and associated with each of the suggested men's houses at Keauhou.

The relationship between the posited residential groups and the new features (Sites 244 and 262) has not been established. Site 244 was originally thought to possibly be a ko'a (Davis and Bordner, 1977:17); however, it could be a large residential structure. As to Site 262, although the enclosure is certainly of sufficient size to be a men's house, it does not appear to have the other structural attributes necessary for such a structure. No conclusive interpretations can be offered for either structure without further data, especially from excavations.

HAWAIIAN TERMS AND ABBREVIATIONS USED
IN THE ARCHAEOLOGIC REPORTS

aa	Rough, chunky lava flow.
ahu	Rock mound; alter.
ahupua'a	Land division usually extending from the uplands to the sea.
c.	Abbreviation for circa; about, approximately.
cm.	Abbreviation for centimeter.
ft.	Abbreviation for feet.
heiau	Temple; pre-Christian place of worship.
'ili'ili	Pebbles; small waterworn stones often used for paving.
in.	Abbreviation for inch.
ko'a	Fishing shrine or fishing grounds.
m.	Abbreviation for meter.
makai	On the seaside; toward the sea.
mauka	Inland; upland; toward the mountains.
pahoehoe	Smooth, ropey lava flow.
pohaku 'aumakua	Rock or stone representing a family or personal god.

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APPENDIX D

APPENDIX D

ARCHAEOLOGICAL EXCAVATIONS (SALVAGE) OF FEATURES 1028-12
AND 1028-13 FOR THE PROPOSED MAKENA ROAD

Palaeua, Honua'ula, Maui, Hawaii

I. INTRODUCTION

Modifications to the proposed Makena Road alignment have been extensively studied by archaeologists. The alignments under consideration all run mauka of the existing road, and as such required archaeological investigation into impacts on historic and prehistoric cultural remains. Work on the "A" and "B" alignments was done by Archaeological Research Center Hawaii, Inc. (ARCH) in 1977. Later that same year the "C" alignment was investigated by ARCH, Inc.

Later, a decision was made to consider a modification of the proposed "C" alignment, which again required archaeological work. This was done in 1980 by archaeologists for Environment Impact Study Corporation (EISC). Based on the compendium of information collected by these various surveys, it was decided that the physical constraints of Site 1028 (Bishop Museum number B11-2) and the location of Wailea Golf Course were such that the proposed Makena Road modification would have to pass through Site 1028.

In order to minimize damage to the site, the mauka road alignment was selected, avoiding as much of the site as possible.

As presently proposed, Makena Road will pass through the upper two surface features of Site 1028 (B11-2), C-shape Features 1028-12 and 1028-13. As the alignment is proposed, there should be no damage to Feature 1028-11. Refer to Figures D-1 and D-2. On the basis of this judgment, the mitigation measures recommended in the previous reports were followed: "further excavations should be undertaken to obtain datable material from this end on the complex" [Davis, November, 1977, pg. 26].

In 1970, a Bishop museum team under Patrick V. Kirsch performed an intensive archaeological investigation of Site 1028. The apparent duplication of effort expended in the current investigation may be viewed as unfortunate in the sense that little archaeological excavation has been done on Maui, though a large amount of surface survey work has been completed. However, re-excavation of one of the few excavated sites in a relatively untouched area is one of the constraints that face contractural archaeologists and is not necessarily to be avoided.

It was considered that, since the features would be destroyed by road construction, re-excavation of these features was necessary and could still provide valuable

information as to possible use of the features and period of utilization. To this end, the research objectives and questions that appeared to be most appropriate to this work included the following:

1. Recovery of datable materials, as per the previous recommendations, in order to provide alternative dates of occupation, as the only one present for the site is a Carbon 14 (C^{14}) date of 295 \pm 90 B. P., with one standard deviation 1545-1745 A.D. [Kirsch, 1971, pg. 76].
2. Determine the exact function of the two C-shaped structures to be investigated. Assuming that there has been some expansion in the body of knowledge on Hawaiian archaeology, the second question was that if further excavations were done in undisturbed portions of these two features, how would interpretation of the material compare with previous interpretations.

II. DESCRIPTION OF THE SITE VICINITY

The 1028 site complex is located in the ahupua'a of Palauea, on the west coast of Maui. This area, more commonly known as Wailea-Makena, is under the rain shadow of Haleakala, and as such gets minimal rainfall. This has resulted in a topographic relief of relatively undissected uplands with minor gulch formations. The low

rainfall has reduced vegetation to a minimum, the species prevalent in the area being kiawe (Prosopis pallida Humb.), koa haole (Leucaena leucocephala (Lam.)) and occasional panini cactus (Opuntia megacantha Salm-Dyck). While these are all contact-period exotics, there are some native species that, in part, probably represent the vegetative cover of the pre-contact period: wiliwili (Erythrina sandwichensis Deg.) and 'ilima (Sida fallax Walp.).

The limited vegetation is not only a result of the lack of water, but also of the largely undeveloped soil in the area. The area in general, and the area of Site 1028 in particular, consists of non-decomposed lava, mainly a'a clinker flows. The small amounts of soil present are either alluvial deposits from upslope or aeolian deposits transported by the strong winds that typify the area. Thus, both the constraints of limited water and soil would have operated on any pre-contact use of the area.

However, the area of Wailea-Makena does have some advantages of marine orientation. The offshore waters are particularly rich in sea life, with a combination of rocky and sandy substrates which provide diverse habitats for marine fauna. It would appear that one of the main attractions for subsistence in this area would be the marine productivity of the region.

The specific area of Site 1028 is a flow of undecomposed a'a clinker with sparse vegetation. A large gully runs just to the north of the site, and the site, being located on an arm of the flow which formed a small ridge has excellent visibility of the surrounding area, especially to the sea. The upper portion of the site, including the two C-shapes under investigation, has undergone very recent modification of the local vegetative conditions as a result of the golf course. One of the holes, specifically the 18th green, is located just mauka of the study area. This area is watered every day by sprinklers, as is the rest of the golf course mauka of the site. This has resulted in a massive increase in vegetation in the areas exposed to run-off from the course. Not only is the existing vegetation more healthy and numerous, but new species have appeared. While some of these are exotics used to landscape the golf course (especially the gully), others appear to be possible native species whose arrival is predicated upon increased water. The heavy rains of last fall and winter (1979-80) have also led to a very large increase in the density of vegetation in the study area, mainly of grasses and vines. It should be noted, however, that none of the native crop-plants were indentified within the study area, either before or after increased water availability.

III. SITE DESCRIPTION

Site 1028 consists of 14 features noted by Kirsch in 1970. These include several possible house platforms and a mua (men's house), along with 4-5 C-shapes and several paved open work areas. The larger features such as the mua and house platforms are located in the makai portion of the site, and will not be impacted by the present road alignment. The features within the site are generally clustered spatially along the ridge. The 1970 investigation was conducted to determine relationships between the various features, and to aid in this determination excavations were carried out in most of the features. Both of the features excavated in this study (1980) were also excavated in 1970. Site 1028-12, originally noted as B11-2/12, was described in 1970 as:

"...a small C-shaped structure much like Feature 10; it too was built up to a natural outcrop. The walls are about 50 cm. high and wide. Two 1 m. squares were excavated; as in Feature 10, no artifacts or features were uncovered. Midden was sparse. The stratigraphy was identical to that in Feature 10 (consisting of 15-20 cm. of grey-brown soil heavily mixed with fine a'a clinkers used as paving material." [Kirsch, 1971, pg. 71]

Excavation of 1028-13 (B11-2/13) came up with different results:

"...a relatively large C-shaped structure which forms a feature complex with 11 and 12. The walls are about 1 m. thick at the base and 50-75 cm. high. The floor was cleared, gridded, and three squares excavated. No artifacts were recovered; however, a

well-defined fireplace was found in the centre of the floor. This fireplace was outlined and paved with medium sized a'a clinkers and filled with light grey ash. Stratigraphy was simply thus:

Layer I. 0-5 cm. Reddish-brown sterile dust.

Layer II. 5-25/30 cm. Grey-brown midden deposit mixed with heavy concentration of small a'a paving stones.

Layer III. Basal yellow-brown sterile deposit."
[Kirsch, 1971, pg. 71-2]

While artifacts were recovered from Feature 1028-11, a paved area with low walls just makai of Feature 1028-12, no artifacts were recovered from either Features 1028-12 or 1028-13. Artifacts from Feature 1028-11 included 2 unfinished bone fishhooks, 1 octopus lure, 2 coral abraders and 1 trachytic glass flake. Midden was recovered from both Features 1028-12 and -13, with a heavy emphasis on cowries (Cypraea reticulata and C. caputserpentis), pipipi (Nerita picea) and opihi (Cellana exarata).

Midden analysis led to several conclusions:

"The small amount of bone material is striking, especially the paucity of fish bone. It is possible that fish were prepared on the beach for later consumption in the uplands of Palaua. Such a pattern was noted in Ka'u, Hawaii, by Handy and Pukui. The presence of fishing gear certainly indicates that fishing activities were carried on. On the other hand, the general absence of domesticated animal bone was to be expected, as the vegetable fodder for these animals could only have been supplied in the uplands.

The general nature of the midden, then, suggests a pattern of transience between uplands

and coast. Molluscs were probably utilized as minor sources of protein for populations residing at the coast for various periods of time." [Kirsch, 1971, pg. 76]

Based on the clustering and type of features located, a tentative classification was made of three structural classes of features, of which 1028-13 was a class "B":

"...distinguished on the basis of size (greater than 10 sq. m.), presence of fireplace or hearth, and in one or more cases, the presence of tools, fishing gear, domestic implements, and animal bone representing more than 1% of the total midden from that feature. Thus, the following functions may be tentatively assigned to this structural class: manufacture of artifacts, food preparation, cooking and/or heating, and eating; sleeping is also a likely function. The most logical hypothesis seems to be that these structures formed the elemental dwelling units." [Kirsch, 1971, pg. 84]

Feature 1028-12 was designated as a structural class "C":

"...characterized by a small size (less than 10 sq. m.), absence of a fireplace or hearth, and general paucity of artifacts. The pairing of each of these structures with a single class B feature strongly suggests that these smaller units served as storage houses." [Kirsch, 1971, pg. 84]

His interpretation of the total Site 1028 complex was that:

"...of a nucleated settlement of several households, or co-residential domestic groups, each with a dwelling house and storage house, two with a cleared working yard, and all sharing a single mua, or men's house. Given the nature of the aboriginal Hawaiian social system, I would further suggest that site B11-2 (Site 1028) was occupied by members of a single 'ohana, or minimal non-unilineal descent group." [Kirsch, 1971, pg. 84]

IV. EXCAVATION PROCEDURES AND RESULTS

As noted before, the current excavation offered several opportunities. Among them was a chance to see what the level of compatibility would be between two different excavations done of the same features, with a span of ten years intervening. Though aware of the excavations in Features 1028-12 and 1028-13, a larger portion of the interior of each feature was still untested, nor had the exterior of the features been tested. The former study was not consulted for material until after excavation was completed, as it was hoped that a different approach, unbiased by previous work, might be more useful for purposes of comparison.

A 1-meter (m) grid was laid out for each feature, upon which the excavation units were laid. A control pin was placed for each feature, and arbitrarily designated NOWO. Though initially excavated in 5-centimeter (cm) levels, the lack of natural stratigraphy or internal features led to use of 10-cm levels. In order to test retention of material, 1028-13 material was run through 1/4-inch screen and sorting was done in the field. Quantitative samples were taken from each level by running material through a 1/8-inch screen and bagging all material for sorting in the lab. Due to the high presence of small shell fragments, later excavations in 1028-13 were conducted

using the 1/8-inch screen sorting procedure entirely, though representative samples were still taken from each layer. Site 1028-12 was excavated with material sorting by 1/8-inch screen entirely, with representative samples from each layer. The lack of visible stratigraphy led to the use of arbitrary 5-cm levels for excavation purposes.

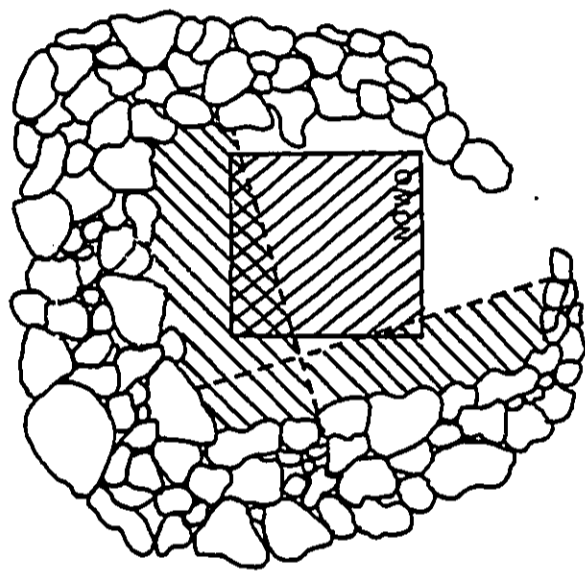
Excavation strategy for 1028-13 resulted from two separate aims:

1. Excavation through the C-shape wall to determine presence/absence of cultural material in the wall and outside of the structure; and
2. Excavation of the area between the two wall-ends, to investigate the area almost outside of the space enclosed by the C-shape.

Excavation strategy for 1028-12 was much less complex - merely to continue excavations of the enclosed area towards the entrance to investigate the remains of the internal area of the structure.

Thus, for 1028-13, excavations consisted of an excavation section through the structure wall, another in the interior contiguous to previous excavation units, and a third extending to the entrance of the structure. Refer to Figure D-3. For 1028-12, excavation consisted of a single unit in the interior of the structure near the entrance, contiguous to earlier excavation units. Refer to Figure D-4.

100 200 300 400 500 600 700 800 900 1000



 APPROXIMATE AREA OF 1970 EXCAVATIONS
 AREA OF 1980 EXCAVATIONS

0 1 METER
SCALE

FIGURE D-3
FEATURE 1028-12

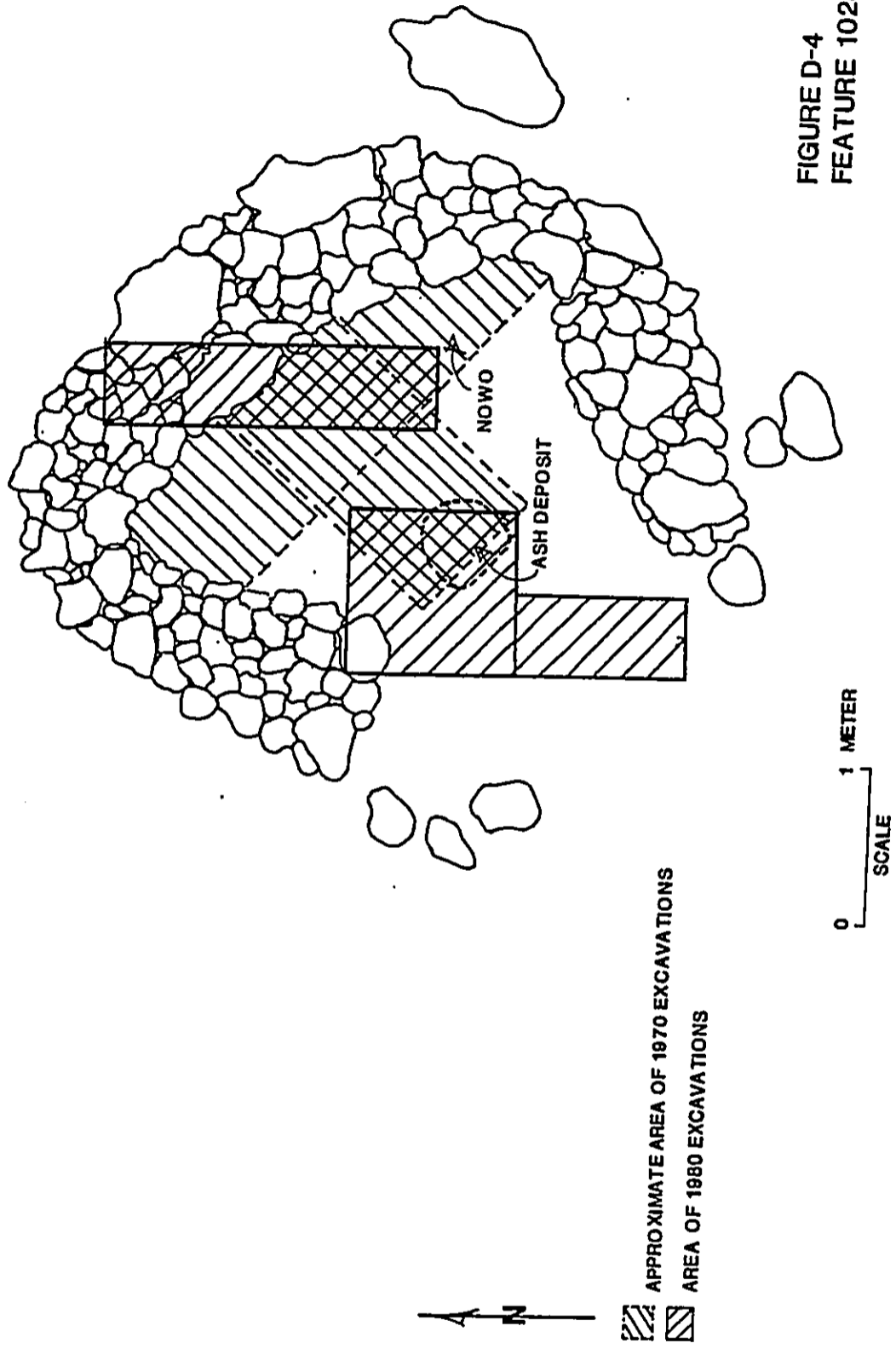


FIGURE D-4
FEATURE 1028-13

1028-13

Excavation of the wall revealed that 1028-13 and 1028-12 are of rubble-fill and stack construction, with the interior consisting of small cobble and some aeolian soil, with larger external masonry. All of the stone utilized for construction was the a'a clinker available at the site.

At Feature 1028-13 the section through the structure wall recovered very little in the way of midden or cultural material, remains essentially consisting of a sterile deposit of aeolian soil.

Of interest is the fact that the soil profile (soil, gravel, and aa clinker) is approximately the same under the wall as in the interior of the C-shape. This is unusual, since normally the soil base under such a structure is a man-made foundation and is different from the paving, if any, within and around the structure. This is because normally such structures were built in areas which had been used prior to construction and special foundations were then made for the walls.

In this case, the facts that no cultural materials were found in the section under the wall and that there was no special foundation for the wall itself appear to indicate that the wall was not a more recent addition to an area already in use. Regardless of whether the soil layer (soil, gravel, and aa clinker) of the entire area

is a natural phenomenon or man-made paving, it appears that construction of the wall was contemporaneous with use of the area as a whole.

Excavation of the interior again showed little change in soil stratigraphy, though there was a large ash/soil deposit from 3-17 cm below the surface. This consisted mainly of soil discoloration, and appeared to be the extension of the fireplace excavated during the 1971 work. There were several coral abrader fragments within and near the ash coloration, varying in depth from 4-13 cm below the surface. No internal stratigraphy was found, except for gradual lightening of the soil from the normal light brown to a distinctive yellow coloration when the sterile level was reached, at a depth of 23-25 cm below the surface.

Excavation of the entrance of the structure revealed no stratigraphic layers. However, internal features, in the form of small ash/shell concentrations, were excavated. These features and the unit in general were located outside of the area encompassed by the walls of the C-shape. Coral abraders were also found, from a depth of 4-10 cm below the surface. In this area the soil/cultural layer was thinner, as the sterile layer was reached at a depth of 17-20 cm below surface.

No internal features were located at Feature 1028-12. The same rough stratigraphy was present - a cultural layer

from the surface to 17-19 cm, then a sterile layer. The cultural layer was a light brown, while the sterile layer had the same yellow coloration as in Feature 1028-13. Artifactual material in the form of coral abraders were recovered from 5-15 cm below the surface.

V. MIDDEN ANALYSIS

As previously mentioned, midden was recovered from the excavations by two different techniques - the major portion was recovered through sorting on-site, while a representative sample was sorted in the lab. The representative sample was recovered in order to find some determination for the quality of the field sorting, and to locate any biases in field selection.

The number of individuals in shell of faunal remains was determined by the presence of similar definitive portions, such as a shell spiral or an echinoderm mouthpart. Thus, a minimum number of individuals could be determined, which is better reflection of usage than weight, which can be skewed by the varied size of shell fragments.

From examination of Table D-1, it becomes clear that while there was more material recovered from Feature 1028-13 than 1028-12 (in part a result of the larger area excavated), the patterns of species selection remain relatively stable. Shells of the family Neritidae (sea snails) and of the species Littorina pintado (periwinkle shell) were

TABLE D-1

MIDDEN ANALYSIS

	1028-12		1028-13	
	Minimum #	Weight (grams)	Minimum #	Weight (grams)
Conidae (all)	3	7.35	7	5.8
<u>Conus lividus</u>			(3)	(3.1)
Cypridae (all)	4	18.15	13	48.45
<u>Cypraea</u>				
<u>caputserpentis</u>			(1)	(4.0)
<u>Columbella varians</u>			2	.05
Patellidae (all)	4	.41	5	.22
(opihi)				
Neritidae (all)	22	4.25	126	25.6
(pipipi)				
<u>Nerita picea</u>			(75)	(16.5)
Periglypta				
<u>reticulata</u>	1	.9	1	.01
<u>Trochus intextus</u>			3	1.4
<u>Littorina pintado</u>	24	2.06	432	41.42
<u>Morula granulata</u>			2	1.9
<u>Morula</u>				
<u>brunneolabrum</u>			2	1.4
Cymatiidae (all)	1	.01	1	.15
<u>Olividae</u>			1	.1
Unidentified shell		13.2		53.0
Shell Total		46.33		179.5
Echinodermata (all)		30.75		64.43
Mouth parts (all) (133)		(9.45)	(155)	(8.47)
<u>Echinometra</u>				
<u>mathaei</u>			(1)	(.8)
<u>Colobocentratus</u>				
<u>atrata</u>			(1)	(.4)
<u>Heterocentratus</u>				
<u>mamilatus</u>	(1)	(.5)	(1)	(1.05)
Crustacea (all)	1	.05	1	.05
Fish bone	1	.02	1	.52
Mammal bone	1	.01		
Rodenta	(1)	(.01)		
Faunal Remains Total		77.16		244.5
Coral		1.57		66.86
Charcoal		.11		.94
Land Snail	53	.43	424	8.68

most heavily represented at both features, as well as Echinodermata (sea urchin) parts.

Of interest is the very large quantities of Littorina pintado (Wood) found at both features, with a total of 456 individuals recovered from the excavations. This is a small mollusc, and could not have functioned as a major food source, though it may have been used as a garnish. However, the high numbers indicate fairly heavy selection of an unimportant food source, while more important food items such as cone shell (Conus sp.) or opihi (Cellana sp.) are not heavily represented. This finding, along with the overall small quantity of bone and shell residue, would suggest the possibility of use as a temporary habitation rather than a permanent one. This is also reflected, in part, by the lack of artifactual materials recovered.

VI. ARTIFACT ANALYSIS

The artifactual material recovered from the excavations at Features 1028-12 and 1028-13 were of three distinct categories: coral abraders, basalt waste flakes and volcanic glass flakes. Refer to Table D-2. The large numbers of these three artifact categories, and the lack of other varieties of artifactual material, appears to indicate an area of specialized activities. If this were not the case, one would expect fewer numbers of artifactual materials, with a greater variety of items.

TABLE D-2

ARTIFACT ANALYSIS

	<u>Minimum #</u>	<u>1028-12</u> <u>Weight (grams)</u>	<u>Minimum #</u>	<u>1028-13</u> <u>Weight (grams)</u>
Coral Abrader	3	1.35	18	24.05
Basalt Flake	84	6.6	602	118.13
Volcanic Glass Flake	<u>2</u>	<u>.15</u>	<u>14</u>	<u>3.26</u>
	89	8.1	634	145.44

As in the 1970 excavations, the coral abraders recovered appear to be of Porites sp. coral, and most exhibit a tapered shape. But as most appeared to be fragmentary pieces rather than complete specimens, it was not considered valid to compare the length distribution with those of the 1970 excavations.

Of great consistency throughout the excavations was the presence of numerous pieces of basalt waste flakes, all appearing to be from a similar fine-grain grey source material. The flakes were generally small in size, and appear to have been finishing flake material, possibly for adzes. However, it should be noted that no identifiable adze fragments were recovered, either in the 1980 nor the 1970 excavations.

The presence of only 1 basalt flake in the entire 1970 Site 1028 excavations, and the presence of 686 in the 1980 excavations of Features 1028-12 and 1028-13 is a very distinct anomaly. However, during the current excavation it was observed that the flake material became much more frequent near the entrance and exterior of the C-shapes. As the 1970 excavations were conducted near the interior wall, away from the entrances, the varied results would seem to be a result of selective area use of the C-shapes. This would also explain the presence of both large numbers of coral abraders and volcanic glass

flakes when they were not present in the 1970 interior excavations of 1028-12 and 1028-13.

The very large variation in artifactual remains observed within such small, and generally non-specialized structures could have strong implications for future excavation of such features. The variation in material recovered within one small structure by two different excavations literally within a meter of one another indicates that placement of excavation units within such a small, generalized feature may be more critical than previously anticipated. It also indicates that a possible cultural bias, in the form of the western concept of enclosed spaces defining areas of use, may be operating in such a way so as to skew the research and results.

The general western concept of space includes defined areas of specialized use. These areas are often delineated through use of features such as walls, markers, etc. As archaeologists study cultural discards as a reflection of behaviors and activities, we must be careful to recognize that they need not follow western patterns or concepts of space. From the 1970 and 1980 excavations, it appears that discovery of artifactual remains recovered from C-shape structures in Hawaii will be highly dependent on excavation location relative to the C-shape orientation.

VII. CONCLUSIONS

In terms of the first research objective, that of obtaining occupation dates for the site complex, sixteen lithic specimens (recorded as volcanic glass) from the excavations were submitted to the Archaeology Laboratory, University of Hawaii, for analyses and interpretation. Five specimens were selected for dating from the sixteen submitted specimens, as they provided a presumed representational sample of the site. These five specimens were accessioned and examined in accordance with current University of Hawaii Archaeology Laboratory procedures (hydration-rind dating) and the prefix number UH 69 was assigned to them. The remaining eleven specimens, also assigned the prefix number 69, were added to the University of Hawaii Archaeology Laboratory glass library and will be available for future research.

Twelve specimens were identified as percussion produced flakes, and four as fragments. One of the fragments (UH 69-5), was further identified as vitreous basalt. The sixteen specimens were typical of Hawaiian volcanic glass assemblages in size and in shape. The specimens ranged in size from 4.6 X 4.0 X 0.6 millimeters (mm) to 16.2 X 10.9 X 6.6 mm, and in weight from .0026 grams to 1.0453 grams. Physical appearance ranged from smoky transparent to opaque black glass.

The five lithic specimens were thin-sectioned for hydration/alteration measurements employing standard laboratory thin-sectioning procedures. Two additional specimens (UH 69-5 and UH 69-7) were thin-sectioned for petrographic analyses to clarify sourcing of the glass. Measurements of hydration/alteration were made along only the culturally flaked portion of the glass, unless otherwise noted.

Hydration, a hydronium-alkali ion-exchange reaction employing Na^+/K^+ and $2\text{H}_2\text{O}$, is not present in most Hawaiian glasses. Measurements are made of only those segments of alteration which are thought by the observer to represent cultural age. This process is rather subjective and is biased by 1) the knowledge of the observer, 2) the type of chemical weathering/alteration on the surface of the glass, which is extremely fragile and friable, 3) the amount of physical weathering of the specimen through time, and 4) the type of sample preparation technique which, occasionally, damages the surface of the glass.

Current University of Hawaii investigations into the phenomena of chemical alteration of volcanic glass have demonstrated that the mean of the measurements on specimens presumed to be older than 1,000 years (correlated with ^{14}C dates of geologic specimens up to 10,000 years B.P.) is much too young. However, there is a good correlation between the maximum measurements and the ^{14}C date when

the rate of 10 microns per 1,000 years is applied. The assumption which follows from this is that the maximum alteration observed on such friable substances represents the minimum "age." All other measurements are possibly in error due to either physical weathering or damage during the sample preparation process. Seemingly, for specimens less than 1,000 years old there is good correlation between the mean measurement and the ¹⁴C date. This may, however, be misleading due to the large range in the radiocarbon date for relatively young specimens.

Using the criteria stated above, and noting a certain interpretive value based upon subjective experience, the following measurements and interpretations of age are assigned to the specimens analyzed:

<u>AL No.</u>	<u>UH No.</u>	<u>MEASUREMENT IN</u>	<u>YEARS B.P.</u>	<u>A.D. DATE</u>
517	69-1	2.28 \pm .3	228 \pm 30	1752
518	69-2	2.53 \pm .4	253 \pm 40	1727
519	69-3	2.08 \pm .3	208 \pm 30	1772
520	69-4	2.60 \pm .4	260 \pm 40	1720
521	69-6	2.53 \pm .3	253 \pm 30	1727
		3.50 \pm .3	350 \pm 30	1630
		5.23 \pm .4	523 \pm 40	1457

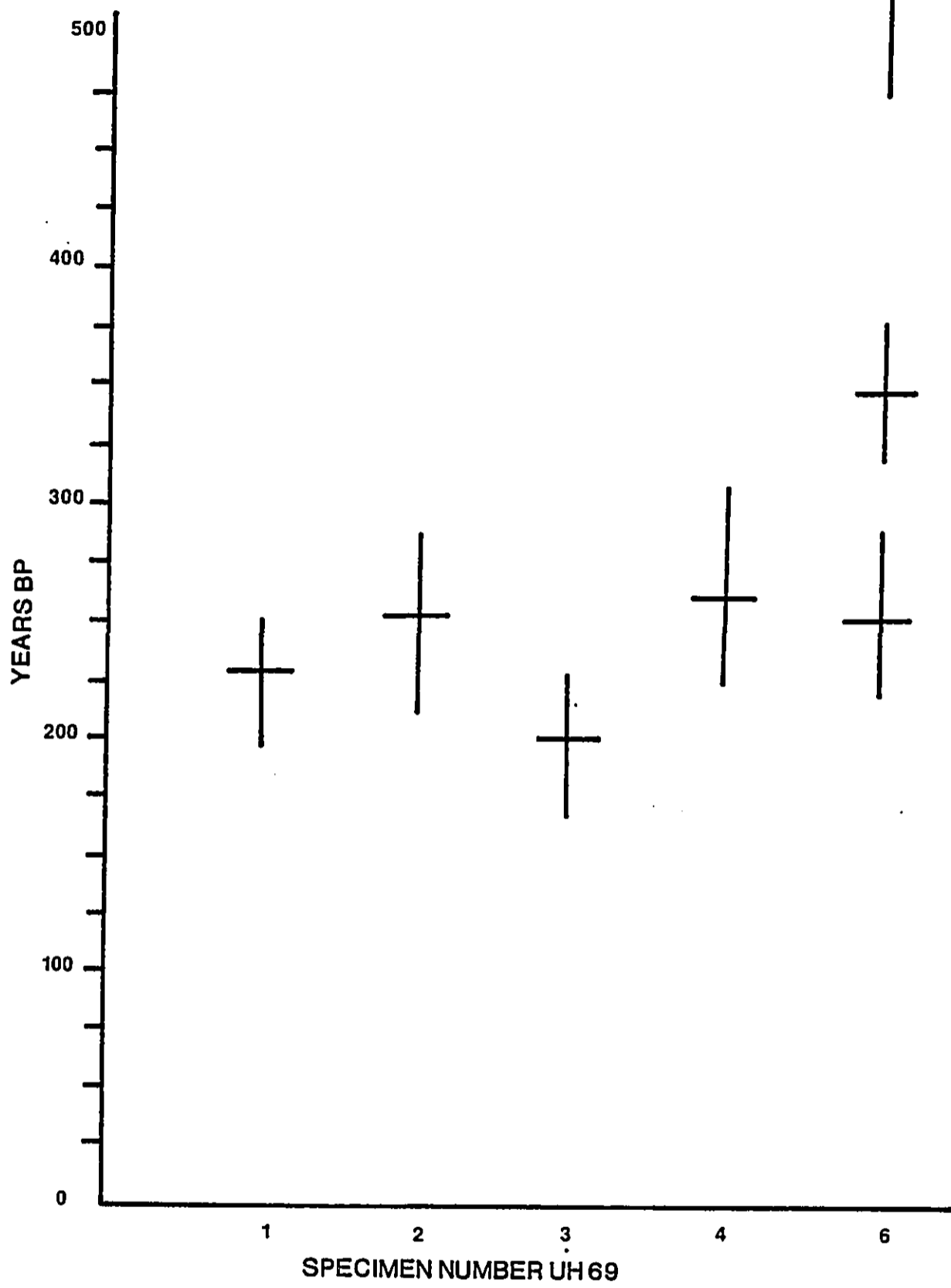
Interpretation of these measurements and "dates" would place the major occupation of the site in the early to mid-1700's. These dates are compatible and fall within

the range of previous "age" determinations of other sites in the Maui/Palauea area.

Specimen No. UH-69-6 was unique in that three distinct age determinations were made: one on each of the two flaked surfaces and one on the bulb of the percussion flake scar. Refer to Figure D-5. The bulb flake scar produced a measurement of 2.53 microns and is compatible with the age determination measurements on other specimens from the site. One flake scar indicated alteration of 3.5 microns and the other 5.23 microns. The specimen is regarded as a fragment and not a flake due to the large amount of cortex and geologic alteration. Geologic alteration is noted on all surfaces except on the bulb side. Therefore, the flake measurements are either 1) remnants of geologic alteration which were mis-interpreted as cultural, or 2) cultural alteration which represents exploitation and modification of the specimen at a time (and probably place) other than that which is represented by the bulb measurements. Further, it is quite possible that the 3.5 micron measurement is a remnant of the 5.23 micron alteration.

Although measurements are reported which represent a maximum age of A.D. 1457, the "age" of the artifacts in the site context range from A.D. 1720 to A.D. 1772. The two older dates on specimen UH 69-6 seem to be out of context with the total site assemblage examined and should

RATE - 1MICRON/100 YEARS



POSSIBLE AGE DETERMINATIONS

FIGURE D-5

D-27

not be considered "dating" the site at this time. It is necessary to date many more specimens to determine if UH 69-6 is an anomaly. The mean age for the dated specimens is A.D. 1739 and this figure should be used as the approximate date for cultural occupation of the site.

The close cluster of dates supports the assumption that the site was in use for a relatively short period of time and the supposition that the site harbored specialized, occasional use rather than continuous long-term occupation.

The mean date of A.D. 1739 is later than that recovered by Kirch (1971), but it does fall within one standard deviation of this date. Also, since the dates of this excavation were recovered in only the most mauka of the line of structures comprising Site 1028, they may possibly reflect a late-period expansion of the site.

A major problem concerning any glass project is to determine which glasses represent the same or similar sources. Identification of the glass characterization is extremely important and crucial to any application of alteration rate determinations as well as interpretations of prehistoric exchange systems.

The Archaeology Laboratory, University of Hawaii, has an extremely limited collection of glass (geological and archaeological) from the island of Maui. Therefore, only preliminary statements concerning the sourcing of volcanic

glass artifacts from the Maui/Palauea excavation can be made at this time. Preliminary sourcing is accomplished by 1) physical appearance, 2) petrography and photomicroscopy-microphotography, and 3) specific gravity determinations.

The specific gravity analyses indicate that most specimens represent the same or similar source. The specific gravity range for the specimens is between 2.73 and 2.86.

An attempt to classify the glasses from this site based upon examination of only a few (7) specimens and without any knowledge of the source glasses for the area could prove to be extremely misleading. Basically, the glasses are common low-silica Hawaiian volcanic glasses. Petrographic analyses of the specimens shows variation within the specimens analyzed. This is very common for Hawaiian glasses as petrographical variations of the same lava flow (source) are based upon several factors such as location from magma source, depth of lava flow, environmental conditions, viscosity of flow, etc.

No exotic glasses were identified. It is therefore assumed that local exploitation of sources (dikelet glasses and surface chill glasses) was practised in the mid-1700's in this area.

All the specimens are maintained in the Archaeology Laboratory, University of Hawaii. Until more specimens from the island of Maui (both archaeological and geological)

are added to the laboratory glass library, speculation and interpretation of prehistoric exchange can only be vague and extremely general. Therefore, classification of glasses from this site will be deferred until such time as an adequate number of specimens from Maui are added to the glass library.

In terms of the second research objective, that of determining the function of the C-shape structures and comparing this interpretation with previous hypotheses, some conclusions can be drawn.

The most striking conclusion of the 1980 excavations of Features 1028-12 and 1028-13 appears to be the variation in recovered material, especially artifacts, when compared to the 1970 excavations of the same features. This variation raises strong implications regarding location of future excavations of such features, which in the past has been considered of relatively minor concern. The general assumption in the past has been that excavation of the interior of the structure, since it most likely served as a shelter, would be likely to yield the greatest amount of material. But the results of these excavations indicate the possibility that the greatest amount of material may be at the entrance, and external to the enclosed area of the C-shape. This could reflect behavior such as clearing the shelter of debris, thus removing most of the cultural materials deposited on-site. Or the pattern of deposition could

simply be a reflection of specialized use areas within and around the C-shapes, in which occasional rather than full-time use of the site would mitigate against movement of materials, allowing for discrete use areas to remain intact.

Of interest is the comparison of these results with the general conclusions of the 1970 excavations. While the idea of features such as 1028-12 serving as storage structures would appear to be questioned by the recovery of much additional material in the 1980 excavations, the later excavations do appear to support the initial hypothesis of nucleated settlements of occasional use. The additional specialized artifacts collected in the 1980 excavations support the contention of specialized occasional use through both the general lack of midden materials and the artifactual emphasis on certain specialized activities.

The 1970 and 1980 excavations, combined, excavated most of the interior of both Features 1028-12 and 1028-13. In addition, sections were taken through the wall of 1028-13 and exterior areas were tested. The combined total amount of excavation is much more complete than usually available in salvage excavations, and it appears that the greater portion of information has been recovered from these two structures. As such, the salvage excavation completes the archaeological work needed on this portion of Site 1028 impacted by the proposed Makena Road realignment.

APPENDIX D

GLOSSARY

- ¹⁴C: The radioactive carbon 14 method of dating a rock.
- Dikelet Glasses: Volcanic glass chilled (solidified) underground.
- Friable: Easily crumbled or pulverized.
- Hydration-rind dating: Using the amount of alteration or degradation caused by water percolation to date a rock.
- Lithic: Of; relating to; or made of stone.
- Midden: A heap or stratum of refuse normally found on the site of an ancient settlement.
- Percussion scar: Hole made in a rock or piece of glass by striking it at an angle.
- Petrography: Study of the mineral make-up of rocks.
- Surface chill glasses: Volcanic glass which was cooled when it extruded on the ground surface.
- Vitreous basalt: Volcanic glass.

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- Sommer, Robert. 1969. Personal Space. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.
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CORRECTION

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

BIBLIOGRAPHY

- Bates, Marston. 1958. Gluttons and Libertines. Random House, Inc. New York, New York.
- Davis, Bertell D. and Richard M. Bordner. June, 1977. Archaeological Reconnaissance of the Makena Coast Road Realignment, Honua'ula, Island of Maui. ARCH 14-82. Ms. Prepared for Environment Impact Study Corporation.
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APPENDIX E

APPENDIX E

ESTIMATED CARBON MONOXIDE (CO) CALCULATIONS

MAKENA ROAD

SOURCE: "Guidelines for Air Quality Maintenance Planning and Analysis Volume 9: Evaluating Indirect Sources." U.S. Environmental Protection Agency, Office of Air, Noise, and Radiation. EPA-450/4-75-001. January, 1975 (QAQPS No. 1.2-028.)

I. INTRODUCTION

"An indirect source is defined as a facility, building, structure or installation which attracts or may attract mobile source activity that results in emissions of a pollutant for which there is a national standard" [Page 1]. At unsignalized intersections, there are two primary determinants of emissions: [Page 5]

- (1) Volume demand, and
- (2) Volume demand-to-capacity ratio

Volume demand provides an estimate of the impact on traffic demand on access roads. When there is little congestion, volume demand is the most important indicator of traffic emissions. The volume demand-to-capacity ratio (V/C) is an indicator of congestion. "Congested traffic conditions result in increased vehicle running times and lower operating speeds (resulting in closer spacing between vehicles)" [Page 3].

Procedures for unsignalized intersections consider volume demand, capacity, and V/C ratio. Additional considerations involve vehicle location "upstream" or "downstream" of the intersection. Vehicles upstream of the intersection are approaching the intersection and may or may not require slowing, depending on the level of congestion, i.e., V/C ratio. Vehicles downstream of the intersection have passed through the intersection and are essentially beginning to free-flow. Figures 7, 9, and 10 of the publication [pages 27, 29, and 30, respectively] are appropriate for this analysis.

"At low demand-capacity ratios, congestion is minimized and the problem posed by queues of vehicles forming at unsignalized exits/entrances to an indirect source or at unsignalized intersections is minimal. Under such circumstances, the impact on CO concentrations at nearby receptors is directly proportional to volume demand passing the receptor. As the demand-capacity ratio increases, queue formation is likely to exert an increasingly important impact on nearby ambient CO concentrations. The solid 'free-flow curves' in Figure 9 depict the range of volume demand-capacity ratios for which the volume demand per se may exert the most important influence on nearby ambient CO concentrations. For demand-capacity ratios exceeding the ratio at which the appropriate free-flow curve intersects the queuing curve, queuing at an intersection or

exit/entrance may exert the maximum impact on nearby ambient CO concentrations, and the queuing curve should be used to estimate the impact at nearby receptors."

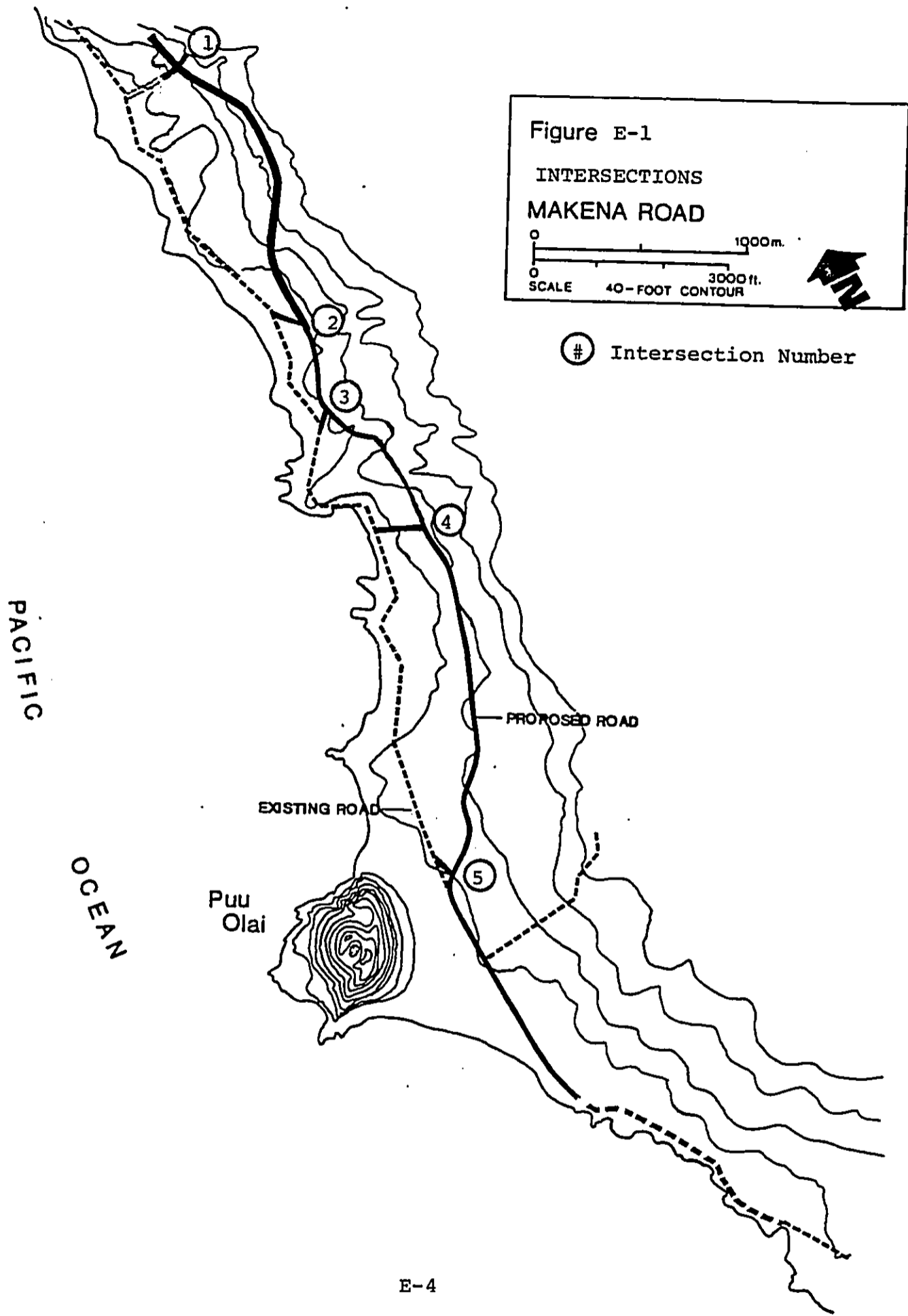
"Figure 7 is used to estimate the impact of traffic in the opposite direction which is downstream from the intersection. . . Figure 10, when combined with Figures 9 and 7, enables the reviewer to estimate the impact of any number of lanes of any width at a receptor site located up to 100 meters away."

II. CARBON MONOXIDE (CO) CALCULATIONS

A. 1-Hour CO Concentrations

Calculations were conducted, based on projected traffic estimates for the year 1990. Traffic projections were made for each of the five intersections along the length of the road. Refer to Figures E-1 through E-4. Carbon monoxide analyses were then made for all five intersections. Refer to Table E-1. All of the estimates are probably much higher than would be the actual case, because conservative estimates were desired. Actual CO concentrations during the peak hour are expected to be significantly lower for the following reasons:

1. The "built-in" 1975 emission correction factors were used in the calculations, not those adjusted for 1990.



1990 PEAK 1-HOUR TRAFFIC PROJECTIONS

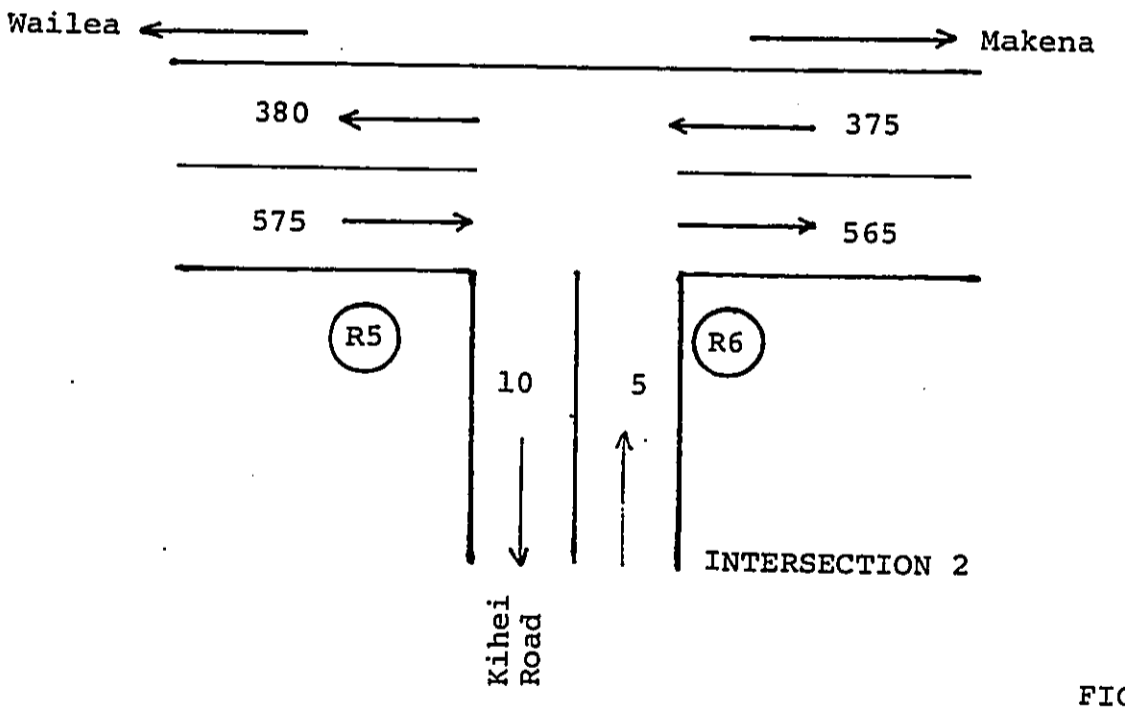
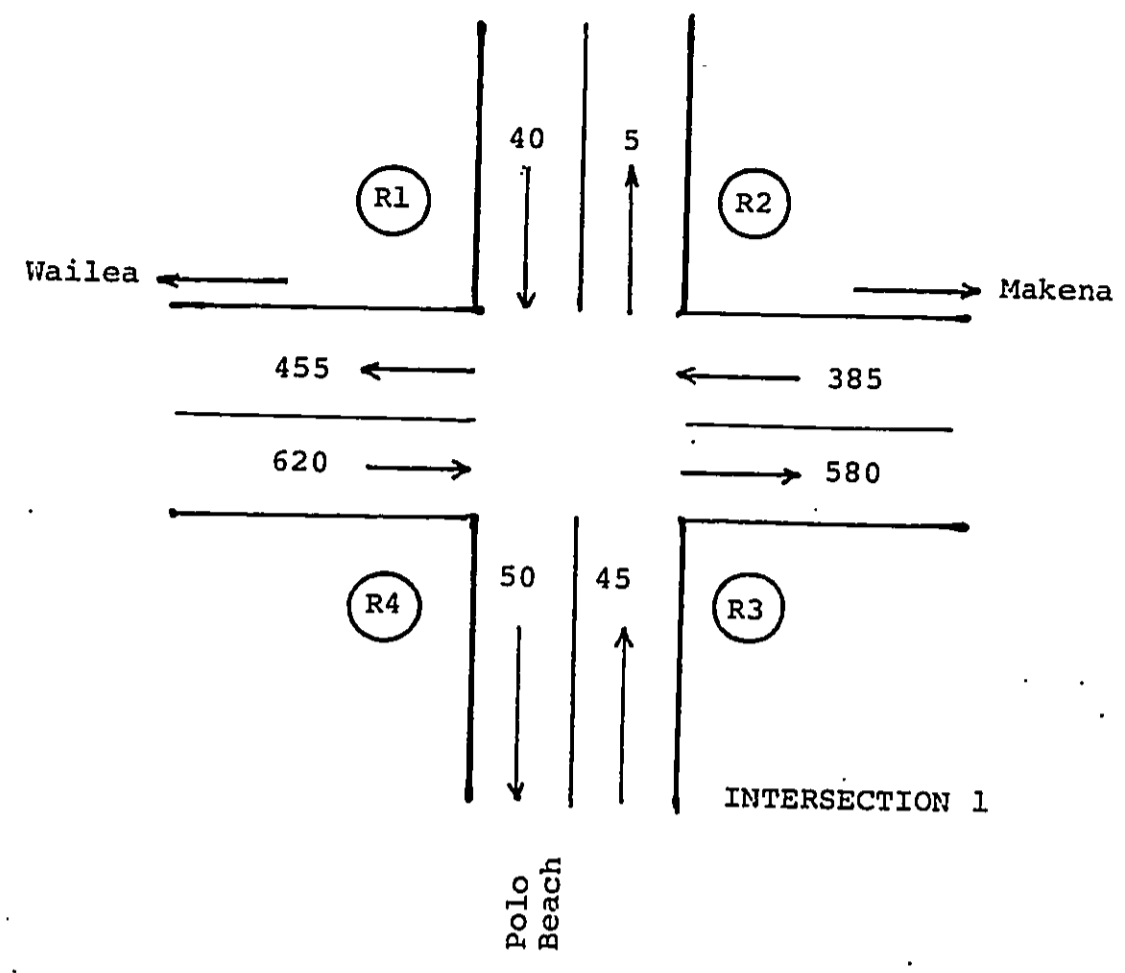
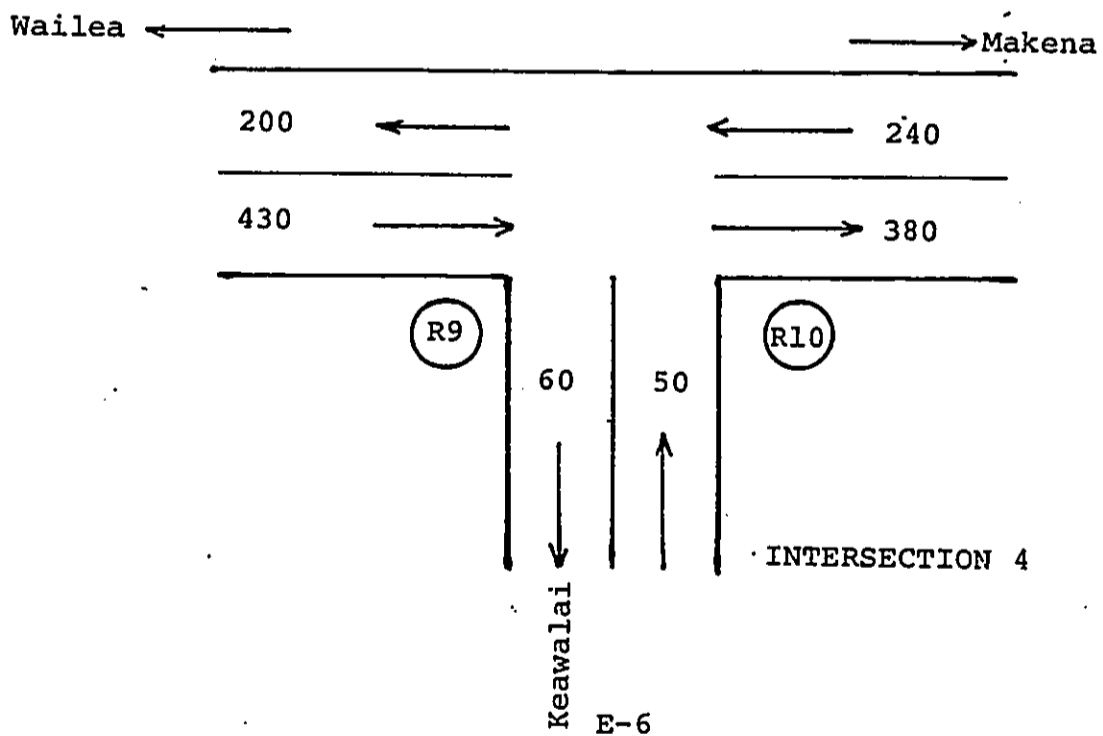
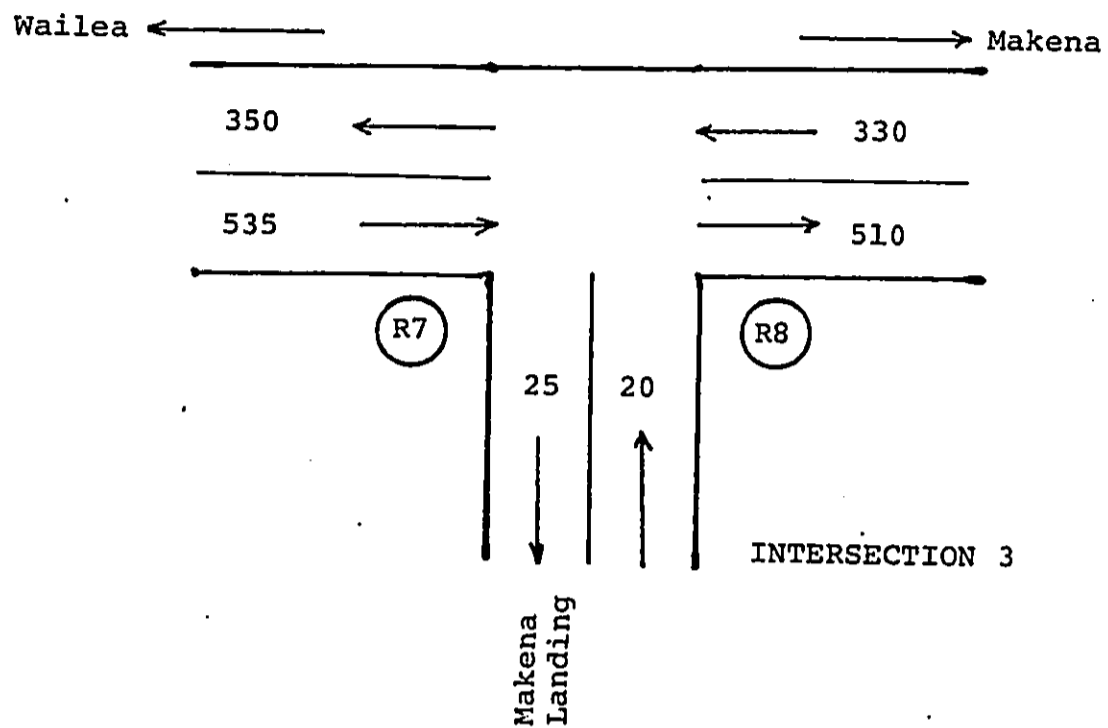


FIGURE E-2

1990 PEAK 1-HOUR TRAFFIC PROJECTIONS



E-6

FIGURE E-3

1990 PEAK 1-HOUR TRAFFIC PROJECTIONS

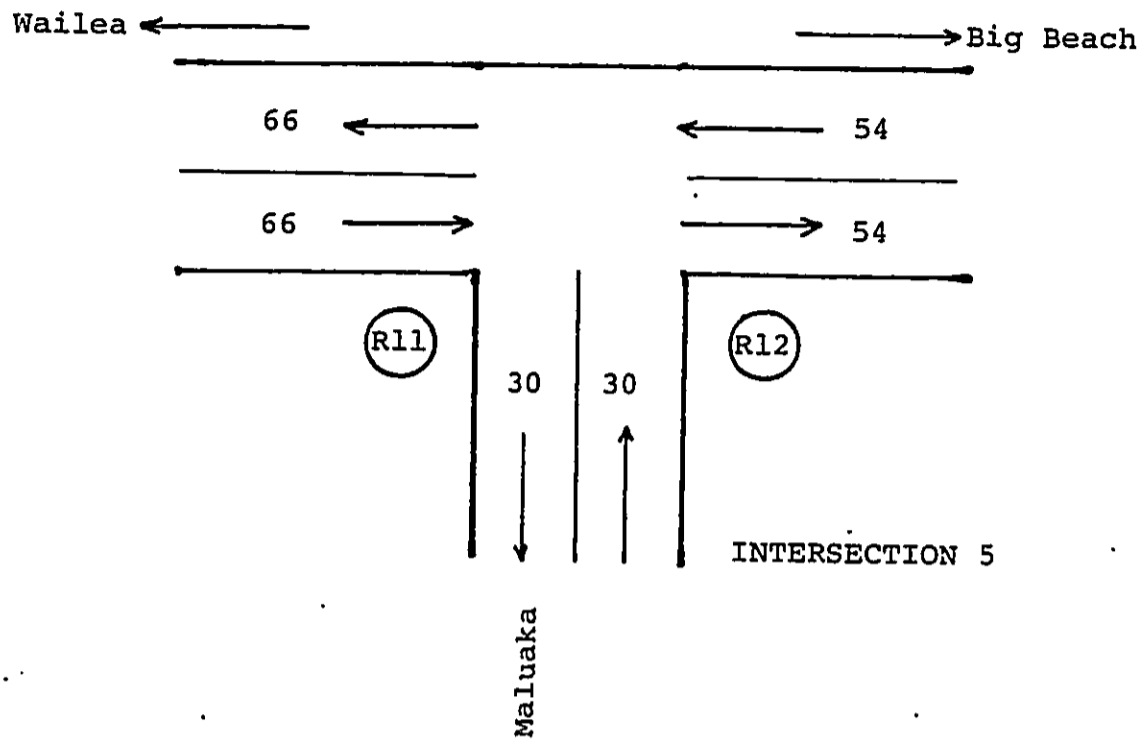


TABLE E-1
RESULTS OF 1-HOUR CO CALCULATIONS

<u>Intersection Number</u>	<u>Receptor</u>	<u>Estimated 1990 (1-hour) CO Impact (ppm)</u>
1	R1	6.18
	R2	7.06
	R3	5.94
	R4	8.44
2	R5	8.01
	R6	5.67
3	R7	7.52
	R8	5.18
4	R9	6.21
	R10	4.18
5	R11	3.13
	R12	3.01

1-Hour State Standard = 10 ppm.

2. Because the area which the proposed road will serve will primarily be visitor-oriented, the projected volume for the evening peak hour is probably exaggerated and vehicles would generally be more spread out throughout the day.

3. There are no major agricultural areas that are in the area or proposed for the area, so the actual truck traffic should be considerably less than the assumed Environmental Protection Agency (EPA) proportions of:

88% cars)	20% operated in "cold start"
12% trucks)	

The allotment of 12% trucks, however, should adequately account for visitor touring buses. This is because such buses are diesel-powered, and would therefore have lower CO emissions than gas-powered trucks. In addition, very few buses are actually anticipated for this area (approximately 2% of traffic volume).

4. The EPA method assumes "worst-case" meteorological conditions, including light winds (1 m/sec) blowing nearly parallel to the highway alignment.

5. There will probably be a higher proportion of late-model, 4-cylinder rental vehicles compared to the national average, which would mean lower CO levels than estimated.

6. Vehicles traveling along Makena Road would primarily be free-flowing, with only a small percentage slowing for turns. This would decrease the overall 1-hour CO impact on the receptors. Estimates at intersections, therefore, would provide the highest anticipated rates, with other sections of the road having lower CO values.

One-hour CO impact concentrations were calculated because it was felt that this would provide the highest estimates of CO for a resort area such as Wailea/Makena. Traffic in such an area could be more spread out throughout the day and the peak hour, therefore, should be less than estimated.

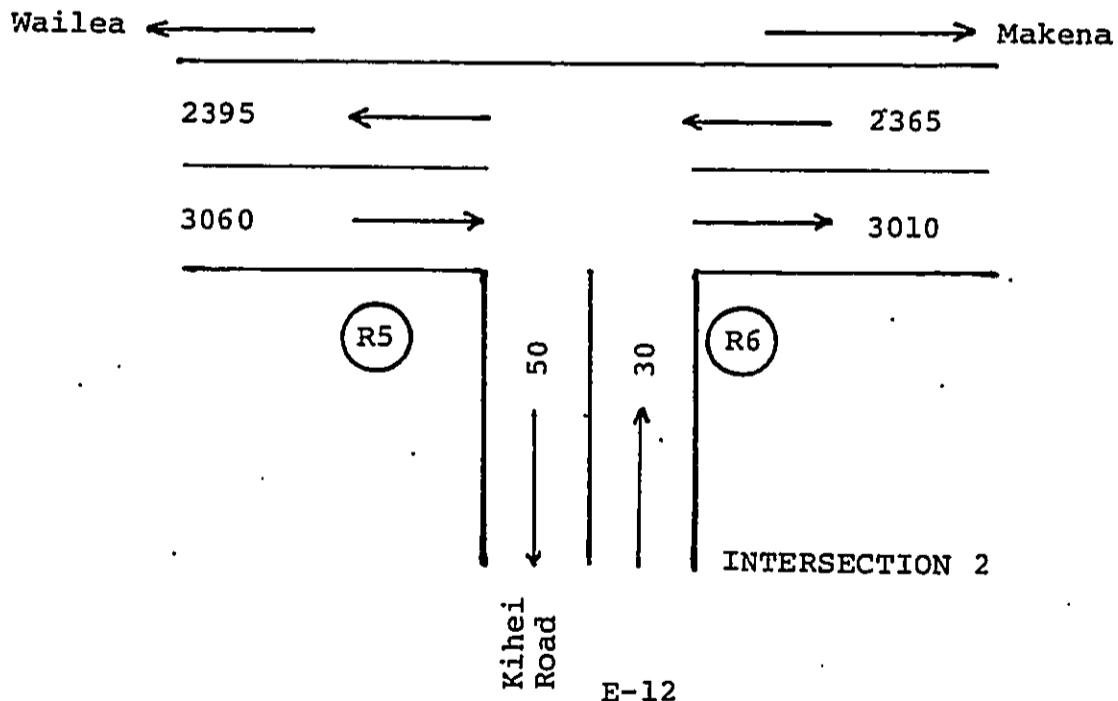
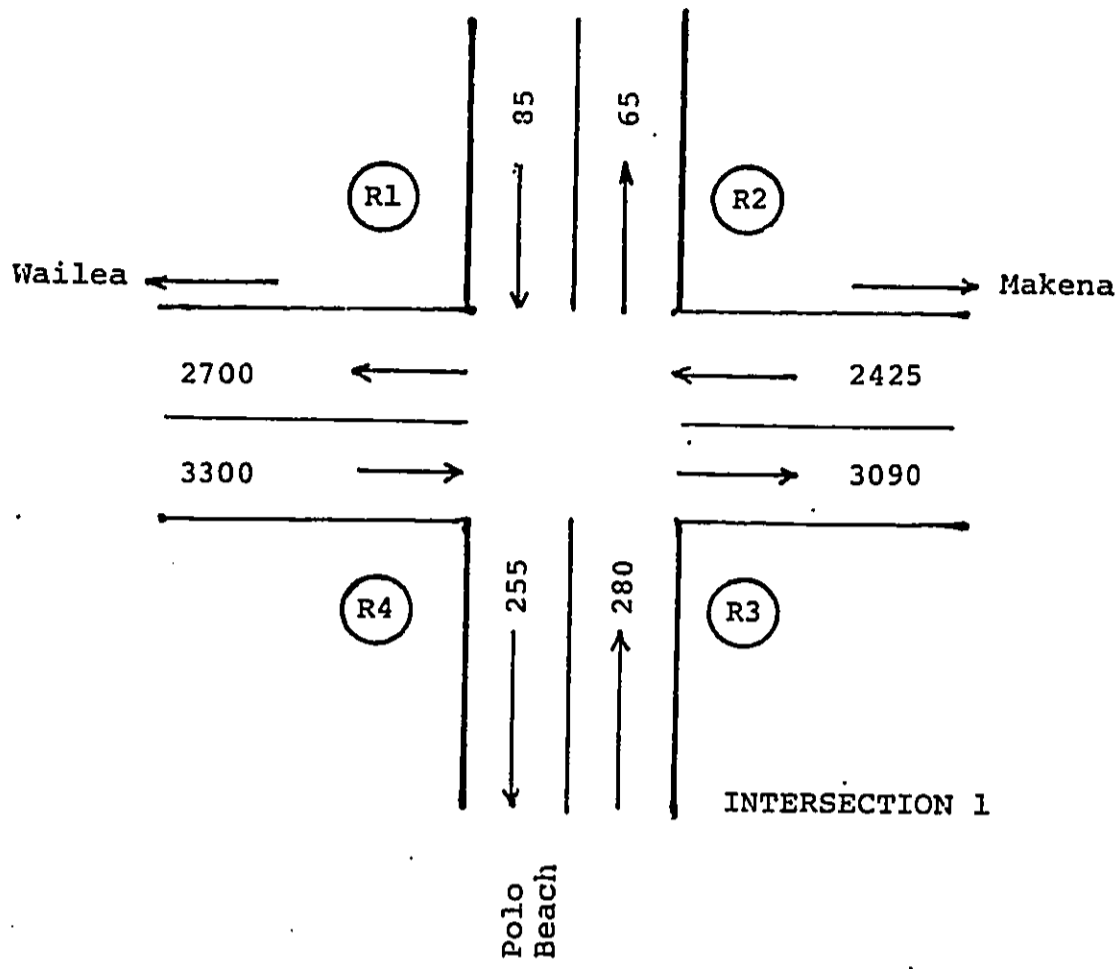
The estimated traffic projections take into account all traffic estimated for the road. If one were to assume that existing traffic at the intersections (some of which are presently nonexistent) were low or negligible, then the estimated 1-hour CO concentrations are about the maximum impact for the area.

It, therefore, appears that the predicted 1-hour CO levels, based on projected 1990 traffic levels, should not exceed current State standards of 10 parts per million (ppm) CO (1-hour).

B. 8-Hour CO Concentrations

Calculations were conducted based on projected traffic estimates for the year 1990. Traffic projections were made for each of the five intersections (refer to Figures E-5 through E-7). Carbon monoxide analyses were then made for all five intersections. Refer to Table E-2. As with the 1-hour CO calculations, estimates are probably much higher than would be the actual case. Refer to the reasons listed above.

1990 PEAK 8-HOUR TRAFFIC PROJECTIONS



1990 PEAK 8-HOUR TRAFFIC PROJECTIONS

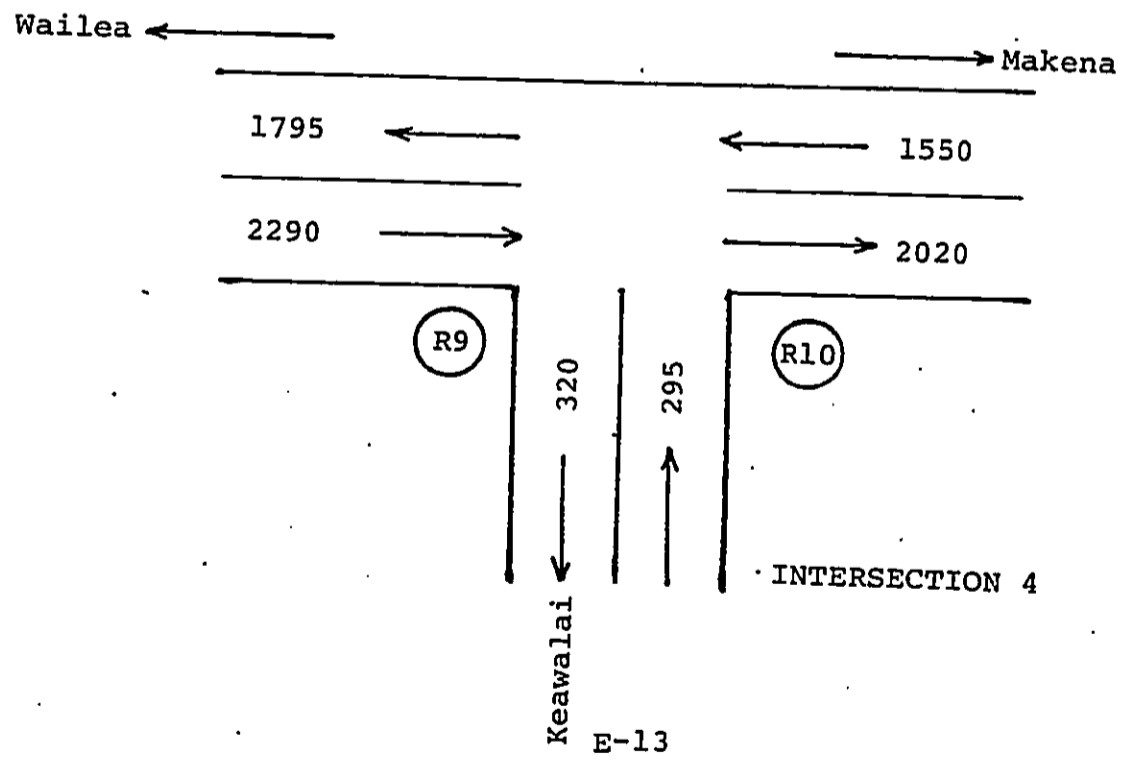
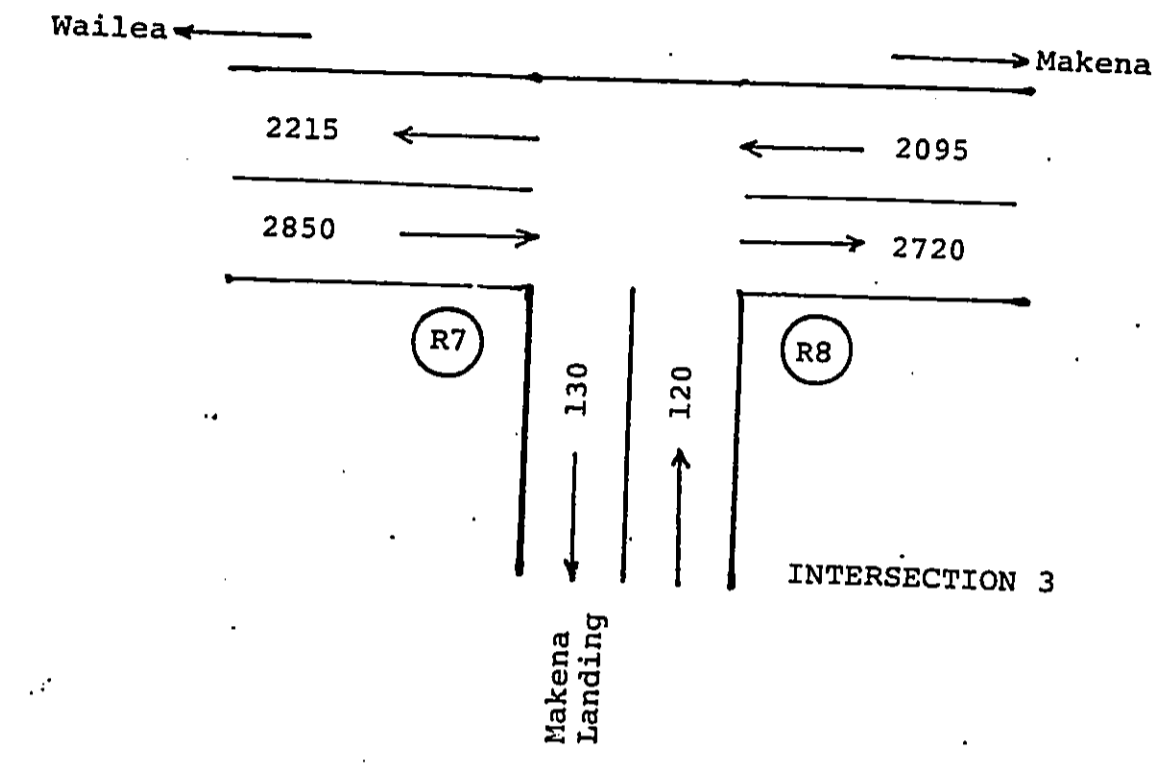


FIGURE E-6

1990 PEAK 8-HOUR TRAFFIC PROJECTIONS

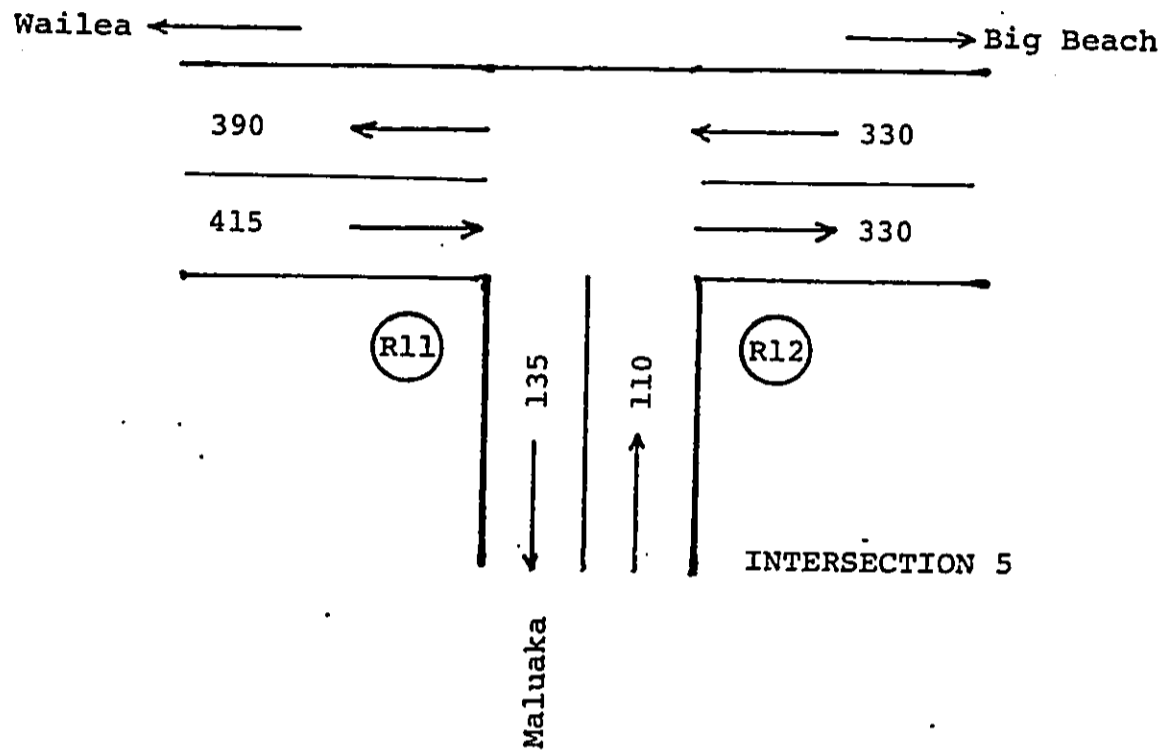


FIGURE E-7

TABLE E-2
RESULTS OF 8-HOUR CO CALCULATIONS

<u>Intersection Number</u>	<u>Receptor</u>	<u>Estimated 1990 (8-hour) CO Impact (ppm)</u>
1	R1	2.9
	R2	2.4
	R3	2.2
	R4	3.7
2	R5	3.6
	R6	2.2
3	R7	3.4
	R8	2.5
4	R9	2.1
	R10	3.5
5	R11	1.8
	R12	1.7

8-Hour State Standard = 5 ppm.

Figure F-1
**NOISE STATIONS
MAKENA ROAD**

0 1000m.
0 3000 ft.
SCALE 40-FOOT CONTOUR



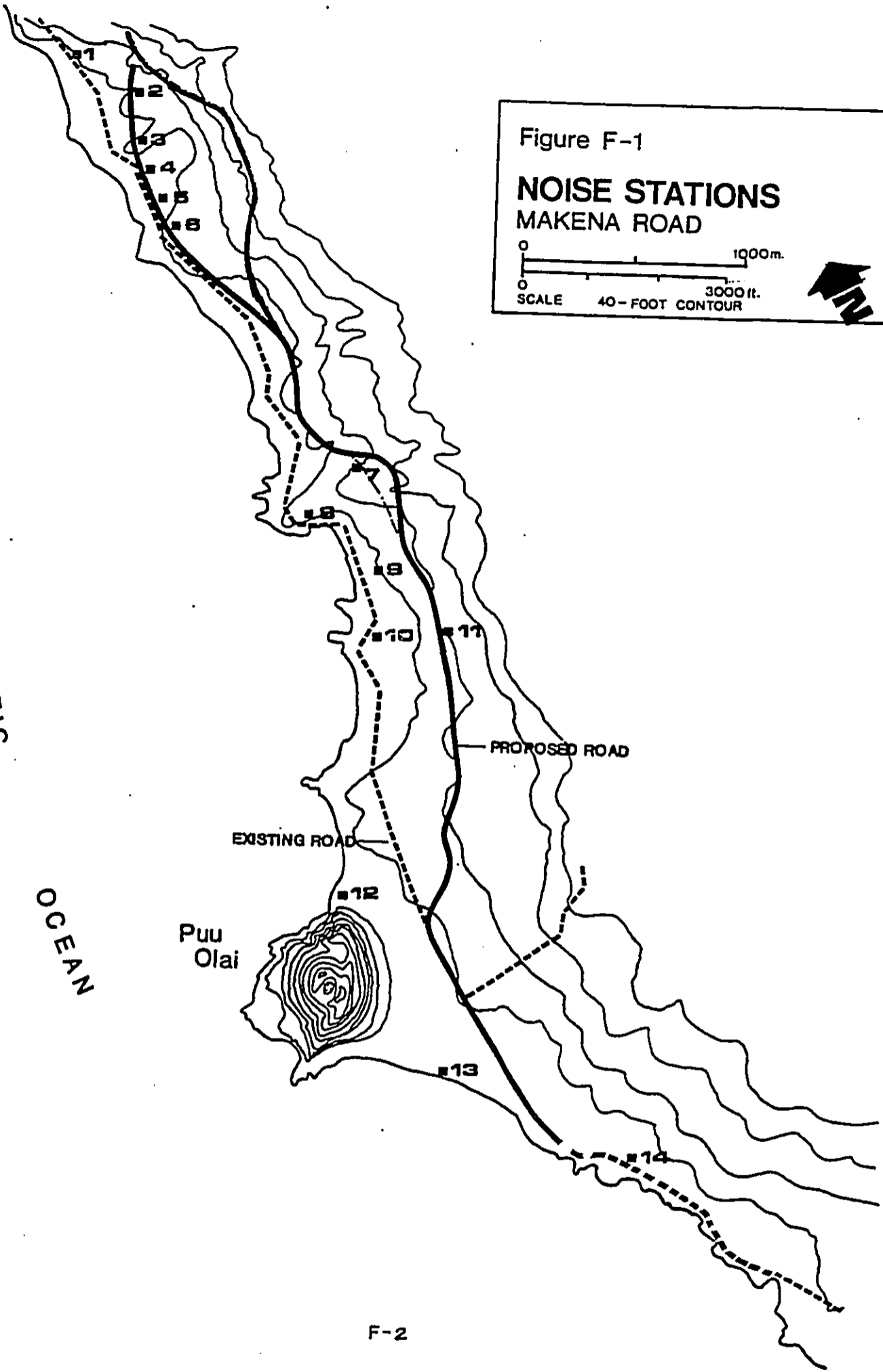
PACIFIC

OCEAN

Puu
Olai

EXISTING ROAD

PROPOSED ROAD



varies both spatially and temporally, and is studied on a statistical basis, it is most meaningfully described as a "statistical time distribution of noise levels" [F.2], or as an "exceedence level, $L_{(x)}$ " [F.3].

For example, $L_{50} = 63$ dBA indicates that a noise level of 63 decibels on the A-scale is the level exceeded 50% of the time. L_{50} and L_{10} are frequently used statistical descriptors of mean and peak noise levels, respectively, and form the basis for Federal Highway Administration (FHWA) standards.

The prediction method used in this study is based on mathematical models derived from the National Cooperative Highway Research Program (NCHRP) Report 117 [F.4]. Comparative analyses are based on the criteria of acceptable noise levels recommended by NCHRP Report 117 and U.S. Department of Transportation (FHWA) FHPM 7-7-3 (PPM 90-2), which are given in Table F-1.

Ambient noise is the total noise associated with a given environment and usually comprises sounds from many sources, both near and far. For purposes of highway noise studies, ambient noise measurements are taken in order to establish a base for existing noise conditions. Thus, the predicted noise levels may be compared to existing noise levels, as well as to Federal standards (design criteria). Refer to Section 2 of this report for a survey of the ambient noise conditions along the existing Makena Road and along the proposed alignment.

TABLE F-1
NOISE LEVEL DESIGN CRITERIA

<u>Reference</u>	<u>Maximum Acceptable Noise Levels</u>			
	<u>L₅₀(dBA)</u>		<u>L₁₀(dBA)</u>	
	<u>School</u>	<u>Residence</u>	<u>School</u>	<u>Residence</u>
NCHRP Report 117	55	50	61	56
FHWA PPM 90-2	--	--	70	70

Sources: (F.4)

II. NOISE LEVEL PREDICTIONS

Noise level predictions were made for several locations along the existing road and along the proposed alignment. They are discussed below. The predictions were based on the assumption of 1) free flowing traffic on a straight roadway lying at grade on a level terrain, and 2) separate noise levels contributed by automobiles and diesel vehicles.

The first assumption would tend to underestimate the noise levels, since the proposed road is not entirely on level terrain and has gentle curves. However, the nature of the prediction method is such that it tends to "over-predict" noise levels for low volume roads, especially with low truck volumes. Thus, the second assumption would tend to compensate for the first [F.5]. Therefore, no adjustments were made in either direction. In addition, the projected traffic levels are the maximum possible, given proposed developments, therefore, the noise level predictions may be viewed as conservative.

Noise level predictions were made for areas which presently contain residences or noise sensitive land uses, such as Keawalai Church. The specific areas of concern and their respective noise station numbers are as follows:

<u>Location</u>	<u>Station</u>
Residences along Makena Road between Wailea Alanui Drive and Halo Point	1,4

CORRECTION

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

II. NOISE LEVEL PREDICTIONS

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Noise level predictions were made for areas which presently contain residences or noise sensitive land uses, such as Keawalai Church. The specific areas of concern and their respective noise station numbers are as follows:

<u>Location</u>	<u>Station</u>
Residences along Makena Road between Wailea Alanui Drive and Halo Point	1,4

<u>Location</u>	<u>Station</u>
Residences near Makena Landing	8
Keawalai Church and nearby residences	10
Residences near Puu Olai	14

In addition, noise level predictions were made for areas along the proposed Alignment "C" which presently do not contain residences, but, which do contain wildlife populations which might be impacted. The noise stations of concern in this regard include numbers 2, 7, and 11.

Predictions were made of noise levels possible with Alignments "A", "B", and "C" and with upgrading the existing road. The results are presented in Table F-2 and are further discussed below. None of the predicted L_{10} levels experienced by persons along the existing road are anticipated to exceed Federal standards.

A. UPGRADE EXISTING ROAD

To begin with, it should be noted that the existing noise levels were measured within 10-20 feet of the road and the predicted levels are for points 200 feet from the road, so the values are not directly comparable. However, in general, it can be said that with this alternative, the mean (L_{50}) or ambient noise levels, would be significantly greater than at present, except at Station 14. The peak (L_{10}) levels would be somewhat higher.

TABLE P-2
NOISE LEVEL ANALYSIS

Station Number	Location	Observed 1977 Noise Levels		Predicted 1990 Noise Levels (dBA)							
		Mean Ambient (dBA)	Mean Peak (dBA)	Upgrade Existing Road*		ALT. "A"		ALT. "B"		ALT. "C"	
				L50	L10	L50	L10	L50	L10	L50	L10
Along Existing Road:											
1	Wailea Alanui Dr. & Makena Road	37.5	63.0	56	64	48	54	48	54	45	49
4	Historic Site mauka of Makena Rd.	40.5	NO	55	64	55	64	55	64	42	46
8	5 feet off Ulupalakua Rd.	37.5	NO	55	62	--	--	--	--	43	46
10	10 feet mauka of Makena Rd.	37.5	68.5	54	61	--	--	--	--	43	47
14	10 feet mauka of Makena Rd.	45.0	66.5	45	57	--	--	--	--	45*	57*
Along New Portions of Proposed Road:											
2	Near Start of Road	45.0	NO	--	--	--	--	--	--	56	64
7	1,000 feet from shoreline	34.0	NO	--	--	--	--	--	--	55	62
11	Mauka of Keawalai Church	32.5	NO	--	--	--	--	--	--	54	61

*Estimates based on distance of 200 feet from road.

NO - No Peaks Observed.

NOTE: The observed peak levels may be higher than predicted peak levels due to the influence of sounds other than traffic noise, such as ocean waves. The predicted levels only take highway noise into account.

Refer to Figure P-1 for Station Locations.

B. ALTERNATES "A" AND "B"

Since these two alternate alignments are just for the northern end of the road, the noise impact would mainly be on those residences along Kihei Road between Wailea Alanui Drive and Halo Point (Stations 1 and 4). Predicted L_{10} noise levels would be close to existing peak levels. The observed peak level at Station 1 is higher than the predicted level because it includes highway noise and other background noise, where as the predicted level is only for highway noise due to the new road.

C. ALTERNATE "C"

This alternate alignment would have the least noise impact on residences near Stations 1 and 4, and the predicted levels are well below Federal standards. This is also true for the residences near Makena Landing and Keawalai Church.

The proposed road south of Alternate Alignment "C" (near Stations 2, 7, and 11) would not impact any existing residences, but could impact wildlife populations in the vicinity. Some wildlife species may be displaced into surrounding areas due to the traffic noise, however, most of the faunal species encountered during the reconnaissance of the area were species common throughout the island and state.

The pueo (Hawaiian short-eared owl) would be the main native species impacted, however, this impact is not anticipated to be significant. The endangered Hawaiian stilt is listed as "probably present" (most likely along the shoreline in swampy areas near the existing road), however, it is most likely already impacted by existing noise and traffic volumes. Thus, no significant impact is anticipated on this species.

REFERENCES FOR APPENDIX F

- [F.1] U.S. Department of Transportation. 1975. Physical Impacts: A Guidance Manual for the Assessment of Physical Impacts Due to Highway Facility Improvements. Environment Assessment Notebook Series: Notebook 4. Page 273.
- [F.2] State of Hawaii, Department of Transportation. February, 1977. Piilani Highway: Administrative Action Final Environmental Impact Statement. Page 68.
- [F.3] Op. Cit., [F.1], Page 274.
- [F.4] Cunniff, Patrick F. 1977. Environmental Noise Pollution. John H. Wiley and Sons, Inc. Pages 164-168.
- [F.5] State of Hawaii, Department of Transportation. November, 1976. Haleakala Highway, Pukalani Section: Administrative Action Final Environmental Impact Statement. Page C-1.

APPENDIX G

APPENDIX G

SPECIAL MANAGEMENT AREA OBJECTIVES AND POLICIES

I. OBJECTIVES

The following objectives shall be used by the Authority for the review of developments within the Special Management Area:

A. Provide Coastal Recreational Opportunities Accessible to the Public

The proposed project should enhance, rather than restrict, public access to the shore.

B. Protect, Preserve, and Where Desirable, Restore Those Natural and Man-made Historic and Pre-historic Resources in the Coastal Zone Management Area That are Significant in Hawaiian and American History and Culture

An archaeological reconnaissance of the project area revealed several natural or man-made historic or prehistoric resources. The significance of the impacted sites is discussed in Section 4 of this report.

C. Protect, Preserve, and Where Desirable, Restore or Improve the Quality of Coastal Scenic and Open Space Resources

The proposed project will remove about 30 acres of open space, however, it will not directly impact the quality of coastal scenic or open space resources.

D. Protect Valuable Coastal Ecosystems from Disruption and Minimize Adverse Impacts on All Coastal Ecosystems

The proposed action will not significantly disrupt or adversely impact the local coastal ecosystem. Increased runoff from the project site is anticipated to be minimal.

E. Provide Public or Private Facilities and Improvements Important to the State's Economy in Suitable Locations

As tourism is the leading industry in the State, the proposed infrastructural improvement to an already designated visitor area may be seen as a "facility . . . important to the State's economy" in a "suitable location."

F. Reduce Hazard to Life and Property from Tsunami, Storm Waves, Stream Flooding, Erosion and Subsidence

Portions of the proposed road are located within a tsunami area according to the Drainage Master Plan for the County of Maui. The proposed road will also cross one flood hazard area (Zone A-4 100-year flood hazard), at the north end of the road. However, this condition was incorporated into the roadway design and no significant impacts are anticipated. The roadway was also designed to minimize erosion.

- G. Improve the Development Review Process, Communication, and Public Participation in the Management of Coastal Resources and Hazards

The proposal will be presented at a public meeting in the near future. In addition, the proposed action will be reviewed by the line agencies, and by the Urban Design Review Board when an SMA permit is applied for.

II. POLICIES

The following policies shall be used by the Authority for the review of developments within the Special Management Area:

A. Recreation Resources:

1. Improve coordination and funding of coastal recreation planning and management

The proposed project will not restrict public access to the shore.

2. Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

- a. Protecting coastal resources uniquely suited for recreation activities that cannot be provided in other areas

The proposed project will not adversely affect coastal resources uniquely suited for recreation.

- b. Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites and sandy 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

The proposed project will not damage coastal resources having recreational value.

- c. Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value

The proposed project will not restrict public access to the shore.

- d. Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation

There are five beach parks in Kihei and five more in the Wailea development. There are two existing parks in the Makena area (Puu Olai State Park and Ahihi-Kinau NAR); and Seibu Hawaii, Inc. proposes to build two more, one at Makena Landing and one north of Maluaka Point. The proposed road would enhance access to the latter four parks.

- e. Encouraging expanded public recreational use of County, State, and federally owned or controlled shoreline lands and waters having recreational value

The proposed action will enhance access to any such County, State, or Federally-owned shoreline lands and waters.

- f. 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

The proposed project is not anticipated to result in significant pollution of coastal waters due to runoff or erosion.

- g. Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, artificial reefs for surfing and fishing

The proposed project will not conflict with this policy.

- h. Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits, and crediting such dedication against the requirements of Section 46-6, Hawaii Revised Statutes

The proposed project will not restrict public access to the shore.

B. Historic Resources:

1. Identify and analyze significant archaeological resources

An archaeological reconnaissance was conducted in the project area and cultural resources, either archaeological or historical, which were located are discussed in Appendices C and D.

2. Maximize information retention through preservation of remains and artifacts or salvage operations

Salvage operations have been or will be conducted, to mitigate impact to the most significant sites.

3. Support State goals for protection, restoration, interpretation and display of historic resources

Specimens of volcanic glass that were obtained in the salvage have been added to the University of Hawaii Archaeology Laboratory glass library and will be available for future research. Artifacts that were obtained will be turned over to the County of Maui for appropriate disposition.

C. Scenic and Open Space Resources

1. Identify valued scenic resources in the coastal zone management area

The proposed highway will not impact scenic resources in the area.

2. Insure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural land forms and existing public views to and along the shoreline

The proposed highway will not alter existing public views to and along the shoreline.

3. Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources

The proposed action will not impact shoreline open space and scenic resources.

4. Encourage those developments which are not coastal dependent to locate in inland areas

This policy does not appear to be applicable to the proposed action.

D. Coastal Ecosystems:

1. Improve the technical basis for natural resource management

Biological and marine reconnaissances of the project area were conducted and revealed that there are no rare or endangered plants or animals, nor critical habitat, that will be impacted by the proposed action.

2. Preserve valuable coastal ecosystems of significant biological or economic importance

No components of the local coastal ecosystem, either on-site or off-site,

will be significantly impacted by the proposed project. The stand of wili-wili trees noted in study area 11 will be flagged to prevent their destruction during construction.

3. 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

The roadway and drainage system was designed with the intent of no diversion or intensification of flow. Surface runoff from the proposed road itself will be minimal. Thus, the natural drainage system will not be sustaining flows significantly greater than at present.

4. 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

Construction of the proposed highway will comply with State water quality standards.

E. Economic Uses:

1. Concentrate in appropriate areas the location of coastal dependent development necessary to the State's economy

The proposed project will not result in scattered urban development. The roadway will be one improvement towards the development of a designated visitor destination area.

2. Insure that coastal dependent development such as harbors and ports, 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

The roadway has been located and designed to minimize impact on existing residences and to minimize drainage impacts.

3. 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:
 - a. Utilization of presently designated locations is not feasible
 - b. Adverse environmental effects are minimized
 - c. Important to the State's economy

The proposed project will be located in an area presently designated for resort development and should allow for "reasonable long-term growth."

F. Coastal Hazards

1. Develop and communicate adequate information on storm wave, tsunami, flood, erosion, and subsidence hazard

Information on these items is presented within Sections 2 and 4 of the EIS. Construction of a portion of the road has been completed, with minimal soil loss along the alignment during several heavy rain storms. There has been no evidence of subsidence during field reconnaissances.

2. Control development in areas subject to storm wave, tsunami, flood, erosion, and subsidence hazard

The southern portion of the proposed roadway will be located within a tsunami area, where it follows the existing road.

3. Ensure that developments comply with requirements of the Federal Flood Insurance Program

The proposed roadway crosses one flood hazard area, at the north end of the road. However, this condition was incorporated into the roadway design and no significant impacts are anticipated.

4. Prevent coastal flooding from inland projects

The proposed action is not anticipated to contribute to coastal flooding.

G. Managing Development:

1. Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development

The proposed action will comply with the Special Management Area (SMA) rules and regulations of the County of Maui and the objectives of the Coastal Zone Management Act.

2. Facilitate timely processing of application for development permits and resolve overlapping of conflicting permit requirements
3. Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the general public to facilitate public participation in the planning and review process

The Environmental Impact Statement helps to meet this requirement, as do the required public meetings which will occur in the SMA process.