



EXECUTIVE CHAMBERS

HONOLULU

JOHN WAIHEE
GOVERNOR

May 4, 1988
MAY 10 10 35

Marvin T. Miura, Ph.D.
Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Based upon the recommendation of your office, I am pleased to accept the Final Environmental Impact Statement for Kapolei Village as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. This environmental impact statement will be a useful tool in the process of deciding 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 the proposed action.

With kindest regards,

Sincerely,

A handwritten signature in cursive script, appearing to read "John Waihee".

JOHN WAIHEE

- Environ. Impact, Stat.
Final
1988-Feb.
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FINAL

KAPOLEI VILLAGE

ENVIRONMENTAL IMPACT STATEMENT



**STATE OF HAWAII
HOUSING FINANCE AND
DEVELOPMENT CORPORATION**

February 1988



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FINAL

ENVIRONMENTAL IMPACT STATEMENT

FOR

KAPOLEI VILLAGE

Ewa, Oahu, Hawaii

This document is prepared pursuant to
Chapter 343, Hawaii Revised Statutes

PROPOSING AGENCY:

STATE OF HAWAII
HOUSING FINANCE AND DEVELOPMENT CORPORATION
1002 N. School Street
Honolulu, Hawaii 97817

RESPONSIBLE OFFICIAL:


JOSEPH K. CONANT, Executive Director


Date

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E - An Affordable Housing Development Concept, State of Hawaii, Hawaii Housing Authority, March 20, 1986	
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PREFACE

This document is an environmental impact statement describing findings and conclusions for the proposed Kapolei Village residential community and the surrounding environment, located in the Ewa Plain of Oahu. The document is divided into sections describing the master plan, the affected environment, and alternatives considered during the planning stages of the master plan and impacts that may result from the proposed development. Additionally, separate studies of noise, traffic, flora and fauna, air quality, and archaeology, conducted by members of the project team, are provided as appendices.

Consulted agencies and organizations were requested to submit their comments, corrections, and/or clarifications to the Housing Finance and Development Corporation prior to the issuance of the final environmental impact statement.

It should be noted that effective July 1, 1987, the development financing and residential leasehold functions of the Hawaii Housing Authority (HHA) were transferred to the newly created Housing Finance and Development Corporation (HFDC). Thus, any reference to the HHA within the Environmental Impact Statement now refers to the HFDC.

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SECTION 1

INTRODUCTION AND SUMMARY

SECTION 1
INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

The Housing Finance and Development Corporation (HFDC) in cooperation with the City and County of Honolulu, Department of Housing and Community Development (DHCD), is proposing to develop an innovative, master planned residential community along with a full range of community support facilities including: recreational opportunities; commercial centers; day care facilities; public schools; and a park and ride facility.

Residential units within the proposed project are designed to provide a mix of housing types suitable for different income levels. These housing types include market units (maximum 40 percent of the total residential units) to be sold at market prices and affordable units (minimum 60 percent of the total residential units). Affordable units are to include elderly housing, gap-group housing, and assisted housing (lower income and very low income).

The Ewa area is designated as the future site of the Secondary Urban Center (SUC). The area was designated as the SUC in 1977 by the City and County of Honolulu to attract future population growth and employment opportunities and to relieve urban pressures within the Honolulu area, designated as the Primary Urban Center (PUC).

The Ewa Development Plan area (Census Tracts 83-86.02) was amended in 1986 in accordance with a land use plan prepared by the Estate of James Campbell for establishment of the SUC. Elements of the plan include an urban core of the SUC, known as Kapolei Town Center, and surrounding residential communities. The goal of the plan is to develop a self-contained community with a full range of support facilities and services, including a mix of housing unit types, commercial/retail centers, businesses and community support facilities. It is envisioned that development of a self-contained community will result in a reduction of commuter traffic to and from the PUC and consequently a reduction in requirements for transportation improvements.

1.2 INTENDED USES OF THIS DOCUMENT

This environmental impact statement is prepared in accordance with Chapter 343, Hawaii Revised Statutes and the rules and regulations of the Office of Environment Quality Control. It has been determined that an environmental impact statement is required pursuant to Chapter 200 of Title 11, Administration Rules, Subchapter 5(b).

The purpose of the environmental impact statement is to provide information to public officials and members of the community on the nature of the subject action; to assess existing environmental conditions of the property and surrounding areas; to evaluate potential impacts that may result from development of the project and to propose mitigating measures for those impacts; and to consider alternatives to the proposed action.

The environmental impact statement and the master plan shall be used as basic documents to justify proposed State land use redesignations and amendments to the County's development plan.

1.3 DEVELOPMENT SUMMARY

- Applicant: Housing Finance and Development Corporation
- Property Owner: Estate of James Campbell
- Property Location: Approximately 22 miles west of the primary urban center of Honolulu, near the center of the Ewa Plain, north of the Naval Air Station, Barbers Point (NAS BARPT), south of the Makakilo residential community and directly east of the proposed Kapolei Town Center.
- Tax Map Key: Zone 9, Section 1, Plat 16 and encompassing all of Parcel 23 and a portion of Parcel 25.
- Area: 830 acres.

State Land Use District: Agricultural

City and County Development Plan Designation: Agriculture, Commercial, Public Facility

Existing Uses: Agricultural

Proposed Uses: Residential, Commercial, Public Facilities, Parks

Proposed Action: The applicant proposes to develop 830 acres of land in the Ewa Plain area, Leeward Oahu. Development of the master planned community will offer a mix of residential housing, commercial/retail areas, community facilities, and recreation facilities including an 18-hole golf course. The proposed project is designed to offer a mix of affordable housing (60 percent) and market housing (40 percent).

EIS Accepting Authority: Governor, State of Hawaii

1.4 DEVELOPMENT CONCEPT

The overall development concept for Kapolei Village provides for a planned residential community with a full range of community support facilities. Based on the report by the Hawaii Housing Authority: An Affordable Housing Development Concept, March 20, 1986 (Appendix E), the development concept emphasizes residential development with a large percentage of affordable units for elderly, assisted and gap-group families. The development concept is designed to provide a 60/40 percent balance between affordable and market units with affordable housing priced to accommodate low to moderate income families and market units to be available at market prices.

Under the development concept, the State will act as the lead in the development of the proposed project and assume all risks associated with

land acquisition, master planning and obtaining necessary land use and zoning amendments. Additionally, the State will work with the City and County of Honolulu and private sector in the actual development of the proposed project.

The proposed Kapolei Village project is designed to help alleviate Oahu's severe affordable housing shortage. As a means to achieve this goal, the HFDC is proposing to acquire fee title to approximately 830 acres of land from the Estate of James Campbell to master plan and develop the residential community. The proposed project will coincide with goals of the City and County's General Plan to develop the Secondary Urban Center (SUC) in the Ewa Plains area.

1.5 SUMMARY OF PROBABLE IMPACTS AND MITIGATION MEASURES

1.5.1 Agricultural Impacts

At present, the entire project site is used for sugar cultivation by the Oahu Sugar Company (OSCo). Development of the project site will result in a decrease of approximately 830 acres of available sugarcane lands. The development of Kapolei Village would not adversely affect the economic viability of Oahu Sugar Company, nor would it require layoffs of sugar workers. This assumes the continuation of historic development rates for housing projects - rates which would allow sufficient time to increase yields and thereby partially or completely compensate for the reduced acreage with little or no loss in production. Reductions in employment would occur through retirement and voluntary movement to other jobs. Over the long term, OSCo could accommodate a major reduction in acreage and maintain economies of scale by operating just one mill, rather than two in parallel.

1.5.2 Air Quality

The principal source of short term air quality impacts will be from construction activities. In the longer term, increased vehicular traffic resulting from the development will be a major contributor of air pollutants. Short term impacts from construction activities are proposed to be controlled by enforcement of Department of Health regulations. Long

term automotive impacts will be mitigated by improved road facilities in the vicinity of the project area and reduced travel demand to and from urban Honolulu.

1.5.3 Traffic

Kapolei Village, as well as adjacent proposed developments, are expected to increase vehicular traffic in and around the project site, especially during peak travel periods. Mitigative measures applicable to Kapolei Village include signalization at major intersections and on-site facilities including commercial and recreational facilities and a Park-and-Ride facility located at the northwest portion of the project site. This facility may also serve as a terminus for a feeder bus system, linked to the City's proposed mass transit system.

1.5.4 Socio-Economic Conditions

Kapolei Village will increase population in the area by an estimated 15,000 to 16,500 persons using average persons per household of 3.0 to 3.3. This total represents 17 percent of the area's population per the development plan projected at 91,700 by the year 2000. Local employment opportunities provided by the development include approximately 640 commercial jobs, as well as positions in schools and recreation. Kapolei Village is expected to provide a wide range of housing opportunities, particularly in the affordable range, for varied levels of families incomes. Total housing units are estimated at approximately 4,871 units for the development with at least 60 percent of them being in the affordable category.

1.5.5 Noise

Noise impacts generated from future traffic within the project site are expected to be relatively minor as development occurs. Noise impacts from Naval Air Station, Barbers Point, operations have been taken into consideration in the overall layout of the proposed development. Kapolei Village is designed with reference to the AICUZ study prepared by the U.S. Navy, although subsequent studies reveal different findings regarding sound levels within the project site.

1.5.6 Topography and Soils

Impacts occurring on the physical terrain from development of the project site are expected to be minimal. Because the existing site is relatively flat, relatively little grading will be required. Generally, most of the soil is considered low to moderately expansive. Soils that are moderately expansive could require special procedures for house foundation design, such as deep footings, subgrade saturation or capping with non-expansive soils.

1.5.7 Flora and Fauna

The proposed project is not expected to have a significant impact on flora as the site consists primarily of cultivated lands. There are no rare, threatened or endangered vertebrate animal species known to exist on the project site.

1.5.8 Water

The total average potable water demand for the development is estimated at 2.8 mgd. Proposed on-site water improvements include water lines along internal roadways. Off-site water improvements include a second 30-inch main along Farrington Highway and additional storage reservoirs, located north of the H-1 Freeway. With approval and implementation of these proposed facilities, no adverse impacts are expected locally or regionally. The water system is to be approved by the Board of Water Supply. An adequate supply of water will be available for the proposed project.

1.5.9 Sewer

The average daily sewer flow generated by the development is projected at 2.1 mgd. Sewage generated by the project is to be conveyed via the West Beach interceptor sewer to the Honouliuli Wastewater Treatment Plant (WWTP) for treatment and disposal. Proposed off-site improvements include upgrading a portion of the West Beach interceptor sewer to accommodate flows from Kapolei Village. Additionally, the Honouliuli Wastewater Treatment Plant (WWTP) is scheduled for expansion to be completed in 1993. After expansion, the WWTP is expected to accommodate all new development in the Ewa area.

1.5.10 Drainage

The only improvement to the off-site drainage system is upgrading the drainage swale north of Farrington Highway to prevent overflowing onto Farrington Highway during a 100-year storm. On-site drainage system improvements consist of underground box culverts and open channels directing runoff to a detention basin (golf course). The detention basin will serve to attenuate the downstream peak flow rates by providing temporary storage of the runoff. The runoff will be released at a controlled rate after the storm subsides into the coral pit inside NAS BARPT at a peak flow of 2,430 cfs.

These improvements are anticipated to have positive impacts on NAS BARPT, since runoff presently sheetflows into the base and causes localized flooding.

1.5.11 Solid Waste

Currently, solid waste is disposed of at the Palailai Landfill and the Waipahu Incinerator. The Palailai Landfill is scheduled to close within the next few years and is not expected to provide a refuse disposal site for the proposed project. However, a new landfill site at Waimanalo Gulch is currently being implemented and a Garbage-to-Energy H-POWER facility, located in the James Campbell Industrial Park, is scheduled to become operational in late 1990. These facilities are expected to accommodate the proposed project.

1.5.12 Power and Communications

No adverse impacts resulting from off-site and on-site improvements are anticipated. Proposed off-site power and communications requirements will be provided as needed.

1.6 UNRESOLVED ISSUES

Unresolved issues regarding development of the proposed Kapolei Village include: the purchase of the project site from James Campbell Estate by the Housing Finance and Development Corporation; requirement of a Land Use

District Boundary Amendment, changing the current land use designation from agriculture to urban; and the operations and management of the golf course, either by a government agency or by a private leaseholder.

1.7 ALTERNATIVES CONSIDERED

Alternatives to the proposed development include a "No Action" alternative resulting in preservation of existing conditions of the proposed project site. The undeveloped site would most likely continue to be used for sugarcane cultivation for the near future. The "No Action" alternative would result in the absence of an innovative residential community offering a mix of housing opportunities to suit lower income families, as well as middle to upper middle income families.

In preparing the recommended master plan for Kapolei Village, five alternative concept plans were created based on a development program established by the Housing Finance and Development Corporation. Initial criteria for the concept plans included provision of approximately 5,000 housing units (60 percent affordable and 40 percent market) within each alternative plan. The plans were then created with varied design elements, infrastructure systems, and recreational facilities, while maintaining the initial number and type of housing units. Brief descriptions of the alternative plans are as follows:

A. Alternative 1

Alternative 1 was designed as a conventional residential subdivision with a simple loop road winding through the project site intersecting the proposed Ewa Parkway. No major community image or focal point was provided within this plan.

B. Alternative 2

Alternative 2 incorporated the use of small neighborhood parks surrounded by high density housing units. The plan also provided

for open drainage channels for on-site retention of storm water and major public facilities located along Farrington Highway, on the northern border of the project site.

C. Alternative 3

Alternative 3 contained a civic facilities "backbone" concept with a surrounding loop road oriented from Barbers Point Access Road. Interior circulation would be provided via walkways and bikepaths. The plan also provided for four recreation centers located within strategic areas of the project site.

D. Alternative 4

Alternative 4 was designed with a central lake located in the middle of the project site, south of the intersection of the internal loop road and the entrance road from Farrington Highway. This plan did not allow for a major east-west roadway running through the project site as did the other concept plans.

E. Alternative 5

Alternative 5 added an 18-hole golf course to the project providing identity, as well as creating premium residential lots with golf course frontage. The golf course design also allowed for integration of drainage channels.

Elements of these alternative plans were evaluated and the best features of each plan were combined into a preferred alternative plan. This preferred alternative was then refined to become the recommended "master site plan" for the proposed project site.

1.8 NECESSARY PERMITS AND APPROVALS

A. State of Hawaii

Land Use Commission

Land Use District Boundary
Amendment

B. City and County of Honolulu

Dept. of General Planning

Ewa Development Plan Amendments

Dept. of Land Utilization

Change of Zone Approvals, Subdivision Approvals

Building Department

Building Permits; Grading Permits

Board of Water Supply

Water Master Plan Approval

Dept. of Public Works

Drainage Master Plan Approval
Sewer Master Plan Approval

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SECTION 2
PROJECT DESCRIPTION

SECTION 2
PROJECT DESCRIPTION

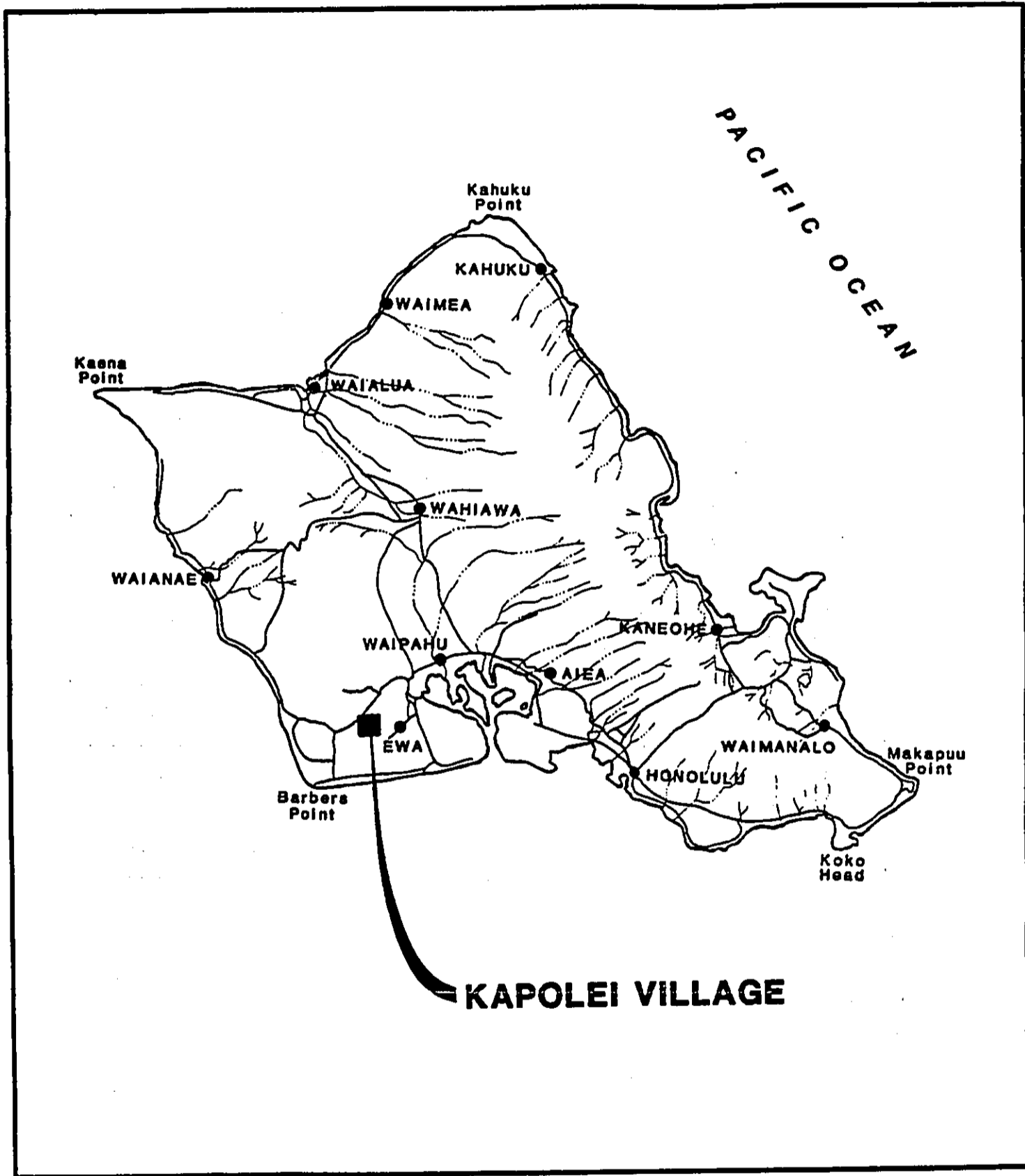
2.1 LOCATION

The proposed Kapolei Village is located on the southwest side of the Island of Oahu, approximately 22 miles west of the primary urban center of Honolulu (Figure 2-1). The site is located near the center of the Ewa Plain, north of Naval Air Station, Barbers Point (NAS BARPT), south of the Makakilo residential community and directly east of the proposed Kapolei Town Center. The Kapolei Shopping Center is now being developed adjacent to the northwest corner of the site. Further to the west lie the Campbell Industrial Park, Deep Draft Harbor, Ko'Olina resort/residential community, and the existing community of Honokai Hale. Major roadways providing access to the site include the H-1 Freeway, Farrington Highway, and Barbers Point Access Road.

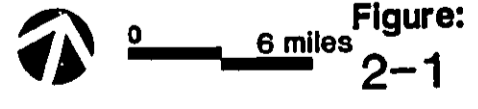
The 830-acre project site is owned by the Estate of James Campbell and is leased to the Oahu Sugar Company for sugarcane cultivation. For taxation purposes, the project site is identified as lying within Zone 9, Section 1, Plat 16 and encompassing all of Parcel 23 and a portion of Parcel 25. Campbell Estate owns all of the land surrounding the project site with the exception of roadway and railway rights-of-way, including Barbers Point Access Road and Makakilo Interchange, owned by the State of Hawaii; Farrington Highway and Fort Barrette Park (Puu Kapolei) owned by the City and County of Honolulu; and NAS BARPT owned by the Federal Government.

2.2 DEVELOPMENT CONCEPT

The overall development concept for the proposed Kapolei Village has as its basis the development of a planned residential community to include a large percentage of affordable residential units for elderly, assisted and gap-group families (Hawaii Housing Authority: An Affordable Housing Development Concept, March 20, 1986). The following are the development concept objectives:



Kapolei Village
LOCATION MAP
Ewa, Oahu, Hawaii



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A. Site Selection

Site selection criteria for the proposed project include obtaining reasonably priced land for the project site; location near existing or planned infrastructure; flat topography; and proximity to existing employment centers and communities or areas of future growth.

B. Land Use

Land use within the project site is to be distributed whereby necessary infrastructure and facilities are to be developed in support of planned residential units.

C. Housing Mix

Residential units shall entertain a 60/40 mix between affordable units and market units, respectively. The affordable units would be sold and/or rented at affordable price ranges to be determined by the HFDC. Affordable units are targeted at groups including the elderly, assisted (very low income and lower income) and gap-group families. Definitions of these affordable groups are as follows:

(1) Elderly

Elderly families are defined as those families whose head of household or spouse (or sole member) is 62 years old or older, disabled or handicapped.

(2) Assisted

Very low income families are defined as those families with earnings not more than 50 percent of the area's median income as defined by the Department of Housing and Urban Development (HUD). Lower income families fall between 50 and 80 percent of the HUD area median income.

(3) Gap Group

Gap-group families are defined as those families with earnings between 80 and 120 percent of the HUD area median income. At current interest rates, a gap group family of four, Island of Oahu, would be able to purchase a home in the price range of \$79,500 to \$125,500. These families are considered to have incomes too high to qualify for rental subsidy programs, yet too low for conventional financing.

D. Markets Units

Market units would be offered for sale at appraised values with the excess revenues derived from the sales used to reduce the costs associated with affordable units. Additionally, market rental units will be available.

E. Commercial Property

Commercial land, developed in support of residential units, would be owned in fee simple by the HFDC and leased to potential developers. Revenues gained from the leases would support various functions of the HFDC.

The development concept acts as an "aggressive vehicle for producing a consistent level of affordable housing units." Using tools available under Act 337, Session Laws of Hawaii, many variables which contribute to high costs associated with housing development can be controlled with the savings used to reduce housing costs.

Under the concept, the State will act as the lead in the development of the proposed project and assume all risks associated with acquiring, master planning and obtaining necessary land use and zoning amendments. Additionally, government will work with the private sector in the master planning and development process of the proposed project.

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2.3 THE MASTER PLAN

The recommended master plan encompasses an 830-acre site and provides for approximately 5,000 residential housing units. A land use summary table is presented in Table 2-1 accompanied by a discussion of each of the principal land use components. In addition to siting criteria discussed above, residential uses have been sited to provide for a balanced mix of housing types throughout the project area (Figure 2-2).

The recommended master plan utilizes loop roads in conjunction with the proposed Ewa Parkway to provide a simple and direct parkway system of collector roads. In addition to the internal loop roads, a secondary connector roadway is located midway down West Loop to provide additional through access to Barbers Point Access Road. Village Parkway and the internal loop roads also provide for pedestrian and bicycle circulation within the project site.

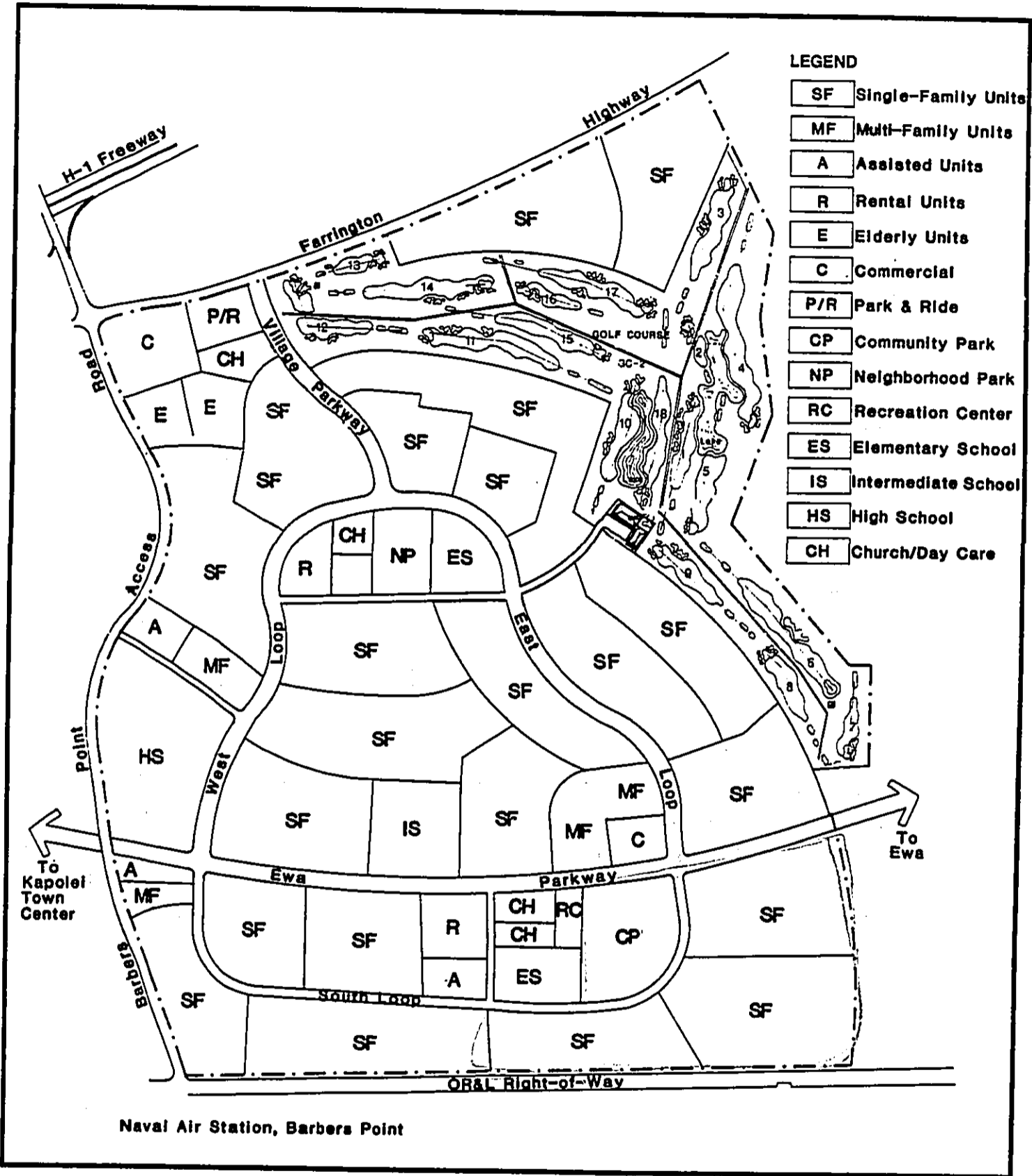
The project site is subdivided into small residential neighborhoods. Within these neighborhoods, the local street system will be designed to discourage high speeds and through traffic. However, many of the interior cul-de-sacs terminate near the loop roads to allow pedestrian and bicycle access.

The primary entry to the project is from Farrington Highway via Village Parkway. Entering the site from this location provides visual overviews of both the project site and Pearl Harbor in the distance. An entry identification feature at this location will signal the arrival into a modern, contemporary residential community. Located west of the entry, at the intersection of Barbers Point Access Road and Farrington Highway, is a commercial center. Adjacent to the commercial center, at the entrance to the property, is a landscaped Park-and-Ride facility providing convenient bus and auto access to Farrington Highway, Barbers Point Access Road on the H-1 Freeway.

TABLE 2-1

RECOMMENDED PLAN LAND USE SUMMARY

	<u>Acreage</u>	<u>Percent of Site</u>	<u>Average Density</u>	<u>Units</u>	<u>Mix</u>
RESIDENTIAL	501.8	60%	9.7	4,871	100%
Single Family (For Sale)	449.0		8.3	3,722	76
Multi-Family (For Sale)	18.9		15.0	283	6
Elderly Rental	12.5		35.0	438	9
Market Rental	12.8		20.0	255	5
Assisted Rental	8.6		20.0	173	4
RECREATION, PARKS & OPEN SPACE	179	22%			
Golf Course	144				
Golf Clubhouse	3				
Recreation Centers (2)	5				
Neighborhood Park (1)	0.6				
Community Park (1)	14				
Entry Feature/Buffer	0.66				
CIVIC	14	2%			
Church & Day Care (4)	9				
Park & Ride	5				
SCHOOLS	52	6%			
Elementary (2)	12				
Intermediate (1)	15				
High (1)	25				
COMMERCIAL	11	1%			
Neighborhood	3				
Other Commercial	8				
ROADWAYS	63	8%			
Major Internal	45				
Ewa Parkway	18				
DRAINAGE	<u>10</u>	<u>1%</u>			
TOTAL ACREAGE	830	100%			



Kapolei Village
RECOMMENDED MASTER PLAN
 Ewa, Oahu, Hawaii

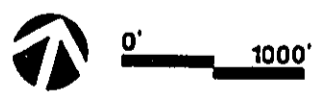


Figure:
 2-2

Throughout the proposed project, a mix of housing types is provided. Residential types are well integrated, although certain overriding guidelines have been followed in determining the placement of each housing type. Market units are located along golf course frontages and in areas of views for maximum value. Higher density increments of rental, assisted and elderly housing have been located in proximity to parkways and community and commercial facilities.

Community facilities have been located along the internal loop roads to allow for convenient access. A 6-acre neighborhood park is located at the southern terminus of Village Parkway to serve as a green background when entering the project site, as well as for location convenience. A community park is located in the southern portion of the project site at the intersection of Ewa Parkway and South Loop. The two elementary school sites are dispersed with one in the northern region and one in the southern region of the site, as are two recreation centers. An intermediate school and a high school are located along Ewa Parkway. Four church/day care center sites have been dispersed throughout the site including one located adjacent to the Park-and-Ride facility near the primary entrance.

2.3.1 Residential

The most extensive land use of the proposed project is residential, occupying approximately 61 percent of the project area. As previously discussed, residential units are planned for a 60/40 percentage mix between affordable and market housing, respectively. Affordable units are targeted at groups including the elderly, assisted (very low income and lower income) and gap-group families while market units will be sold at market prices. Discussions of the various housing types are presented below.

A. Single Family (For Sale) Units

Single family units occupy approximately 76 percent of the designated residential land. The recommended master plan accommodates 3,722 single family housing units on 449.0 acres of land dispersed throughout the development. Many of the market units are planned along fairway frontages to maximize value.

B. Multi-Family (For Sale) Units

Multi-family units comprise approximately 6 percent of the residential land. The master plan accommodates 283 multi-family units on 18.9 acres of land situated on four sites. Multi-family units are located adjacent to major public facilities such as schools, shopping areas, recreation centers and churches and day care facilities.

C. Assisted Rental, Market Rental and Elderly Rental Housing

A total of three sites have been located within the development for assisted rental housing which will include approximately 173 housing units. Two sites for market rental housing have been designated, one site includes 5.4 acres and another includes 7.4 acres. Together these sites will provide for 255 housing units. Elderly rental housing will be provided on two sites of approximately 6 acres each with a total of 438 units.

All rental units are strategically located adjacent to major public facilities and are readily accessible to public transportation.

2.3.2 Recreation, Parks and Open Space

Recreation, parks and open space amenities have been strategically planned within the development to adequately service community demands. These land uses and a discussion of the entry feature and landscape buffers follows below.

A. Golf Course

An 18-hole golf course has been provided on approximately 144-acres of land in the northeastern quadrant of the project site. The golf course is fully contained within the U.S. Navy AICUZ designated APZ II Zone and the high noise areas (65 Ldn and above). A principal rationale for the golf course is its ability to function as a drainage path and act as a retention basin for stormwater drainage flows generated from the project site. To

perform this function, the entire golf course area will be excavated two to four feet below existing grades. Soils excavated from the golf course will be used throughout the project site to create landscaped berms and to provide fill for roadways and construction activities. The existing 24-inch Navy water line, extending from Farrington Highway through the golf course and the southern residential areas to NAS BARPT, will have to be rerouted before the golf course excavation can begin.

A three-acre site for the golf clubhouse has been reserved with access off of East Loop. Golf course fairways have been designed with the safety of the abutting housing in mind. Minimum distances from fairway centerlines to property lines have been maintained with additional distances provided in many cases. All fairways have been aligned to minimize the potential for misdirected golf balls entering adjacent residential areas. The golf course also serves as a buffer between residential areas and agricultural activities occurring east of the project site.

B. Parks and Recreation

One 6-acre neighborhood park, one 14-acre community park, and two 2-acre recreation centers have been planned for the project. The neighborhood park is located adjacent to the elementary school at the intersection of Village Parkway and South Loop. The community park is located at a very visible location at the eastern intersection of Ewa Parkway and South Loop. A district park serving the regional needs of Ewa residents will be located within the proposed Kapolei Town Center development, immediately west of Kapolei Village.

Recreation centers have been located adjacent to parks and other public areas: one recreation center is located adjacent to the neighborhood park and church site at the southern terminus of

Village Parkway, while the second recreation center is located adjacent to the community park and elementary school site, south of Ewa Parkway.

C. Entry Feature/Buffer

A small 0.6-acre entry feature at the Farrington Highway, Village Parkway intersection will signal the arrival to Kapolei Village. Additionally, perimeter landscaping is planned along the Barbers Point Access Road and Farrington Highway to create aesthetically pleasing project boundaries and to provide buffers from adjacent roadway activities.

2.3.3 Civic

A. Churches/Day Care Centers

A total of four churches and church/day care center sites have been designated throughout the project site on lots ranging from 1.8 to 3 acres in size. The sites have been selected for their visibility and convenience to residential neighborhoods. A combination church and day care center is located adjacent to the Park-and-Ride facility near the intersection of Village Parkway and Farrington Highway.

B. Park-and-Ride Facility

A 5-acre Park-and-Ride site (capacity: c. 600 vehicles) proposed to be developed by the City and County of Honolulu is planned adjacent to the main entry at the Village Parkway/Farrington Highway intersection. The Park-and-Ride facility is sited next to a commercial center and a church/day care facility.

2.3.4 Schools

A full range of public school sites have been designated. Two elementary schools are proposed (approximately 6 acres each), one located near the intersection of East Loop and Village Parkway and the other located within the residential area north of South Loop. A proposed intermediate school

site of 15 acres is located on the north side of Ewa Parkway between East Loop and West Loop. A 25-acre high school site is proposed along Ewa Parkway at the intersections of West Loop and Barbers Point Access Road. This location will be accessible to Makakilo residents as well as residents of Kapolei Town Center and Kapolei Village.

2.3.5 Commercial

Two commercial areas are proposed within the project. A 8.1-acre site is proposed at the corner of Farrington Highway and Barbers Point Access Road and a smaller 3-acre site is located at the intersection of Ewa Parkway and East Loop. The larger site will be reserved for regional scale commercial activities while the smaller site will be developed in later stages of the project for neighborhood commercial activities.

2.4 SUPPORT INFRASTRUCTURE

2.4.1 Water

The total average water demand for Kapolei Village is approximately 2.8 million gallons per day (mgd). The maximum daily demand is 4.2 mgd, and the peak hour demand is 8.4 mgd.

Proposed water improvements include water mains and appurtenances along Village Parkway, East Loop, West Loop, and Ewa Parkway, as well as smaller 8-inch water lines along internal roadways. The proposed water system is planned to be connected to the existing 30-inch transmission line along Farrington Highway. A second parallel 30-inch transmission line along Farrington Highway to be installed by Campbell Estate, will also serve the development. Future water storage will be provided by the proposed Kapolei 228-foot reservoir, to be located north of the H-1 Freeway. Construction of the reservoir will be the responsibility of the developers of Kapolei Village and Campbell Estate. The water reservoir design is to be approved by the Board of Water Supply.

The HFDC is reviewing several options for off-site water sources, one of which is to participate in the Ewa Regional Water Development Corporation.

Under this master plan, water requirements will be shared among participating developments with costs allocated according to total unit numbers. Should HFDC decide not to participate in the water development corporation, HFDC will seek out and develop their own water sources. Consideration is being given to implementing a "dual system": potable water and non-potable water.

2.4.2 Sewer

The average daily sewer flow generated by the development is projected at 2.1 mgd. The peak flow is projected at 6.6 mgd.

Sewage generated by the project is to be conveyed via the West Beach interceptor sewer to the Honouliuli Wastewater Treatment Plant (WWTP) for treatment and disposal. Proposed off-site improvements include upgrading the West Beach interceptor from Barbers Point Access Road to the Honouliuli WWTP to accommodate flows from Kapolei Village.

On-site improvements include sewer lines and appurtenances along Village Parkway, East Loop, West Loop, and Ewa Parkway. The collection system will be a gravity system with ultimate connection to the West Beach interceptor sewer, located southeast of the project site. During the initial period of development, the sewage will be collected and pumped to the Makakilo interceptor located along Barbers Point Access Road via a temporary pump station. In the later phases, the pump station will be replaced with a complete gravity system.

The sewer system will be designed in accordance with the Division of Wastewater Management, City and County of Honolulu, and the Department of Health, State of Hawaii.

2.4.3 Drainage

The only improvement to the off-site drainage system is upgrading the drainage swale north of Farrington Highway to prevent overflowing onto Farrington Highway during a 100-year storm. This has been categorized as off-site because the land is not part of the project site.

The on-site drainage system can be separated into two categories: (1) major facilities and (2) street collection system. Improvements in the first category include the development of major facilities to handle large amounts of runoff generated north of the site and within the project site. These improvements consist of underground box culverts, open channels, and a detention basin (which utilizes the golf course area). Runoff entering the study site will be collected by the improved swales above Farrington Highway and conveyed by underground box culverts to the detention basin. The flows are then routed through the basin. Runoff leaving the study site will be carried by an open channel from the detention basin to an existing coral pit with NAS BARPT.

The detention basin will serve to attenuate the downstream peak flow rates by providing temporary storage of the runoff. The basin is sized to hold a volume of runoff equivalent to the additional amount generated as a result of the project. The detained runoff will be released at a controlled rate after the storm subsides. A small culvert at the exit will be able to pass everyday low flows.

The second category pertains to the on-site street collection system. These improvements consist of drain lines and appurtenances within the road rights-of-way. The collection system will collect and direct runoff to either the detention basin (golf course) or to a major channel or box culvert.

2.4.4 Power and Communications

Proposed off-site power and communication requirements include a telephone switching station to serve the proposed Kapolei Town Center and the project site, and an electrical substation when existing power capacities are exceeded.

Proposed on-site power and communications improvements consist of power and telephone conduits provided along the major roadways. The system also includes streetlights and handholes. Power and telephone systems will be underground within the development.

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2.4.5 Circulation

Kapolei Village will provide an effective roadway system to serve residents of the development as well as commuters from surrounding areas. Roadway types within the planned development include local streets, collectors, arterial streets, and parkways. All roadways within the planned development will be dedicated to the City and County of Honolulu.

Major off-site improvements include upgrading the Makakilo interchange of the H-1 Freeway, and widening and signaling sections of Farrington Highway and Barbers Point Access Road.

On-site roadway improvements include: construction of Village Parkway, East Loop and West Loop (120-foot right-of-way, four-lane roadways); two arterial roads (70-foot right-of-way, three-lane roadways); and a range of local and minor street collectors within the residential areas. A major segment of Ewa Parkway (150-foot right-of-way, 6-lane roadway) will also be constructed. Local streets and minor collectors will provide access to residential properties, as well as schools, parks, and churches. Commercial areas will be accessed from arterial streets.

Access into each neighborhood will be provided via minor collectors and all neighborhoods will have either a second point of access or an emergency lane. Collector streets are limited in length and have been laid out to discourage through traffic. Four-foot wide sidewalks will be provided on both sides of roadways and on-street parking will be allowed at most locations. A standard 56-foot right-of-way will be used for collectors. Local streets will use a 44-foot right-of-way, except for dead-end streets where lengths are less than 300 feet where the right-of-way will be 32 feet. Some of the dead-end streets will terminate near arterial streets, allowing pedestrian and bicycle access into neighborhoods.

Neighborhoods will be linked by an arterial street system which includes loop roads (East Loop, West Loop and South Loop), Ewa Parkway, Village Parkway connecting the loop roads to Farrington Highway, and a smaller arterial street (Road A) between West Loop and Barbers Point Access Road.

The parkway and the loop roads north of Ewa Parkway will include planted medians, with no on-street parking allowed. Signalization at major intersections is anticipated.

Running through the project site, the Ewa Parkway corridor will consist of a 150-foot right-of-way. The parkway will be a six-lane boulevard with landscaped medians. Separated bike paths and meandering sidewalks are also included in the conceptual landscape plan for the parkway. The parkway is planned to traverse across the Ewa Plain, linking Pearl Harbor to the Ko'Olina Resort.

Village Parkway, East Loop and West Loop will be constructed within 120-foot rights-of-way. These four-lane divided roadways will include landscaped medians and landscaping along roadsides. The 32-foot pavement areas will include two automobile travel lanes and a bike lane in each travel direction. Additional pavement width at major intersections will be provided for turn movements by reducing median widths and/or roadside area. Because parkways are primarily intended for movement of traffic, median openings will only be provided at street intersections. A limited number of driveways will be allowed with ingress/egress movements limited to right turn movements only.

South Loop and Road A will be within 70-foot right-of-ways. On these streets, median left turn lanes will be provided to facilitate driveway access. These streets will have broader sidewalks to serve the expected higher pedestrian activity.

The loop roads and Village Parkway will be used for public bus routing within the project site. Over 95 percent of the residential units would be within the City and County 2,000-foot guideline for "adequate" bus service without having to route buses into neighborhoods. Bus routing could include shuttle buses circulating within Kapolei Village or between the Village and the Town Center connecting to express buses and other routes at the Park-and-Ride site.

2.4.6 Landscaping

The landscape of Kapolei Village is designed to establish a unique "sense of place" and to insure a central theme or character throughout the development.

A. Roads and Streets

Landscape development within ROW's of project roads, streets and adjacent roadways outside of the project vary in scale and level of development. Landscaping will occur on the project side of each of the peripheral roadways. Utility corridors, bicycle/pedestrian sidewalks and planting, including large canopy trees in a formal arrangement, will occur within this area. A wall is proposed for the northern and eastern borders of the project which will form the edge/limit of the landscape improvements as well as providing a sound barrier against vehicle noise. Landscaped medial strips and landscaped shoulder areas (similar to the peripheral roadways) will occur along the major 120-foot right-of-way project roadways. Project walls are also recommended. Other project roads are planned to conform to existing standards.

B. Pedestrian/Bicycle Circulation

Pedestrian and bicycle circulation systems are provided along all peripheral and internal roadways. A combined pedestrian/bicycle path is proposed for the project side of both Farrington Highway and Barbers Point Access Road. Within the 120-foot right-of-way internal roadways, a bicycle path is designated along the paved roadway. Pedestrian circulation would be accommodated by a separate sidewalk occurring within the landscaped portion of the right-of-way. In order to facilitate pedestrian and bicycle movements, specific points of connection from residential areas to major project roads have been provided.

2.5 PROJECT PHASING AND COSTS

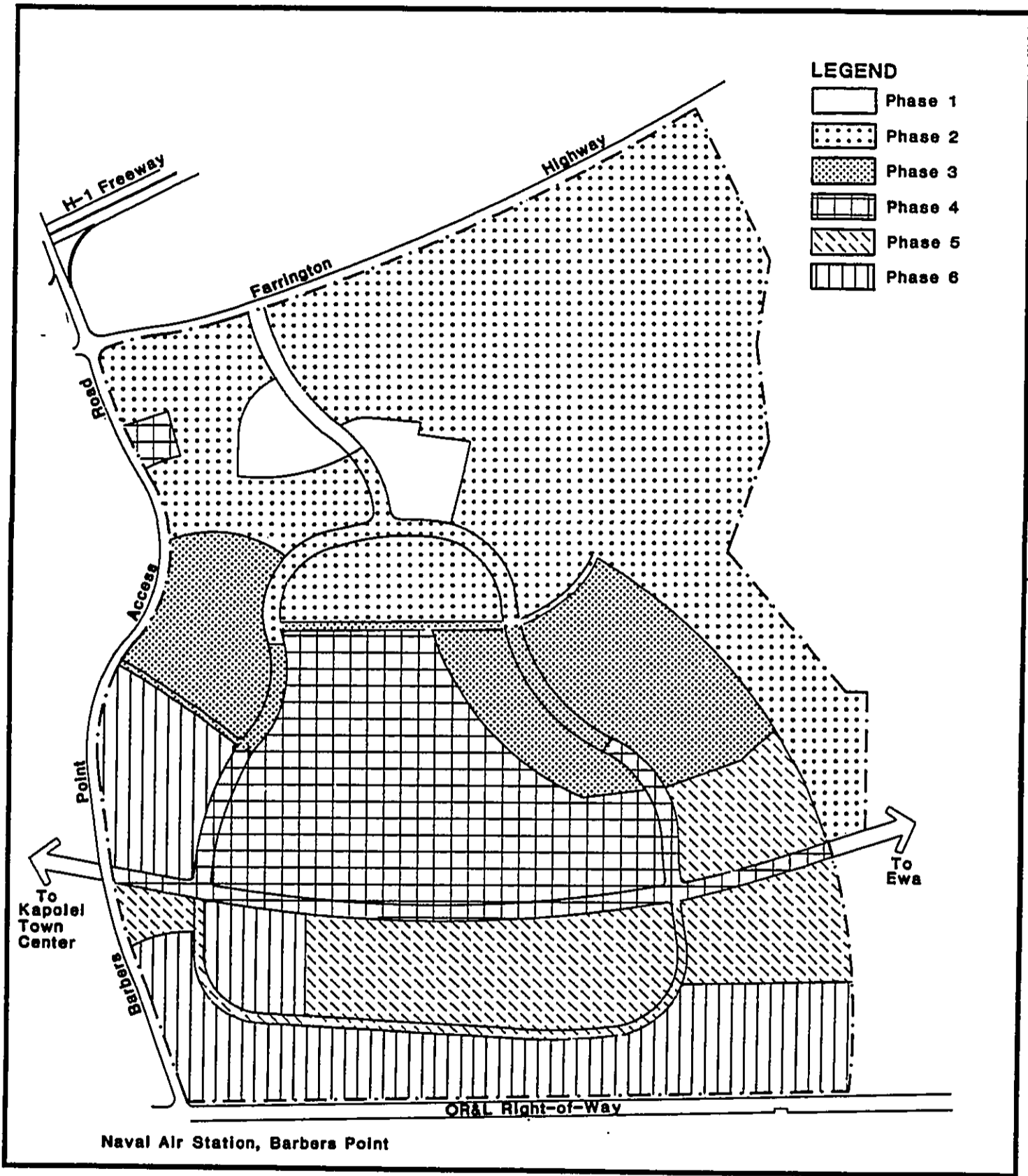
2.5.1 Phasing

The project will be developed in six phases with construction of the first phase beginning in 1988. Construction activities will begin in the northern quadrant of the project working from north to south (Figure 2-3). A general constraint imposed on the project phasing was the request by the Oahu Sugar Company to maintain the Waimanalo agricultural roadway until 1995.

2.5.2 Costs

Infrastructure costs were broken down by utilities and categorized as either off-site or on-site. Costs reflect only construction costs and do not include survey, design, marketing, master planning, land and other non-construction cost items.

The ultimate off-site cost of the entire 830-acre site (including a 10 percent contingency factor) is \$63.3 million. Average on-site costs are estimated between \$19,000 and \$25,000 per lot for an average finished lot cost between \$35,000 and \$40,000.



Kapolei Village
PHASING PLAN
 Ewa, Oahu, Hawaii

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Figure:
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SECTION 3

ALTERNATIVES TO THE PROPOSED ACTION

SECTION 3
ALTERNATIVES TO THE PROPOSED ACTION

3.1 NO ACTION ALTERNATIVE

A "no action" alternative would result in continuation of existing conditions for the Kapolei Village project site. The site would most likely continue to be used for sugarcane cultivation for the near future. However, as surrounding development occurs as part of the Secondary Urban Center, agriculture activities would probably be eliminated.

Advantages of the "no action" alternative are few. These advantages include: no further expenditures of resources required by public and private agencies; continued sugarcane cultivation of the site; and no adverse impacts on the project site generated by development.

The primary disadvantage of this non-project alternative would be the absence of a planned residential community with a unique mix of housing opportunities to suit lower income families, as well as middle to upper middle income families. Additionally, losses resulting from this alternative would include lost housing and employment opportunities, as well as lost tax revenues for City and State governments.

3.2 SITE SELECTION

The initial site selection process conducted by the Hawaii Housing Authority (now the Housing Finance and Development Corporation) involved finding a large enough land area to accommodate a planned residential community. After research revealed no available State land areas suitable for their needs, the Hawaii Housing Authority sought possible project sites from private land owners. The Estate of James Campbell suggested possible sites, all of which are located within the Ewa plains area. Analysis of the sites resulted in selection of the current proposed project site due to the availability of a large land area and the proximity to future development of the proposed Secondary Urban Center.

3.3 CONCEPT PLAN ALTERNATIVES

A total of five alternative concept plan configurations were developed from program criteria specified by the Housing Finance and Development Corporation. Major differences in the alternative plans deal with treatments of drainage, circulation, and recreational facilities. Each plan is discussed in detail below in terms of basic concept/design, land use pattern, and treatment of roads and drainage.

3.3.1 Alternative 1

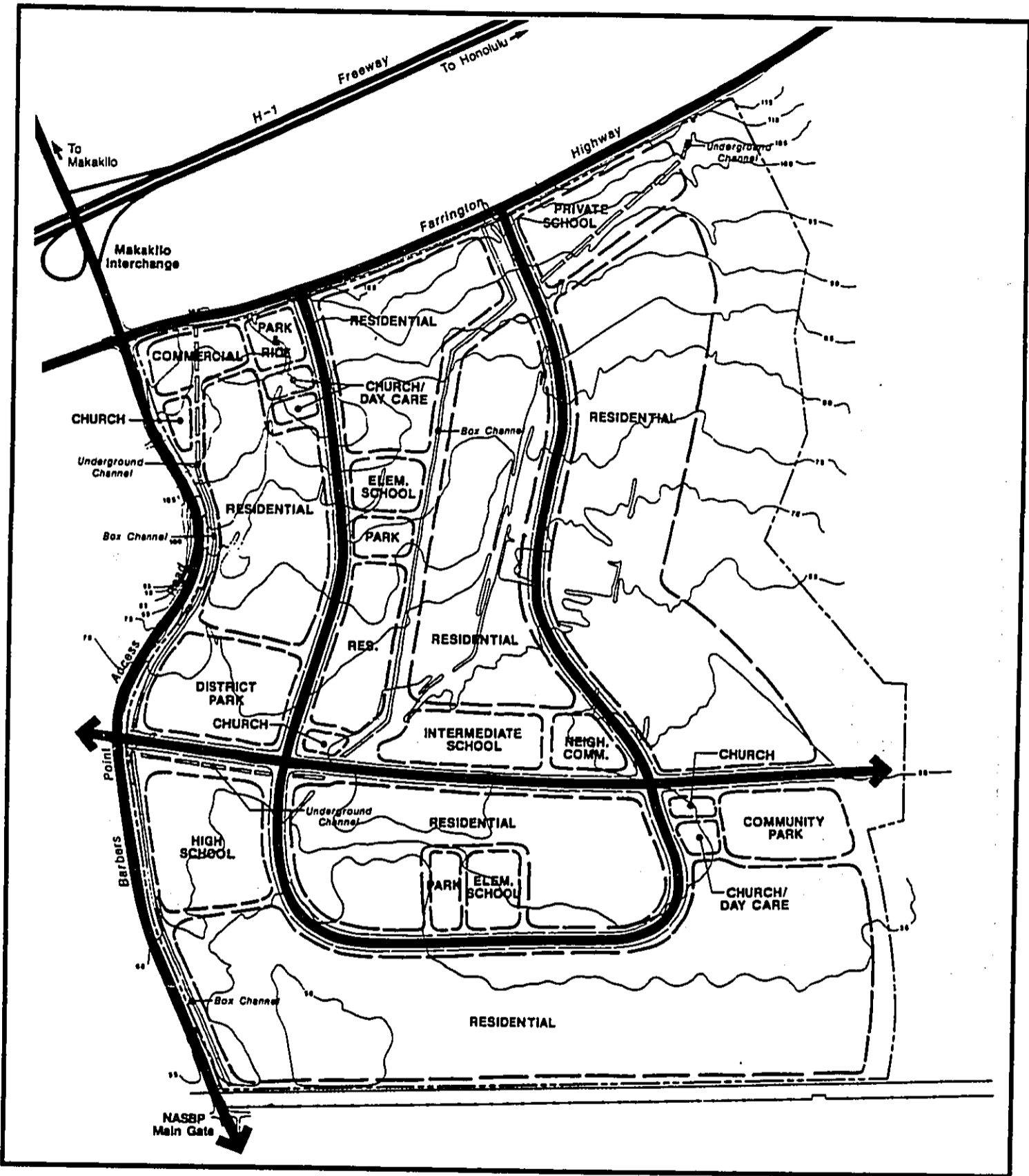
Alternative 1 was prepared as a conventional residential subdivision with a simple loop road winding through the project site, intersecting the proposed Ewa Parkway (Figure 3-1). Major facilities, such as school sites, neighborhood commercial centers and park systems are clustered along major roadway corridors. Drainage throughout the project site is directed underground via box culvert, virtually eliminating constraints of land use. The proposed Ewa Parkway is sited along the Waimanalo Road corridor. No major community image or focal point was provided within this plan.

3.3.2 Alternative 2

The basic organizing concept of Alternative 2 is the use of small neighborhood parks (lokus). High density housing is placed around the lokus to take advantage of open space. Open drainage channels provide bicycle and pedestrian circulation systems and provide for some on-site retention of stormwater. Public facilities, such as a Park-and-Ride facility, a high school site, church sites, an elementary school and a community park are located adjacent to Farrington Highway. Other public facilities are located near the middle and along the southern sections of the project site (Figure 3-2).

3.3.3 Alternative 3

The central concept of Alternative 3 is the creation of a major civic "backbone" created along the realigned drainage swale running north and south on the project site (Figure 3-3). The civic backbone would link most major community uses and activities via bicycle and pedestrian paths. The

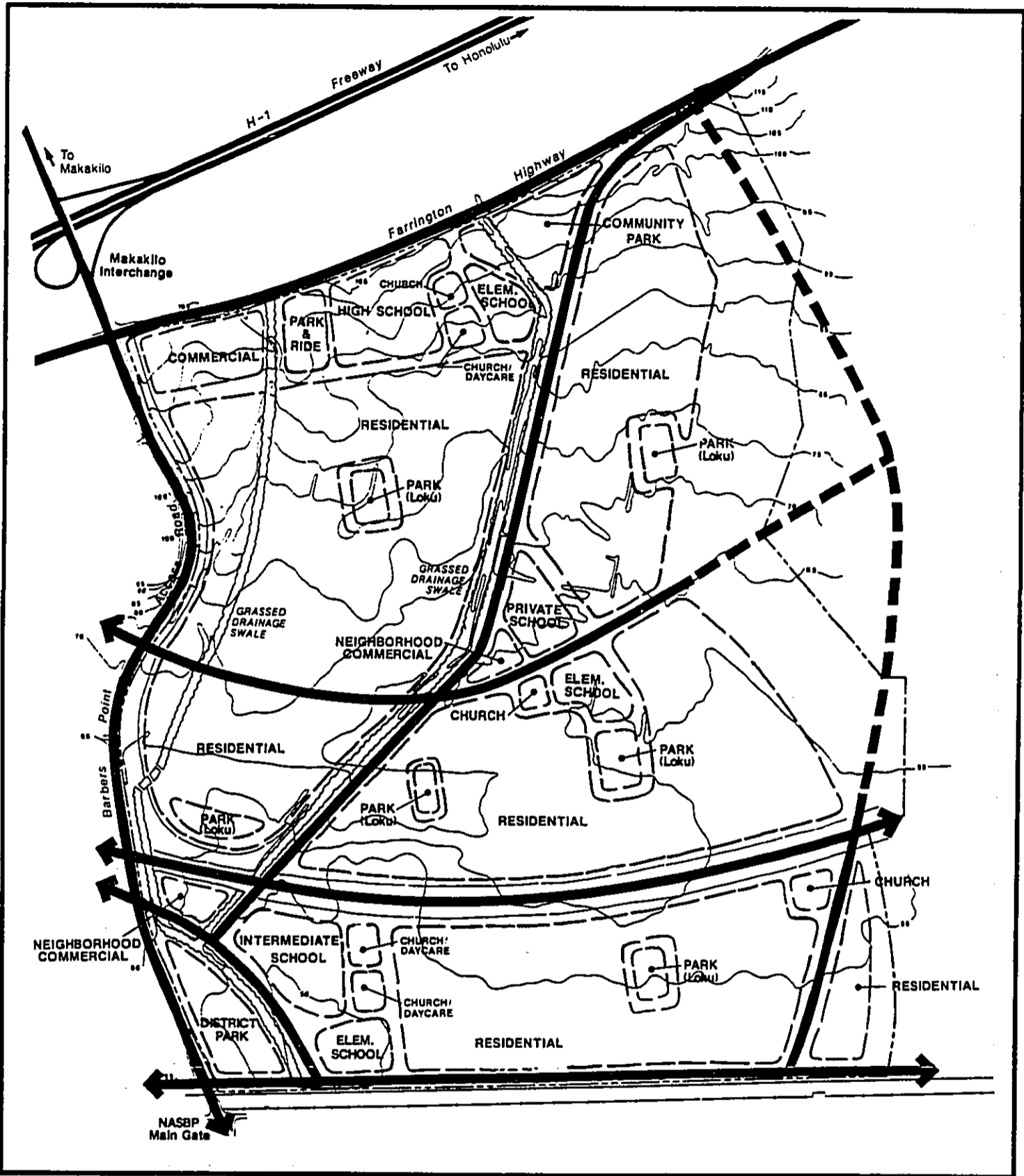


Kapolei Village
ALTERNATIVE NO.1
 Ewa, Oahu, Hawaii



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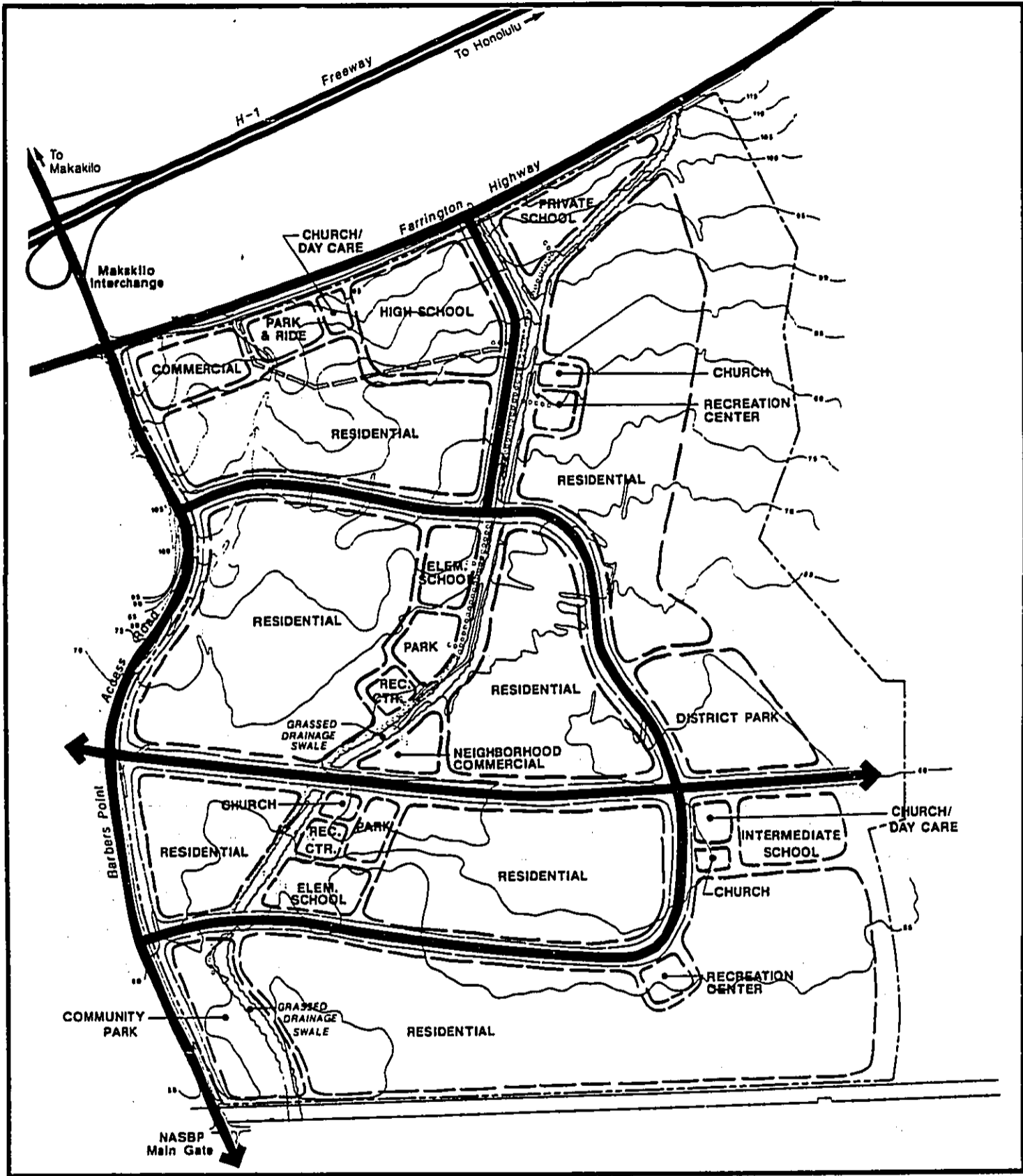
Figure:
 3-1



Kapolei Village
ALTERNATIVE NO.2
 Ewa, Oahu, Hawaii

Figure:
3-2

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



Kapolei Village
ALTERNATIVE NO.3
 Ewa, Oahu, Hawaii



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Figure:
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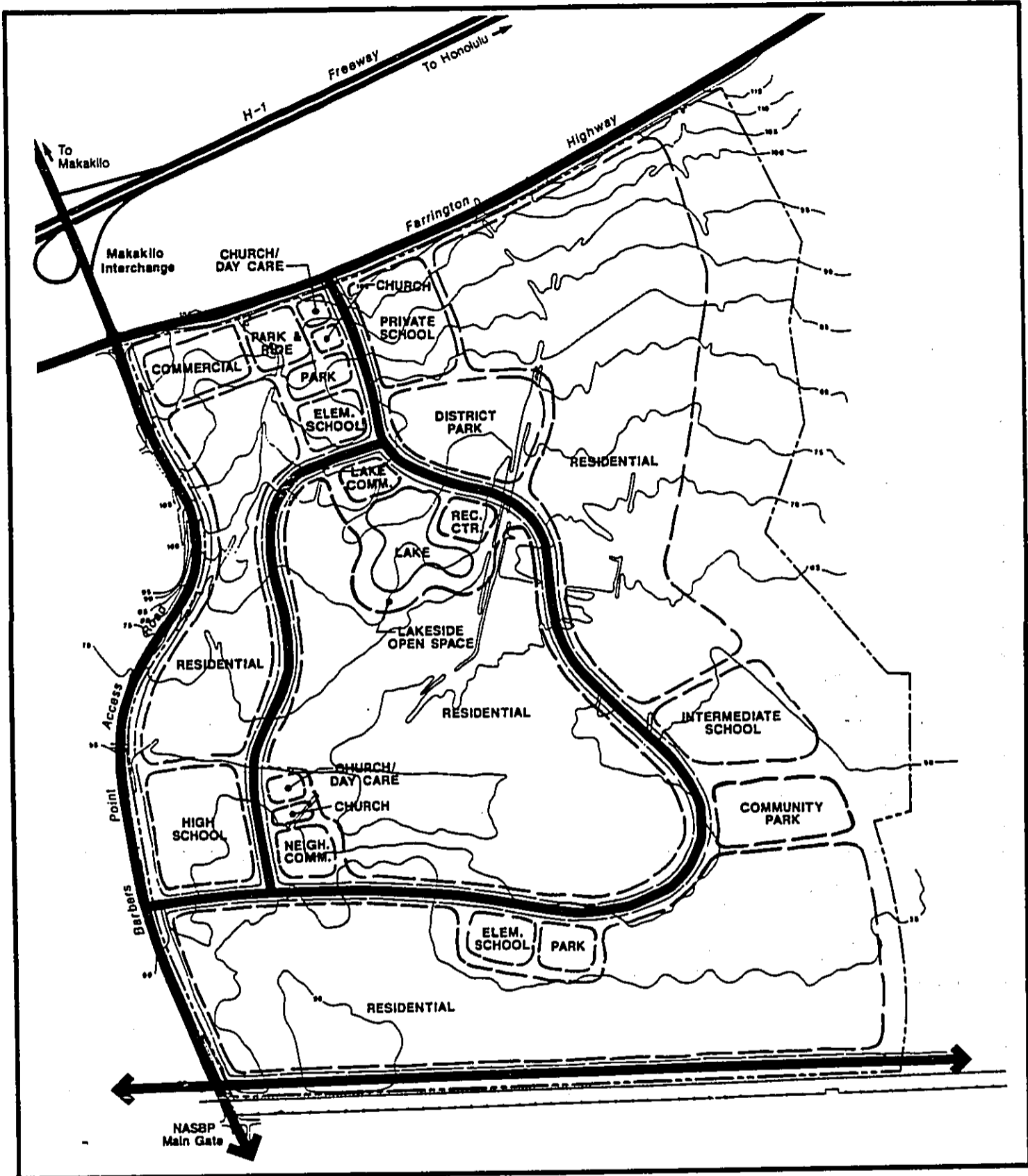
basic circulation system of the plan is simple with a major internal loop road oriented towards Barbers Point Access Road, and additional access to Farrington Highway. Another important attribute of Alternative 3 is the addition of four recreation centers, approximately 2 acres each in size. The recreation centers would be located in each of the four quadrants of the development and would provide a neighborhood focus for each of these four quadrants. Typical amenities of the recreation centers would include a swimming pool, a children's playground, changing rooms, meeting rooms, and office area, possible tennis courts, and parking areas. Also, the proposed Ewa Parkway right-of-way is sited along the Waimanalo Road alignment.

3.3.4 Alternative 4

A dominant design feature of Alternative 4 is the use of a central lake (approximately 10 acres of water). Strategically located at the intersection of the entrance road from Farrington Highway and the central internal loop road, the lake would provide a primary design influence and would create an identity for the entire development. Surrounding the lake would be a 10-acre park area providing public open space and access to the lake perimeter. Adjacent to the lake is a "lake side commercial" area, identified for specialty commercial uses including restaurants and other "resort related" commercial uses. Also adjacent to the lake is a recreation center taking advantage of the vast amount of open space. A major change made in this plan is the omission of the major east-west roadway common to all other four plans. The road system provides for principal access from Farrington Highway with additional access to Barbers Point Access Road. Ewa Parkway is sited adjacent to the OR&L ROW at the southern boundary of the project site (Figure 3-4).

3.3.5 Alternative 5

The major design element of Alternative 5 is the addition of an 18-hole golf course to the project site (Figure 3-5), creating an identity to the overall project. Because of extensive acreage requirements, only 12 holes of the golf course (approximately 10 acres) are shown with an additional

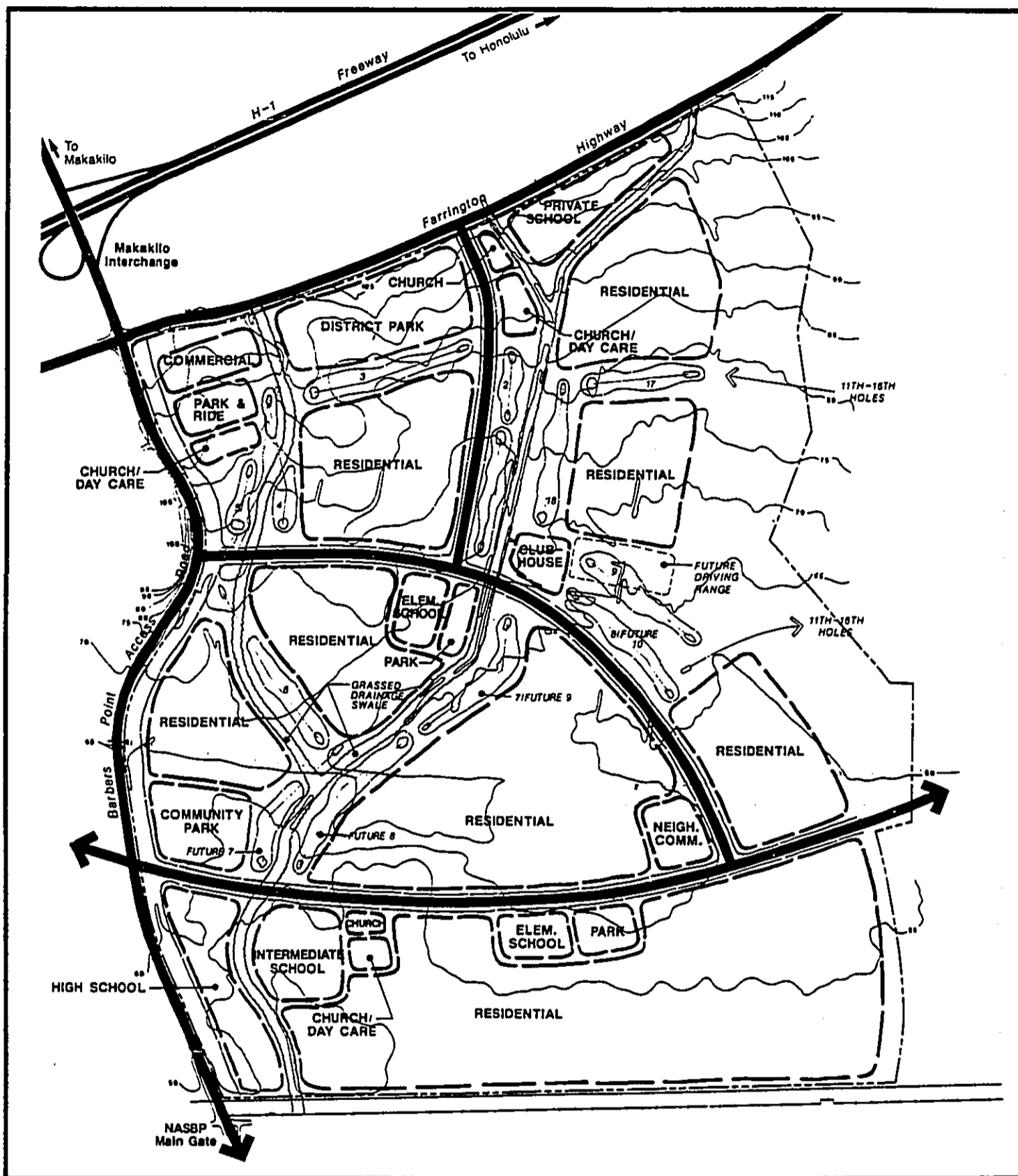


Kapolei Village
ALTERNATIVE NO.4
 Ewa, Oahu, Hawaii



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Figure:
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Kapolei Village
ALTERNATIVE NO.5
 Ewa, Oahu, Hawaii



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Figure:
 3-5

six holes to be developed on lands east of the project site. A benefit of the golf course, aside from its amenity value, is its ability to internalize the cost of maintaining drainage swales through the project site to the golf course operator. These channels/swales have been integrated into the course fairways. The roadway system is perhaps the most simplified of all five alternatives providing for one major access point at Farrington Highway and two access points at Barbers Point Access Road.

The addition of a golf course to the project site will generate a premium for residential lots facing the golf course. This premium will result in higher priced houses and correspondingly increase the range of housing type offered within the development. This in turn would increase the market size and socio-economic range of residents in the project.

3.4 CONCLUSION

Elements of the alternative concept plans were evaluated with the best features of each plan implemented into a preferred alternative plan. This preferred alternative plan was then refined to become the recommended "master site plan" of the proposed project site.

SECTION 4

**RELATIONSHIP TO LAND USE, POLICIES,
AND CONTROLS OF THE AFFECTED AREA**

SECTION 4
RELATIONSHIP TO LAND USE, POLICIES AND
CONTROLS OF THE AFFECTED AREA

4.1 THE HAWAII STATE PLAN

The Hawaii State Plan represents a guide for the future of Hawaii. The State Plan sets forth a broad range of goals, objectives, and policies to serve as guidelines for growth and development of the State and establishes a coordination system between the State and County agencies. Chapter 226, Hawaii Revised Statutes (as amended, 1986) states the following purpose of the State Plan:

"[it] shall serve as a guide for the future long-range development of the State; identify the goals, objectives, policies, and priorities for the State of Hawaii; provide the basis for determining priorities and allocating limited resources, such as public funds, services, manpower, land, energy, water, and other resources; improve coordination of state and county plans, policies, programs, projects, and regulatory activities; and to establish a system for plan formulation and program coordination to provide for an integration of all major state and county activities." (Chapter 226-1: Findings and Purpose, HRS)

The proposed project is generally consistent with objectives and policies of the Hawaii State Plan, although the proposed project will result in the loss of important agricultural land. The following sections analyze relevant goals, objectives, policies and guidelines of the State Plan to the proposed project.

A. Section 226-5 Objectives and Policies for Population

Kapolei Village will contribute to the distribution of future growth expectations of the Secondary Urban Center by providing a well managed community offering a mix housing types and community support facilities.

B. Section 226-6 Objectives and Policies for the Economy In General
Development of Kapolei Village will directly benefit the economy in construction, commercial/retail, and real estate opportunities.

C. Section 226-7 Objectives and Policies for the Economy - Agriculture

The majority of the project site is located within the State Agricultural District and is currently being used for sugarcane cultivation by the Oahu Sugar Company (OSCo). Development of Kapolei Village will result in the loss of approximately 830 acres of important agricultural land.

D. Section 226-12 Objectives and Policies for the Physical Environment - Scenic, Natural Beauty, and Historic Resources

Kapolei Village is designed to promote overviews of surrounding Puu's, Pearl Harbor, and the Pacific Ocean in the distance. With the topography of the site gently sloping southward, these views can be seen from the main entrance of the Village at the northwest corner of the project site.

E. Section 226-13 Objectives and Policies for the Physical Environment - Land, Air and Water Quality

Air quality of the Ewa area will be impacted from traffic generated from the proposed project and surrounding communities. Water quality impacts will be minimal due to implementation of an effective potable water system and drainage system. Because the project site is relatively flat, little grading of the land will be needed for development, allowing for little change of natural slopes.

F. Section 226-15 Objectives and Policies for Facility Systems - Solid and Liquid Wastes

Wastewater generated from Kapolei Village will utilize the Honouliuli WWTP for treatment and disposal. Solid waste will be

collected and disposed of by the City and County of Honolulu and private refuse collection services.

G. Section 226-16 Objectives and Policies for Facility Systems - Water

The development of Kapolei Village will incorporate the use of a water system supplying brackish water for irrigation purposes and potable water for residential use and human consumption.

H. Section 226-17 Objectives and Policies for Facility Systems - Transportation

The proposed project will add to traffic volumes in and around the project site. Measures to mitigate the increased traffic include a Park-and-Ride facility and roadway improvements to both on-site and off-site roadways.

I. Section 226-18 Objectives and Policies for Facility Systems - Energy/Telecommunications

Energy and telecommunication facilities necessary for the development of Kapolei Village will be planned and coordinated with the appropriate agencies and public utilities.

J. Section 226-19 Objectives and Policies for Socio-Cultural Advancement - Housing

The proposed project is designed to accommodate a variety of housing types suited to families with incomes ranging from very low to upper middle. Kapolei Village will be consistent with this section by offering a mix of housing types, (including gap-group, assisted, elderly and market housing) and costs to suit the needs of a large portion of the housing market. The development concept behind the proposed project is to provide a 60/40 percentage split between affordable and market housing, respectively. Affordable housing will be priced to accommodate very low to median income families whereas market units will be

priced according to appraised market values. Integral planning of the overall development will provide necessary support facilities for these housing areas.

K. Section 226-20 Objectives and Policies for Socio-Cultural Advancement - Health

Medical and health care facilities are currently located in Waipahu and Honolulu with emergency services provided by the Kaiser Moanalua Hospital or the Waianae Comprehensive Health Center. There are anticipated increases of medical and health care facilities for the Ewa area as the development of the SUC occurs. Construction of the St. Francis Hospital has already begun with a new facility located on Fort Weaver Road, east of the project site. Additionally, the abundance of recreational facilities planned within the development and vicinity will promote "wellness" through physical and mental health.

L. Section 226-21 Objectives and Policies for Socio-Cultural Advancement - Education

The Kapolei Village master plan provides for educational facilities of all levels. Within the plan are two elementary schools, one intermediate school and one high school, as well as day care centers for small children. Close cooperation with the Department of Education will be maintained to assure adequate provision of educational services.

M. Section 226-23 Objectives and Policies for Socio-Cultural Advancement - Leisure

Recreational facilities will be provided within the development offering a variety of activities including an 18-hole golf course, small neighborhood parks, a community park and two recreation centers. These facilities, as well as school sites provide an abundant amount of open space within the project site.

N. Section 226-104 Population Growth and Land Resources Priority Guidelines

Development of Kapolei Village will result in the loss of approximately 735 acres of agricultural land currently used for sugarcane cultivation. Although this land is agriculturally significant, urban use of the land is acceptable when the scope, planning, and socio-economic benefits of the proposed project are considered.

The project site was not determined to be environmentally critical in the areas of archaeology, flora and fauna. Any environmental impacts resulting from development will be mitigated where possible. The development of the site will result in the permanent loss of open space as it exists, however, the master plan of the project is designed with open space areas including parks and golf course fairways.

O. Section 226-106 Affordable Housing, Priority Guidelines for the Provision of Affordable Housing

The proposed project will incorporate a mix of housing types to include gap-group, assisted, market and elderly housing. Chapter 359G-10.5, Hawaii Revised Statutes, allows the HFDC to shorten the processing requirements which contribute to the cost of housing. These savings are then passed on to households not able to purchase housing in the open market. Chapter 359G-10.5 also allows the HHA to develop projects that include market units with the net income gained from the sale of these units used to help reduce cost of affordable units. Chapter 359G-10.5 allows for a 60/40 percent housing mix between affordable and market units whereby at least 60 percent of the units must be available in price ranges within the purchasing power of lower income buyers.

4.2 STATE FUNCTIONAL PLAN

The Hawaii State Plan is used as the primary tool for directing the planning process for Hawaii's long-term and short-term goals. Functional

plans, created as extensions of the State Plan, are prepared by the appropriate State agencies to specify objectives, policies and implementation actions of their respective concerns. These plans were reviewed and evaluated with regard to the proposed project. The following are descriptions of functional plans applicable to the proposed project.

4.2.1 Education Plan and State Higher Education Plan

This functional plan relates to educational functions, school systems, goals and growth. Topics within the plan are organized under four categories: personal skills and knowledge; employability and economy; social and natural resources; and educational support services.

Development of Kapolei Village, as well as neighboring communities, will result in an increased demand for educational facilities for the Ewa area. The proposed project will include a wide range of educational facilities to include two elementary schools, one intermediate school, and one high school.

4.2.2 Housing Plan

This functional plan, managed by the Housing Finance and Development Corporation, deals with orderly development of housing and expanded housing opportunities for Hawaii's people. Objectives of the functional plan are to:

"develop greater opportunities for Hawaii's people to secure reasonably priced, safe, sanitary, liveable homes located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals";

"assist the orderly development of residential areas sensitive to community needs and other land uses."

An innovative concept of the proposed project is to offer a wide range of housing types with varying costs. The Kapolei Village project will address the need for affordable housing by providing homeownership and rental opportunities to families with varied income levels. For-sale units will be available to families whose income levels are too low for conventional home buying methods. Additionally, market and elderly housing units, included as part of the Kapolei Village Master Plan, assures a diversity of housing opportunities to serve a wide socio-economic range of households. Housing within the development will include approximately 5,000 units. Of these units, a minimum of 60 percent will be affordable housing (gap-group, assisted, and elderly), and a maximum of 40 percent will be market housing.

4.2.3 Health Plan

The primary purpose of the State Health Plan is to serve as a guide for State and County agencies and the private sector in outlining environment related objectives and health care objectives for Hawaii. This plan, under the jurisdiction of the State Department of Health (DOH), focuses on: "preventing disease and promoting healthful life styles and environmental conditions; ensuring and promoting appropriate provisions and access to health care; protecting society from potential dangers; and enhancing the quality of air, land and water resources and preventing environmental degradation."

Currently, there are no health care facilities are located within the area of the project site and are expected to accommodate additional population generated from the development. However, a new medical facility is currently being constructed in Ewa, located along Fort Weaver Road, south of the H-1 Freeway.

Environmental concerns expressed in the functional plan have also been addressed in their respective sections of this document. Minimal adverse impacts of utilities such as drainage and sewerage are expected to occur from the development. Air and noise quality impacts are also expected to be minimal. Mitigation measures of adverse impacts will be implemented as necessary.

4.2.4 Agricultural Plan

Major concerns addressed within this plan include: "Hawaiian agriculture and the underlying needs and requirements of the commodity industries for resources such as land, water, capital, human resources and transportation; and for government support in the areas of farm management, cultural practices, livestock production, waste management, government regulation, pest and disease control, handling and processing, marketing, and research and development."

Specific objectives include increased viability in the sugar and pineapple industries and continued growth and development of diversified agriculture throughout the State. Lands found "suitable and used, or potentially usable for agricultural production," are identified as important agricultural lands by the State Department of Agriculture.

Development of Kapolei Village will result in the loss of approximately 735 acres of usable agriculture land which is currently under cultivation by the Oahu Sugar Company. It has been determined that a phased withdrawal of sugarcane cultivation in the project site will not affect viability of the Oahu Sugar Company. Additionally, urbanization of the project site is supported by the General Plan and the Ewa Development Plan of the City and County of Honolulu.

4.2.5 Transportation Plan

General objectives of this functional plan are to ensure an efficient multi-modal transportation servicing statewide needs of movement of people and goods, and to ensure a transportation system supportive of statewide growth. The functional plan is divided into five major topics addressing each mode of transportation, as well as statewide transportation planning and energy conservation.

Kapolei Village will provide an efficient on-site transportation network of roadways to effectively meet demands. Additionally, off-site roadway improvements will be provided, adjacent to the project site. These transportation mitigating measures, discussed in greater detail in

Appendix B, are presented in an effort to meet general objectives of the functional plan.

4.2.6 Recreation Plan

The Department of Land and Natural Resources is responsible for the State Recreational Plan. This functional plan reviews demands and actions needed to fulfill existing and future recreation demands. Other objectives of the plan include "guiding State and County agencies in acquiring and preserving lands of recreational value, and ensuring public access to recreational areas."

Kapolei Village will be consistent with the functional plan by providing a variety of passive and active recreational facilities. Neighborhood parks, a community park, recreation centers, and an 18-hole golf course are all planned within the development.

4.3 STATE LAND USE LAW

The State Land Use Commission has classified all land in the State to one of four classifications: Urban, Rural, Agricultural, and Conservation. The entire proposed project site lies within an agricultural district boundary. For development of the proposed project, a change in classification from agricultural to urban is necessary. Decision-making criteria for district boundary amendments include: conformance to "goals, objectives, and policies of the Hawaii State Plan and adopted functional plans; conformance to applicable district standards; and impacts on areas of Statewide concern." Kapolei Village coheres to these amendment concerns.

4.4 GENERAL PLAN OF THE CITY AND COUNTY OF HONOLULU

The General Plan of the City and County of Honolulu provides a statement of long range social, economic, environmental, and design objectives for the Island of Oahu and a statement of policies necessary to meet these objectives. Sections of the General Plan relevant to the proposed project include:

4.4.1 Population

This section is concerned with growth management of the island's population and promoting a balance between society, the economy and the environment. Also indicated within this section is a policy concerning growth of a "secondary urban center located in the West Beach-Makakilo area to relieve developmental pressures in the urban-fringe areas."

4.4.2 Natural Environment

This section is directed at preserving and enhancing the natural environment of Oahu. Kapolei Village will include in its design an efficient surface drainage and flood control system to preserve the natural setting. The development will also use natural slopes in the development design, taking advantage of views seen from northern portions of the project site.

4.4.3 Housing

Affordable housing with support facilities, as well as housing proximity to employment, recreation, commercial centers are expressed concerns within this section. The Kapolei Village Master Plan provides for a mix of housing types including gap-group, assisted, elderly, and market units along with appropriate support facilities.

4.4.4 Transportation and Utilities

Efficient and cost effective means of transportation are emphasized in this section, as well as providing a variety of transportation modes. Additionally, bus transportation will be provided as needed. Utility objectives include adequate amounts of water, efficient waste disposal systems, and high levels of service of all utilities. The proposed project is designed with efficient roadway and utility systems to adequately serve the community.

4.4.5 Physical Development and Urban Design

This section focuses on coordination with sequencing of "all new developments" and to preserve the physical character of older developments. This section also encourages development of the secondary urban center in

the West Beach-Makakilo area while maintaining cooperation with government agencies the sugar industry. Kapolei Village is planned to be developed in incremental stages with a phased withdrawal of sugarcane fields.

4.4.6 Culture and Recreation

The concern of this section applicable to the proposed project is the provision of a wide range of recreational opportunities "readily available" to the people of Oahu. Included in this section are policies of developing and maintaining a variety of park and beach facilities. As noted earlier, the design of Kapolei Village allows for a variety of recreational opportunities.

4.5 EWA DEVELOPMENT PLAN

The Ewa Development Plan (Census Tracts 83-86.02) of the City and County of Honolulu acts as a detailed structure of General Plan objectives for that area. The Ewa Development Plan area includes the area of coral plain from the Waipahu and Pearl Harbor boundaries to Nanakuli. Regarding development of the Ewa area, the Development Plan states:

"Relevant General Plan policies for Ewa encourage the gradual development of a secondary urban center in order to relieve development pressures in the urban-fringe and rural areas."

Kapolei Village will be consistent with the Ewa Development Plan objectives and design elements. Currently, the majority project site is designated as Agriculture on the Ewa Development Plan Land Use Map. Other designations within the project site boundaries include Commercial and Public Facility, located along Barbers Point Access Road. An amendment to the agricultural land use designation will be necessary before development of the proposed project.

4.6 COUNTY ZONING

The entire proposed project site is currently zoned for agricultural use (AG-1 Restricted). A change in the zoning designation for planned urban

use will be required at the appropriate time by the Department of Land Utilization.

4.7 COASTAL ZONE MANAGEMENT/SMA RULES AND REGULATIONS

Objectives and policies of the Coastal Zone Management Program are described in Chapter 205A-2, Hawaii Revised Statutes (HRS), Part I. Special Management Area guidelines are found in Part II of the same chapter. The proposed project site is not located within a Special Management Area and therefore, a Special Management Area permit is not required.

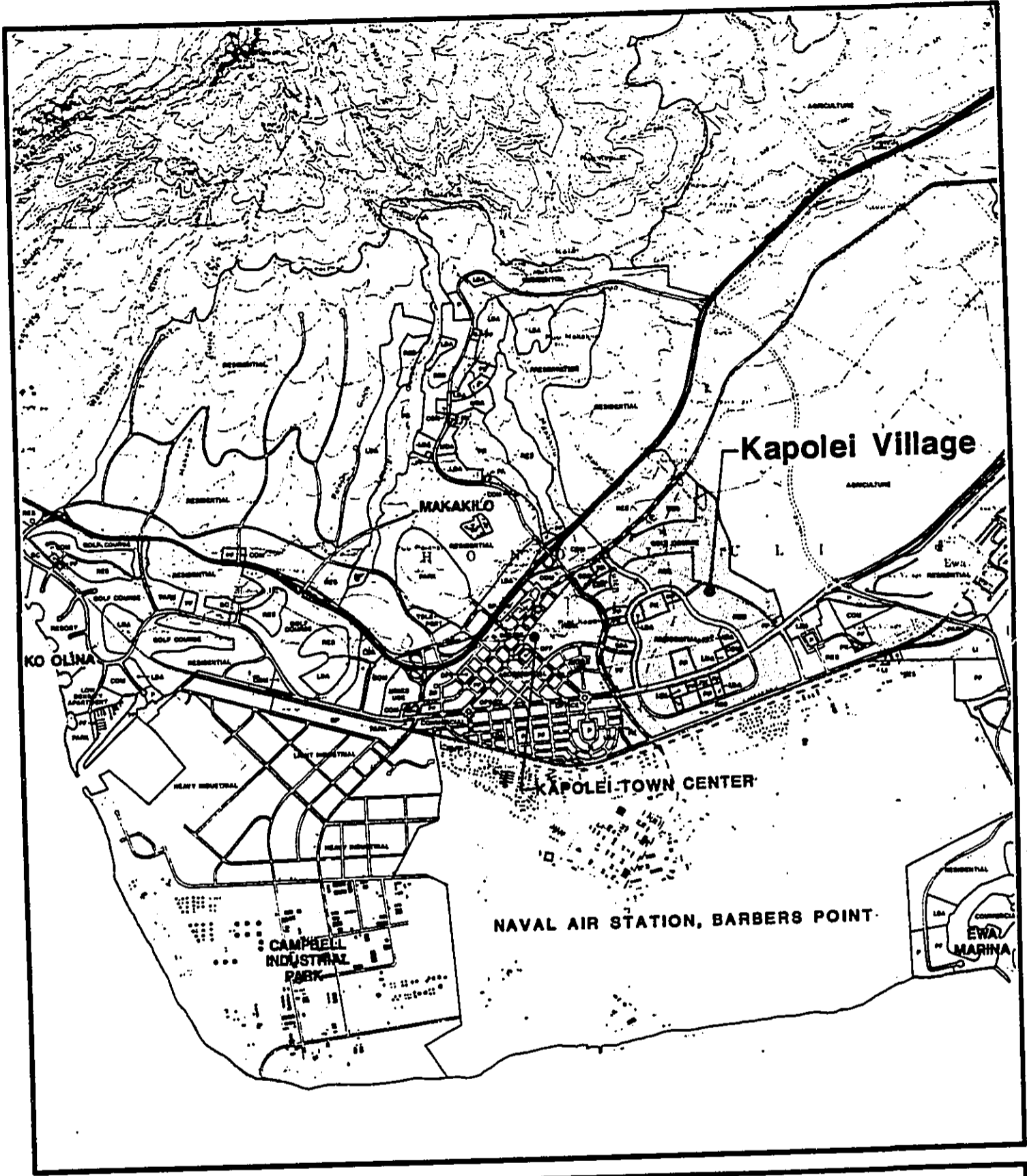
4.8 ENVIRONMENTAL IMPACT STATEMENT (Chapter 343, HRS)

Chapter 343 outlines the necessary procedures and contents of environmental impact statements. The chapter states: "environmental review at the state and county levels shall ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations." This environmental impact statement is prepared in accordance with the legislative mandates of Chapter 343, HRS. The requirement of an environmental impact statement was determined pursuant to Chapter 200 of Title 11, Administration Rules, Subchapter 5(b).

4.9 CAMPBELL ESTATE MASTER PLAN

The Estate of James Campbell is the major landowner in the Ewa area with approximately 34,000 acres of land within the Ewa Plain. The Estate maintains a planning program to coordinate the long range development of their Ewa lands.

Kapolei Village is consistent with the Campbell Estate Master Plan in that the Master Plan provides for the development of a planned residential community on the proposed project site. Existing and proposed uses of the long range plan are identified in Figure 4-1.



Kapolei Village
CAMPBELL LONG RANGE PLAN

Ewa, Oahu, Hawaii



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Figure:
 4-1

SECTION 5

**ASSESSMENT OF EXISTING CONDITIONS:
PHYSICAL ENVIRONMENT**

SECTION 5
ASSESSMENT OF EXISTING CONDITIONS:
PHYSICAL ENVIRONMENT

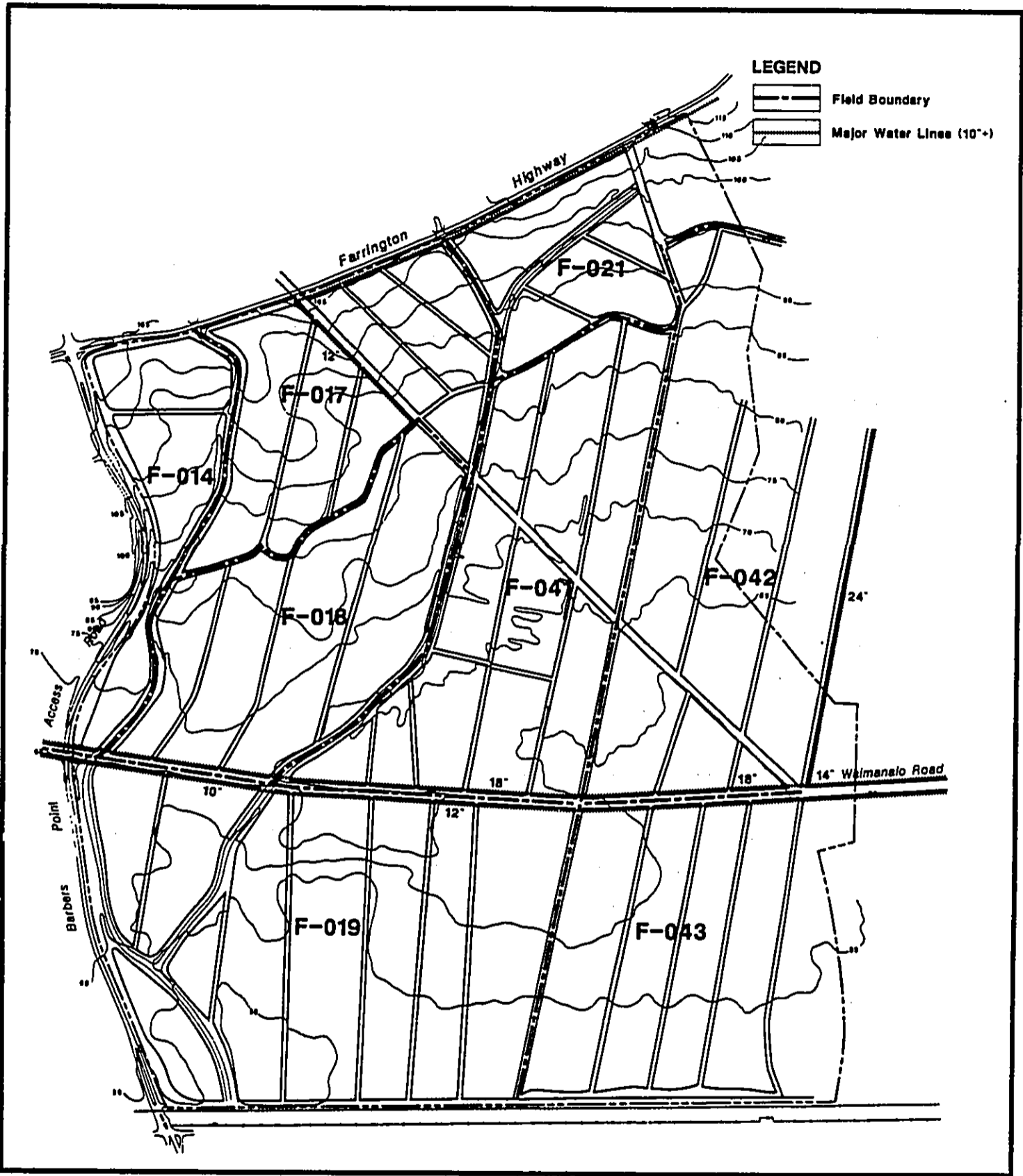
5.1 EXISTING USES AND OWNERSHIP

The 830-acre project site is owned by the Estate of James Campbell and is leased to the Oahu Sugar Company (OSCo) for sugarcane cultivation. The project site is identified as lying within Zone 9, Section 1, Plat 16 and encompasses all of Parcel 23 and a portion of Parcel 25. Campbell Estate owns lands surrounding the project site with the exception of: Barbers Point Access Road and Makakilo Interchange owned by the State of Hawaii; Fort Barrett Park (Puu Kapolei) and Farrington Highway owned by the City and County of Honolulu; and Naval Air Station, Barbers Point (NAS BARPT) owned by the Federal Government.

The entire project site is currently under sugarcane cultivation by OSCo. The site contains five fields: 14, 17, 18, 19 and 41; and portions of three other fields: 21, 42 and 43 (Figure 5-1). Fields 14 and 18 were harvested at the end of April 1987, with field 42 harvested in August 1987. Fields 17, 21 and 41 were planted in mid to late 1986.

OSCo maintains an agricultural water system within the project site consisting of 18-inch transit mains along Farrington Highway and Waimanalo Road and a series of 10-inch, 12-inch and 14-inch laterals. A major 24-inch main intersects with the Waimanalo 14-inch main at the extreme eastern side of the project. OSCo maintains 12 KV power lines servicing water pumping facilities located on the project site.

Waimanalo Road crosses the project site in an east-west direction and provides the major transportation corridor for sugarcane hauling activities in the area. Waimanalo Road provides a link from the Waipahu Sugar Mill to the fields in Ewa, including those west of the project site. Discussions with OSCo indicate the importance of maintaining Waimanalo Road as a major east-west agricultural roadway until the year 1995.



Kapolei Village
OAHU SUGAR CO. FIELD MAP
 Ewa, Oahu, Hawaii

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Figure:
 5-1

5.1.1 On-Site Encumbrances

A number of easements run through the project site (Figure 5-2) and described below:

A. U.S. Navy Water Line

This is a perpetual easement granted by the Estate of James Campbell to the Federal Government for use as a road (jointly with grantor and other tenants) and for constructing, operating, maintaining and repairing a 24-inch water pipeline.

The pipeline extends from the Navy's well field, located north of the project site (TMK 9-1-16:10), through the site and into NAS BARPT. Under the terms of the easement, the Navy is restricted to pumping less than 5 mgd from the well field unless Campbell Estate permits a greater withdrawal.

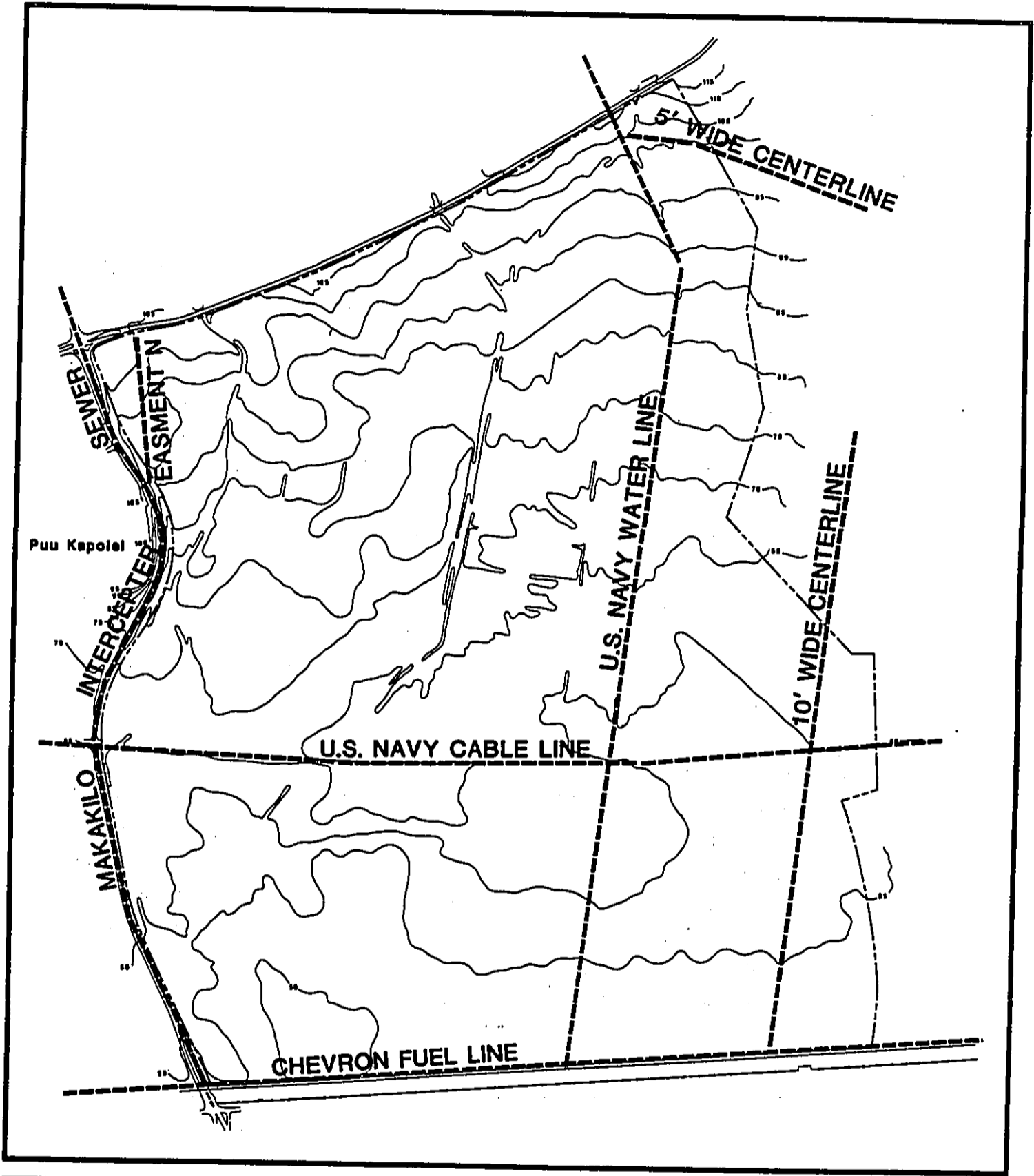
The pipeline easement is referred to as Lot 221 as it crosses the project site. The easement is approximately 7,800 feet in length (Farrington Highway to OR&L ROW) and 3.678 acres in size, with an approximate width of 20.54 feet.

B. Chevron Fuel Line

This is an 8-inch "black oil" line heated by adjacent 4-inch hot water line linking Chevron Refinery with its Honolulu Harbor terminal and Hawaiian Electric Company's Iwilei tank farm. The line runs along a 15-foot easement at the southern boundary of the project site (north of the OR&L ROW) under an existing agricultural road. A minimum of 48 inches is allowable for pipeline burial below roadways.

C. U.S. Navy Cable Line

This is identified as a 5-foot wide centerline easement lying along Waimanalo Road. Discussions with Campbell Estate



Kapolei Village
ON-SITE ENCUMBRANCES
 Ewa, Oahu, Hawaii



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representatives indicate that this was an easement for a Navy cable which has since been quitclaimed back to Campbell Estate and is therefore no longer an encumbrance.

D. Makakilo Interceptor Sewer

The sewer line extends from the abandoned Makakilo WWTP, south along Barbers Point Access Road and east to the Honouliuli WWTP. Portions of this easement cross the Barbers Point Access Road frontage of the project site.

E. 10-Foot Wide Center Line Easement

This easement follows an agricultural roadway easement extending from the southeast corner of the project site. The easement originates at the Farrington Highway/Palehua Access Road intersection, east of the project and terminates at the southern boundary of the project site.

F. 5-Foot Wide Center Line Easement

This easement appears to follow another agricultural roadway and crosses the project site at the northeast corner.

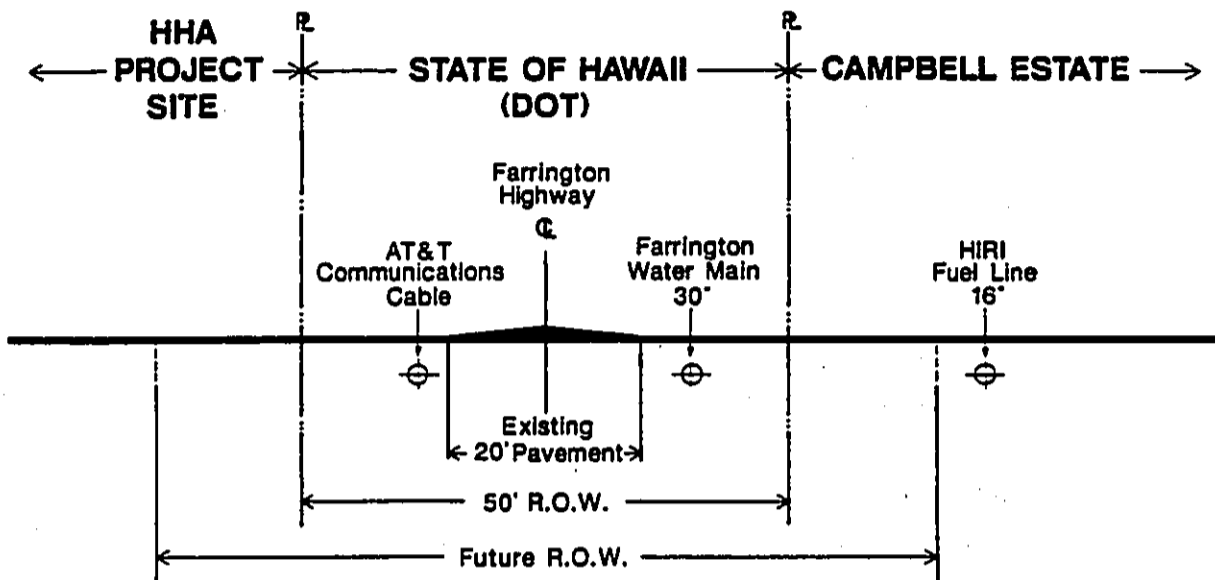
G. Easement N

This is a 12-foot wide irrigation line easement which crosses the property at the extreme northwest corner.

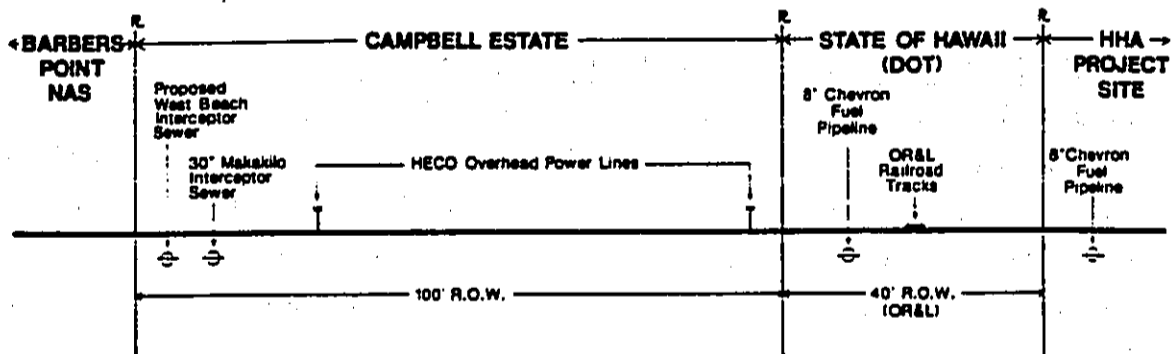
5.1.2 Detail of Northern and Southern Boundaries

Figure 5-3 illustrates typical sections of the northern and southern boundaries of the project site. The northern boundary shows existing 50-foot and proposed 80-foot right-of-ways (ROW). An AT&T Communications cable is buried on the south side of the roadway pavement within the Farrington Highway ROW. The existing 30-inch Farrington water main and the Hawaiian Independent Refinery, Inc. (HIRI) fuel line are buried on the north side of the roadway pavement.

**TYPICAL SECTION THROUGH NORTHERN
BOUNDARY OF PROJECT SITE.**
Scale: 20' - 1"



**TYPICAL SECTION THROUGH SOUTHERN
BOUNDARY OF PROJECT SITE.**
Scale: 30' - 1"



Kapolei Village
TYPICAL BOUNDARY SECTIONS
Ewa, Oahu, Hawaii

Figure:
5-3

The southern boundary contains an existing 8-inch Chevron "black oil" line, shown within a 15-foot easement adjacent to the OR&L ROW. Another Chevron line, the "light oil" line, runs along a 15-foot easement just south of the railroad tracks within the State-owned OR&L ROW. To the south, within the 100-foot ROW owned by the Campbell Estate, are existing overhead power lines (Hawaiian Electric Company) and the 30-inch Makakilo Interceptor Sewer (Division of Wastewater Management). The proposed West Beach Interceptor will be placed next to the existing Makakilo Interceptor.

5.2 SURROUNDING LAND USES

A. Kapolei Town Center

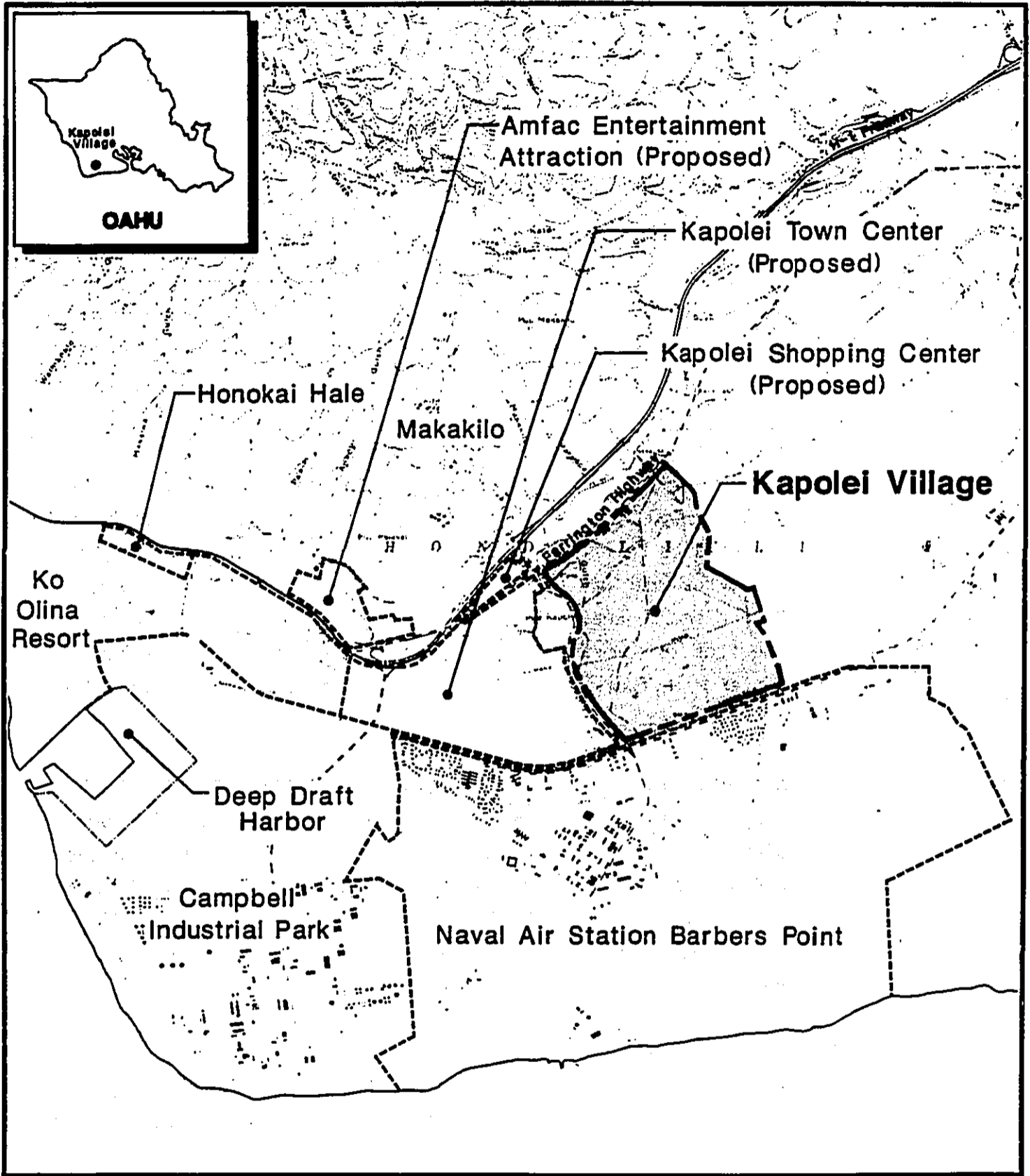
The Estate of James Campbell is pursuing the development of a 580-acre site immediately west of the project site called the "Kapolei Town Center" (Figure 5-4). The Town Center has been proposed to fulfill the long range growth policy of the City and County of Honolulu General Plan to establish a Secondary Urban Center in the Ewa Plain. The Estate has submitted a petition to the Land Use Commission to reclassify a portion of the Town Center site from the agricultural district to the urban district.

B. Makakilo

A 22-year old residential community consisting of mid priced, single family and multi-family housing is located on the lower slopes of the Waianae Range, north of the project site. About 2,400 housing units were built by 1985, with an estimated 2,700 units remaining to be built. Population of Makakilo in 1985 was 9,000 with ultimate future population estimated at 16,700 residents.

C. Honokai Hale/Nanakai Gardens

West of the project site, adjacent to the south of Farrington Highway lies the community of Honokai Hale/Nanakai Gardens. This is an older residential community with 500 moderately priced housing units. Population in 1985 included approximately 2,000 residents.



Kapolei Village
SURROUNDING LAND USES
 Ewa, Oahu, Hawaii



0' 4000'

Figure:
 5-4

D. James Campbell Industrial Park

This industrial park is located southwest of the project site. The industrial park is approximately 2,400 acres in size with 1,360 acres absorbed and the remaining acreage available for future expansion. Users of the industrial park include a mix of heavy industrial and light industrial businesses. These enterprises provided employment for approximately 2,500 people in 1985.

E. Deep Draft Harbor

A partially completed deep draft harbor for which the primary basin has been completed, is located west of the industrial park. Development of wharf and dock facilities will be started with the first phase of development to begin in 1987. Complete development of the harbor and its facilities is expected to take 10 to 15 years.

F. Ko'Olina

Groundbreaking for the planned 970-acre Ko'Olina residential/resort community (formerly, the "West Beach Resort") took place on December 2, 1986. Land and infrastructure development began in March 1987 with completion anticipated for mid 1989. First phase development plans call for 5,200 housing units. Of these units, 3,700 are designated as high-rise apartment/condominium units. The remaining 1,500 units are planned for low rise, lower density attached units located around the golf course. Another 4,000 visitor units, consisting of hotel rooms and resort condominiums are also planned.

5.3 CLIMATE

The climate in the project area is generally dry with northeast tradewinds providing the predominant wind direction, blowing 85 percent of the time with an average velocity of 9 knots. The Ewa Plain experiences light rainfall of approximately 20 inches per year.

Temperatures in the area range from 69°F to 91°F. The warmest average monthly temperature is 80.7°F and the coolest month average temperature is 72.3°F. The highest temperature of record is 93°F, and the lowest temperature recorded is 53°F.

5.4 GEOLOGY, PHYSIOGRAPHY AND TOPOGRAPHY

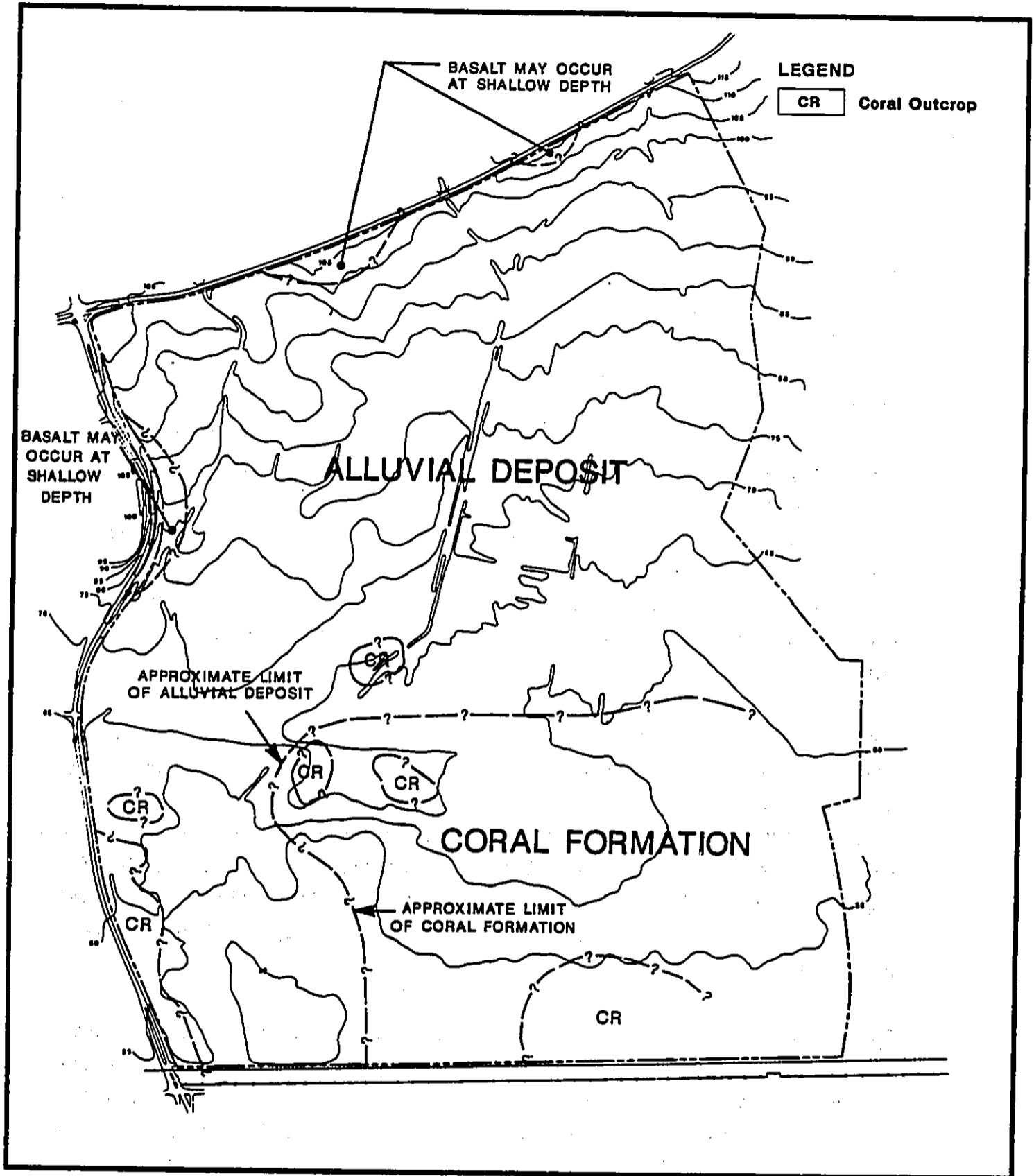
Geologic formations of the site include coral at shallow depths in the southeastern corner of the site and basalt rock at shallow depths in the northern and western portions of the site (Figure 5-5). Both formations are generally hard and may require ripping for excavation. The remainder of the site is made up of alluvial deposition.

The coral is generally hard and may require moderate ripping for excavation. The excavated coral material can provide a good source of low expansive structural fill. Cavities of varying sizes are often found in the coral formation. If encountered, backfilling of the cavities with grout or compacted fill may be required.



The basalt rock is generally hard and would require hard ripping to excavate. The excavated rock may produce many boulders which would have to be placed in the deeper fill areas.

The project site ranges in elevation from approximately 50 feet above mean sea level (MSL) at the southern boundary to approximately 115 feet MSL at the northeast corner. Approximately two-thirds of the site lies between 50 and 70 feet MSL.

The major topographic feature in the area is the Waianae Range forming the major backdrop of the project area. Intermediate features in the area include: Puu Makakilo (972 feet MSL), Puu Kapuai (1,047 feet MSL), Puu Palailai (492 feet MSL), all located directly north of the site; Puu Kapolei (166 feet MSL), located on the northwestern edge of the site; and two intermittent streams (Makakilo Gulch and Makalapa Gulch).



Kapolei Village
GEOLGIC SOIL TYPES
 Ewa, Oahu, Hawaii



**Figure:
5-5**

The site slopes gently from the southwest corner near the access gate of NAS BARPT to the northeast corner adjacent to Farrington Highway. Average slope is less than one percent (0.7). Approximately 90 percent of the site ranges in slope from zero to two percent. The remaining area is in the two to four percent range with a few spot locations in the four to six percent range.

5.5 SOILS AND AGRICULTURAL POTENTIAL

Predominant soil types within the project site consist of Mamala stony silty clay loam 0 to 12 percent slopes, and Waialua silty clay 0 to 3 percent slopes. In general, most of the clays can be classified as low to moderately expansive. Local soft zones in the clay were encountered beneath drainage ditches, irrigation trenches and in areas where water leaked from irrigation hoses. Easy excavation and conventional site grading procedures are anticipated for earthwork on these areas. Some of these soils may be moderately expansive and could require special procedures for house foundation design, such as deep footings, subgrade saturation or capping with non-expansive soils.

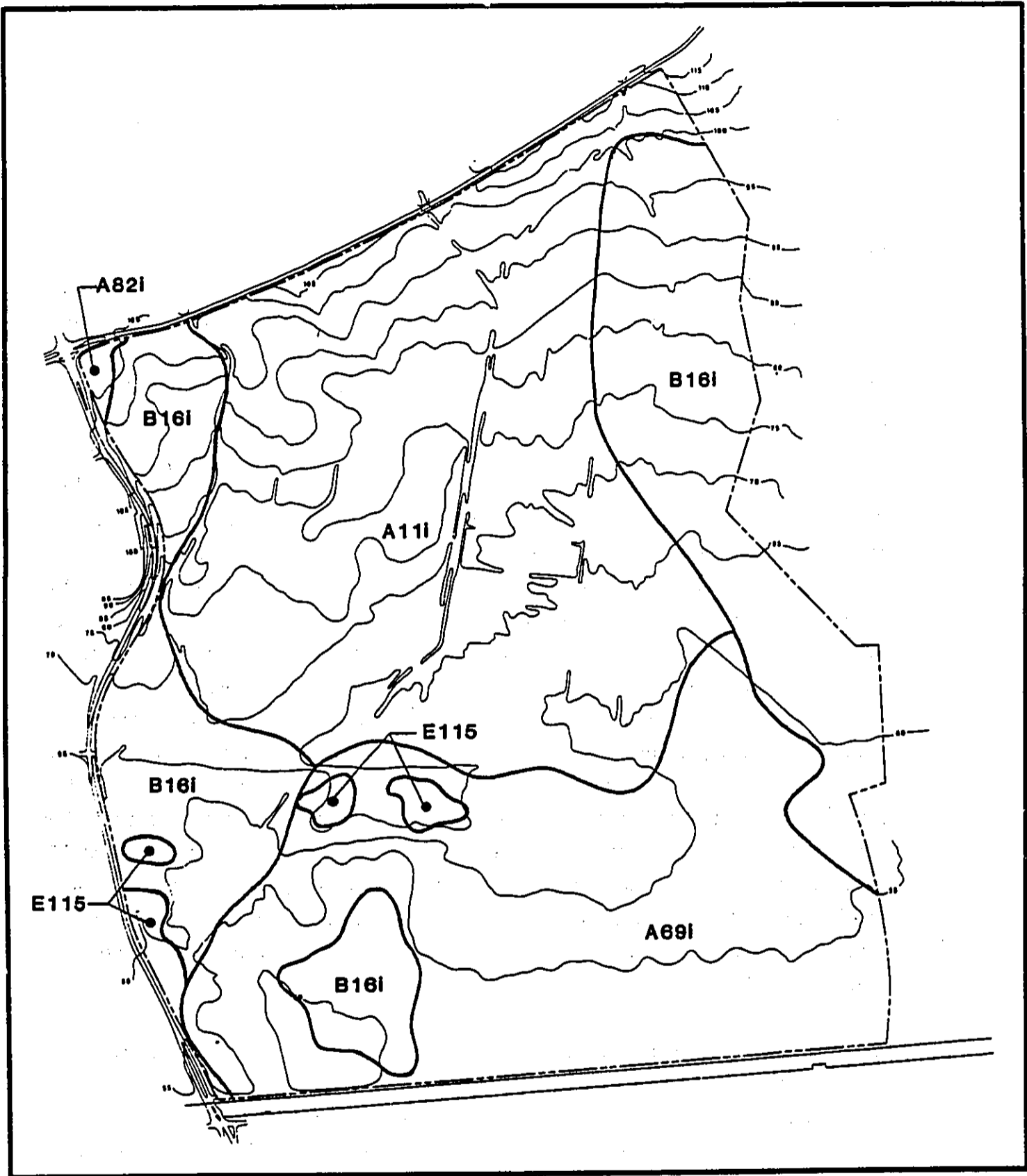
Soil studies conducted for Hawaii which analyze the suitability of different soil types include the Detailed Land Classification (Land Study Bureau, University of Hawaii), the Soil Conservation Service Soil Survey (U.S. Department of Agriculture Soil Conservation Service and University of Hawaii Agricultural Experiment Station), and the Agricultural Lands of Importance to the State of Hawaii (ALISH) system. The following are brief discussions of these studies and their respective applications to the project site.

The Detailed Land Classification reports were developed to provide land inventory and productivity evaluation based on State-wide standards of crop yields and levels of management. Land within the project site were found to have overall productivity ratings and land types of A69i (249 acres), All1 (329 acres), B16i (254 acres) and E115 (18 acres and corresponds to the

coral outcrop areas)(Figure 5-6). These findings indicate that most of the project site has good to very good productivity potential for most agricultural activities, if irrigated.

The Soil Conservation Service Soil Survey ranks soil types according to their suitability for most kinds of crops. These rankings are patterned after the nationwide soil classification. Also provided within the survey are listed of crops commonly grown on the soil types and their expected productivity under present management. Findings of the survey identify the predominant soils as (1) Ewa silty clay (EaB, EmA, EwA) with 0 to 6 percent slopes which is used for sugarcane, truck crops and pasture; (2) Honouliuli clay (HxA, HxB) with 0 to 6 percent slopes which is used for sugarcane, truck crops and pasture; (3) Waialua silty and stony silty clay (WkA, WIB) with 0 to 8 percent slopes which is used for sugarcane, pineapple and pasture; (4) Waiaphu silty clay (WzA) with 0 to 2 percent slopes which is used for sugarcane; (5) Molokai silty clay loam (MuC) with 0 to 3 percent slopes which is used for sugarcane, pineapple and pasture; (6) Mamala stony silty clay loam (MnC) with 0 to 12 percent slopes which is used for sugarcane, truck crops and pasture; (7) Kawaihapai stony silty clay loam (KlaB) with 2 to 6 percent slopes which is used for sugarcane, truck crops and pasture; and (8) Coral Outcrop (CR). The majority of crop capability classifications (i.e., general suitability for most kinds of crops) for these soils range from I to IIIe, when irrigated (soils with few limitations that restrict their use to soils with severe erosion hazard if cultivated and not protected). As a whole, according to the Soil Survey, nearly the entire project site is suited for a variety of agricultural uses. Land areas with coral outcrop are not cultivatable, but they represent only about 12 acres of the project site.

The ALISH system consists of mapped identification of three broad classifications of agricultural land, based in part on the Soil Conservation Service. These classifications are (1) Prime (591 acres), (2) Other Important (209 acres), and (3) Unique. Approximately 30 acres of the site, including areas of coral outcrop, was not classified under the



Kapolei Village

DETAILED LAND CLASSIFICATION

Ewa, Oahu, Hawaii



0' 1000'

Figure:
5-6

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

ALISH system (Figure 5-7). Lands giving the highest yields with the lowest amount of energy input or money with the least amount of damage to the environment are considered to be Prime agricultural lands. Generally, the upper half of the development consists of soils which are rated as "prime" agricultural lands.

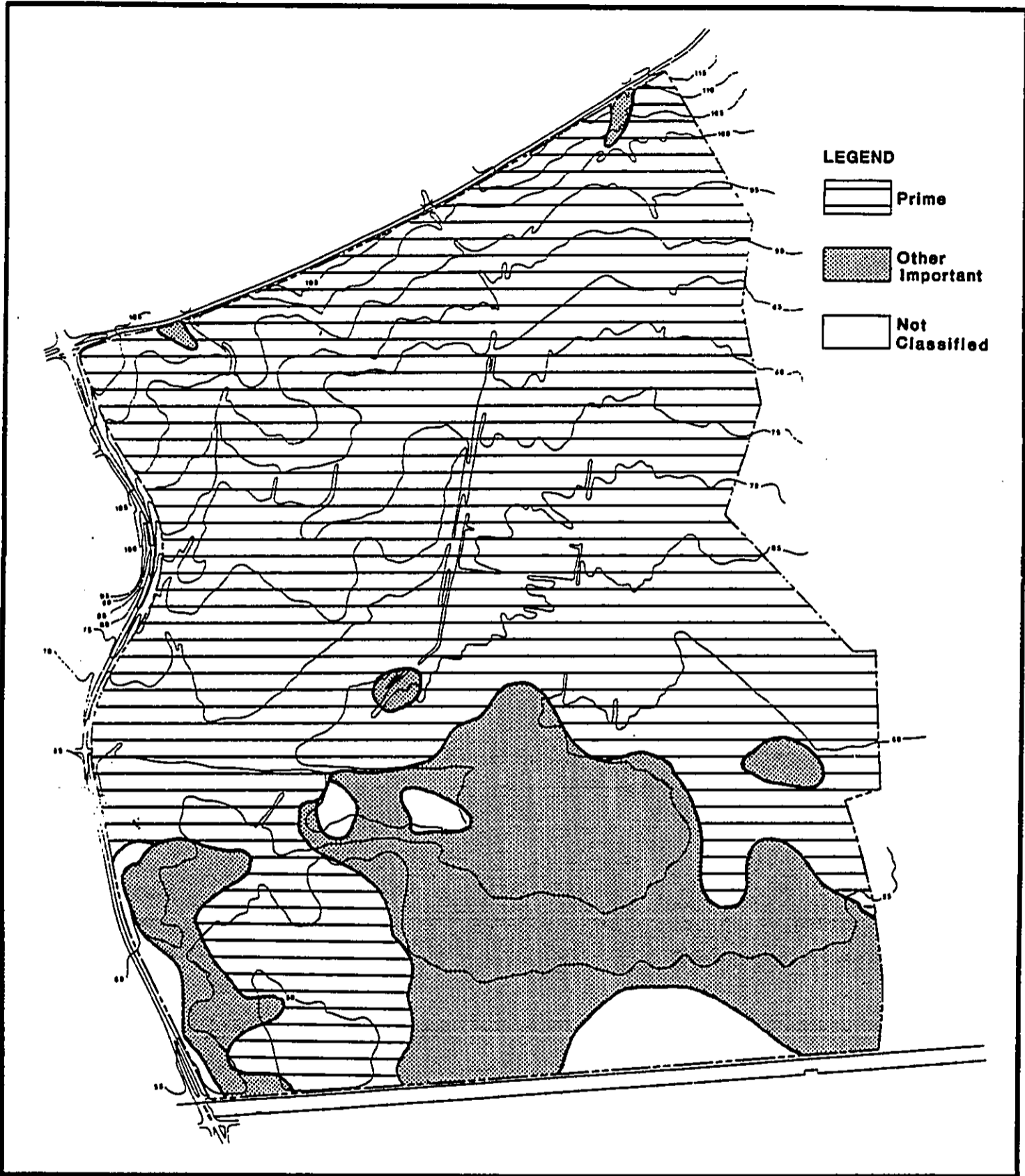
In addition to the soil classifications described above, a more comprehensive and quantitative means for determining viable agricultural lands of Hawaii is the Land Evaluation and Site Assessment (LESA). The LESA system was designed to identify important agricultural lands (IAL).

The Land Evaluation (LE) portion of the LESA system is a quantitative rating of the physical characteristics (including irrigation) of the soil resources of Hawaii. The LE ratings are a composite of the three previously discussed soil classification systems. The Site Assessment (SA) factors or criteria express the relative quality of a site or area based upon its non-physical characteristics or attributes. The SA factors are criteria which indicate the agricultural viability of a parcel, site of area.

To date, only the LE ratings methodology has been developed and applied to the land area in the State. To meet the projected agricultural production goals for Oahu for the year 1995 (approximately 57,661 acres), the application of the LE methodology has resulted in a threshold or "cutoff" value of 66 on Oahu (on a rating scale of 12 to 100). Thus, soils with a LE rating of 66 or greater are among the best soils on Oahu from an agronomic standpoint.

The project site has a range of LE ratings from 12 to 93, as follows:

<u>Soil Type</u>	<u>Acreage</u>	<u>LE Rating</u>
HxA	96	87
HxB	17	85



Kapolei Village
**AGRICULTURAL LANDS OF IMPORTANCE
 TO THE STATE OF HAWAII**
 Ewa, Oahu, Hawaii



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Figure:
5-7

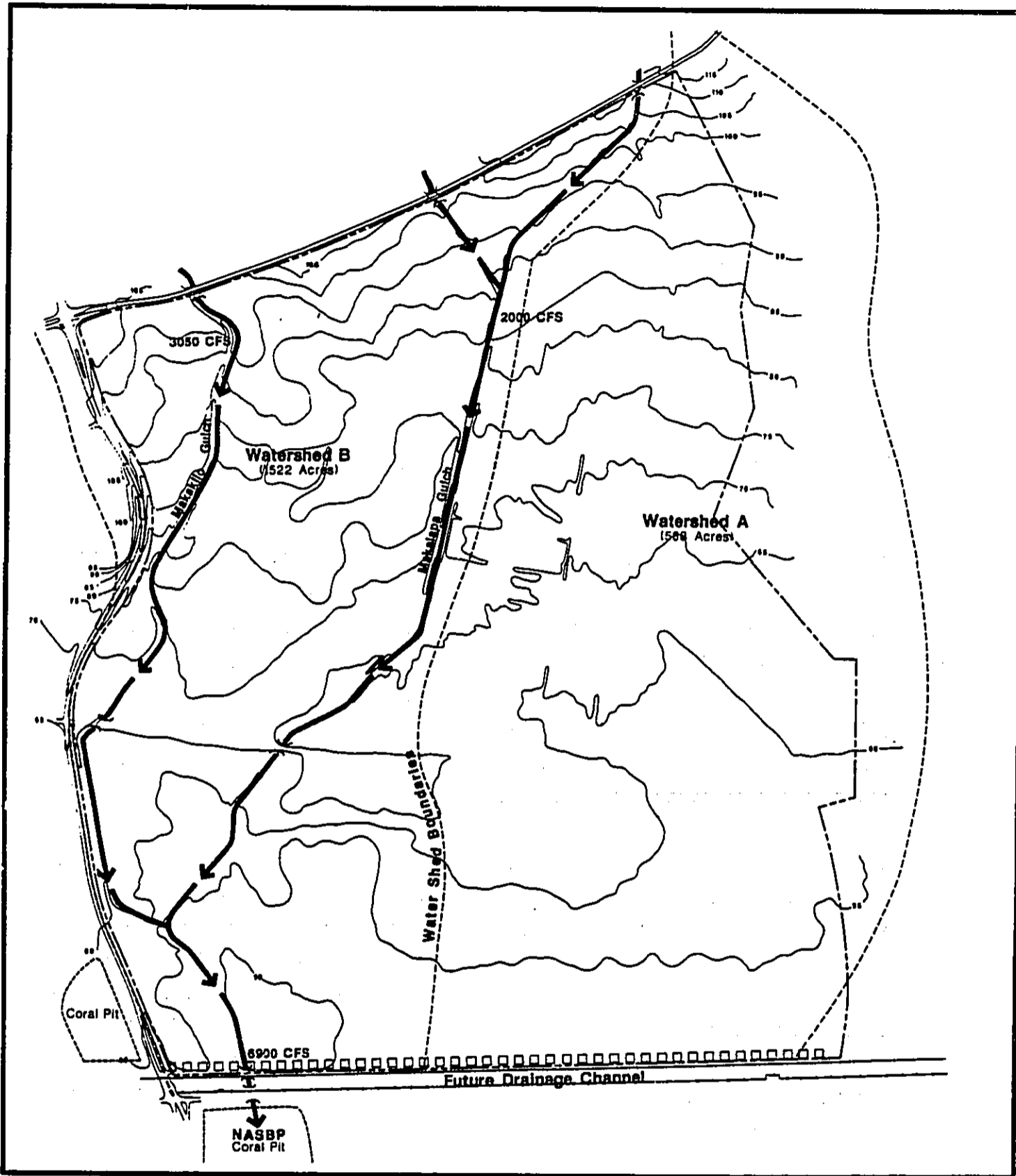
EwA	11	84
EmA	61	74
EaB	22	85
WkA	360	93
WzA	15	92
WIB	3	83
MuC	7	81
MnC	210	66
K1aB	1	83
CR	47	12

The average LE rating for the entire property is 78.5.

5.6 HYDROLOGY

The project site lies within two watersheds (Figure 5-8). Watershed "A" contains no defined waterways, allowing storm runoff to sheetflow over canefield land. Watershed "B" includes two small intermittent streams, Makalapa and Makakilo Gulches, comprising the only two waterways transversing the project site. Makakilo Gulch enters the site with a volume of approximately 3,050 cubic feet per second. Makalapa Gulch has a comparable volume of 2,000 cfs. Total cumulative volumes at the southern boundary are estimated at 6,900 cfs.

Disposal of storm runoff is generally accomplished through infiltration in ground depressions in lower cane regions, with excess runoff overflowing into portions of NAS BARPT. Disposal of storm runoff from the western portion of the project site is accomplished primarily through surcharging of the coral pit located just within the northern boundary of NAS BARPT. A culvert structure at the southern boundary of the project site limits flows into the pit to 1,600 cfs. In the past, debris has restricted passage through this culvert and resulted in flooding of the area immediately north of the culvert.



Kapolei Village
HYDROLOGY
 Ewa, Oahu, Hawaii



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Figure:
 5-8

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The NAS BARPT coral pit is approximately 45 feet deep and consists of porous sand/coral, heavily overgrown with keawe and haole-koa trees. The pit has a storage capacity of about 774 acre-feet and has enough runoff retaining capacity for a 25-year storm (assuming developed conditions). Sheetflows, resulting from stream channel overflow, pond for eventual infiltration in shallow ground depressions just above NAS BARPT.

5.7 FLORA AND FAUNA

This section provides a summary of findings of the biological survey of the project site. The analysis, conducted by Char & Associates, Botanical/Environmental Consultants is presented in the Appendix section of this report. Findings of the analysis are summarized below.

A. Flora

Canefields cover most of the project area. Weedy species which are found associated with these cultivated fields include nutgrass (Cyperus rotundus), swollen fingergrass (Chloris inflata), red pualele (Emilia fosbergii), sowthistle (Sonchus oleraceus), and hairy spurge (Euphorbia hirta). Locally common along the margins of the fields are two vines, wild bitter melon (Momordica charantia var. pavel) and little bell (Ipomoea triloba).

Drainage areas support a dense growth of California grass (Brachiaria mutica), two Panicum species, and Natal redtop (Rhynchelytrum repens). Scattered clumps of castor bean (Ricinus cummunis) and koa haole (Leucaena leucocephala) shrubs are also frequently encountered.

The spiny fruited puncture vine (Tribulus terrestris) is locally abundant on some of the canehaul roads.

Roadside vegetation occurring within the area is composed mostly of a mixture of grass, small shrub, and herbaceous species. The most abundant element in this vegetation type is buffelgrass

(Cenchrus ciliaris). Also abundant is pitted beardgrass (Andropogon pertusus). Other grasses occasionally found here include Bermuda grass (Panicum maximum), and sourgrass (Tricachne insularis). Among the small shrubs and weedy annual species, the following are frequently encountered: spiny amaranth (Amaranthus spinosus), several weedy Euphorbia species, golden crown-beard (Verbesina encelioides), coat buttons (Tridax procumbens), partridge pea (Cassia lechenaultiana), indigo (Indigofera suffruticosa), 'uhaloa (Waltheria indica var. americana), and 'ilima (Sida fallax).

Kiawe - koa haole thicket vegetation consists of very scattered kiawe trees (Prosopis pallida) with a rather dense cover of koa haole shrubs (Leucaena leucocephala) filling in the matrix between the trees. Buffelgrass (Cenchrus ciliaris) forms a more or less dense ground cover. A number of sisal plants (Agave sisalana) are found in this vegetation type. Sisal was grown on the Ewa Plains from 1893 to the 1920's to provide material for sisal or marine rope and sisal twine.

The OR&L (Oahu Railway and Land Company) right-of-way, with rail bed and tracks, runs along the length of this vegetation type.

B. Fauna

Over the three types of vegetation, a total of ten bird species was recorded. Due to the highly disturbed nature of the vegetation, all but one of the bird species observed were introduced (or foreign) ones. The sole native species, the Pacific Golden Plover (Pluvialis dominica), is a wide ranging migratory species. The nine introduced species were the Cattle Eret (Bulbulcus ibis), Spotted Dove (Streptopelia chinensis), Zebra Dove (Geopelia striata), Black-rumped Waxbill (Estrilda troglodytes), Chestnut Mannikin (Lonchura malacca), Northern Cardinal (Cardinalis cardinalis), Red Avadavat (Amandava

amandava), Red-vented Bulbil (Pycnonotus cafer), and Common Myna (Acridotheres tristis).

No mammals were actually observed on the site, but tracks of the Indian Mongoose (Herpestes auropunctatus) were found along the edge of the canefields.

A number of other bird and mammal species are also likely to use the study site, or at least pass through on occasion. The Mockingbird (Mimus polyglottos), reported from the Barbers Point Deep-Draft Harbor site (M&E Pacific, 1978) and Campbell Industrial Park (Belt, Collins & Associates, 1980), can be expected to utilize the study area to some degree. Four other bird species which are common in the thickets in adjacent parcels are the Red-crested Cardinal (Paroaria coronata), House Finch (Carpodacus mexicanus), House Sparrow (Passer domesticus), and the Japanese White-eye (Zosterops japonica). Another bird, the Nutmeg Mannikin (Lonchura punctulata), is commonly seen in adjacent areas feeding in overgrown grassy areas and can be expected to utilize the study site.

Other mammal species which are likely to be found on the study site but were not observed during this survey include the Roof Rat (Rattus rattus), the Norway Rat (Rattus norvegicus), the Polynesian Rat (Rattus exulans), the House Mouse (Mus musculus), and possibly, also feral dogs (Canis familiaris) and feral cats (Felis catus).

No terrestrial reptiles or amphibians were noted during the study. The Hawaiian Islands do not have any native amphibians or terrestrial reptiles. It is likely, however, that introduced gecko and skink species, such as the Mourning Gecko (Lepidodactylus lugubris), occur on the project site in those areas with shrubs and trees.

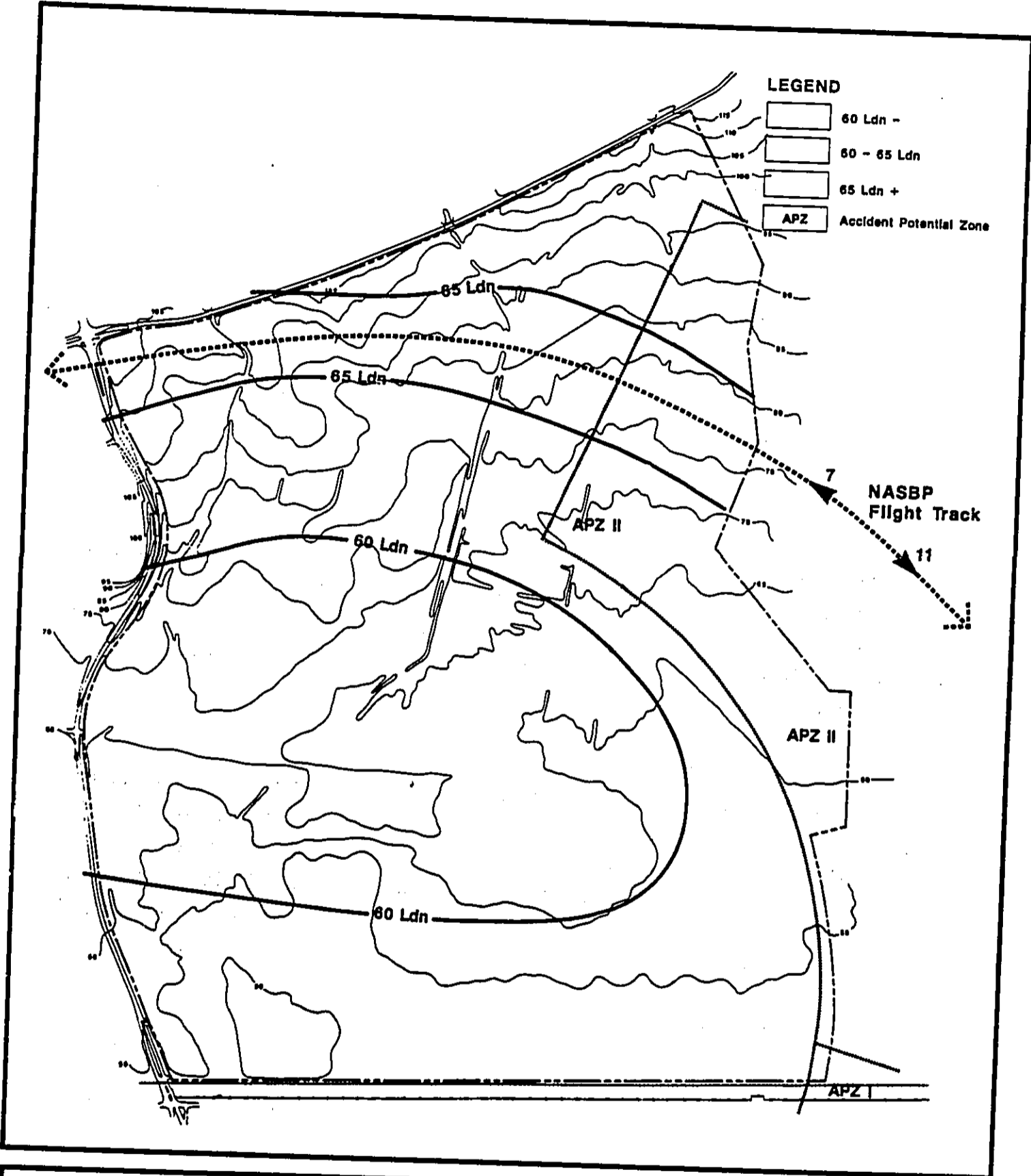
5.8 NOISE

Existing noise levels in the vicinity of the project area are mostly generated from NAS BARPT operations and sugarcane cultivation activities. Noise impacts of aircraft operations from NAS BARPT on the project area and surrounding environment have been the subject of a number of studies.

The U.S. Navy has prepared an Air Installations Compatible Use Zone (AICUZ) Study (1984) which established off-station contours and safety zones (Figure 5-9). The AICUZ identifies significant noise impacts to the project site. A "noise arm" of 65 Ldn and above crosses the top portion of the site following Flight Tracks 7/11. Approximately 11 percent of the site lies within the 65 Ldn+ Zone. Another 56 percent lies within the 60 Ldn to 65 Ldn contours with the balance of 33 percent lying within an area below 60 Ldn.

Accident Potential Zones (APZ) are areas under aircraft flight paths which have a higher than normal potential for aircraft accidents. The three zones of accident potential used in the NAS BARPT AICUZ are described as follows:

- A. Clear Zone - The first 3,000 feet of the trapezoidal approach/departure zone at each end of the runway. The clear zone represents the area of highest potential hazards due to accident and most land uses are precluded in this area.
- B. APZ I - A 5,000-foot long by 3,000-foot wide zone beyond the clear zone. APZ I defines a zone of lesser hazard potential than the clear zone, and some degree of density restrictions are required. All forms of residential use are considered incompatible.



Kapolei Village
U.S. NAVY AICUZ
 Ewa, Oahu, Hawaii

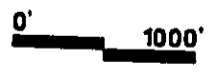


Figure:
5-9

- C. APZ II - A 7,000-foot long by 3,000-foot wide zone beyond the APZ I. APZ II encompasses areas less hazardous than the APZ I, but still possessing a level of risk sufficient to require density and use restrictions. Most forms of open space, industrial, commercial, and scattered low density residential uses are compatible, whereas medium and high density residential developments and public facilities (schools, churches, etc.) are not. Additionally, structures in this area should not reflect glare, emit electronic interference, or produce smoke.

Approximately 108 acres of the site were identified to lie within APZ II. An additional one-third acre of the site at the extreme southeast corner lies within the APZ I zone. None of the site lies within the clear zone.

Subsequent studies done by the Estate of James Campbell and the HFDC have questioned many of the findings of the U.S. Navy AICUZ report. Principal concerns relate to the magnitude and extent of off-station noise and safety zones. Concerns of aircraft noise impacts are further expressed in Appendix A of this report.

Along existing canehaul roads, which traverse across the project site, canehaul trucks are the dominant source of noise during the harvesting season which occurs every 2.5 years. During the peak harvesting day of 24-hour operation, canehaul truck noise levels could exceed acceptable levels. However, studies conducted for other sugarcane fields in the Ewa Plains area indicate average Ldn values for a harvest season do not exceed moderate levels.

5.9 AIR QUALITY

Since the early 1970's the State's air quality standards have been substantially more stringent than their Federal counterparts and were absolute values not to be exceeded. In 1986, the Department of Health

amended these standards making total suspended particulates (TSP) and sulfur dioxide (SO₂) values the same as the Federal standards and permitting one exceedance per year. Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, visibility, climate and economic values.

The existing conditions in the vicinity of the project site are such that there are no impacts to public health because the area is not populated. The principal air pollution source in the area is cane burning. Cane fires result in the emission of particulates, carbon monoxide, and trace amount of other organics. Until urbanization entirely replaces sugarcane cultivation in the Ewa District, there will be some human exposures and complaints about cane fire smoke.

The James Campbell Industrial Park also affects air quality in the project area. However, neither monitoring nor computer modeling show violations of the current standards ("Air Quality Impact Report, Secondary Urban Center" 1987).

5.10 SCENIC AND VISUAL RESOURCES

The predominant view from the site is of the Waianae Mountain Range located approximately three miles to the north. Visible peak height (Palehua) is approximately 3,100 feet MSL. Other views include the primary urban center with Diamond Head visible approximately 25 miles to the east; the Pacific Ocean offlying NAS BARPT, two miles to the south; and of Puu Kapolei (peak height 166 feet MSL) directly to the west.

5.11 HISTORIC AND ARCHAEOLOGICAL RESOURCES

This section provides a summary of findings of historic and archaeological resources of the project site. The analysis, conducted by Paul H.

Rosendahl, Ph.D., Inc., Consulting Archaeologist, is presented in the Appendix section of this report. The analysis is summarized below:

"Although no archaeological remains are known to exist within the project area, one previously identified site and a second reported site are immediately adjacent to it. The Oahu Railroad Company and land company right-of-way (railroad bed), which bounds the project area on the southeast side, is listed on the National Register of Historic Places (Site 50-80-12-9714). A heiau and large rock shelter were reported by J.G. McAllister (1933:108) to have once been located on Puu Kapolei, a volcanic cone situated southwest of and immediately adjacent to the project area; however, this site (Site 138) evidently had been destroyed prior to McAllister's 1930 survey field work. (For a compilation of available traditional information concerning Puu Kapolei and the Honouliuli lands of the Ewa Plain, see Sterling and Summers 1978:31-41)."

"No potentially significant archaeological sites or features of any kind were encountered during the reconnaissance survey of the Kapolei Village project area. Based on the entirely negative results of the reconnaissance survey, it is concluded that no further archaeological work of any kind is necessary, and it is recommended that full archaeological work clearance for the project area be granted. This recommendation is made on the basis of the survey reconnaissance survey field work, and is given with the general qualification that during any development activity involving the extensive modification of the land surface there is always the possibility, however, remote, that previously unknown or unexpected subsurface cultural features or deposits might be encountered. In such a situation, immediate archaeological consultation should be sought."

SECTION 6

**ASSESSMENT OF EXISTING CONDITIONS:
SOCIO-ECONOMIC ENVIRONMENT**

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SECTION 6
ASSESSMENT OF EXISTING CONDITIONS:
SOCIO-ECONOMIC ENVIRONMENT

6.1 POPULATION

6.1.1 Existing Conditions

According to the decennial census conducted in 1980, the Ewa Development Plan area's (Census Tracts 83-86.02) population of 36,234 constituted 4.7 percent of the island's total population. Department of General Planning statistics for the area show an increase in the total population in 1985 to 37,300.

Existing population centers in the Ewa area include: Barbers Point Naval Air Station (NAS BARPT), located south of the project site (1985 population: 2,924); Ewa Beach, located between Pearl Harbor and NAS BARPT (1985 population: 14,500); Honokai Hale/Nanakai Gardens, located west of the project site (1985 population: 1,989); Makakilo, located on the lower slopes off the Waianae Range, north of the project site (1985 population: 8,992); and the Ewa Villages, located east of the project site (1985 population: 3,000).

Demographic characteristics of the Ewa Development Plan area, as compared with Oahu, as a whole, generally reveal a younger population, less college level graduates and slightly different ethnic composition with more Caucasians, Filipinos, and Hawaiians, and less Japanese and Chinese.

Table 6-1 identifies selected demographic characteristics of the Ewa Development Plan area and the City and County of Honolulu taken from 1980.

6.1.2 Future Projections

Population projections made by the Department of General Planning for the Ewa Development Plan area show a great amount of population growth for that area. It is projected that population will more than double from approximately 36,000 in 1980 to 83,000 by the year 2005.

TABLE 6-1

SELECTED DEMOGRAPHIC CHARACTERISTICS

	<u>City & County of Honolulu</u>	<u>Ewa D.P. Area (C.T. 83-86.02)</u>
TOTAL POPULATION	762,545	36,234
ETHNICITY	(percent)	(percent)
Caucasion	41.2	44.5
Japanese	24.9	8.8
Chinese	6.9	2.0
Filipino	12.6	24.8
Hawaiian	10.5	12.4
Other	5.5	7.5
AGE		
Less Than 5 Year	7.9	10.7
5-17 Years	20.2	27.8
18-64 Years	64.6	58.6
65 or More Year	7.3	3.0
Median Age (Year)	28.1	N/A
PLACE OF BIRTH		
Hawaii	55.1	49.6
Other U.S.**	30.1	36.1
Foreign County	14.8	14.5
RESIDENT 5 YEARS PREVIOUS* (People Aged 5+ Years)		
Same House	48.2	44.0
Same Island	25.5	23.6
Different Island	1.3	0.8
Different State	18.4	26.1
Different Country	6.6	6.1
EDUCATION (People Aged 25+ Years)		
0-8 Years Only	14.4	14.3
High School Only	35.5	43.0
College, 4+ Years	21.7	12.4

NOTES: * Except for Total Population and Age, all figures based on 15 percent sample.

** Including persons born in U.S. territories, and abroad or at sea to American parents.

SOURCE: Community Resources, Inc., 1986.

6.2 ECONOMY/EMPLOYMENT

6.2.1 Existing Conditions

Employment statistics (1980) within the Ewa Development Plan area reveal a relatively high proportion of the labor force employed in the armed forces. Pearl Harbor and NAS BARPT employ 18 percent of the area's labor force compared with only 10 percent island wide. Table 6-2 provides labor force comparisons between the Ewa Development Plan area and Oahu as a whole.

Unemployment levels of the Ewa area in 1980 were nearly double the general population levels (8 percent versus 4.6 percent). Occupational profiles of the Ewa labor force reveal a large number of blue collar occupations (service, farm, precision, craft, repair, laborers, etc.) with few white collar occupations. The occupation profile is largely reflected by agricultural jobs within the Ewa area being three times as high as the general population.

6.2.2 Future Projections

Employment projections for the Ewa Development Plan area indicate that the Ewa area will become a major employment center upon completion of the Secondary Urban Center. Areas of concentrated employment opportunities include the James Campbell Industrial Park, the Ko'Olina Resort and the proposed Kapolei Town Center located immediately west of the proposed Kapolei Village site.

6.3 HOUSING

6.3.1 Existing Conditions

In 1985, the Department of General Planning estimated that the Ewa Development Plan area contained a total of 9,300 housing units, comprising approximately 3.5 percent of the total housing stock on Oahu.

Existing residential communities in the Ewa area consist of: Barbers Point, Naval Air Station (NAS BARPT), located south of the project site (1985 housing units: 850); Ewa Beach, located between Pearl Harbor and NAS BARPT (1985 housing units: 3,465); Honokai Hale/Nanakai Gardens, located

TABLE 6-2
LABOR FORCE SIZE AND CHARACTERISTICS
(1980)

	<u>City & County of Honolulu</u>	<u>Ewa D.P. Area (C.T. 83-86.02)</u>
POTENTIAL LABOR FORCE		
(Aged 16+/-)	574,903	23,862
not in labor force	30.8%	31.9%
armed forces	10.1	18.5
civil. labor force	59.1	49.5
CIVILIAN LABOR FORCE	339,863	11,821
unemployed	4.6%	8.0%
TOTAL EMPLOYED CIVIL. LABOR FORCE	324,113	10,873
OCCUPATION		
service	17.6%	19.5%
manager/professional	24.7	14.2
technical, sales & admin.	33.8	31.0
farm/fish/forest	1.8	3.9
precision, craft, repair	11.3	15.5
operators, fabricators, laborers	10.9	16.3
INDUSTRY (selected)		
agric., forest, fish, mining	1.7%	6.1%
construction	6.6	7.5
manufacturing	7.7	12.0
retail trade	20.5	20.1
financial, insurance, real estate	8.1	5.2
personal, entertain. & rec. svcs.	8.1	5.9
health, educ., and professional	18.5	12.7
public adminis.	10.9	13.4
COMMUTE TO WORK		
45 minutes or more	12.0	22.6
mean travel (min.)	22.6	25.8

NOTES: All figures based on 15 percent sample; hence, numbers represent estimates.

SOURCE: Community Resources, Inc., 1986.

west of the project site (1985 housing units: 500); Makakilo, located on the lower slopes of the Waianae Range, north of the project site (1985 housing units: 2,700); and the Ewa Village, located east of the project site (1985 housing units: 900).

6.3.2 Future Projections

The projected housing demand for Oahu is expected to increase significantly as population, employment and household incomes continue to grow. The Department of Business and Economic Development (DBED) projects the population of Oahu to increase to approximately 954,000 persons by the year 2005. This increase represents the need for an additional 48,000 housing units, assuming a factor of 2.9 persons per household. The greatest demand for additional housing is expected to occur in the Ewa and Central Oahu areas, due to increased employment opportunities in those areas.

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

SECTION 7

**ASSESSMENT OF EXISTING CONDITIONS:
PUBLIC FACILITIES AND SERVICES**

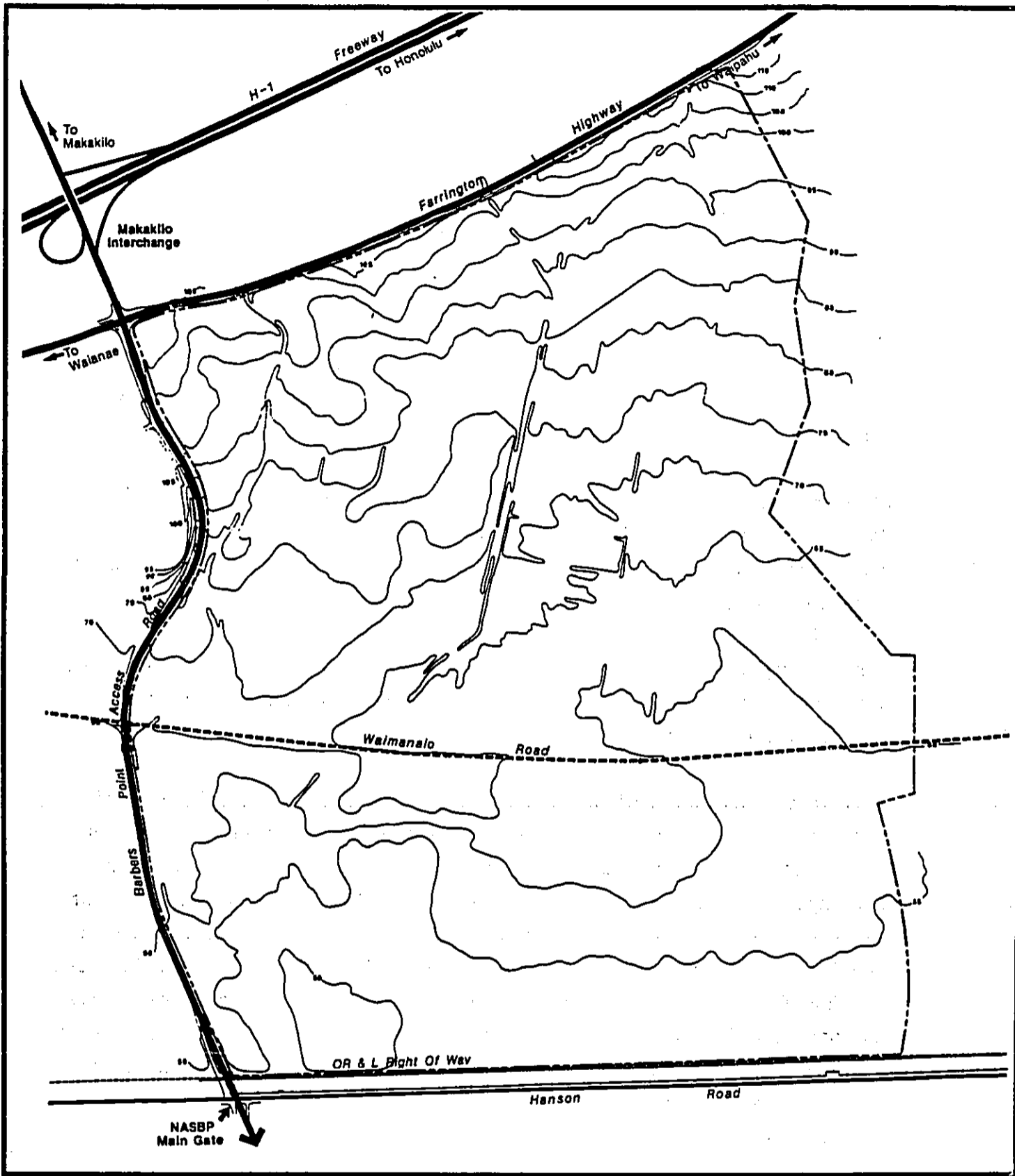
SECTION 7
ASSESSMENT OF EXISTING CONDITIONS:
PUBLIC FACILITIES AND SERVICES

7.1 TRANSPORTATION

The project site is well served by regional and local road systems (Figure 7-1). Major public roadways adjacent to the site include Farrington Highway, a two-lane highway along the northern boundary and Barbers Point Access Road, a two-lane highway along the western boundary of the site. Further north of the site is the H-1 Freeway allowing access to the site via the Makakilo Interchange. The freeway in the vicinity of the site is presently being upgraded from four lanes to six lanes.

Other roadways located in and around the project site include: Waimanalo Road, a private agricultural road used by the Oahu Sugar Company to transport harvested sugarcane to the mill in Waipahu; the State-owned OR&L ROW, located adjacent to the southern boundary of the project site, extending from Pearl Harbor to the Ko'Olina Resort; and Hanson Road, paralleling the OR&L ROW inside the NAS BARPT boundary, connecting Geiger Road and Fort Weaver Road, providing military access to the major residential communities of Ewa Beach and Iroquois Point.

Traffic on Farrington Highway, west of Barbers Point Access Road, exhibits directional splits during peak periods typical of suburban commuter routes. The existing two-way peak hour traffic volumes on this portion of Farrington Highway are between 500 and 600 vehicles per hour. East of Barbers Point Access Road, eastbound and westbound traffic are almost evenly distributed. Major employment areas (Campbell Industrial Park and NAS BARPT) attract traffic during the morning which balances eastbound commuter traffic produced in residential areas. Highest hourly traffic on Farrington Highway adjacent to the project site occurs in the afternoon, with a two-way volume of 580 vehicles per hour, or approximately one-third of the highway's capacity.



**Kapolei Village
ROADS**
Ewa, Oahu, Hawaii



0' 1000'

**Figure:
7-1**

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

Barbers Point Access Road, adjacent to the project site, carries a two-way volume of approximately 1,300 vehicles per hour during the morning peak hour and 1,200 vehicles per hour during the afternoon peak hour. Traffic on Makakilo Drive exhibits the typical pattern of a residential area with high directional splits reflecting home-to-work and work-to-home commuting. The existing two-way peak hour traffic volumes on Makakilo Drive near the H-1 Freeway overpass are approximately 1,300 vehicles per hour during the morning (AM) and afternoon (PM) peak periods.

The signalized intersection of Farrington Highway and Barbers Point Access Road has an estimated total capacity of 2,700 vehicles per hour. At this intersection, the existing counts show the volume to be 1,750 vehicles per hour during both morning and afternoon peak hours.

The H-1 Freeway in the vicinity of the proposed project is presently being upgraded from a four-lane freeway to a six-lane freeway. The on-ramps from Makakilo Drive merge before entering the freeway and presently handle a peak volume of 830 vehicles per hour in the morning during which time the freeway volume is approximately 1,300 vehicles per hour approaching the ramp. Westbound traffic from the freeway using the off-ramp to Makakilo and NAS BARPT is stopped at Makakilo Drive; some delays occur in the morning because of high volumes wishing to turn left towards the air station.

Bus transportation services are supplied by the City and County of Honolulu, Department of Transportation Services (DTS). Bus service operates according to supply and demand, subject to availability of resources. Bus services within the vicinity of the project area are currently supplied to Makakilo, Ewa and Ewa Beach (Route 50 and 51).

7.2 WATER

The project site is located within the Board of Water Supply's (BWS) Ewa-Waianae District. Presently, the site is serviced by an agricultural water system maintained by the Oahu Sugar Company.

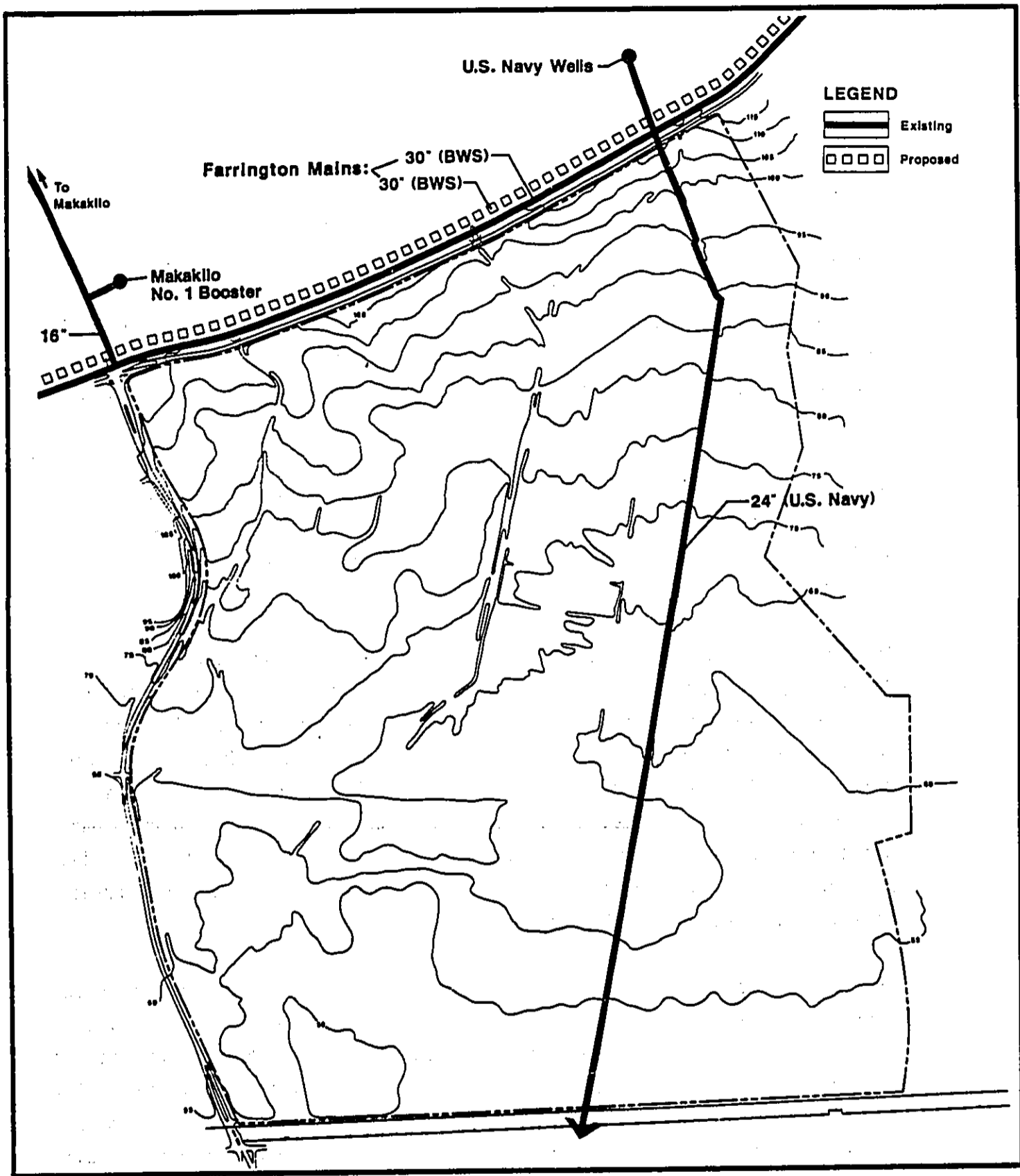
Existing BWS infrastructure in the area (Figure 7-2) includes: a 30-inch water main running along the northern side of Farrington Highway from Waipahu to the 215-foot Barbers Point tank (9 MG total capacity) located approximately 2.5 miles west of the project site; the Makakilo No. 1 Booster, located north of the project site, supplying water to the Makakilo residential community; and a 24-inch water line (withdrawal capacity: 5 MG per day) maintained by the Navy, providing potable water needs of NAS BARPT from Navy wells located north of the project site between Farrington Highway and the H-1 Freeway.

The 30-inch transmission line along Farrington Highway currently provides water to existing developments in the Ewa area as well as the Waianae-Makaha area. Water sources supplying the existing 30-inch main belong to the Board of Water Supply.

The Ewa area lies within the Pearl Harbor Ground Water Control Area. According to the Department of Land and Natural Resources, State of Hawaii, current groundwater pumpage has nearly reached the aquifer's sustainable yield.

To date, the Estate of James Campbell has verbally agreed to provide 175,000 gallons of water per day to the development at no cost. Water from the Board of Water Supply is made available as needed, providing there is a sufficient supply available. Additionally, water may be available from the Estate of James Campbell based on an Ewa (Regional) Water Master Plan. The master plan takes into consideration the development schedules of various projects in the Ewa area with regard to storage, transmission and scheduling of water resources. The cost of implementing this plan will be distributed to the various developments on a per unit or gallon per day (gpd) basis.

Major proposed water facilities in the area include a second 30-inch water main paralleling the existing main along Farrington Highway and additional storage reservoirs located at an approximate elevation of 220 feet above sea level, located north of the H-1 Freeway. Additionally, the 24-inch



Kapolei Village
WATER
 Ewa, Oahu, Hawaii



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Figure:
 7-2

water line maintained by NAS BARPT, currently running through the project site will need to be relocated.

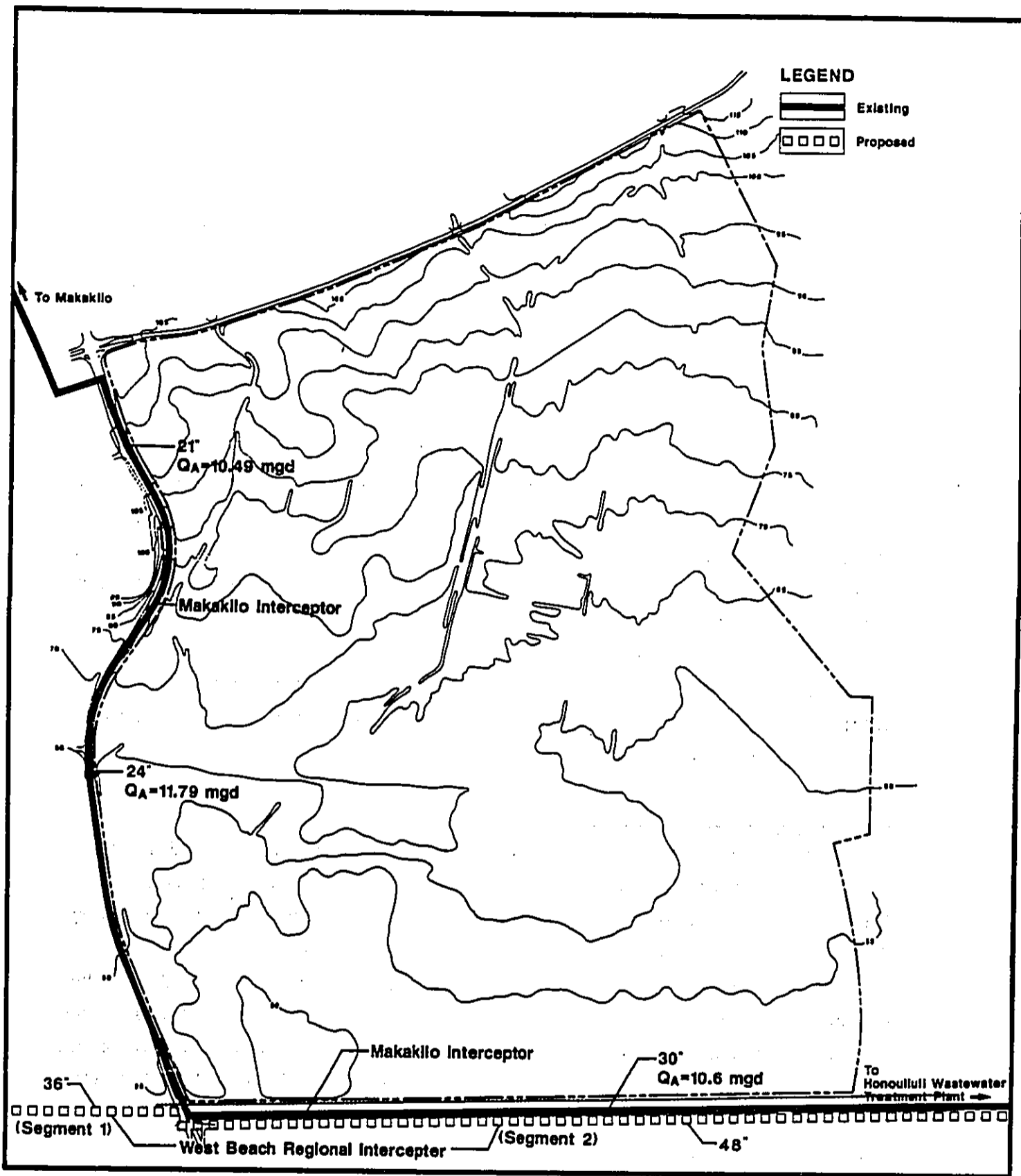
7.3 WASTEWATER

The existing sewerage system includes the Makakilo Sewer Interceptor, the Ko'Olina Interceptor and the Honouliuli Wastewater Treatment Plant (WWTP). The Makakilo Interceptor conveys the sewage produced from the Makakilo development to the Honouliuli WWTP, via Fort Barrette Road and Renton Road. Presently, there is excess capacity in the interceptor. The size of the interceptor varies from 18 inches to 30 inches in diameter. The existing sewerage system is shown on Figure 7-3.

The existing capacity of the Honouliuli WWTP is 25 mgd. The existing flow is approximately 21 mgd. The effluent outfall capacity is 112 mgd. The ultimate capacity of the WWTP is 51 mgd. A planned expansion to 38 mgd is anticipated in 1993.

The Ko'Olina development has plans to construct an interceptor from the Ko'Olina development to the Honouliuli WWTP. The interceptor is to be constructed in two increments. The first increment extends from the Ko'Olina development to the intersection of Fort Barrette Road and Renton Road, where it connects to the existing Makakilo interceptor. The first increment will be upgraded to accommodate flows from the Secondary Urban Center (SUC). First phase development of Kapolei Village and the SUC will be connected to the Makakilo interceptor to take advantage of the unused capacity of the Makakilo interceptor.

The second increment of the interceptor will be an extension of the first increment from Fort Barratte Road to the Honouliuli WWTP. The second increment will be constructed when the capacity of the Makakilo interceptor is reached. Connection between the first increment of the interceptor will be severed and all flows from the first increment will be diverted from the Makakilo interceptor to the new interceptor. The second increment of the interceptor must be upgraded to accommodate flows generated from Kapolei Village.



Kapolei Village
WASTEWATER
 Ewa, Oahu, Hawaii



0' 1000'

Figure:
 7-3

The first increment of the interceptor is to be constructed in the near future and construction of the second increment is anticipated in 1990.

7.4 SOLID WASTE

Solid waste disposal services for residential areas near the project site are currently provided by the City and County of Honolulu, Division of Refuse. Non-residential disposal services are provided by private refuse collection companies. Solid wastes are disposed of either at the Palailai Landfill or the Waipahu Incinerator.

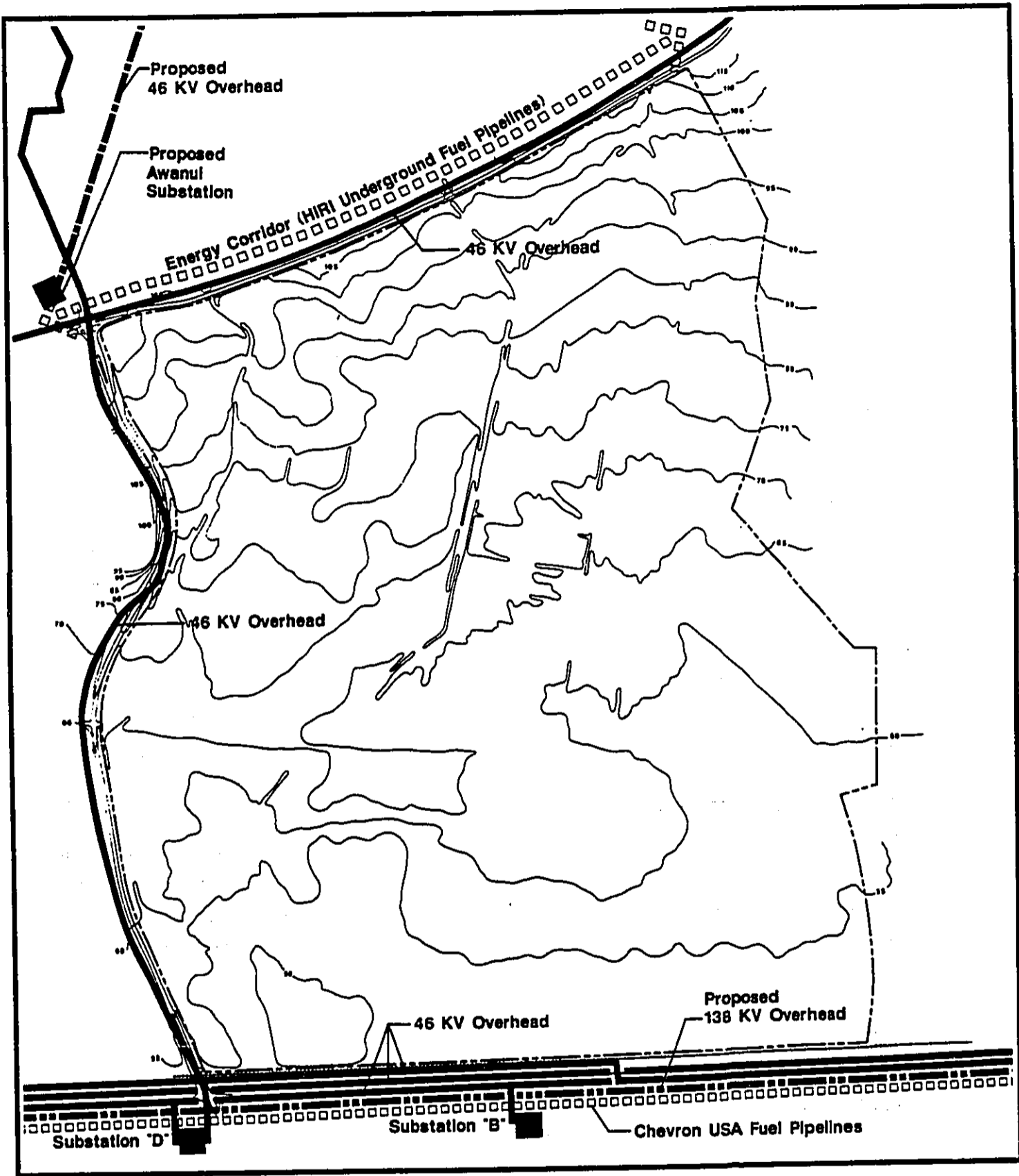
7.5 STORM DRAINAGE

There is no existing drainage system on the project site. Storm runoff from the area above Farrington Highway is presently conveyed through three culverts crossing Farrington Highway to the project site. The runoff passes through the project site via cane field ditches to NAS BARPT. Some of the runoff enters a large coral pit located in NAS BARPT, while some runoff flows through NAS BARPT.

The "Ewa Drainage Study" provides detailed information on the existing drainage conditions and proposed drainage improvements for the Kapolei Village development and the SUC.

7.6 POWER AND COMMUNICATIONS

Electrical power for the project site and vicinity is provided by the Hawaiian Electric Company (HECO). Overhead lines (46 KV) lie within the 100-foot ROW south of the project site paralleling the NAS BARPT boundary. Other 46 KV overhead lines run along Barbers Point Access Road and Farrington Highway. HECO has designated the 100-foot ROW, south of the project site, as a possible corridor for a proposed 138 KV overhead line extending from the Waiiau Power Plant. An alternate corridor for this major transmission facility is located along Farrington Highway. HECO has also proposed a 46 KV overhead line and substation (Awanui Substation) to be sited next to the proposed Makakilo Shopping Center, adjacent to the northwestern corner of the project site (Figure 7-4).



Kapolei Village
POWER
 Ewa, Oahu, Hawaii



0' 1000'

Figure:
 7-4

Both Chevron USA and Hawaiian Independent Refineries, Inc., (HIRI) maintain petroleum pipelines in the project area. Chevron USA maintains two petroleum pipelines: an 8-inch "black oil" line along the southern border of the project site, and a "light oil" line along the 40-foot OR&L ROW. HIRI maintains an energy corridor located north of Farrington Highway, extending from their refinery facilities at Barbers Point to the Honolulu International Airport and Downtown Honolulu Terminal facilities.

Hawaiian Telephone Company maintains telecommunications facilities in the project area at Makakilo, NAS BARPT and the Honokai Hale Subdivision. A new switching facility will be required to accommodate additional loads created by Kapolei Village and other proposed developments in the area.

7.7 FIRE AND POLICE SERVICE

Fire services to the project area are provided from the Makakilo Station, which houses an engine company and five firefighters. Additional City Fire Department units are available from the Waipahu and Nanakuli units.

Police service to the Ewa area is provided from the Pearl City Station, which is staffed by 161 police officers. The Pearl City Station patrols three districts: Waianae Coast; Waipahu/Ewa Beach; and Aiea/Pearl City.

7.8 MEDICAL FACILITIES

Health care facilities for the area are provided by the Waipahu Clinic with a staff of 70 doctors, nurses, and aides. The service area for the clinic extends from Waipahu to Waianae offering a variety of health services. The nearest hospital emergency services are provided at the Moanalua Kaiser Medical Center.

7.9 SCHOOLS

Schools within the vicinity of the project area include Barbers Point, Makakilo, Maukalani, and Ewa Beach Elementary Schools, Ilima Intermediate School, and Campbell High School.

7.10 RECREATION FACILITIES

Existing recreation facilities near the project site include neighborhood parks located in Ewa Beach and Makakilo, beach parks located in Ewa Beach and NAS BARPT, and a golf course located on the eastern border of NAS BARPT. At present, a shortage of recreational facilities exists in the Makakilo area where participants must use Ewa Beach facilities for many sports activities.

SECTION 8

SUMMARY OF IMPACTS AND MITIGATION MEASURES

SECTION 8

SUMMARY OF IMPACTS AND MITIGATION MEASURES

8.1 AGRICULTURAL IMPACTS

Impacts on agriculture were studied by Decision Analysts Hawaii, Inc., in November 1987. A summary of findings is presented below with the complete study presented in Appendix F.

At present, the entire project site is used for sugar cultivation by the Oahu Sugar Company (OSCo). OSCo currently manages approximately 14,200 acres of plantation land covering portions of Central Oahu, north of Pearl Harbor, and portions of the Ewa Plain, west of Pearl Harbor. Nearly all of the plantation land is leased, primarily from the Estate of James Campbell and Robinson Estate. Land leases from the Estate of James Campbell are scheduled to expire in 1995, with leases of the Robinson Estate expiring one year later. Both leases allow for partial withdrawal of lands for urbanization. Development of the project site will result in a decrease of approximately 830 acres of available cane lands.

Loss of agricultural land, in terms of Agricultural Lands of Importance to the State of Hawaii (ALISH), include approximately 591 acres of "Prime" agricultural land and approximately 209 acres of "Other Important" agricultural land. The remaining 30 acres include areas of coral outcrop not classified under the ALISH system.

The development of Kapolei Village would not adversely affect the economic viability of OSCo, nor would it require layoffs of sugar workers. This assumes the continuation of historic development rates for housing projects - rates which would allow sufficient time to increase yields and thereby partially or completely compensate for the reduced acreage with little or no loss in production. Reductions in employment would occur through retirement and voluntary movement to other jobs. Over the long term, OSCo could accommodate a major reduction in acreage and maintain economies of scale by operating just one mill, rather than two in parallel.

The development of Kapolei Village on sugarcane acreage would eliminate the possibility of using these lands for diversified agriculture. However, it is extremely doubtful that this would adversely affect the growth of diversified agriculture in Hawaii. There are four reasons for this assessment: (1) an extensive amount of prime-agricultural land and water has been freed from sugar and pineapple production because of past mill closings and reductions in operations; (2) a very real possibility exists that additional land and water will be freed from sugar production given the outlook for low sugar prices; (3) some - if not most or even all - of the sugar operations will make their lands available for profitable replacement crops to the extent that such crops are available; and (4) compared to the available supply a very small amount of land and water is required to grow proven and promising crops to achieve a realistic level of food and animal-feed self-sufficiency, and to increase exports. The increasing availability of prime agricultural land in Hawaii is part of very long-term and accelerating trends occurring throughout most developed and developing market economies. Productivity and yields have been increasing faster than population growth, and genetic engineering and other advances, combined with slower population growth, indicate an acceleration of these trends. Rapid productivity and yield increases require that labor, land, and other resources be withdrawn from agriculture in order to restore balanced markets and to increase farm income for those who remain.

8.2 AIR QUALITY

The principal source of short term air quality impacts will be from construction activities. Construction vehicle activity will increase concentrations of pollutants in the vicinity of the project site. Because there are no residents in the vicinity of the project, no public health risks are involved. As the project is developed, increased vehicular traffic resulting from the development will be a major contributor to air pollutants. Short term impacts from construction activities (e.g., fugitive dust) are proposed to be controlled by enforcement of Department of Health regulations.

Long term impacts to air quality resulting from increased vehicular traffic will be offset to some degree by the automotive industry compliance with EPA emission requirements. Other mitigative measures such as improved road facilities in the vicinity of the project, proposed ride sharing, and reduced travel demands will help mitigate direct impacts from increased carbon monoxide emissions. Other long term impacts include increased sulfur dioxide emission resulting from increased electrical demand.

The types of measures that have been incorporated into the plan to help reduce the predicted adverse air quality impacts include:

- additional highway improvements to increase capacity
- development of a mass transit system
- encouraging car pooling
- establishment of more jobs in Ewa

Additional adverse impacts on air quality will result from cane burning operations of nearby sugarcane fields. With phased development of the proposed project, a growing number of residents will be affected by the air pollution from cane fires. The impact on air quality from cane fires is expected to last until termination of sugarcane cultivation in the project vicinity. As an interim measure, prospective residents of the development will be advised of this potential health hazard.

8.3 TRAFFIC CONDITIONS

The following is a summary of Appendix B, Traffic Impact Study conducted by Parsons, Brinckerhoff, Quade and Douglas, Inc. Traffic impacts are projected at full project development.

The proposed project will increase traffic on the existing and proposed roadways in the area of the project. Projected traffic volumes for intersections resulting from development of Kapolei Village include the following:

<u>Signalized Intersection</u>	PEAK HOUR	
	A.M. (vph)	P.M. (vph)
Barbers Point/Farrington	1386	1266
Barbers Point/Road "A"	1150	1199
Barbers Point/Ewa Parkway	1129	1302
Ewa Parkway/West Loop	1100	1234
Ewa Parkway/East Loop	1357	1283
Farrington/Village Parkway	1585	1238
Village Parkway/Loop Road	1595	1349
West Loop/Road "A"	920	774

NOTES: vph - vehicles per hour
0-1200 = under capacity
1201-1400 = near capacity
greater than 1400 = over capacity

The Kapolei Village Master Plan proposes signalization at the following intersections: Barbers Point Access Road/Road "A," Barbers Point Access Road/Ewa Parkway and Farrington Highway/Village Parkway. Signalization of the major intersections of Ewa Parkway/West Loop Road, Ewa Parkway/East Loop Road, East (West) Loop Road/Village Parkway and West Loop Road/Road "A" would also be justified at full development using the Manual of Uniform Traffic Control Devices Warrant 11 for peak hour volumes.

The following recommendations apply to the roadway system for Kapolei Village.

- A. Provisions for traffic signals should be included during construction at the following intersections: Village Parkway/East (West) Road, West Loop Road/Ewa Parkway, East Loop Road/Ewa Parkway and West Loop Road/Road "A." Traffic volumes at these intersections need to be monitored and signalization should be provided when necessary and warranted.
- B. Farrington Highway should be widened to include two lanes in each direction from Barbers Point Access Road to the Access 1 intersection.

- C. The Farrington Highway approach for Access 1 should include a deceleration lane for right turns and a left turn lane for turns onto the Access Road. Separate lanes for left and right turns should be provided from the Access Road.

Regional recommendations for traffic mitigation include the following:

- A. The intersection of the west bound off-ramp from H-1 Freeway with Makakilo Drive should be signalized. The off-ramp approach should be widened to include two left turn lanes for southbound traffic and a right turn lane for northbound traffic. Makakilo Drive should be restriped to include four through lanes on the south bound approach and two through lanes on the north bound approach of this intersection. Analysis of this signalized intersection shows that it will be near capacity during the A.M. peak hour and under capacity during the P.M. peak hour.
- B. The east bound on-ramp for traffic from the south should be extended to enter the freeway separately from the east bound loop on-ramp from the north.
- C. The High Occupancy Vehicle (HOV) designation of the center lanes on the H-1 Freeway should be reviewed; west bound traffic volumes in the A.M. peak period and east bound volumes in the P.M. peak period would each require three lanes. Improved access to the HOV lane from the local streets should be considered in view of the high traffic volumes on the freeway.

Additionally, a proposed rapid transit system is currently being planned to extend as far as the Waiawa Interchange between H-1 and H-2. If the proposed system is built, a major train and bus terminal, along with park-and-ride facilities could be built at the Ewa Navy Drum Storage Area site. From there, frequent feeder

bus service could be provided to Kapolei Village. Also under consideration is the possibility of extending the guideway to Kapolei Village when population growth warrants.

8.4 SOCIO-ECONOMIC IMPACTS

The Ewa Development Plan area is planned to undergo a rapid growth cycle over the next twenty-year period as it becomes Oahu's Secondary Urban Center. City and County of Honolulu population projections indicate the Ewa Development Plan Area population is expected to increase from approximately 36,000 in 1980 to 83,000 by the year 2005.

New housing development at the project site will add to the population of the Ewa development plan area. Estimating the size of project population depends upon assumptions about the average household size of future residents.

For single-family housing, the Department of General Planning assumes 3.3 persons per unit in assessing population impacts. This figure may be somewhat high, as household sizes in Ewa and Central Oahu, as reported by developers, tend to show smaller families. At Mililani, 3.03 persons per unit were reported for single-family homes priced between \$115,000 to \$164,000 (John Child & Co., 1987). Therefore, the population impact is calculated using 3.0 persons per unit as the lower range of single-family units and 3.3 persons per unit as the upper range.

Utilizing these averages and a maximum 5,000 units for Kapolei Village, it is projected that the project will produce a maximum increase in population of 15,000 to 16,500 persons.

Corresponding to growth of the Secondary Urban Center are increased local employment opportunities. The Secondary Urban Center is planned to provide balanced growth with a full complement of facilities and services to encourage business. Areas of concentrated employment opportunities include

the James Campbell Industrial Park, the Ko'Olina Resort and the proposed Kapolei Town Center located immediately west of the proposed Kapolei Village site.

Kapolei Village will provide local employment opportunities for proposed commercial sites. The proposed project contains approximately 480,000 square feet of commercial area. Assuming one-third of that area is used for commercial building space (160,000 square feet) and by using an island-wide average of one employee per 250 square feet of commercial space, 640 jobs will be created by the development. Additional jobs will be available in staffing schools and recreational facilities.

The master plan of Kapolei Village is designed with 3,722 single-family units, 283 multi-family units, 173 assisted units, 255 rental units, and 438 elderly units.

Kapolei Village, as well as neighboring communities, would provide increased housing opportunities, especially for median to low income families. An innovative design concept of Kapolei Village is to provide a mixture of housing types including affordable units (elderly, gap-group and assisted), 60 percent of the total housing stock and market units (sold at market values), 40 percent of the total housing stock.

8.5 NOISE

Noise impacts generated from future traffic within the project site are expected to be relatively minor as development occurs. Although a significant increase in noise levels is expected with the overall development of the Secondary Urban Center, it is anticipated that noise levels within Kapolei Village will remain at acceptable levels.

To effectively minimize noise impacts generated from automobiles, the proposed project will use perimeter walls around the project site. By implementing sound attenuation walls, earth berms and vegetation between housing units and roadways, traffic noise, as well as dust and visual disruption will be reduced.

Noise generated from cane haul trucks during harvesting of sugarcane will impact initial development of Kapolei Village. However, due to the anticipated withdrawal of sugarcane operations at project build-out, no long term impacts will result. Mitigation to alleviate noise impacts during initial phases of project development include a sound attenuation wall bordering the cane haul road passing through the site and advance notification to buyers concerning noise from sugarcane operations.

Adverse impacts resulting from different land uses within the project site are not expected to occur. Design of the proposed project incorporates the use of landscaping features and land buffers between different land use types to effectively screen or diminish noise impacts. Additionally, architecture of the proposed project will maximize noise containment between structures. Noise generated by construction activities will be in compliance with Title 11, Administrative Rules, Chapter 43. Construction activities that may exceed the allowable noise levels will require variances sought from Chapter 43.

Noise and safety impacts of flight operations from the adjacent NAS BARPT on the project area and environs have been the subject of a number of studies. The U.S. Navy prepared an Air Installations Compatible Use Zone (AICUZ) Study (1984) which established off-station noise contours and safety zones.

The AICUZ identifies significant noise impacts to the project site. A "noise arm" of 65 Ldn and above crosses the top portion of the site following Flight Tracks 7/11. Approximately 11 percent of the site lies within the 65 Ldn+ Zone. Another 56 percent lies within the 60 Ldn to 65 Ldn contours with the balance of 33 percent lying within an area below 60 Ldn.

Accident Potential Zones (APZ) are areas under aircraft flight paths which have a higher than normal potential for aircraft accidents. The three zones of accident potential used in the NAS BARPT AICUZ include: (1) clear zones, the first 3,000 feet of the trapezoidal approach/departure zone at

each end of the runway representing the area of highest potential hazards; (2) APZ I, a 5,000-foot long by 3,000-foot wide zone beyond the clear zone representing lesser hazard potential than the clear zone; and (3) APZ II, a 7,000-foot long by 3,000-foot wide zone beyond the APZ I representing areas less hazardous than the APZ I. Approximately 108 acres of the site was identified to lie within APZ II. An additional one-third acre of the site at the extreme southeast corner lies within the APZ I zone. None of the site lies within the clear zone.

Subsequent studies done by the Estate of James Campbell and the HFDC have questioned many of the findings of the U.S. Navy AICUZ report. These questions relate to the magnitude and extent of off-station noise and safety zones.

The 1984/85 Campbell Estate studies contend that the use of 365-day averaging and the correction of jet fighter/trainer and civilian aircraft flight operations would eliminate the 65 Ldn noise arm crossing the project site and reduce aircraft noise levels below 60 Ldn over 90 percent of the site. The Estate's studies further contend that the potential for accidents at NAS BARPT is such that it does not meet the basic definition for APZ's found in Navy regulations as there is no supporting rationale for applying an APZ to the Runway 4L departure path. The vast majority of fixed wing operations at the air station are accomplished by large, four-engined aircraft that are among the safest in the Navy's inventory.

In December 1986, the Hawaii Housing Authority commissioned Darby & Associates, Acoustical Engineers, to "objectively review and comment on those portions of the (Navy AICUZ study and subsequent Campbell Estate Studies) and data pertaining to aircraft noise impact on the proposed Kapolei Village site." The principal findings of the noise study support some of the findings of previous Campbell Estate studies. Major points discussed in their report are:

- Civilian aircraft noise levels used in the 1984 AICUZ study appear unreasonably large;
- The high noise levels for jet aircraft operations (reported in the 1984 AICUZ study) over the HHA project site appear to be overstated; and
- A 365-day averaging should be used in order to be consistent with other long term noise impacts analyses.

The result of the analysis indicates that "there should not be sufficient aircraft noise impact to place constraints on residential housing within the project site according to local and Federal guidelines."

In light of the apparent controversy between the U.S. Navy and others over noise and safety impacts, a conservative approach, using the AICUZ study, has been taken within the design of Kapolei Village. No residential land uses are sited within the hypothetical 65 Ldn "noise arm" traversing across the northern portion of the project site. Uses within this noise arm include the golf course, a church site, a commercial site, and a Park-and-Ride facility. Land use lying within the APZ I and APZ II include only golf course and drainage right-of-ways.

8.6 TOPOGRAPHY AND SOILS

Impacts occurring on the physical terrain from development of the project site are expected to be minimal. Because the existing site is relatively flat, relatively little grading will be required. Prior to site preparation, it will be necessary to strip existing vegetation. To minimize soil erosion during the construction process, erosion control measures will be designed and implemented during the construction phasing in accordance with City and County regulations.

Generally, most of the soil is considered low to moderately expansive. Local soft zones in the clay were encountered beneath drainage ditches, irrigation trenches and in areas where water leaked from irrigation hoses.

Easy excavation and conventional site grading procedures are anticipated for earth work in these areas. Soils that are moderately expansive could require special procedures for house foundation design, such as deep footings, subgrade saturation or capping with non-expansive soils.

8.7 FLORA AND FAUNA

No rare, threatened or endangered plant species (as defined by the State and Federal Governments) have been found to exist on the project site. The proposed project is not expected to have significant impact on flora as the site consists primarily of cultivated lands. The few native plant species which are found in the vicinity of the project site are of little botanical interest.

There are no rare, threatened or endangered vertebrate animal species known to exist on the project site. Because there are no ponds on the site, no native waterbirds have been observed. There are also no significant wooded areas on the project site and the site does not provide suitable nesting and roosting areas.

Introduced bird species, especially those compatible with man such as the common myna and house sparrow, are expected to increase in numbers when the project is completed as it will provide additional habitats (trees, grassy areas, etc.).

8.8 WATER

The total average water demand for the development is estimated at 2.8 mgd. According to the BWS, the proposed development will be serviced from the existing 30-inch main along Farrington Highway originating from existing BWS wells in Waipahu. As development occurs, a second 30-inch transmission line will be added along Farrington Highway parallel to the existing main. A new 5.0 mg water tank located in Honouliuli is planned to provide future service to the project site via the Honouliuli Booster Station. When existing storage is exceeded, a reservoir located north of the project site will be required for additional storage capacity.

These proposed facilities are planned to adequately serve Kapolei Village, as well as neighboring developments. With approval and implementation of these proposed facilities, no adverse impacts are anticipated either for the immediate project site or regionally. Approval of the water system for Kapolei Village is required by the BWS.

8.9 SEWER

The average daily sewer flow generated by the development is projected at 2.1 mgd. Sewage generated by the project site is to be conveyed via the West Beach interceptor sewer to the Honouliuli Wastewater Treatment Plant (WWTP) for treatment and disposal. Proposed off-site improvements, including upgrading the West Beach interceptor from Barbers Point Access Road to the Honouliuli WWTP to accommodate flows from Kapolei Village.

Additionally, the Honouliuli WWTP is scheduled for expansion to accommodate new development in the Ewa District. Currently, the WWTP processes 21 mgd. Current capacity of the WWTP is 25 mgd. With expansion of the facility to be completed in 1993, expected capacity is 38 mgd which is projected to accommodate all development in the Ewa District.

The sewer system will be adequate to serve the proposed development. The sewer system will be designed in accordance with the Division of Wastewater Management, City and County of Honolulu, and the Department of Health, State of Hawaii.

8.10 DRAINAGE

At present, the project site contains no drainage system and storm runoff passes through the project site via cane field ditches. Development of the project site will include an effective drainage system, diverting storm runoff via underground box culverts and open channels to a detention basin (which utilizes the golf course area).

The detention basin will serve to attenuate the downstream peak flow rates by providing temporary storage of the runoff. The basin is sized to hold a

volume of runoff equivalent to the additional amount generated as a result of the project. The detained runoff will be released at a controlled rate after the storm subsides. A small culvert at the exit will be able to pass everyday low flows.

Runoff generated off-site will be directed around the development to the NAS BARPT coral pit for disposal by infiltration and evaporation. Estimated peak flow to the coral pit after development is 2,430 cubic feet per second (cfs). The only improvement to the off-site drainage system is upgrading the drainage swale north of Farrington Highway to prevent overflowing onto Farrington Highway during a 100-year storm.

Drainage improvements implemented within the project development, as well as other neighboring developments, will have a positive impact on NAS BARPT since runoff presently sheet flows into the base.

It is anticipated that the constituent quality of runoff from the project site will change. As development occurs, runoff could contain a decrease in nitrogen and suspended solids and an increase in phosphorus.

8.11 SOLID WASTE

Currently, solid waste for the region is disposed of at the Palailai and Waianae Landfills. Both of these landfill sites are expected to close in mid 1988 and are not expected to provide refuse disposal services for the proposed Kapolei Village. However, a new landfill site is currently under construction at Waimanalo Gulch and is expected to open as the other two landfill sites close. Additionally, a Garbage-to-Energy H-POWER facility, located in the James Campbell Industrial Park is scheduled to become operational in late 1990.

8.12 POWER AND COMMUNICATIONS

No adverse impacts resulting from off-site and on-site improvements are anticipated. Proposed off-site power and communication requirements include a telephone switching station to serve the proposed Kapolei Town

Center and the project site, and an electrical substation when existing power capacities are exceeded. Proposed on-site power and communications improvements consist of electrical and telephone conduits provided along the major roadways. The system also includes street lights and hand holes. Electrical and telephone systems will be underground within the development.

SECTION 9

**IRREVERSIBLE/IRRETRIEVABLE COMMITMENTS OF RESOURCES,
AND THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF
THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT
OF LONG-TERM PRODUCTIVITY**

SECTION 9

IRREVERSIBLE/IRRETRIEVABLE COMMITMENTS OF RESOURCES
AND THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE
ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

9.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of Kapolei Village will involve the irretrievable loss of certain environmental and fiscal resources. However, the costs associated with the use of these resources should be evaluated in light of recurring benefits to the residents of the region, State of Hawaii and the City and County of Honolulu.

It is anticipated that the construction of the proposed project will commit the necessary construction materials and human resources (in the form of planning, designing, engineering, construction labor, landscaping, and personnel for the sales, management, services offices, and maintenance functions). Reuse for much of these materials and resources is not practicable. Although labor is compensated during the various stages of development, labor expended for project development is non-retrievable.

Air and noise quality will be adversely affected by the proposed development, but will remain in compliance with State standards. While ambient air and noise quality in the area is relatively good, the proposed development will result in a greater number of vehicles traveling to and from the project site, creating vehicular pollution emissions.

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

No short-term exploitation of resources resulting from development of the project site will have long-term adverse consequences. The appearance of the project site will be altered from its present open sugarcane environment to that of a completed planned residential community. The completed development will be visually integrated with the eventual surrounding environments of the Secondary Urban Center.

Long-term community gains resulting from development of the project include residential and commercial uses which will likely benefit future homeowners, the landowners, private businesses, and the State and County governments. As the property develops, its productivity in terms of generating tax revenues will increase. Income from property, personal, and excise taxes are expected to more than offset expenses associated with expanded public facilities and services to meet the requirements of the development and population growth.

SECTION 10

**LIST OF ORGANIZATIONS AND AGENCIES CONSULTED
AND LIST OF EIS PREPARERS**

SECTION 10
LIST OF ORGANIZATIONS AND AGENCIES CONSULTED
AND LIST OF EIS PREPARERS

10.1 PARTICIPANTS IN THE EIS PREPARATION PROCESS

A. Federal Agencies

- * Department of Agriculture, Soil and Conservation Service
- * Department of the Army, U.S. Army Engineer District, Honolulu
- * Department of the Navy, Naval Base Pearl Harbor
- * Department of the Interior, Fish and Wildlife Service
- * Department of Housing and Urban Development

B. State Agencies

- * Department of Accounting and General Services
- * Department of Agriculture
- * Department of Education
- * Department of Health
- * Department of Land and Natural Resources
- * Department of Business and Economic Development
- * Department of Transportation
- * Office of Environmental Quality Control
- * Land Use Commission
- * Environmental Center

C. County Agencies and Boards

- * Department of General Planning
- * Department of Housing and Community Development
- * Department of Land Utilization
- * Department of Parks and Recreation
- * Department of Public Works
- * Board of Water Supply
- * Fire Department
- * Police Department

D. Public Utilities

* Hawaiian Electric Company

E. Neighborhood Boards, Community Associations

* Sunset Beach Rezoning Committee

10.2 LIST OF EIS PREPARERS

R. M. Towill Corporation	Bruce T. Tsuchida, Project Manager Chester Koga, EIS Coordinator Cary Brockman, Technical Writer
Darby & Associates	Ron Darby, Principal
Parsons, Brinckerhoff, Quade and Douglas, Inc.	Julian Ng, Traffic Engineer
Char & Associates	Winona Char, Principal
Paul H. Rosendahl, Ph.D., Inc.	Paul H. Rosendahl, Principal
Decision Analysts, Hawaii	Bruce Plasch, Principal
J. W. Morrow, Environmental Management Consultant	J. W. Morrow, Principal

**COMMENTS AND RESPONSES
FOR THE
EIS PREPARATION NOTICE**



DEPARTMENT OF THE ARMY
 U. S. ARMY ENGINEER DISTRICT, HONOLULU
 BUILDING 230
 FT. SHAFTER, HAWAII 96830-5440

REPLY TO: J 11 31 September 17, 1987
 ATTENTION:

Mr. Russell N. Fukumoto, Executive Director
 Department of Business and Economic Development
 P.O. Box 17987
 ATTN: Housing Finance and Development Corporation
 Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice for the Kapolei Village Master Plan, Ewa, Oahu, Hawaii. The following comments are provided for your information.

- a. A Department of the Army Permit pursuant to Section 484 of the Clean Water Act is not required for this project.
- b. The project area is not located in an area which has been designated as a flood zone.

Sincerely,

C. Cheung
 Kisek Cheung
 Chief, Engineering Division

OSM 1000 10-88

Suspense

No.	ED	AD	SA	ENV	ENG	WHS	ILA	PLN	IP	HCC	HWK	DET	LEGAL	PER	PLN
1															

FILE: 87-02476743

87DEV/4502

October 21, 1987

Mr. Kisek Cheung, Chief
 Engineering Division
 Department of the Army
 Building 230
 Ft. Shafter, Hawaii 96830-5440
 Dear Mr. Cheung:

SUBJECT: Environmental Impact Statement
Kapolei Village Master Plan
Ewa, Oahu

Thank you for your comments of 17 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraquchi, Project Coordinator at 848-3240.

Sincerely,

ORIGINAL SIGNED BY

RUSSELL N. FUKUMOTO
 Acting Executive Director

REP:LRV



RECEIVED
U.S. DEPARTMENT OF THE INTERIOR
HAZARD AND WILDLIFE SERVICE
AUTHORITY
SEP 29 3 08 PM '87

U.S. DEPARTMENT OF THE INTERIOR
 HAZARD AND WILDLIFE SERVICE
 300 ALA MOANA BOULEVARD
 P. O. BOX 50167
 HONOLULU, HAWAII 96850

Mr. Lloyd Haraguchi, Project Coordinator
 Development Branch
 Housing Finance and Development Corporation
 1002 North School Street
 Honolulu, Hawaii 96817

Re: Environmental Impact Statement Preparation Notice, Kapolei
 Village Master Plan, Ewa, Oahu

Dear Mr. Haraguchi:

We have reviewed the referenced Preparation Notice, and have no
 comments to offer at this time.

We appreciate this opportunity to comment.

Sincerely yours,

Kathleen R. Jones
 Kathleen R. Jones
 Field Supervisor, Environmental Services
 Pacific Islands Office

DOSH USE ONLY

Suspense

No.	ID	Sub	Cont	Act
1	AD			M/G
2	AD			
3	SA			
4	EXEM			
5	DET			
6	ENC			
7	INS			
8	ISA			
9	ISLP			
10	NER			
11	IP			
12	NEC			
13	INCEI			
14	INTE			
15	LICAL			
16	RES			
17	PLAC			

FILE # 87-297-6872

8718EV/4511

October 21, 1987

Mr. Ernest Koseka, Field Supervisor
 Fish and Wildlife Service
 U.S. Department of the Interior
 P. O. Box 50167
 Honolulu, Hawaii 96850

Dear Mr. Koseka:

SUBJECT: Environmental Impact Statement,
Kapolei Village, Master Plan,
Ewa, Oahu

Thank you for your comments of 29 September 1987. The Draft
 Environmental Impact Statement for the above named project
 is in preparation and when the document is finalized, we
 will forward a copy to you for review.

Should you have any questions or additional comments and
 suggestions, please direct them to Mr. Lloyd Haraguchi,
 Project Coordinator at 848-3240.

Sincerely,

ORIGINAL SIGNED BY

RUSSELL N. FUKUMOTO
 Acting Executive Director

RNF:LHIVT

DEVELOPMENT COPY



RECEIVED
HAWAIIAN HOUSING
AUTHORITY

SEP 30 3 03 PM '87

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Honolulu Office, Region IX
300 Ala Moana Blvd., Room 3318, Box 50007
Honolulu, Hawaii 96850-4851

future land uses in the area will generate noise levels in excess of 60 and 65 LDN. Particular attention should be given to the Barbers Point Access Road and Village Parkway.

2. Aquifer

The project's potential impact on the sustainable yield of the Pearl Harbor Aquifer should be discussed.

3. Sewage Disposal

The project's potential impact on the capacity of the Honolulu Sewer Treatment Plant should also be discussed.

4. Historic Preservation

If HUD assistance is anticipated for any project abutting the OR and L Right-of-way compliance with Section 106 of the National Historic Preservation Act of 1966 will be required.

It should be noted that HUD will not require the preparation of an EIS if use of HUD programs are proposed.

If you have any questions, you may call Frank Johnson at 541-1326.

Very Sincerely yours,

Carole-Lux
Carole-Lux
Director
Community Planning and
Development Division

Enclosure

cc: D. James

September 28, 1987

Mr. Lloyd Haraguchi
Project Coordinator
Development Branch
Housing Finance and Development
Corporation
1002 North School Street
Honolulu, HI 96817

Dear Mr. Haraguchi:

SUBJECT: Environmental Impact Statement
Preparation Notice for the Proposed
Kapolei Village Master Plan,
Ewa, Oahu, Hawaii

This responds to your invitation for review and comments on the subject project that consists of 850 acres that will provide for 4006 residential units, a golf course and other recreational facilities, schools, commercial and other land uses. The project is located in the Ewa district and is consistent with the City and County of Honolulu's general plan for the area.

We have identified the following concerns that should be addressed in the EIS:

1. Impact of MAS Barbers Point and Vehicular Traffic.

a. Noise/Accident Potential Zones

Noise will be generated by aircraft operations at the MAS Barbers Point. The Air Installation Compatible Use Zone (AICUZ) study dated January 16, 1985 documents both the noise levels and extent of Accident Potential Zones created by aircraft operation.

b. Vehicular Traffic

Traffic studies should be made to determine if vehicular traffic, both auto and truck generated by existing and

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Honolulu Office, Region IX
300 Ala Moana Blvd., Room 3318, Box 50007
Honolulu, Hawaii 96850-4851

87:DRV/4518

October 21, 1987

Mr. Calvin Lew, Director
U.S. Department of Housing and Urban Development
P. O. Box 50007
Honolulu, Hawaii 96850

Dear Mr. Lew:

SUBJECT: Environmental Impact Statement,
Kapolei Village Master Plan,
Ewa, Oahu

Thank you for your comments of 28 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review.

As part of the Master Plan and FIS study process we will be conducting special studies to ascertain the noise and traffic impacts on the project. Special attention has been placed on the impacts from aircraft noise and accident potential zones. The findings and recommendations from these studies will be incorporated into the Draft EIS.

Utilities system demand and capacity of the project are also being studied as part of the master planning. The findings of these studies will be incorporated into the Draft EIS.

The current plans for the project provides for the protection of the Oahu Railway right-of-way by the inclusion of a 40 feet setback along the right-of-way.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haseguchi, Project Coordinator at 848-3240.

Sincerely,

ORIGINAL SIGNED BY
RUSSELL N. FURUKO
Acting Executive Director

RRF:LHVt

JON W. WAHNEE
GOVERNOR



SUZANNE D. PETERSON
CHAIRPERSON, BOARD OF AGRICULTURE
TADASHI TOJO
DEPUTY TO THE CHAIRPERSON

Mr. Russell N. Fukumoto
September 25, 1987
Page -2-

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512
September 25, 1987

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

MEMORANDUM

To: Mr. Russell N. Fukumoto, Executive Director
Housing Finance and Development Corporation
Department of Business and Economic Development

Subject: Environmental Impact Statement Preparation Notice
(EISPN) for Kapolei Village Master Plan
THK: 9-1-16; 23 and por. 25 Ewa, Oahu
Area: 850 acres

The Department of Agriculture has reviewed the subject
EISPN and offers the following comments.

According to the EISPN, the Housing Finance and Development
Corporation (HFDC) is seeking to develop a planned residential
community of about 4,000 housing units on the subject property.
The proposed project is on the eastern boundary of the proposed
Kapolei Town Center project.

The draft EIS should include discussion on the following
issues:

- The impact of the removal of productive lands from
sugarcane production on Oahu Sugar Company's economic
viability;
- A complete soils description with references to the
Agricultural Lands of Importance to the State of
Hawaii (ALISH) system, Land Study Bureau Overall
Productivity Rating system, and the Soil Conservation
Service Soil Survey which indicate the suitability of
agricultural use of the project site;
- The potential of establishing viable alternative
agricultural uses on the lands in the project site;
- Present source(s) of agricultural irrigation water at
the project site;

- The broader economic and resource impacts on the State
from the irrevocable loss of prime agricultural lands;
- Conformity to the State Agriculture Functional Plan
and its objectives and policies, particularly,
Implementing Action B(5)(c); and
- The relationship to the Hawaii State Plan Priority
guidelines 226-104(b)(2) and 226-106(1), which direct
development into marginal or non-essential
agricultural land to meet housing needs and
"...(maintain) agricultural lands of importance in the
agricultural district."

Thank you for the opportunity to comment. We will provide
further comment upon our receipt and review of the Draft
Environmental Impact Statement.

Suzanne D. Peterson

SUZANNE D. PETERSON
Chairperson, Board of Agriculture

cc: DBED
OEQC
Mr. William Balfour, President and General Manager, Oahu
Sugar Company

87:DEV/4517

October 21, 1987

The Honorable Suzanne D. Peterson,
Chairperson
Board of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Dear Chairperson Peterson:

SUBJECT: Environmental Impact Statement,
Kapolei Village Master Plan,
Ewa, Oahu

Thank you for your comments of 25 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to your office for review. As part of the EIS preparation process we are conducting a special study to assess the impact of this development on the Oahu Sugar Company and sugar production in general, as well as the viability of alternative agricultural ventures in the area.

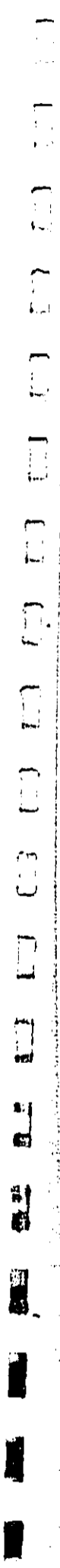
While we are responsible for the protection of agricultural lands, we are also charged with the responsibility of providing affordable homes for our citizens. We believe that a balance between agricultural needs and the need for affordable housing is necessary. We believe that the Kapolei Village project will provide for an orderly transition between the current agricultural uses to a planned residential community.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraquchi, Project Coordinator at 848-3240.

Sincerely,
ORIGINAL SIGNED BY

RUSSELL N. FUKUMOTO
Acting Executive Director

RP:LH:vt



RECEIVED
FROM THE
BOARD FROM 11/10/80



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3278
HONOLULU, HAWAII 96817

JOHN G. LITTLE, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3278
HONOLULU, HAWAII 96817

October 20, 1987

Mr. Russell N. Fukumoto
Executive Director
Housing Finance and Development Corporation
Department of Business and Economic Development
State of Hawaii
P. O. Box 17907
Honolulu, HI 96817

Dear Mr. Fukumoto:

Subject: Environmental Impact Statement Preparation Notices (EISP/N)
for the Proposed Kapolei Village Master Plan, Ewa, Oahu, Hawaii

Thank you for the opportunity to comment on the subject document. We provide the following comments:

Drinking Water Program

The Kapolei Village EISP/N identifies the fact that the project will involve the development of new sources of water to support the project. Please be advised that the development of new sources of potable water intended to serve new or existing public water systems are subject to requirements as identified under the Administrative Rules, Title 11, Chapter 20, Section 11-20-29. Briefly, these regulations require that all such new sources be approved by the Director of Health prior to their use to serve potable water. Such approval is based primarily upon the submission of a preliminary engineering report which satisfactorily addresses all concerns as set down in Section 11-20-29. This report must be prepared by a registered professional engineer and bear their seal upon submittal.

In addition, the new distribution system will be subject to approval of the Director of Health as called for under Section 11-20-30 of Chapter 20. This requires that all new or substantially modified distribution systems be approved by the Director of Health. An exception to this case is provided for in cases of additions or modifications intended for dedication to the Board or Departments of Water or Water Supply and built to their specifications and under their review. In these cases, approval authority has been delegated to the county water supply agency. The ownership and operation of the system should be fully discussed in the environmental impact statement.

Vector Control Branch

This area will experience occasional mice infestation from the undeveloped Makakilo hillside areas where natural breeding sites occur. Rodent proofing of homes and other structures is a must as stipulated in the Department of Health regulations (Chapter 11-26-31, paragraphs a. & c.).

Noise and Radiation Branch/Noise Section

1. Noise problems are anticipated due to the integration of various land uses within the project location. In preparation of the environmental impact statement, these concerns must be addressed including mitigative measures to control such noise impacts.

- a. Noise from activities associated with commercial facilities can have an adverse effect on residents in the surrounding neighborhood. Increase in vehicular traffic, including heavy vehicles utilized for deliveries and vehicles within off-street parking areas, may also create noise impacts on adjacent residential communities.
- b. Noise from activities associated with the use of recreational facilities and parks can have adverse effects, in terms of annoyances, on residential areas. The proposed concept of siting residential units along the golf course may result in noise disturbances from ground maintenance and club activities.
- c. Plans should be initiated to locate areas discussed above away from adjacent residential communities. Areas utilized for such usage should be designed in such a way to minimize possible noise impact.

2. Through facility design, noise from equipment such as air conditioning/ventilation units, generators, compressors, pumps and exhaust fans must be attenuated to meet the allowable noise levels of the Administrative Rules, Title 11, Chapter 43, Community Noise Control for Oahu. Such designs must be especially directed toward building facilities in commercial areas.

3. Should the proposed development utilize residential lots within structures in close proximity to each other, these homes should be designed so as to maximize the containment of noise.

4. Noise emanating from activities associated with the proposed elementary, intermediate, and high schools may adversely affect adjacent residents.

5. Noise from religious activities associated with the proposed churches may create disturbances in terms of annoyances for neighboring residents. Plans to minimize the noise impact should be developed.

6. Noise emanating from vehicles on Farrington Highway, Fort Barette Road (Barbers Point Access Road), Renon Road, and the proposed Ewa Parkway, Village Parkway, East Loop, West Loop, and South Loop may have an adverse effect on residents adjacent to these roadways. Noise attenuation measures, such as berm and noise barriers, must be included in the project plans.

7. Aircraft noise from Barbers Point Naval Air Station and Honolulu International Airport may have adverse noise impacts on residents of the proposed project.

8. Construction activities must comply with the provisions of the Administrative Rules, Title 11, Chapter 43, Community Noise Control for Oahu.

a. The contractor must obtain a noise permit if the noise levels from the construction activities is expected to exceed the allowable levels of the regulations.

- b. Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers.
 - c. The contractor must comply with the conditional use of the permit as specified in the regulations and conditions issued with the permit.
9. Should there be any baseyard or stockpile areas located adjacent to residences of Barbers Point Naval Air Station, mitigative measures, such as barriers or berms, must be developed in the event that noise complaints are received.
10. Traffic noise from heavy vehicles travelling to and from the project site must be minimized in residential areas and must comply with the provisions of the Administrative Rules, Title II, Chapter 42, Vehicular Noise Control for Oahu.

Sincerely yours,

Bruce S. Anderson
 BRUCE S. ANDERSON, Ph.D.
 Deputy Director for
 Environmental Health

KS/rg

87:ENV/4847

November 9, 1987

The Honorable Dr. Bruce S. Anderson, Ph.D.
 Deputy Director for Environmental Health
 Department of Health
 P. O. Box 3378
 Honolulu, Hawaii 96813

Dear Dr. Anderson:

Subject: Environmental Impact Statement,
Maipoi Village Master Plan,
Hwa, Oahu

Thank you for your comments of October 20, 1987, the Draft Environmental Impact Statement for the above named project is being prepared. When the document is finalized, we will forward a copy to you for your review.

Thank you for comments relating to the drinking water program, vector control, and noise control and mitigation. We fully expect to be in compliance with all applicable state and county regulations.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 948-3240.

Sincerely,

MUSEKEL M. FUKUNOTO
 Acting Executive Director

RNF:LS/vt



WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
LIMEST. & LIMESTONE
DEPT.
AGRICULTURE DEVELOPMENT
INDUSTRIAL
CONSERVATION AND
RECREATION
CONSTRUCTION AND
CONSTRUCTION
LAND MANAGEMENT
PLANNING AND
DEVELOPMENT
WATER AND LAND DEVELOPMENT

Honorable Russell N. Fukumoto - 2 - DOC. NO.: 1581E

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 681
HONOLULU, HAWAII 96808

DOC. NO.: 1581E
FILE NO.: 88-119

OCT 21 1987

Honorable Russell N. Fukumoto
Executive Director
Department of Business and Economic Development
Housing Finance and Development Corporation
P.O. Box 17907
Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

SUBJECT: Environmental Impact Statement (EIS) Preparation
Notice, Kapolei Village Master Plan, Honolulu,
Iwa, Oahu
TRK: 9-1-16: 25

Thank you for the opportunity to review the preparation
notice cited above. We offer the following comments:

Aquatic Resources Concerns:

Since the proposed project site is distant from the sea (1.8
miles), direct impact to marine aquatic resource appears small.
However, any aquatic resource or use thereof that may exist in the
intermittent streams, should be documented and quantified in the
forthcoming EIS.

Historic Sites Concerns:

The project area has been under sugarcane cultivation for
many years, and we believe that all surface sites, except for the
railroad, have been destroyed by this cultivation. As noted in
the Preparation Notice, a heiau and rock shelter may have been
located on Puu Kapolei. Puu Kapolei is now military land and is
not within the subject parcel.

The Oahu Railroad and Land Company right-of-way, as noted in
the Preparation Document, forms the southern boundary of the
project area. This site is listed on the National Register of
Historic Places. The planners will need to coordinate with the
Historic Sites Section, Department of Transportation and the

Water and Land Development Concerns:

Providing water for the Kapolei project will become an
important issue, particularly because all ground water withdrawals
from the Pearl Harbor aquifer must be reviewed by, and be subject
to the permitting rules of, the Board of Land and Natural
Resources. Accordingly, the EIS should address the quantity and
source of water that would be required for this 850-acre
development.

Thank you for your consideration of our concerns.

Very truly yours,

WILLIAM W. PATY, Chairperson
Board of Land and Natural Resources

57,DEV/4846

November 9, 1987

The Honorable William Paty, Chairperson
Board of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: ENVIRONMENTAL IMPACT STATEMENT,
KAPOLEI VILLAGE MASTER PLAN,
EPA, OAHU

Thank you for your comments of October 21, 1987. The Draft Environmental Impact Statement for the above named project is being prepared. When the document is finalized, we will forward a copy to you for your review.

The intermittent streams that run through the project site are dry for most of the year. However, there are times when there are storms severe enough to cause runoff. Because of these conditions we do not anticipate any aquatic animals being affected.

A special study to identify and record the historic and cultural features of the site will be conducted as part of the EIS process. The findings will be published in the Draft EIS.

A water master plan is being prepared as part of the overall planning for this project. The water requirements for this project will be addressed in the Draft EIS.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haseguchi, Project Coordinator at 548-3240.

Sincerely,

RUSSELL M. FUKUMOTO
Acting Executive Director

RNF:ILH:vt

COMMUNICATE
CONTINUED



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
140 KAPOLILEI VILLAGE, SUITE 100
HONOLULU, HAWAII 96813

September 18, 1987

DEPT. DIRECTOR
JOHN X. LISI
RONALD N. HIRANO
DARYL KOCH
IN REPLY REFER TO
STP 8-2362

DIRECTOR
EDWARD Y. HIRATA

Oct 13 1 00 pm '87

MEMORANDUM

TO: The Honorable Russell N. Fukumoto, Executive Director
Housing Finance and Development Corporation
Department of Business and Economic Development

FROM: Director of Transportation

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
KAPOLEI VILLAGE MASTER PLAN, EWA, OAHU

A Traffic Impact Analysis Report should be prepared and submitted for our review. The report should identify the mitigation measures necessary to minimize traffic impacts to our highway facilities.

Thank you for this opportunity to provide comments.

DSM-1209-18-87

Signature

Ph	TD	AD	SA	TECH	ENG	INS	PLA	PLN	ENR	UP	ROC	INVEST	LEGAL	TRIS	PLNS
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Edward Y. Hirata
Edward Y. Hirata

B11

October 21, 1987

8710F1/4513

The Honorable Edward Y. Hirata
Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hirata:

SUBJECT: Environmental Impact Statement,
Kapolei Village, Master Plan,
Ewa, Oahu

Thank you for your comments of 18 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review.

A traffic impact analysis report is being prepared to assess the traffic impacts of this project. The findings and recommendations of this study will be included in the Draft EIS.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraquchi, Project Coordinator at 848-3240.

Sincerely,

RUSSELL N. FUKUMOTO
Acting Executive Director

RMP/ELBIVE

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STATE OF HAWAII
DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT
LAND USE COMMISSION
1001 Kalia Road, Room 313, Kalia, Honolulu, Hawaii 96813

OSDH 009-2 (Rev. 7/80)			Suspense		
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September 11, 1987

Mr. Russell N. Fukumoto
Executive Director
Housing Finance and
Development Corporation
P. O. Box 17907
Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Subject: EIS Preparation Notice for the Proposed Kapolei
Village Master Plan, Ewa, Oahu, Hawaii

Thank you for the opportunity to comment on the subject EIS
Preparation Notice.

The proposed project is located within the State
Agricultural District, and it is our understanding that the
Housing Finance Development Corporation intends to seek a
District Boundary Amendment for the project.

We have no other comments to offer at this time.

Sincerely,

Esther Ueda

ESTHER UEDA
Executive Officer

EU:to

October 21, 1987

87:DEV/4512

Ms. Esther Ueda, Executive Officer
Land Use Commission
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813

Dear Ms. Ueda:

SUBJECT: Environmental Impact Statement,
Kapolei Village Master Plan
Ewa, Oahu

Thank you for your comments of 11 September 1987. The
Draft Environmental Impact Statement for the above named
project is in preparation and when the document is finalized,
we will forward a copy to you for review.

As part of the development process, the Housing Finance and
Development Corporation will be required to have the 850 acres
reclassified. When we are ready to proceed with this action,
we will be consulting with your office.

Should you have any questions or additional comments and suggest-
ions, please direct them to Mr. Lloyd Matsuguchi, Project
Coordinator at 948-3240.

Sincerely,

ORIGINAL SIGNED BY

RUSSELL N. FUKUMOTO
Acting Executive Director

RMF:LHIVt

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



DONALD A. CLEGG
CHIEF PLANNING OFFICER
GEORGE COMBELL
DEPUTY CHIEF PLANNING OFFICER

Honorable Russell N. Fukumoto, Executive Director
Housing Finance and Development Corporation
Page 2
September 16, 1987

4. Drainage System

The Draft EIS should examine the project's drainage impact and proposed mitigation measures.

5. Environmental Characteristics

- A. Agriculture: The Draft EIS should address the loss of agricultural land and its impact on the agricultural industry on Oahu.
- B. Environmental Quality: The projects impact on air quality and noise levels should be evaluated.
- C. The Air Installations Compatible Use Zone Plan for the Naval Air Station Barbers Point (1984) should be considered in the land use plan for the project.

Thank you for giving us an opportunity to comment on this matter.

Donald Clegg
DONALD A. CLEGG
Chief Planning Officer

KK/DGP 9/87-3072

September 16, 1987

Honorable Russell N. Fukumoto, Executive Director
Department of Business and Economic Development
Housing Finance and Development Corporation
State of Hawaii
P.O. Box 17907
Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Chapter 343, Hawaii Revised Statutes
Environmental Impact Statement Preparation Notice
for the Proposed Kapolei Village
Development Project Situated in Ewa, Oahu

This is in response to your request for comments on the Environmental Impact Statement Preparation Notice for the proposed Kapolei Village development in Ewa.

The following points should be addressed in the preparation of the Draft Environmental Impact Statement:

- 1. Vehicular Access and Traffic
The applicant should prepare a traffic study which discusses the proposed development's impact on Farrington Highway and Barbers Point Access Road and its impact on downstream traffic on the H-1 Freeway.
- 2. Sewage Treatment and Disposal
The availability of capacity at the Honolulu Wastewater Treatment Plant to service the proposed development should be addressed.
- 3. Water System
The water needs of the proposed development and its impact on the water resources in Ewa should be discussed.

REVIEW COPY

87:DEV/4515

October 21, 1987

The Honorable Donald A. Clegg, Director
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

SUBJECT: Environmental Impact Statement,
Lepelei Village Master Plan,
Ewa, Oahu

Thank you for your comments of 23 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review.

A traffic impact analysis report is being prepared for the Draft EIS. The findings and recommendations of this report will be incorporated in the Draft EIS.

The utility needs of the project are being studied as part of the master plan process. The availability, capacity, and mitigation measures will be addressed in the Draft EIS.

The environmental characteristics of the project site will also be addressed in the Draft EIS. The withdrawal of agricultural lands, air quality, and noise impacts will be the subject of special studies being conducted for the Draft EIS.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240.

Sincerely,

ORIGINAL SIGNATURE

RUSSELL N. FUKUMOTO
Acting Executive Director

RNF:svt

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

830 SOUTH KING STREET
 HONOLULU HAWAII 96813
 PHONE 933-4181



FRANK P. FALU
 MAIL ROOM

MIKE MOON
 DIRECTOR
 ROBERT MUYALATO
 SENIORITY DIRECTOR

September 22, 1987

Mr. Russell N. Fukumoto
 Executive Director
 Housing Finance and Development
 Corporation
 P. O. Box 17907
 Honolulu, Hawaii 96817

Attention: Mr. Lloyd Haraguchi

Dear Mr. Fukumoto:

Subject: Preparation Notice for the Proposed Kapolei Village Master Plan, Ewa, Oahu, Hawaii

Thank you for sending a copy of the proposed Kapolei Village preparation notice for review and comments.

We understand that the proposed 850-acre project will provide approximately 720 assisted, rental and elderly housing units. This will provide affordable units and we concur with the project.

Sincerely,

Robert M. Moon

MIKE MOON
 Director

October 21, 1987

87:DEV/4505

The Honorable Mike Moon, Director
 Department of Housing and Community Development
 City and County of Honolulu
 630 South Beretania Street
 Honolulu, Hawaii 96813

Dear Mr. Moon:

SUBJECT: Environmental Impact Statement,
Kapolei Village, Master Plan,
Ewa, Oahu

Thank you for your comments of 23 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240.

Sincerely,

ORIGINAL SIGNATURE

RUSSELL N. FUKUMOTO
 Acting Executive Director

FOR:LR:vt

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
 850 SOUTH KING STREET
 HONOLULU, HAWAII 96813



September 21, 1987

Mr. Russell M. Fukumoto
 Executive Director
 Department of Business and
 Economic Development
 State of Hawaii
 P. O. Box 17907
 Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
 Kapolei Village Master Plan
 Tax Map Key 9-1-16: 23 and Por. 25

We have reviewed the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kapolei Village Master Plan and offer the following comments:

The overall concept for the Kapolei Village development is acceptable. The recreational needs of the project have been addressed with the establishment of public and private parks in the Master Plan, Figure 2-1.

The number and type of public parks now comply with our Park and Facility Guidelines. Based on the 4,000 units proposed for the Kapolei Village project, one community and one neighborhood park will be developed for the project.

The firm of Helber, Hastert, Van Horn and Kimura is coordinating the revision of the land use maps and reports to reflect the recommended changes.

Thank you for the opportunity to review and comment on the EISPN.

Sincerely,

Russell M. Fukumoto
 RUSSELL M. FUKUMOTO, Director

HKK:ei

cc: R. M. Towill Corp.
 Helber, Hastert, Van Horn & Kimura

DISPATCH SLIP

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FILE 8-1-16: 23 and Por. 25

October 21, 1987

87:DEV/4503

The Honorable Miram Kamaka, Director
 Department of Park and Recreation
 City and County of Honolulu
 830 South Beretania Street
 Honolulu, Hawaii 96813

Dear Mr. Kamaka:

SUBJECT: Environmental Impact Statement,
 Kapolei Village, Master Plan,
 Ewa, Oahu

Thank you for your comments of 21 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraquchi, Project Coordinator at 868-3240.

Sincerely,

ORIGINAL SIGNED BY
 RUSSELL M. FUKUMOTO
 Acting Executive Director

RRP:LSH:vt

DEPARTMENT OF TRANSPORTATION SERVICES
CLERMONT COUNTY OF HONOLULU
HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

10/25/87



JOHN E. MERTEN
DIRECTOR

JOSEPH M. MAGALON, JR.
DEPUTY DIRECTOR

TE-7869
PL1-0794

October 22, 1987

Mr. Russell N. Fukumoto
Executive Director
Housing Finance and Development
Corporation
Department of Business and
Economic Development
State of Hawaii
P. O. Box 17907
Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Subject: Preparation Notice for the Proposed
Kapolei Village Master Plan
Ewa, Oahu, Hawaii

This is in response to your letter dated September 1, 1987
regarding the above subject matter.

We have reviewed the Environmental Impact Statement Preparation
Notice and have the following comments:

1. A comprehensive traffic study should be conducted to assess the traffic impact of the project. The study should address the following concerns:
 - a) The amount of vehicular traffic to be generated by the project and its impact on the surrounding streets. In this regard, the street system for the project should be carefully planned to adequately service high traffic generator uses such as schools, commercial, park-and-ride facilities and parks. These streets should be laid out in a system that minimizes the impact on the residential streets.
 - b) The traffic impact of the project on the arterial system that will be affected.
 - c) The need for street improvements on the surrounding street system to support the proposed uses.

DEPT OF TRANSPORTATION

Mr. Russell N. Fukumoto
October 22, 1987
Page Two

2. The EIS Preparation Notice for Kapolei Village does not include consideration of prospects for an automated rapid transit system for Honolulu. The proposed rapid transit alternative alignments currently being planned extend as far as the Waiala Interchange between H-1 and H-2. If the proposed system is built, a major train and bus terminal, along with park-and-ride facilities could be built at the Navy Ewa Drum Storage Area site. From there, frequent feeder bus service could be provided to Kapolei Village. Also under consideration is the possibility of extending the guideway out to Kapolei Village at some future date when population growth warrants. Both of these possibilities need to be considered in the Master Plan for Kapolei as mitigation measures to ease the development impacts.

The draft EIS should include discussion of rapid transit in at least the following sections:

- Section 2 - Project Description
---Possible alignment alternatives and station locations should be shown and described in the subsection on "Land Use."

---Proposed rapid transit system improvements should be discussed as part of "Support Infrastructure," and include:

- Possible continuous and direct streets for feeder bus routes.
- Pedestrian routes (sidewalks and walkways) to bus stops, so the maximum possible number of residents are within 1/4 mile walk of public transportation.

- Section 5 - Public Facilities and Services 5.1 Transportation

A rapid transit system should be included among the transportation facilities and services planned for Kapolei Village. An integrated transportation system consisting of road, bus, and rail facilities is necessary to support development. Alternative combinations of road, bus and rail need to be compared and evaluated in order to determine the best combination.

Russell N. Fukumoto
October 22, 1987
Page Three

Section 6 - Summary of Impacts and Mitigating Measures
6.3 Traffic Conditions

The role of a rapid transit system in mitigating the impacts of increased traffic congestion generated by this project needs to be addressed. The effectiveness of a proposed transit system in reducing the effects of traffic should be quantified and assessed as part of the evaluation of mitigating measures.

The Rapid Transit Development Division of DTS is available to provide information on the proposed system and assist in the planning effort.

- Reference to current City bus service as indicated on page 5-1 should be corrected to read "Bus services within the vicinity of the project area are currently supplied to Makakilo, Ewa and Ewa Beach (Route 50), and NASBP Gate 2 and Ewa Mill (Route 50).

We appreciate this opportunity to review and comment on the project.

Sincerely,


JOSEPH M. MAGALDI, JR.
Acting Director

87:ENV/4248

November 9, 1987

The Honorable Joseph M. Magaldi
Acting Director
Department of Transportation Services
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Magaldi:

Subject: Environmental Impact Statement,
ESPOCAL Village Master Plan,
Ewa, Oahu

Thank you for your comments of October 22, 1987. The Draft Environmental Impact Statement for the above named project is being prepared. When the document is finalized, we will forward a copy to you for your review.

A traffic study is being prepared and will address the concerns you raised. The findings and recommendations will be included in the Draft EIS. We will be examining your recommendations relating to mass transit facilities for the project. As we are able, we will incorporate them into our master plan for the project.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240.

Sincerely,

RUSSELL N. FUKUMOTO
Acting Executive Director

RMF:JL:vt

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813



RECEIVED
SEPTEMBER 23, 1987

SEP 23 1987

Mr. Russell N. Fukumoto
Executive Director
Department of Business
and Economic Development
State of Hawaii
P. O. Box 17907
Honolulu, Hawaii 96817

Attention: Mr. Lloyd Haraguchi

Dear Mr. Fukumoto:

Subject: Your Letter of September 1, 1987 on the
Environmental Impact Statement Preparation Notice
for the Proposed Kapolei Village Master Plan, Ewa.
TMK: 9-1-16: 23, Por. 25

Thank you for the opportunity to review and comment on your
proposed community development master plan.

We have the following comments for your consideration:

1. A water master plan for the development should be submitted for our review and approval.
2. According to the Ewa Water Master Plan, the development will be first serviced from our existing 30-inch main along Farrington Highway. A reservoir and new main will be required to be connected to the 30-inch main when existing storage is exceeded. Service to the development shall then be from the 228 Kapolei Reservoir.
3. A second 30-inch main on Farrington Highway will be needed in the future, when growth exceeds the capacity of the existing 30-inch main.
4. All costs for off-site and on-site water improvements will be borne by the developer.

If you have any questions, please contact Lawrence Whang at 527-6138.

Very truly yours,

KAZU HAYASHIDA

Manager and Chief Engineer

87DEV/4504

October 21, 1987

The Honorable Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

SUBJECT: Environmental Impact Statement,
Kapolei Village Master Plan,
Ewa, Oahu

Thank you for your comments of 17 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review.

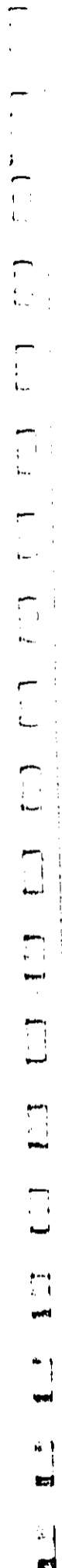
Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240.

Sincerely,

ORIGINAL SIGNED BY
RUSSELL N. FUKUMOTO
Acting Executive Director

RUSSELL N. FUKUMOTO

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CITY AND COUNTY OF HONOLULU
POLICE DEPARTMENT
 1415 SOUTH BERETANIA STREET
 HONOLULU, HAWAII 96813 - AREA CODE (808) 548-3111



DOUGLAS G. GIBB
 CHIEF
 SARAH FERREIRA
 DEPUTY CHIEF

SEP 28 4 00 PM '87

FRANK P. FAHI
 MAYOR

OUR REFERENCE SS-1C

September 28, 1987

Mr. Russell N. Fukumoto
 Executive Director
 Department of Business and Economic Development
 Housing Finance and Development Corporation
 P. O. Box 17907
 Honolulu, Hawaii 96817

Dear Mr. Fukumoto:

Subject: Preparation Notice for the Proposed Kapolei Village
Master Plan, EWA, OAHU, HAWAII

We have reviewed the Environmental Impact Statement Preparation
 Notice for the Proposed Kapolei Village Master Plan and have no
 comments to offer at this time.

We request that we be consulted during the preparation of the
 Environmental Impact Statement.

Sincerely,

Douglas G. Gibb
 DOUGLAS G. GIBB
 Chief of Police

OSM 1228 1486

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	LU	100
	DU	100
	IS	100
	MS	100
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October 21, 1987

07:DEV/4509

The Honorable Douglass Gibb
 Chief of Police
 1455 South Beretania Street
 Honolulu, Hawaii 96804

Dear Chief Gibb:

SUBJECT: Environmental Impact Statement,
Kapolei Village, Master Plan,
EWA, OAHU

Thank you for your comments of 28 September 1987. The Draft
 Environmental Impact Statement for the above named project
 is in preparation and when the document is finalized, we
 will forward a copy to you for review.

Should you have any questions or additional comments and
 suggestions, please direct them to Mr. Lloyd Haraguchi,
 Project Coordinator at 848-3240.

Sincerely,

ORIGINAL SIGNED BY
 RUSSELL N. FUKUMOTO
 Acting Executive Director

RNF:LDJ/vt

~~SECRET~~

SUNSET BEACH REZONING COMMITTEE
SUNSET BEACH AND PUPUKEA CONCERNED CITIZENS COMMITTEE

We would appreciate being kept appraised of the situation as it relates to the aforementioned concerns.

Mahalo Mui Ioa for your consideration in this matter.

Kamuela Price

Kamuela Price
Chairperson Sunset Beach and Pupukea Concerned Citizens Committee

cc: Office of Environmental Quality

September 25, 1987

Mr. Lloyd Haraguchi
Project Coordinator
Development Branch
Housing Finance and Development
Corporation
1002 K. School Street
Honolulu, Hawaii 96817

Subject: EIS Preparation Notice Kapolei Village Master Plan for Ewa Beach, Oahu.

Aloha Lloyd,

Pursuant to our telephone conversation of September 25th there are three major infrastructure problems in the proposed Village Project directly relating to people living in the Sunset Beach Pupukea area.

These concerns are:

1. Is it proposed that a waste water plan utilizing EPA monies be installed in this new development prior to correcting the grossly inadequate cess pool system of the densely populated Sunset Beach Pupukea area?
2. Will it be necessary to divert fresh water from the Windward side of Oahu to supplement the proposed Village's fresh water system?
3. Will the project start up date be prior to a Uni Rail system being approved or the bottleneck in the HI freeway Aloha Stadium junction being corrected. As things now stand during the heavy traffic hours it takes North Shore residents approximately an hour and half to reach or return from down town Honolulu, now with the Milliani town expansion the heavy traffic problem will only increase. Before approving the Kapolei Village EIS, it is essential traffic flow problem be properly addressed.

DEVELOPMENT COPY

87:DEV/4516

October 21, 1987

Mr. Kamuela Price, Chairperson
Sunset Beach and Pupukea Concerned Citizens Committee
P.O. Box 459
Haleiwa, Hawaii 96712

Dear Mr. Price:

SUBJECT: Environmental Impact Statement,
Kapolei Village Master Plan,
Ewa, Oahu

Thank you for your comments of 25 September 1987. The Draft Environmental Impact Statement for the above named project is in preparation and when the document is finalized, we will forward a copy to you for review. As part of the EIS preparation process we are conducting a study to assess the impact of this development on the wastewater treatment facilities in the area. We believe that your concerns for adequate wastewater facilities should be directed to the City and County of Honolulu as they are charged with providing such services in your area.

Current water development plans for this project will not require the diversion of water from the Windward side of Oahu for this project.

As part of the EIS process a traffic impact assessment will be conducted to determine the traffic impacts of the project. The findings of this study will be included in the Draft EIS.

Should you have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraquchi, Project Coordinator at 848-3240.

Sincerely,
ORIGINAL SIGNED BY

RUSSELL N. FUKUMOTO
Acting Executive Director

RNF:vt

**COMMENTS AND RESPONSES
FOR THE
DRAFT EIS**



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858 -5440

REPLY TO
ATTENTION OF:

December 11, 1987

Planning Branch

Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Thank you for the opportunity to review the Environmental Impact Statement (EIS) for Kapolei Village, Ewa, Oahu. The following comments are offered.

a. As noted in our review comments on the EIS Preparation Notice (letter dated November 17, 1987), a Department of the Army permit pursuant to Section 404 of the Clean Water Act is not required for this project.

b. There are no flood insurance map panels printed for the project area. The site is located in Zone D (area of unstudied but possible flood hazards).

Sincerely,

ORIGINAL SIGNED

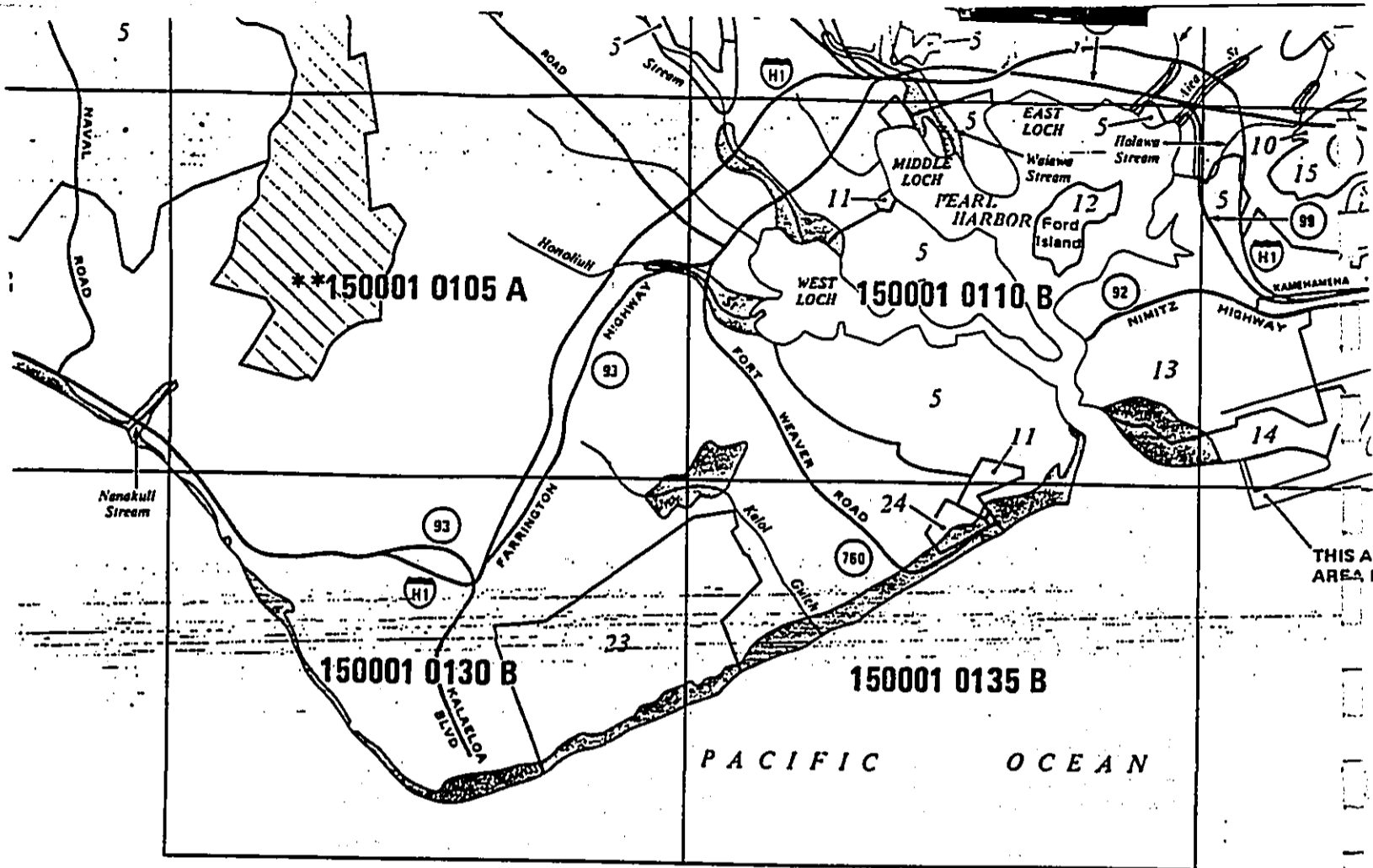
Kisuk Cheung
Chief, Engineering Division

Enclosure

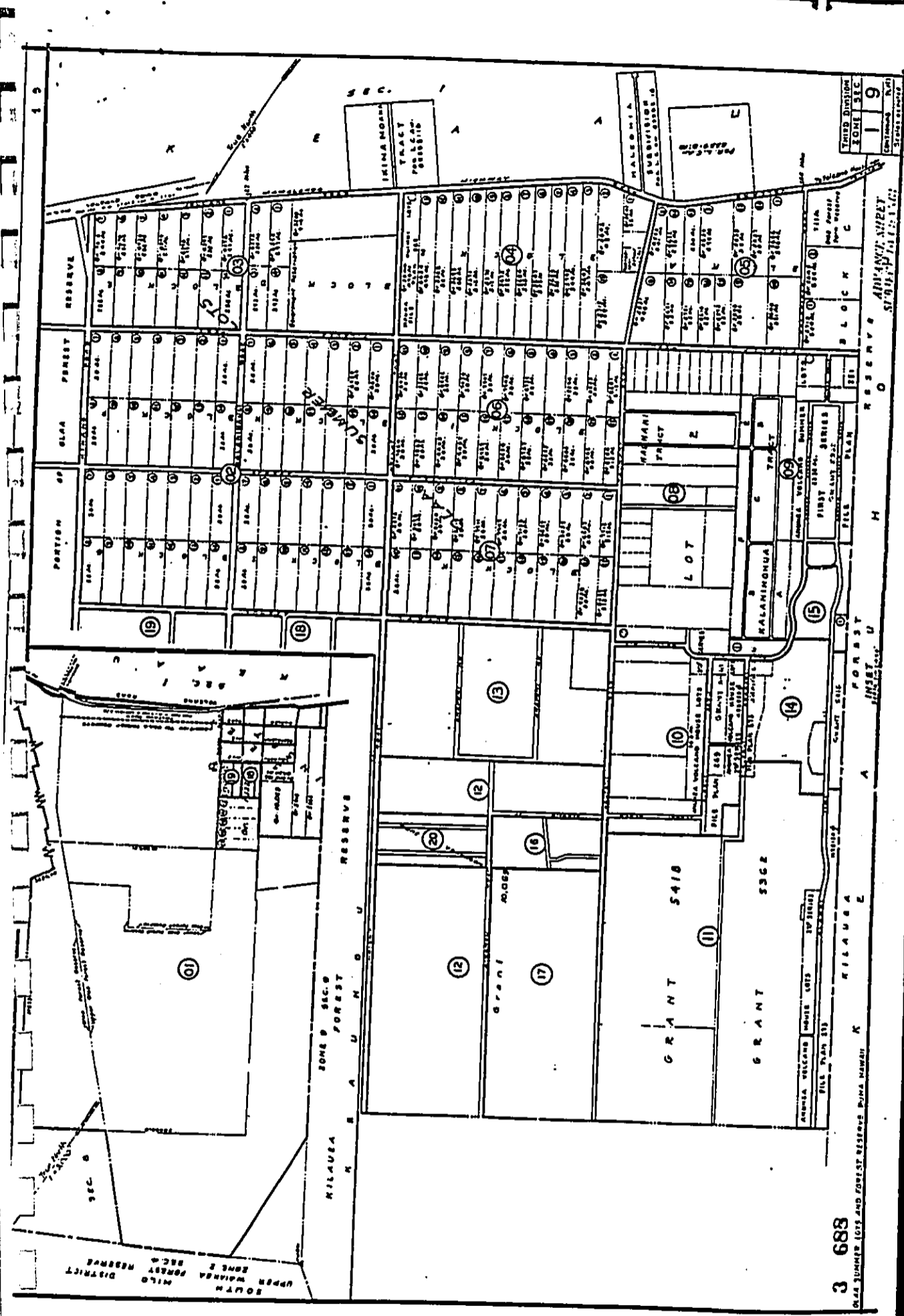
Copy Furnished:

✓ Mr. Russell N. Fukumoto, Acting
Executive Director
Housing Finance and Development Corp.
1002 N. School Street
Honolulu, Hawaii 96817

DEVELOPMENT COPY



*PANEL NOT PRINTED - AREA IN ZONE D
 **PANEL NOT PRINTED - AREAS SUBJECT TO FLOODING ARE SHOWN AS INSETS
 ON OTHER PANELS, REST OF PANEL IN ZONE D:
 150001 0010 A IS SHOWN ON 150001 0005 B
 150001 0070 A IS SHOWN ON 150001 0100 B
 150001 0075 A IS SHOWN ON 150001 0100 B
 150001 0080 A IS SHOWN ON 150001 0065 B
 150001 0085 A IS SHOWN ON 150001 0135 B
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SOUTH NILE DISTRICT
UPPER WAIKANA FOREST RESERVE
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John Waihee
GOVERNOR



STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

IN REPLY REFER

TO: 88:DEV/158

January 13, 1988

Mr. Kisuk Cheung, Chief,
Engineering Division
Department of the Army
U.S. Army Engineering District, Honolulu
Building 230
Fort Shafter, Hawaii 96858-5440

Dear Mr. Cheung:

SUBJECT: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your comments of December 14, 1987 relating to the proposed Kapolei Village project.

We appreciated your review of the document and the information you provided. The changes included in your comments will be included in the Final EIS. Please note that a separate drainage study for the project area has been prepared and is available for review in our office.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

Sincerely,

A handwritten signature in cursive script, appearing to read "Russell N. Fukumoto".

RUSSELL N. FUKUMOTO
Acting Executive Director

RNF:RK:vt

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HAWAII
96850

January 11, 1987

Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, HI 96813

Dear Dr. Miura:

Subject: Draft Environmental Impact Statement for Kapolei
Village, Ewa, Oahu, Hawaii

We want to emphasize that the irreversible loss of approximately 800 acres of prime agricultural land can have a major impact on agriculture in Hawaii.

Sincerely,



RICHARD N. DUNCAN
State Conservationist

cc: Mr. Russell N. Fukunoto, Acting Executive Director, Housing Finance
and Development Corp., 1002 N. School Street, Honolulu, HI 96817

DSSH 4308 (6/86)

Suspense _____

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FILE 88-201407

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John Waihee
GOVERNOR



Joseph K. Conant
~~XXXXXXXXXXXX~~
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

February 3, 1988

88:DEV/478

Mr. Richard N. Duncan
State Conservationist
U.S. Department of Agriculture
Soil Conservation Service
P. O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Duncan:

RE: Kapolei Village Draft Environmental Impact Statement

Thank you for your comments on January 11, 1988 relating to the proposed Kapolei Village project. We appreciated your review of the document and the information you provided.

We have attempted to provide our best estimate, in consultation with Oahu Sugar, the potential impact on the viability of sugar operations in Ewa. While we recognize that the conversion of agricultural lands will impact agricultural activities, we must be cognizant of our mandate which is to provide a variety of housing opportunities for the people of Hawaii. Our planning has included consultation with Oahu Sugar Company and has been sensitive to their needs. We believe that our phased approach to land development will lessen the overall impact by not affecting Oahu Sugar's planned harvesting schedule and key transportation links.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph K. Conant".

JOSEPH K. CONANT
Executive Director

JOHN WAIHEE
GOVERNOR



SUZANNE D. PETERSON
CHAIRPERSON, BOARD OF AGRICULTURE

DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

December 30, 1987

MEMORANDUM

To: Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control

Subject: Draft Environmental Impact Statement (DEIS) for
Kapolei Village
Housing Finance and Development Corporation (HFDC)
TMK: 9-1-16: 23 and por. 25 Ewa, Oahu
Area: 830 acres

The Department of Agriculture has reviewed the subject DEIS and offers the following comments.

The applicant proposes to develop a master planned residential community to be comprised of market-valued and affordable housing units.

In our review of the EIS Preparation Notice for the subject project, we listed several concerns for the applicant to address (Department of Agriculture memorandum of September 25, 1986, DEIS, Section 10). The responses to our concerns as found in the DEIS show a good faith effort to address each of our concerns.

We would like specifically to request that the soils information referred to in the DEIS be mapped in the Final EIS to show the Land Study Bureau and Agricultural Lands of Importance to the State of Hawaii (ALISH) classifications within the subject property.

We would also like to comment further on the following two points made in the DEIS:

1. "The development of Kapolei Village would not adversely affect the economic viability of OSCo, nor would it involve layoffs of sugar workers. This assumes the continuation of historic development rates

DEVELOPMENT COPY

Dr. Marvin T. Miura
December 30, 1987
Page -2-

for housing projects - rates which would allow sufficient time to increase yields and thereby partially or completely compensate for the reduced acreage with little or no loss in production... Over the long term, OSCo could accommodate a major reduction in acreage and maintain economies of scale by operating just one mill, rather than two in parallel." (DEIS, page 8-1)

According to pages 8-1 to 8-2 and Appendix F of the DEIS, the future economic viability of Oahu Sugar Company (OSC) is contingent on:

- (1) a 20-year development period of the proposed and approved projects in the Central Oahu/Ewa areas; and
- (2) increases in sugar yield to make up for losses of cultivated sugarcane acreage under OSC's current double mill system, possibly under one of the following two scenarios: (a) 16 tons of sugar per acre (TSA) to accommodate the loss of 1,990 acres (projected acreage to be developed in Ewa/Central Oahu that would affect OSC by 1995) and continue production of 92,500 tons of sugar annually from 11,550 acres; or (b) 21.6 TSA to accommodate the loss of 4,990 acres (the total area proposed and approved for development over 20 years) and continue production of 92,000 tons of sugar annually from 8,550 acres; or
- (3) switching to a single mill operation at 67,500 tons of sugar annually which would require 8,550 acres at 15.8 TSA.

A recent statement from Oahu Sugar Company concerning another project indicates that if all the pending projects on the drawing boards [affecting its lands] culminate collectively and out of a desirable sequence, they will adversely affect the economic viability of OSCo (emphasis added). It appears from the DEIS that it is assumed the development of the subject project and the other approved and proposed development projects will be distributed over the next twenty years "in a desirable sequence".

According to Appendix F, "Continued success of the OSCo Survival Plan will depend on [among other events] ... retaining fields which are economical to farm and which provide sufficient

yields to operate the mill at an economical level" (page 6). We question whether OSC can realistically maintain its profitability in the future if available acreage is reduced to the point where there is little or no leeway to alter the total area available for sugarcane cultivation, especially if high-yield lands are removed from production. Increased sugar yields can generally only occur with additional production costs for capital, labor, management, energy, and/or research. The majority of OSC fields are already drip-irrigated. Is it reasonable to assume that OSC can attain and maintain the sugar yields necessary for overall economic viability described in the DEIS? The Final EIS should incorporate the detailed sequence or phasing of development of the projects listed on page 7 of Appendix F into the aforementioned scenarios.

2. "...it is extremely doubtful that this [the loss of agricultural use of the subject area] will adversely affect the growth of diversified agriculture in Hawaii." This assessment is based on: "(1) an extensive amount of prime-agricultural land and water has been freed from sugar and pineapple production because of past mill closings and reductions in operations; (2) a very real possibility exists that additional land and water will be freed from sugar production given the outlook for low sugar prices; (3) some - if not most or even all - of the sugar operations will make their lands available for profitable replacement crops to the extent that such crops are available; and (4) compared to the available supply, a very small amount of land and water is required to grow proven and promising crops to achieve a realistic level of food and animal-feed self-sufficiency, and to increase exports" (DEIS, and Appendix F, page iv).

The third point is highly problematic. While there may be a reduction in sugarcane acreage, the fallowed lands do not necessarily become available for other agricultural uses if landowners wish to pursue other activities that promise higher returns, or hold their lands off the market. Our records show more than 270 individuals searching for suitable farm land to begin, expand or relocate their diversified farming activities. These "freed" lands should be specifically identified in the Final EIS in terms of location, their availability for profitable replacement crops, and their sale or lease prices and terms.

Dr. Marvin T. Miura
December 30, 1987
Page -4-

The Department of Agriculture is compelled by the State Constitution and Section 141-1(8), Hawaii Revised Statutes to "...conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands". On Oahu, it happens that the lands most suitable for agricultural use are situated in the areas (Ewa and Central Oahu) that are under the greatest pressure for housing expansion. We take the perspective that agriculturally suitable land is a resource in its own right rather than simply an economic commodity that should be used for the highest private return. Agriculturally suitable lands once developed for higher uses will remain unavailable for agricultural use. Thus, while there may be more important agricultural lands in total on Oahu than can be fully utilized over the next decade, we feel it should be the policy of the State and the City and County to allocate the best agricultural lands to agricultural use to the fullest extent possible. Alternative uses should be directed to lands of lesser value for agriculture wherever possible. That is why it will be helpful to see maps of the project site's Land Study Bureau and ALISH classifications in the Final EIS.

The Department of Agriculture is well aware and supportive of the need to develop affordable housing for Hawaii's residents. The State Agriculture Functional Plan contains Implementing Action B(5)(c) which states: "Until standards and criteria to conserve and protect important agricultural lands are enacted by the Legislature, important agricultural lands should be classified in the State Agricultural District and zoned for agricultural use, except where, by the preponderance of the evidence presented, injustice or inequity will result or overriding public interest exists to provide such lands for other objectives of the Hawaii State Plan." (emphasis added)

To summarize, we request that the following be included in the Final EIS:

1. Maps showing the Land Study Bureau and ALISH classifications for the subject property.
2. Identification of the sequencing or phasing of development of the subject project and other approved and proposed projects affecting OSC sugarcane cultivated lands and how this phasing would affect the economic viability of OSC.

Dr. Marvin T. Miura
December 30, 1987
Page -5-

3. Specific identification of the "extensive amount of prime agricultural land and water [that] has been freed from sugar and pineapple production" and is "available for profitable replacement crops".

Thank you for the opportunity to comment. We hereby request a copy of the Final EIS as soon as it is available.

Suzanne D. Peterson

SUZANNE D. PETERSON
Chairperson, Board of Agriculture

cc: Mr. Russell N. Fukumoto, HFDC
Mr. William Balfour, OSCo
OSP
DGP
LUC

John Waihee
GOVERNOR



Joseph K. Conant
~~XXXXXXXXXXXX~~
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:
88:DEV/477

February 3, 1988

MEMORANDUM

TO : The Honorable Suzanne D. Peterson
Chairperson, Department of Agriculture

FROM : Joseph K. Conant, Executive Director
Housing Finance & Development Corporation

SUBJECT : KAPOLEI VILLAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your comments of December 30, 1987 relating to the proposed Kapolei Village project. We appreciated your review of the document and the information you provided.

1. The specific request to provide a map of the Land Study Bureau and ALISH classification will be included in the Final EIS (FEIS).
2. We have identified in the FEIS an approximate phasing plan for the Kapolei Village project. We have projected an approximate start date for the first phase, however, this may change pending reclassification action of the Land Use Commission and funding authorizations of the Legislature. Other projects in the vicinity of the Kapolei Village have also been identified in the Final EIS as to their potential impact on Oahu Sugar lands.
3. We have queried our consultant to identify lands that have been freed from sugar and pineapple production per your request. He noted that freed sugar lands include lands in Kilauea on Kauai, Kahuku on Oahu, Kohala and Puna on Hawaii. He further noted that pineapple lands freed includes lands on Lanai and Molokai. Water resources that were used for agriculture could be made available for other uses.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

A handwritten signature in dark ink, appearing to read "Joe Conant", written over a printed name and title.

JOSEPH K. CONANT
Executive Director

JOHN WAIHEE
GOVERNOR OF HAWAII

JAN 8 10 32 AM '88



JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSD

January 4, 1988

MEMORANDUM

To: Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control

From: Deputy Director for Environmental Health

Subject: Draft Environmental Impact Statement (DEIS) for Kapolei Village, Ewa, Oahu

Thank you for allowing us to review and comment on the subject DEIS. Concerns toward this proposed development were addressed in our previous letter of comment to the Environmental Impact Statement Preparation Notice (October 20, 1987). The following additional noise comments are made as a follow-up to the earlier comments.

1. The DEIS has addressed concerns regarding vehicular traffic noise impact along with possible mitigative measures.
2. Comments regarding potential impacts from aircraft noise on the proposed development were included. The AICUZ study reported that significant noise impacts on the project site are expected; showing noise contours of 60-65 Ldn. The applicant indicated that no residential land uses are sited within the 65 Ldn contour (northern portion of the proposed development). However, the recommended master plan shows single-family units within the 65 Ldn contour areas. The DEIS also addressed a report submitted by Darby and Associates. This report showed significantly lower Ldn values than that of the AICUZ study and indicated that aircraft noise impact should not be significant to place constraints on the residential units.

Ldn values may include isolated events, such as aircraft flyover, and the occurrence of such noise intrusion tend to be more pronounced to the impacted community. Therefore, since aircraft noise can adversely affect residents within the proposed development, mitigative measures should be instituted to control such impacts.

3. The applicant has indicated that the average Ldn values of canehaul trucks during the harvesting season should not exceed moderate levels. However, it should be noted that noise from individual or series of trucks may impact residents while travelling along the canehaul route, particularly during nighttime hours. Since complaints regarding such activities have been received by the Department of Health, mitigative measures must be incorporated to minimize such disturbances.

DEVELOPMENT COPY

Dr. Marvin T. Miura
January 4, 1988
Page 2

4. The following concerns and regulatory requirements addressed on the earlier comment were not included in the DEIS.
 - a. Noise impacts resulting from the integration of various land uses within the project location, particularly toward commercial and recreational activities adversely affecting adjacent residential areas.
 - b. Noise emanating from stationary equipment.
 - c. Noise emanating from activities associated with proposed schools.
 - d. Noise from religious activities associated with proposed churches.
 - e. Structural design to maximize noise containment, specifically toward attached units or residential structures in close proximity to each other.
 - f. Regulatory compliance during the construction phase.


BRUCE S. ANDERSON, Ph.D.

cc: Mr. Russell N. Fukumoto ✓

JOHN WAIHEE
GOVERNOR



JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

88:DEV/398

January 29, 1988

MEMORANDUM

TO: The Honorable Bruce S. Anderson, Ph.D.,
Deputy Director
Department of Health

FROM: Joseph K. Conant, Executive Director

SUBJECT: Kapolei Village Draft Environmental Impact Statement

Thank you for your comments of January 4, 1987 relating to the proposed Kapolei Village project.

Your concerns relating to potential impacts on the residential community from aircraft overflights and canehaul trucks have been noted. We have reexamined the plan to ensure that there are no residential developments within the 65 Ldn contours. We are proposing that potential homebuyers be made aware of the potential overflights from the Naval Air Station. Noise impacts from canehaul trucks will be a temporary impact until such time as the project is completely built out. The Master Plan provides for sound attenuating walls along major streets to reduce the noise impacts.

We believe that the plan provides for sufficient buffering of the various uses, e.g., school, recreational area, to mitigate potential noise impacts. Noise impacts resulting from construction activity will be mitigated through compliance with Chapter 43, Title 11, Administrative Rules. Where specific construction equipment or activity cannot comply with Chapter 43, variances will be requested.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or

JOHN WAIHEE
GOVERNOR OF HAWAII



WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

LIBERT K. LANDGRAF
DEPUTY

AQUACULTURE DEVELOPMENT
PROGRAM
AQUATIC RESOURCES
CONSERVATION AND
ENVIRONMENTAL AFFAIRS
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

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

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DEC 23 1987

DOC. NO.: 2265E
FILE NO.: 88-254

Dr. Marvin T. Miura
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura

SUBJECT: Draft EIS for Kapolei Village
TMK: 9-1-16: 23 & 25

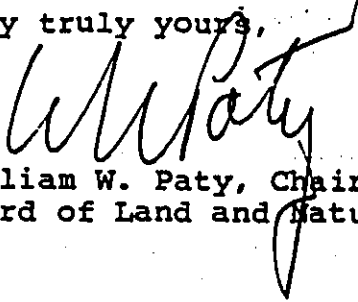
Thank you for the opportunity to review the Draft Environmental Impact Statement cited above. We offer the following comments:

DOWALD CONCERNS:

This proposed development is located in the Pearl Harbor Ground Water Control Area, where ground water pumpage has nearly reached the aquifer's sustainable yield. Therefore, the EIS should address the source of water supply for this development.

Thank you for your consideration of our concerns.

Very truly yours,


William W. Paty, Chairman
Board of Land and Natural Resources

cc: Russell Fukumoto

DEVELOPMENT COPY

John Waihee
GOVERNOR



Joseph K. Conant
~~XXXXXXXXXXXX~~
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

February 3, 1988

88:DEV/476

MEMORANDUM

TO : The Honorable William W. Paty, Chairman
Board of Land and Natural Resources

FROM : Joseph K. Conant, Executive Director
Housing Finance and Development Corporation

SUBJECT : KAPOLEI VILLAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your comments of December 23, 1987 relating to the proposed Kapolei Village project.

The Kapolei Village plan does not include information relating to water source development and water availability because current water development planning has not reached a point where we can make definitive statements. We have been exploring alternative water development scenarios which include joining the Ewa Water Development Corporation and the possibility of developing our own sources. The project as currently planned includes a verbal water commitment for 175,000 gallons per day which will be sufficient to supply water for 350 single family homes.

The plan does provide for the use of non-potable water for the irrigation of the golf course, other recreation areas, and along selected roadways.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.


JOSEPH K. CONANT
Executive Director



**DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT**

KAMAMALU BUILDING, 250 SOUTH KING ST. HONOLULU, HAWAII 96813
MAILING ADDRESS: P.O. BOX 2139, HONOLULU, HAWAII 96804

ROGER A. ULVELING
DIRECTOR
MURRAY E. TOWILL
DEPUTY DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR

Ref. No. P-7994

January 20, 1988

MEMORANDUM

TO: Dr. Marvin T. Miura, Director
Office of Environmental Quality Control

FROM: Roger A. Ulveling

SUBJECT: Kapolei Village Draft Environmental Impact Statement (EIS)

We have reviewed the subject DEIS and offer the following comments.

1. The final EIS should address regional employment, income, and housing characteristics to assess whether residents will be able to afford the pricing of housing units as currently proposed.
2. The final EIS should address alternative plans or programs to provide affordable housing if the Kapolei Town Center is not developed. Are contingency plans, locations, and alternative conceptual designs currently available?
3. The final EIS should address the viability of Oahu Sugar Company in light of other planned or proposed development projects on lands currently cultivated by Oahu Sugar Company.
4. Commuting patterns to regional employment centers is a major consideration which should be addressed. If housing development is accelerated faster than employment opportunities in the Ewa area, the problem facing the existing transportation system may be exacerbated.
5. The final EIS should describe what mitigation measures are available to protect the State from future noise complaints resulting from aircraft originating from Barbers Point Naval Air Station. We note that virtually the entire project site is located at or near the 60 Ldn noise contour. Approximately 50 percent of the proposed residential area is located within the 60 to 65 Ldn noise contour zone (Figure 5-7).
6. The final EIS should describe in greater detail how the Barbers Point coral pit and proposed drainage features of Kapolei Village are interrelated and how the system will be funded.

DEVELOPMENT COPY

Dr. Marvin T. Miura
Page 2
January 20, 1988

7. The final EIS should also indicate the fiscal impacts of improvements to upgrade the Makakilo interchange of the H-1 Freeway, Farrington Highway, and Barbers Point Access Road, and should discuss the adequacy of police and fire protection services, recreational opportunities, and schools with their associated costs.
8. The final EIS should discuss the constitutional mandate to protect the best agricultural lands in the State and the proposed project's ability to fulfill an overriding public need for housing.

Thank you for the opportunity to review and comment on this EIS.

ORIGINAL SIGNED BY
ROGER A. ULVELING

cc: ✓ Housing Finance and Development Corp.
Land Use Division

John Waihee
GOVERNOR



Joseph K. Conant
~~RESIDENCE~~
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

February 3, 1988

88:DEV/475

MEMORANDUM

TO : The Honorable Roger A. Ulveling, Director
Department of Business & Economic Development

FROM : Joseph K. Conant, Executive Director
Housing Finance and Development Corporation

SUBJECT : KAPOLEI VILLAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your comments of January 20, 1988 relating to the proposed Kapolei Village project. We appreciated your review of the document and the information you provided.

1. A financial feasibility analysis was conducted for the Kapolei Village Master Plan. We will forward a copy of the Master Plan for your review.
2. The scope and breadth of providing affordable housing for the people of Hawaii is addressed in the State Housing Plan. The Housing Finance and Development Corporation (HFDC) is continually examining the potential for providing affordable housing on a number of fronts. The Kapolei Village plan is one of the first plans proposed whereby the government took the lead in acquiring and planning for large scale development of affordable housing. In addition, HFDC is pursuing large projects on Hawaii, Maui and Kauai. The HFDC is also continuing to pursue infill projects throughout the State.
3. We have attempted to provide our best estimate, in consultation with Oahu Sugar, the potential impact on the viability of sugar operations in Ewa. While we recognize that the conversion of agricultural lands will impact agricultural activities, we must be cognizant of our goal which is to provide a variety of housing opportunities for the people of Hawaii. We have coordinated our planning efforts with Oahu Sugar Company to ascertain the potential impact on the withdrawal of agricultural lands. The phasing plan proposed has also been coordinated with their input.

Memo to Honorable R. A. Ulveling
February 3, 1988
Page 2

4. We concur with your assessment in noting that if housing development occurs faster than employment centers we can expect a variation in the commuting patterns projected. However, as development occurs there may be a net decrease in eastbound commuting as new employment opportunities are realized.
5. We have endeavored to locate housing and other noise sensitive uses outside of the flight tracks of the Barbers Point Naval Air Station. We have not included any residential uses within the 65 Ldn contours in order to be compatible with the Navy's Air Installation Compatible Use Zone (AICUZ) Study. As mitigation measures we are proposing the use of buyer disclosure statements and the potential use of aviation easements. We are also cognizant that such measurement cannot mitigate against random overflights.
6. The Barbers Point coral pit is part of the overall drainage system for the Kapolei Village Plan. The coral pit currently serves to retain flood waters within the drainage basin. The current drainage plan provides for the containment of all average storm waters produced by the project within the planned golf course. The drainage system is designed to prevent localized flooding which now occurs and direct this storm water towards the coral pit for retention. The projected flow into this coral pit will not exceed that which is currently directed into this pit. The cost of the drainage system has been factored into the overall development cost of the project.
7. The proposed roadway improvements to the on-off ramps on the H-1, Farrington Highway, and Barbers Point Access Road have been factored into the development costs for the Kapolei Village Plan based on the pro-rata share to the Kapolei Village project. It is anticipated that a portion of the cost can be borne by federal aid.

We have discussed the adequacy of other public facilities and services with the appropriate agencies involved and have provided for these services as we are able. For the most part, however, they will be funded via legislative and city council appropriations.
8. We find ourselves in a difficult position in having to defend our legislative mandates and directives against other equally important legislative mandates. The findings of studies conducted by this agency as well as others indicate that there is a critical shortage of affordable housing in the State, particularly on Oahu. These studies point to the need for as many as 40,000 to 50,000 affordable units. On Oahu, there is a lack of urban classified lands for large scale residential development. Based on these as well as other factors, we feel that this project does have the ability to impact the "overriding public need" for affordable housing.

Memo to Honorable R. A. Ulveling
February 3, 1988
Page 3

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator, to 848-3240. Thank you again.


JOSEPH R. CONANT
Executive Director

RECEIVED
HAWAII HOUSING
AUTHORITY
DEC-21 10 25 AM '87

ENGINEERING OFFICE
OFFICE OF THE ASSISTANT GENERAL
3945 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96813-4495

DSSH 4308 (8/88)

Suspense

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	AED				
	AED				
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	TSERV				
2	DEV				
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	LREF				
	LEGAL				
	PERS				
	PLNG				
FILE	87:Dev				9/26/88

December 17, 1987

Engineering Office

Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Kapolei Village
Ewa, Oahu

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Yours truly,

S:

Jerry M. Matsuda
Major, Hawaii Air
National Guard
Contr & Engr Officer

Enclosure

cc: Russell N Fukumoto, Housing
Finance & Development Corp.

DEVELOPMENT COPY

John Waihee
GOVERNOR



RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO: 88:DEV/160

January 13, 1988

Major Jerry M. Matsuda
Contract and Engineering Officer
Hawaii Air National Guard
3940 Diamond Head Road
Honolulu, Hawaii 96816-4495

Subject: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL
IMPACT STATEMENT

Dear Major Matsuda:

Thank you for your comments of December 17, 1987 relating to the proposed Kapolei Village project.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

Sincerely,

A handwritten signature in cursive script, reading "Russell N. Fukumoto".

RUSSELL N. FUKUMOTO
Acting Executive Director

RNF:RK:vt



STATE OF HAWAII
 DEPARTMENT OF BUSINESS
 AND ECONOMIC DEVELOPMENT
 • • •
LAND USE COMMISSION

Room 104, Old Federal Bldg., 335 Merchant Street
 Honolulu, Hawaii 96813 Telephone: 548-4611

DEC 19 2 37 PM '87

JOHN YAIHEE
 Governor
 TEOFILO PHIL TACSIAN
 Chairman
 FREDERICK P. WHITTEMORE
 Vice Chairman

COMMISSION MEMBERS:
 Richard B.F. Choy
 Lawrence F. Chun
 Everett L. Cuskaden
 Sharon A. Himeno
 Toru Suzuki
 Robert S. Tamayo
 Renton L.K. Nip
 ESTHER UEDA
 Executive Officer

December 9, 1987

Dr. Marvin T. Miura, Interim Director
 Office of Environmental Quality Control
 465 South King Street, Room 104
 Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Kapolei Village Draft Environmental Impact Statement

Thank you for the opportunity to comment on the subject Draft EIS for Kapolei Village. We have no comments to offer except that the subject site of the proposed Kapolei Village is designated within the State Land Use Agricultural District and it is our understanding that a boundary amendment for a reclassification into the Urban District will be processed for the project pursuant to the provisions of Chapter 359G, Hawaii Revised Statutes.

Sincerely,

Esther Ueda

DSSH 4308 (6/86)

Suspense _____

ESTHER UEDA
 Executive Officer

EU:to

cc: ✓ Russell Fukumoto

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FILE 87 Dev- 90229

DEVELOPMENT COPY

John Waihee
GOVERNOR



RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO: 88:DEV/162

January 13, 1988

Ms. Esther Ueda
Executive Director
Land Use Commission
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813

Subject: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL
IMPACT STATEMENT

Dear Ms. Ueda:

Thank you for your comments of December 9, 1987 relating to the proposed Kapolei Village project.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

Sincerely,

A handwritten signature in cursive script, appearing to read "Russell N. Fukumoto".

RUSSELL N. FUKUMOTO
Acting Executive Director

RNF:RK:vt

JOHN WAIMEE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2380
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

December 8, 1987

Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

SUBJECT: KAPOLEI VILLAGE - EIS

DSSH 4309 (8/86)

L.H.

Suspense

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FILE 88-02-459

The following are our projections on the number of students that may be generated from the proposed 5,000 housing units:

<u>SCHOOLS</u>	<u>GRADES</u>	<u>STUDENTS</u>
Elementary	K-6	1,150 - 2,000
Intermediate	7-8	450 - 600
High	9-12	600 - 900

The estimates may be revised pending review of the types of housing units. The information has been requested from the R. M. Towill Corporation.

The four school sites (two elementary, one intermediate, and one high school) identified for the project are adequate to accommodate the projected school needs.

Please keep us informed of the development schedule.

Thank you for the opportunity to comment.

Sincerely,

Charles T. Toguchi

Charles T. Toguchi
Superintendent

CTT:j1 (WO)

cc E. Imai, OBS
E. Nakano, Leeward Dist.
R. Fukumoto, Housing Finance & Dev. Corp.

DEVELOPMENT COPY

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

JOHN WAIHEE
GOVERNOR



JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

88:DEV/397

January 29, 1988

MEMORANDUM

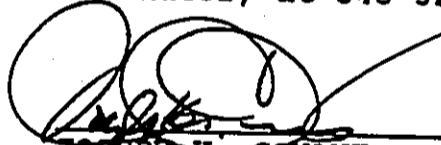
TO: The Honorable Charles T. Toguchi, Superintendent
Department of Education

FROM: Joseph K. Conant, Executive Director

SUBJECT: Kapolei Village Draft Environmental Impact Statement

Thank you for your comments of December 8, 1987 relating to the proposed Kapolei Village project. We appreciated your review of the document and the information you provided.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator, at 848-3240. Thank you again.


JOSEPH K. CONANT
Executive Director



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

January 7, 1988
RE: 0482

Dr. Marvin T. Miura
Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Draft Environmental Impact Statement
Kapolei Village
Ewa, Oahu

The above cited document proposes the development of a 5,000 unit residential complex on approximately 830 acres. The document discusses five alternative land uses and one recommended master plan. The recommended master plan includes 3722 single family units, 283 multi-family units, 173 assisted housing units, 255 rental housing units, 438 elderly housing units, one eighteen hole golf course, a park and ride facility, two commercial areas, various public schools and numerous recreational and park facilities. The proposed development is sited on land north of the Naval Air Station at Barber's Point, south of Farrington Highway and adjacent to Barber's Point Access Road. This development is sponsored by the State of Hawaii, Housing Finance and Development Corporation, therefore, approximately 60 percent of the units will be made available to low income families. This review was prepared with the assistance of Anders Daniels, Meteorology; P. Bion Griffin, Anthropology; Henry Gee, Edwin Murabayashi, and Yu-Si Fok, Water Resources Research Center; and Steven Armann, Environmental Center.

Water Supply

The Draft EIS is inadequate in addressing the impacts associated with providing water to Kapolei Village. At present the major portion of the water is imported from the Pearl Harbor Basin in the existing main. Water in the 30 inch main line of the Board of Water Supply (BWS) is obtained from various wells such as the Waipahu, Kunia and Hoesae wells. Although water is available in the vicinity of the project, the chloride levels are in the range of 250 mg/l, which is the recommended maximum concentration allowable. This water must be blended with lower chloride water from the Pearl Harbor Basin 30 inch main. A similar situation exists in the Makakilo water supply where water from well number 2004.04 is blended and pumped to a reservoir. This fact was not discussed in the Draft EIS.

ADDITIONAL OPPORTUNITIES EMPLOYER
DEVELOPMENT COPY

January 7, 1988

Local water blended with water from the Pearl Harbor Basin can be a viable alternative source in addition to desalinization. However, because the development in the Kapolei area will remove sugarcane from production and the agricultural water system maintained by Oahu Sugar Company will no longer be a source of groundwater recharge, any further removal of water from the aquifer aside from Makakilo well number 2004.04 and the Navy well number 2103.03 will increase the chloride concentration in all wells.

Other information not included in the Draft EIS is the water available based on the Ewa Water Master Plan. The two wells located mauka of the H-1 Freeway near Waipahu at the 440 foot elevation level are not mentioned. What is the water quality of these wells and what are their pumping capacities? Have the plans for a dual water system as described by Mike Warren, Manager of Residential/Resort Properties, at Campbell Estate, in March of 1986 been discarded or, is this still being considered a viable alternative method of water conservation?

Air Quality

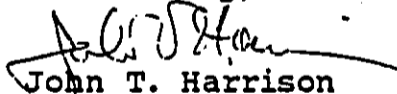
The air quality discussion is adequate with one exception. The EIS states on page 5-16, "As urbanization closes in around agricultural operations, complaints about air pollution will arise." The EIS simply treats this problem as being "infrequent and only lasts a few hours." Based on problems, complaints, and frequently voiced concerns of the population in urbanized areas next to cane fields such as Kihei, Maui and Hamakua on the Big Island, we are convinced that air pollution from cane fires will create serious problems for the proposed area which cannot simply be brushed off as "infrequent and lasting a few hours." We strongly recommend that this issue be addressed as one of the major impacts of the proposed development.

Archaeology

We find the archaeological survey to be adequate.

Thank you for the opportunity to comment on this Draft EIS. We hope our comments will be helpful in preparing the final document.

Yours truly,



John T. Harrison
Environmental Coordinator

cc: Russell N. Fukumoto ✓
L. Stephen Lau
Anders Daniels
Henry Gee
P. Bion Griffin
Edwin Murabayashi
Yu-Si Fok
Steven Armann

John Waihee
GOVERNOR



Joseph K. Conan
~~XXXXXXXXXXXX~~
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

February 3, 1988

88:DEV/479

Mr. John T. Harrison
Environmental Coordinator
ENVIRONMENTAL CENTER
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Mr. Harrison:

SUBJECT: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your comments of January 7, 1988 relating to the proposed Kapolei Village project. We appreciated your review of the document and the information you provided.

1. Water Supply. We appreciated the information you have provided and will include them as they are appropriate. The Kapolei Village plan does not include information relating to water source development and water availability because current water development planning has not reached a point where we can make definitive statements. We are exploring alternative water development scenarios which include joining the Ewa Water Development Corporation and the possibility of developing our own sources. The project as currently planned includes a verbal water commitment for 175,000 gallons per day which will be sufficient to supply water for 350 single family homes.

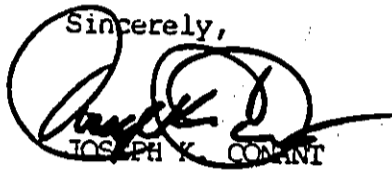
The plan does provide for the use of non-potable water for the irrigation of the golf course, other recreation areas, and along selected roadways.

2. Air quality. We apologize for the apparent glossing over of the cane burning issue. It was not our intent to suggest that it is not a serious problem. We recognize that cane burning can be a serious health problem and poses risks to those afflicted with respiratory illnesses. In the vicinity Mr. John T. Harrison of the project site prevailing winds will generally direct the smoke away from the project site (approximately 80% of the time). During "Kona" conditions, the smoke will be directed towards the project site until such time as sugar production is terminated in the area. As an interim measure, we will advise all potential homebuyers of this potential health hazard. In addition, we will consider taking down larger areas of land in our efforts to minimize the potential hazard.

Mr. John T. Harrison
February 3, 1988
Page 2

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator, at 848-3240. Thank you again.

Sincerely,

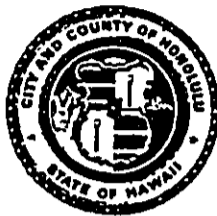


JOSEPH K. CONANT
Executive Director

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4492

FRANK F. FASI
MAYOR



JOHN P. WHALEN
DIRECTOR

LU11/87-6716(BM)

January 7, 1988

Marvin T. Miura, Ph.D.
Interim Director
Office of Environmental Quality Control
465 S. King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Comments on Draft EIS Proposed
Kapolei Village, TMK 9-1-16: 23, por. 25

Thank you for the opportunity to comment. We have the following comments:

1. Distribution of Housing Mix

The explanation of how many residential units will be dedicated for sale to elderly, very low income, low income, gap group, and other buyers who will purchase at market prices is unclear. The description of the number of units which will be set aside for rental units is also unclear. We suggest that tables be used to clearly summarize this information.

2. Cumulative Effect on Resources

The Draft EIS only describes the infrastructure connections that the project will have to the regional water, sewer, and drainage systems. A discussion is needed to indicate the cumulative impact on these regional systems.

The cumulative impact of the Kapolei Village project should be described considering the impacts of other projects in the region such as: 1) the West Loch housing project, 2) those included in the Ewa master Plan, 3) the Ewa Marina and 4) West Beach (Ko 'Olina).

DEVELOPMENT COPY

Dr. Marvin T. Miura
Page -2-

3. Alternatives

The "Alternatives to the Proposed Action" are merely different site configuration alternatives. Alternative sites were not discussed. We suggest that alternative sites be discussed and the process by which this particular site was selected be described. If there is a Housing Master Plan, this should be cited and/or included in the appendix.

4. Transportation

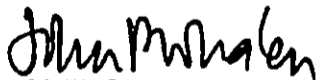
The transportation analysis included traffic volume predictions for Farrington Highway and H-1 Freeway. We suggest that the volume predictions be related to probable Levels of Service.

5. Agricultural Impact

The Draft EIS purports that increases in productivity and yield have increased faster than population growth and because of this and decreased population growth and genetic engineering advances, a withdrawal of land, labor and other resources is required to restore a balanced economic market. The extension of this logic seems to indicate that agricultural land should be continuously withdrawn for the sole purpose of balancing economic markets without regard to the fact that the land will be irretrievably lost for future agricultural development which may not be economically feasible at this point in time. We suggest that the section on Agricultural Impacts describe the permanent loss of Agricultural lands in terms of acres loss in terms of its ALISH (Agricultural Lands of Importance in the State of Hawaii) ratings, since this is undoubtedly a factor the State Land Use Commission will have to weigh in reaching a decision on this project.

If you have any questions regarding these comments, please call Bennett Mark of our Environmental Affairs Branch at 527-5038.

Very truly yours,



JOHN P. WHALEN
Director of Land Utilization

JPW:ap
0232N

cc: ✓ Russell N. Fukumoto,
HFDC

John Waihee
GOVERNOR



STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

February 3, 1988

Joseph K. Conant
~~XXXXXXXXXXXXXXXXXXXX~~
EXECUTIVE DIRECTOR

IN REPLY REFER

TO:

88:DEV/475

The Honorable John P. Whalen,
Director
Department of Land Utilization
City and County
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

SUBJECT: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your comments of January 7, 1987 relating to the proposed Kapolei Village project. We appreciated your review of the document and the information you provided.

Distribution of Housing Mix. We have included information in the Final EIS that addresses the housing mix for the project. The principal feature of this plan is the provision of at least 60 percent of the units being in the affordable category. Of the 60 percent, some will be available for sale, while others will be for rentals.

Cumulative Effect on Resources. The resultant impact of the proposed project as well as others planned for the region includes: a net overall increase in the total housing inventory for the island of Oahu and an overall increase in the demand for public facilities and services, e.g. water, wastewater, police, fire, roads, etc.. The opportunities for homeownership will certainly be enhanced by the development of this project.

Alternative Sites. The selection of the Kapolei Village site was the result of a site selection process that included the study of State lands and private holdings. The criteria used to select a suitable site was influenced by area available. We noted in our research that there were no large tracts of State lands available on Oahu. We selected the Kapolei site from others because it was part of a large scale planned community, its close proximity to existing infrastructure, and proposed Second Urban Center and the availability of large acreages of developable land.

The Honorable J. P. Whalen
February 3, 1988
Page 2

Transportation. We have reviewed the transportation plan and will include information relating to various levels of service.

Agricultural Impact. We acknowledge that the implementation of the proposed action will mean the permanent loss of agricultural land and the loss of opportunities for other uses. Land areas that will be withdrawn will be quantified in the Final EIS.

We did not intend to imply that agricultural lands are required to be withdrawn in light of advances in agricultural technology. Rather, agricultural land will be withdrawn because of changes in the economy and advances in technology.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator, at 848-3240. Thank you again.

Sincerely,



JOSEPH V. CORRENT
Executive Director

RECEIVED
STATE HOUSING
AUTHORITY
DEC 21 10 24 AM '87

December 16, 1987

Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Your Letter of November 23, 1987 on the Draft EIS
for Kapolei Village, TMK: 9-1-16: 23, Por. 25

Thank you for the opportunity to review and comment on the
proposed residential community development project.

We have the following comments:

1. A Water Master Plan should be submitted for our review and approval.
2. The source of potable water should be indicated in the EIS. Consideration should be given to using brackish water for landscape irrigation. (Ref. pp. 1-6, 2-9)
3. The second 30-inch transmission main will be installed by Campbell Estate. (Ref. p. 2-9, Fig. 7-2)

The construction of the future Kapolei 228 storage tank will be the responsibility of the developers of Kapolei Village and Campbell Estate not the BWS.

4. A new 2.8 mgd source will be required for the development, if the State's Housing Finance and Development Corporation chooses not to participate in the Ewa Regional Water Master Plan.
5. The term "coral" in the text should be changed to "limestone." (Ref. pp.5-6 to 5-11)

DEVELOPMENT COPY

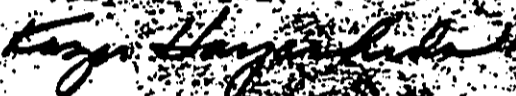
Mr. T. Mura, Interim Director
Page 2

December 16, 1987

- 6. The sources of water for the existing 30-inch main belong to the Board of Water Supply. The Makakilo Well was installed by Campbell Estate but was conveyed to the Board. (Ref. p. 7-3)

If you have any questions, please contact Lawrence Whang at 527-6138.

Very truly yours,



KAZU HAYASHIDA
Manager and Chief Engineer

cc: Russell N. Fukumoto
(Housing Finance and Development Corp.)

John Waihee
GOVERNOR



Joseph K. Conant
~~XXXXXXXXXXXX~~
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO:

February 3, 1988

88:DEV/472

The Honorable Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

RE: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your comments of December 16, 1987 relating to the proposed Kapolei Village project.

We appreciated your review of the document and the information you provided. The changes included in your comments will be included in the Final EIS. As noted in the Draft EIS a master plan for the water system in the area will be developed. This document will be forwarded to your office for review when it is completed.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph K. Conant".
JOSEPH K. CONANT
Executive Director

Mr. Marvin T. Miura, Ph.D.

-2-

December 10, 1987

3. We do not have any comments on the storm drainage system in addition to the prior "Ewa Drainage Study".

Very truly yours,

Sam Callejo

ES ALFRED J. TRIEDE
Director and Chief Engineer

cc: / Mr. Russell N. Fukumoto
Acting Executive Director
Housing Finance and Development Corp.

JOHN WAIHEE
GOVERNOR



JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

88:DEV/467

February 3, 1988

The Honorable Alfred J. Thiede
Director and Chief Engineer
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Thiede:

SUBJECT: Kapolei Village Draft Environmental Impact
Statement

Thank you for your comments of December 10, 1987 relating to the proposed Kapolei Village project.

We appreciated your review of the document and the information you provided. The corrections included in your comments will be included in the Final EIS. While not stated explicitly, it is our intention that all streets will be dedicated to the City and County of Honolulu.

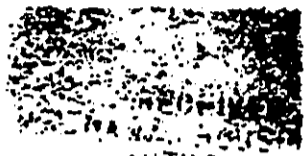
Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator, at 848-3240. Thank you again.

Sincerely,

A handwritten signature in dark ink, appearing to read "Joseph K. Conant".
JOSEPH K. CONANT
Executive Director

Suspense

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FILE 87-1001		8992			



HONOLULU FIRE DEPARTMENT
 1455 S. Beretania Street, Room 305
 DEC 9 4 20 PM '87 Honolulu, Hawaii 96814

December 7, 1987

Dr. Marvin T. Miura, Interim Director
 Office of Environmental Quality Control
 465 South King Street, Room 104
 Honolulu, Hawaii 96813

Dear Dr. Miura:

SUBJECT: KAPOLEI VILLAGE, EWA, OAHU



We have reviewed the Kapolei Village EIS and have no additional comments at this time.

Should you have any questions, please contact Battalion Chief Kenneth Word at 943-3838.

We are returning the report to the Office of Environmental Quality Control.

Sincerely,

Frank K. Kahooanohano

FRANK K. KAHOOHANOHAND
Fire Chief



FKK/RS

cc: Mr. Russell N. Furumoto
 Acting Executive Director
 Housing Finance and Development Corp.

DEVELOPMENT COPY

John Waihee
GOVERNOR



RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO: 88:DEV/161

January 13, 1988

The Honorable Frank K. Kahoohanohano
Fire Chief
Honolulu Fire Department
1455 South Beretania Street
Honolulu, Hawaii 96814

Subject: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL
IMPACT STATEMENT

Dear Chief Kahoohanohano:

Thank you for your comments of December 7, 1987 relating to the proposed Kapolei Village project.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

Sincerely,


RUSSELL N. FUKUMOTO
Acting Executive Director

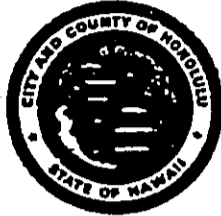
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DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
 HONOLULU, HAWAII 96813

DEC 18 4 20 PM '87
 AUTHORITY

FRANK F. PASI
 MAYOR



HIRAM K. KAMAKA
 DIRECTOR

DSSH 4309 (8/86)

Suspense

December 14, 1987

Dr. Marvin T. Miura, Interim Director
 Office of Environmental Quality Control
 465 South King Street, Room 104
 Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Environmental Impact Statement
 Kapolei Village - Ewa, Oahu
 Tax Map Key 9-1-16: 23 and Por. 25

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We have determined that the Environmental Impact Statement (EIS) for the Kapolei Village Development is acceptable. The recreational needs of the proposed development have been addressed with the establishment of a community park, neighborhood park and two community recreation centers.

Thank you for the opportunity to review the EIS.

Sincerely,

HIRAM K. KAMAKA, Director

HKK:ei

cc: ✓ Mr. Russell N. Fukumoto, Housing Finance & Development Company

DEVELOPMENT COPY

John Waihee
GOVERNOR



RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

TO: 88:DEV:159

January 13, 1988

The Honorable Hiram K. Kamaka
Director
Department of Parks and Recreation
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Kamaka:

SUBJECT: KAPOLEI VILLAGE DRAFT ENVIRONMENTAL
IMPACT STATEMENT

Thank you for your comments of December 14, 1987 relating to the proposed Kapolei Village project.

Your willingness to assist in the planning of this development is greatly appreciated. If you should have any questions or additional comments and suggestions, please direct them to Mr. Lloyd Haraguchi, Project Coordinator at 848-3240. Thank you again.

Sincerely,

A handwritten signature in cursive script, appearing to read "Russell N. Fukumoto".

RUSSELL N. FUKUMOTO
Acting Executive Director

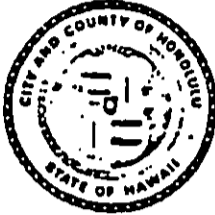
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POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1458 SOUTH WILHETANIA STREET
HONOLULU, HAWAII 96814 - AREA CODE (808) 943-3111

FRANK F. FASI
MAYOR

JAN 1 5 52 AM '88



DOUGLAS G. GIBB
CHIEF
WARREN FERREIRA
DEPUTY CHIEF

OUR REFERENCE SS-LK

December 28, 1987

Dr. Marvin T. Miura, Interim Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Environmental Impact Statement (EIS) for
Kapolei Village, Ewa, Oahu

We have reviewed the EIS for Kapolei Village and offer the following comments.

Kapolei Village, as a planned residential community, is estimated to increase population in the Ewa district by about 15,000 to 16,500 persons. Because of this projected increase in population, along with other development in the Central Oahu and Leeward areas, we can expect much greater demands for police services. Our ability to accommodate and service the needs of the public will depend primarily upon the availability of sufficient manpower, equipment and communications.

We can also expect greater strain on our already congested freeways. We support the inclusion of a park-and-lock facility and recommend work with MTL to insure that sufficient express buses are made available.

We would also encourage developers to make a collaborative effort at pulling together their resources and ideas in seeking solutions to our traffic problems.

Thank you for the opportunity to provide comments.

Sincerely,

Handwritten signature of Douglas G. Gibb in cursive.

DOUGLAS G. GIBB
Chief of Police

cc: Russell N. Fukumoto

DEVELOPMENT COPY

JOHN WAIMEE
GOVERNOR



JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

88:DEV/400

January 29, 1988

The Honorable Douglas G. Gibb
Chief of Police
Honolulu Police Department
City and County of Honolulu
1455 South Beretania Street
Honolulu, Hawaii 96814

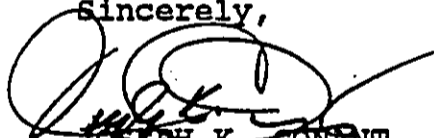
Dear Chief Gibb:

SUBJECT: Kapolei Village Draft Environmental Impact
Statement

Thank you for your comments of December 28, 1987 relating to
the proposed Kapolei Village project.

Your willingness to assist in the planning of this development
is greatly appreciated. If you should have any questions or
additional comments and suggestions, please direct them to
Mr. Lloyd Haraguchi, Project Coordinator, at 848-3240. Thank
you again.

Sincerely,


JOSEPH K. CONANT
Executive Director

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU

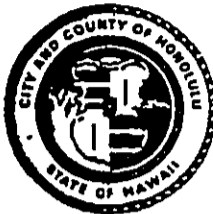
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HONOLULU, HAWAII 96813

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APPROVED

DEC 29 11 15 AM '87



FRANK F. FASI
MAYOR

DONALD A. CLEGG
CHIEF PLANNING OFFICER

GENE CONNELL
DEPUTY CHIEF PLANNING OFFICER

KK/DGP 11/87-4072

December 24, 1987

Honorable Marvin T. Miura, Director
Office of Environmental Quality Control
State of Hawaii
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Draft Environmental Impact Statement for the
Proposed Kapolei Village Development, Ewa, Oahu

We have reviewed the subject Draft Environmental Impact Statement and have found that most of the concerns we presented on the EIS Preparation Notice have been addressed. We feel, however, that other measures or conditions which may relieve the projects impact on downstream H-1 traffic congestion should be discussed.

In addition to the recommended park and ride facility and High Occupancy Vehicle (HOV) lanes the City is proposing a rail transit system tentatively planned to extend from Honolulu to Waipahu. This proposed transit system may be extended to the Ko Olina resort area as development and ridership estimates increase.

The creation of a major employment center in Ewa, the secondary urban center, should help to balance traffic using the H-1 Freeway by reversing some of the traffic flow from the east bound to the west bound (Ewa) direction in the morning hours. This would increase traffic traveling in the presently underutilized Ewa bound traffic lanes on the H-1 Freeway.

In our review we also found the following substantive errors:

1. On page 1-5 in the last sentence under "Socio-Economic Conditions" the "55,000 units" should be "5,000 units."

DEVELOPMENT COPY

Honorable Marvin T. Miura, Director
Office of Environmental Quality Control
Page 2
December 24, 1987

2. Page 4-7 appears twice with differing versions of the "Housing Plan" and "Health Plan." It seems that the first page 4-7 should be deleted.
3. On page 5-17 in the last paragraph the phrase "and it is recommended that full archaeological work of any kind is necessary" should be deleted in that it contradicts the rest of the paragraph and the appended archaeological study.
4. On page 6-1 and 8-5 under "Future Projections" and "Socio-Economic Impacts" respectively the phrase "from 47,000 to 83,000" should be revised. The 47,000 figure represents the increase over the existing 1980 population of 36,234.
5. On page 7-2 the second to the last paragraph should be revised. Please contact the Bus Systems Division of the Department of Transportation Services for the current bus routes in the Ewa area.

Thank you for giving us an opportunity to comment on this matter.

Donald A. Clegg

DONALD A. CLEGG
Chief Planning Officer

cc: Mr. Russell N. Fukumoto, Acting Executive Director
Housing Finance and Development Corp.

JOHN WAIHEE
GOVERNOR



JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. BOX 17907
HONOLULU, HAWAII 96817

IN REPLY REFER

88:DEV/399

January 29, 1988

Mr. Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

SUBJECT: Kapolei Village Draft Environmental Impact
Statement

Thank you for your comments of December 24, 1987 relating to
the proposed Kapolei Village project.

We appreciated your review of the document and the information
you provided. The corrections noted in your comments will be
included in the Final EIS.

Your willingness to assist in the planning of this development
is greatly appreciated. If you should have any questions or
additional comments and suggestions, please direct them to
Mr. Lloyd Haraguchi, Project Coordinator, at 848-3240. Thank
you again.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph K. Conant", written over a circular stamp or seal.
JOSEPH K. CONANT
Executive Director

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REFERENCES

REFERENCES

1. General Plan, Objectives and Policies, December 8, 1982, City and County of Honolulu.
2. Development Plan, Special Provisions for Ewa, City and County of Honolulu.
3. West Loch Estates Environmental Impact Statement, Department of Housing and Community Development, City and County of Honolulu, October 1986.
4. Kapolei Village Master Plan Report, Housing Finance and Development Corporation, State of Hawaii, October 1987.
5. Kapolei Town Center Environmental Assessment, The Estate of James Campbell, December 1986.
6. Chapter 226, Hawaii Revised Statutes, An Act Relating to the Hawaii State Plan, approved May 29, 1986.
7. State Housing Functional Plan, Hawaii Housing Authority, State of Hawaii, June 1984.
8. State Transportation Functional Plan, Department of Transportation, State of Hawaii, June 1984.
9. State Recreation Functional Plan, Department of Parks and Recreation, State of Hawaii, June 1984.
10. State Educational Functional Plan, Department of Education, State of Hawaii, May 1985.
11. State Health Functional Plan, Department of Health, State of Hawaii, June 1984.
12. State Agriculture Functional Plan, Department of Agriculture, State of Hawaii, June 1985.
13. Data Book 1986: A Statistical Abstract, Department of Planning and Economic Development, State of Hawaii, 1986.
14. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, Washington D.C., August 1972.
15. Detailed Land Classification - Island of Oahu, University of Hawaii, Honolulu, Hawaii 1972.
16. Memorandum: Soils Info for Kapolei Village, Department of Agriculture, State of Hawaii, September 25, 1987.
17. Air Quality Impact Report, Secondary Urban Center, Ewa, Oahu, J. W. Morrow, Environmental Management Consultant, April 27, 1987.

APPENDICES

APPENDIX A

Noise Study:
Darby & Associates, Acoustical Consultants

05/04/1987

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION
KOAULU INTERNATIONAL AIRPORT - HONOLULU HAWAII

August 6, 1987

PREPARED

AUG 12 1987

DARBY & ASSOCIATES.

MR. RUSSELL N. FUKUMOTO, EXECUTIVE DIRECTOR
HAWAII HOUSING AUTHORITY

MR. LLOYD HARAGUCHI

AIRPORTS ADMINISTRATOR

SUBJECT: KAPOLEI VILLAGE, EWA, OAHU, HAWAII

Mr. Russell N. Fukumoto
August 6, 1987
Page 2

The above conclusions of the Darby & Associates study are not supported by the results reported in the study for the following reasons:

1. All of the aircraft flight tracks and noise contributors modeled by the 1984 AICUZ were not considered in the Darby study. Specifically, these tracks which were included in the 1984 AICUZ, but not in the Darby study, are Tracks 25, 34, 39(HIA), and all jet departure noise contributions from NAS, BP RWY 04R. The Darby study did not include the same inputs as reported in the 1984 AICUZ, or supporting calculations to substantiate the insignificance of the track omissions on the computed Ldn values at Location A. Unless this degree of thoroughness is undertaken to include all significant noise contributors into the cumulative Ldn computations on the project site, the Darby study cannot be interpreted as providing the worst case Ldn values in the project site.

2. Because only a single Location A was evaluated in the Darby study, and because the combined aircraft noise exposure from NAS, BP, and HIA aircraft may be greatest along the southern boundary of the project, the conclusion that no Ldn 60 or Ldn 65 'arm' would extend over the project and therefore the project site should be exposed to less than Ldn 60 has not been demonstrated in the Darby study. The necessity for inclusion of HIA ILS Track 39 and NAS, BP departure tracks from RWY 04R, as was done in the 1984 AICUZ, is more obvious along the southern boundary of the project than at Location A.

3. In studies of this type, where significant policy or land use decisions could be formulated from the conclusions of the study, a greater reliance should be placed on measured sound exposure data rather than published, generic, or assumed data (or aircraft power settings). This is particularly true if conclusions are to be made within 2.3 Ldn tolerance of the 60 Ldn planning threshold. The use of measured sound exposure data should have been used to support the study purpose to objectively review and comment on the 1984 AICUZ and the Parnell Associates, Inc. report.

The information provided in the subject report by Darby & Associates, does not support the following conclusions contained in Paragraph 7.0 Summary: "In this analysis, a simplified technique to estimate the worst case Ldn values in the project site is developed. The technique is essentially validated by using the same inputs as reported in the 1984 AICUZ by showing that, under those assumptions, an Ldn 65 contour 'arm' would exist over the project site. Then, an independent estimate of worst case Ldn values is made using aircraft noise source levels and averaging techniques that I believe to be reasonable based on my experience and upon data from the literature. The result of these calculations indicate that there should not be sufficient aircraft noise impact to place constraints on residential housing in the project according to local and federal guidelines." The additional conclusion at the bottom of Page 3 is not substantiated by the study: "The final resultant Ldn of 57.7 db implies that no Ldn 60 or Ldn 65 'arm' would extend over the project and therefore the project site should be exposed to less than Ldn 60."

DEVELOPMENT COPY

Mr. Russell N. Fukumoto
August 6, 1987
Page 3

4. The source of Darby's information regarding the civil aircraft source noise, or "SEL value reportedly used in the AICUZ," should be disclosed because of the apparent significance of the assumptions on his results. Was the source a personal, first-hand examination of the 1984 AICUZ computer model input listing, information provided by the Navy or its representatives, or Campbell Estate or its representatives?
5. Similar disclosure by Darby should be made of the method in which the 100% P-4 aircraft and P-3 power settings were confirmed to have been used in the 1984 AICUZ ("Similar power settings and SEL's were apparently used in the 1984 AICUZ," para 4, page 4). If the source of the information was Campbell Estate as indicated in TABLE I (Reference 4) of the Darby report, then the conclusions may not be Darby's but a restatement of Campbell Estates' conclusions by Darby.

Should there be any questions, please contact Mr. Dean Nakagawa of my staff at 836-6526.


OHEN MIYAMOTO



Hawaiian Housing Authority
1002 North School Street
Honolulu, Hawaii 96817

Attention: Mr. Lloyd Haraguchi

Subject: Response to DOT's Comments on Report "Aircraft Noise Impact
Evaluation on Proposed Resort Development in Honolulu", Ewa,
Oahu, Hawaii" dated December 30, 1986 - Kow Kapolei Village.

Dear Mr. Haraguchi:

On August 12, 1987, I received a copy of a letter to R. Fukumoto (attentioned to you) from O. Miyamoto dated August 6, 1987. The letter comments on the subject report dated December 30, 1986. Between August 17 and 20th, I had phone conversations with Mr. Dean Nakagawa, Airports Division, DOT, and now have the following understanding:

1. DOT played a "devil's advocate's" role in evaluating the subject report and did not realize that it represented a very short study completed within a two-and-one-half week period based upon the two AICUZ documents and any additional supporting data provided by Campbell Estate within that time period. It is to be noted that the report is dated December 30, 1986 and the opening sentence references a proposal dated December 12, 1986. Also, it was explained that our agreement was that I would provide "no opinions on the various legal issues involved" and that no aircraft noise measurements would be made and that no new noise contours would be developed (reference 1).

2. DOT would like to see a thorough evaluation of the combined HIA and BPHAS noise impact, but DOT does not intend to perform such a study because of the current litigation between Campbell Estate and the Navy.

3. That we can use preliminary data being developed in the FAA Part 150 Noise Compatibility Study for HIA to evaluate the Kapolei situation in greater detail.

With this understanding, I respond to the comments as follows:

A. Comment 3; page 2:

"3. In studies of this type, where significant policy or lend use decisions could be formulated from the conclusions of the study, a greater reliance should be placed on measured sound exposure data rather than published, generic, or assumed data (or aircraft power settings). This is particularly true if conclusions are to be made within 2.3 Ldn tolerance of the 60 Ldn planning threshold. The use of measured sound exposure data should have been used to support the study purposes "to objectively review and comment on" the 1984 AICUZ and the Parnell Associates, Inc. report."

Response - As mentioned above, noise level measurements were not within the scope of the short study. I concur that SEL measurements should be obtained for fine tuning a computer model, but common sense and engineering judgement should also be used in cases where large discrepancies exist in different computer studies based upon the same input data. Furthermore, even if there was a large bank of measured SEL's along with their statistical parameters, there are still basic problems (that were addressed in the report, but not commented upon) in averaging together the sporadic events dominating the military flight operations at BPHAS along with the relatively steady stream of operations into HIA. The persons making final decisions concerning land use may not wish to base their decisions on fine-line contours representing complexly averaged day-night noise levels compared to an Ldn threshold; but may consider the fact that more than one-half of the F-4 operations in 1982 apparently occurred within a single period of less than one month; that one F-4 afterburner overflight can equal 832 P-3 overflights in noise dose; and that the BPHAS operations typically do not occur on week-ends when most people are home enjoying their outdoor style of Hawaiian living, etc.

B. Comments 4 and 5, page 3:

"4. The source of Darby's information regarding the civil aircraft source noise, or "SEL value reportedly used in the AICUZ" should be disclosed because of the apparent significance of the assumptions on his results. Was the source a personal, first-hand examination of the 1984 AICUZ computer model input listing, information provided by the Navy or its representatives, or Campbell Estate or its representatives?

5. Similar disclosure by Darby should be made of the method in which the 100% F-4 aircraft and P-3 power settings were confirmed to have been used in the 1984 AICUZ ("Similar power settings and SEL's were apparently used in the 1984 AICUZ," para. 4, page 4). If the source of the information was Campbell Estate as indicated in TABLE I (Reference 4) of the Darby report, then the conclusions may not be Darby's but a restatement of Campbell Estates' conclusions by Darby."

Response - As mentioned above, the subject report was to evaluate the two AICUZ documents and any supporting information provided by Campbell Estate essentially within a one-week period at the beginning of the study. I obviously was aware of the fact that I couldn't substantiate the validity of the data and entitled it "as Reported in the 1984 AICUZ Document". The data was basically in a handout packet entitled "Campbell Estate - Navy Lawsuit Discussion Summary" dated December 15, 1986. It also included four worksheets showing Tracks 02 and 07 with P3, C130, helicopters and U48 aircraft with power setting distances, SEL values, etc. apparently done by a knowledgeable consultant. No "first-hand examination of the 1984 AICUZ computer model input listing" was provided. On December 23, 1986, Mr. Clint Churchill also provided me in a phone conversation with SEL data associated with F-4, A-4, and T-33 aircraft at various generic aircraft operational modes. In the report, this compendium of information was called reference 4 - "Miscellaneous documents and data provided by Campbell Estate in December 1986."

In response to the comment that the conclusions may not be mine, "but a restatement of Campbell Estate's conclusions by Darby"; I can only respond as a technical specialist in that if the flight tracks are fixed; the aircraft types and number of operations are fixed; the altitude is fixed; how can relatively high L_{dn} values emerge unless there are relatively high SEL values, and therefore high thrust values, etc.? As mentioned above, the report was not to get involved with legal issues; but these non-technical legalistic comments by a party who publically is on-record to stay out of the litigation are confusing.

C. Comments 1 and 2, page 2:

- "1. All of the aircraft flight tracks and noise contributors modeled by the 1984 AICUZ were not considered in the Darby study. Specifically, these

tracks which were included in the 1984 AICUZ, but not in the Darby study, are Tracks 25, 34, 39 (HIA), and all jet departure noise contributions from NAS, BP, RMY OAR. The Darby study did not include "the same inputs as reported in the 1984 AICUZ" or supporting calculations to substantiate the insignificance of the track omissions on the computed L_{dn} values at Location A. Unless this degree of thoroughness is undertaken to include all significant noise contributors into the cumulative L_{dn} computations on the project site, the Darby study cannot be interpreted as providing "the worst case L_{dn} values in the project site."

2. Because only a single Location A was evaluated in the Darby study, and because the combined aircraft noise exposure from NAS, BP, and HIA aircraft may be greatest along the southern boundary of the project, the conclusion "that no L_{dn} 60 or L_{dn} 65 'arm' would extend over the project and therefore the project site should be exposed to less than L_{dn} 60" has not been demonstrated in the Darby study. The necessity for inclusion of HIA ILS Track 39 and NAS, BP departure tracks from RMY OAR, as was done in the 1984 AICUZ, is more obvious along the southern boundary of the project than at Location A."

Response - In my opinion, the short study included enough significant noise contributors in the cumulative L_{dn} computations on the project site to make a rational judgement. It did not include Tracks 25, 34, and all jet departures from OAR nor did it include the HIA ILS track. What is the basis that these aircraft operations are significant? Why didn't DOT demonstrate a "degree of thoroughness" and provide typical L_{dn} contributions from these tracks? Are the commenters willing to assume that insignificant contributions arise from any other airport operations at BPHAS and HIA?

The worst case L_{dn} values on the project site obviously occur where the highest L_{dn} values exist, e.g. greater than 65 L_{dn} and where two major tracks intersect which generate the high L_{dn} values. This is where location "A" was chosen for exercising the simplified technique. What is the basis for stating that the inclusion of the HIA ILS, BPHAS departures from Runway OAR is more obvious along the southern boundary of the project than at location "A"?

In the spirit of pursuing L_{dn} contour evaluations, we have evaluated the other aircraft operations cited in the comments. The problem is complicated by the AICUZ studies using the military's Noise Map computer model while DOT

Hawaiian Housing Authority
Attn: Lloyd Haraguchi

September 10, 1987
Page 5

studies utilize FAA Integrated Noise Model (INM) and difference will exist when fine line comparisons are made due to the two different models.

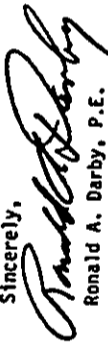
Figure 1 shows the resulting noise contours when the BPHAS touch-and-go operations are based on the FAA's INM procedure. In these contours, the engine thrust levels and SEL's are pre-established by the model. Because this technique doesn't honor the 1,000-foot level flight involved in the touch-and-go; the INM was rerun by redefining the touch-and-go operations in more detail. Figure 2 shows these results. Both sets of noise contours do not indicate that 60 L_{dn} is exceeded on the project site. Thus, the contours substantiate the judgements made in the report. Enclosures 1 through 3 are computer model output for first-hand examination. Figure 3 shows the aircraft flight tracks considered.

There are no known aircraft SEL measurements on the project site. However, HIA data obtained at locations "A" and "B" (shown in Figure 3) from reference 2 are tabulated in Tables I and II to validate the HIA ILS traffic noise. The table also compares values from the most recent preliminary HIA INM data from reference 2. Table III shows comparisons at location "A" in the original study (redefined as location "C") between the simplified manual effort and the INM data.

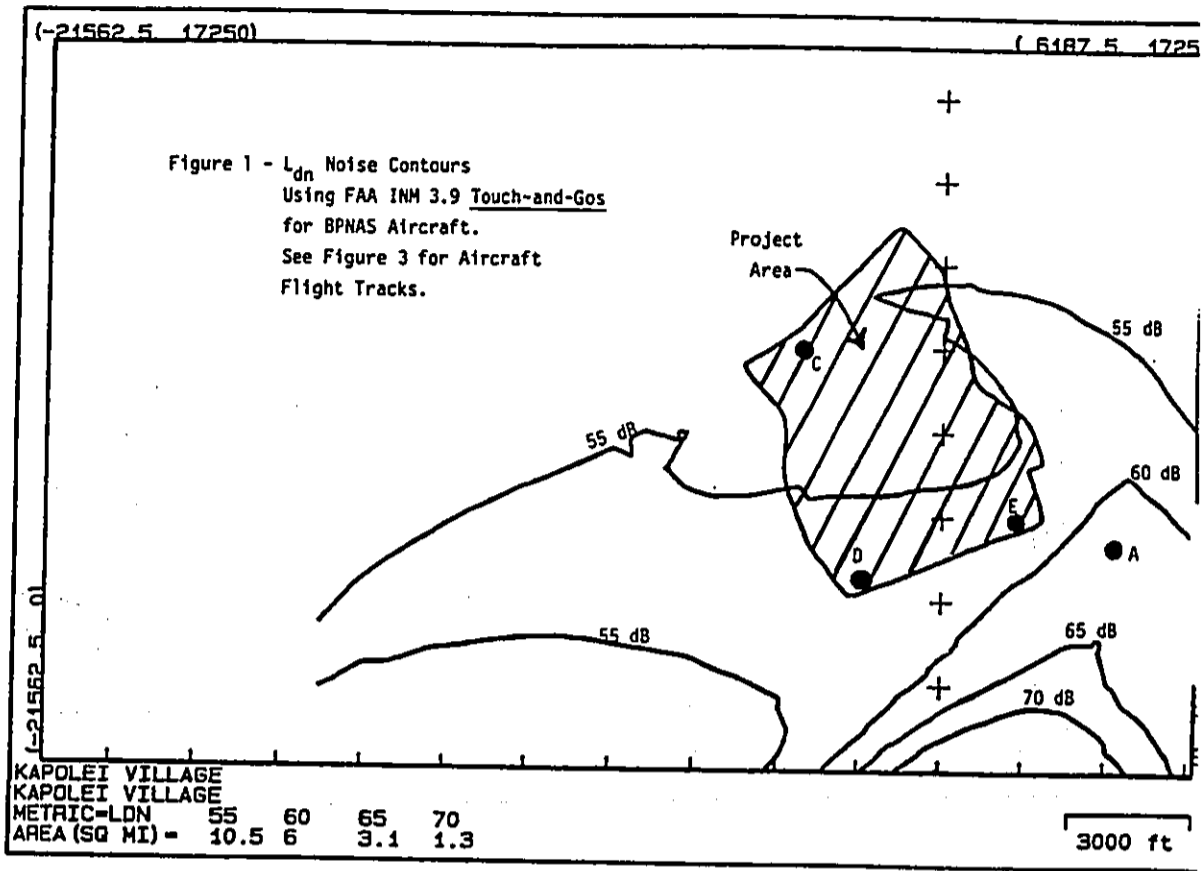
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enc's.

- References:
1. Letter to L. Haraguchi from R. Darby dated December 12, 1986.
 2. "Inventory of Existing Noise Mitigation Programs and Noise Map Information", Draft - "HIA Master Plan Update and Noise Compatibility Program", March 1987.

Sincerely,



Ronald A. Darby, P.E.



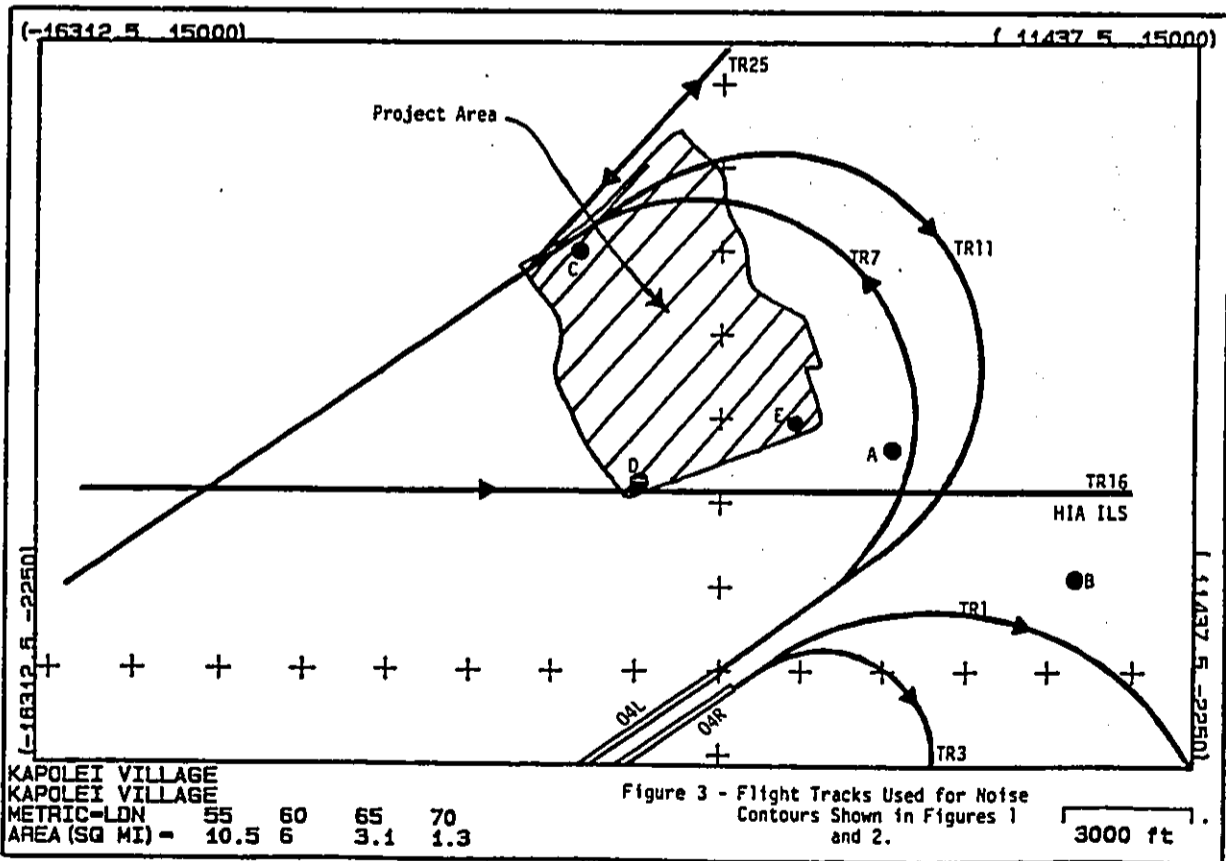
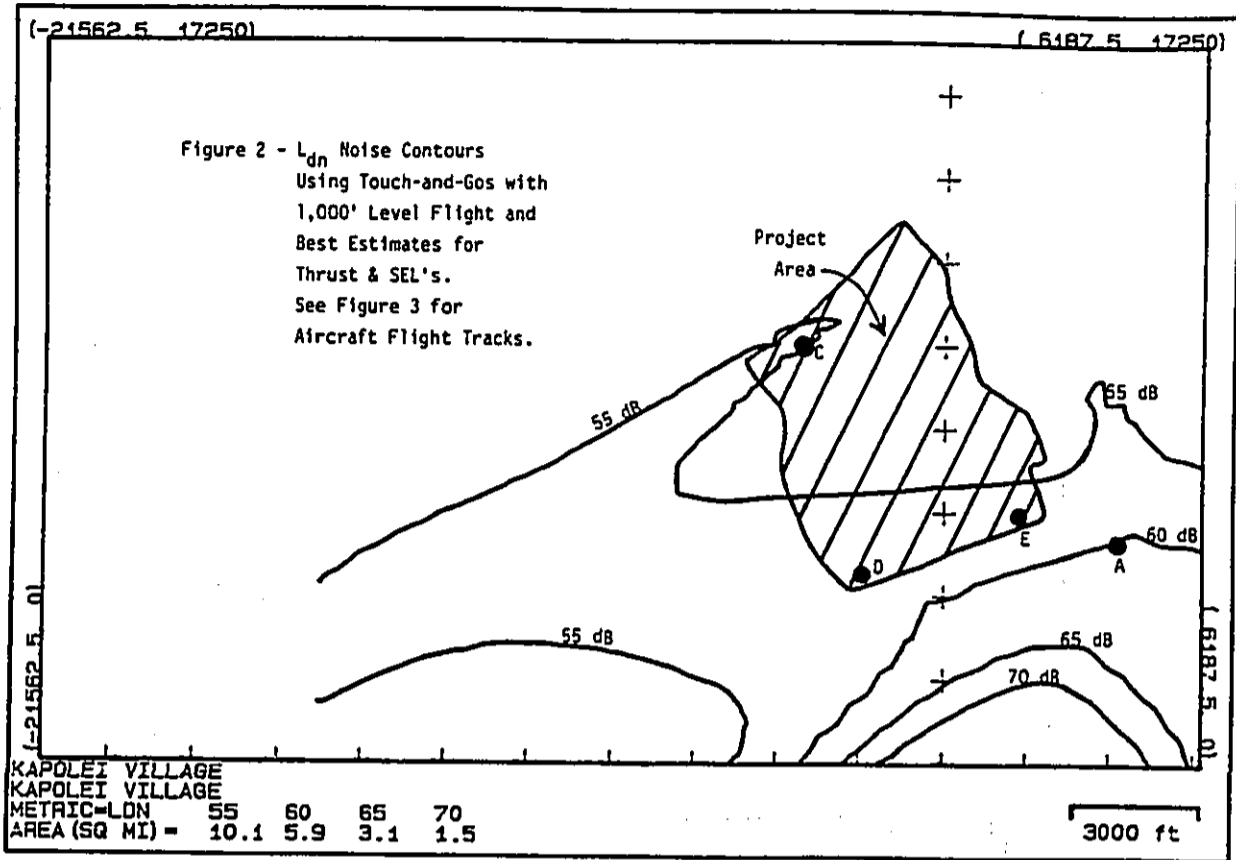


Table I - Comparisons of SEL Values for INM Kapolei Study and SEL Values in Preliminary DOT Study for HIA (ref. 2)
(Applicable to HIA ILS for Noise Contours in Figures 1 and 2.)

LOCATION A											
Preliminary DOT INM for HIA (TR 16, 17 & 19)				Kapolei INM Study (TR 16)					Measured Prelim. DOT for HIA		
A/C	OPS D/N	SEL	L _{dn} Contrib.	A/C	OPS D/N	SEL	ΔSEL ₁	L _{dn} Contrib.	SEL	ΔSEL ₂	
F4 HIA	8.1	92.7	52.4	F4 HIA	10.3	92.9	+0.2	53.7	92.7	+0.2	
C5A	1.6	98.6	50.1	C5A	1.8	99.2	+0.6	52.6	94.3	+4.9	
C141	6.6	89.1	46.7	C141	5.3 / .1	89.7	+0.6	48.0	84.8	+4.9	
KC 135	3.8	94.2	49.7	KC 135	3.9	96.3	+2.1	52.8	--	--	
747 10A 747 20A	16.8	85.9	47.8	747 100	16.8	86.2	+0.3	49.0	85.2	+1.0	
DC 101A DC 103A	9.7	82.9	45.4	DC 1010	19.3	80.2	-2.7	43.6	81.3	-1.1	

$$\Delta SEL_1 = SEL_{(INM Kapolei)} - SEL_{(INM DOT)}$$

$$L_{dn(INM DOT)} = 58.1 \text{ dB}$$

$$\Delta SEL_2 = SEL_{(INM Kapolei)} - SEL_{(Meas. DOT)}$$

$$L_{dn(INM Kapolei)} = 58.9 \text{ dB}$$

Table II - Comparisons of SEL Values for INM Kapolei Study and SEL Values in Preliminary DOT Study for HIA (ref. 2)
(Applicable to HIA ILS for Noise Contours in Figures 1 and 2.)

LOCATION B											
Preliminary DOT INM for HIA (TR 16, 17, 18 & 19)				Kapolei INM Study (TR 16)					Measured Prelim. DOT for HIA		
A/C	OPS D/N	SEL	L _{dn} Contrib.	A/C	OPS D/N	SEL	ΔSEL ₁	L _{dn} Contrib.	SEL	ΔSEL ₂	
F4 HIA	8.4	91.3	51.1	F4 HIA	10.3	92.3	+1.0	53.1	87.9	+4.4	
C5A	1.6	97.5	50.1	C5A	1.8	97.1	-0.4	50.5	--	--	
C141	6.6	87.9	46.7	C141	5.3 / .1	87.5	-0.4	45.8	88.3	-0.8	
KC 135	3.8	93.2	49.6	KC 135	3.9	93.7	+0.5	49.9	91.9	+1.8	
747 10A 747 20A	16.8	84.9	47.8	747 100	16.8	84.4	-0.5	47.2	83.6	-2.4	
DC 101A DC 103A	19.3	81.9	45.4	DC 1010	19.3	78.8	-3.1	42.3	81.6	-2.8	

$$\Delta SEL_1 = SEL_{(INM Kapolei)} - SEL_{(INM DOT)}$$

$$L_{dn(INM DOT)} = 57.6 \text{ dB}$$

$$\Delta SEL_2 = SEL_{(INM Kapolei)} - SEL_{(Meas. DOT)}$$

$$L_{dn(INM Kapolei)} = 57.2 \text{ dB}$$

Table III - Comparisons of SEL Values from TR7 from Kapolei Studies, Manual vs. INM. (Applicable to BPNAS Aircraft in Noise Contours in Figure 2.)

LOCATION C

← Kapolei Manual Study Using Noise Map Data				→ Kapolei INM Study				
A/C	OPS	SEL	L _{dn} Contrib.	A/C	OPS	SEL	SEL	L _{dn} Contrib.
P3	14.6	92.7	54.9	"C130"	14.6	88.5	-4.2	50.7
C-130	4.5	90.7	47.8	C130	4.5	88.5	-2.2	45.6
A-4	0.3	88.7	33.3	"A70"	0.3	92.7	+4.0	37.3
F-4	0.1	102.7	42.8	"F4C"	0.1	102.4	-0.3	42.6
T-33	0.2	87.1	29.7	"A70"	0.2	92.7	+5.6	35.1
Civ11	4.2	75.0	49.9	"Comsep"	4.2	76.5	+1.5	33.4
H-52/53	2.6	95.2	46.5	"CH53"	2.6	88.3	-6.9	43.1
CH-46/47	0.6	98.0	38.2	"CH47"	0.6	96.1	-1.9	44.6
H-1/58	1.2	87.0	31.9	"UH1"	1.2	87.6	+0.6	38.9
U-11	Neglected			BEC58p	0.6	81.7		30.5
O-2								
C-12								
C-7								
Misc.								

L_{dn} (Manual Study) = 57.3 dB

L_{dn} (INM Study) = 55.1 dB

PAGE 1

ENCLOSURE 1

LOCATION "A"

Applicable to Noise Contours in Figure 2

INTERPOLATED NOISE MODEL - RETIARDED GEAR ANALYSIS REPORT

1. R. 451.0	Y. 500.1
2. RETIARDED GEAR	INM. 44.0

ALTERNATE	PERCENTILE	MODE	PROB	ENTR	STAGE	APPROACH	TYPE	TIME	PSYCH	SEL	OPS	ENTR	CONTRIB
F001	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	16.3	0	.5387E+02
F002	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	3.9	0	.5203E+02
F003	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	1.8	0	.5203E+02
F004	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	15.0	0	.5203E+02
F005	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	16.0	0	.5203E+02
F006	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F007	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F008	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F009	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F010	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F011	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F012	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F013	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F014	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F015	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F016	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F017	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F018	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F019	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F020	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F021	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F022	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F023	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F024	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F025	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F026	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F027	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F028	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F029	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F030	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F031	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F032	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F033	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F034	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F035	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F036	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F037	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
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F039	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F040	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F041	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
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F090	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F091	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+02
F092	PROLON	0	0.5%	77001	0	0	0	1115	228	92.5	0	0	.5203E+0

L = 0770. Y = 2040. Z = 1000. METRIC LM TOTAL = 55.1

ENCLOSURE 2 LOCATION "B"

Applicable to Noise Contours in Figure 2

Table with columns: AIRCRAFT, PROFILE, APPROX. NOISE, I AND S FLIGHT, OPERATIONS, CONTRIBUTION. Lists aircraft types like B737, B738, B777, etc., and their noise contributions.

PEAK LEVEL = 79.3

Summary table showing metrics: NUMBER OF FLIGHTS, NUMBER OF OPERATIONS, etc., with values for different aircraft types.

Note: TR16-RNHV 22R 1s HIA TLS

L = 0770. Y = 1000. Z = 1000. METRIC LM TOTAL = 55.1

ENCLOSURE 3 LOCATION "C"

Applicable to Noise Contours in Figure 2

Table with columns: AIRCRAFT, PROFILE, APPROX. NOISE, I AND S FLIGHT, OPERATIONS, CONTRIBUTION. Lists aircraft types like B737, B738, B777, etc., and their noise contributions.

PEAK LEVEL = 106.5

Summary table showing metrics: NUMBER OF FLIGHTS, NUMBER OF OPERATIONS, etc., with values for different aircraft types.

Note: TR16-RNHV 22R 1s HIA TLS

APPENDIX B

Traffic Study:
Parsons, Brinckerhoff, Quade and Douglas, Inc.

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TRAFFIC IMPACT STUDY

KAPOLEI VILLAGE
Ewa, Oahu, Hawaii

October 1987

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Prepared for:

Housing Finance and Development Corporation

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Prepared by:

Parsons Brinckerhoff Quade and Douglas, Inc.

KAPOLEI VILLAGE

TMK 9-1-16:23 & 25

TRAFFIC IMPACT STUDY

EXISTING CONDITIONS

The project site is on the Ewa Plain on leeward Oahu and is situated between Makakilo and the Naval Air Station at Barbers Point (Figure 1). Presently, Oahu Sugar Company uses the land to grow sugarcane and there is no public vehicular access into the project site.

INTRODUCTION

The State of Hawaii's Housing Finance and Development Corporation, in conjunction with the City and County of Honolulu's Department of Housing and Community Development, has proposed to develop a residential community on approximately 850 acres near the center of the Ewa Plain on leeward Oahu. The project includes approximately 4,940 residential dwelling units, commercial areas, a golf course, and sites for churches, schools and parks. This report summarizes the findings of an evaluation of the traffic impacts of the proposed project. Other developments proposed in the Ewa area which will contribute to traffic in the vicinity of the proposed project have also been considered. Recommendations for transportation system improvements are provided.

Roadway System

Farrington Highway forms the northern boundary of the project site. It is presently a two-lane rural highway with a 20-foot wide pavement structure and connects to the east to Waipahu; to the west, the two-lane highway ties to a four-lane Farrington Highway at the Palalal Interchange with the H-1 Freeway.

Barbers Point Access Road (also referred to as Fort Barrette Road) forms the western boundary of the project site and serves the main gate to the Barbers Point Naval Air Station. This two-lane highway becomes wider as it nears Farrington Highway, which it crosses at-grade in a signalized intersection. The present intersection includes turn lanes and a demand-actuated traffic signal system. Mauka of the intersection, the road continues up to Makakilo as the six-lane Makakilo Drive, crossing over the H-1 Freeway at Makakilo Interchange. Ramps provide connections toward Honolulu to/from both the makai and mauka directions. However, connections to or from Waianae are made via Farrington Highway and Palalal Interchange, located approximately one mile to the west.

Waimanalo Road, a private agricultural road used by the Oahu Sugar Company to transport harvested sugarcane from the site and fields located to the west of the site, bisects the project site

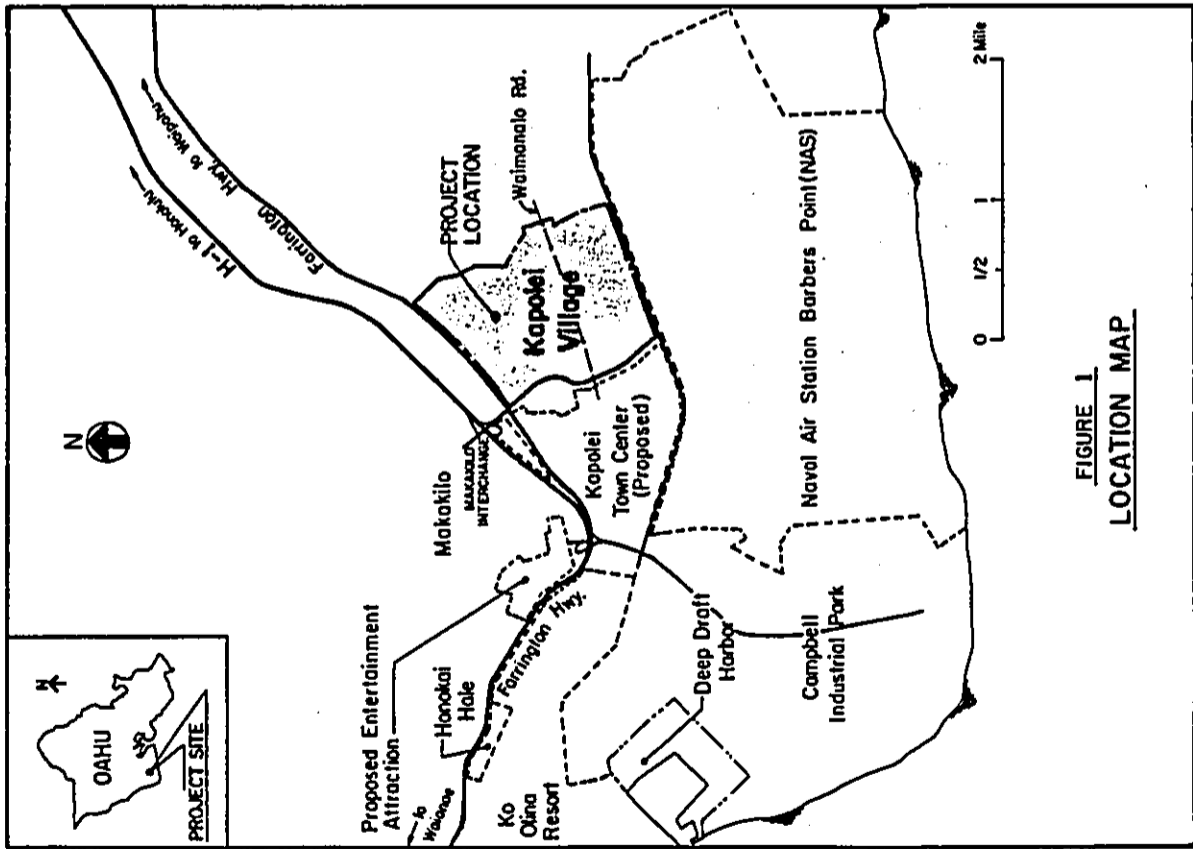


FIGURE 1
LOCATION MAP

in a east-west direction. Waimanalo Road is a two-lane paved roadway which crosses Barbers Point Access Road at a signalized intersection.

Traffic Conditions

In the vicinity of the project site, the existing roadways operate well during peak periods. Traffic on Farrington Highway, west of Barbers Point Access Road, exhibits directional splits during peak periods typical of suburban commuter routes. The existing two-way peak hour traffic volumes on this portion of Farrington Highway are between 500 and 600 vehicles per hour. East of Barbers Point Access Road, eastbound and westbound traffic are almost evenly distributed. The major employment areas at Campbell Industrial Park and NAS Barbers Point attract traffic during the morning which balances the eastbound commuter traffic produced in residential areas. Highest hourly traffic on Farrington Highway adjacent to the project site occurs in the afternoon, with a two-way volume of 580 vehicles per hour, or approximately one-third of the highway's capacity.

The section of Barbers Point Access Road adjacent to the project site carries a two-way volume of approximately 1,300 vehicles per hour during the morning peak hour and 1,200 vehicles per hour during the afternoon peak hour. Traffic on Makakilo Drive exhibits the typical pattern of a residential area by displaying high directional splits reflecting home-to-work and work-to-home commuting. The existing two-way peak hour traffic volumes on Makakilo Drive near the H-1 Freeway overpass are approximately 1,300 vehicles per hour during the morning (AM) and afternoon (PM) peak periods¹.

The signalized intersection of Farrington Highway and Barbers Point Access Road has an estimated capacity of 2,700 vehicles per hour total entering traffic. At this intersection, the existing counts show the volume to be 1,750 vehicles per hour during both morning and afternoon peak hours.

The H-1 Freeway in the vicinity of the proposed project is presently being upgraded from a four-lane freeway to a six-lane freeway. The on-ramps from Makakilo Drive merge before entering the freeway and presently handle a peak volume of 830 vehicles per hour in the morning during which time the freeway volume is approximately 1,300 vehicles per hour approaching the ramp. Westbound traffic from the freeway using the off-ramp to Makakilo and HAS Barbers Point is stopped at Makakilo Drive; some delays occur in the morning because of high volumes wishing to turn left towards the air station.

FUTURE DEVELOPMENTS

The Estate of James Campbell is the major landowner in the Ewa area with approximately 34,000 acres of land within the Ewa Plain. The Estate maintains a planning program to coordinate the long range development of their Ewa lands. Proposed land uses identified on the long range plan in the area of the project site are described below.

The Estate of James Campbell is pursuing the development of a 580-acre site immediately to the west of the project site called the "Kapolei Town Center". The Town Center has been proposed to fulfill the long range growth policy of the City and County of Honolulu's Oahu General Plan to establish a Secondary Urban Center in Ewa. The Estate has submitted a petition to the Land Use Commission to reclassify a portion of the Town Center site from the Agricultural district to the Urban district.

Makakilo, a 22-year old residential community consisting of single family and multi-family housing units, is located on the lower slopes of the Maianae Range to the north of the project site. About 2,400 housing units had been built by 1985, with an estimated 2,700 units remaining to be built. Population in 1985 was 9,000 with ultimate future population estimated at 16,700 residents.

James Campbell Industrial Park is located southwest of the project site. Ultimately planned for an approximate 2,400 acres, the industrial park presently covers 1,360 acres. Employment at the park is estimated at 2,500 people in 1985.

The Barbers Point Deep Draft Harbor is located west of the industrial park. Development of wharf and dock facilities will

be started with the first phase of development to begin this year. Complete development of the harbor and all supporting facilities is expected to take 10 to 15 years.

Groundbreaking for the planned 970-acre Ko 'Oliina residential/resort community (formerly, the "West Beach Resort") took place on December 2, 1986. Land and infrastructure development began in March 1987 with completion anticipated for mid-1989. First phase development plans call for 5,200 housing units. Of these, 3,700 units will be apartment/condominium units, primarily in highrise buildings, with 1,500 units designated as low rise, lower density attached units located around the golf course. Another 4,000 visitor units, consisting of hotel rooms and resort condominiums, are also planned.

Campbell Estate is planning to pursue development of an approximate 106-acre site mauka of Farrington Highway (approximately 1.5 miles west of the site) into an entertainment attraction "which will take both residents and visitor on a journey around the Pacific and Asian Basin." The attraction is expected to employ up to 1,200 persons and is planned to be operational by 1991.

Gentry Pacific Ltd., is proposing a residential subdivision, Ewa Villages, on 544-acres located east of the project site. The subdivision would consist of approximately 2,700 multi-family and 3,000 single family units to be built by year 2000. In addition, the Department of Housing and Community Development has proposed to develop the West Loch Estates, approximately 1,500 units on acres north of Ewa Village.

PROPOSED PROJECT

The proposed project includes 4,937 residential units, a golf course and clubhouse, two parks/recreation centers, four church/day care centers, four schools, two commercial developments and a park-and-ride facility.

Roadway System

Access to the proposed project will be provided by the existing Farrington Highway and Barbers Point Access Road and a new road, Ewa Parkway, running from east to west between the Ko 'Oliina and Ewa Village areas. The project's internal roadway system includes local streets, minor collectors and arterial streets (Figure 2). Local streets and minor collectors will provide access to residential properties, while schools, parks, churches and commercial areas will be accessed from arterial streets.

The neighborhoods will be linked by an arterial street system which includes the Ewa Parkway, a loop road, a "Village Parkway" connecting the loop road to Farrington Highway, and a smaller arterial street ("Road A") between the loop road and Barbers Point Access Road. The parkways and the loop road north of the Ewa Parkway will include planted medians, with no on-street parking allowed. Access to the residential area located on the makai side of Farrington Highway just east of Village Parkway will be provided by three minor roads referred to as Access 1, Access 2 and Access 3.

The Ewa Parkway will carry traffic between the Kapolei area, Campbell Industrial Park, and Ko 'Oliina to the west and the Ewa Village/Ewa Beach area to the east. The Ewa Parkway through the project site will be a 150-foot corridor, within which a divided,

six-lane boulevard with landscaped medians and roadside areas could ultimately be constructed. Full development of Ewa Parkway is planned between Barbers Point Access Road and West Loop Road. East of the West Loop Road, the Ewa Parkway will be built along the mauka side of the corridor with a 40-foot pavement structure comprised of one lane in each direction and an auxiliary left turn lane in the center of the roadway.

The Village Parkway and the East and West Loop Roads will be constructed within 120-foot rights-of-ways. These four-lane divided roadways will include landscaping in their medians and along the roadides. The 32-foot pavement areas will include two automobile travel lanes and a bike lane in each travel direction. Additional pavement width at major intersections for turning lanes will be provided by reducing the widths of median or roadside areas. Because the parkways are intended primarily for the movement of traffic, median openings will be provided only at street intersections. A limited number of driveways will be allowed, but ingress/egress to these will be via right turn movements only.

The South Loop Road and Road A will be within 70-foot rights-of-ways. On these streets, median left turn lanes will be provided to facilitate access to driveways.

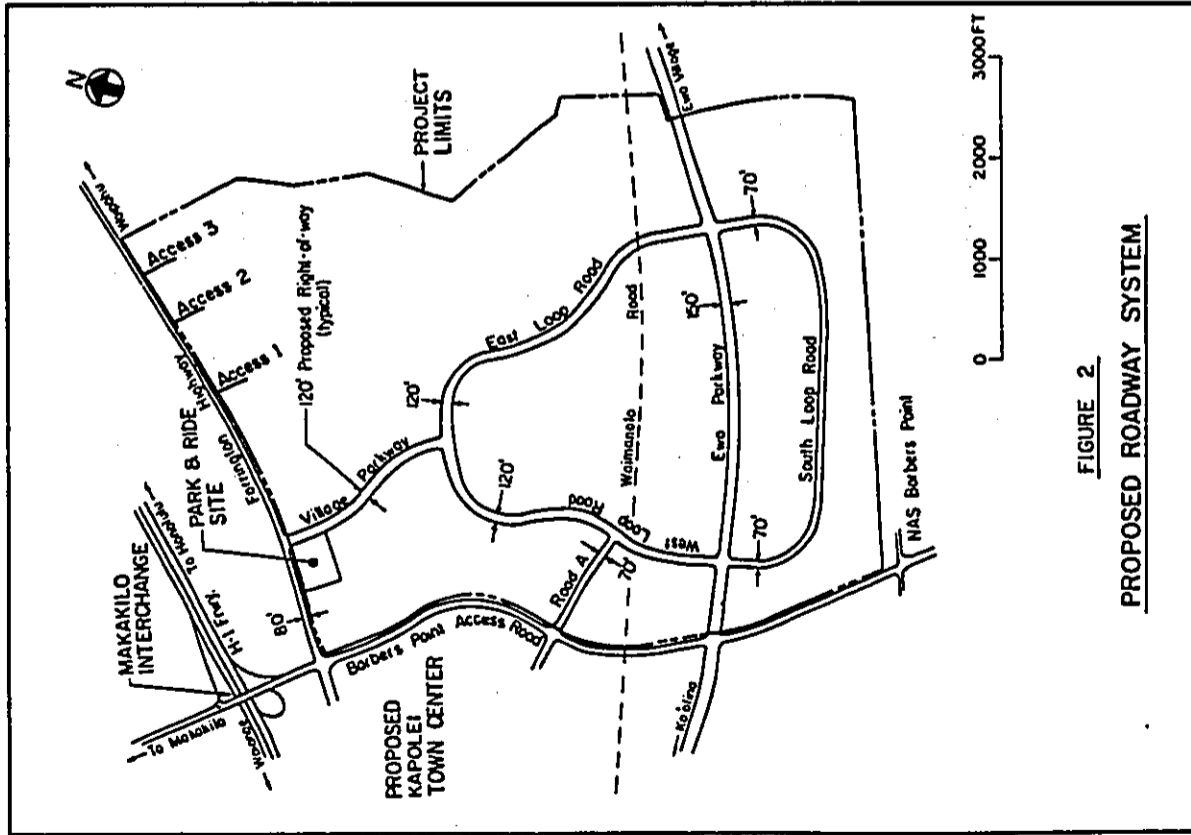


FIGURE 2
PROPOSED ROADWAY SYSTEM

TABLE 1
TRIP GENERATION RATES

Land Use (Parameter)	Daily (vpd)	AM Peak Hour (vph)		PM Peak Hour (vph)	
	Enter & Exit	Enter	Exit	Enter	Exit
Single Family (Dwelling Unit)	10.00	0.21	0.55	0.63	0.37
Multi-Family* (Dwelling Unit)	6.60	0.12	0.48	0.47	0.23
Elderly Homes (Dwelling Unit)	3.30	0.11	0.29	0.25	0.15
Golf Course (Acre)	6.90	0.22	0.05	0.08	0.31
Park/Recreation Center (Acre)	6.00	0.00	0.00	0.46	0.92
Church/Day Care (Children)	2.50	0.55	0.50	0.35	0.40
Elementary/Intermediate School (Student)	1.02	0.11	0.05	0.00	0.00
High School (Student)	1.39	0.22	0.08	0.02	0.06
Neighborhood Commercial (TSF)	107.76	1.43	1.29	6.50	6.58
Commercial (TSF)	73.75	0.99	0.88	3.57	3.47
Park and Ride (Acre)	300.00	40.00	1.00	1.00	40.00

Notes: vpd = vehicles per day
vph = vehicles per hour

* Includes Assisted and Rental Units
TSF = Thousand Square Feet

Source: Institute of Transportation Engineers (ITE), Trip Generation

TRAFFIC GENERATION

Traffic generation is composed of trip generation which estimates the number of trips that the project produces or attracts, trip distribution which determines the origins and destinations of those trips, and traffic assignment which places the project traffic onto the proposed roadway network.

Trip Generation

Trip generation estimates the number of trips that the project produces or attracts. The trip rates were based on the Institute of Transportation Engineers Informational report, Trip Generation, Third Edition². The study classified the rental and assisted units as multi-family dwelling units. The trip rates for the parks included estimates of their use during peak hours. For the commercial developments, the study assumed a floor area ratio (FAR) of 0.35 for each site. The study also estimated that the schools will have densities of 850 students per six-acres. Full utilization of the park-and-ride facility was assumed, with 35% (approximately 200 vehicles) of the available spaces used by vehicles entering during the AM peak period. Table 1 shows the trip generation rates and Table 2 shows the trip generation.

Trip Distribution

Trip distribution determines the origins and destinations of traffic generated by the project. The distribution was based on the completion of the other proposed developments in the Ewa area and the Ewa Parkway which would provide a direct connection from this project to Ewa Villages, Ewa Beach and Ko 'Olina. The trips were distributed in five directions: north to Makakilo, south to Barbers Point MAS, east to Honolulu and Waipahu, west to Waiānae and southeast to Ewa Villages and Ewa Beach. The trip distribution factors are shown in Table 3.

TABLE 3

TRIP DISTRIBUTION FACTORS

Direction	AM Peak Hour		PM Peak Hour	
	Enter	Exit	Enter	Exit
North	0.19	0.07	0.08	0.13
South	0.03	0.06	0.07	0.03
East	0.28	0.23	0.17	0.41
West	0.42	0.61	0.65	0.40
Southeast	0.08	0.03	0.03	0.03
	1.00	1.00	1.00	1.00

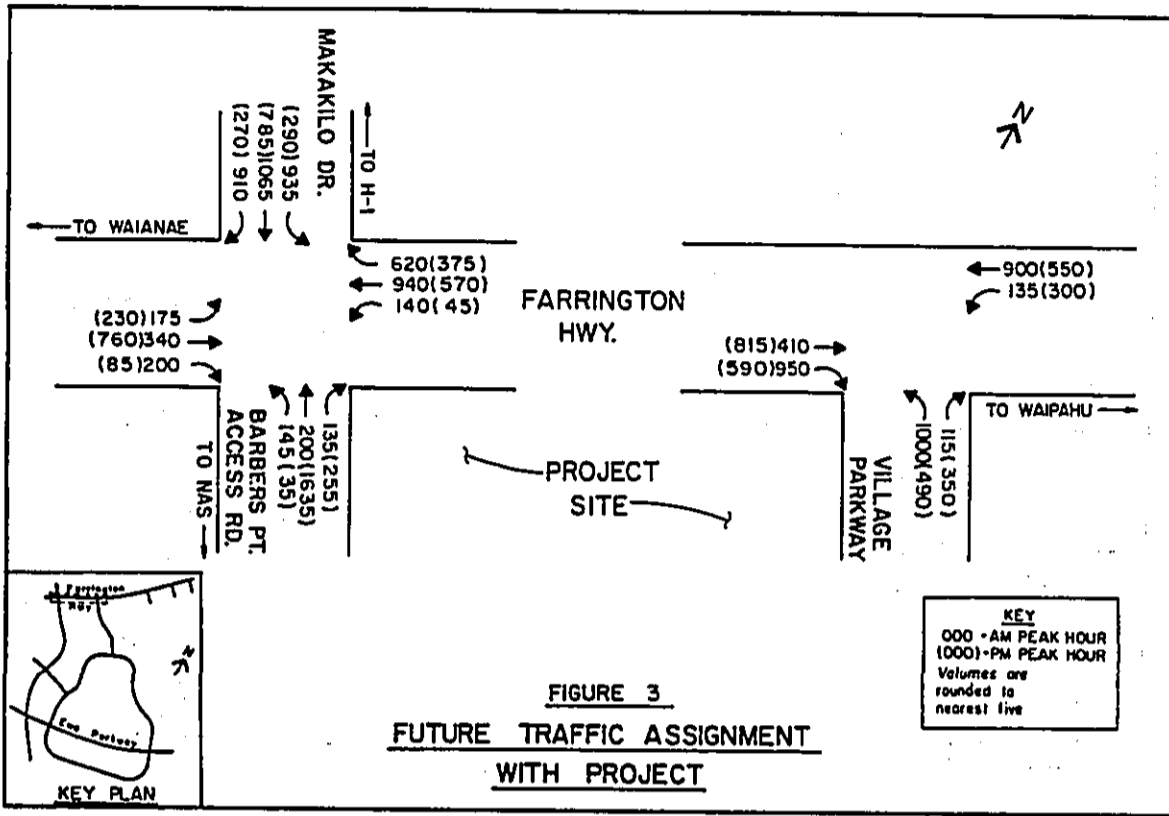
TABLE 2
TRIP GENERATION

Land Use (Parameter)	Daily (vpd)	AM Peak Hour (vph)		PM Peak Hour (vph)	
	Enter & Exit	Enter	Exit	Enter	Exit
Single Family Units (3,802 DU)	38,020	798	2,091	2,395	1,407
Multi-Family Units* (701 DU)	4,627	84	336	829	161
Elderly Units (434 DU)	1,432	48	126	109	65
Golf Course/Club House (147.2 acres)	1,016	32	7	12	46
Park/Rec. Center (24.3 acres)	146	0	0	11	22
Church/Day Care (218 children)	545	120	109	76	87
Elem./Inter. School (3,382 students)	3,450	372	169	0	0
High School (4001 students)	5,561	880	200	80	240
Neighborhood Commercial (46 TSF)	4,957	66	59	299	303
Commercial (115 TSF)	8,481	114	101	411	399
Park and Ride (5 acres)	1,500	200	5	5	200
TOTAL TRIP ENDS	69,735	2,714	3,204	3,727	2,930

Note: vpd = vehicles per day
vph = vehicles per hour

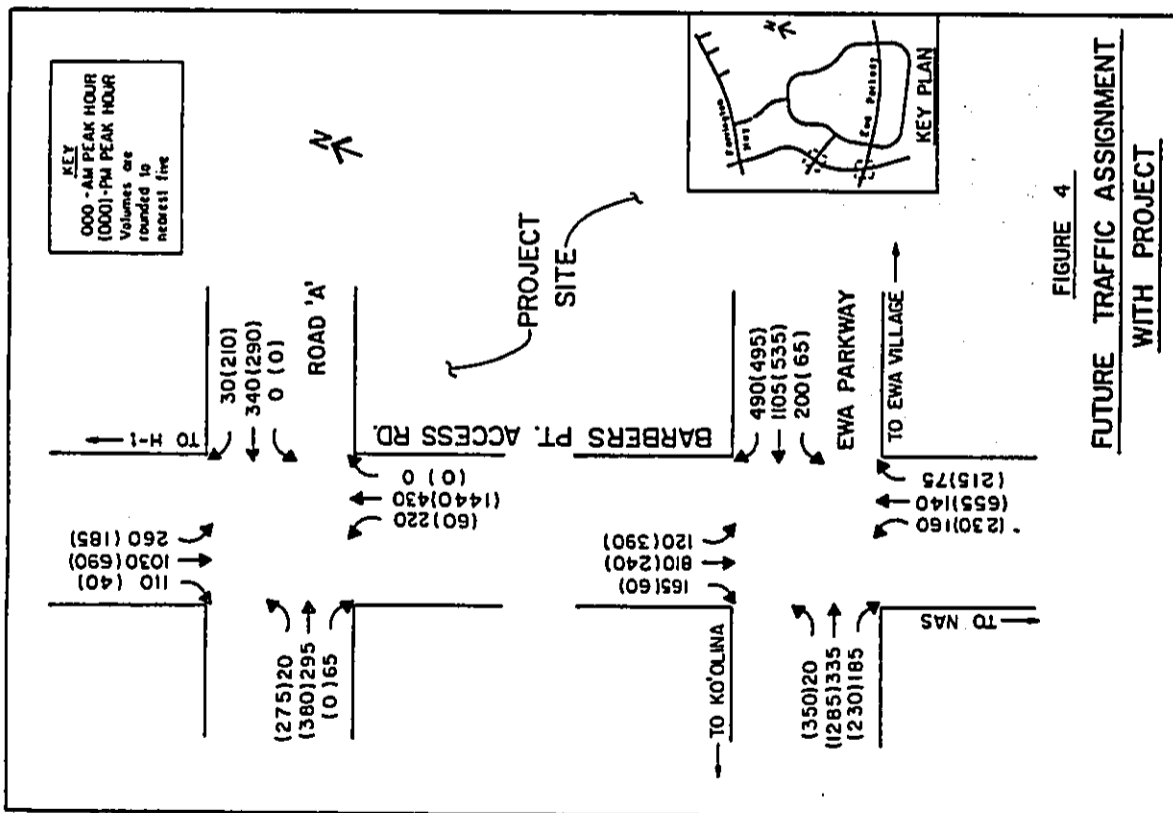
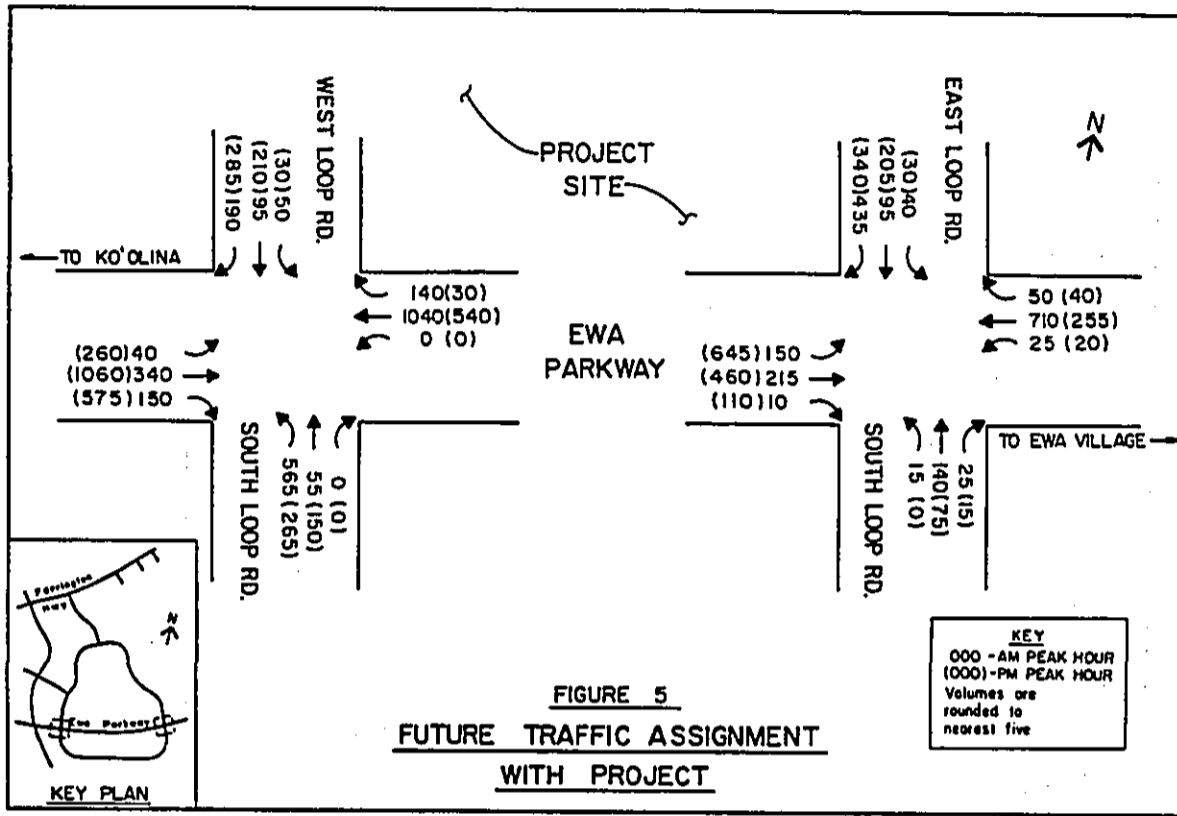
TSF = thousand square feet
DU = dwelling unit

* Includes Assisted and Rental Units



Traffic Assignment

Traffic assignment designates the roadways that project traffic can be expected to utilize. Traffic entering and exiting from the north and south are assigned to Barbers Point Access Road or Farrington Highway. Traffic to/from the east and west are assigned to Farrington Highway and Ewa Parkway. The internal trips are assigned to the various collector roads within the project. Figures 3, 4, 5, 6 and 7 show the estimated "Future Traffic Assignment With Project."



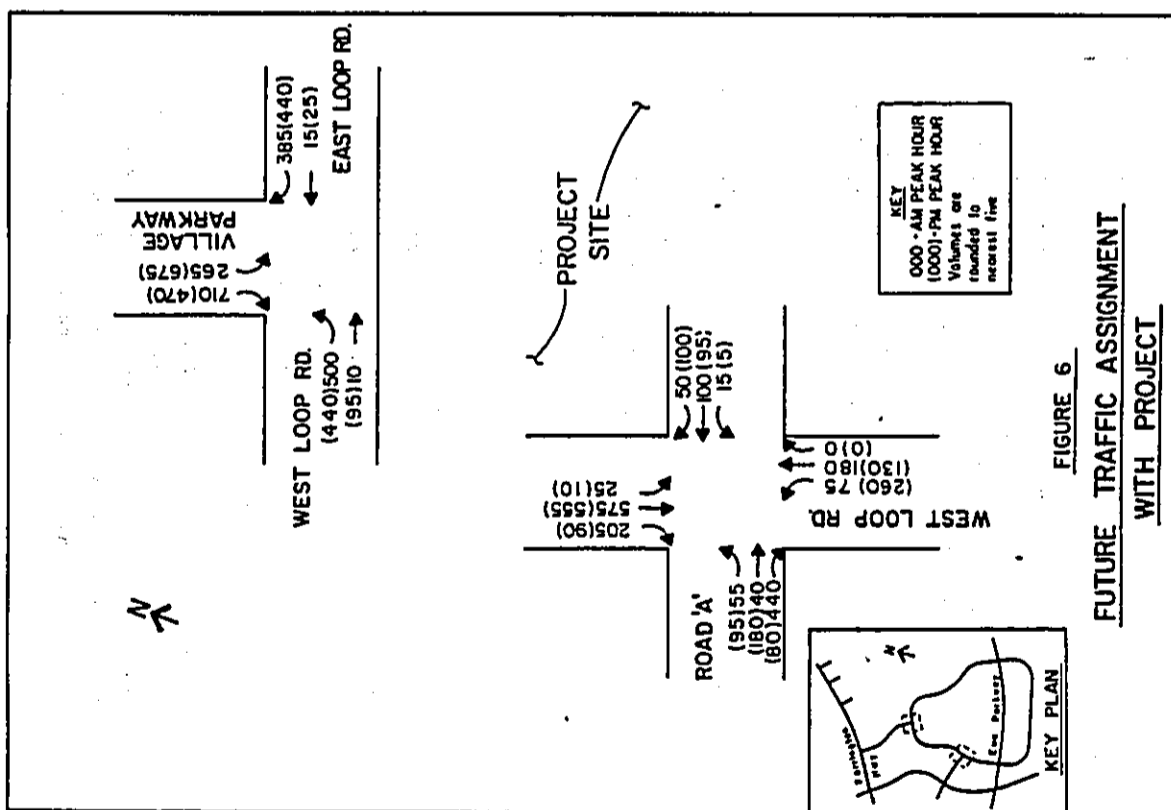
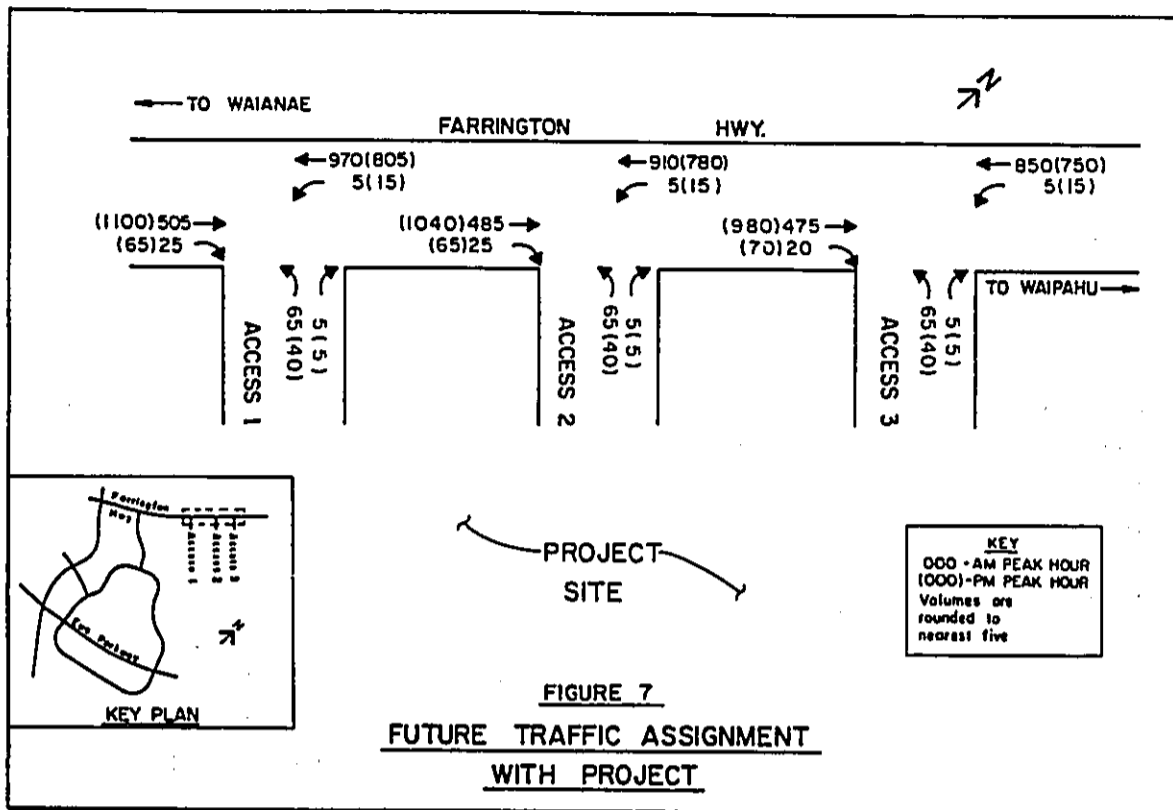


TABLE 4
INTERSECTION ANALYSIS

Signalized Intersection	AM Peak Hour		PM Peak Hour	
	CV (vph)/Status	RT Arrow	CV (vph)/Status	RT Arrow
Barbers Point/Farrington	1386/near	1234/near	1266/near	1198/under
Barbers Point/Road 'A'	1150/under	--	1199/under	--
Barbers Point/Ewa Pky	1129/under	1129/under	1302/near	1199/under
Ewa Pky/West Loop	1100/under	1062/under	1234/near	1156/under
Ewa Pky/East Loop	1357/near	1208/near	1283/near	1148/under
Farrington/Village Pky	1585/over	1085/under	1238/near	1057/under
Village Pky/Loop Road	1595/over	1096/under	1349/near	1215/near
West Loop/Road 'A'	920/under	--	774/under	--

Notes: CV = critical volume
vph = vehicles per hour
RT = right turn

Maximum Sum of Critical Volumes	Status
0 to 1,200	under-capacity
1,201 to 1,400	near-capacity
> 1,400	over-capacity

PROJECT IMPACTS

The following discussion on project traffic impacts identifies conditions and improvements at full development. Traffic generated by the project will impact the existing roadway system and the new internal roadways within the project site. The study used the NCAP³ computer software which analyzed signalized and unsignalized intersections using computation methods from the 1985 Highway Capacity Manual⁴. Table 4 lists the results of the analysis for each intersection.

The Kapolei Village master plan proposes signalization at the following intersections: Barbers Point Access Road/Road 'A', Barbers Point Access Road/Ewa Parkway and Farrington Highway/Village Parkway. Signalization of the major intersections of Ewa Parkway/West Loop Road, Ewa Parkway/East Loop Road, East (West) Loop Road/Village Parkway and West Loop Road/Road 'A' would also be justified at full development using the Manual on Uniform Traffic Control Devices⁵ Marrant 11 for peak hour volumes.

The development of a major employment center at Kapolei Town Center west of Barbers Point Access Road will generate large volumes of traffic to or from the H-1 Freeway in the Honolulu direction. A new eastbound on-ramp from the Town Center directly into H-1 was assumed to carry 1,150 vehicles during the PM peak hour. Significant left turn volumes onto the Barbers Point Access Road are still expected.

The signalized cross-intersection of Barbers Point Access Road/Hakakilo Drive with Farrington Highway was assumed to have the following improvements. The northbound approach on Barbers Point Access Road would be widened to include a left turn lane, two through lanes, and a shared lane for through and right turn

through traffic. The analysis shows that this intersection will operate at under-capacity conditions during the AM peak period and near-capacity conditions during the PM peak period.

The intersection of Ewa Parkway with West Loop Road will form a cross-intersection which will be signalized. The northbound approach on West Loop Road will contain a left turn lane, a shared lane for left turns and through movements, and another shared lane for through movements and right turns. The southbound approach on West Loop Road will be striped for single lanes for left turns, through movements and right turns. The eastbound and westbound approaches on Ewa Parkway will have a left turn lane, a through lane, and a shared lane for through movements and right turns. The Ewa Parkway/West Loop Road intersection would operate at under-capacity conditions during the AM and peak hour and near-capacity conditions during the PM peak hour.

Another signalized cross-intersection will be formed by Ewa Parkway and East Loop Road. The analysis assumed that the northbound approach on East Loop Road will be striped for a left turn lane, a through lane, and a shared lane for through and right turn movements while the southbound approach on East Loop Road will include a separate lanes for left turns, through traffic, and right turns. Both Ewa Parkway approaches would contain a single left turn lane and a shared lane for through and right turn movements. The Ewa Parkway/East Loop Road intersection would operate at near-capacity during the AM and PM peak periods.

The intersection of Farrington Highway with Village Parkway would be a signalized T-intersection with Village Parkway serving as the stem of the intersection. Both approaches on Farrington Highway are assumed to have two through lanes and separate lanes for turns into Village Parkway. The Village Parkway approach

movements. The southbound approach on Makalo Drive would include double turn lanes for left and right turn movements and two lanes for through traffic. The eastbound approach on Farrington Highway would also be widened to include two lanes for left turns, two through lanes, and a separate lane for right turns. The westbound approach on Farrington Highway would be similar except it would contain a single lane for left turns. This intersection would operate at near-capacity conditions during the AM and PM peak periods.

The intersection of Barbers Point Access Road with the new Road 'A' forms a cross-intersection which will be signalized. The northbound approach on Barbers Point Access Road and the westbound approach on Road 'A' will be striped for a left turn lane, a through lane, and a shared lane for right turn and through movements. The southbound approach on Barbers Point Access Road would be similar except that it would contain two lanes for left turns. The eastbound approach on Road 'A' would be striped for two left turn lanes and a shared lane for through movements and right turns. Analysis of this intersection shows that it will be under-capacity during the AM and PM peak hours.

The Barbers Point Access Road/Ewa Parkway intersection is another signalized cross-intersection. The analysis assumed that the northbound approach on Barbers Point Access Road will have a single lane for left turns, a through lane, and a shared lane for through movements and right turns. The southbound approach on Barbers Point Access Road includes two left turn lanes, two through lanes, and a single lane for right turns. The eastbound approach on Ewa Parkway would be striped for two left turn lanes, two through lanes, and a shared lane for through movements and right turns. The westbound approach on Ewa Parkway contains single lanes for left and right turns and two lanes for

includes two left turn lanes and a single right turn lane. The analysis shows that this intersection will be over-capacity during the AM peak period and near-capacity during the PM peak period due to the high southbound right turn traffic on Farrington Highway.

The East (West) Loop Road/Village Parkway Intersection is another signalized T-intersection with Village Parkway forming the stem of the intersection. The two Loop Road approaches will include a single through lane with a separate turn lane leading into Village Parkway. The Village Parkway approach will be striped for two left turn lanes and a right turn lane. The analysis shows that this intersection will be over-capacity during the AM peak hour and near-capacity during the PM peak hour.

The intersection of West Loop Road with Road 'A' forms a signalized cross-intersection. The northbound and southbound approaches on West Loop Road each contain a left turn lane, a through lane and a shared lane for through and right turn traffic. The eastbound approach on Road 'A' will be striped for single lanes for left turns, through movements, and right turns. The westbound approach on Road 'A' will contain a right turn lane and a shared lane for through movements and left turns. The analysis shows that this intersection would operate at under-capacity conditions during the AM and PM peak hours.

The Highway Capacity Manual analysis for unsignalized intersections evaluates gaps in the major street traffic flow and calculates capacities available for left turns across oncoming traffic and for left and right turns onto the highway from the minor street. Table 5 shows the criteria for levels of service for unsignalized intersections.

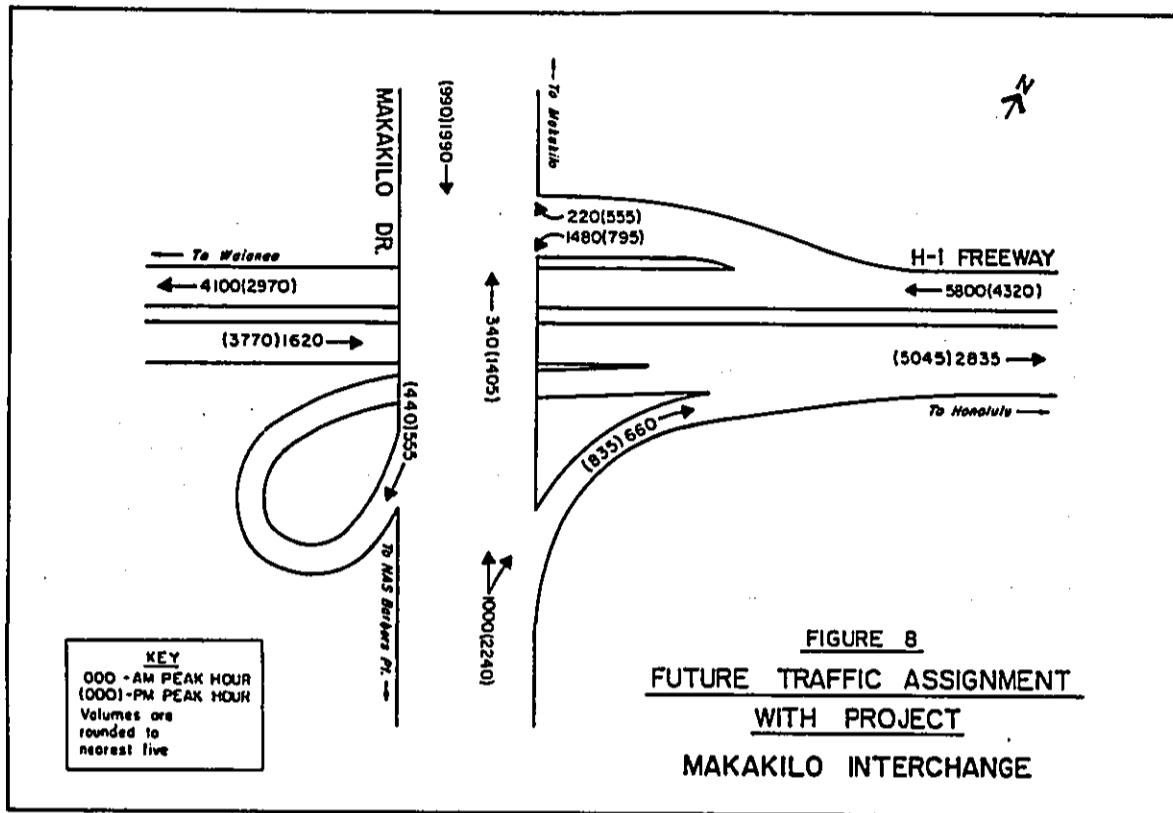
The intersections of Access 1, Access 2 and Access 3 with Farrington Highway form unsignalized T-intersections with the Access Roads serving as the stems of each T-intersection. Analysis of these intersections assuming a shared lane for left and right turns onto Farrington Highway shows that the shared lane operates at Level of Service (LOS) E during both peak hours. The left turn movement from Farrington Highway into each Access Road operates at LOS A during the AM peak hour and LOS B during the PM peak hour.

TABLE 5

LEVEL OF SERVICE CRITERIA
(UNSIGNALIZED INTERSECTIONS)

Reserve of Capacity	Level of Service	Expected Delay to Controlled Movement
≥ 400	A	Little or no delays
300 - 399	B	Short traffic delays
200 - 299	C	Average traffic delays
100 - 199	D	Long traffic delays
0 - 99	E	Very long traffic delays
≤ 0	F	Demand exceeds capacity; extreme delays

The Highway Capacity Manual analysis of two-lane highways evaluates percent time delay with highway speed and portion of capacity utilized serving as secondary measures. The section of Farrington Highway located east of the site is projected to carry a two-way volume of 1335 vehicles per hour (vph) and 1750 vph during the AM and PM peak periods, respectively. At these volumes, Farrington Highway will operate at LOS E.



The ramp volumes for the H-1 Freeway's Makakilo Interchange were estimated using the projection of Ewa development made by Campbell Estate. Kapolei Town Center was assumed to be a major employment area that would attract many work trips from Kapolei Village. In addition, a new on-ramp to eastbound H-1 directly from the town center was assumed. A high percentage of the new traffic from Makakilo was also assumed to travel to the town center. The estimate also included growth in Campbell Industrial Park and Ko 'Olina. Figure 8 shows the traffic assignment developed for Makakilo Interchange. An evaluation of the interchange ramps indicates that the interchange has the capacity to service the projected traffic demand.

MITIGATION MEASURES

In order to lower the critical volumes at intersections with high right turn volumes, a right turn arrow could be included in the signal phasing to allow right turns during the phase for its complementary left turn. The procedure used in the NCAP program for signalized intersections was modified to account for phase overlaps when right turn movements are allowed to occur simultaneously with its complementary (non-conflicting) left turn movement at intersections with heavy right turn traffic volumes (see Table 4).

The following signalized intersections should include a right turn arrow for turns on red:

- Barbers Point Access Road/Farrington Highway:

This intersection would be near-capacity during the AM peak period and under-capacity during the PM peak period if the northbound right turn traffic from Farrington Highway is allowed to turn during with the eastbound left turn traffic from Makakilo Drive.

- Barbers Point Access Road/Ewa Parkway:

Allowing the northbound right turn traffic from Ewa Parkway to turn with the eastbound left turn traffic from Barbers Point Access Road will improve the condition of this intersection to under-capacity during the PM peak period.

- Ewa Parkway/West Loop Road:

If a turn arrow for the westbound right turn traffic from West Loop Road is provided to allow turns with the northbound left turn traffic from Ewa Parkway, this intersection will operate at under-capacity during the PM peak hour.

- Ewa Parkway/East Loop Road:

If the westbound right turn traffic from East Loop Road is provided a green arrow with the left turn traffic from Ewa Parkway, the intersection will be near-capacity during the AM peak period and under-capacity during the PM peak period.

- Farrington Highway/Village Parkway:

Providing a turn arrow for the southbound right turn traffic on Farrington Highway to turn with the westbound left turn traffic from Village Parkway will improve the condition this intersection to under-capacity during the AM and PM peak hours.

- East (West) Loop Road/Village Parkway:

The condition of this intersection can be improved to under-capacity during the AM peak period and near-capacity during the PM peak period if the westbound right turn traffic from Village Parkway is allowed to turn with the northbound left turn traffic from the Loop Roads.

RECOMMENDATIONS AND CONCLUSIONS

The proposed project will increase traffic on the existing roadways in the area of the project. Other developments proposed in the Ewa area will also have an impact on the existing roadway system. General recommendations are as follows:

- The park-and-ride facility should be constructed during the first phase of the project in order to encourage its use and to get the residents of Kapolei Village comfortable with using public transportation.
- The other proposed developments in the Ewa area should also implement ridesharing programs.

The following recommendations apply to the roadway system for Kapolei Village.

- Provisions for traffic signals should be included during construction at the following intersections: Village Parkway/East (West) Road, West Loop Road/Ewa Parkway, East Loop Road/Ewa Parkway and West Loop Road/Road 'A'. Traffic volumes at these intersections need to be monitored and signalization should be provided when necessary and warranted.
- Farrington Highway should be widened to include two lanes in each direction from Barbers Point Access Road to the Access 1 intersection.
- The Farrington Highway approaches for Access 1, Access 2 and Access 3 should include a deceleration lane for right turns and a left turn lane for turns onto the Access Roads. Separate lanes for left and right turns should be provided from each of the three Access Roads.

The following recommendations are for Makakilo Interchange and H-1 Freeway.

- The intersection of the westbound off-ramp from H-1 Freeway with Makakilo Drive should be signalized. The off-ramp approach should be widened to include two left turn lanes for southbound traffic and a right turn lane for northbound traffic. Makakilo Drive should be re-stripped to include four through lanes on the southbound approach and two through lanes on the northbound approach of this intersection. Analysis of this signalized intersection shows that it will be near-capacity during the AM peak hour and under-capacity during the PM peak hour.
- The eastbound on-ramp for traffic from the south should be extended to enter the freeway separately from the eastbound loop on-ramp from the north.
- The High Occupancy Vehicle (HOV) designation of the center lanes on the H-1 Freeway should be reviewed; westbound traffic volumes in the AM peak period and eastbound volumes in the PM peak period would each require three lanes. Improved access to the HOV lane from the local streets should be considered in view of the high volumes on the freeway.

REFERENCES

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2. Institute of Transportation Engineers, Trip Generation, Third Edition, Washington, D.C., 1982.
3. Professional Solutions Inc., Vachon Washington
4. Transportation Research Board, National Research Council, Highway Capacity Manual, Special Report 209, Washington, D.C., 1985.
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APPENDIX C

Biological Study:
Char & Associates, Botanical/Environmental Consultants

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by
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1.0 INTRODUCTION

The State's Hawaii Housing Authority proposes to develop a housing complex on approximately 850-acres of land within the 'Ewa District, Island of O'ahu. The majority of the ± 850-acre parcel is presently under active sugar cane cultivation by Oahu Sugar Company.

The proposed Kapolei Village residential community site is bound by Farrington Highway on the north; by Oahu Sugar Company lands on the east; the Naval Air Station, Barbers Point on the south; and Fort Barrette Road on the west. Elevation on the project site ranges from 50 ft. along the southern boundary to approximately 100 ft. along Farrington Highway, its northern boundary. Rainfall on this part of O'ahu is low, about 20 in./year. The soils on the project site generally belong to the Luaiuaiei-Fill land-'Ewa association, which are deep, nearly level to moderately sloping, well-drained soils found on the coastal plains (Foote et al 1972).

The ± 850-acre parcel is presently zoned "Agriculture". The proposed housing development will require a land use change to redesignate the project site to the "Urban" designation. An Environmental Impact Study (EIS) is required as part of this process. A field study to gather the biological information which would be incorporated into the EIS was conducted in October 1986 for approximately 600 acres; a survey was later conducted in September 1987 for the additional 250 acres.

2.0 FLORA SURVEY

The primary objectives of the survey were to describe and inventory the vegetation; search for rare, threatened or endangered species of plants; and to identify areas of potential environmental problems or concerns.

Field work was conducted on 23 October 1986 for the ± 600-acre parcel and on 10 September 1987 for the ± 250-acre parcel.

A total of 60 plant species was found on the project site. Of these, 56 (93.3%) are introduced or exotic species, 3 (5%) are native, and 1 (1.7%) is of early Polynesian introduction.

2.1 Survey Methods

Prior to undertaking the field survey, a search was made of the pertinent literature to familiarize the principal investigator with other biological studies conducted in the general area.

Existing topographic maps, as well as an aerial photograph, were examined to determine access, terrain characteristics, and potential logistical and technical problems. Access onto parts of the project site was provided by the paved and unpaved roads (cane-haul roads) which transect the site.

A walk-through survey method was used. Species were identified in the field; plants which could not be positively identified were collected for later determination in the herbarium and laboratory. Notes were made of the species present in each of the major vegetation types. The species recorded are indicative of the season (rainy vs. dry) and environmental conditions under which this survey was taken. Surveys taken at different times of the year and under varying environmental conditions, would no doubt yield slight variations in the kinds of plants recorded. The abundance of weedy, annual species may vary significantly.

2.2 Description of Vegetation

In their survey of the 'Ewa Plains Flora for the U.S. Fish and Wildlife Service, Char and Balakrishnan (1979) mapped most of the ± 850-acre project site as sugar cane fields; scattered patches of koa-haole were distributed around the margins of the project site. A more recent study by Char and Whistler (1986b) of an adjacent ± 1,400-acre parcel also describes similar vegetation types.

During the present survey, three major vegetation types are recognized on the project site. Actively cultivated sugar cane fields cover most of the area. Along the Naval Air Station fence is a thicket composed of koa-haole shrubs and scattered kiawe trees. A weedy mixture of small shrubs, grasses, and herbs is found along the paved roadsides.

Cane Fields. This vegetation type covers the most area on the ± 850-acre parcel. Associated with the cane fields is a network of unpaved cane-haul roads and irrigation and drainage systems. Makakilo and Makalapa Gulches drain this area. Both drainage systems have been highly modified.

Weedy species which are found associated with these cultivated fields include nutgrass (Cyperus rotundus), swollen fingergrass (Chloris inflata), red pualele (Emilia fosbergii), sowthistle (Sonchus oleraceus), and hairy spurge (Euphorbia hirta). Locally common along the margins of the fields are two vines, wild bitter melon (Momordica charantia var. pavel) and little bell (Ipomoea triloba).

Drainage areas support a dense growth of Californiagrass (Brachyaria mutica), two Panicum species, and Natal reedtop (Rhynchosyris repens). Scattered clumps of castor bean (Ricinus communis) and koa-haole (Leucaena leucocephala) shrubs are also frequently encountered.

The spiny-fruited puncture vine (Tribulus terrestris) is locally abundant on some of the cane-haul roads.

Roadside Vegetation. Along the paved roads, i.e. Farrington Highway and Fort Barrette Road, is a narrow band of vegetation which is periodically maintained. The roadside or ruderal vegetation is composed of a mixture of grass, small shrub, and herbaceous species. These species are weedy in nature and have adapted to the more or less frequent disturbances from vehicular and pedestrian traffic as well as periodic mowing, clearing, and herbicide treatment.

The most abundant element in this vegetation type is buffelgrass (Cenchrus ciliaris). Also abundant is pitted beardgrass (Andropogon pertusus). Other grasses occasionally found here include Bermuda grass (Panicum maximum), and sourgrass (Triticachne insularis). Among the small shrubs and weedy annual species, the following are frequently encountered: spiny amaranth (Amaranthus spinosus), several weedy Euphorbia species, golden crown-beard (Verbesina enceloides), coat buttons (Iridax procumbens), partridge pea (Cassia lechnautiliana), indigo (Indigofera suffruticosa), 'uhaloa (Waltheria indica var. americana), and 'ilima (Sida fallax).

Kiawe - Koa-haole Thicket. This vegetation type consists of very scattered kiawe trees (Prosopis pallida) with a rather dense cover of koa-haole shrubs (Leucaena leucocephala) filling in the matrix between the trees. Buffelgrass (Cenchrus ciliaris) forms a more or less dense ground cover. A number of sisal plants (Agave sisalana) are found in this vegetation type. Sisal was grown on the 'Ewa Plains from 1893 to the 1920's to provide material for sisal or marine rope and sisal twine.

The ORL (Oahu Railway and Land Company) right-of-way, with rail bed and tracks, runs along the length of this vegetation type.

2.3 Rare, Threatened or Endangered Plants

The project site has been actively cultivated for a long time. Today, those areas which are not actively cultivated support a vegetation dominated by introduced species such as koa-haole, buffelgrass, and Guinea grass. Wild descendants of sisal plants, which were once cultivated, are found in the kiawe - koa-haole thicket.

Two officially listed (federal and state) endangered plants, the 'Ewa Plains 'akoko (Euphorbia skottsbergii var. kalaeloana) and Achyranthes rotundata, are found on the nearby Naval Air Station, however, no plants considered rare, threatened or endangered by federal and state governments (U.S. Fish and Wildlife Service 1980; Fosberg and Herbst 1975) occur on

the project site itself. In an earlier survey of the 'Ewa Plains, Char and Balakrishnan (1979) did not report any such plants from the ± 850-acre parcel.

The three native species found during this survey -- 'uhaloa, 'ilima, popolo -- are found throughout the Hawaiian Islands and the Pacific. They are often considered "weedy natives" as they favor disturbed areas.

3.0 FAUNA SURVEY

The following survey was undertaken to provide information primarily on the bird and mammal populations on the ± 850-acre Kapolei Village parcel proposed for development.

Ten species of birds were recorded from the study site: nine are foreign (or introduced) species and one is an indigenous migratory species. Only one species of mammal, the Indian Mongoose, was recorded from the site.

3.1 Survey Methods.

The field work was carried out on 23 October 1986 between the hours of 0800 and 1400 and 10 September 1987 between 0630 and 0800. Birds were detected both by sight and by their vocalizations. To ensure a more complete study, the list of birds recorded during the field survey was compared with checklists made from other bird surveys for the Environmental Impact Statements of nearby areas such as Makakilo (U.S. Department of Housing and Urban Development 1978), Barbers Point Deep-draft Harbor (H. & E. Pacific 1978), and Campbell Industrial Park (Belt, Collins and Associates 1980). Two other recent checklists (Char and Whistler 1986a, 1986b) compiled from studies of adjacent parcels were also examined.

Although no mammals were observed on the study site, their presence was determined indirectly by tracks and scat.

3.2 Faunal Habitats

The study site is covered by three basic types of vegetation: (1) cane fields, including the vegetation occurring along the margins of fields and in drainage ditches; (2) roadside vegetation, occurring mostly along the paved and unpaved roads; and (3) kiawe - koa-haole thicket which occurs primarily along the Barbers Point Naval Air Station boundary. More complete descriptions of these vegetation types can be found in the flora survey.

Over the three types of vegetation, a total of ten bird species was recorded. Due to the highly disturbed nature of the vegetation, all but one of the bird species observed were introduced (or foreign) ones. The sole native species, the Pacific Golden Plover (Pluvialis dominica), is a wide-ranging migratory species. The nine introduced species were the Cattle Egret (Bulbulcus ibis), Spotted Dove (Streptopelia chinensis), Zebra Dove (Geopelia striata), Black-rumped Waxbill (Estrilda troglodytes), Chestnut Mannikin (Lonchura malacca), Northern Cardinal (Cardinalis cardinalis), Red Avadavat (Amandava amandava), Red-vented Bulbill (Pycnonotus cafer), and Common Myna (Acridotheres tristis).

No mammals were actually observed on the site, but tracks of the Indian Mongoose (Herpestes auropunctatus) were found along the edge of the cane fields.

A number of other bird and mammal species are also likely to use the study site, or at least pass through on occasion. The Mockingbird (Mimus polyglottos), reported from the Barbers Point Deep-draft Harbor site (H. & E. Pacific 1978) and Campbell Industrial Park (Belt, Collins and Associates 1980), can be expected to utilize the study area to some degree. Four other bird species which are common in the thickets in adjacent parcels are the Red-crested Cardinal (Paroaria coronata), House Finch (Carpodacus mexicanus), House Sparrow (Passer domesticus), and the Japanese White-eye (Zosterops japonica). Another bird, the Kubneg

Mannikin (Lonchura punctulata), is commonly seen in adjacent areas feeding in overgrown grassy areas and can be expected to utilize the study site.

Other mammal species which are likely to be found on the study site but were not observed during this survey include the Roof Rat (Rattus rattus), the Norway Rat (Rattus norvegicus), the Polynesian Rat (Rattus exulans), the House Mouse (Mus musculus), and, possibly, also feral dogs (Canis familiaris) and feral cats (Felis catus).

No terrestrial reptiles or amphibians were noted during the study. The Hawaiian Islands do not have any native amphibians or terrestrial reptiles. It is likely, however, that introduced gecko and skink species, such as the Mourning Gecko (Lepidodactylus lugubris), occur on the project site in those areas with shrubs and trees.

3.3 Annotated Species List

Common and scientific names of the bird species are in accordance with those listed in Hawaii's Birds (Hawaii Audubon Society 1984).

Birds (Aves)

A. ARDEIDAE

Cattle Egret (Bulbulcus ibis); Foreign

The Cattle Egret is common in the Pearl Harbor area where it feeds in wetlands and occasionally in disturbed, dryland areas. Several egrets were seen flying over the study site, but this species is not likely to make much use of the area because of the lack of suitable habitat.

B. CHARADRIIDAE

Pacific Golden Plover (Pluvialis dominica); Migratory

The Pacific Golden Plover (also called American Golden Plover and Kolea in Hawai'i) is an indigenous, migratory species which winters in the islands and leaves for the Arctic by April. It is found in various open habitats from sea level to 10,000 ft. elevation. Several plovers were seen feeding in recently plowed cane fields, both in the October 1986 and September 1987 surveys.

C. COLUMBIDAE

Spotted Dove (Streptopelia chinensis); Foreign

The Spotted Dove (also known as the Chinese Dove or Lace-necked Dove) is an introduced species which is common in cultivated and habitated areas throughout the islands. At the study site, many individuals were observed on the ground in open places.

Zebra Dove (Geopelia striata); Foreign

The Zebra Dove (also known as Barred Dove) is an introduced species which is very common in cultivated and habitated areas throughout the islands, often congregating in flocks. At the study site, numerous, mostly solitary birds were observed on the ground in open, weedy areas.

D. FRINGILLIDAE

Black-rumped Waxbill (Estrilda troglodytes); Foreign

The Black-rumped Waxbill (also known as Red-eared Waxbill) was reported in Hawaii's Birds as occurring around Diamond Head. At the study site it is common in flocks on the edges of the cane fields and in weedy areas with tall grass.

Chestnut Mannikin (Lonchura malacca); Foreign

The Chestnut Mannikin (also known as Black-headed Munia or Black-headed Mannikin) is an introduced species reported to be particularly common around Pearl Harbor and Waikawa. At the study site, it is common in flocks or singly along the edges of cane fields and in weedy areas.

Northern Cardinal (Cardinalis cardinalis); Foreign

The Northern Cardinal (also called Kentucky Cardinal) is an introduced species occasional to common in the lowlands of the larger main islands. It is occasional at the study site in the kawe - koo-haole thicket.

Red Avadavat (Amadava amadava); Foreign

The Red Avadavat (also called Red Munia or Strawberry Finch) is an introduced species which is common around Pearl Harbor. At the study site it is rather common in grassy areas and on the edge of the cane fields, singly or in mixed flocks with other species of mannikin.

E. PSYCHOTRIDAE

Red-vented Bulbill (Pycnonotus cafer): Foreign

The Red-vented Bulbill is an introduced bird which in recent years has become common in urban areas on the island of O'ahu. It was occasional at the study site, but since it lacks its preferred habitats of urban and wooded areas, it probably makes little use of the study site.

F. STURNIDAE

Common Myna (Acridotheres tristis): Foreign

The Common Myna is an introduced species which is widespread in habitated and agricultural areas, only occasionally found in forested areas. At the study site it was occasional in cultivated areas, however, most of the individuals seen were just flying through the area and are not likely to make much use of it.

Mammals (Mammalia)

A. VIVERRIDAE

Indian Mongoose (Hemstes auropunctatus): Foreign

Scat and tracks of mongoose were seen along the edge of the cane fields and it can be expected to occur in all three vegetation types.

3.4 Threatened or Endangered Fauna

No threatened or endangered vertebrate animal species were observed in the study area during the course of this survey.

Although there are ponds in an abandoned quarry on the adjacent parcel west of the study site, there are no wetlands of any kind on the study site. Hence, no native waterbirds are expected here. There are also no significant wooded areas on the site and the site does not provide suitable nesting and roosting areas.

The Hawaiian Owl or Pueo (Asio flammeus sandwichensis), which is scarce on O'ahu and prefers areas with less human activity, would not find suitable roosting areas at the site.

The endangered Hawaiian Hoary Bat or 'ope'ape'a (Lasurus cinereus semotus) is the only native land mammal in the Hawaiian Islands. It may fly into the area to feed in the evenings but there is no record of this. Bats forage for insects in openings in woodlands, along the shore or over ponds and streams near the sea during dusk and at night. Very little is known about the habits of this species (Tomich 1969; Van Riper and Van Riper 1982).

4.0 DISCUSSION AND RECOMMENDATIONS

The vegetation on the project site consists almost exclusively of actively cultivated sugar cane fields. Uncultivated areas support a ruderal or roadside vegetation type composed of a weedy mixture of grasses, shrubs, and herbs. A thicket of scattered kiawe trees and koa-haole shrubs lines the Barbers Point Naval Air Station boundary.

The proposed project is not expected to have a significant impact on the flora as it consists primarily of cultivated lands. The few native plant species which are found here occur in similar environmental habitats throughout the islands; none of the plant species are rare, threatened or endangered. There is little of botanical interest on the site.

The terrestrial vertebrate fauna is composed primarily of foreign or introduced species. Of the 10 avian species observed at the project site, only one, the Pacific Golden Plover, is an indigenous migratory species. Tracks of the introduced Indian Mongoose were found. No endangered native fauna were observed at the project site.

The project site does not provide suitable habitat for native terrestrial fauna. Some of the introduced bird species, especially those commensal with man such as the Common Myna and House Sparrow, are expected to increase in numbers when the project is completed as it will provide more available habitat -- trees, grassy areas, etc.

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APPENDIX A. PLANT SPECIES LIST, PROPOSED KAPOLEI VILLAGE PROJECT,
'EWA DISTRICT, OAHU

In the plant species list, families are arranged alphabetically within each of two groups: Monocotyledons and Dicotyledons. Taxonomy and nomenclature of the flowering plants, Monocotyledons and Dicotyledons, follow St. John (1973) except where more recently accepted names are used. Hawaiian names are in accordance with Porter (1972) or St. John (1973). The following information is provided:

1. Botanical name with author citation.
2. Common English or Hawaiian name, when known.
3. Biogeographic status of the species. The following symbols are used:

I = indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s)

P = Polynesian = plants of Polynesian introduction; all those plants brought by the Polynesian immigrants prior to contact with the Western world

X = introduced or exotic = not native to the Hawaiian Islands; brought here intentionally or accidentally after Western contact

4. Vegetation types. Three vegetation types are recognized on the project site and are discussed in detail in the text. The symbol heading each of the columns refers to the following vegetation types:

c = cane fields

r = roadside vegetation

k = kiawe - koa-haoie thicket

5. Relative abundance within each of the three vegetation types; absence is noted by a dash (-). These ratings reflect the abundance of the particular species within the project area and are not applicable to areas outside the project. The following symbols are employed:

A = abundant = the major or dominant species in a given vegetation type

C = common = distributed in large numbers throughout a given vegetation type

L = locally common = found in localized patches where it occurs in relatively large numbers but otherwise occasional to rare within a certain vegetation type

O = occasional = occurring widely throughout a given vegetation type in moderate numbers

U = uncommon = observed infrequently but not more than 10 times in a certain vegetation type

R = rare = observed 1 to 10 times in a certain vegetation type.

SCIENTIFIC NAME	COMMON NAME	STATUS	VEGETATION TYPE		
			c	r	k
<u>MONOCOTYLEDONS</u>					
AGAVACEAE (Agave Family) Agave sisalana Perrine ex Engelm.	sisal, malina	X	-	-	0
COMMELINACEAE (Spiderwort Family) Commelina diffusa Burm. f.	honohono	X	R	-	-
CYPERACEAE (Sedge Family) Cyperus rotundus L.	nutgrass	X	0	-	-
GRAMINEAE (Grass Family) Andropogon aristatus Poir.	Wilder grass	X	-	U	-
Andropogon pertusus (L.) Willd.	pitted beardgrass	X	U	C	0
Brachiaria mutica (Forsk.) Stapf	Californiagrass	X	L	-	-
Cenchrus ciliaris L.	buffelgrass	X	L	A	A
Chloris inflata Link	swollen fingergrass, mau'ulei	X	0	0	0
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	0	0	U
Dactyloctenium aegyptium (L.) Willd.	beach wiregrass	X	R	-	-
Eleusine indica (L.) Gaertn.	wiregrass	X	-	U	-
Panicum maximum Jacq. var. maximum	Guinea grass	X	L	0	0
Panicum maximum var. trichoglume Eyles ex Robyns	green panicgrass	X	U	-	-
Rhynchelytrum repens (Willd.) C.E. Hubb.	Natal redtop	X	L	0	U
Saccharum officinarum L.	sugar cane, ko	P	A	-	R
Setaria verticillata (L.) Beauv.	bristly foxtail	X	U	-	-
Sporobolus africanus (Poir.) Robyns & Tournay	African dropseed	X	-	U	-
Tricachne insularis (L.) Nees	sourgrass	X	-	0	-

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SCIENTIFIC NAME	COMMON NAME	STATUS	VEGETATION TYPES		
			c	r	k
<u>DICOTYLEDONS</u>					
AMARANTHACEAE (Amaranth Family) Amaranthus spinosus L.	spiny amaranth	X	0	0	U
Amaranthus viridis L.	slender amaranth	X	-	0	-
COMPOSITAE (Daisy Family) Bidens cynapiifolia HBK.	West Indian beggar's tick	X	U	-	-
Bidens pilosa L.	Spanish needle, ko'oko'olau	X	-	R	-
Calyptocarpus vialis Less.	hierba del cabello	X	-	0	-
Emilia fosbergii Nicolson	red pualele	X	0	0	-
Pluchea odorata (L.) Cass.	pluchea	X	-	U	-
Sonchus oleraceus L.	sowthistle, pualele	X	0	-	-
Tridax procumbens L.	coat buttons	X	U	0	U
Verbesina encelioides (Cav.) B. & H. ex Gray	golden crown-beard	X	U	0	U
Wedelia trilobata (L.) Hitchc.	vedelia	X	-	U	-
CONVOLVULACEAE (Morning-glory Family) Ipomoea obscura (L.) Ker-Gawl	little bell	X	R	-	-
Ipomoea triloba L.		X	L	U	-
CUCURBITACEAE (Squash Family) Cucurbita pepo L.	pumpkin, pala'ai	X	R	-	-
Monordia charantia var. pavel Crantz	wild bittermelon	X	L	0	0
EUPHORBIACEAE (Spurge Family) Euphorbia geniculata Ortega	wild spurge, kaliko	X	0	U	-
Euphorbia glomerifera (Millsp.) L.C. Wheeler		X	-	0	-
Euphorbia heterophylla var. cyathophora (Nurr.) Griseb.	Mexican fire plant	X	U	-	-

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SCIENTIFIC NAME	COMMON NAME	STATUS	VEGETATION TYPES		
			c	r	k
<i>Euphorbia hirta</i> L.	hairy spurge	X	O	O	U
<i>Euphorbia prostrata</i> Ait.	prostrate spurge	X	-	O	-
<i>Ricinus communis</i> L.	castor bean, koli	X	L	O	U
LABIATAE (Mint Family)					
<i>Leonotis nepetaefolia</i> (L.) Ait. f.	lion's-ear	X	U	-	-
LEGUMINOSAE (Pea Family)					
<i>Cassia lechensaultiana</i> DC.	partridge pea, lauki	X	-	O	-
<i>Cassia surattensis</i> Burm. f.	kolomona	X	-	R	-
<i>Crotalaria incana</i> L.	fuzzy rattlepod	X	U	R	-
<i>Desmanthus virgatus</i> (L.) Willd.	virgate mimosa	X	U	O	-
<i>Desmodium canum</i> (Gmel.) Schinz. & Thell	Spanish clover	X	-	O	-
<i>Indigofera suffruticosa</i> Mill.	indigo	X	-	O	-
<i>Leucaena leucocephala</i> (Lam.) de Wit	koa-haole, ekoa	X	L	O	A
<i>Phaseolus lathyroides</i> L.	cow pea, wild bush bean	X	-	L	-
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) HBK.	kiave, mesquite	X	-	R	O
<i>Samanea saman</i> (Jacq.) Merr.	monkeypod	X	-	R	-
MALVACEAE (Hibiscus Family)					
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon	X	U	-	U
<i>Malvastrum coromandelianum</i> (L.) Garcke	false mallow	X	U	O	O
<i>Sida fallax</i> Walp.	'ilima	I	U	O	O
<i>Sida rhombifolia</i> L.	Cuba jute	X	-	R	-
<i>Sida</i> sp.		X	-	R	-
NYCTAGINACEAE (Four o'clock Family)					
<i>Boerhavia coccinea</i> Mill.		X	R	U	-

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SCIENTIFIC NAME	COMMON NAME	STATUS	VEGETATION TYPES		
			c	r	k
PORTULACACEAE (Purslane Family)					
<i>Portulaca oleracea</i> L.	common purslane, 'ihi	X	R	U	-
SOLANACEAE (Tomato Family)					
<i>Solanum nigrum</i> L.	popolo	I?	R	-	-
STERCULIACEAE (Cocoa Family)					
<i>Waltheria indica</i> var. <i>americana</i> (L.) R. Br. ex Hosaka	'uhaloa, hi'aloa	I	U	O	U
ZYGOPHYLLACEAE (Tribulus Family)					
<i>Tribulus terrestris</i> L.	puncture vine	X	L	U	-

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APPENDIX D

Archaeology Study:
Paul H. Rosendahl, Ph.D., Inc., Consulting Archaeologist

PAUL H. ROSENDahl, Ph.D., Inc.
Consulting Archaeologist

Hawaii Housing Authority
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Subject: Archaeological Reconnaissance Survey
for Environmental Impact Statement
Kapolei Village Master Plan Project
Honouliuli, Ewa District, Island of Oahu

Gentlemen:

At the request of Mr. Chester Koga of R.M. Towill Corp., acting for their client, the Hawaii Housing Authority, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological reconnaissance survey of the approximately 850 ac Kapolei Village project area in Honouliuli, Ewa, Island of Oahu. The primary objective of this survey was to provide information concerning the presence or absence of any sites or features of potential archaeological significance within the project area limits—both appropriate to and sufficient for an Environmental Impact Statement (EIS) being prepared as part of the Kapolei Village Master Plan project and in anticipation of a Land Use Boundary District Amendment petition to be submitted to the State Land Use Commission.

The goal of the reconnaissance survey was to identify—to discover and locate on available maps—sites and features of potential archaeological significance. A reconnaissance survey comprises the initial level of archaeological investigation. It is extensive rather than intensive in scope, and is conducted basically to determine the presence or absence of archaeological resources within a specified project area. Reconnaissance survey indicates both the general nature and variety of archaeological remains present, and the general distribution and density of such remains. A reconnaissance survey permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for such further work as might be necessary or appropriate. Such work could include intensive survey—data collection involving detailed recording of sites and features, and selected test excavations; and possibly subsequent mitigation—data recovery research excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

The specific objectives of the reconnaissance survey of the Kapolei Village project area were four-fold: (a) to identify (find and locate) any sites or features present within the project area; (b) to evaluate the potential general significance of any identified archaeological remains; (c) to determine the possible impacts of proposed development upon any identified remains; and (d) to define the general scope of any subsequent data collection or mitigation work that might be necessary or appropriate.

The potential general significance of any archaeological remains identified during the reconnaissance survey was to be evaluated in terms of the National Register criteria contained in 36 CFR Part 60, Section 6. The State Department of Land and Natural Resources-Historic Sites Section (DLNR-HSS) uses these criteria to evaluate eligibility for both the Hawaii State and National Register of Historic Places. It was anticipated that the potential significance of any identified remains would most likely relate to National Register criterion "(d)," which refers to remains "...that have yielded, or may be likely to yield, information important in prehistory or history". Once potential significance had been tentatively evaluated, DLNR-HSS was to be consulted (a) to determine and fix formally the significance of the remains, and (b) to determine appropriate mitigation actions to be undertaken.

In order to facilitate future cultural resource management decisions regarding site treatments, any significant sites identified within the project area were also to be evaluated in terms of three value modes—scientific research, interpretive, and cultural values—which may be derived from the previously mentioned State and National Register eligibility criteria. Research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and cultural processes at the local, regional, and interregional levels of organization. Interpretive value refers to the potential of archaeological resources for public education and recreation. Cultural value, within the framework for significance evaluation used here, refers to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and values.

Reconnaissance survey field work was carried out on July 20 and August 24, 1987, by PHRI Principal Archaeologist Dr. Paul H. Rosendahl. Approximately six man-hours of labor were expended in carrying out the field work. Oral reports on field work findings were given respectively to Ms. Colette Sakoda and Mr. Chester Koga of R.M. Towill Corp. on August 24 and 26, 1987. Field work findings were also subsequently discussed with Dr. Joyce Bath, DLNR-HSS staff archaeologist for Oahu. The present letter report constitutes the final report on the reconnaissance survey.

Based on a preliminary review of available background literature and records, and discussions with Mr. Koga and Dr. Bath, the following specific objectives were determined to constitute an adequate scope of work for the reconnaissance survey of the Kapolei Village project area:

1. To review and evaluate available archaeological and historical literature relevant to the immediate project area;
2. To conduct a sample field inspection of the approximately 850 acre project area and determine the presence or absence of any potentially significant archaeological sites;
3. To determine the nature of the physical conditions of the project area that would influence the conduct of any subsequent archaeological field work, should such be necessary; and

4. Prepare an appropriate scope of work (including specific field work and other non-field tasks) and accurate man-hour estimates for any subsequent archaeological work that might be necessary.

The Kapolei Village project area consists of approximately 850 acres located in the Land of Honolulu, Eva District, Island of Oahu (see attached map). The project area is located on the Ewa Plain in the southwest portion of Oahu, immediately north of and adjacent to the Barbers Point Naval Air Station (NAS). It is bounded by Farrington Highway on the northwest, the Barbers Point NAS Access Road on the southwest, the Oahu Railway and Land (ORAL) Company Right-of-Way (ROM) (railroad bed) on the southeast, and Oahu Sugar Company lands adjacent to Kaloi Gulch on the northeast. The northeastern boundary of the project area, an irregular line extending between Farrington Highway and the ORAL-ROM, is situated from c. 5000 to 6000 ft northeast of the Barbers Point NAS Access Road, in currently cultivated cane land. Comprised of land owned by the Estate of James Campbell and leased by Oahu Sugar Company, the entire project area has been extensively modified in recent times, primarily by sugarcane cultivation. Oahu Sugar Company currently cultivates essentially all of the project area, and most of the land therefore has a dense cover of sugarcane (*Saccharum sp.*). Other grasses and scattered stands of koa-haole (*Leucaena glauca* [L.] Benth.) are present primarily as a fringe along shallow gullies and drainages that cut through the project area.


Although no archaeological remains are known to exist within the project area, one previously identified site and a second reported site are immediately adjacent to it. The Oahu Railroad and Land Company Right-of-Way (railroad bed), which bounds the project area on the southeast side, is listed on the National Register of Historic Places (Site 50-80-12-9714). A heiau and large rockshelter were reported by J.G. McAllister (1933:108) to have once been located on Puu Kapolei, a volcanic cone situated southwest of and immediately adjacent to the project area; however, this site (Site 138) evidently had been destroyed prior to McAllister's 1930 survey field work. (For a compilation of available traditional information concerning Puu Kapolei and the Honolulu lands of the Ewa Plain, see Sterling and Summers 1978:31-41.)

Reconnaissance survey field work conducted on July 20 and August 24, 1987 by FHRI consisted of limited systematic pedestrian coverage and a combination of vehicular coverage and pedestrian point inspections. Field work was greatly facilitated by an aerial photograph of Campbell Estate lands (approx. scale 1"=1,000'; R.M. Towill [?], 9/21/82). Systematic pedestrian coverage concentrated on those very limited portions adjacent to the several shallow gullies and drainages which, on the basis of the aerial photograph and initial field inspection, appeared to have been least modified by sugarcane cultivation and other activities. The combination of vehicular coverage and pedestrian point inspections was used primarily to check accessible locations throughout the project area in order to verify the essentially total modification of the project area in recent times by sugarcane cultivation.

No potentially significant archaeological sites or features of any kind were encountered during the reconnaissance survey of the Kapolei Village project area. Based on the entirely negative results of the reconnaissance survey, it is concluded that no further archaeological work of any kind is necessary, and it is recommended that full archaeological clearance for the project area be granted. This recommendation is made on the basis of the surface reconnaissance survey field work, and is given with the general qualification that during any development activity involving the extensive modification of the land surface there is always the possibility—however remote—that previously unknown or unexpected subsurface cultural features or deposits might be encountered. In such a situation, immediate archaeological consultation should be sought.

If you have any questions, please contact me at our Hilo office.

Sincerely yours,


Paul H. Rosendahl, Ph.D.
President and Principal
Archaeologist

Attachment: Project Area Location Map

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CFR (Code of Federal Regulations)

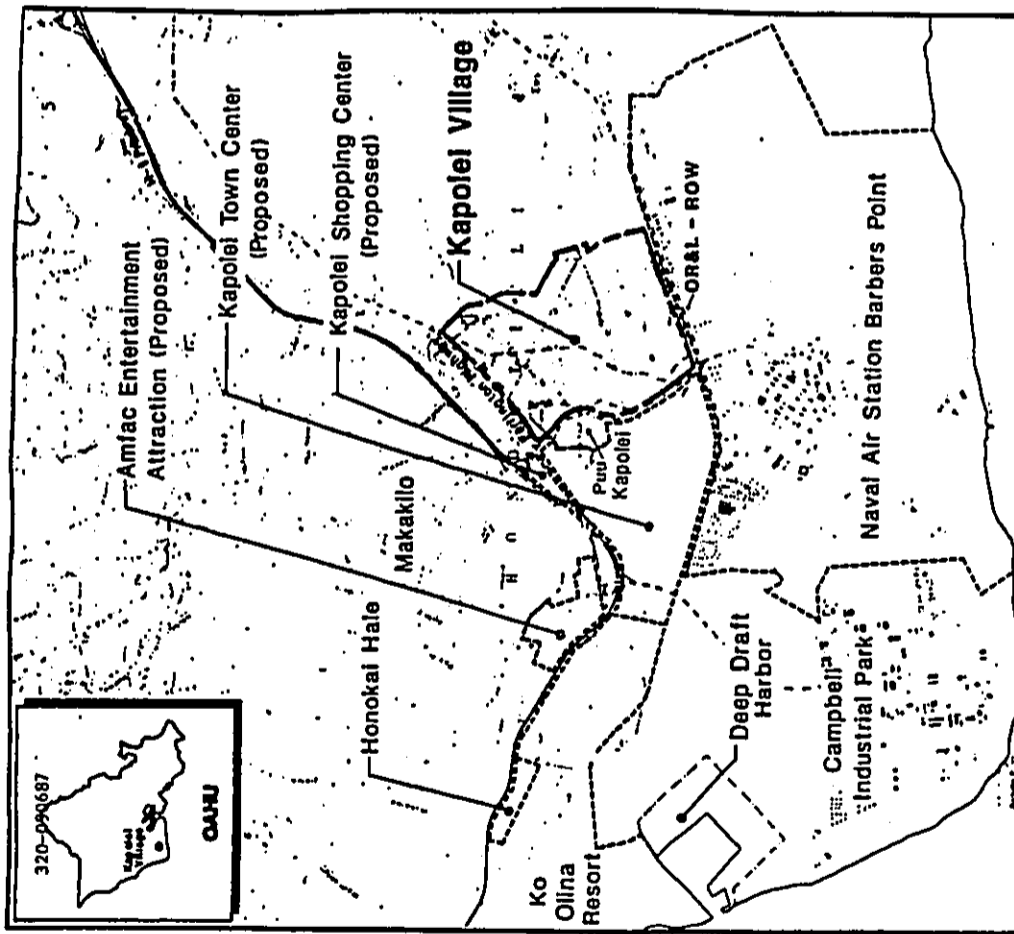
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PROJECT AREA LOCATION MAP

Archaeological Reconnaissance Survey
 for Environmental Impact Statement
 Kapolei Village Project Area
 Honouliuli, Ewa District, Island of Oahu
 PHRI Project 87-320 August 1987

A project of the Hawaii Housing Authority with the
 Department of Housing and Community Development

APPENDIX E

An Affordable Housing Development Concept, State of Hawaii,
Hawaii Housing Authority, March 20, 1986

3/19/86

AN AFFORDABLE HOUSING DEVELOPMENT CONCEPT

RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY

P. O. BOX 17811
HONOLULU, HAWAII 96817

MEMO REPLY

TO:

March 20, 1986

MEMORANDUM


TO: Hawaii Housing Commissioners

From: Russell N. Fukumoto
Executive Director

SUBJECT: AN AFFORDABLE HOUSING DEVELOPMENT CONCEPT

The attached report introduces a development concept directed at producing a consistent level of affordable housing units. Under the concept, the Authority assumes a more aggressive role than in the past to meet Hawaii's housing needs.

A workshop will be held in April to discuss your questions and concerns relating to the concept.


RUSSELL N. FUKUMOTO
Executive Director

Attachment

I. Introduction

This report presents a development concept that is directed at producing a consistent level of affordable housing units for elderly and handicapped persons and for lower-income and gap group families. (Attachment 1 outlines the income limits for these targeted groups.) The objective of this report is to stimulate thinking and feedback in regards to the concept. If workable, further refinements are required.

The concept was formulated in response to the increasing difficulties in meeting the need for more affordable housing. It is not only guided by the complementary objectives of the Hawaii Housing Authority and the State Housing Functional Plan, but is sensitive to county general plans. The concept utilizes Chapter 359C, HRS.

Parts II and III of the report set the stage for the concept by establishing the need for more affordable housing and the preferred course of action for meeting that need. Parts IV and V introduce and discuss the various aspects and concerns of the development concept.

II. Overview of the Housing Market

A. Housing Demand

According to a 1981 study by Daly and Associates, required residential housing production in Hawaii for the 10 year period from 1980 to 1990 is estimated at 77,357 units, or roughly

7,700 units a year. (Staff's estimate of required housing production for the next decade, from 1990-2000, is attached as Attachment 2.) This is an ideal estimate based on the anticipated number of new households, the expected number of housing unit losses due to demolition and the economically preferred vacancy rate of 5%. (A vacancy rate of 5% is generally acknowledged to be the minimum level adequate to assure choice and mobility for housing consumers. It is also an acceptable vacancy level that landlords can absorb.) Table 1 details the components of required housing production.

Table 1

Estimated Housing Production Requirements: 1980-1990

	Honolulu	Maui	Hawaii	Kauai	State
New Households	40,187	7,787	4,395	2,860	55,229
Demolition Replacement	6,040	900	880	100	7,920
Additional Vacancies	10,964	1,277	1,355	612	14,208
Total New Units	57,191	9,964	6,630	3,572	77,357

Assumptions:

- 1) Existing residential vacancy rate of 1.6%
- 2) 1990 average household size of 3.0.
- 3) 5% residential vacancy rate achieved by 1990.
- 4) 1990 population figures based on DPED II-F projections.
- 5) 4% of projected population assumed residing in group quarters.
- 6) Annual demolition equal to the 1975-1980 annual average.

Source: Daly & Associates, Inc., Affordable Housing Issue Paper, December 1981.

B. Housing Production

Statewide, there were 39,793¹ building permits authorized for new residential construction from 1980 through 1985, averaging 6,600 units per year. By comparison, from 1965-1980, the number of units during 11 of the 15 years averaged more than 10,000 units.

It is not known how many of the units authorized were "affordable"; however, based on average sales prices on Oahu in 1984 of \$140,700 and \$81,372² for new for new single-family and multi-family dwellings, respectively, it is assumed that the majority of the units produced were not "affordable."

C. Housing Shortfall

Based upon the average authorization rate of 6,600 units per year, the housing inventory in 1990 would fall short of the projected "ideal" by about 11,300 units. Although these figures are approximations, it appears that low residential construction rates in the face of rising household formations will tend to keep upward pressure on prices and further limit housing affordability.

- 1 Source: Bank of Hawaii, Construction in Hawaii 1985 and files; County of Maui, Department of Public Works.
- 2 Bank of Hawaii, Construction in Hawaii 1983.

III. State Housing Functional Plan

The State Housing Functional Plan is one of 12 State functional plans formulated to manage and coordinate functional area activities and to guide resource allocation decision making. It presents a balanced set of programs and projects directed toward meeting Hawaii's future housing needs.

The actions proposed in the State Housing Functional Plan are not intended to limit government, industry or individuals to a single course of action when another course can achieve the same or better result. However, the implementing actions of the functional plan present a preferred course of action given current conditions and available information.

One of the objectives of the State Housing Functional Plan is to "assist the orderly development of residential areas sensitive to community needs and other land uses." A preferred course of action to achieve this objective is to "assess and delineate lands suitable for future housing development." (State Housing Functional Plan Implementing Action B(1)(a).) The intent of this action is to insure the availability of lands for future residential use and to undertake the planning for those areas in an organized manner. Staff has formulated a development concept along these lines.

IV. Development Concept

The development concept basically incorporates a planned development with emphasis on providing a large percentage of

residential units affordable to lower-income and gap group families.

This concept is predicated on government acquiring, master planning and developing large parcels of land in the various counties. By assuming this role, government would be subject to various development risks, which include, but are not limited to, loss of funds advanced for feasibility and preliminary engineering studies and for master planning should requested land use and zoning changes be denied, as well as unforeseen construction problems such as strikes and acts of God. However, with the provisions of Chapter 359G, HRS, it appears that the advantages of government taking the lead far outweighs the risks.

Section 359G-10.5 allows the Authority to develop projects that include market units. Under this concept, the net income derived from the sale of these market units could be used to reduce the cost of some or all of the affordable units within the development.

The following sub-sections will further describe the concept.

A. Site Selection Criteria

Criteria for site selection would include the following:

1. Reasonably priced land. (The usual case would be land not classified for urban and/or residential use.)

2. Adjacent to existing or planned infrastructure, i.e., water, sewer, drainage, roads and power, thereby minimizing infrastructure cost.
3. Relatively flat land so as to decrease massive grading.
4. Close to employment centers, existing communities and/or areas of growth.

B. Land Use

Given a 500 acre parcel in which all the land is useable, and assuming 70%, or 350 acres (500 A. x 70%), is used for housing at a density of approximately 8.6 units per acre, roughly 3,000 units (350 A. x 8.6 units) could be built. The remaining 30%, or 150 acres, would support infrastructure, public facilities, commercial development, day care centers and other uses, as needed.

C. HOUSING MIX

To provide for economically integrated housing, Section 359G-10.5, HRS, entertains a 60/40 housing mix whereby not less than sixty percent of the units would be sold in price ranges established by the Authority and the balance of the units would be sold at other prices. Under the development concept, 60% of the units would be sold and/or rented at affordable levels. The remaining 40% would be designed to be marketed at higher prices. Using this ratio, the number of affordable units and market units would be 1,800 and 1,200, respectively.

1. Market Units

The 1,200 market units would be offered for sale at appraised value and would not be subject to the buyback restrictions under Chapter 359G. However, as with FHA-insured mortgages, buyers must be owner-occupants.

The excess revenues derived from the sale of the market units could be used to reduce the cost of the affordable units. For example, assuming a per unit sales price of \$140,000 and cost of development of \$125,000, the estimated excess revenue from the sale of each market unit would be \$15,000. The excess revenues from the sale of all 1,200 market units would then be \$18 million. This \$18 million could be used to lower the cost of some or all of the 1,800 affordable units.

2. Affordable Units

The affordable units would provide housing for elderly and handicapped persons and lower-income and gap group families. A suggested distribution of the affordable units is shown in the following table.

Table 2

Suggested Distribution of Affordable Units	
Low rent (10% x 1,800)	180 units
Elderly (10% x 1,800)	180 units
Market rent (10% x 1,800)	180 units
For-sale (70% x 1,800)	1,260 units
Total affordable	1,800 units

Assuming 1) a typical 3-bedroom, 1-1/2 bath, 1,000 square foot gap group unit could be developed for \$100,000 and 2) the \$18 million excess revenues generated from the sale of the market units is used solely to lower the initial cost of the 1,260 gap group units (by \$14,280 each), then the average sales price of a home would be \$85,720. This lowered price will enable more first-time homebuyers to qualify for mortgage financing. (Attachment 3 compares the annual income needed to qualify for a home priced at \$100,000 and \$85,720 at prevailing interest rates.)

The \$14,280 per unit reduction would be recouped so that additional funds would be available for future housing development. (Note that all Dwelling Unit Revolving Fund (DURF) moneys are recaptured when the units are initially sold.) To recoup the per unit reduction of \$14,280, the Authority could either 1) defer payment until such time that the property is sold or transferred to someone other than a spouse or 2) offer the lot in leasehold with the option to purchase the fee.

Under the leasehold method, the leased fee value of the land could be set at \$14,280 for the first 10 years of the lease. Thereafter, the leased fee interest could be based upon the appraised value or incrementally increased by predetermined amounts for the remainder of the lease. The intent is to induce homeowners to purchase the leased fee interest within the first 10 years of the lease.

The lease could be for a total of 55 years, of which lease

rents could be fixed for the entire lease term. As shown in Table 3, lease rents during the fixed period could be gradually increased, producing a steady income stream to support the various activities of the Authority.

Table 3
Leasehold Illustration

Years	Annual Lease Rent/Lot	Annual Lease Rent From 1,260 Lots	Total Lease Rent From 1,260 Lots
1 - 5	\$ 300	\$ 378,000	\$ 1,890,000
6 - 10	420	529,200	2,646,000
11 - 20	1,050	1,323,000	13,230,000
21 - 30	1,200	1,512,000	15,120,000
31 - 55	1,500	1,890,000	28,350,000
			\$ 61,236,000

Also, under the leasehold method, homeowners should have an easier time obtaining financing for home improvements as compared to the deferred sales price method. This is because a deferred sales price is an encumbrance on the property.

D. Commercial Property

As required, a commercial parcel would be developed. This parcel would be owned in fee simple by the Authority and leased to potential developers. The premiums and fair market rents derived from lease of the property would support the various functions of the Authority.

V. Discussion

A. HHA would be the developer and thereby assumes the up-front risks.

HHA would take the lead and the associated risks involved in acquiring and master planning the land, and in obtaining appropriate land use district boundary amendments and proper zoning.

In order to successfully implement the concept, the Authority must be able to control the many variables which contribute to the high cost of housing. Of the 16 variables listed in Table 4, HHA is able to exert some amount of control over 10 of them.

Table 4

Variables Which Contribute to the Cost of Housing

- *1. Land
- *2. Interim financing
- *3. Taxes (Property and General excise tax)
- *4. Zoning (City council)
- *5. Master plan
- *6. Profit/overhead
- *7. Sales expense and commission
- *8. Architect/engineering
- **9. Park and water (fees and assessment)
- **10. Offsite improvements
- +11. Land use (State Land Use Commission redesignation process)
- 12. Construction of house (labor, materials)
- 13. Permanent financing
- 14. On site improvements
- 15. Community opposition
- 16. Environmental impact statement requirements

*Can be controlled by HHA

**May be controlled by HHA through site selection
 +A bill pending before the 1986 Legislature would exempt HHA from land use district boundary proceedings.

The following discussion details how these variables may be controlled by the Authority primarily through the use of the tools available under Chapter 359G.

1. Land. Purchase land that is not classified as urban and utilize the state's power of condemnation.
 2. Interim financing at a below market interest rate is available through DURF.
 3. Real property tax/General excise tax (GET). HHA is exempt from paying property tax and may provide GET exemptions.
 4. Zoning. Chapter 359G, HRS, provides a means for expediting county approvals on variances from subdivision standards, building codes and zoning and general and development plans.
 5. Master plan. The Authority would oversee the master planning effort.
 6. Profit/overhead. With HHA as the developer, there is no profit and HHA overhead (administrative cost) is usually lower than that of a private developer.
 7. Sales expense/commission and
 8. Architect and engineering fees are negotiated by HHA and therefore, are usually lower than that of a private developer.
 9. Land use. If the Legislature clarifies that HHA is exempt from land use district boundary proceedings in the development of housing projects, decisions on land use change petitions would be made within 45 days.
- B. Private Sector Involvement.
- Private sector participation is an integral part of the development concept. Once the land is acquired and master planned, and proper land use and zoning designations are obtained, the Authority may then develop the parcel in phases or grant development rights to private developers. The bulk of the development activities, such as the architectural, engineering, construction and appraisal work, will be performed by the private sector.

This concept could also be applied to private sector developments where government provides the previously stated cost-saving tools under Chapter 359C.

C. The development would involve a desired income mix of families.

The planned development will encompass a mix of housing projects -- low rent, elderly, market rent, and below-market and market for-sale -- to satisfy a spectrum of housing needs.

D. Increase in housing stock.

The estimated 3,000 housing units produced by implementing the concept will increase the supply of housing units and should have a stabilizing effect on sales prices and rent levels.

E. Competing interests for agricultural land.

The protection and maintenance of agricultural lands has consistently received support among Hawaii's residents. However, when asked to express their preference with respect to conflicting alternatives, sentiment for protection of agricultural lands has lost support over the years. Table 5 presents public attitudes on the trade-off

between preserving agricultural lands versus lowering housing costs.

Table 5
Public Attitudes on the Trade-off Between Preserving Agricultural Lands or Lowering Housing Costs*

	1977	1978	1981	1984
Preserve ag lands	82%	75%	36%	37%
Lower housing costs	17%	24%	60%	51%
Don't Know	2%	1%	4%	12%

* The trade-offs posed were as follows: In 1976--"Land for agriculture should be protected, even if this means less land for housing." In 1978, the words "...and higher prices for housing" were added to the above query. In 1981--"Which one is more important to you--lower housing costs or preserving agricultural land?" In 1984--"We should have more affordable housing for residents even if we lose prime agricultural land."

Source: Hawaii State Dept. of Planning and Economic Development, The Hawaii State Plan Survey; January 1977, December 1978, July 1981, and November 1984.

Staff recognizes the importance of preserving productive agricultural lands and will therefore be sensitive to the concerns of those affected by the acquisition.

F. The concept will create more job opportunities.

VI. Conclusion

The development concept presented in this report is a bold and aggressive vehicle for producing a consistent level of affordable housing units. It provides a "win-win" situation

Income Limits for Targeted Groups

1. Lower income limits are determined by the Dept. of Housing and Urban Development at 80% of a county's median. Income limits are as follows:

Lower-Income Family Size	Hawaii	Honolulu	Kauai	MauI
1	\$13,900	\$17,550	\$15,100	\$16,350
2	\$15,900	\$20,050	\$17,300	\$18,700
3	\$17,850	\$22,550	\$19,450	\$21,000
4	\$19,850	\$25,050	\$21,600	\$23,350
5	\$21,100	\$26,600	\$22,950	\$24,800
6	\$22,350	\$28,200	\$24,300	\$26,250
7	\$23,550	\$29,750	\$25,650	\$27,750
8+	\$24,800	\$31,300	\$27,000	\$29,200

2. Elderly income limits follow those established for lower-income families. An elderly family is one whose head or spouse (or sole member) is a person who is 62 years old or older, disabled or handicapped.

3. Gap group households have income that are too high to qualify for rental subsidy programs, yet too low to be able to purchase a home with conventional financing. The upper income limits for this group are defined by HHA's Hula Mae eligibility requirements (150% of median) and may be raised by 4% for every 1/2 percentage point over a Hula Mae interest rate of 10%. The current limits are as follows:

Family Size -(Persons)	Income Limits*	Income Limits**
1	\$36,154	\$39,546
2	\$39,904	\$43,296
3	\$41,154	\$44,546
4	\$42,404	\$45,796
5	\$43,654	\$47,046
6	\$44,904	\$48,296
7	\$46,154	\$49,546
8+	\$47,404	\$50,796

*The income limits based on a simple interest rate of 9.70%
 **The income limits based on a simple interest rate of 11.00%

for the consumer of housing services, the private development sector, and the state as a whole.

Under this concept, government would take the lead and assume the up-front risks associated with acquiring, master planning, and obtaining proper land use and zoning designations for the development of large parcels of land. Government could also opt to develop and/or market the housing units. With the tools available under Chapter 359G, many variables which contribute to the high cost of housing can be controlled, thereby reducing the cost of units and consequently, making the units more marketable.

Additionally, government will continue to work with the private sector in the master planning and development of the large land parcels. Hence, increased job opportunities for Hawaii's labor force will be provided.

The largest social benefit of the concept is the ability to achieve a balanced mix of households in well-planned communities. This mix will include elderly and handicapped persons, lower-income and gap group families and "market" families that do not require governmental assistance. As required, daycare centers, public and commercial facilities are envisioned for these planned communities. This is one way that government can really "make a dent" in the housing marketplace and take care of the ever-growing list of families in need or want of better shelter.

APPENDIX F

Agricultural Impacts: Decision Analysts Hawaii

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PROPOSED KAPOLEI VILLAGE:
IMPACT ON AGRICULTURE

January 1988

TABLES

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EXECUTIVE SUMMARY

The development of Kapolei Village would result in the urbanization of approximately 775 acres of sugarcane lands which are currently under cultivation by Oahu Sugar Company, Ltd. (OSCo), plus the eventual fallowing of an additional 241 acres to the west of the project because of the expense of farming this relatively small and isolated area. Assuming that U.S. sugar prices will continue to be high enough to justify continued sugar operations in Hawaii, an important question is whether Kapolei Village—combined with other planned and proposed projects—would eventually cause the closing of OSCo, either by reducing sugarcane acreage sufficiently to reduce economies of scale, and/or by contributing to a scattered and therefore inefficient plantation rather than a more compact and efficient one.

Assuming that all proposed projects will be approved, and that it would take about 20 years to realize the full development of all projects, OSCo would retain about 11,760 acres under cultivation in 1995 when its major lease expires. If yields increase from their current average of about 15 tons of raw sugar to 16 tons per acre by the end of 1995 (which is a conservative projection), then 11,760 acres would be sufficient land to maintain the current production of about 90,000 to 95,000 tons of raw sugar per year, without any loss in economies of scale. No layoffs of sugar workers would be expected, since OSCo has a practice of reducing its employment by attrition.

However, if the sequence of urbanization results in a scattered plantation that is too inefficient to operate at the current level of production, or if urbanization and loss of sugarcane acreage proceeds at too rapid a rate to be compensated by increasing yields, then a switch from a two- to one-mill operation would be required to maintain an efficient and economically viable operation. For this case, land requirements would be about 8,440 acres, assuming a yield of 16 tons per acre and production of about 67,500 tons per year. This would provide a buffer of 3,320 acres from which to assemble an efficient plantation; this figure is based on 11,760 acres remaining after projected urbanization (assuming approval of all planned and

proposed projects), minus the estimated 8,440 acres required for a one-mill operation. It is uncertain whether or not attrition would be sufficient to accommodate a reduction in employment associated with a switch to a one-mill operation.

At full development of all the planned and proposed projects (assuming approval of all projects), the amount of land under cultivation by OSCo would be about 8,520 acres. If development proceeds gradually, and if yields increase sufficiently (as a result of genetic engineering and other advances), then it is conceivable that OSCo could maintain production near its current level. In order for this to occur, the average yield would have to increase by about 45 percent, from 15 to 21.7 tons per acre.

It is more likely, however, that a switch to a one-mill operation would be required to maintain economic viability. Assuming an average yield of 18 tons per acre by the time the various projects reach full development (which is a conservative projection), a one-mill operation would require about 7,500 acres. This would provide a buffer of about 1,020 acres from which to assemble an efficient plantation; this figure is based on 8,520 acres remaining after urbanization (assuming approval and full development of all planned and proposed projects), minus the estimated 7,500 acres needed for a one-mill operation.

To summarize the above, Kapolei Village, in combination with other approved and proposed projects, is not expected to threaten the economic viability of OSCo; economies of scale and a compact efficient plantation would be possible by (1) switching to a single-mill operation, or (2) retaining a two-mill operation provided that urbanization proceeds gradually and yields can be increased rapidly to compensate for the loss of acreage.

If OSCo were to cease operations for whatever reason (most likely because of low sugar prices), the loss of jobs would be less than 450 direct jobs and 510 indirect jobs. This would be equivalent to the loss of a hotel about half the size of the Hyatt Regency in Waikiki. Immediately following the mill closing, significant economic loss and social disruption would occur. But over the long term, the economic loss would be absorbed easily by expanding economic opportunities in the Ewa/Central-Oahu area.

Assuming that OSCo does close, revenues to Waialua Sugar Company, Inc. (WSCo) would be decreased slightly because OSCo's contribution to shared terminal facilities and services would be lost. At worst, the economic effect would correspond to an increase in production cost of less than 2 percent. But rather than absorb increased terminal charges, a more profitable alternative would be to increase the refining capacity of C&H in Aiea to process all of the WSCo production. Refined

sugar in excess of the Hawaii requirements would be shipped at favorable backhaul rates to Los Angeles and Seattle. Currently, Hawaiian sugar is delivered to these markets by rail from the C&H refinery in Crockett, California near San Francisco. Consequently, the net economic effect of the closing of OSCo on WSCo would be small, and would be unlikely to force the closing of WSCo—like OSCo, the future economic health of WSCo will be determined primarily by the price of sugar in the U.S. market.

The development of Kapolei Village on sugarcane acreage would eliminate the possibility of using these lands for diversified agriculture (including aquaculture). However, it is extremely doubtful that this would adversely affect the growth of diversified agriculture in Hawaii. There are four reasons for this assessment: (1) an extensive amount of prime-agricultural land and water has been freed from sugar and pineapple production because of past mill closings and reductions in operations; (2) a very real possibility exists that additional land and water will be freed from sugar production given the outlook for low sugar prices; (3) some—if not most or even all—of the sugar operations will make their lands available for profitable replacement crops to the extent that such crops are available; and (4) compared to the available supply, a very small amount of land and water is required to grow proven and promising crops to achieve a realistic level of food and animal-feed self-sufficiency, and to increase exports. The increasing availability of prime agricultural land in Hawaii is part of very long-term and accelerating trends occurring throughout most developed and developing market economies. Productivity and yields have been increasing faster than population growth, and genetic engineering and other advances, combined with slower population growth, indicate an acceleration of these trends. Rapid productivity and yield increases require that labor, land, and other resources be withdrawn from agriculture in order to restore balanced markets and to increase farm income for those who remain.

Since the Kapolei Village is not expected to adversely affect the economic viability of OSCo, and would not limit the growth of diversified agriculture, the project is consistent with the major thrust of the agricultural portion of the Hawaii State Plan, the State Agriculture Functional Plan, and the General Plan of the City and County of Honolulu. This thrust is to preserve the economic viability of plantation agriculture and to promote the growth of diversified agriculture. Also, the project would provide a public benefit (i.e., affordable housing) which would override the proposed "important agricultural lands" designation of the Land and Evaluation Site Assessment (LESA) Commission.

EXECUTIVE SUMMARY

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The project is also consistent with the City & County policy of directing population growth to Ewa which, by definition, must occur at the expense of sugarcane acreage.

Sugar operations and housing would be buffered from one another by the Kapolei golf course, which would help minimize conflicts between the two. Therefore, with one exception, the project would not adversely affect cultivation of adjacent sugarcane acreage, and complies with the Hawaii Right-to-Farm Act. The single exception concerns complaints over the burning of fields just prior to harvest; in order to minimize these complaints, OSCo is likely to schedule the burning of adjacent fields when the fewest residents are at home—such as during the work day rather than on weekends—or to harvest without burning. Similar operations are already conducted for other fields adjacent to urban areas. Nevertheless, complaints should be expected over dust generated when fields are prepared for planting, noise from trucks and harvesters, and smoke from burning cane prior to harvesting.

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

Subclass IIs if irrigated, which indicates that the soil has a moderate limitation of stoniness, unfavorable texture, shallowness, or low water-holding capacity. Soil type MnC is in Subclass IIs if irrigated, which indicates that the soil has a severe limitation of stoniness, unfavorable texture, shallowness, or low water-holding capacity.

—Agricultural Lands of Importance in the State of Hawaii (ALISII), by the SCS, University of Hawaii College of Tropical Agriculture and Human Resources, and the State of Hawaii Department of Agriculture.

This system classifies lands into three categories: (1) prime agricultural land which is land that is best suited for the production of crops because of its ability to sustain high yields with relatively little input and with the least damage to the environment; (2) unique agricultural land which is non-prime agricultural land that is currently used for the production of specific high-value crops; and (3) other prime agricultural land which is non-prime and non-unique agricultural land that is of importance to the production of crops. Generally, the upper half of the development consists of soils which are rated as "prime" agricultural lands.

—Overall Productivity Rating, by the Land Study Bureau (LSB) of the University of Hawaii.

This classification rates soils according to five levels, with "A" representing the class of highest productivity and "E" the lowest. Most of the petition lands now planted in sugarcane are rated A. The remaining lands, which comprise about 25 percent of the development, are rated B. About half of these B lands are located on the west side of the project, and the remainder on the east side.

—Proposed Land Evaluation and Site Assessment (LESA) System, by the State of Hawaii Land Evaluation and Site Assessment Commission

Based on soil quality, locational attributes, improvements, nearby activities, and land-use plans, this proposed system would designate a sufficient amount of the better agricultural lands so as to meet projected agricultural goals. The designated lands would be termed important agricultural lands (IAL) and, based on the proposed maps, would include all of the lands in the petition area now under cultivation. However, the identification would be subject to change based on a change in nearby activities and a change in County land-use plans. Also, the designation could be changed if there is an overriding public benefit.

PROPOSED KAPOLEI VILLAGE: IMPACT ON AGRICULTURE

The proposed Kapolei Village would involve the urbanization of about 775 acres of sugarcane lands cultivated by Oahu Sugar Company, Ltd. (OSCo). The impacts of this loss on OSCo operations, as well as on Waiatua Sugar Company, Inc. (WSCO) which shares terminal facilities at Honolulu Harbor, and on the potential growth of diversified agriculture (including aquaculture), are summarized in this report.

SOIL QUALITY OF AFFECTED SUGARCANE ACREAGE

The affected sugarcane acreage consists primarily of four soil types:

- WkA: Waiatua silty clay, 0 to 3 percent slope, comprising about 40 percent of the area and located primarily in the upper half of the development;
- MnC: Mamala stony silty clay loam, 0 to 12 percent slopes, comprising about 25 percent of the area and located primarily in the lower half of the development;
- IixA: Honouliuli clay, 0 to 2 percent slopes, comprising about 20 percent of the area and located primarily in the northeast side of the development;
- EmA: Ewa silty clay loam, moderately shallow, 0 to 2 percent slopes, comprising about 5 percent of the development and located in the lower half of the development.

These soils can be used for sugarcane, truck crops, and pasture (USDA Soil Conservation Service).

The soils within the petition area have been rated in terms of four classification systems commonly used in Hawaii:

- Land Capability Classification by the United States Department of Agriculture Soil Conservation Service (SCS).

This classification rates soils according to eight levels, ranging from the highest classification level 1 to the lowest level VIII. If irrigated, WkA and IixA both have a capability classification I, which indicates that the soils have few limitations which restrict their use. Soil type EmA is in

IMPACT ON OSCO¹Background Information

Amfac's OSCo first milled sugar in 1899, and is now the fourth largest sugar operation in the State. It cultivates about 13,540 acres of sugarcane land, and produces about 90,000 tons of raw sugar, or nearly 10 percent of Hawaii's total sugar production. Its lands cover portions of Central Oahu on each side of Kunia Road above Pearl Harbor, and portions of the Ewa Plain to the west of Pearl Harbor. The Ewa lands were taken over from Ewa Plantation in 1970.

Another 4,860 acres of OSCo lands were in production in 1987, the bulk of which are now fallow, while a few hundred acres have been urbanized. These lands are mostly mauka lands with high pumping costs, and lands close to the seashore where soils tend to be inferior, yields low, and hauling costs high because of the distance to the mill.

Nearly all of the land which OSCo cultivates is leased, principally from Campbell Estate with a lease expiration date of 1995, and from Robinson Estate with a lease expiration date of 1996. The lease rents on these lands are among the highest in the State for sugarcane acreage, and are adjusted as a function of the revenues from sugar operations. Both leases allow partial withdrawal of lands for urbanization. The Campbell Estate lands above H-1 Freeway and west of Kunia Road have been dedicated to agricultural use in order to obtain special property tax assessments.

OSCo is one of the major water users on Oahu, pumping up to 92.5 million gallons per day (MGD) of groundwater, and diverting in normal-rainfall years 25 to 30 MGD from the Windward side via Waihole Ditch. Per-acre usage by OSCo can exceed 9,000 gallons per day. For comparison, pumpage by the Board of Water Supply averages about 140 MGD, and per-acre usage for single-family homes at 5 units per acre averages about 2,130 gallons per day.

Field, mill, and management employment at OSCo is approximately 450 workers. Indirect employment dependent upon OSCo is estimated to be 510 jobs (multiplier of 1.13, based on the State Economic Model). For comparison, OSCo's economic contribution to Hawaii's economy is less than half that of the Hyatt Regency Hotel in Waikiki.

¹Unless otherwise noted, the material in this section is from OSCo, Amfac, and/or Section B, Chapter VI of Hawaii's Sugar Industry: Problems, Outlook, and Urban Growth Issues.

Because of favorable growing conditions, good farming practices, and drip irrigation, sugar yields at OSCo are very high, about 14.5 to 15.5 tons per acre, versus a 1986 Statewide average of 12.5 tons per acre (HSPA, "Hawaii Sugar News," March 30, 1987). In fact, OSCo holds the world record sugar yield at 21.63 tons per acre set in April 1985 (HSPA, "Hawaii Sugar News," June 26, 1985). The current average yield is about 33 percent higher than the 1979 yield of 11.3 tons per acre.

But even with high yields and very efficient operations, OSCo is only marginally profitable—the principal problem being low sugar prices. The marginal profitability is measured before accounting for new capital investment needed to replace equipment.

Outlook for Sugar Prices

In the long term, the survival of OSCo will depend primarily on the price of sugar, for which the outlook is pessimistic. In the world market, the average price of sugar is expected to remain well below the production costs for all countries. This is because most sugar is traded in controlled and/or subsidized markets, with surplus sugar dumped onto the world market for sale at a loss. Dramatic price increases have occurred, however, following a 6- to 9-year cycle, with prices increasing whenever world production falls short of consumption. But, there have been a number of fundamental developments in sugar and related industries in the past 10 years which appear to have altered the pattern of sugar prices, reducing peak prices and extending the periods of low prices. These changes include: the decline or stagnation of sugar consumption in most developed countries; inroads made by the liquid sweetener high-fructose corn syrup (HFCS); the availability of substantial sugar reserves in the form of sugarcane now devoted to ethanol production; major gains in sugar beet productivity in several European countries which were traditionally cane sugar importers; and the appearance of the European Economic Community ECC as a major exporter of refined sugar (Brown).

In the United States, Federal legislation protects sugar from the low world prices by import quotas, tariffs, and import fees. However, U.S. sugar prices are managed so that they are fairly low in order to prevent accelerating the growth of competing sweeteners, and to maintain public support. Under the U.S. Farm Bill, which runs to 1991, the target price for sugar is 18 cents per pound, with no adjustments for inflation.

The competing sweetener of major concern has been HFCS. It is as sweet or sweeter than regular sugar, costs less to produce, sells for less, is more profitable, is

An important component of OSCo's reduction in costs is a continued decline in the labor force; over the past 2 years, employment decreased by about 150 jobs, or about 25 percent. The employment decrease is accomplished by attrition—that is, employees who retire or leave OSCo for other voluntary reasons generally are not replaced.

Continued success of the OSCo Survival Plan will depend on (1) continued Federal price supports for sugar which are sufficiently high to justify continued operations, (2) union support to reduce costs, (3) an adequate allocation of water from the Pearl Harbor aquifer, and (4) retaining fields which are economical to farm and which provide sufficient yields to operate the mill at an economical level. After the major leases expire with Campbell Estate and Robinson Estate in 1995 and 1996, respectively, continued sugar operations also will depend on success in negotiating favorable lease terms.

An additional option which has been under consideration by OSCo is to contract operations by running a single mill rather than two mills in parallel as is currently the case. With a single mill, OSCo could reduce production from its current level of from 90,000 to 95,000 tons per year to from 60,000 to 75,000 tons without losing its economies of scale; a corresponding decrease would occur in the acreage requirements for OSCo. Of significance, Amfac's Kekaha Sugar Company, Inc., which has climatic conditions similar to those of OSCo lands and a similar yield potential, historically has been one of the most profitable sugar operations in the State. Yet this plantation has only about 8,000 acres under cultivation, and produces only about 55,000 tons of sugar per year.

Of interest, nearly all sugarcane operators throughout the world are pursuing a similar strategy to that expressed in the OSCo Survival Plan: improve efficiency by increasing yields and reducing production costs; and search for alternative crops (Brown).

Urbanization Pressures on OSCo

The gradual growth westward of urban Honolulu has consumed a large amount of former sugarcane land as evidenced by the fact that the eastern boundary of OSCo lands has moved westward by 9 miles from Moanalua Valley out past Waikole Stream. Since the 1960s, four ridges west of Halawa have been urbanized. But because of new plantings in the foothills of the Waianae mountains and on former pasture lands, sufficient acreage was cultivated to maintain economies of scale. The westward urbanization pressures of Honolulu continues, but plantings of new lands to compensate for lost fields is no longer feasible.

very similar to liquid sugar, can be substituted readily in many applications, and is easier and cheaper to handle. It has experienced rapid growth in sales at the expense of regular sugar sales. However, HFCS has captured nearly all of the liquid-sweetener market so that continued growth will depend on the market acceptance of Crystar, the crystalline version of HFCS. In addition, the new low-calorie sweetener aspartame, sold under the brand name "Equal," is capturing market share and putting additional downward pressure on U.S. sugar prices.

Regarding the long-term outlook for sugar legislation, it should be noted that, because of HFCS, many corn states have joined the sugar and sweetener coalition, making it larger and stronger than in the past, even though a number of sugar companies have closed in recent years. Also, the Farm Act is generally supported by those countries which receive a sugar quota, since they benefit from a high price for a major portion of their sugar. The considered expectation among sugar experts and lobbyists is that sugar will continue to be included in the U.S. Farm Act, but that the price-support level may be relatively low and may increase at a rate that is somewhat slower than inflation. Even though this is expected, there is a risk that efforts by sugar users and consumer groups to exclude sugar from the Farm Act or to reduce the support price will be successful.

OSCo Plans

In 1982, Amfac developed a Master Agricultural Plan which included a Survival Plan for OSCo. This plan, which has been fully implemented, was developed in response to an operating loss of nearly \$10 million in 1981 and an outlook for low sugar prices. In recognition of the fact that sugar plantations are in place with substantial improvements, but suitable replacement crops have yet to be identified, the plan amounts to a holding action to gain time to find as many replacement crops as possible before OSCo may be forced by outside economic factors to cease operations.

Key components of the plan are:

- continue to improve the economic efficiency of OSCo by increasing sugar yields and reducing production costs (both of which have been improved substantially in the last few years);
- urbanize Waikole (the only OSCo land owned by Amfac) in order to derive revenues to help support and justify continued sugar operations; and
- experiment with a variety of crops (papaya, sweet corn, potatoes, forage and feed crops, coffee, etc.) in order to find profitable replacements to sugar.

The economic forces which create urbanization pressures on OSCo include:

- Financial returns from urban land uses far exceed those from agricultural uses.
- Proximity to the new or growing employment centers of West Beach, Barbers Point Harbor, Campbell Industrial Park, and downtown Honolulu.
- Reasonable travel times to these employment centers because of the H-1 Freeway.
- Availability of water if it is freed from sugar production.
- Proximity to the Honolulu waste-treatment facility.
- Low construction costs compared to areas that require extensive grading or removal of structures.

In contrast, redevelopment of downtown suffers from the high expense and displacement problems required to remove existing structures, the high expense and inconvenience of redeveloping inadequate infrastructure, less desirable high-rise housing compared to single-family homes, and strong community opposition on occasion. Hawaii Kai suffers from a lack of employment growth centers, relatively little land available for further single-family housing, severe transportation problems, and community opposition to further development. Similarly, the Windward side suffers from a lack of growing employment centers, transportation problems, and community opposition to further development.

In view of these factors, the City & County of Honolulu has designated the Ewa area as a "Secondary Urban Center" which will be developed to accommodate a major portion of Honolulu's future growth. Developments approved and proposed for the Ewa/Central-Oahu area which would affect OSCo acreage include:

	Sugarcane Acreage
Kapolei Village	775
Kapolei Town Center	693
Lusk Kapolei	55
Ko Olina Resort (approved)	281
Other (see text)	241
Ewa Century (300 acres approved by the State, and 75 by the County)	932
Ewa Marina (approved)	410
West Loch Estates	195
Village Park (547.5 acres approved by the State)	980
Kunia Golf Course	190
Golf Course (J. Myers)	270
Total	5,022

In this listing of major developments, the 241 acres for "Other" represents acreage to the west of Kapolei; OSCo expects to fallow this acreage due to the expense of farming this relatively small and isolated area. It is likely that this land would be laid fallow as soon as Kapolei Village is developed down to Waimanalo Road, which would occur in the latter stages of the project. Regarding the Kunia Golf Course, the land owner lacks withdrawal rights before the lease expires in 1996.

Acreage Required to Maintain Economies of Scale

Before addressing the question of how the acreage withdrawals for the above projects would affect the economic viability of OSCo, acreage requirements of OSCo are discussed. These requirements are summarized in Table 1 for a one- and two-mill operation as a function of yield. As mentioned previously, OSCo currently produces from 90,000 to 95,000 tons of raw sugar per year using two mills. With a single mill, OSCo could reduce production to from 60,000 to 75,000 tons without losing its economies of scale. The mid-values for these ranges are used in Table 1: 67,500 and 92,500 tons of raw sugar per year for a one- and two-mill operation, respectively.

Also shown in Table 1 are yield assumptions, along with two past yields and OSCo's world-record yields: 11.3 tons of raw sugar per harvested acre in 1979, 15 tons in 1987, and 21.63 tons for the record yield. The two past yields indicated the substantial increase which can occur over time, while the record yield indicates future potential under favorable farming conditions.

Average sugar yields fluctuate from year to year but, over the long term, yields have increased gradually over time, and are expected to continue their gradual increase. For the future, increasing yields are expected to occur as a result of contracting operations to higher-quality fields, introducing improved varieties of cane, improving farming practices, adding chemical ripeners, introducing more efficient harvesters, etc. In the long-term, genetic engineering provides the promise of dramatically improved cane varieties that will have much higher yields and will be cheaper to farm because they will require less fertilizer, will resist diseases, and will produce less leafy trash.

Based on long-term industry trends, a conservative projection of OSCo's average yield in 1995, when the lease with Campbell Estate expires, is 16 tons of raw sugar per harvested acre; 20 years into the future, a conservative projection for the average yield is 18 tons per acre. The projected increase in the average yield is less than 1 percent per year.

Table 1.— OSCo ACREAGE REQUIREMENTS FOR ONE AND TWO MILLS, BY YIELD LEVEL¹

Yield (tons of raw sugar per harvested acre)	One Mill ² (67,500 tons of raw sugar per year)	Two Mills ³ (92,500 tons of raw sugar per year)
10	13,500 acres	18,500 acres
11	12,273	16,818
11.3 (1979 average yield)	11,947	16,372
12	11,250	15,412
13	10,385	14,231
14	9,643	13,214
15 (1987 average yield)	9,000	12,333
16 (1995 conservative projection)	8,438	11,563
17	7,942	10,882
18 (2008 conservative projection)	7,500	10,278
19	7,105	9,737
20	6,750	9,250
21	6,429	8,810
21.6 (record yield)	6,241	8,553
22	6,136	8,409

¹It is assumed that one-half of the acreage is harvested annually.

²The estimated output from a one-mill operation would be from 60,000 to 75,000 tons of raw sugar per year.

³Current production from the two-mill operation is from 90,000 to 95,000 tons of raw sugar per year.

Table 1 indicates that OSCo could reduce acreage and maintain economics of scale by increasing its average yield and/or switching from a two- to a single-mill operation. Increasing the average yield to 16 tons per acre would reduce land requirements from the current 13,540 acres to about 11,560 acres, thereby freeing about 1,980 acres. If the average yield were to increase to 18 tons per acre, this would reduce land requirements to about 10,280 acres, which would free about 3,260 acres. Switching from a two- to one-mill operation while maintaining yields at 15 tons per acre would reduce land requirements to about 9,000 acres and free about 4,540 acres. Switching to a single mill and increasing yields to 16 tons per acre would reduce land requirements to about 8,440 acres, and free about 5,100 acres. Finally, switching to a single mill and increasing yields to 18 tons per acre would reduce land requirements to only about 7,500 acres, and free about 6,040 acres.

Although these acreage reductions would allow economies of scale to be maintained, economic viability will also depend on other factors, one of the most important of which will be a favorable U.S. price for sugar. The agricultural quality of the lands which remain, and the form of the plantation would also be important. In general, any reduction in the plantation lands should occur from the outside in because this would result in a compact plantation with high-quality lands: a more compact plantation reduces trucking and other costs, while higher quality lands contribute to higher yields.

Outlook for OSCo

Assuming that U.S. sugar prices will continue to be high enough to justify continued sugar operations in Hawaii, an important question is whether Kapolei Village—combined with other planned and proposed projects—would eventually cause the closing of OSCo, either by reducing sugarcane acreage sufficiently to reduce economies of scale, and/or by contributing to a scattered and therefore inefficient plantation rather than a more compact and efficient one. The concern is over three proposed projects: Kapolei Village, Kapolei Town Center, and Ewa Gentry.

Outlook to 1995

Assuming that all the planned and proposed developments previously listed are approved, a 20-year average development period for the housing, commercial, and resort projects, and at least a one-year delay before construction begins for most of the projects, then the loss of sugarcane acreage by the end of 1995 when the major lease with Campbell Estate expires would be about 1,780 acres. Remaining acreage

under cultivation by OSCo would fall from 13,540 acres to about 11,760 acres, assuming no replanting of fallowed land.

In terms of land required to maintain economies of scale, 11,760 acres would provide sufficient land to maintain a two-mill operation, assuming the projected average yield of about 16 tons per year in 1995 (see Table 1).

In terms of the form of the plantation, the development sequence for Kapolei Village and Kapolei Town Center would proceed from mauka to makai (from north to south). This is not the preferred sequence (from the outside in, which is west to east), nor is it the worst sequence (from within the plantation towards the outside, which is from east to west). For Ewa Gentry, the development sequence would be from Ewa Villages starting on land already approved for development, then proceeding makai. Again, this is not the preferred sequence, but it does proceed from an existing urban area in an outward direction toward inferior lands rather than inward toward superior lands.

If the resulting form of the plantation proves to be inefficient for a two-mill operation (or if urbanization proceeds much more rapidly than projected), then an efficient sugar operation could be achieved by switching to a one-mill operation. For this case, land requirements would be about 8,440 acres, assuming a yield of 16 tons per acre (see Table 1). This would provide a buffer of 3,320 acres from which to assemble an efficient plantation; the figure of 3,320 acres is based on 11,760 acres remaining after projected urbanization assuming approval of all planned and proposed projects, minus the estimated 8,440 acres needed for a one-mill operation.

In summary, by the end of 1995 when the major lease with Campbell Estate expires, Kapolei Village, in combination with other planned and proposed projects, is not expected to threaten the economic viability of OSCo. However, in order to retain economic viability, a switch from a two- to a one-mill operation may be required if urbanization proceeds rapidly, or if the sequence of urbanization results in a scattered plantation that is inefficient for a two-mill operation.

Long-Term Outlook

Assuming approval and full development of all the planned and proposed projects, the amount of land under cultivation by OSCo would decline by 5,022 acres, from 13,540 acres to about 8,520 acres. If development proceeds gradually, and if yields increase sufficiently (possibly resulting from advances in genetic engineering), then it is conceivable that OSCo could maintain economies of scale and an economically viable operation with two mills. It is more likely, however, that a

switch to a one-mill operation would be required to maintain economic viability. Assuming an average yield of 18 tons per acre, a one-mill operation would require about 7,500 acres. This would provide a buffer of about 1,020 acres from which to assemble an efficient plantation; the figure of 1,020 acres is based on 8,520 acres remaining after urbanization assuming approval of all planned and proposed projects, minus the estimated 7,500 acres needed for a one-mill operation.

In summary, given a change from a two- to a single-mill operation, Kapolei Village, in combination with other approved and proposed projects, is not expected to threaten the economic viability of OSCo.

Economic Impact of Reducing OSCo Operations

Assuming that a two-mill operation remains economically viable, little or no loss in revenues to OSCo would occur as a result of urbanizing sugarcane lands because production would remain near its current level. Also, the reduction in employment associated with the projected reduction in acreage is not expected to require any layoffs of sugar workers since OSCo makes a practice of reducing employment through attrition.

For a one-mill operation, production would decline by about 25,000 tons of raw sugar per year, or 27 percent of current production. Based on 1986 prices (\$334.59 per ton for sugar, and \$45.80 per ton for molasses, with one-third of a ton of molasses produced for each ton of sugar), lost revenues would amount to about \$8.7 million per year. But because less sugar would be grown and milled, production costs would also decline. Whether or not attrition would be sufficient to accommodate a reduction in employment associated with a switch to a one-mill operation is uncertain.

Economic Impact of Closing OSCo

If OSCo were to cease operations for whatever reason (most likely because of low sugar prices), the loss of jobs would be less than 450 direct jobs and 510 indirect jobs, with the actual number dependent upon the reduced employment made possible by continuing productivity increases. This would be the economic equivalent of losing of a hotel about half the size of the Hyatt Regency in Waikiki. Immediately following the mill closing, there would be a significant economic loss and social disruption. But over the long term, the economic loss would be absorbed easily by expanding economic opportunities in the Ewa/Central-Oahu area. For example, the new hotels at Ko Olina will be the equivalent of about nine OSCos in terms of direct plus indirect jobs and—when tip income and all indirect jobs are considered—will

provide higher average wages (based on analysis with the State Economic Model). Other new jobs in the Ewa area will be provided by Barbers Point Harbor, expansion of Campbell Industrial Park, development of Kopelei Town Center, growth of diversified agriculture made possible by lands freed from sugar (growth which is likely to be at the expense of Neighbor Island farmers), and other economic activities which may be attracted to the area or which may occur spontaneously due to of the increased availability of land and water, and lower urban land costs than would otherwise be the case. Therefore, most if not all sugar employees can be expected to find other employment if this should be required. However, some unskilled sugar workers and those having non-transferable skills may receive reduced pay when and if they are forced to find non-sugar jobs.

Assuming a policy favoring rapid urbanization of lands freed by the closing of sugar operations—a policy which presumably would be designed to increase the supply of land for housing and various economic opportunities, and increase competition among landowners and developers, with the objective of decreasing housing costs and increasing economic opportunities—three to four decades, or even longer, would be required to absorb the land. During this period, a huge supply of land and water would remain available for diversified agriculture and other economic activities. Even at full urbanization, over 2,000 acres would remain available for agriculture in the blast zone surrounding the Navy's magazine storage area located at West Loch, Pearl Harbor.

IMPACT ON WAIALUA SUGAR COMPANY

If OSCo ceases operations for whatever reason, the profitability of WSCO would be decreased—an operation which employs about 450 workers. This is because OSCo's contribution to the Honolulu Harbor terminal charges would be lost. In 1986, these charges were \$978,000, of which \$418,800 were WSCO's share. If only WSCO's production were to be handled by the Harbor, then the terminal manager estimates that the charge would be only about \$100,000 less than currently. Therefore, the terminal charge to WSCO would increase from \$418,800 to about \$878,000, or an increase of \$460,000. Based on WSCO's 1986 production of 72,446 tons, the increase in WSCO's cost amounts to 0.3 cent per pound. This is less than a 2-percent increase in the cost of production.

Rather than absorb the increased terminal charges, a more profitable alternative would be to increase the refining capacity of C&H in Aiea from about 45,000 tons per year to about 72,500 tons per year so as to process all of the WSCO

production. A crude estimate for the cost of the plant expansion is about \$2 million. Refined sugar in excess of the 36,000-ton-per-year Hawaii requirements would be shipped at favorable backhaul rates to Los Angeles and Seattle. Currently, Hawaiian sugar is delivered to these markets by rail from the C&H refinery in Crockett, California near San Francisco. The economic feasibility of this alternative is considered to be "very probable."

In view of the above, a closing of OSCo for whatever reason is unlikely to force the closing of WSCO. Like OSCo, the future economic health of WSCO will be determined primarily by the price of sugar in the U.S. market.

IMPACT ON DIVERSIFIED AGRICULTURE

The development of Kapelei Village is an irrevocable commitment of prime agricultural land to urban use. For the purposes of this discussion, prime agricultural land is loosely defined to mean any high-quality agricultural land capable of providing high yields for a variety of crops, and would include the lands currently cultivated in the petition area. This commitment to urban use raises the question of whether Kapelei Village would affect adversely the development of diversified agriculture (including aquaculture), either immediately or in the long term. Before addressing this question, the demand for and the supply of prime agricultural land for diversified agriculture is clarified.

Demand for Prime Agricultural Land

As part of its analysis to identify IAL (see page 2), the LESA Commission adopted projections of the amount of agricultural land required to increase food and animal-feed self-sufficiency given resident plus visitor population growth, and increased crop exports. The projections for the State and Oahu are shown in Tables 2 and 3, respectively. As indicated, an estimated 52,684 additional acres will be required Statewide to accommodate the the 1983-to-1995 increase in production. The corresponding figure for Oahu is 7,979 acres. As shown, the crops and acreage requirements are categorized according to those which generally do not require prime agricultural land (although some crops may be grown profitably on prime agricultural land), those crops which generally do require prime agricultural land, plus a contingency of 10 percent of all acreage other than for beef and cattle.

It should be noted that the LESA projections and the corresponding illustrative Generalized IAL Maps contain, or appear to contain, a number of major flaws which have led to a gross overestimation of the amount of agricultural land required:

Table 2.— LESA AGRICULTURAL ACREAGE REQUIREMENTS,
STATE OF HAWAII: 1983 AND 1995

Crop or Activity	1983	1995	Increase
Crops and Activities which Generally Do Not Require Prime Agricultural Lands			
Beef/cattle ^{1,2}	765,450	365,090	--
Livestock:			
Dairy	1,000	1,182	182
Eggs/Poultry	281	515	234
Swine	600	1,050	450
Subtotal for Livestock	1,881	2,747	866
Unique Crops:			
Aquaculture	500	4,500	4,000
Coffee	2,000	5,700	3,700
Flowers/Nursery	1,786	3,040	1,254
Papsaya	2,120	11,850	9,730
Taro/Watercress	400	527	127
Subtotal for Unique Crops	6,806	25,617	18,811
Macadamia Nuts	15,800	27,000	11,200
Crops and Activities which Generally Do Require Prime Agricultural Lands			
Plantations:			
Sugarcane ³	194,300	177,700	-16,600
Pineapple	36,000	36,049	49
Subtotal for Plantation	230,300	213,749	-16,551
Other:			
Guava	965	1,400	435
Seed Corn	730	1,060	330
Bananas	1,100	2,200	1,100
Feed/Forage ^{2,4}	8,705	12,495	3,790
Fruits	635	1,156	521
Vegetables/Melons ⁵	4,340	7,022	2,682
Subtotal for Other Crops	16,475	25,333	8,858
Contingency ⁶	--	29,500	29,500
TOTAL	1,036,712	689,036	--
TOTAL, Excluding Beef/Cattle	271,262	323,946	52,684

Table 2.— LESA AGRICULTURAL ACREAGE REQUIREMENTS,
STATE OF HAWAII: 1983 AND 1995
(continued)

- ¹Includes marginal grazing and pasture lands. The 1983 figure includes arid zones and other areas having low carrying capacity, while the 1995 figure does not.
- ²Often includes land in a holding operation awaiting discovery of profitable uses.
- ³The decline in acreage primarily reflects the loss of Puna Sugar Co.
- ⁴Includes some pasture and 8,000 of guinea grass from Molokai.
- ⁵Overstated in that the acreage figures are for harvested acres, not the amount of land required.
- ⁶Based on 10% of all acreage other than that for beef/cattle. Adding a contingency amounts to double counting in that the projections are optimistic to begin with. Also, the contingency figure includes 17,770 acres for expansion of sugarcane, even though the sugar industry is expected to decline, not expand.

Table 3.- LESA AGRICULTURAL ACREAGE REQUIREMENTS, CITY AND COUNTY OF HONOLULU: 1983 AND 1995

Table 3.- LESA AGRICULTURAL ACREAGE REQUIREMENTS, CITY AND COUNTY OF HONOLULU: 1983 AND 1995 (continued)

Crop or Activity	1983	1995	Increase
Crops and Activities which Generally Do Not Require Prime Agricultural Lands			
Beef/cattle ^{1,2}	18,200	10,090	--
Livestocks:			
Dairy	340	402	62
Eggs/Poultry	250	390	140
Swine	144	200	56
Subtotal for Livestock	734	992	258
Unique Crops:			
Aquaculture	300	2,400	2,100
Flowers/Nursery	495	850	355
Papaya	70	170	100
Taro/Watercress	60	85	25
Subtotal for Unique Crops	925	3,505	2,580
Crops and Activities which Generally Do Require Prime Agricultural Lands			
Plantations:			
Sugarcane	27,200	25,300	-1,900
Pineapple	11,829	11,800	-29
Subtotal for Plantation	39,029	37,100	-1,929
Other:			
Guava	--	242	242
Seed Corn	125	180	55
Bananas	540	836	296
Feed/Forage ^{2,3}	1,741	2,912	1,171
Fruits	90	200	110
Vegetables/Melons ⁴	1,155	1,595	440
Subtotal for Other Crops	3,651	5,965	2,314
Contingency ⁵	--	4,756	4,756
TOTAL	62,539	62,408	--
TOTAL, Excluding Beef/Cattle	44,339	52,318	7,979

¹ Includes marginal grazing and pasture lands. The 1983 figure includes arid zones and other areas having low carrying capacity, while the 1995 figure does not.

² Often includes land in a holding operation awaiting discovery of profitable uses.

³ Includes some pasture.

⁴ Overstated in that the acreage figures are for harvested acres, not the amount of land required.

⁵ Based on 10% of all acreage other than that for beef/cattle. Adding a contingency amounts to double counting in that the projections are optimistic to begin with. Also, the contingency figure includes 2,530 acres for expansion of sugarcane, even though the sugar industry is expected to decline, not expand.

--Based on a thorough, in-depth, and widely reviewed analysis of the market potential for crops grown on Molokai (Plasch and Garrod), and analysis of previous projections distributed by the State of Hawaii Department of Agriculture, the LESA projection for diversified agriculture appears to be excessively optimistic. Apparently, it is assumed that many unprofitable crops will become profitable, that Hawaii farmers will be able to undersell low-cost summer crops from California, and that each and every activity will experience rapid growth. Verification of the extent of these flaws is hampered by the fact that the assumptions and analysis which underlie the LESA projections have not been made available for public inspection.

--Some of the acreage estimates are for harvested acreage, which leads to an overestimate of the land requirements for those crops which are harvested more than once a year (e.g., a crop harvested twice a year should have its acreage requirement halved).

--The LESA contingency of 29,500 acres is excessive, especially since LESA projects a requirement for less than 9,000 additional acres of prime agricultural lands. The contingency is large primarily because the LESA methodology implicitly allows for expansion of sugar operations—a grossly unrealistic possibility. Furthermore, the contingency amounts to double counting since optimistic projections have a built-in contingency.

--The LESA methodology assumes that prime agricultural lands that were freed from sugar and pineapple production and placed in pasture or some other low-profit operation will stay in these uses. This is very unrealistic in that these are holding operations for land until profitable crops can be identified.

--The LESA methodology incorrectly assumes that sugar is a healthy industry, and that sugar lands would be unavailable for more profitable replacement crops.

--The Illustrative Generalized IAL Maps incorrectly allocates prime agricultural lands to certain activities which do not need such lands (e.g., aquaculture should be allocated the agriculturally low-quality coastal lands at Kahuku).

The relevant figures from Tables 2 and 3 are not the total figures, but the increase in the amount of prime agricultural land required to accommodate diversified agriculture: the increase is 8,858 acres for the State, and 2,314 acres for Oahu.

As discussed above, these figures are excessive; a more realistic estimate for the State is probably closer to 1,200 acres (Plasch and Garrod). Nevertheless, even using the excessive LESA estimate, the amount of additional prime agricultural land that would be required to accommodate diversified agriculture, and provide the hope (but not the realistic expectation) of profitable operations, is surprisingly small.

If diversified agriculture is to require a large amount of prime agricultural land, then additional crops will have to be grown for the export market rather than the small Hawaii market. However, the extreme difficulty of developing large export markets should be noted. Numerous and extensive crop searches and experiments for over a century by many people and organizations has led to surprisingly few major long-term successes in Hawaii, thereby indicating the extreme difficulty in identifying new export crops and developing them into new and profitable industries. Furthermore, the difficulty in developing export markets is increasing because of increasing competition from other sugarcane-growing areas. As noted previously, low sugar prices have led nearly all sugarcane operators throughout the world to search for profitable replacement crops, particularly crops which can maintain export earnings.

Supply of Prime Agricultural Land

Regarding the supply of land, an enormous and growing supply of prime agricultural land is available for other uses. Since 1970, about 83,000 acres of Hawaii's prime agricultural land has been freed from sugar and pineapple production: about 43,000 acres of land freed from sugar production (about 9,000 acres on Oahu and 33,600 on the Neighbor Islands), and over 40,000 acres freed from pineapple production (about 12,000 acres on Oahu and over 28,000 on the Neighbor Islands) (Plasch, Hawaii's Sugar Industry, HSPA, Hawaii Agricultural Reporting Service). Some of the land freed from sugar and pineapple production has or will be converted to urban, diversified agriculture, and aquaculture uses. Also, some of the land freed from pineapple use on Oahu was converted to sugar production. Making allowances for the various conversions, uncommitted acreage which remains available to diversified agriculture and aquaculture amounts to many tens of thousands of acres, with a large share of this on Oahu. Much of this land is fallow, in pasture, or some other low-value land-holding operation.

This supply of prime agricultural land probably will increase given the very real possibility of future sugar-mill closings. As discussed above, the outlook for sugar prices is unfavorable, and some unprofitable mills are in operation today only because they have lease and/or energy contracts which make closing too expensive. However, these contracts eventually will end.

Furthermore, much of the sugarcane lands is in holding awaiting the discovery of profitable replacement activities, so is part of the supply of prime agricultural land available to profitable diversified agriculture crops. For example, one of the components of the OSCo Survival Plan is to experiment with a variety of crops in order to find profitable replacements to sugar.

Many of the lands freed, to be freed, or which can be freed from sugar and pineapple production have excellent agricultural qualities and climatic conditions, and are well-suited for a variety of crops. Also, water is available for most of these lands, especially lands freed from sugar production. However, some of the lands freed from sugar are at high elevations where pumping costs are relatively high.

Additional lands which have been made available for diversified agriculture are in government-sponsored agricultural parks throughout the State. Lands for agricultural activities which do not require prime agricultural land include pasture land, land for livestock operations, and unique lands. Unique lands are not prime agricultural lands, but are important lands for certain crops, the principal examples are the coffee lands in Kona, and certain lava lands in Puna that are well-suited for growing papaya. The supply of unique lands is quite large and distinct from the supply of prime agricultural lands.

Availability of Land to Small Farmers

Even though considerable agricultural land is available, it should be noted that in many areas of the State small agricultural parcels are not available to small-scale farmers under long-term leases. The reason for the unavailability is that land-use regulations and the political environment make it unprofitable and too risky to lease small farm parcels. It is unprofitable because agriculture is generally a low-value use of land which can afford only relatively low lease rents, while County subdivision regulations designed for rural estates require expensive electrical power, paved rather than gravel roads, and buried rather than surface water lines. The combination of low rents and expensive subdivision requirements makes it unprofitable to subdivide land for small farms. For example, rather than develop the State agricultural park in Kahuku, it would have been cheaper for the State to give each farmer \$100,000. In addition, there is the risk that when the lease expires, the farmer will turn to the legislature to try and prevent an escalation of the lease rent, or to prevent eviction by the landowner in favor of a higher and more profitable use—this is often the case for long-term leases for land on which the farmer has built a home. Such an economic environment favors leases to large-scale operators (including

cooperatives consisting of many small farmers), short-term and illegal leases of unsubdivided land, subdivision of the land into rural estates for sale to buyers who can afford the costs of the subdivision requirements, or leaving the land fallow.

The unavailability of small parcels of land to farmers is a serious problem, but does not invalidate the fact that there is a vast supply of prime agricultural land available for profitable diversified agricultural activities. However, the activities must be large scale, or the subdivision requirements circumvented.

Outlook for Diversified Agriculture

Based on the above analysis, ample prime agricultural land will be available to easily accommodate prime agricultural land requirements of diversified agriculture. This conclusion derives from the fact that there is a vast amount of prime agricultural land and water that has been freed from sugar and pineapple production in recent years, the very real possibility that additional sugarcane acreage and water will be freed given the outlook for low sugar prices, the fact that some if not most or even all of the sugar operations would make their lands available for profitable replacement crops, and the surprisingly modest land requirements for diversified agriculture. In other words, the limiting factor will be the market, not the land supply. Kapolei Village, combined with other major housing developments in the Ewa/Central-Oahu area and elsewhere, involves far too little land to affect this conclusion. Therefore, Kapolei Village would not affect adversely the growth of diversified agriculture.

Consistency with Overseas Long-Term Trends

Hawaii's increased availability of prime agricultural land compared to that of prior decades is part of some very long-term and accelerating trends occurring throughout most developed and developing market economies. For example, an excess of about 45 million acres of agricultural land exists in the United States (Dvoskin). Productivity and yields have been increasing faster than population growth; and genetic engineering—which gives promise of developing crops having higher yields, increased resistance to diseases and pests, and increased tolerance to climatic variations—and other advances, combined with slower population growth, indicate an acceleration of these trends. Rapid productivity and yield increases lead to overproduction, market gluts, low agricultural prices, low farm income, bankruptcies, and a need to withdraw labor, land, and other resources from agriculture in order to restore balanced markets and increase farm income to those who remain.

The major agricultural problem facing the United States and many other economies is how to make this withdrawal an orderly one so as to minimize social problems. This is a problem associated with tremendous success in agriculture, and contrasts sharply with and invalidates the 200-year old prediction of Thomas Malthus that population will increase faster than the food supply.

CONSISTENCY WITH STATE AND COUNTY PLANS

Kapolei Village is consistent with the major thrust of the agricultural portions of the Hawaii State Plan, the State Agriculture Functional Plan, and the General Plan of the City and County of Honolulu. This thrust is to preserve the economic viability of plantation agriculture and to promote the growth of diversified agriculture (see Table 4). To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured. The thrust of these plans is not to preserve prime agricultural lands simply for the sake of preservation—preservation is to occur only if there is a potential agricultural need for these lands.

Regarding housing, the Kapolei Village is clearly in support of the Hawaii State Plan, particularly those policies, objectives, and priority directions which encourage development of reasonably priced, safe, sanitary, livable homes in suitable environments. Nevertheless, certain priority guidelines (but not objectives or policies) dealing with population growth and distribution do call for directing urban growth primarily to existing urban areas and marginal agricultural lands, and away from important agricultural lands (e.g., Section 226-104 (b)(2)). While this is desirable, it is unrealistic in terms of the supply of lands suitable for building reasonably priced housing, and unrealistic as to the agricultural market which could use the vast supply of prime agricultural lands profitably.

Kapolei Village is also consistent with the City and County policy of directing population growth to Ewa which, by definition, must occur at the expense of sugar-cane acreage.

Since the Kapolei Village would not adversely affect the economic viability of OSCo, would not limit the growth of diversified agriculture, but would contribute to a healthier housing market in an area designated for development, the project is consistent with the major thrust of the State and County Plans. Also, the project would provide a public benefit which would override the proposed IAL designation of the LESA Commission.

Residents of homes adjacent to and/or downwind from sugar operations often complain about the dust generated when fields are prepared for planting, noise from

Table 4.— SELECTED STATE AND COUNTY OBJECTIVES, POLICIES, AND GUIDELINES RELATED TO AGRICULTURAL LANDS

HAWAII STATE PLAN (Chapter 226, Hawaii Revised Statutes, as amended):

Section 226-7 Objectives and policies for the economy—agriculture.

- (a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:
 - (1) Continued viability in Hawaii's sugar and pineapple industries.
 - (2) Continued growth and development of diversified agriculture throughout the State.
- (b) To achieve the agricultural objectives, it shall be the policy of the State to:
 - (6) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.

Section 226-103 Economic priority guidelines.

- (c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:
 - (1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.
- (d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:
 - (1) Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.

Section 226-104 Population growth and land resources priority guidelines.

- (b) Priority guidelines for regional growth distribution and land resource utilization:
 - (2) Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

Table 4.—SELECTED STATE AND COUNTY OBJECTIVES, POLICIES, AND GUIDELINES RELATED TO AGRICULTURAL LANDS (continued)

STATE AGRICULTURAL FUNCTIONAL PLAN (June 1985)

(Functional plans are guidelines for implementing the State Plan, and are not adopted by the State Legislature.)

B. Objective: Achievement of Productive Agricultural Use of Lands Most Suitable and Needed for Agriculture.

(5) Policy: Provide greater protection to agricultural lands in accordance with the Hawaii State Constitution.

(c) Implementing Action: Identify important agricultural lands to promote diversified agriculture, increased agricultural self-sufficiency, and assure the availability of agriculturally suitable lands.

(d) Implementing Action: Until standards and criteria to conserve and protect important agricultural lands are enacted by the Legislature, important agricultural lands should be classified in the State Agricultural District and zoned for agricultural use, except where, by the preponderance of the evidence presented, injustice or inequity will result or overriding public interest exists to provide such lands for other objectives of the Hawaii State plan.

**CITY AND COUNTY OF HONOLULU
GENERAL PLAN, Objectives and Policies (Resolution No. 82-188)**

Population

Objective C. To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.

Policy 1. Encourage the gradual development of a secondary urban center in the West Beach-Makaloa area to relieve developmental pressures in the urban-fringe and rural areas.

Economic Activity

Objective C. To maintain the viability of agriculture on Oahu.

Policy 4. Provide sufficient agricultural land in Ewa, Central Oahu, and the North Shore to encourage the continuation of sugar and pineapple as viable industries.

Policy 5. Maintain agricultural land along the Windward, North Shore, and Waianae coasts for truck farming, flower growing, aquaculture, livestock production, and other types of diversified agriculture.

trucks and harvesters, and smoke when fields are burned prior to harvesting. In order to minimize conflicts and complaints, sugar operations and housing would be buffered from one another by the Kapolei golf course. Therefore, with one exception, Kapolei Village would not adversely affect cultivation of adjacent sugarcane acreage, and complies with the Hawaii Right-to-Farm Act. The one exception concerns the burning of fields just prior to harvesting; in order to minimize complaints, OSCo is likely to schedule the burning of adjacent fields when the fewest residents are at home—such as during the work day rather than on weekends—or to harvest without burning. Similar operations are already conducted for other fields adjacent to urban areas.

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APPENDIX G

Air Quality Impact Report
J. W. Morrow, Environmental Management Consultant
December 7, 1987

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AIR QUALITY IMPACT REPORT
KAPOLEI VILLAGE
December 7, 1987

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AIR QUALITY IMPACT REPORT
KAPOLEI VILLAGE

1. INTRODUCTION

A major residential community is being proposed by the Housing Finance and Development Corporation (HFDC) in cooperation with the Department of Housing and Community Development (DHCD) of the City and County of Honolulu. The project situated approximately 35 kilometers west of downtown Honolulu in the Ewa District of Oahu encompasses 830 acres and is master planned for some 5,000 residential dwelling units. In addition, there will be commercial/retail establishments, community facilities, and recreation facilities including an 18-hole golf course.

The purpose of this report is to assess the impact of the proposed development on air quality both on a local and regional basis. The overall project is clearly an "indirect source" of air pollution as defined in the federal Clean Air Act [1] since its primary association with air pollution is due to its inherent generation of mobile source, i.e., motor vehicle activity. Much of the focus of this analysis therefore is on the project's ability to generate traffic and the resultant impact on air quality. Air quality impact was evaluated for existing and future (2005) conditions.

A residential project such as this also has off-site impacts due to increased demand for electrical energy which must be met through the combustion of some type of fuel. Disposal of the refuse generated by the residents will also result in offsite impact as it will most probably be burned in the City's proposed resource recovery facility (HPOWER). Both of these combustion processes result in pollutant emissions to the air which have been addressed.

Finally, during construction of the various buildings and facilities air pollutant emissions will be generated due to vehicular movement, grading and general dust-generating construction activities. These impacts have also been addressed.

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards is presented in Table 1 [2, 3]. Note that Hawaii's standards are not divided into primary and secondary standards as are the federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to

soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values [4].

Some of Hawaii's standards are clearly more stringent than their federal counterparts but, like their federal counterparts, may be exceeded once per year. It should also be noted that in April, 1986, the Governor signed amendments to Chapter 59 (Ambient Air Quality Standards) making the state's standards for particulate matter and sulfur dioxide the same as national standards. In the case of particulate matter, however, this uniformity did not last long. On July 1, 1987, the EPA revised the federal particulate standard to apply only to particles 10 microns or less in diameter (PM-10) [5], leaving the state once again with standards different than the federal ones.

In the case of the automotive pollutants [carbon monoxide (CO), oxides of nitrogen (NOx), and photochemical oxidants (Ox)], there are only primary standards. Until 1983, there was also a hydrocarbons standard which was based on the precursor role rather than any unique toxicological effect they had at ambient levels. The hydrocarbons standard was formally eliminated in January, 1983 [6].

The U.S. Environmental Protection Agency (EPA) is mandated by Congress to periodically review and re-evaluate the federal standards in light of new research findings [7]. The last review resulted in the relaxation of the oxidant standard from 160 to 240 micrograms/cubic meter (ug/m3) [8]. The carbon monoxide (CO), particulate matter, sulfur dioxide (SO2), and nitrogen dioxide (NO2) standards are currently under review, but final action has not been taken yet [9].

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [10]. There simply can be no visible emissions from fugitive dust sources.

3. EXISTING AIR QUALITY

The nearest State Department of Health air monitoring station to the project area is located at the Campbell Industrial Park about 4.5 kilometers to the southwest. The State Department of Health has monitored air quality at the park since 1971, and a summary of the data is presented in Table 2. Total suspended particulates (TSP), sulfur dioxide (SO2), and nitrogen dioxide (NO2) were all monitored on a 24-hour basis. Initially, the site was at the Barbours Point Lighthouse, but the proximity to the ocean resulted in very high TSP levels due to salt spray. The station was therefore moved to the Chevron Refinery site about

1.7 kilometers north of the lighthouse on March 17, 1972. In 1976, NO2 monitoring was ceased. On August 7, 1979, the monitoring station was moved to a rooftop location at the same Chevron site.

It should also be noted that total suspended particulate monitoring with a high-volume sampler was ceased at the site in October, 1985. In November, 1985, a new PM-10 sampler was installed. This instrument measures respirable particulate matter under 10 microns in aerodynamic diameter. PM-10 and SO2 monitoring data for 1986 are summarized in Table 3.

It is evident from the data in Tables 2 and 3 that both the National Ambient Air Quality Standards (NAAQS) and Hawaii Ambient Air Quality Standards (HAAQS) are being met at those monitoring sites. Because the Campbell Industrial Park monitoring station is situated relatively close to the elevated sources, i.e., the stacks, located at the industrial park, the data collected may not be representative of the highest ambient pollutant levels resulting from the various industrial sources at the park. Computer modeling done in conjunction with the City's resource recovery facility permitting indicated maximum SO2 concentrations occurring some 1.0 to 1.5 kilometers north of the park in the flat terrain as well as on the hillsides also north of the park [11].

Unfortunately, there are no routine monitoring data for the primary automotive pollutant, i.e., carbon monoxide. The nearest CO monitoring site is at the Department of Health building in downtown Honolulu some 21 kilometers east-southeast of the project area. Because the area is presently at an early stage of development, it can be surmised that present CO levels are also relatively low.

4. CLIMATE & METEOROLOGY

Weather conditions in the project area are typical of sites located on the leeward coast of Oahu. Long-term climatic data collected at Barbers Point Naval Air Station indicate mean daily maximum and minimum temperatures of 81 and 69 degrees Fahrenheit, respectively; mean annual rainfall of 20.3 inches; and prevailing winds from the northeast at 9 knots [12]. Annual rainfall is of interest because of its role in particulate matter removal from the atmosphere, while wind speed and direction are determinants of pollutant concentration and potential receptors, respectively. Atmospheric stability is another important factor in determining the potential for air pollution problems. It is largely a function of insolation and wind speed, and an objective methodology for determining it has been developed by Turner [13].

Historical meteorological data from Barbers Point NAS which had been processed using the Turner method were also reviewed [14,15,16]. They confirmed the annual predominance of north-easterly trade winds, but also indicated a significant occurrence of onshore winds primarily associated with a midday seabreeze regime. A screening of the 1967 - 71 Barbers Point surface observations indicated SE to SW winds occurred 643 - 1,032 hours per year. This is equivalent to 6.5 - 11.8% of the time.

Secondly, they indicate that almost 25% of the time slightly to moderately unstable conditions exist. Such conditions are conducive to bringing smoke plumes from elevated sources, e.g., smoke stacks, down to the ground within a relatively short distance downwind. Somewhat surprisingly, the data also show a very significant percentage (45%) of stable air conditions which tend to carry plumes largely intact for great distances. Such conditions can result in high pollutant concentrations if the plume reaches hills which are at approximately the same height as the stack. Such stable conditions can also contribute to high pollutant concentrations if they coincide with peak traffic hours because automotive pollutants are emitted close to the ground.

Finally, since the impact analysis focuses on the a.m. peak hour of traffic, a recent year of meteorological data (1984) was processed to produce a 7:00 a.m. (0700 Hawaiian Standard Time) wind rose as shown in Table 4. The predominance of low wind speed northeasterly winds is clearly evident in the table. Winds between east and north northeast comprise about 95% of the data while winds of 6 knots or less comprise about 74%. Figures 1 and 2 depict the same data but show the frequency of occurrence in terms of numbers of hours per year.

5. MOBILE SOURCE IMPACT

5.1 Mobile Source Activity. A traffic impact study was prepared for the proposed development [17] and served as the basis for this mobile source impact analysis. Existing (1985) [18] and projected p.m. peak-hour volumes at the following intersections were obtained for use in the air quality impact analysis:

- Makakilo Drive at H-1 Freeway
- Barbers Point Access Road at Farrington Highway
- Barbers Point Access Road at Ewa Parkway
- Farrington Highway at Village Parkway
- East Loop Road at Ewa Parkway

- West Loop Road at Eva Parkway
- East-West Loop Roads at Village Parkway

5.2 Mobile Source Emission Factors. Carbon monoxide (CO) emission factors for vehicles were generated for the year 2005 using the MOBILE-3 emissions model [19]. The emission factors were localized by use of the age distribution of registered vehicles in the City & County of Honolulu [20]. Fraction of vehicle miles travelled (VMT) was assumed to be directly proportional to the registration distribution. Emission factors were based on traffic speeds ranging from 10 - 40 mph depending on the volumes on each leg of the intersections. Intersections were assumed to be signalized with green/cycle ratios proportional to approach demands. Queue lengths and emission strengths at intersection approaches were determined by an EPA method [21].

5.3 Modeling Methodology. While emissions burden analysis is one means of evaluating a project's impact, it is generally more important to estimate the ambient impact since air quality standards are expressed as ambient concentrations, and it is the ambient concentrations to which living things are exposed. Computer modeling is normally employed to generate these ambient concentration estimates, most commonly with non-reactive pollutants. This is due to the complexity of modeling pollutants which undergo chemical reactions in the atmosphere and are subject to the effects of numerous physical and chemical factors which affect reaction rates and products. For projects involving motor vehicles as the principal air pollution source, carbon monoxide is normally selected for modeling because it has a relatively long half-life in the atmosphere (about 1 month) [22], and it comprises the largest fraction of automotive emissions.

The EPA guideline model CALINE-4 [23,24] was employed to estimate maximum 1-hour CO concentrations at receptor locations 10 - 40 meters from intersections during the worst-case AM peak hour traffic. Worst-case meteorological conditions were selected accordingly.

Because of the time of day of the analysis (AM peak hour), the currently low level of urbanization in the area which would otherwise contribute to a "heat island" effect and increased turbulence, a stable atmosphere (Pasquill-Gifford Class "F") [13] and 1 meter per second (m/sec) wind speed were assumed as worst case meteorological conditions. A background CO level of 0.1 parts per million (ppm) was also assumed to account for the existing low level of traffic activity, but was raised to 1.0 ppm for the year 2005 analysis.

Wind directions were based on preliminary modeling with 10 - 45 degree wind-road angles and were selected based on their ability to produce the maximum pollutant concentrations at each intersection. Specifically, due to the traffic volumes, predicted queuing, and probability of occurrence, northwest thru northeast winds direction were used for the "worst-case" analysis.

5.4 Results: 1-Hour Concentrations. The results of the modeling for existing conditions are presented in Figures 3 - 6 for the intersections and road segments under study. It is evident that with the exception of one intersection, both state and federal 1-hour CO standards appear to be met even under "worst-case" conditions of traffic, meteorology, and receptor location. At the Barbers Point Access Road - Farrington Highway intersection there appears to be some potential for queuing on the east-bound approach resulting in some predicted high CO levels close (within 10 meters) to the highway.

Figures 7 through 13 depict the predicted CO concentrations at the intersections identified in the traffic study as approaching or exceeding their respective capacities. The results again indicate that both state and federal standards would be met at all locations except in close proximity to the Barbers Point Access Road - Farrington Highway intersection.

5.5 Results: 8-Hour Concentrations. Estimates of 8-hour concentrations can be derived by applying a "persistence" factor of 0.6 to the 1-hour concentrations. This "persistence" factor is recommended in an EPA publication on indirect source analysis [25] and has been further corroborated by analysis of carbon monoxide monitoring data in Honolulu which yielded the same 8-hour-to-1-hour ratio [26]. When using this approach any 1-hour CO concentration greater than 8.4 mg/m³ (7.3 ppm) would indicate exceedance of the State's 8-hour standard. Similarly, any 1-hour concentration over 16.7 mg/m³ (14.5 ppm) would indicate exceedance of the federal 8-hour standard.

Applying this factor to the 1-hour concentration estimates reveals results quite similar to those just described above. Exceedance of the state, but not the federal 8-hour standard, appears possible at the Barber Point Access Road intersection with Farrington Highway. In addition, exceedances appear possible at the Makakilo Interchange with the H-1 Freeway.

5.6 Correlation with Meteorological Data. In light of the possible exceedances predicted for two of the intersections under study, a more detailed analysis of the Barbers Point meteorological data was undertaken in order to estimate the frequency of occurrence of those high concentrations.

First, the MNE (19 degree) wind direction and 1 m/sec (2 kts) wind speed used in the modeling at the intersections in question were reviewed in light of the data in Table 4 and Figures 1 and 2. This review suggested that the frequency of occurrence of such conditions was on the order of 5 times per year at 0700 HST without regard to the stability category. A screening of the 1984 data revealed only one day on which the 0700 HST weather matched the stability, wind speed and direction conditions used in this analysis.

5.7 In-Vehicle CO Levels. It should also be noted that operators and passengers can be exposed to levels of carbon monoxide inside vehicles significantly higher than that indicated by the microscale ambient air quality impact analysis. This exposure is, of course, exacerbated as congestion increases. When volume capacity ratios reach the 0.90 - 1.0 range and service levels drop to E and F, this occurs. With vehicles at idle or very low speed, CO emissions increase sharply and the occupants of vehicles are delayed in traffic; thus, for both reasons their CO exposure increases sharply. Unfortunately, there is currently no standardized modeling technique to estimate this exposure. In this particular instance, these conditions might occur during portions of a commute trip to Honolulu.

One recently reported commuter trip from the Ewa area to downtown Honolulu resulted in an average carbon monoxide exposure of 12.8 mg/m³ (11.1 ppm) over a 33-minute trip [27]. Unfortunately, the commute cited began at 7:30 a.m. and thus was near the end of the normal peak traffic period. The CO exposure was comparable to levels found during a previous study of a.m. peak hour commutes along the Pali Highway [28].

6. STATIONARY SOURCE IMPACT

6.1 Electrical Generation. The estimated 36 million kilowatt hours of annual electrical demand by the ultimate development will necessitate the generation of electricity by power plants. Currently, most of Oahu's electrical energy is generated at Hawaiian Electric Company's (HECO) Kahe Power Station located near Nanakuli on the leeward coast. This is currently a six-unit, approximately 650-megawatt facility firing low-sulfur fuel oil. A seventh 150-megawatt unit was proposed by HECO [29], but more recently two outside companies have proposed building new oil- and coal-fired power plants at Campbell Industrial Park and selling power to the utility [30]. For the purposes of this analysis, oil-firing was assumed. Estimates of annual emissions were computed based on EPA emission factors and the fuel required to meet a 36 million kWh demand. The results are presented in Table 5.

6.2 Solid Waste Disposal. The refuse generated by the residents of the 5,000 new homes in Kapolei Village will require disposal. Presently, about 80% of Oahu's refuse is being landfilled with the remaining 20% being burned at the Waipahu Incinerator [31]. In the future, most refuse will be burned at the City's proposed resource recovery facility. Estimates of annual emissions attributable to the combustion of Kapolei Village refuse at that facility are included in Table 5.

7. OTHER LONG-TERM IMPACTS

7.1 Agricultural Burning. Burning of sugar cane fields prior to harvest is a long-standing practice in Hawaii's sugar industry. Unfortunately for the plantations and new residents, however, as urbanization closes in around agricultural operations, human exposure increases and the inevitable concerns about air pollution arise. Cane fires result in the emission of particulates, carbon monoxide, and trace amounts of other organics. This was most recently demonstrated in an EPA study of cane burning on Maui [32]. Concentrations of particulates can reach high levels within about one mile of the fires [33]. A complete quantitative characterization of cane smoke, however, has yet to be performed. Fortunately, fires are generally infrequent and only last about 20 - 30 minutes.

7.2 Campbell Industrial Park. The industrial sources at Campbell Industrial Park obviously affect air quality in the Ewa area. The maximum concentrations of total suspended particulates (TSP) and sulfur dioxide, however, are in compliance with existing federal and state air quality standards. Neither monitoring nor computer modeling show violations of the current standards. Historically, there has been a problem meeting the State's TSP standard, and even with adoption of the less stringent federal standards, this may continue to be a problem as levels in the past have on occasion even exceeded those standards. As noted in Section 2, the state and federal particulate standards are once again different and while recent monitoring data indicate that the federal PM-10 standard is being met, the state TSP standard continues to be threatened.

SO₂ standards are being gradually approached as new sources come in and existing sources expand. The impending construction of the City's resource recovery facility and the future construction of new power plants and other as yet unidentified sources in the industrial park will all contribute additional increments of regulated and unregulated pollutants to the Ewa air. The responsible government agencies will have to watch the situation closely to insure that standards continue to be complied with.

8. SHORT-TERM IMPACT

The principal source of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along roads serving the area as well as in the vicinity of the project site itself. Because of the moderate existing off-peak traffic volumes, the additional construction vehicle traffic should not exceed road capacities although the presence of large trucks can reduce a roadway's capacity as well as lower average travel speeds.

The site preparation and earth moving will create particulate emissions as will building and on-site road construction. Construction vehicle movement on unpaved on-site roads will also generate particulate emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and a precipitation/evaporation (P/E) index of 50 [34,35].

The principal soil types in the project area are Mamala stony silty clay loam and Waialua silty clay with silt contents of about 55%. The precipitation/evaporation (P/E) index for the area is 39. Compared to the EPA estimates and conditions, it would appear that there is a greater potential for fugitive dust due to the drier local climate, i.e., P/E index of 39 versus 50 and higher silt content of the local soils.

Other offsite activities which will have temporary impacts on air quality include concrete batching operations to produce the concrete necessary for building foundations within the project and asphalt batching operations to build the new roads. At this point in time, the magnitude of these operations have not been quantified and thus a quantitative impact analysis is not possible.

9. DISCUSSION AND CONCLUSIONS

9.1 Mobile Source Impacts.

At complete buildout the presence of project-generated traffic will clearly increase ambient carbon monoxide levels in the area but, with the possible exception of the H-1 Makakilo Interchange area, will not create new exceedances of state air quality standards. The traffic will continue to contribute to potential state standard exceedances in the vicinity of the Barbers Point Access Road intersection with Farrington Highway. Federal standards do not appear to be threatened by emissions from the

additional traffic that will be generated. Currently, the principal means of controlling automotive emissions within the state is dependence on the federal motor vehicle control program [36].

9.2 Stationary Source Impacts. The emissions estimates may be compared to the 1980 county emissions inventory in Table 6 in order to provide some perspective on their significance. The project's contribution to county emissions appears to be less than 1%.

9.3 Other Long-Term Impacts. As noted in Section 7, there will be at times exposure to the smoke from agricultural field burning. Until urbanization entirely replaces sugar cane cultivation in the Ewa District, this will result in some human exposure and complaints about cane fire smoke. The State Department of Health and Federal EPA have indicated that they are continuing efforts to better characterize the exposure and potential health effects [37]. Depending on the results of those efforts, the smoke exposure may be reduced or eliminated before cane cultivation ceases in Ewa.

In the case of Campbell Industrial Park, an increasing number of industrial air pollution sources will over time have an increased impact on the project area. However, because of the relatively low frequency of the southwesterly winds necessary to carry emissions from the industrial park to Kapolei Village and government requirements for "best available control technology" (BACT) on new plants which will minimize emissions, it is not likely that air pollution levels in the project area will approach or existing standards for many years.

9.4 Short-Term Impacts. Since as noted in Section 8, there is a potential for fugitive dust due to the dry climate and fine soils, it will be important for adequate dust control measures to be employed during the construction period. Dust control could be accomplished through frequent watering of unpaved roads and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50%. The soonest possible landscaping of completed areas will also help.

9.5 Conclusions. Based on the foregoing analysis, the following conclusions may be drawn:

- The proposed project will result in increased air pollutant emissions due to its inherent traffic generation ability, and its requirements for electrical power and solid waste disposal;

- The addition of project-related traffic will increase the existing probability of exceedances of state 1-hour and 8-hour carbon monoxide standards within 20 meters of Barbers Point Access Road at Farrington Highway;

- Annual emissions of criteria pollutants due to electrical generation and solid waste disposal attributable to Kapolei Village will increase county emissions by less than 0.5% and

- Due to the relatively dry climate and fine soils in the area, dust control measures during construction will be important to prevent violations of state fugitive dust standards.

9.6 Mitigation Measures. The principal means available to reduce the predicted CO concentrations are:

- improve intersections to increase capacity
- increase bus service to area
- encourage car-pooling
- modify business/school starting hours
- develop mass transit system
- increase employment opportunities in Ewa
- restrict residential development

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TABLE 1

SUMMARY OF STATE OF HAWAII AND FEDERAL
 AMBIENT AIR QUALITY STANDARDS

POLLUTANT	SAMPLING PERIOD	FEDERAL STANDARDS		STATE STANDARDS
		PRIMARY	SECONDARY	
1. Total Suspended Particulate Matter (TSP) (micrograms per cubic meter)	Annual Geometric Mean	75	60	60
	Maximum Average in Any 24 Hours	260	150	150
2. PM-10 (micrograms per cubic meter)	Annual	50	50	--
	Maximum Average in Any 24 Hours	150	150	--
3. Sulfur Dioxide (SO ₂) (micrograms per cubic meter)	Annual Arithmetic Mean	80	--	80
	Maximum Average in Any 24 Hours	365	--	365
	Maximum Average in Any 3 Hours	1,300	1,300	1,300
4. Nitrogen Dioxide (NO ₂) (micrograms per cubic meter)	Annual Arithmetic Mean	100	70	70
	Maximum Average in Any 8 Hours	10	5	5
5. Carbon Monoxide (CO) (milligrams per cubic meter)	Maximum Average in Any 1 Hour	40	40	10
	Maximum Average in Any 1 Hour	240	240	100
6. Photochemical Oxidants (as O ₃) (micrograms per cubic meter)	Maximum Average in Any Calendar Quarter	1.5	1.5	1.5
	Maximum Average in Any Calendar Quarter	1.5	1.5	1.5

T A B L E S

TABLE 2

AIR MONITORING DATA
CAMPBELL INDUSTRIAL PARK
1971-85

YEAR	TSP			SO ₂			NO ₂		
	RANGE	MEAN	>AQS	RANGE	MEAN	>AQS	RANGE	MEAN	>AQS
1971	18-471	125	54	<5-16	<5	0	<20-49	29	0
1972	24-155	55	4	<5-7	<5	0	<20-49	21	0
1973	14-129	50	1	<5-5	<5	0	<20-33	<20	0
1974	23-132	47	1	<5-10	<5	0	<20-40	25	0
1975	13-137	52	1	<5-11	<5	0	< 5-25	11	0
1976	12-101	40	1	<5-7	<5	0	< 5-29	14	0
1977	25-134	54	1	<5-18	<5	0	-----	-----	-----
1978	22-127	48	1	<5-40	<5	0	-----	-----	-----
1979	23-223	76	10	<5-27	<5	0	-----	-----	-----
1980	29-158	53	2	<5-10	<5	0	-----	-----	-----
1981	26-188	51	2	<5-40	<5	0	-----	-----	-----
1982	15- 63	41	0	<5-12	<5	0	-----	-----	-----
1983	28-193	---	2	<5-95	---	1	-----	-----	-----
1984	17-112	50	1	<5-5	<5	0	-----	-----	-----
1985	24-138	57	3	<5-25	<5	0	-----	-----	-----

- NOTES:
1. TSP = total suspended particulates
 2. SO₂ = sulfur dioxide
 3. NO₂ = nitrogen dioxide
 4. >AQS = number of violations of state air quality standard
 5. All concentrations are in micrograms per cubic meter of air.
 6. Sampling station was moved from Barbers Point Lighthouse to the Chevron Refinery site due to salt spray from the ocean on 17 March 1972.
 7. The samplers were elevated to a rooftop on 7 August 1979.
 8. Source: State Department of Health

TABLE 3
TSP & SO₂ MONITORING DATA
BARBERS POINT, OAHU
1986

MONTH	Particulate Matter-10 _u (PM-10) 24-Hour Concentrations (ug/m ³)			Sulfur Dioxide (SO ₂) 24-Hour Concentrations (ug/m ³)				
	SAMPLES	MIN.	MAX.	MEAN	SAMPLES	MIN.	MAX.	MEAN
Jan 86	5	13	31	19	4	<5	<5	<5
Feb 86	4	21	40	27	4	<5	10	5
Mar 86	4	16	28	20	2	<5	<5	<5
Apr 86	4	27	31	28	5	<5	7	<5
May 86	5	19	20	24	5	<5	6	<5
Jun 86	3	18	42	31	5	<5	<5	<5
Jul 86	5	12	26	19	6	<5	<5	<5
Aug 86	3	24	35	29	5	<5	<5	<5
Sep 86	5	21	31	27	5	<5	<5	<5
Oct 86	5	17	43	28	5	<5	<5	<5
Nov 86	5	19	66	33	5	<5	<5	<5
Dec 86	4	7	40	24	5	<5	<5	<5
ANNUAL	52	7	66	26	56	<5	10	<5

SOURCE: Department of Health

TABLE 4

0700 HST Wind Rose
Barbers Point Naval Air Station
1984

Direction	1-3	4-6	7-10	11-16	17-21	>21	Total
N	0.00275	0.00000	0.00275	0.00000	0.00000	0.00000	0.00550
NNE	0.01374	0.02473	0.02198	0.00275	0.00000	0.00000	0.06320
NE	0.06868	0.19231	0.04945	0.00549	0.00000	0.00000	0.31593
ENE	0.17033	0.22527	0.10440	0.02198	0.00000	0.00000	0.52198
E	0.00824	0.02473	0.01923	0.00000	0.00000	0.00000	0.05220
ESE	0.00275	0.00275	0.00000	0.00549	0.00000	0.00000	0.01099
SE	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SSE	0.00000	0.00000	0.00000	0.00275	0.00000	0.00000	0.00275
S	0.00000	0.00000	0.00275	0.00000	0.00000	0.00000	0.00275
SSW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SW	0.00000	0.00000	0.00549	0.00000	0.00000	0.00000	0.00549
WSW	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
W	0.00000	0.00000	0.00275	0.00000	0.00000	0.00000	0.00275
WNW	0.00000	0.00000	0.00000	0.00275	0.00275	0.00000	0.00550
W	0.00000	0.00000	0.00000	0.00275	0.00000	0.00000	0.00275
WNW	0.00000	0.00000	0.00000	0.00275	0.00000	0.00000	0.00275
Calms:	0.26649	0.46979	0.20880	0.04671	0.00275	0.00000	0.99454
Total:	0.26649	0.46979	0.20880	0.04671	0.00275	0.00000	0.99454
Calms:	0.00549						0.00549
Total:							1.00003

TABLE 5

Estimates of Annual Emissions Due to
Electrical Generation and Solid Waste Disposal
Kapolei Village

Pollutant	Emissions (T/Yr)	
	Electrical Generation	Solid Waste Disposal
Sulfur dioxide	99.5	6.2
Nitrogen oxides	131.4	30.3
Particulate Matter	10.0	2.5
Carbon monoxide	6.3	26.7
Hydrocarbons	1.3	1.6

TABLE 6

1980 EMISSIONS INVENTORY
CITY & COUNTY OF HONOLULU

SOURCE CATEGORY	EMISSIONS (Tons/Year)					
	PH	SOx	NOx	CO	HC	
Steam Electric Power Plants	2092	36,736	12,855	1,065	184	
Gas Utilities	14	0	199	0	0	
Fuel Combustion in Agricultural Industry	1088	579	358	0	31	
Refinery Industry	622	7,096	2,149	266	2,584	
Petroleum Storage	0	0	0	0	1,261	
Metallurgical Industries	28	96	40	0	0	
Mineral Products Industry	6,884	1,883	597	0	31	
Municipal Incineration	42	145	2,029	0	184	
Motor Vehicles	1,413	1,014	17,270	239,198	22,853	
Construction, Farm and Industrial Vehicles	124	193	2,507	3,729	338	
Aircraft	382	145	1,751	5,594	1,476	
Vessels	42	386	438	533	123	
Agricultural Field Burning	1,399	0	0	15,982	1,692	
TOTAL:	14,191	48,274	39,792	266,367	30,758	

SOURCE: State Department of Health

FIGURES

FIG. 1: BARBERS POINT NAVAL AIR STATION
0700 HST WIND SPEED DISTRIBUTION

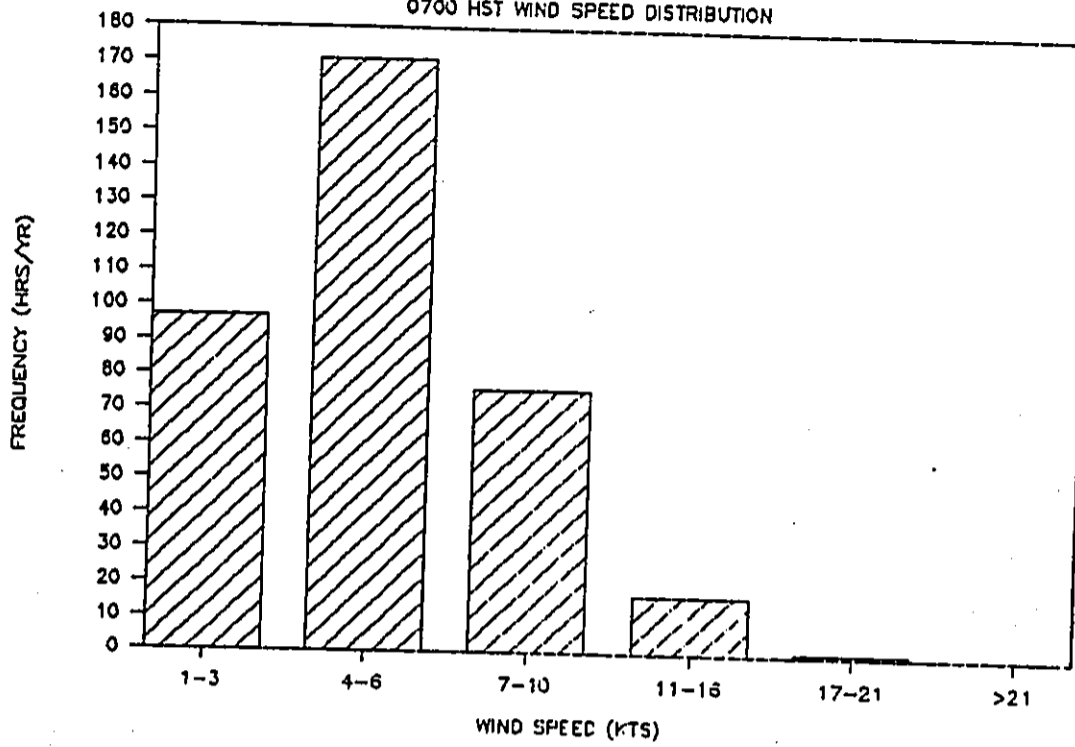


FIG. 2: BARBERS POINT NAVAL AIR STATION
0700 HST WIND DIRECTION DISTRIBUTION

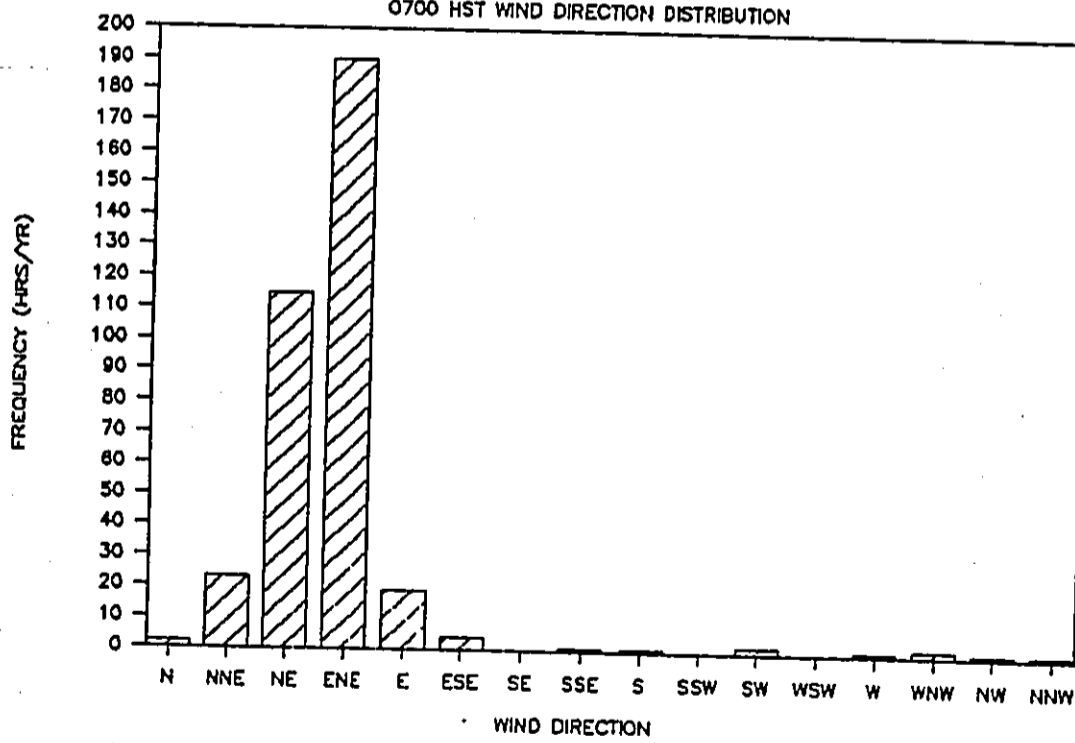


FIGURE 5
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS

BARBERS POINT ACCESS ROAD
SOUTH OF FARRINGTON HIGHWAY
A.M. PEAK HOUR (1985)

		331 deg	
		A	azimuth
0.8	1.4	2.6	
0.9	1.5	2.6	
0.9	1.6	2.7	
Barbers Point Access Road			
Eva Parkway (future)			
1.1	1.7	2.8	
1.1	1.7	2.8	
1.2	1.8	1.2	

NOTES

CO concentrations = parts per million (ppm)
Receptor spacing = 10 meters
Wind direction = 341 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 0.1 ppm
Diffusion model: CALINE-4
Emissions model: MOBILE-3

FIGURE 6
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS

FARRINGTON HIGHWAY
EAST OF BARBERS POINT ACCESS ROAD
A.M. PEAK HOUR (1985)

		315 deg	
		A	azimuth
1.0	1.0	0.9	
0.6	0.6	0.6	
0.4	0.4	0.4	
Farrington Highway			
		Village	0.9 0.9 0.9
		Parkway	0.5 0.5 0.5
		(future)	0.3 0.3 0.3

NOTES

CO concentrations = parts per million (ppm)
Receptor spacing = 10 meters
Wind direction = 35 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 0.1 ppm
Diffusion model: CALINE-4
Emissions model: MOBILE-3

FIGURE 7
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
MAKAKILO DRIVE AT H-1 FREEWAY
A.M. PEAK HOUR (2005)

Makakilo Drive		319 deg A I I ezjauth	
2.0	2.2	2.7	
2.0	2.2	2.7	
2.0	2.2	2.7	

H-1 Freeway		
5.3	6.1	7.2
5.7	6.6	8.0
5.4	6.2	7.7

NOTES

CO concentrations = parts per million (ppm)
Receptor spacing = 10 meters
Wind direction = 19 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-C Class 6)
Background CO concentration = 1.0 ppm
Diffusion model: CALINE-4
Emissions model: MOBILE-3

FIGURE 8
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS

BARBERS POINT ACCESS ROAD AT FARRINGTON HIGHWAY
A.M. PEAK HOUR (2005)

Barbers Point Access Road		319 deg A I I ezjauth	
2.9	4.3	9.0	
5.4	8.6	12.6	
8.1	10.2	13.2	

Farrington Highway		
5.2	4.9	5.1
3.9	3.9	4.4
3.5	3.6	4.1

NOTES

CO concentrations = parts per million (ppm)
Receptor spacing = 10 meters
Wind direction = 19 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-C Class 6)
Background CO concentration = 1.0 ppm
Diffusion model: CALINE-4
Emissions model: MOBILE-3

FIGURE 9
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS

BARBERS POINT ACCESS ROAD AT EVA PARKWAY
A.M. PEAK HOUR (2005)

1.8	2.5	5.3
3.1	4.7	6.5
4.2	5.0	6.6

Barbers Point
Access Road

331 deg

A
|
|
|
azimuth

Eva Parkway

3.0	3.0	3.2
2.6	2.7	3.0
2.5	2.6	2.9

FIGURE 10
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS

FARRINGTON HIGHWAY AT VILLAGE PARKWAY
A.M. PEAK HOUR (2005)

315 deg

A
|
|
|
azimuth

Farrington Highway

3.3	3.4	3.6	4.9
3.1	3.6	4.9	6.7
3.8	4.7	5.6	6.9

Village
Parkway

NOTES

CO concentrations = parts per million (ppm)
Receptor spacing = 10 meters
Wind direction = 31 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 1.0 ppm
Diffusion model: CALINE-4
Emissions model: MOBILE-3

NOTES

CO concentrations = parts per million (ppm)
Receptor spacing = 10 meters
Wind direction = 15 deg
Wind speed = 1 meter per second (m/s)
Atmospheric stability = "F" (P-G Class 6)
Background CO concentration = 1.0 ppm
Diffusion model: CALINE-4
Emissions model: MOBILE-3

FIGURE 13
 ESTIMATES OF MAXIMUM 1-HOUR
 CARBON MONOXIDE CONCENTRATIONS
 VILLAGE PARKWAY AT EAST-WEST LOOP ROADS
 A.M. PEAK HOUR (2005)

2.1	2.3	2.6	Village Parkway 338 deg azimuth
2.2	2.9	4.5	
3.0	3.7	4.6	

West Loop Road	East Loop Road
----------------	----------------

5.0	3.6	2.4
2.4	1.8	1.5
1.6	1.4	1.4

NOTES

CO concentrations = parts per million (ppm)
 Receptor spacing = 10 meters
 Wind direction = 38 deg
 Wind speed = 1 meter per second (m/s)
 Atmospheric stability = "F" (P-G Class 6)
 Background CO concentration = 1.0 ppm
 Diffusion model: CALINE-4
 Emissions model: MOBILE-3