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ENVIRONMENTAL IMPACT STATEMENT

**KOHANA'IKI MAUKA**

KOHANA'IKI, NORTH KONA, HAWAII

OCTOBER 1991

ENVIRONMENTAL IMPACT STATEMENT

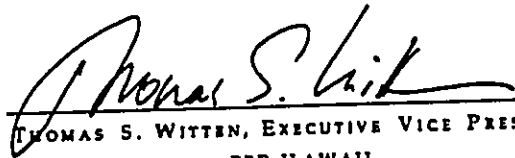
**KOHANAIKI MAUKA**

KOHANAIKI, NORTH KONA, HAWAII

PREPARED FOR: KAMAAINA EIGHT PARTNERS

PREPARED BY: PBR HAWAII

SUBMITTED BY:



THOMAS S. WITTEN, EXECUTIVE VICE PRESIDENT  
PBR HAWAII

OCTOBER 1991

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**APPENDICES**

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- B** Engineering Report for Kohanaiki Mauka
- C** Archaeological Surface Reconnaissance Report
- D** Kohanaiki Mauka Traffic Impact Assessment Report
- E** Hydrological Report



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C H A P T E R 1

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INTRODUCTION AND PROJECT SUMMARY

## CHAPTER 1 - INTRODUCTION AND PROJECT SUMMARY

### 1.0 APPLICANT AND DEVELOPMENT SUMMARY

**Landowner:** Kamaaina Eight Partners  
73-4354 Mamalahoa Highway  
Kailua-Kona Hawaii 96740

**Subject Parcel:** 70 acres

**Location:** Kohanaiki, North Kona District, Hawaii

**Tax Map Key:** Zone 7, Section 3, Plat 09, Parcel 15

**State Land Use District:** Conservation and Agricultural

**General Plan:** Urban Expansion

**County Zoning:** Open and Unplanned

**Existing Uses:** The project site is currently vacant and unused. The property is covered by rough a'a and pahoehoe lava flows.

**Proposed Uses:** A commercial/light industrial subdivision encompassing the 70 acres is proposed. 25 individual parcels within the development would range in size from one-half to three or more acres. Parcels would be individually sold or leased as improved, partially graded parcels which would be further developed by new owners or lessees.

### 1.1 PROPOSED GOVERNMENT ACTION

The immediate requested governmental action is a State Land Use Commission Petition for the redesignation of the project lands from Conservation and Agriculture to Urban to permit the establishment of the proposed commercial/light industrial subdivision. Future actions would include zoning applications to be approved by County council, as well as plan and subdivision approvals from the County of Hawaii Planning Department.

## 1.2 PURPOSE THIS DOCUMENT

This Environmental Impact Statement (EIS) has been prepared in response to a State Land Use Commission (SLUC) Decision and Order of April 8, 1991. It is intended the EIS, once accepted and approved, accompany a SLUC Petition for a boundary amendment from Conservation to Urban and Agriculture to Urban to allow establishment of a proposed commercial/light industrial subdivision. The document will also support a change of zone application which will be submitted to Hawaii County. Figures 1 and 2 provide locational information.

The lands on which the commercial/light industrial subdivision would be established are presently designated Conservation (about 42 acres) and Agriculture (about 28 acres) by the SLUC (See Figure 3). The lands are designated for Urban Expansion on the recently updated Hawaii County General Plan, Land Use Pattern Allocation Guide (LUPAG) map (1989), and on the Keahole to Kailua Development Plan, Land Use Plan (April, 1991). County zoning designations are Open (O) and Unplanned (U) for the project site (See Figure 4). Along Queen Kaahumanu Highway the LUPAG map designation is Open (O). The proposed development would be on the northern boundary of and contingent to other Kohanaiki lands designated Urban by the SLUC and proposed for golf course use.

This EIS has been prepared in accordance with the provisions of Hawaii Revised Statutes (HRS) Chapter 343 and Title 11, Department of Health, Chapter 200, Environmental Impact Rules, Sections 11-200-9 through 11-200-13. A description of the affected environment, the alternatives considered to date, preliminary impact determinations based on the information contained herein and proposed mitigation measures are provided. The information contained in this EIS has been developed from site visits and generally available information regarding the environmental characteristics of the project site and surrounding area.

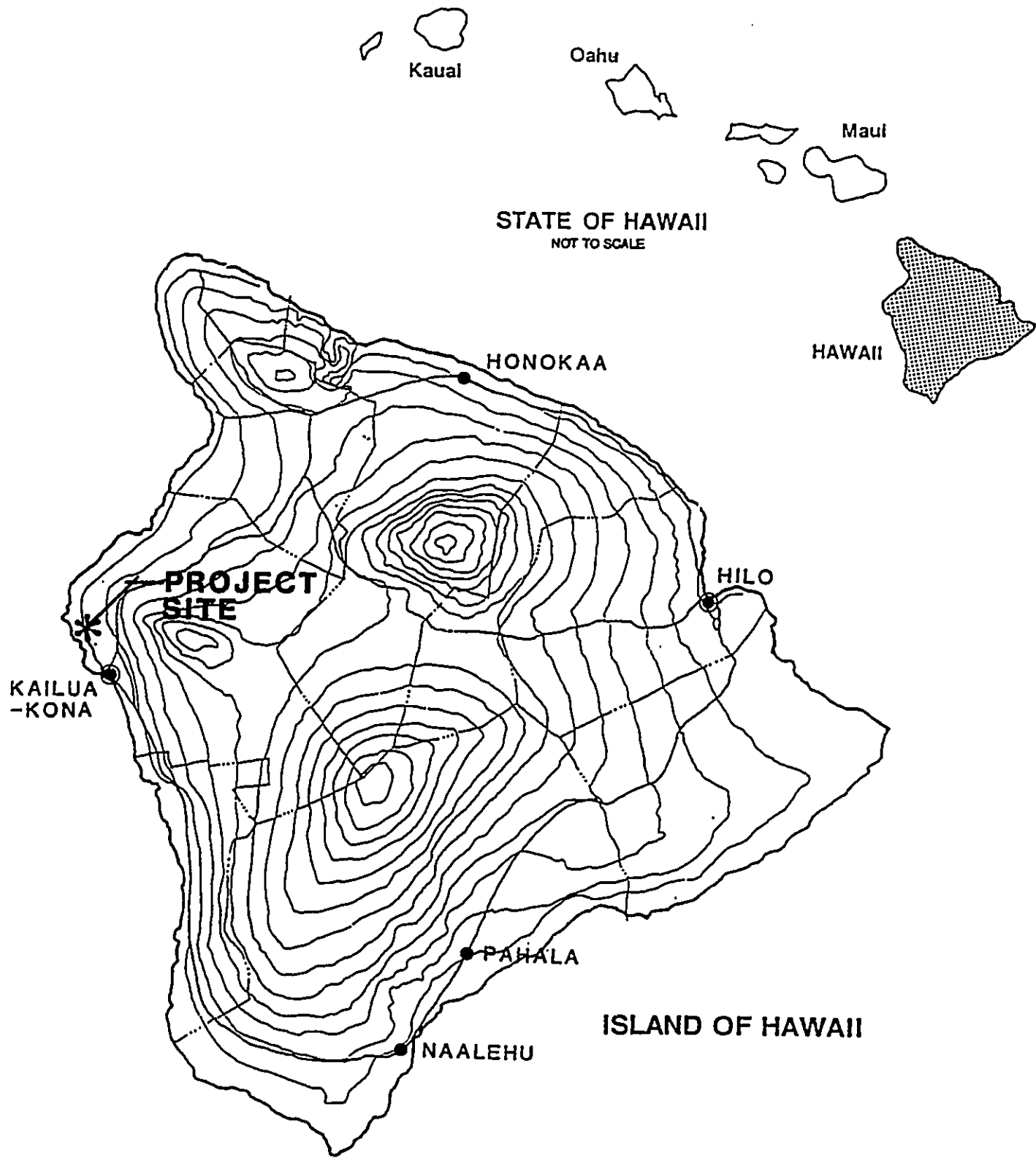
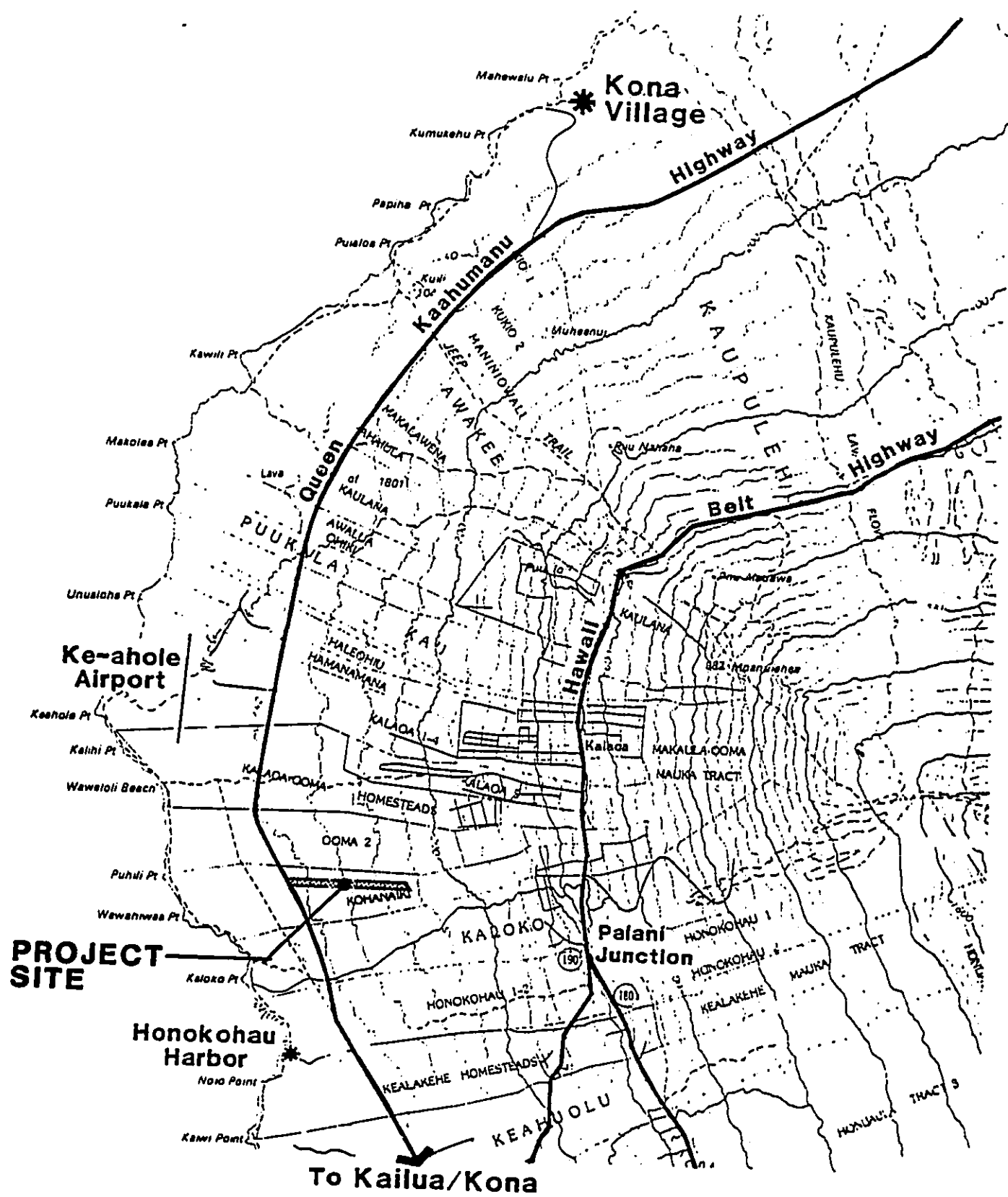


FIGURE 1  
ISLAND LOCATION MAP  
KOHANA'IKI MAUKA



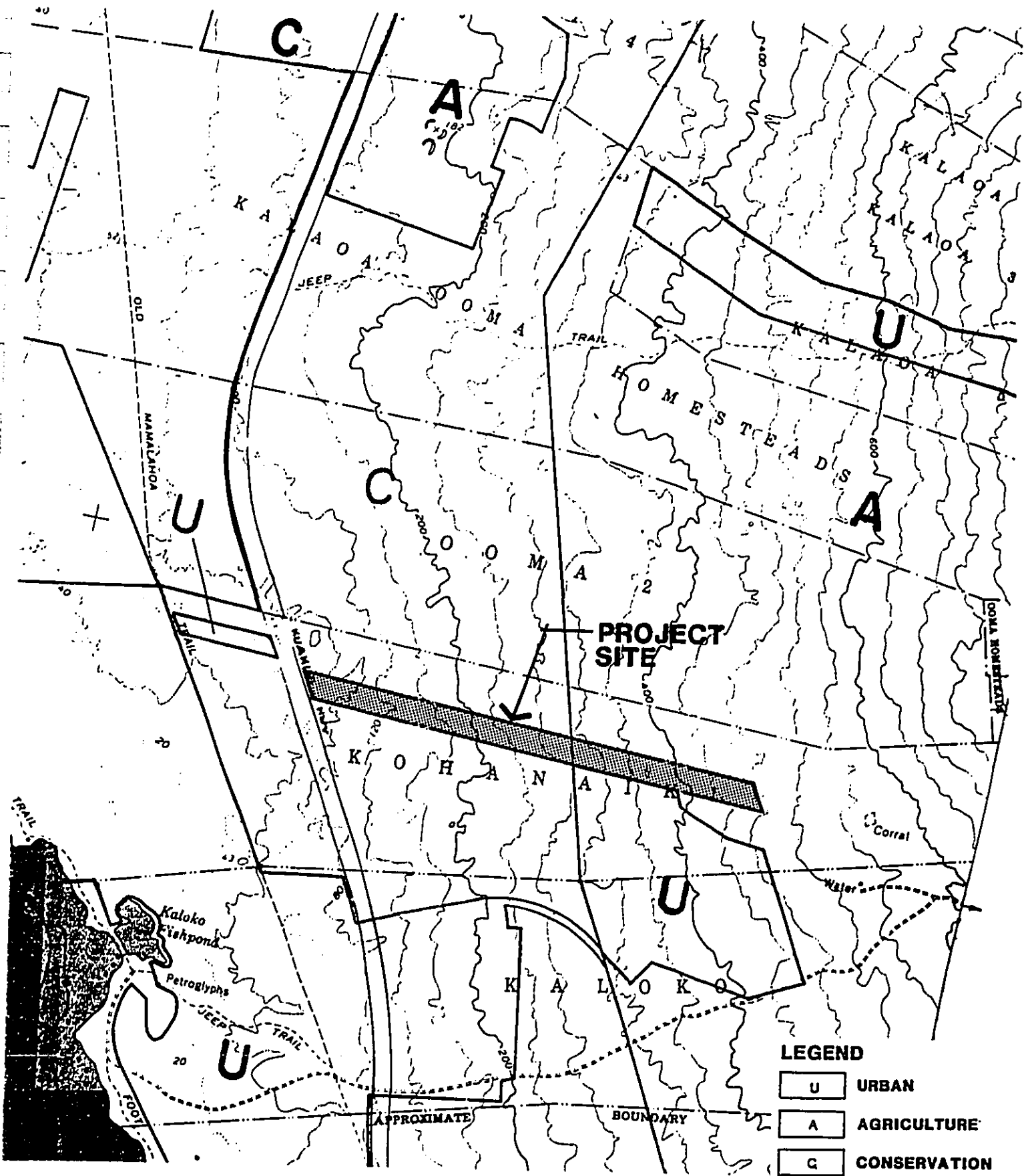


Source: USGS Map  
Hawaii County, Hawaii  
1980

Note: Topographic Map is in metric

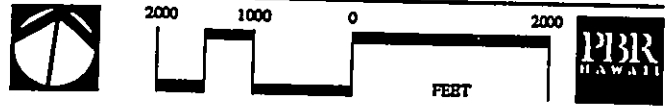
FIGURE 2  
REGIONAL CONTEXT MAP  
KOHANAUKI MAUKA

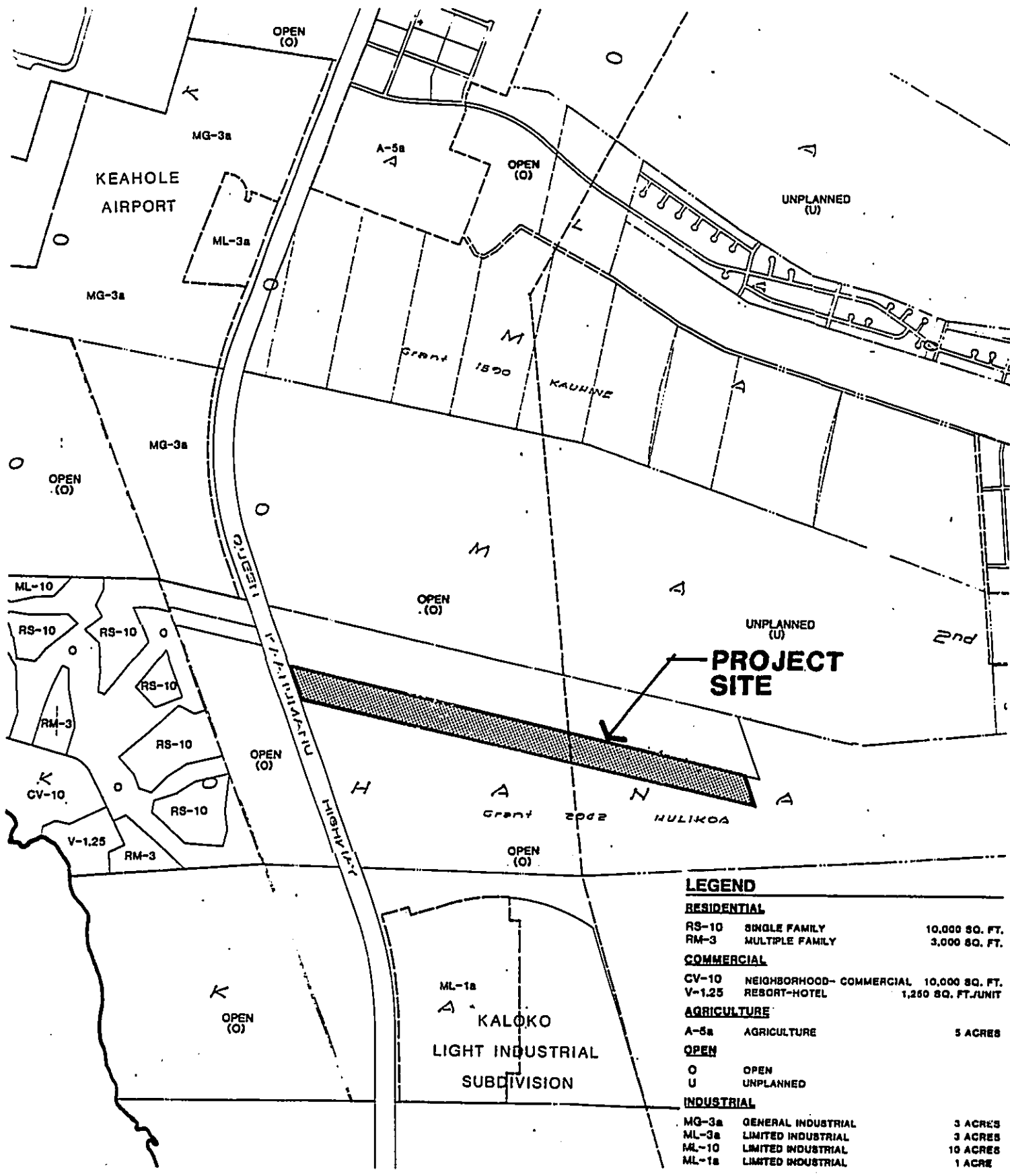




Source: State Land Use Office,  
Keahole Quad (H-2), 1977

FIGURE 3  
STATE LAND USE  
KOHANA K I MAUKA





**LEGEND**

RESIDENTIAL		
RS-10	SINGLE FAMILY	10,000 SQ. FT.
RM-3	MULTIPLE FAMILY	3,000 SQ. FT.
COMMERCIAL		
CV-10	NEIGHBORHOOD-COMMERCIAL	10,000 SQ. FT.
V-1.25	RESORT-HOTEL	1,250 SQ. FT./UNIT
AGRICULTURE		
A-5a	AGRICULTURE	5 ACRES
OPEN		
O	OPEN	
U	UNPLANNED	
INDUSTRIAL		
MG-3a	GENERAL INDUSTRIAL	3 ACRES
ML-3a	LIMITED INDUSTRIAL	3 ACRES
ML-10	LIMITED INDUSTRIAL	10 ACRES
ML-1a	LIMITED INDUSTRIAL	1 ACRE

Source: Planning Commission, County of Hawaii  
North Kona Zoning Map, May 24, 1967

**FIGURE 4**  
**COUNTY ZONING**  
**KOHANAII MAUKA**





### 1.3 STATEMENT OF OBJECTIVES

The objectives of the project include:

- Meeting the additional commercial and light industrial area needs of the current property owners, in particular, their transportation and trucking businesses.
- Provide alternative light industrial properties to serve existing suppliers of products and services in North Kona and south Kohala Districts.
- Furnish light industrial property required to support the forecast expansion of population and planned resort/residential projects in West Hawaii.
- Development of an 8- to 10-acre commercial area as an integrated, high amenity retail and service commercial center having a Hawaii products focus. The center would have a recreation, education and commercial purpose in presenting the people, customs and products of Hawaii.

### 1.4 PROJECT DESCRIPTION

#### 1.4.1 Project Setting

The proposed project site is located approximately five miles north of Kailua-Kona on the mauka side of Queen Kaahumanu Highway in North Kona, Hawaii. The proposed commercial/light industrial subdivision would encompass about 70 acres with individual parcels ranging in size from one-half to three or more acres. The project has been termed *Kohanaiki Mauka* due to situation of the site within the ahupua'a of Kohanaiki and its location on the mountain side of Queen Kaahumanu Highway.

#### 1.4.2 Proposed Infrastructure

Infrastructure required for the project includes:

- internal roadway system
- potable water transmission and storage system
- drainage improvements
- power and communications system stub-outs

### 1.5 SUMMARY OF PROBABLE IMPACTS

Impacts to the physical and social environment will result from the development of the

proposed project. Adverse impacts will be mitigated, where possible, and offset by benefits resulting from the project.

#### **1.5.1 Probable Short Term Impacts**

Short term impacts are generally limited to construction activities that occur during project development. Potential short-term adverse impacts could result in increased localized noise levels during and after construction activities, and decreased air quality during construction due to construction equipment and increased vehicular traffic.

#### **1.5.2 Probable Long Term Impacts**

Long term impacts are the result of project implementation and are assumed to include future conditions which occur because of the proposed project. Future conditions which occur without the proposed project, such as the projected population increase in North Kona, are not considered as resulting from this project. The major potentially positive impacts that are expected to result from the establishment of the proposed commercial/light industrial subdivision are direct and induced economic gains to be realized by construction and operation of the development; expected increases in County and State tax revenues from various tax sources; increased commercial and light industrial siting opportunities in West Hawaii; and reasonable travel times for employees of the businesses locating in the development.

The major potential adverse impact that could result from development of the subject property is potentially increased vehicular traffic in the immediate vicinity of the development. Some people may also perceive the visual attributes of the proposed development and components to be adverse relative to the present open character of the project property.

Based on a review of biological surveys conducted in the area, no endangered animal or plant species appear to inhabit the project site. Similarly, an archaeological study conducted on the site found no above ground indications of sensitive historical or archaeological features.

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# CORRECTION

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- Meeting the additional commercial and light industrial area needs of the current property owners, in particular, their transportation and trucking businesses.
- Provide alternative light industrial properties to serve existing suppliers of products and services in North Kona and south Kohala Districts.
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Based on a review of biological surveys conducted in the area, no endangered animal or plant species appear to inhabit the project site. Similarly, an archaeological study conducted on the site found no above ground indications of sensitive historical or archaeological features.

There will be a net increase in water used at the site. The County has committed 18,000 gallons per day of potable water to the site. This commitment is sufficient to meet the needs of the first phase of project development. A hydrologic survey is underway to determine potential sites for new source development. Water use would remain at & committed levels until new sources are developed or otherwise approved by the County Department of Water Supply.

Wastewater disposal is to be provided by leach fields and septic tanks until such time as the development can be connected to the County wastewater system. Industrial uses which may generate hazardous or controlled waste substances will be handled according to federal, State and County government regulations.

#### **1.6 SUMMARY OF PROPOSED MITIGATION MEASURES**

The mitigation measures proposed to ensure that potential adverse environmental impacts resulting from establishment of the proposed commercial/light industrial subdivision are minimized include two types: generic and specific.

Generic mitigation measures are those where standard actions to reduce or eliminate impact have already been institutionalized through County, State, or federal regulations, codes and ordinances. These types of mitigation usually apply to control of temporary or short term construction impacts of soil loss, noise, air quality effects, etc.. Generic mitigation measures are standard, accepted activities appropriate for minimizing temporary or limited environmental impacts.

Specific mitigation measures are recommended for actions which have potential residual or long term effects that require monitoring or some kind of compensation of the environmental effect. In terms of the Kohanaiki Mauka project, the specific and generic mitigation measures these involve:

- coordination of development plans and activities with appropriate State and County agencies;

- limiting construction to dry periods as much as practicable;
- limiting construction activities to daytime hours;
- adherence to all federal, State and County environmental protection, health, safety and construction rules and regulations;
- early construction of drainage features such as berms;
- immediate stabilization of any denuded areas through sodding or planting;
- application of fertilizers or biocides to landscaped areas only during periods of low rainfall to minimize chemical runoff;
- covering of open vehicles carrying soils, gravel or other particulate matter which may affect air quality;
- controlling dust by watering and use of proper stockpiling procedures;
- providing a 50-foot wide landscape buffer along the highway;
- protection of wildlife habitat as required and preservation of archaeological and historical resources in accordance with appropriate federal, State and County rules and regulations;
- installation of grease traps and use of concrete pads for maintenance activities;
- use of xerographic vegetation for landscaping to assist in water conservation;
- establishment of "best management practices" with regard to handling storage and disposal of solid waste, hazardous waste and underground storage tanks.

#### **1.7 SUMMARY OF ALTERNATIVES CONSIDERED**

Included in the alternatives analyses have been: various configurations of the parcels and roadways within the project site; development of the property for other purposes; and the alternative of no action. These alternatives have been rejected in part because they do not meet the objectives of the proposed project, i.e., would not provide an effective and efficient commercial/light industrial subdivision layout; would have greater environmental impacts than the proposed project; or because they are not entirely feasible.

#### **1.8 SUMMARY OF COMPATIBILITY WITH LAND USE PLANS AND POLICIES**

As further discussed in Chapter 7, the proposed project was devised to be compatible with the County General Plan and the Keahole to Kailua Development Plan. Governmental land use plans, policies and controls affecting the proposed project include Chapter 205 (HRS) Land Use Commission Rules, the Hawaii State Plan, State Agriculture Functional Plan, State Conservation Lands Functional Plan, State Historic Preservation Functional Plan, Hawaii County General Plan, and Hawaii County Zoning. Subsequent to granting the requested State Land Use Boundary Amendment Petition and the following zoning request to the County, the

proposed project would be consistent with the previously noted plans land use controls. The Kohanaiki Mauka project owners will continue planning efforts in consideration of County Plans, and will cooperate with adjacent owners as necessary.

#### **1.9 NECESSARY APPROVALS AND PERMITS**

<u>Permit or Approval</u>	<u>Authority</u>
Land Use Boundary Amendment	State Land Use Commission
Underground Injection Control Permit	State Department of Health
Plan Approval	Hawaii County Planning Department
Change of Zoning	Hawaii County Council
Subdivision Approval	Hawaii County Planning Department
Building and Grading Permits	Hawaii County Department of Public Works



C H A P T E R 2

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D E S C R I P T I O N O F T H E P R O P O S E D P R O J E C T

## CHAPTER 2 - DESCRIPTION OF THE PROPOSED PROJECT

### 2.0 REGIONAL SETTING

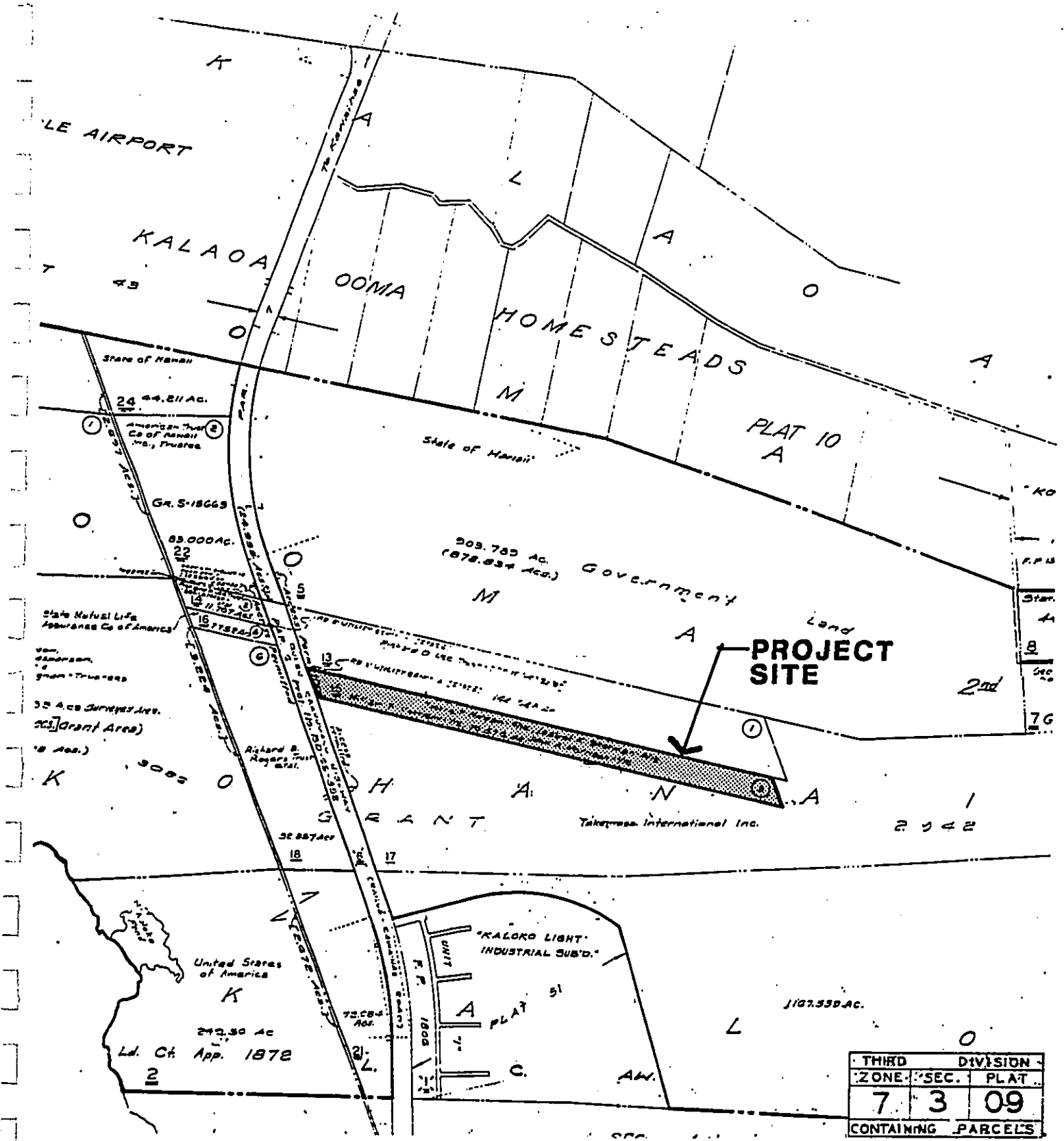
The proposed project is located in North Kona, Hawaii, on the landward (mauka) side of Queen Kaahumanu Highway, approximately five miles north of Kailua-Kona, an urban center and area of growth in West Hawaii in recent years. The property on which the proposed project would be located is identified as tax map key (TMK) 7-3-09:15 (See Figure 5). The project consists of approximately 70 acres of land.

### 2.1 EXISTING AND SURROUNDING USES

The project site is directly mauka of the Kohanaiki lands that are planned and zoned for hotel/resort development. A complete description of the Kohanaiki Resort Community project area makai of Queen Kaahumanu Highway is found in the approved and accepted Kohanaiki Resort Community Final Environmental Impact Statement (Helber, Hastert, Van Horn & Kimura, August 1986). The Kohanaiki Resort Community is planned to include two hotels, single and multi-family housing, a marina, support housing, commercial facilities and a golf course.

The other planned use for properties adjacent to the proposed project is a planned golf course within the SLUC Urban boundary on the southerly (Kailua-Kona) side of the Kohanaiki Mauka property (Kona International Country Club, TSA International, Ltd.). The lands to the north of the Kohanaiki Mauka lands are owned by the Richard D. Lee Trust and the State of Hawaii. There are no known planned uses of the Lee Trust lands.

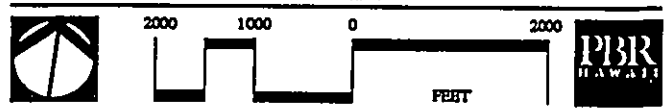
The Kaloko light industrial subdivision is about 2,000 feet south of the proposed Kohanaiki commercial/light industrial subdivision, and Keahole Airport, the Natural Energy Laboratory of Hawaii (NELH) and the Hawaii Ocean Science and Technology (HOST) Park are about one and one-half miles north of the proposed project site. Other proposed land uses in the proposed project area include the proposed 'O'oma II resort project and the proposed Kaloko-Honokohau National Historical Park (US Dept. of Interior, National Park Service, 1975),



THIRD DIVISION	
ZONE	SEC. PLAT
7	3 09
CONTAINING PARCELS	

Source: Tax Map Bureau & Survey Dept., Jan 3, 1989

FIGURE 5  
TAX MAP KEY  
KOHANAIKI MAUKA



south and makai of the proposed project site. Other industrial zoned land is located at Keahole Airport, Kaloko Industrial Park, Queen Liliuokalani Trust Industrial Subdivision: Phase II, and the Isemoto Industrial Subdivision.

## **2.2 ACCEPTING AUTHORITY**

The accepting authority for this EIS is the State Land Use Commission.

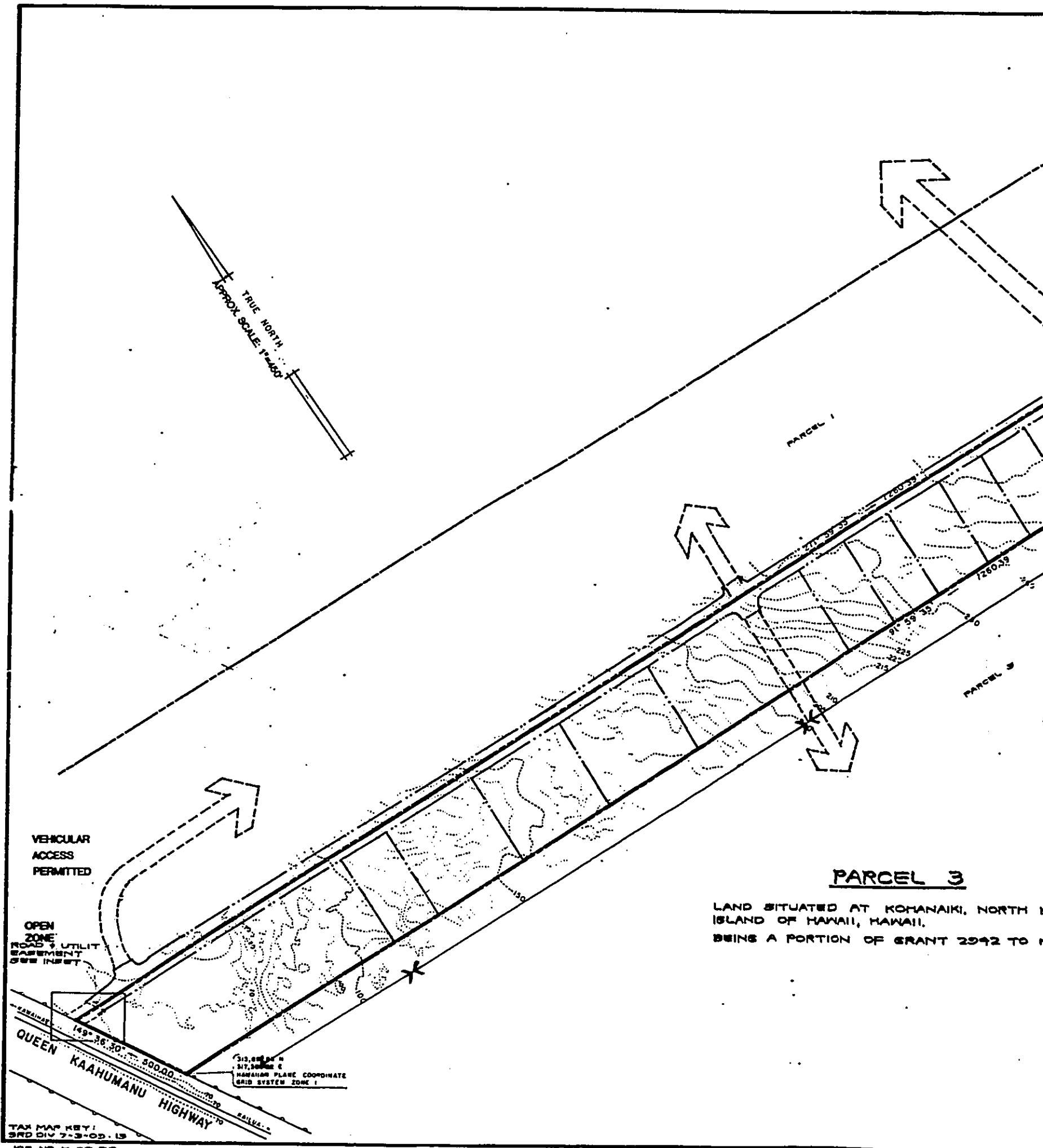
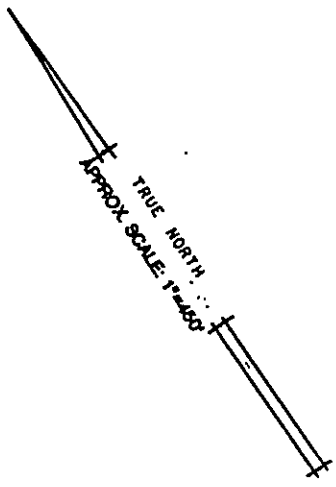
## **2.3 PURPOSE OF THE PROPOSED ACTION**

The purpose of the proposed project is to provide a commercial/light industrial subdivision in the North Kona area for the immediate commercial operation and industrial activity needs of the property owners, i.e., for their own businesses. The project would also provide alternative light industrial properties from which suppliers of products and services can readily serve the existing, under construction and planned resort/residential projects in the North Kona and South Kohala Districts, as well as existing businesses and services in West Hawaii, such as Keahole Airport. A market study conducted for the proposed project (Appendix A), indicates that there is a present need for additional light industrial property in the North Kona area. Additionally, the need for additional light industrial property is forecast to increase in the future as planned resort/residential projects are completed and become operational.

## **2.4 MASTER PLAN**

The applicant is proposing the development of a commercial/light industrial subdivision on the Kohanaiki lands adjacent to other presently Urban designated Kohanaiki lands (Figure 3). The project property extends mauka approximately 7,500 feet and is about 400 feet wide. The commercial/light industrial subdivision would begin at an elevation of about 60 feet at the mauka border of the Queen Kaahumanu Highway and ascend to an elevation of about 475 feet.

The Conceptual Master Plan and preferred alternative, Figure 6A, illustrates a main access roadway along the northern property boundary, which, if developed, would require an access agreement with the adjoining property owners. Development of the project would include the



VEHICULAR  
ACCESS  
PERMITTED

OPEN  
ZONE  
ROAD & UTILIT  
EASEMENT  
SEE INSET

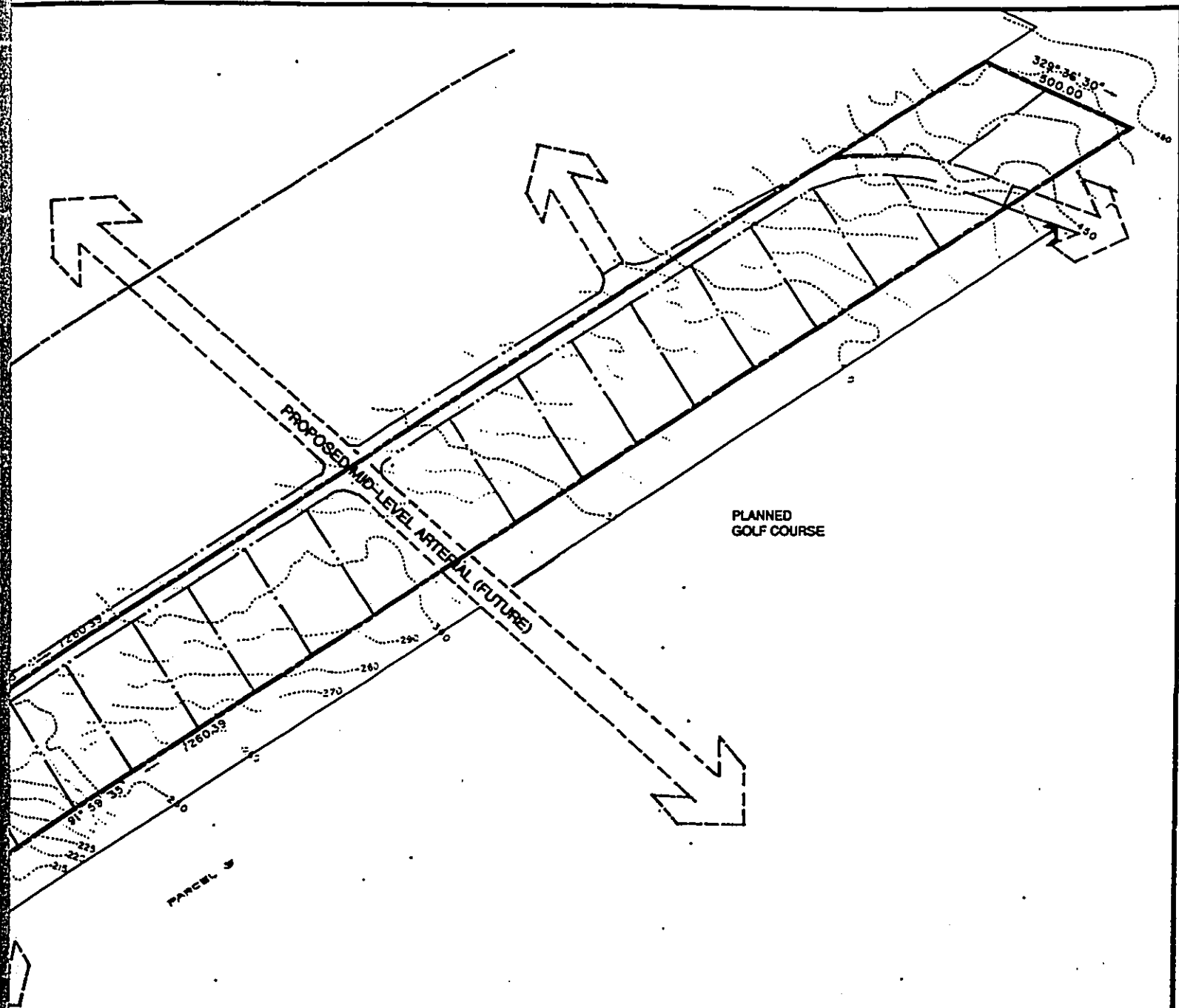
QUEEN KAAHUMANU HIGHWAY

S10,884.8  
S17,888.6  
HAWAIIAN PLANE COORDINATE  
GRID SYSTEM ZONE 1

**PARCEL 3**

LAND SITUATED AT KOHANAHI, NORTH  
ISLAND OF HAWAII, HAWAII,  
BEING A PORTION OF GRANT 2942 TO

TAX MAP KEY:  
3RD DIV 7-3-03. 13  
JOB NO H-86-76



TOTAL PARCEL 3 = 70.376 ACRES

**NOTE:**

CONTOURS TAKEN FROM AERIAL PHOTO  
 CONTOUR INTERVAL: 70 TO 250 = 5 FT.  
 250 TO 780 = 10 FT.

**PARCEL 3**

AT KOHANAIKI, NORTH KONA,  
 MAUI, HAWAII.  
 DEED OF GRANT 2992 TO MULIKOA.

**FIGURE 6A  
 CONCEPTUAL MASTER PLAN  
 PREFERRED ALTERNATIVE  
 KOHANAIKI MAUKA  
 NORTH KONA, COUNTY OF HAWAII**



OCTOBER 7, 1986

necessary internal roadway system, potable water, drainage improvements and electrical power system stub-outs for the complete development of the proposed commercial/light industrial subdivision. Additionally, the potable water system serving the development would include a 0.3 million gallon concrete water reservoir located at an elevation of about 325 feet and another existing 0.3 million gallon reservoir at an elevation of about 570 feet. The project would be entirely located mauka of Queen Kaahumanu Highway and would be screened from the highway by a 50-foot wide landscaped buffer along the highway right-of-way. Individual parcels within the development would be sold or leased as improved, partially graded parcels that the new owner and/or lessee would develop in accordance with applicable State and County rules and regulations, as well as any design and use standards established by the project developers.

## **2.5 DEVELOPMENT COSTS AND PHASING**

The proposed project will be developed with the preliminary costs estimated to be approximately \$13,000,000.00, and will include highway intersection, roadways, drainage, water, electrical and communications infrastructure.

The infrastructure, which includes all waterlines necessary to distribute water to the future tenants of the lots, will be installed in one increment. It is anticipated the improvements will be completed over a period between one and two years. Site occupation and improvements by tenants are market driven. Please see the market study, Appendix A.

C H A P T E R 3

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ALTERNATIVES CONSIDERED



## CHAPTER 3 - ALTERNATIVES CONSIDERED

### 3.0 INTRODUCTION

Known feasible alternatives to the proposed project are limited to those that would allow the objectives of the proposed project to be met, while minimizing potential adverse environmental impacts. The purpose of the proposed project is to provide a commercial/light industrial subdivision in the North Kona area for the immediate needs of the property owners and to meet projected market demands.

The parcel was purchased by the Kamaaina Eight Partners specifically to provide for the expansion of their existing business in the Kona area. In effect, this limited the alternatives which were considered for the parcel.

The project would also provide alternative light industrial properties from which suppliers of products and services can serve existing, under construction and planned resort/residential projects in the North Kona and South Kohala Districts, as well as existing businesses and services in West Hawaii. Also, the need for additional light industrial property is forecast to increase in the future as planned resort/residential projects are completed and become operational. As described in the following sections of this EIS, the proposed project is expected to have minimal and/or positive impacts on the physical, natural, social and economic environments of the project area.

### 3.1 DESCRIPTION OF ALTERNATIVES

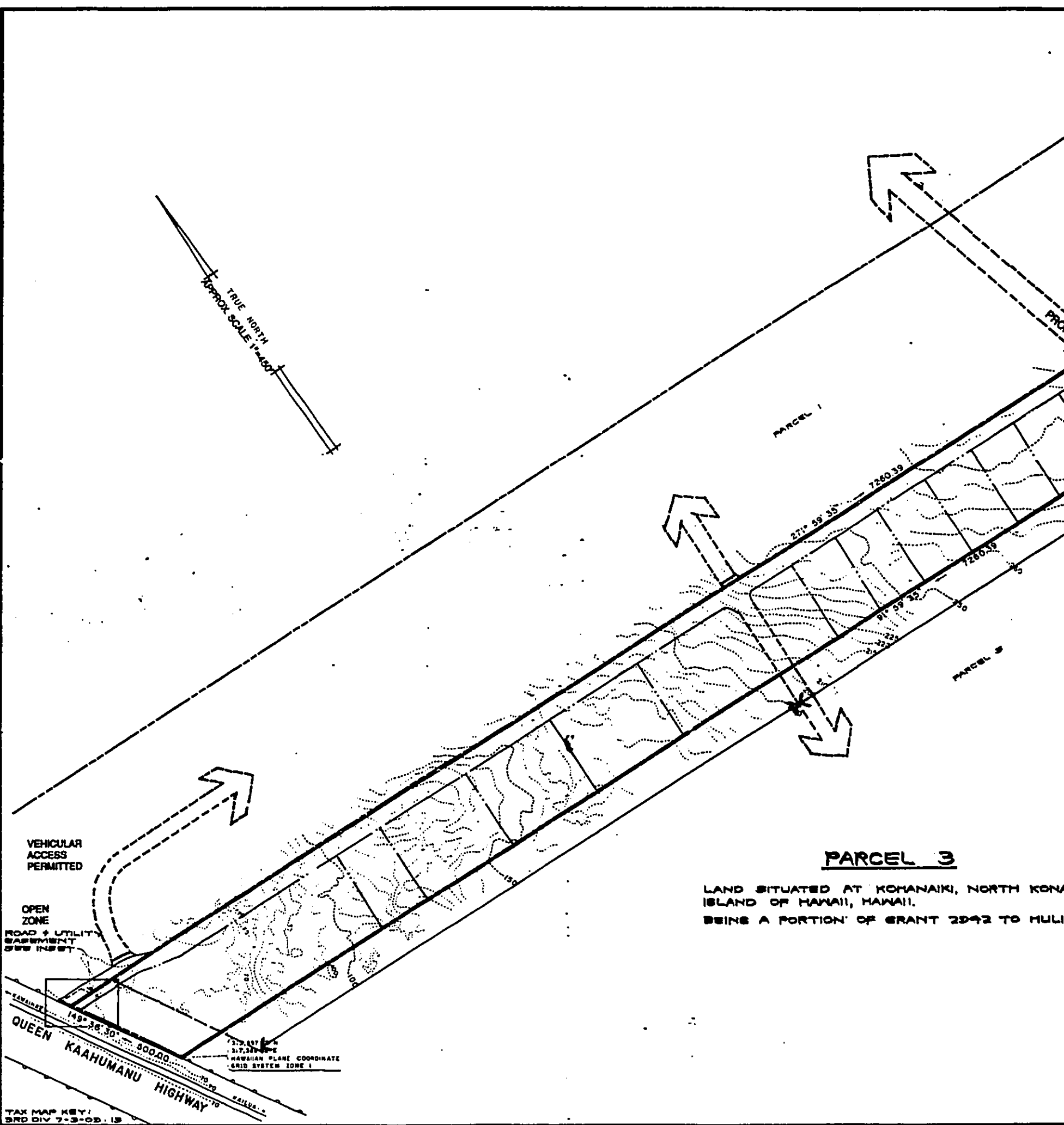
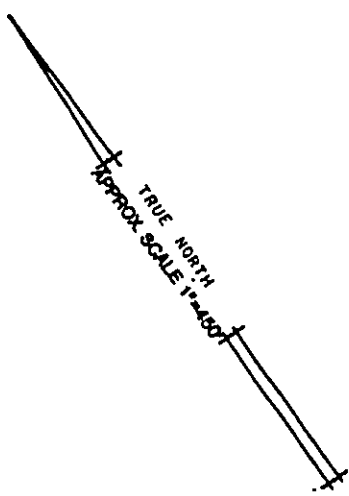
In compliance with applicable regulations, other possible alternatives to the proposed project have been investigated and rejected for a variety of reasons. Included in the alternatives analyses have been various configurations of the parcels and roadways within the project site; development of the property for other purposes; and the alternative of no action. These alternatives have been rejected in part because they do not meet the objectives of the proposed project, i.e., would not provide an effective and efficient commercial/light industrial subdivision layout; would have greater environmental impacts than the proposed project; or

because they are not entirely feasible.

Development of the property for residential uses does not appear feasible, due to the relatively long and narrow configuration of the property. The configuration limits the potential for residential development because market residential products require a more sensitive siting on land than industrial and commercial parcels. The shape of the property restricts siting considerations.

The alternative of no action has also been rejected because it would not allow the objectives of the proposed project to be met.

Figures 6B and 6C show a set of alternative development concepts for the proposed development, which include a main spine road and internal roadway system planned to accommodate the regional roadway system proposed by the County of Hawaii in the Draft Keahole to Kailua Development Plan, May 1990.



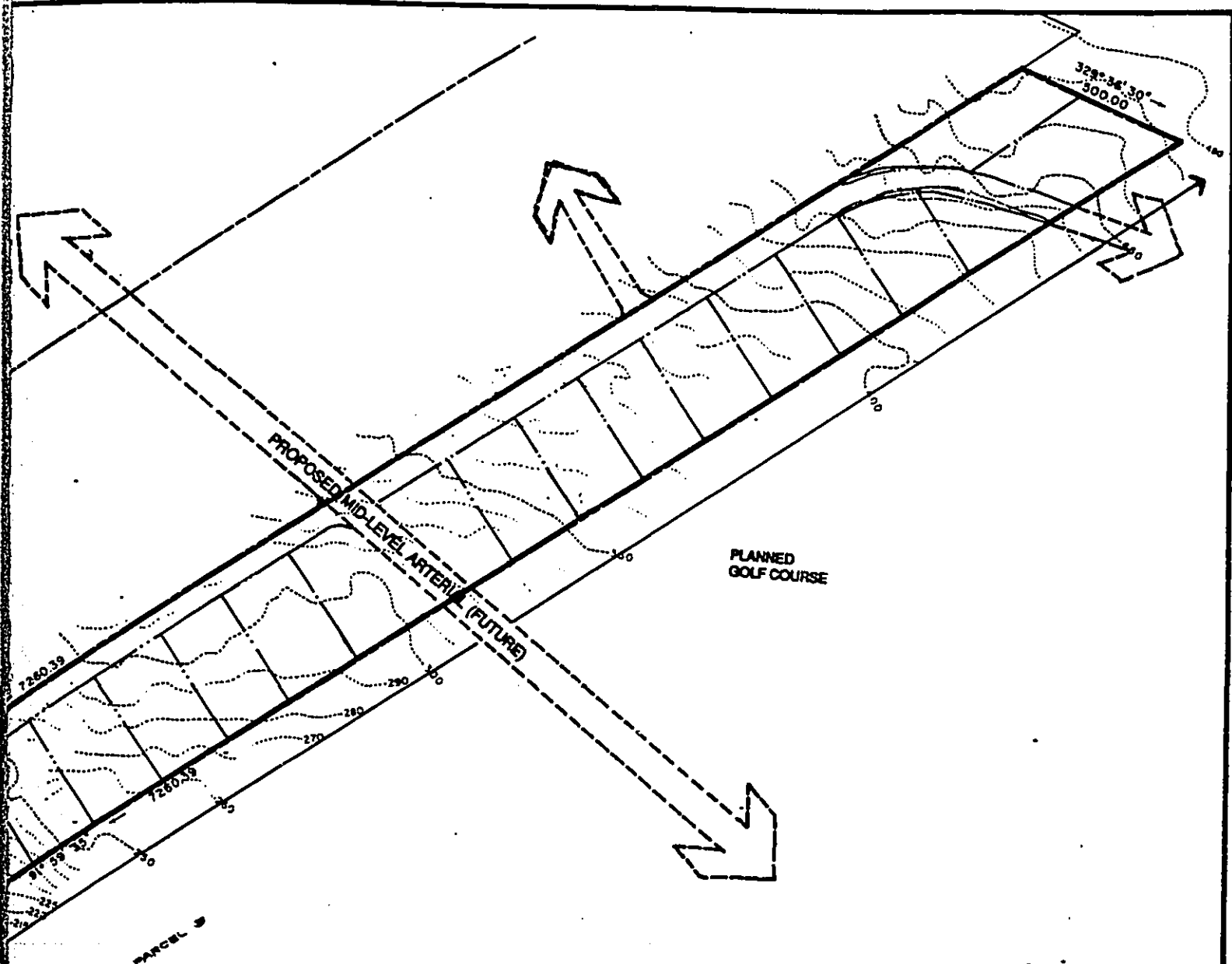
PARCEL 1

PARCEL 2

**PARCEL 3**

LAND SITUATED AT KOHANA'IKI, NORTH KONA ISLAND OF HAWAII, HAWAII.  
BEING A PORTION OF GRANT 2942 TO HULI

QUEEN KAAHUMANU HIGHWAY  
 149° 26' 30" 500.00  
 217,327.00  
 HAWAIIAN PLANE COORDINATE  
 GRID SYSTEM ZONE 1  
 TAX MAP KEY:  
 SRD DIV 7-3-03. 13  
 JOB NO H-88-76



PARCEL 3

AREA PARCEL 3 = 70.376 ACRES

**NOTE:**  
 CONTOURS TAKEN FROM AERIAL PHOTO.  
 CONTOUR INTERVAL: 70 TO 250 = 5 FT.  
 250 TO 400 = 10 FT.

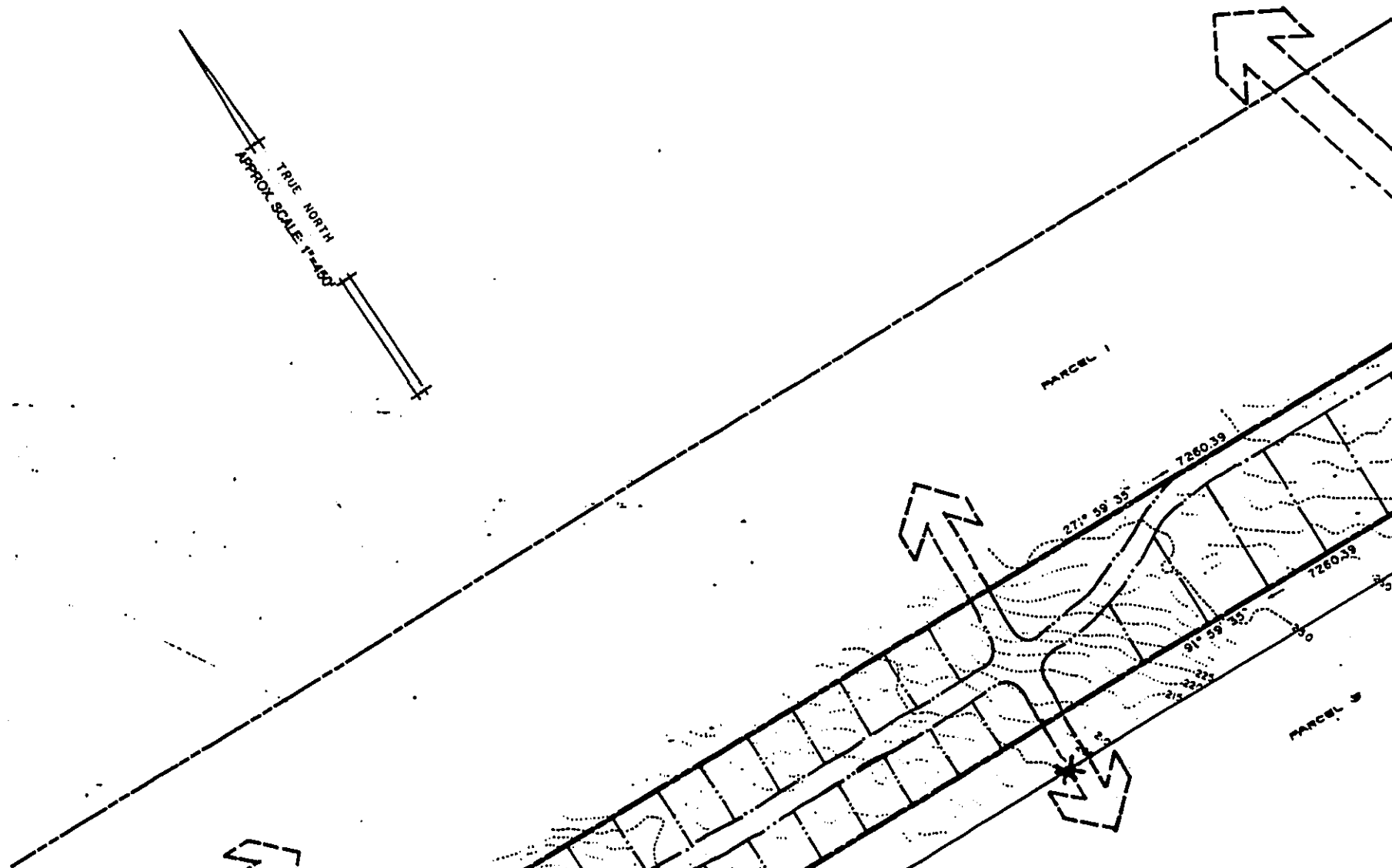
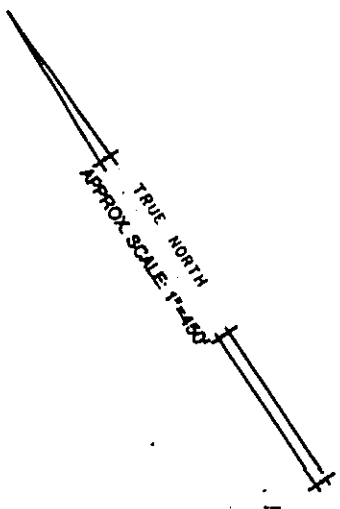
**PARCEL 3**

KOHANA'IKI, NORTH KONA,  
 HAWAII,  
 DEED GRANT 2042 TO HULIKOA.

**FIGURE 6B  
 CONCEPTUAL DEVELOPMENT PLAN  
 ALTERNATIVE  
 KOHANA'IKI MAUKA  
 NORTH KONA, COUNTY OF HAWAII**



OCTOBER 7, 1988



**PARCEL 3**

LAND SITUATED AT KOHANA'IKI, NORTH ISLAND OF HAWAII, HAWAII, BEING A PORTION OF GRANT 2942 TO

VEHICULAR ACCESS PERMITTED

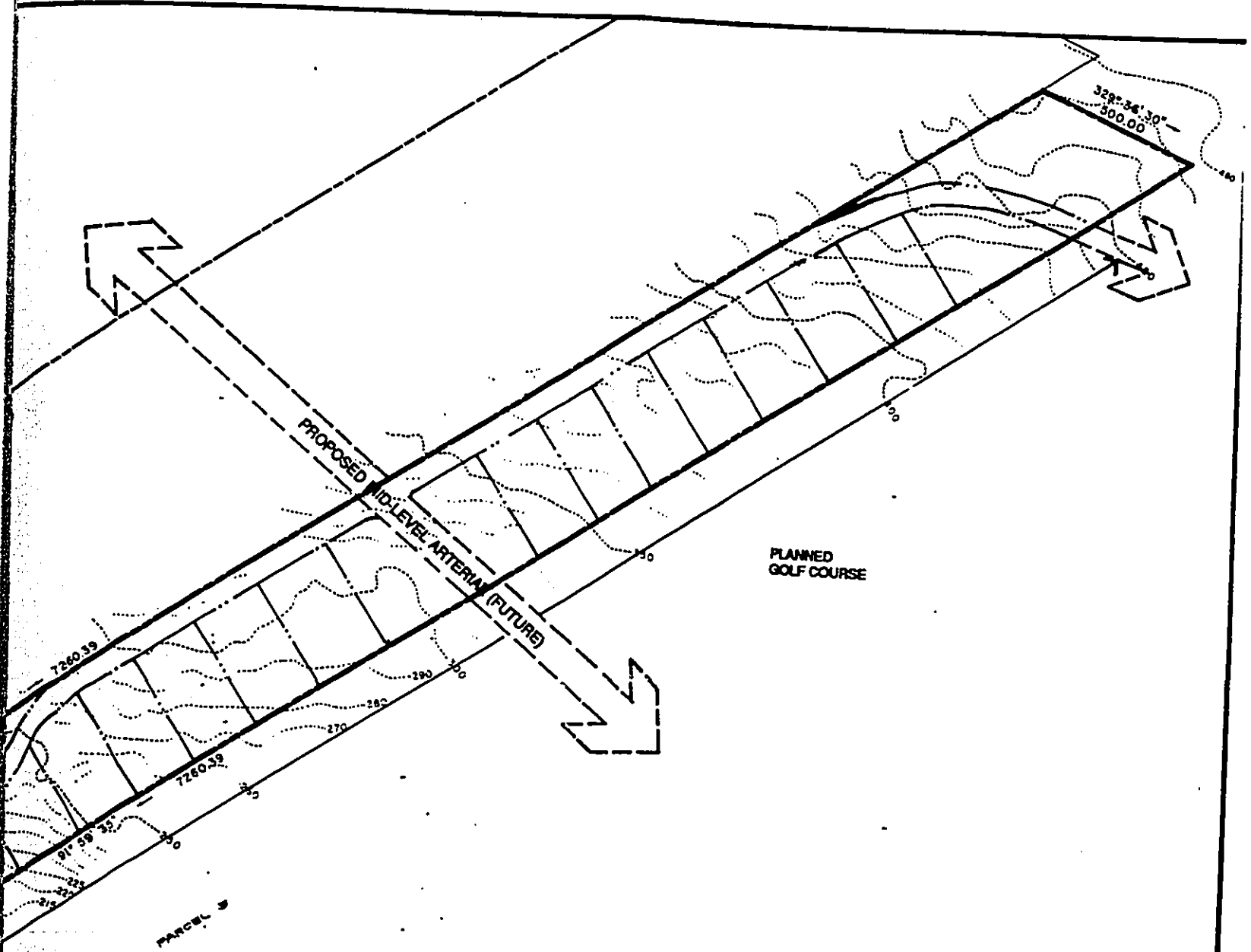
OPEN ZONE

ROAD & UTILITY EASEMENT SEE INSET

33,007  
17,388 24  
HAWAIIAN PLANE COORDINATE  
S.D. SYSTEM ZONE 1

QUEEN KAAHUMANU HIGHWAY

TAX MAP KEY:  
3RD DIV 7-3-03-13  
JOB NO H-88-76



AREA PARCEL 3 = 70.376 ACRES

NOTE:  
 CONTOURS TAKEN FROM AERIAL PHOTO.  
 CONTOUR INTERVAL: 70 TO 250 = 5 FT.  
 250 TO 400 = 10 FT.

**PARCEL 3**  
 AT KOHANAIKI, NORTH KONA,  
 HAWAII.  
 OF GRANT 2942 TO HULIKOA.

**FIGURE 6C**  
**CONCEPTUAL DEVELOPMENT PLAN**  
**ALTERNATIVE**  
**KOHANAIKI MAUKA**  
 NORTH KONA, COUNTY OF HAWAII



OCTOBER 2, 1988

C H A P T E R 4

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PHYSICAL AND NATURAL ENVIRONMENT

## CHAPTER 4 - PHYSICAL AND NATURAL ENVIRONMENT

### 4.0 INTRODUCTION

The existing environment of the project area is characterized by vacant, sparsely vegetated a'a and pahoehoe lava flows frequented by a few bird species and feral goats, mongoose, rats and mice. A portion of the lands to the south of the project property have been designated Urban by the State Land Use Commission to allow development of a golf course and lands makai of the project site and Queen Kaahumanu Highway have been zoned Open and Urban by the County to allow development of the Kohanaiki Resort Community which will include hotels, single and multi-family housing, a marina, support housing, commercial facilities and a golf course.

### 4.1 PHYSICAL ENVIRONMENT

#### 4.1.1 Geology, Physiography, Soils and Agriculture

##### 4.1.1.1 Existing Conditions

The general geology of the project site is dominated by the lava flows that emanated from Hualalai in 1800-1801. These flows entered the ocean at the northern boundary of the Keahole Point area and are characterized by numerous accretionary lava balls; a'a channels; lava stalactites; and brown, red and black spattering bordering the channels. Both a'a and pahoehoe lavas are present on the proposed project site, with little or no soil or ground cover. Slopes within the project site are generally less than 10 percent.

Soils in Hawaii are commonly rated in terms of three soil classification systems: (1) USDA Soil Survey; (2) Agricultural Lands of Importance to the State (ALISH); and (3) Land Study Bureau's Detailed Land Classification.

##### *Soil Survey*

Two land types, as described below, have been identified on the Kohanaiki Mauka lands by the U.S. Department of Agriculture Soil Conservation Service (SCS) (December, 1973) in a comprehensive soil survey of the Island of Hawaii. Neither of the two are particularly



agriculturally significant. All of the proposed project site land and soil types are well to excessively well drained. Figure 7 shows the site soil survey as comprising:

- (1) A'a Lava Flows (rLV). This lava has practically no soil cover and is generally bare of vegetation except for mosses, lichens, ferns and a few small ohia trees. The surfaces of a'a flows are masses of clinkery, hard, sharp pieces piled in tumbled heaps that are difficult to traverse on foot. It has been demonstrated that the clinkery a'a surface can be easily moved and crushed by bulldozers into relatively smooth surface cobbles one to four inches in size.
- (2) Pahoehoe Lava Flows (rLW). Pahoehoe lava flows, similar to the a'a flows, are also a miscellaneous land type. This lava has a billowy, glassy surface that is relatively smooth. In some areas the surface is rough and broken and there are hummocks and pressure domes. Pahoehoe lava generally has no soil covering and is typically bare of vegetation except for mosses and lichens. When and where soil in this land type occurs, it is found in cracks and depressions, having been transported there by wind and storm run-off.

#### *Detailed Land Classification*

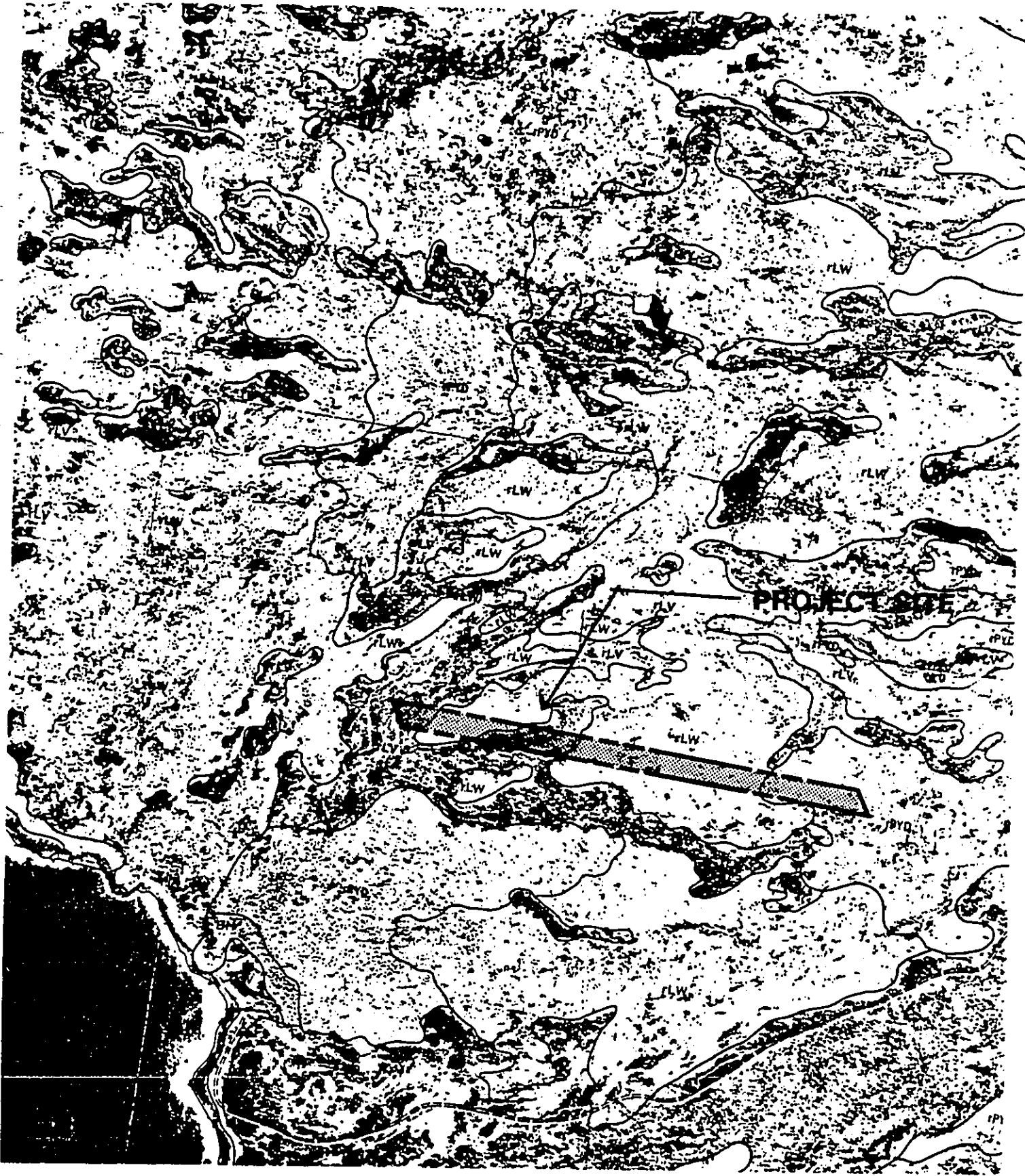
Agriculturally, the Detailed Land Classification, Island of Hawaii (University of Hawaii, Land Study Bureau, 1972), classifies the Kohanaiki Mauka lands as E289 and E319 (See Figure 8). These classifications indicate the soil's unsuitability for agricultural purposes.

#### *ALISH*

None of the land within the proposed utility corridor is classified in the Agricultural Lands of Importance to the State of Hawaii (ALISH) system. However, the mauka one-third of the proposed project would be located in lands that are presently designated Agriculture by the State Land Use Commission for possible future agricultural use.

#### **4.1.1.2 Probable Impacts**

Development of the proposed project is not expected to significantly impact or be impacted by the geology or physiography of the project area; nor is development expected to significantly impact or be impacted by the soils of the project site or area. At this time there are no known plans to utilize the project site for agricultural activities nor has the property



Source: United States Department of Agriculture,  
 Soil Conservation Service, Soil Survey of  
 Island of Hawaii, State of Hawaii, Dec. 1972

FIGURE 7  
 SOIL SURVEY  
 KOHANAIKI MAUKA





Source: Detailed Land Classification, Island of Hawaii  
 Land Study Bureau, Nov. 1965

FIGURE 8  
 DETAILED LAND CLASSIFICATION  
 KOHANAIKI MAUKA



been utilized for agricultural activities in the recent past. Similarly, it does not appear likely that future agricultural activities would be pursued on the site given the lack of suitable soils, the lack of sufficient developed water supplies and the arid climatic characteristics of the project area.

#### **4.1.1.3 Proposed Mitigation Measures**

Due to the lack of expected significant impacts to the geology, physiography, soils or agricultural potential of the area or site, mitigation measures to minimize potential adverse impacts, other than adherence to State and County building codes and standards, do not appear warranted.

#### **4.1.2 Groundwater, Hydrology, Surface Water and Drainage**

##### **4.1.2.1 Existing Conditions**

The proposed Kohanaiki Mauka project lands, in the lee of Mauna Kea, Mauna Loa and Hualalai, are situated within an area of low rainfall amounts and intensities averaging less than 10 inches annually. The land is comprised of porous and unweathered lavas and has sparse soil cover. As a consequence, there are no naturally occurring or well-defined drainageways or drainage outlets on-site, and surface water run-off is virtually nonexistent. Surface run-off results only under conditions of intense rainfall events, which occur only rarely. The Flood Insurance Rate Map (FIRM) shows no areas of the project site subject to flooding. FIRM Panel 155166000-1900 of July 16, 1990 shows the project site in Zone X - unshaded, representing areas determined to be outside of the 500-year flood plain.

The existing Kohanaiki watershed contains an area of approximately 3,700 acres and extends from the western slopes of Hualalai volcano to the coast. The area is considered part of the Kiholo Aquifer system. Elevations in the watershed range from 4,800 feet to mean sea level, and ground slope varies from about eight percent in the upper elevations to about one percent near the coast. Average ground slope of the watershed area is approximately six percent.

The subject property is situated below the Underground Injection Control (UIC) line which is the boundary set by the Department of Health to delineate areas of watershed recharge.

Beneath the proposed project area highly permeable layered basalts contain basal groundwater, i.e., fresh-brackish water floating on sea water. The salinity of this water ranges from very brackish at the coast to moderately brackish near the highway. From Queen Kaahumanu Highway inland to Mamalahoa Highway, the groundwater quality is moderate to weakly brackish. Groundwater beneath the subdivision site is likely to have chloride concentrations too high to be suitable as a potable water source.

According to the hydrogeologic analysis conducted for this EIS (please see Appendix E), the nitrogen and phosphorus level at the surface of the brackish basal lens is less than 0.2 mg/l for each element. Groundwater discharge occurs as diffused and highly mixed flow along the entire shoreline from Kailua Village to Keahole Point.

#### **4.1.2.2 Probable Impacts**

There will be an increase in potable water use on the site (approximately 166,000 gallons per day (gpd) upon full occupancy). Because of the highly porous nature of the lavas underlying the proposed project site, surface water runoff and drainage associated with the proposed project could affect the groundwater lens below the site. Although present surface water runoff is almost nonexistent, following full development of the project, surface water runoff would increase due to paved and roofed surfaces. Industrial uses could include activities which generate substances that could leach into groundwater.

#### **4.1.2.3 Proposed Mitigation Measures**

Present plans call for surface water runoff to be directed to appropriate treatment facilities and disposed of through dry wells (Appendix B). The dry wells would be located within the development's primary roadway right-of-way. They would be 20 feet deep and capable of percolating approximately six to eight cubic feet of water per second. The dry wells would be spaced approximately 750 feet apart and percolate the surface water generated by the roadway and a portion of each adjoining lot. These wells promote all rainfall presently falling on the subject property returning as local recharge to the brackish basal lens.

The improvement plans for each lot will include plans for additional drainage improvements to accommodate the drainage generated by each lot. These improvements include grease and oil traps to filter and absorb suspended material. Other substances, such as inorganic constituents in solution (e.g. nitrogen and phosphorus) would be filtered through lava beneath the surface.

While lava permeability rates are uncertain, the dispersion area is typically calculated at 15 to 30 degrees in width. This wide dispersion, together with the anticipated modest increase in runoff from rainwater and industrial uses expected at the site, suggests that the dilution would occur as the solution moved shoreward and concentration of any contaminants reaching the brackish water lens is likely to be low.

The proposed project and attendant facilities would be designed to provide an efficient and effective commercial/light industrial subdivision. Adverse impacts to the groundwater resources and hydrologic characteristics of the area as a result of the proposed project are not expected to occur given the best management practices, as described above, that will be taken to protect the groundwater resources below the project site.

The treatment and disposal facilities would be designed, engineered and constructed in compliance with applicable federal, State and County rules and regulations. The design of the facilities will take into account the types of activities that might occur at the proposed project, as well as appropriate groundwater environmental protection requirements. It is noted that a storm water drainage system, designed and constructed in accordance with applicable State and County standards, would be included as part of the internal infrastructure serving the development.

Since the hydrologic analysis done for the EIS concludes that the residential cesspools and agricultural activities mauka of the subject property have not contributed to an increase in nitrogen or phosphorus in the brackish lens, the minimal sanitary waste generated by the proposed development should have "little or no significant impact on the brackish lens"

(Bowles, 1991). Additional measures to minimize potential adverse impacts to the groundwater resources and hydrologic characteristics of the project site are, therefore, not warranted.

#### 4.1.3 Natural Hazards

##### 4.1.3.1 Existing Conditions

Potential natural hazards to which the subject property could be subjected include earthquakes and volcanic eruptions. Because the land and soil types are well to excessively well drained, floods due to rainwater surface run-off are unlikely to occur.

Volcanic hazards in the area have been studied in detail (Mullineaux, et al, 1987). The last volcanic eruption of Hualalai that affected the Kohanaiki lands occurred in 1800-1801. Lavas emerged from the northwest volcanic rift zone at about the 1,600-foot elevation (in the vicinity of the Puhi-a-Pele Cinder Cone, just makai of Mamalahoa Highway) creating the flow that entered the ocean north of Keahole Point. Mullineaux, et al (1987), indicate that the Kohanaiki lands are in lava flow hazard Zone 4. Less than 15 percent of the land in this zone has been covered with lava in the last 750 years. Although lava flows on Hualalai have typically covered large areas, the rift zones of the volcano do not seem to have a distinctly higher degree of hazard than do its flanks. As such, lava flow hazards for the project site are relatively low.

In addition to lava flow hazard zones, hazard zones for tephra falls (ash fall) have also been defined for Hawaii (Mullineaux, et al, 1987). The Kohanaiki Mauka project land is located in ash fall Hazard Zone 2, which indicates that tephra falls from lava fountains could be frequent but thin.

Hazard zones are not designated on Hawaii in the Kohanaiki area for pyroclastic surges. The single pyroclastic surge hazard zone on the island surrounds the Kilauea Caldera and extends a distance of 10 km from its center. Hazard zones for volcanic gases are the same as hazard zones for tephra, i.e., Hazard Zone 2. The Kohanaiki lands are outside hazard zones for

ground fracture and subsidence. However, earthquakes, associated with volcanic events, primarily underground magmatic movement of Hualalai, have been reported. Based on historical data, earthquakes of a level of 6.4 Richter Scale Magnitude occur on an average of once every 62 years.

#### **4.1.3.2 Probable Impacts**

As indicated, the proposed project would not affect existing hazards, but could be potentially impacted by those hazards, including earthquakes and volcanic activity.

#### **4.1.3.3 Proposed Mitigation Measures**

Because the proposed project could be affected by volcanic events, such as lava flows or earthquakes, appropriate design, engineering and construction measures would be taken to minimize potential risks due to volcanic activity. These measures would include adherence to engineering design standards in accordance with federal, State and County rules and regulations.

#### **4.1.4 Visual Attributes**

##### **4.1.4.1 Existing Conditions**

The Kohanaiki lands on which the project would be established range from an elevation of about 60 feet at Queen Kaahumanu Highway to about 475 feet at the mauka property boundary. The present visual characteristics of the project site are shown in Figures 9 and 10. As shown, the project site is characterized by barren lava flows with sparse vegetation.

##### **4.1.4.2 Probable Impacts**

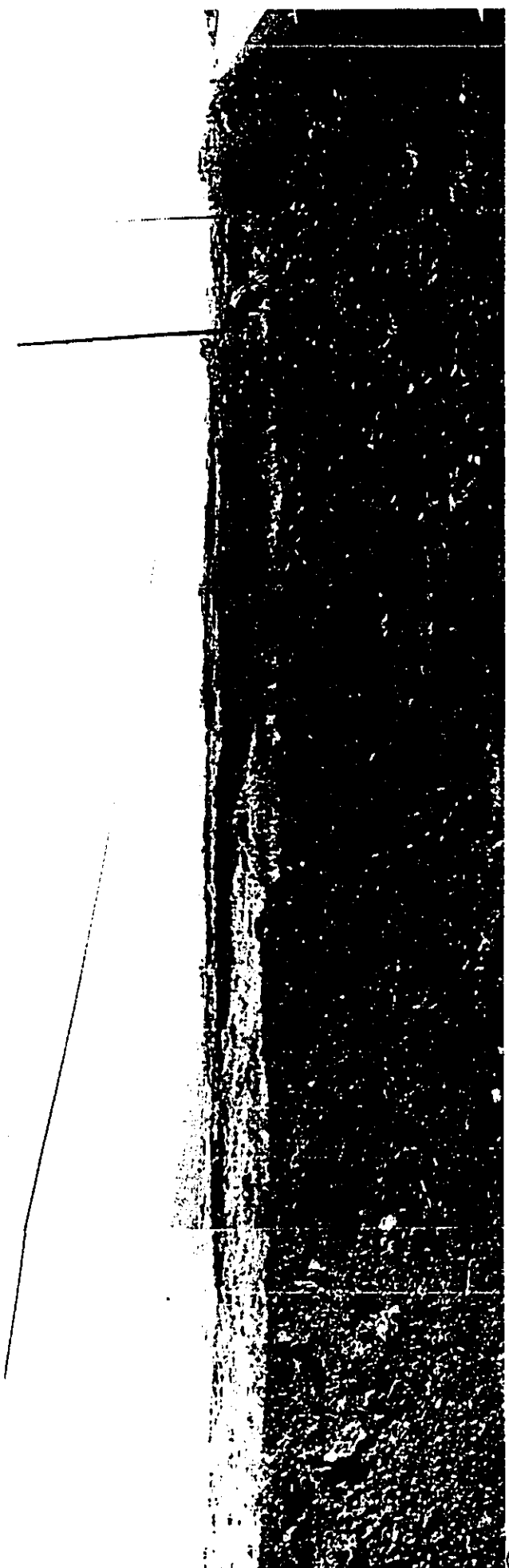
The site features and attributes of the property area would be changed from the present open space appearance by the development of the proposed commercial/light industrial subdivision. The commercial/light industrial subdivision would be visible from Queen Kaahumanu Highway, as would the 0.3 million gallon reservoir tank to be constructed at about the 325-foot elevation. The tank size would be approximately 17 feet high and 61 feet in diameter. Similarly, it is likely that the development would be visible from Mamalahoa Highway above



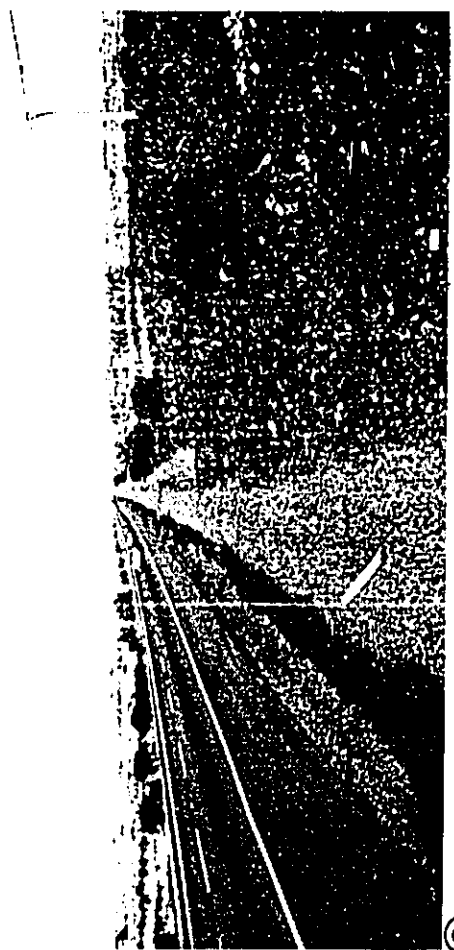
the project area.

#### **4.1.4.3 Proposed Mitigation Measures**

Other industrial sites along Queen Kaahumanu Highway have utilized buffer plantings and/or berms for visual enhancement with success. Similarly, to reduce visual intrusion along Queen Kaahumanu Highway, a 50-foot wide landscape buffer would be planted along the mauka boundary of the highway right-of-way. Given the relatively slight slope of the project site, this landscape buffer is expected to screen the project from travellers along the highway. It is expected that future building structures within the development would be designed to blend in with the surroundings as much as possible. The tank will be appropriately sited, graded and landscaped to minimize visual intrusion. Although significant adverse impacts are not expected, some may view the light industrial facilities as an intrusion on the aesthetic character of the area.



① VIEW SOUTH ALONG QUEEN KAAHUMANU HIGHWAY



② QUEEN KAAHUMANU HWY/ VIEW NORTH

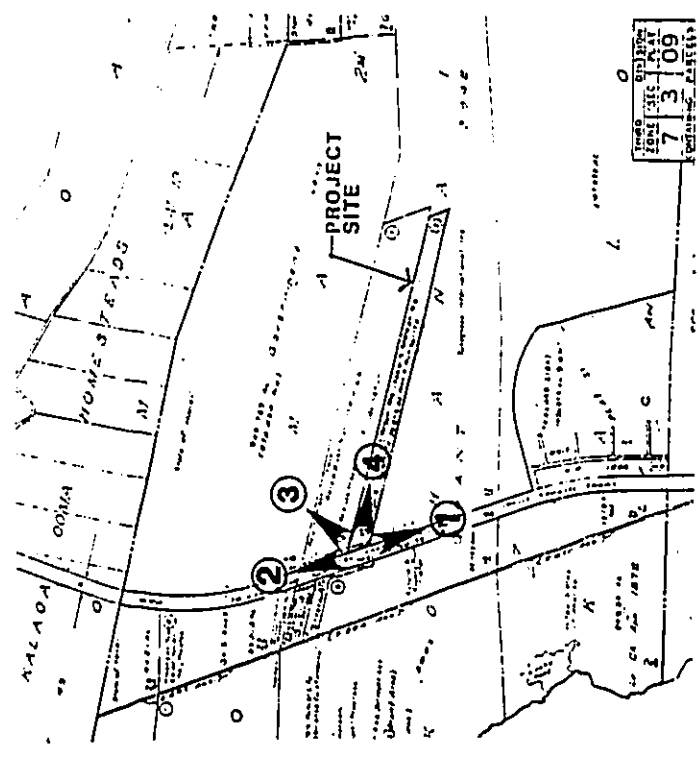
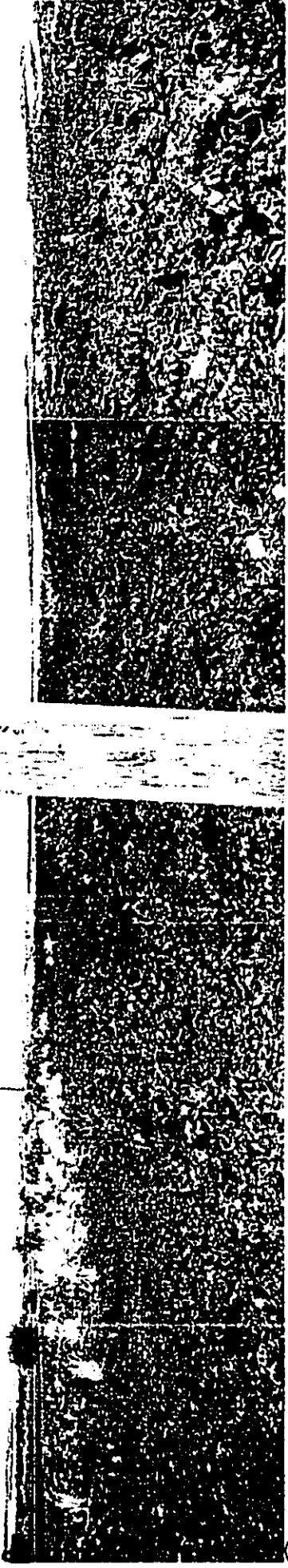
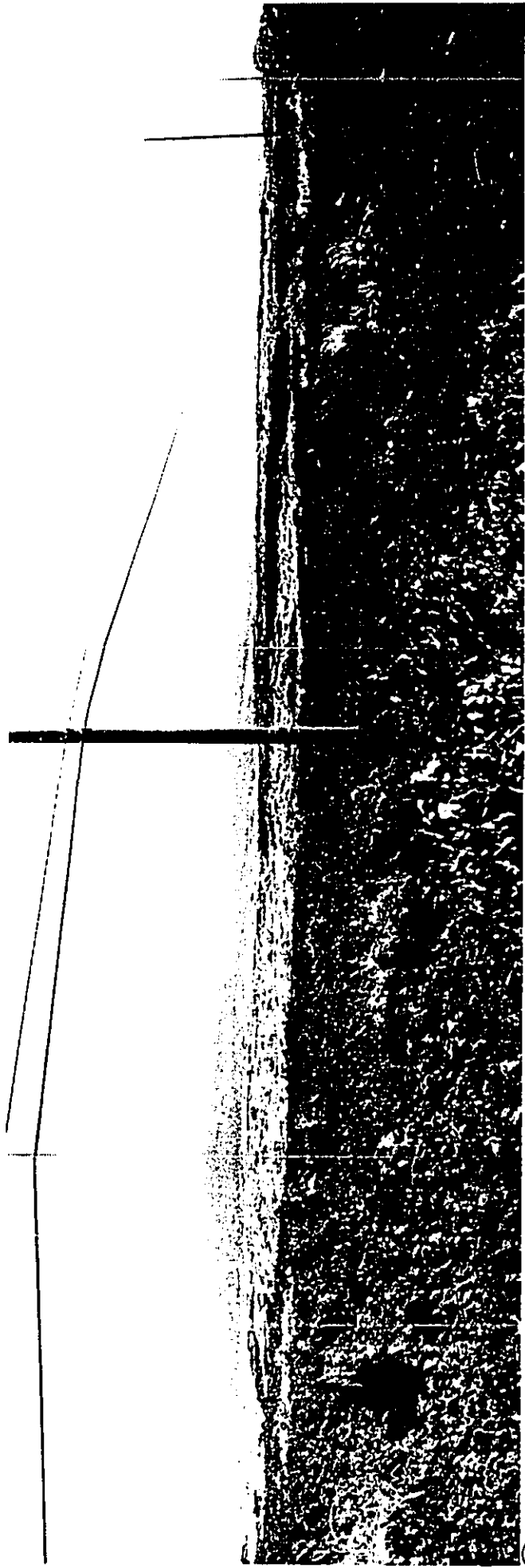


FIGURE 9  
SITE PHOTO & LOCATION MAP  
KOHANAUKI MAUKA





③ VIEW NORTH & MAUKA



④ VIEW MAUKA

FIGURE 10  
SITE PHOTO  
KOHANAIKI MAUKA

## 4.2 NATURAL ENVIRONMENT

### 4.2.1 Terrestrial Flora

#### 4.2.1.1 Existing Conditions

Information in this section has been augmented by flora studies in the vicinity of the subject property. Given the lack of rainfall and limited soil on the site, the environment is not conducive to vegetation. Few trees are found on the site. Any flora occurring on the proposed project site is likely to be similar to that of nearby and adjoining properties having the same climate, elevation and soil types. These areas are primarily characterized by a few stands of fountain grass (Pennisetum setaceum) and kiawe (Prosopis pallida) scrub. Other common grasses which could be encountered on the site are pili grass (Heteropogon contortus) and Natal Red-top (Rhynchelytrum repens). 'Ilina (Sida fallax) and 'uhaloa (Waltheria indica var. americana) are the most commonly observed shrubs. Other frequently found plant species in the area include the sword fern (Nephrolepis multiflora) which exists in the cracks of the lava where some soils have accumulated. Because botanical studies of neighboring properties have demonstrated the lack of habitat for threatened or endangered plants, it appears likely none would be found within the proposed commercial/light industrial subdivision property boundaries (Char, 1986). The plant species likely to exist within the proposed development are found in similar environmental habitats throughout the islands.

#### 4.2.1.2 Probable Impacts

None of the above listed plants are included in the U.S Department of the Interior Fish and Wildlife Services's proposed endangered and threatened species plant list. The plants mentioned are either abundant or locally common in the area, and removal of them would not constitute significant impact to the plant colonies. Development of the proposed project would result in the loss of some of the already limited vegetation on the site. Since the vegetation within the project site is likely to be typical of that found throughout most of the islands in similar environmental conditions (elevation, soil conditions, climate and topography) to other studied sites (Char, 1986), no significant adverse impacts to botanical resources is expected.

#### 4.2.1.3 Proposed Mitigation Measures

Landscaping along the highway and around future structures would act as replacement vegetative habitat for that which would be lost. Additionally, the limited quantity of existing vegetation, scope (installation of infrastructure), and size (70 acres) of the project reduce the likelihood of significant adverse botanical impact to the project site. As such, the proposed project is not expected to significantly affect the flora of the area and specific mitigation measures to minimize adverse impacts are not warranted. The installation of landscaping would increase and enhance vegetation on the site.

#### 4.2.2 Terrestrial and Sub-Terrestrial Fauna

##### 4.2.2.1 Existing Conditions

No faunal study was conducted on the proposed project site, however, fauna on the subject property is likely to include species common to Hawaii comprised primarily of exotic (introduced) birds (Helber, Hastert & Kimura; O'oma II Final EIS and Kohanaiki Resort Community Final EIS; 1986). Generally, the most abundant of these are noted to be the Japanese White-eye (Zosterops japonicus), Spotted Dove (Streptolia chinensis), Zebra Dove (Geopelia striata), Common Myna (Acridotheres tristis), Nutmeg Mannikin (Lonchura punctulata) and House Finch (Carpodacus mexicanus). Other species, such as Black Francolin (Francolinus francolinus), grey Francolin (Francolinus pondicerianus) and Yellow-billed Cardinal (Paroria capitata) may also frequent the project site. The Short-eared Owl or Pueo (Asio flammeus sandwichensis) potentially could occur on the proposed project site.

Feral mammals that could frequent the project site include goats (Capra hircus), Small Indian Mongoose (Herpestes auropunctatus), rats, mice and cats. Feral mammal surveys conducted for the nearby Kohanaiki Resort Community indicated that individuals of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) have not been observed frequenting that site or in the area of the subject property. Other studies have confirmed this finding (ibid).

Underground lava tubes that may exist on the proposed project site could contain troglobites,

or cave dwelling insects, such as the wolf spider (Lycosa Howarthi), blind cricket (Cacnemobius varius), the linyphiid spider (Erigone stygius), and earwig (Anisolabis howarthi). These insects typically occur in extensive systems of pahoehoe lava in spaces which range from 10 millimeters to cave size (20 or 30 centimeters). It is unlikely that the cave-adapted cixiid planthopper (Homoptera fulgoroidea) would be found, as it feeds solely on tree roots which penetrate to the lava tubes (Howarth, 1990). As previously discussed, there are relatively few trees on the site.

No wetlands or anchialine ponds occur on the project site. Since wetland and pond habitats generally support known endangered or threatened terrestrial species, none of those species are likely to inhabit or frequent the project site.

#### **4.2.2.2 Probable Impacts**

Development of the proposed project will result in the loss of some existing wildlife habitat. However, the proposed project would also create new habitat within the landscaping planned for the shoulder of the highway. Further, should the proposed golf course on the south side of the proposed project site be developed, additional wildlife habitat would also be created, although the new habitat would be altered from existing conditions.

Should grading or grubbing activities alter the interior of the lava tubes, some troglobites and their habitat could be destroyed. Since the entrance to these lava tubes are not evident on the project site, it is impossible to survey the tubes to determine what species, if any would be impacted, without disrupting the existing lava tube habitat.

#### **4.2.2.3 Proposed Mitigation Measures**

Studies of other sites with similar habitat have not reported the presence of threatened or endangered species. Habitats necessary for these species, such as wetlands or anchialine ponds do not occur on the project site. Therefore, it is expected that the overall project will result in negligible impacts, if any, on the wildlife of the area. No mitigation measures are recommended.

It is known that troglobite species can colonize lava tubes that are as little as six years old (Howarth, 1987). Since the habitat for these epigeal species is abundant throughout the island of Hawaii, and no major caves or lava tubes are known to occur on the project site, no significant adverse impacts on the variety or habitat of troglobites are anticipated. Therefore, no mitigation measures are proposed.

#### **4.2.3 Historical and Archaeological Resources**

##### **4.2.3.1 Existing Conditions**

To determine the archaeological and historical resources of the proposed project site, an archaeological surface reconnaissance survey of the property has been performed and is included as Appendix C. During the on-foot sweep examination of the project site, no surface archaeological features were observed. Seven caves were examined and found to be devoid of cultural materials. Although the project site appears to be without cultural features, subsurface lava tubes whose entrances are located outside the property boundaries are present. It is likely that heavy grading equipment will break through the thin lava crust, thereby exposing the tubes. It has been recommended (Appendix C), that an archaeological monitoring team be on call during ground preparation to investigate any subsurface features that may be found. This recommendation will be followed by the project developers.

##### **4.2.3.2 Probable Impacts**

Based on the findings of the archaeological surface reconnaissance survey conducted for the proposed project (Appendix C), there are no cultural features on the site. The proposed project would not impact archaeological and cultural resources of the project area.

##### **4.2.3.3 Proposed Mitigation Measures**

During grading operations, an archaeological monitoring team will be on call to investigate any subsurface features that may be found. Construction activities would be curtailed should significant cultural features be found.

#### **4.2.4 Noise Quality**

##### **4.2.4.1 Existing Conditions**

The existing aural quality of the subject property site is dominated by motor vehicle traffic movement along Queen Kaahumanu Highway and, to a limited degree, by natural factors including wind moving through vegetation. Based on noise level measurements taken at other similar Hawaii and Oahu locations, it is presumed that existing noise levels are in the 30 to 50 dBa range, depending on the time of day and levels of traffic along Queen Kaahumanu Highway.

##### **4.2.4.2 Probable Impacts**

Potential impacts on the aural quality of the site and area are primarily limited to those that might be generated by an increased volume of traffic in the immediate vicinity of the property and, in the short-term, construction activity noise. Increased human noise generation that might be caused by light industrial equipment and operators is also expected to occur in the immediate vicinity of the development.

Traffic generated noise levels both on- and off-site, are expected to be in the range of 40 to 50 Leq (energy equivalent sound level for a given time period) (dB) at 50 feet. That is, traffic generated sound levels are expected to be typical of a business/residential/resort condition. The planned industrial facilities are sufficiently geographically removed from existing and/or planned human habitation locations such that localized light industrial noises are not expected to adversely affect residential communities.

##### **4.2.4.3 Proposed Mitigation Measures**

The lack of expected significant adverse impacts (noise) to the aural quality of the property site and area indicate that mitigation measures, other than limiting construction work to daylight hours, are not warranted.



## **4.2.5 Climate, Meteorology and Air Quality**

### **4.2.5.1 Existing Conditions**

The Kohanaiki lands lie within an arid area between Honokohau and Anaehoomalu called Kekaha, meaning dry, sunbaked land. Rainfall at the coast averages only seven to eight inches per year. There is very little rainfall below the 1,000-foot elevation and only 25 to 30 inches annually at the 2,000-foot elevation. All of the proposed project would be located below the 1,000-foot elevation contour.

Mean annual temperature in the Kohanaiki area is about 75 degrees F. with relatively small daily and seasonal variations. Daytime temperatures above 88 degrees F. or nighttime temperatures below 63 degrees F. are rare.

Because of the preponderant Northeast tradewinds, air quality in Hawaii is generally good, with a few localized climatic features affecting air quality in small areas. There are no State or County air quality monitoring stations in the vicinity of the project site; the nearest station is in Hilo. However, given the present relative lack of urbanization in the project area; the relatively low level of vehicular traffic on Queen Kaahumanu Highway; and the lack of stationary air pollutant sources in the vicinity of the project site, it is presumed that the air quality of the area is good. It would be safe to assume that all six air pollutant categories (carbon monoxide, sulphur dioxide, nitrogen dioxide, particulate matter, lead, and ozone) are well within federal and State standards.

### **4.2.5.2 Probable Impacts**

Development of the proposed project is not expected to have any impact on the climate or meteorology of the project area or region. Structures would not be tall enough to significantly affect existing wind patterns; and any new landscaping that might be planted around future facilities is not expected to be great enough to significantly affect temperature or rainfall patterns.

The proposed commercial/light industrial subdivision would be classified as an "indirect

source" of air pollution as defined in the Federal Clean Air Act of 1977 because its primary association with air pollution due to its inherent generation of mobile source, i.e., motor vehicle activity. The proposed action would also have off-site air quality effects due to increased demand for electrical energy, which must be met through fuel combustion; and there would be short-term impacts during construction due to vehicular movement, clearing and grading and general dust-generating construction activities. Light industrial uses that might generate point source air pollutant emissions are not expected to be located in the proposed project. The principal sources of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along Queen Kaahumanu Highway fronting the property site. Because of the present moderate level of existing traffic volumes, the additional construction vehicle traffic should not cause State or federal air quality standards to be violated.

#### **4.2.5.3 Proposed Mitigation Measures**

Due to the lack of expected significant impacts to the climate or meteorology of the property site or area, mitigation measures to minimize potential adverse impacts are not warranted.

Similarly, long-term air quality impacts resulting from traffic in and out of the project site are not expected to be sufficiently great to cause State or federal air quality standards to be violated, and no mitigation measures are recommended.

Short-term air quality construction impacts would be minimized by dust control measures (frequent watering) that would be employed during the construction period. It is expected that at completion of construction, including any landscaping, existing fugitive dust emissions in the project area would decrease.

All light industrial activities within the project site would be required to comply with all federal, State and County environmental protection rules and regulations. As such, adverse air quality impacts are not expected to result from any of the industrial activities that would be located within the development. It is expected that standard construction and operation

permitting procedures would ensure that appropriate environmental protection equipment and methods are designed and constructed into any light industrial facilities that would be located within the development.

C H A P T E R 5

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SOCIOECONOMIC FACTORS

## CHAPTER 5 - SOCIOECONOMIC FACTORS

### 5.0 SOCIAL AND ECONOMIC CONDITIONS

In general, socioeconomic conditions are analyzed in terms of five factors: (1) population, (2) employment and economic conditions, (3) historic and geographic elements, (4) housing, and (5) community lifestyles. In terms of the proposed project, potential impacts are addressed herein for employment, economic base and market, and housing.

While general social and economic characteristics of the Kohanaiki area are provided in the Kohanaiki Resort Community Final Environmental Impact Statement (Helber, Hastert, Van Horn & Kimura, 1986a) and 'O'oma II Final Environmental Impact Statement (Helber, Hastert, Van Horn & Kimura, 1986b), conditions likely to relate specifically to the proposed Kohanaiki Mauka commercial/light industrial subdivision are further discussed in this chapter. An updated market study was prepared by the Hallstrom Appraisal Group, Inc. in January of 1991 (Appendix A). Current and projected economic and population information was analyzed and commercial/industrial demand was reviewed.

The potential socio-economic impacts and mitigation measures designed to minimize potential adverse impacts of the proposed project are described in the sections below.

#### 5.0.1 Population

According to the State Department of Business and Economic Development, West Hawaii has been one of the fastest growing areas in the Hawaii (DBED 1989). On a percentile basis, the North Kona District has been the fastest growing in the State over the past 15 years (Appendix A).

The Kohanaiki Mauka project site is located in U.S. Census Tract 215, which includes the North Kona District of the Island of Hawaii. This census tract had an estimated resident population of 20,500 in 1987 (Hawaii, DBED, 1988), an increase of approximately 49 percent over the 1980 population. At present there are an estimated 33,400 full-time residents in

North Kona and 9,000 in South Kohala. This represents a population increase of 142.94 percent since 1980. By 2010, it is estimated nearly 60,000 new residents will live in the North Kona and South Kohala area.

### **5.0.2 Employment and Economic Condition**

Currently, the major economic activities in West Hawaii are the visitor industry, construction, diversified agriculture and ranching, and high technology operations in ocean science and astronomy. In terms of importance, the visitor industry is the leading economic stimulus for the region and the main business activity in North Kona.

#### **EMPLOYMENT**

According to the updated market study, there is general agreement that up to 45,000 new jobs will be created in Hawaii County within the next 20 years. At least half of the jobs are tourism related and half are estimated as occurring in general support businesses. According to the 1988 "Tourism Impact Management System" (TIMS) survey by the DBED (1989), 40 percent of Kona employed workers considered themselves "in the visitor industry" and 35 percent in Kohala also placed themselves in that category. This compares to an island wide figure of just 25 percent. These employment figures demonstrate the influence of the visitor industry on the West Hawaii economy.

Employment in the State of Hawaii is at the lowest level in the nation. General unemployment on the island of Hawaii in March 1989 was 6.0 percent compared to 4.9 percent in February 1989 (Hawaii State Department of Labor and Industrial Relations [DLIR], 1989). DLIR figures for August of 1989 showed a further unemployment rate reduction to 2.9 percent. Because DLIR estimates for sub-county areas are based on 1980 census shares, it is likely that these figures under-estimate numbers for high growth areas such as West Hawaii. Table 5-1 indicates that of the sub-county areas, North Kona experiences the lowest unemployment rate.

**TABLE 5-1**  
**HAWAII COUNTY WORKFORCE AND UNEMPLOYMENT ESTIMATES\***  
 (Selected areas)

<b>Area</b>	<b>1988 ANNUAL AVERAGE</b>		<b>AUGUST 1989</b>	
	<b>Civilian Labor Force</b>	<b>Unemp. Rate %</b>	<b>Civilian Labor Force</b>	<b>Unemp. Rate %</b>
North Kona	9,776	3.7	10,645	2.1
South Kona	3,778	4.0	4,108	2.4
North Kohala	1,795	4.4	1,929	3.9
South Kohala	2,819	4.4	3,060	2.6
West Hawaii	18,168	4.3	19,742	2.4
Hawaii County	54,676	5.0	59,206	2.9

\* Source: Department of Labor and Industrial Relations

***ECONOMIC CONDITION***

There are seven major industrial developments in West Hawaii. The Kona Industrial Subdivision; the Kaloko Light Industrial Subdivision; Kali Hana II; Honokohau Small Boat Harbor; Queen Liliuokalani Trust Industrial Subdivision, Phase II; the Isemoto Industrial Subdivision; and Hawaiian Ocean Science and Technology (HOST) Park. There are 20 vacant lots throughout the Keahole to Kailua corridor available for development at present.

**5.0.3 Geographic and Historic Elements**

Historically, West Hawaii was composed of small fishing villages. Kailua, renamed Kailua-Kona, was named capital of Kamehameha the Great's kingdom in 1812. When missionaries arrived in 1820, cattle and horses, oranges, grapes, and other crops were established. Since then, agriculture, specifically diversified agriculture, has historically provided the economic base for the region. However, the importance of diversified agriculture is rapidly being surpassed by the growth of the visitor industry and associated service related jobs and businesses. During the last decade in particular, there has been an accelerated transition in the socio-economic character of the region from an agrarian lifestyle to a resort and residential-oriented community. Development has evolved to meet the urban and

employment requirements resulting from increased tourism growth and the broad spectrum of services needed to support them.

Geographically, the area is characterized by extensive lava flows with little vegetation. Combined with a sunny, dry climate, this has resulted in the establishment of several large destination resorts along the coast, totaling over 4,762 acres. Of existing land uses in West Hawaii, resort oriented development is foremost (Appendix A).

#### **5.0.4 Housing**

Housing in West Hawaii, particularly in North Kona and South Kohala is considered to be in short supply, as evidenced by high rental and sales costs, along with a high vacancy rate. The Keahole to Kailua Plan, recently adopted by County Council, calls for several, large urban expansion areas and the establishment of three village center sites. The State Housing Finance and Development Corporation (HFDC) has received State Land Use Commission approval for the development of approximately 4,100 residential housing units, 60% of which is designated as affordable housing. Other residential development is planned (Queen Liliuokalani Trust, Waikoloa, Puako, and Kau) but do not have all appropriate entitlements to proceed at present. According to the market study prepared for this EIS, there is an existing demand for up to 3,000 homes which will increase by 22,000 housing units in the next 20 years.

The proposed project site is situated in an area designated for urban expansion, however, residential use was eliminated because the long narrow configuration of the site is not suitable for master planned residential development.

Additional information has been provided in Section 5.0.2 regarding the employment opportunities estimated to be generated by the project. It is estimated that employment opportunities could range from a high of 1,150 to a low of 704 over a period of six years, somewhat over 100 employment opportunities per year. The 1,150 figure, which was derived from the market study, assumed a "quasi-industrial" project similar in tenant mix to Kaloko



Industrial Park. In actuality, it is likely the lower figure is more realistic because the project location would primarily attract industrial tenants. Further, it is expected a substantial number of the employment opportunities will be taken by employees of existing businesses that relocate to the site.

Since the Kohanaiki Mauka project represents less than 3.7 percent of the 1,900 proposed industrial acres listed in the 1988 West Hawaii Regional Plan, it is anticipated the proposed development will generate a less proportional impact on direct job creation, and therefore, on housing demand. In terms of mitigation, the County of Hawaii has recently proposed an Unified Impact Fee policy directed toward developments having infrastructure expansion demands. Projects would be assessed a fee proportional to impact on County infrastructure. To date, no housing requirements have been exacted by the State or Hawaii County for commercial or industrial project in West Hawaii. A unified impact fee, or similar legislation, would be a fair and equitable methodology to address any impact the Kohanaiki Mauka project may have on regional infrastructure systems and demand for housing.

#### **5.0.5 Community Lifestyle**

While South Kohala, historically, was a close-knit community after the establishment of the Parker Ranch in the 1800s. Ranch managers, much like plantation managers, operated in a paternalistic fashion and controlled many aspects of employees' lives, such as providing housing and health care. In contrast, the Kona coast has been occupied by highly independent and individualistic people.

During the past few decades, there has been a shift from the former agriculturally based economy to a service based economy. That change, along with substantial immigration and demographic transition, has changed the community's social characteristics. South Kohala is now more socially diverse and independent, and Kona residents are more likely to belong to a common social or economic institution. In spite of these changes, Kona residents continue to be regarded as different in lifestyle and values from the East Hawaii area, which is more affected by the plantation era's communal values. For example, a 1988 DBED survey asked

residents in various areas of Hawaii County why they chose to live in their part of the island. Kona residents were more likely to respond by citing physical characteristics such as location and less likely to refer to family or other long term connections.

### 5.1 MARKET CONDITIONS

The Economic Market Sector (EMS) occupied by West Hawaii has become a major focus for resort development in Hawaii. From 50 to 60 percent of all resort (hotel and condominium) units built in the State over the next twenty years are estimated to occur within the existing and proposed coastal resort communities along the Kohala/Kona shoreline. The major impact from this trend has been an increase in demand for real estate by both developers and by residents and businesses who serve resort employee and support needs. In particular, 60 acres of vacant industrial sites have been absorbed over the last five years, along with occupation of over 700,000 square feet of finished space.

In terms of the proposed project uses, several factors influence market demand levels: the rapidly expanding economy in the region, fueled by tourism and residential development; the offering of competitive fee simple sites after a historic under-supply; and government commitment to support urban development in West Hawaii.

As the economy of West Hawaii becomes more complex, and the development at coastal resorts occurs, additional product and service needs are produced. According to the market study done for this EIS, the industrial lands in this region are being quickly absorbed upon offering. While there are vacant sites and sites under construction, it is expected that near future demand will absorb these sites and a shortage will occur in the industrial sector, unless new lands are developed. It is estimated over 282 acres of finished industrial sites and nearly 3,100,000 square feet of gross floor space will be needed by 2010. In particular, there appears to be a potential shortage of supply over the mid-term (two to four years) during which the Kohanaiki Mauka project is proposed for development. In addition, there appears to be a demand for approximately 1,555,000 square feet of retail and service/commercial development by 2010. (See Appendix A for details.)

## **5.2 PROBABLE SOCIAL AND ECONOMIC IMPACTS**

In general, the social impacts associated with the overall development of the Kohanaiki Mauka commercial/light industrial subdivision area are expected to be positive. The proposed project site would allow existing and/or new businesses serving the West Hawaii area an opportunity to relocate/locate to an area specifically designed to accommodate commercial/light industrial subdivisions; the site is close to existing and planned residential areas, thereby affording workers reasonable travel times to and from work; and the site is conveniently located to serve existing, under construction and planned resort/residential projects in North Kona and South Kohala, as well as existing resort and residential developments in West Hawaii.

### **5.2.1 Population**

Population in West Hawaii is calculated to continue to grow. While various forecasts have been made by the Office of State Planning (OSP) and the County Planning Department, an increase in total population of between 78,000 people and 99,000 people by 2005 has been estimated. The market study prepared for this EIS estimates a resident population increase of nearly 60,000 by the year 2010, or a population of 102,900 residents. This increasing population base is primarily attributed to the development of coastal corridor resort projects.

The proposed project, Kohanaiki Mauka, is not considered to significantly impact future population growth, as there is no residential component of the project, and businesses locating on the site would be meeting light industrial or commercial needs of West Hawaii residents.

### **5.2.2 Employment and Economic Condition**

Throughout this document, impacts are defined as the difference between two possible forecasts: future conditions which occur without the project and future conditions occurring with the project. In this instance, resort development is anticipated to occur whether or not the project is developed. Impacts due to increases in the visitor industry will greatly impact employment and economic foundations of West Hawaii. For example, continuing West Hawaii resort development would suggest an even greater concentration of workers in the

visitor industry than the previous TIMS survey indicates (ibid). In 1988, four out of five potential workers aged 15 or above held a job or was actively seeking one; and West Hawaii workers (particularly North Kona) are more likely than those in East Hawaii to work more than 48 hours a week and to work standard evening and/or weekend hours, i.e., hours considered typical of service sector industries (DBED 1989). Increased employment, then, appears strongly linked to resort and tourism development.

According to the Market study done for this EIS:

" ... upwards of 20,000 to 25,000 total resort units in the Kailua-Kona to Kawaihae corridor will have received approvals by 1990, or about two-thirds the number of visitor units currently in Waikiki. If all proposed projects are approved, the total could surpass 30,000 units. This figure does not include the proposed Mahukona Resort (in North Kohala), or the proposed Hawaiian Riviera Resort (in Kau)."

Again, employment and economic base impacts appear to originate from the strong growth, both potential and projected, of resort development. To illustrate, four resorts have received major government approvals and are likely to begin development (Kohanaiki, Regent Kona Coast (Kukio Beach), Kaupulehu and South Kohala Resort). These projects alone would contain up to 3,850 hotel rooms, 3,450 condominium units, 1,000 residential lots, and create an additional 6,000 to 10,000 employment opportunities (see Appendix A). Conditional approval by the State Land Use Commission has now been given to the Hawaiian Riviera Resort.

If it is assumed that employment growth and increasing expansion of the visitor industry will occur, then commercial and light industrial development is needed to support the new population and service the increased resort operations. Inasmuch as the proposed project provides business location opportunities and employment opportunities which support visitor industry development, the employment characteristics of the proposed action are expected to be positive. The establishment and development of the Kohanaiki Mauka commercial/light industrial subdivision would provide some construction related jobs, and a few operational jobs.

### **EMPLOYMENT**

Indirectly the proposed project would provide long-term job opportunities associated with operation and maintenance of the businesses that would locate in the development. The proposed project would allow new jobs to be created in the vicinity of existing and planned residential areas, thereby lessening travel times to jobs. The indirect number of jobs created, and whether new or existing businesses would locate in the proposed project, are estimated at upwards of 1,150 employment opportunities (400 "commercial" and 750 "industrial"). These figures assume a "quasi-industrial" development similar to Kaloko Industrial Park, however, the location of the proposed project is likely to attract primarily industrial tenants.

Using Urban Land Institute calculations for industrial employment shown in the table below, and a market absorption rate of six years, it is likely the proposed project would generate about 704 employment opportunities. A substantial number of these jobs would be positions in existing businesses relocating to the project site. Appendix A provides the market study details.

**TABLE 5.2  
EMPLOYEES PER NET LEASABLE ACRE**

Light Industrial	17
Warehouse	4
Industrial Service	15
Office	31
Commercial Service	7

**TABLE 5.3  
KOHANA I KI MAUKA ABSORPTION SCHEDULE**

Date of Occupancy: 04/93

Estimated Dates	Completion: 10/92	1995	1997	TOTAL
Net leasable acres:	24 acres	20 acres	20 acres	64 acres
Number of Employees:	216-264	180-220	180-220	576-704

### *ECONOMIC CONDITIONS*

Over the next 10 years, there are 11 industrial projects proposed for West Hawaii. If all projects were approved and constructed, 30 years of industrial inventory, or sufficient amount to meet market demands for 2020 and beyond would be available. (See Appendix A).

However, it is unlikely that all will be readily approved and nearly 67 percent of the total acreage is associated with three larger mixed-use communities, which will require years of infrastructure and other on-site improvements before the industrial sites would be available. There appears, then, to be a near- to short-term shortage of fee simple industrial land before the proposed major developments come on line.

The current demand, along with existing and anticipated industrial inventory, provides significant market support for the Kohanaiki Mauka commercial/light industrial subdivision. Because the proposed development is intended to be offered within two years, the proposed project would meet the anticipated near-term shortfall of industrial property.

Further, development of the property would result in increased real property tax revenues, as well as increased general excise tax receipts. The assessed value of unimproved agricultural land to that of improved light industrial/commercial land (\$8.50 per \$1000 of unimproved land and \$8.50 per \$1,000 assessment for buildings in 1990) is twice that of unimproved land. While the amount of improvements by tenants cannot be accurately determined, a level of increase can be predicted.

Several commercial projects have been constructed or proposed in the Kona urban area. These include: Lanihau Center; Waterfront Row; commercial development within the Kona Industrial Park; Coconut Grove Marketplace; and various commercial/retail offerings in the Kona Industrial Subdivision and Kaloko Industrial Park.

If all of these projects were approved and constructed in a timely manner, they would represent in excess of 30 years of inventory. However, more than 60% of the proposed

inventory would be dependant on the integration of large-scale and private development efforts. According to the Market Study (Appendix A), unless the remaining vacant commercial sites in Kailua are developed before the major master planned communities are developed, no shortfall of commercial inventory supply is forecast.

Due to the level of potentially competitive supply, the Kohanaiki Mauka commercial/light industrial subdivision could not anticipate being the focus of a general retail or service/commercial development in the next ten years. There is retail potential in the proposed development as a fast food, convenience, and gas station center along the highway. Use of a portion of the site for development of a thematic/resort commercial center, however, appears warranted over the long-term. Please refer to Appendix A for details.

Both employment and economic impacts directly and indirectly resulting from development of the proposed project are expected to be positive in the short- and long-term. Development of the property will provide short-term construction employment, primarily for presently on-island workers and long-term employment during the operational phases of the businesses located in the development. Similarly, development of the property will increase both State and County tax revenues and require minimal public expenditures for public services. It is noted that the proposed project owners would be responsible for providing appropriate infrastructural components to serve the property.

Due to the expected positive social and economic benefits resulting from development of the proposed project, and the lack of expected adverse impacts to the social and economic characteristics of the region, County or State mitigation measures to minimize potential adverse employment impacts are not warranted.

### **5.2.3 Housing**

Although the proposed project would indirectly support the creation of new jobs as well as the potential relocation of businesses having existing employees, no determination of potential new housing units required by employees has been made, since specific new

business/employee distribution is not known. The development of 70 acres (25 parcels), however, is proposed in response to population growth which is projected, even without the project. Due to the pent-up demand for industrial parcels, it is expected that most commercial and industrial tenants would be existing Hawaii businesses.

Using the employment opportunity figures described previously (704 to 1,150) over six years, (or 117 to 191 employment opportunities per year), the potential housing impact which could be generated by the activities on the proposed project can be considered. Since a substantial number of jobs would be associated with relocation of existing businesses, and the proposed project represents less than 3.7 percent of the 1,900 proposed industrial acreage listed in the 1988 West Hawaii Regional Plan, the Kohanaiki Mauka project is anticipated to have a less proportional impact on housing. As stated earlier, growth projections for West Hawaii indicate that housing demand is primarily related to the population growth created by resort development. No significant housing impacts are anticipated.

#### **5.2.4 Community Lifestyle**

The proposed action and the establishment of a commercial/light industrial subdivision in and of itself is not expected to have significant effects on the social characteristics of the project area, however, the overall development of the various existing, under construction and planned resort/residential/ recreational projects in West Hawaii are expected to continue to have significant effects on the social characteristics of the area, as discussed in section 5.2.4. These effects have been described in detail in the several environmental impact statements and planning documents prepared for the various planned projects. The primary social characteristic of the proposed Kohanaiki Mauka commercial/light industrial subdivision would be to provide additional business location and employment opportunities for present and future businessmen and residents of the region. As such, the social characteristics of the proposed action are expected to be positive.

### **5.3 PROBABLE MARKET IMPACT**

As noted previously, the purpose of the proposed project is to provide a mixed use

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subdivision in the North Kona area for the immediate commercial and industrial activity needs of the property owners. The project would also provide alternative light industrial properties from which suppliers of products and services can serve existing, under construction and planned resort/residential projects in the North Kona and South Kohala Districts, as well as existing businesses and services in West Hawaii, such as Keahole Airport. Market studies conducted specifically for the proposed project (Appendix A), indicate that there is a present need for additional light industrial and commercial property in the North Kona area. The need for additional commercial and light industrial property is forecast to increase in the future as planned resort/residential projects are completed and become operational.

The market support for the proposed project is derived from several factors which contribute to the overall regional planning of West Hawaii. These include:

*Access:* Strong existing access to the region's major thoroughfare, Queen Kaahumanu Highway and frontage on proposed north/south connector roadways.

*Location:* Proximity to existing and proposed residential sites, as well as to users of industrial and retail products and services.

*Tenant Support:* Numerous public transportation and government sponsored economic investment projects are nearby and would provide additional clientele for tenant businesses.

*Design:* The commercial/light industrial design focuses on both market opportunities and community planning goals.

*Compatibility With Existing Public Plans:* The project is commensurate with public goals and objectives in the State of Hawaii West Hawaii Regional Plan and the County of Hawaii Keahole to Kailua Development Plan.

*Compatibility With Private Plans:* While smaller than most private planning efforts in the region, the project is supportive of planning efforts being undertaken or proposed by major landowners in the region and with the State Kealakehe project. No significant community or market opposition has been expressed.

C H A P T E R 6

INFRASTRUCTURE AND PUBLIC UTILITIES

## CHAPTER 6 - INFRASTRUCTURE AND PUBLIC UTILITIES

### 6.0 GROUND TRANSPORTATION FACILITIES

#### 6.1 Access

##### 6.1.1 Existing Conditions

Access to the proposed project would be provided by a fully channelized intersection, from a permitted entry off Queen Kaahumanu Highway within the highway right-of-way. At present, there are no public or private side or rear access points to the property, nor are any planned. Access to individual parcels within the project would be through an internal roadway system with the primary roadway designed to meet County commercial and industrial subdivision standards.

Current plans also provide a potential easement across the property, at approximately the 360 foot elevation, to accommodate a mid-level arterial roadway, as described by the County in the Keahole to Kailua Development Plan.

The Keahole to Kailua Development Plan also describes the Department of Transportation's long-range plans for Queen Kaahumanu Highway as including, an expansion of the highway to six lanes, grade separated interchanges at Keahole Airport and Kealakehe, and two lane frontage roads on both sides. It is assumed that future connection to the Highway may be via of the frontage roadway, which, according to initial discussions with the State Department of Transportation, would be accommodated within the existing 300 foot highway right-of-way.

##### 6.1.2 Probable Impacts

Based on a traffic study performed specifically for the proposed project (see Appendix D), it is expected that no significant traffic impact on Queen Kaahumanu Highway will occur as a result of the proposed project, including the scenario of a 1999 fully occupied project site. The results of the analysis indicate that the two lanes of Queen Kaahumanu highway will be operating at congested levels even without the proposed project.

Access to the proposed project site would be provided via a turnoff from Queen Kaahumanu Highway, within the highway right-of-way. The primary roadway within the development would have a 60-foot wide right-of-way in compliance with the County subdivision ordinance for commercial and industrial subdivisions. The roadway will be designed to be dedicated to the County and include two twelve-foot wide lanes of two inches thick asphalt concrete pavement over a four-inch thick aggregate base and six-inch thick sub-base. A paved swale section, 18 feet wide, will be provided on each side of the traffic lanes.

### **6.1.3 Proposed Mitigation Measures**

If development in the project area continues as forecast, i.e., other planned resort, residential, recreational facilities, the highway may need to be widened to four lanes. Based on the traffic analysis performed, it has been recommended that the proposed intersection of the project access road with Queen Kaahumanu Highway be fully channelized with left-turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway. Further, when future traffic volumes meet signal warrants, the intersection of the project access road and the highway should be signalized.

The project developers would coordinate development of the access and property with the County Department of Public Works and State Department of Transportation, Highways Division, to assure that traffic flow and safety on Queen Kaahumanu Highway is maintained.

## **6.2 WATER SUPPLY**

### **6.2.1 Existing Conditions**

The North Kona potable water system is supplied by five deep wells and one inclined shaft at Kahaluu and Holualoa, as well as from Waiaha Stream, with the majority of water provided by the Kahaluu wells. Additional wells are currently in the drilling and test stages at Kahaluu and Kalaoa. Present output capacity is 9 to 11 MGD. The project site currently has no potable water transmission system on site, as it is vacant and unused. Figure 11 details the area water supply system.

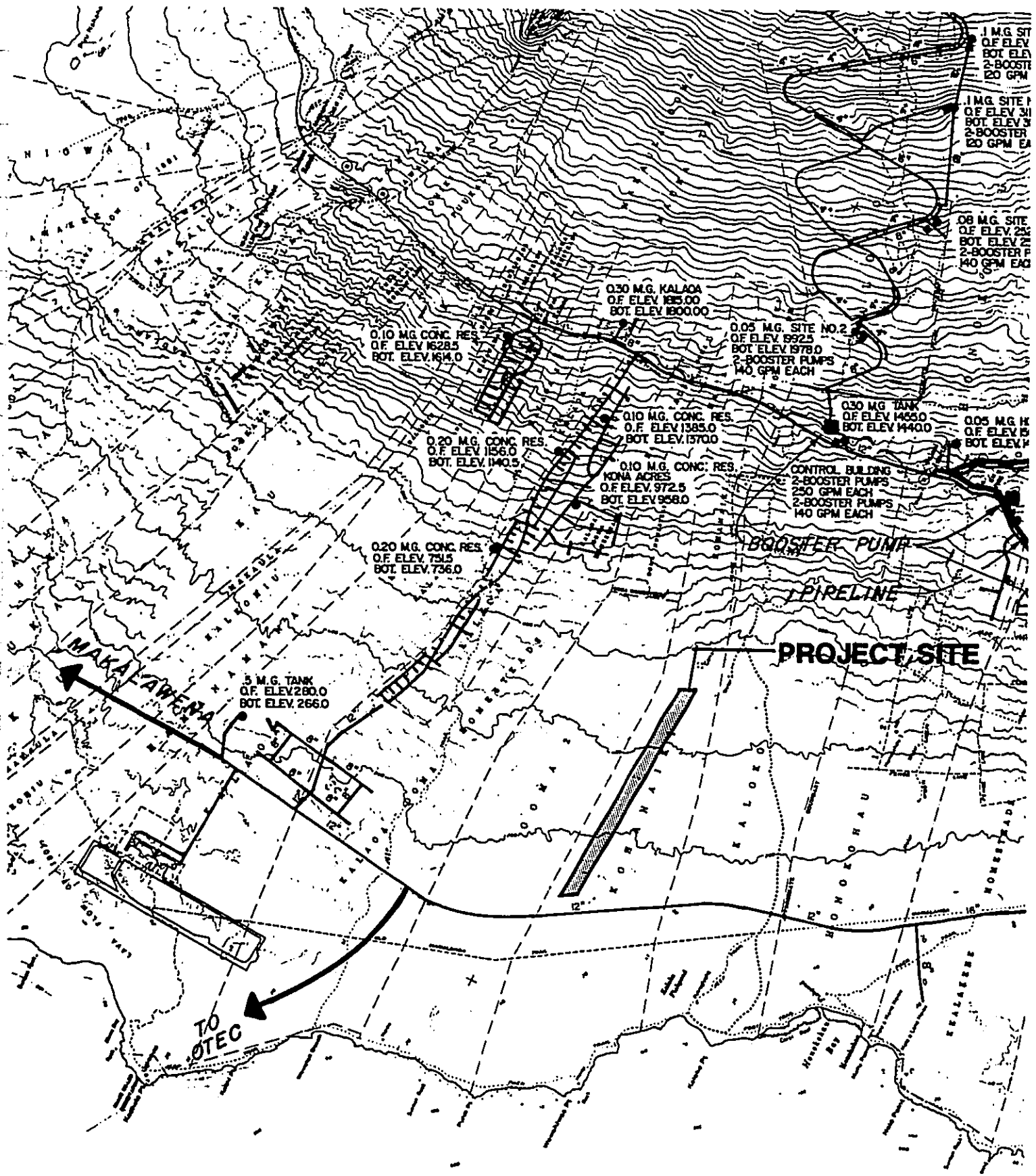
### **6.2.2 Probable Impacts**

Although the project site does not presently have potable water service, potable water is available to the site. Water would be provided from the County's 0.3 million gallon reservoir along Palani Road at an elevation of about 325 feet, and 12-inch ductile iron water lines located along Palani Road and within Queen Kaahumanu Highway right-of-way. This water main is part of the North Kona Water System which serves the area from Keahole Airport to Kealahou to the south. The system is supplied by four wells and a shaft located at Kahuluu, between Kailua and Keauhou Bay at the 600-foot level. Lateral lines would be run into the project site with stub-outs to individual parcels.

### **6.2.3 Proposed Mitigation Measures**

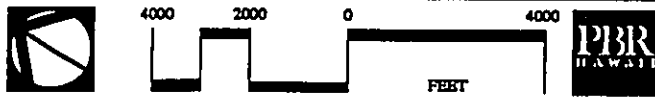
The County Department of Water Supply has committed 30 units or 18,000 gallons per day of potable water for the proposed commercial/light industrial subdivision. This commitment would be sufficient to meet the needs of the first phase of the proposed project. At build-out potable water needs are estimated by the County Department of Water Supply to total 166,000 gpd. The applicant is currently pursuing an agreement with the County for the joint development of a water source in the Hualalai area, mauka of the property, off Mamalahoa Highway. It is expected that the applicants' proportionate share from the wells estimated yield would more than meet the projects' projected demand for potable water.

The water system for the project would include a 0.3 million gallon concrete reservoir, with appropriate pumps and other appurtenances, would be located within the development at about the 325-foot elevation. A second 0.3 million gallon concrete reservoir would be located at an elevation of about 570 feet. These reservoirs would provide sufficient water quantity and pressure for fire protection purposes within the commercial/light industrial subdivision. Future phases of the proposed project would require the development of additional water sources. This development would be coordinated and planned with the Department of Water Supply at the time it is required. Detailed engineering studies that are in process will include the determination of the water line size required to serve the individual parcels within the development.



Source: Water Master Plan, Island of Hawaii  
 Department of Water Supply, Dec 1980

FIGURE 11  
 WATER SUPPLY SYSTEM  
 KOHANA'IKI MAUKA



The developers of the proposed project have received a commitment from the County Department of Water Supply for sufficient units of potable water to serve the initial project development phase. Future development phases would require the development of additional water sources. The applicant is currently pursuing an agreement with the County for the joint development of an additional water source needed to meet the projected project needs. The proposed project is not expected to significantly effect the potable water supplies of the area or region.

The timetable for a joint water source development agreement with the county will be contingent upon the timing for land use approvals. At this time the applicant, in consultation with the Department of Water Supply, has submitted a subdivision application (No. 91-136) to consolidate a quarter acre area with the Department's Keopu Tank site in order to serve as a future well development site. The applicant plans to enter into a formal agreement with the County for joint development of this well site, following SLUC approval of the Boundary Amendment Petition and prior to their rezoning application to the County.

### **6.3 WASTEWATER AND DISPOSAL**

#### **6.3.1 Existing Conditions**

At present, the proposed project site does not generate any wastewater and is not served with any collection, treatment or disposal system.

#### **6.3.2 Probable Impacts**

The proposed development is not expected to significantly effect planned wastewater collection, treatment or disposal systems. As noted previously, initially the development would be served by individual septic tanks and leach fields meeting the State and County regulations. Following completion of a joint County/State planned West Hawaii wastewater treatment and disposal plant, the proposed project would be connected to that system at the developer's expense.

The wastewater generated from activities on the proposed project at build-out is estimated to



range between 24,640 gpd to 40,250 gpd, based on 35 gallons per person per day (using an employee range of 704 to 1,150 – see Section 5.0.2).

### **6.3.3 Proposed Mitigation Measures**

Wastewater treatment and disposal for the proposed Kohanaiki commercial/light industrial subdivision would be handled initially by individual wastewater systems for each lot, consisting of a septic tank and leach fields meeting State and County rules and regulations, specifically Department of Health Administrative Rules, Chapter 11-62, "Wastewater Systems". Future treatment and disposal would be via a joint County/State planned treatment plant to be located in the Keauhou area south of Kailua-Kona. The timing and construction of the conversion to the new system is dependent on the availability of connectors to the area.

## **6.4 SOLID WASTE COLLECTION AND DISPOSAL**

### **6.4.1 Existing Conditions**

There are 28 solid waste transfer station chutes in 21 areas in the County. Refuse generated in the vicinity of the proposed project is transferred to the active landfill site at Kealakehe. The Kealakehe landfill is nearing capacity, however, the County has recently selected a new landfill site located about 15 miles north of the airport at Puuwaawaa. When this site is developed, the Kealakehe landfill would be closed and would function only as a solid waste transfer station. Solid wastes are not presently generated on the subject property because it is vacant and unused.

### **6.4.2 Probable Impacts**

The proposed project is not expected to significantly effect solid waste collection or disposal. As noted previously, solid wastes would be collected and disposed of by private contractors in approved County disposal sites. Using the same employee numbers as Section 6.4.1, the solid waste anticipated to be generated from the activities on the proposed project at build-out is estimated to range from 4,928 to 8,050 pounds per person per day.

### **6.4.3 Proposed Mitigation Measures**

Solid waste collection and disposal for the proposed development would be handled by private contractors. Wastes would be disposed of at approved County disposal sites in accordance with County rules and regulations.

## **6.5 HAZARDOUS WASTE GENERATION AND DISPOSAL**

### **6.5.1 Existing Conditions**

At present the proposed project site is vacant and generates no hazardous wastes. The entire project lies seaward and down gradient of the Underground Injection Control line of the State Department of Health. As noted in the hydrological report done for the EIS, existing residential cesspools and agricultural activities mauka of the parcel and Kaloko wells have not contributed to an increase of phosphorus or nitrogen in the brackish lens.

### **6.5.2 Probable Impacts**

The proposed reclassification of the site would allow establishment of light commercial and industrial development which could include installation and operation of underground tanks, as well as the possible use of hazardous substances and potential generation of hazardous wastes. Small businesses which could potentially lease space in the proposed project could generate hazardous wastes such as solvents, paints, thinners and oils.

### **6.5.3 Proposed Mitigation Measures**

The potential use of underground storage tanks and generation of hazardous waste is highly regulated through federal, State and County administration. All owners and operators of underground storage tanks containing petroleum products or hazardous substances are subject to federal control through Title 40 of the Code of Federal Regulations Part 280. The regulations include requirements for design, construction, installation, notification and operation guidelines. Instructions for release or leak detection, reporting, investigation and corrective action are also mandated under Part 280. Title 40 Part 260 to 270 governs the management and disposal of hazardous wastes, such as those mentioned above.

In addition to federal regulations, the State Department of Health, Solid and Hazardous Waste Branch requires a notification form be completed within 30 days of bringing underground storage tanks into use. Should underground storage tanks contain flammable and combustible liquids, the tanks are subject to regulation by the Hawaii Fire Department. Toxic wastes or fuels would be confined or removed from the site as required or approved by the State Department of Health.

Since the rules and regulations governing underground storage tanks and hazardous substance management are adequate for new development, other than strict compliance to federal, State and County regulations, no further mitigation measures are suggested.

## **6.6 ELECTRICAL POWER AND COMMUNICATIONS**

### **6.6.1 Existing Conditions**

Electric power on Hawaii is presently generated at a HELCO power generation plant. There are existing overhead electric and telephone transmission lines on the mauka side of Queen Kaahumanu Highway.

### **6.6.2 Probable Impacts**

Electrical power to the development facilities would be drawn from the existing HELCO overhead transmission lines located along the highway. Sufficient HELCO generating capacity exists to serve the planned facilities. In general, 8-10 watts per square foot is required for light industrial uses, and 12 watts per square foot is needed for commercial uses. Based on those guidelines, the total power requirements for the Kohanaiki Mauka industrial/commercial subdivision would be approximately 9,500 kilowatts. An electrical substation for conditioning the power to the site could be constructed either on- or off-site possibly in conjunction with other planned developments in the immediate area. Adverse impacts to the electrical system of the area are not expected to occur. Similarly, Hawaiian Telephone facilities are capable of serving the planned facilities and no adverse impacts to their system is expected. Both utilities will be involved in the planning of the proposed project.

### **6.6.3 Proposed Mitigation Measures**

Electrical power to the proposed development would be provided by the Hawaii Electric Light Company (HELCO) from their existing overhead transmission lines. It is likely that a small electrical substation would be required for the development. The substation could be located within the proposed commercial lot (Figure 6). Detailed engineering studies to be completed include analysis of the appropriate size and location of the substation. Establishment of the substation would be performed in coordination with HELCO and the developers of the adjacent properties. Electrical power to individual parcels within the project site would be provided via underground stub-outs to the parcels.

Communications (telephone service) to the subject property would be provided by Hawaiian Telephone Company via the existing pole line on the mauka side of Queen Kaahumanu Highway. The existing regional telephone system would not be significantly affected by future development of the proposed project.

## **6.7 POLICE AND FIRE PROTECTION SYSTEMS**

### **6.7.1 Existing Conditions**

Police and fire protection services afforded the Kohanaiki area are described in the Kohanaiki Resort Community Final Environmental Impact Statement (Helber, Hastert, Van Horn & Kimura, 1986a). The proposed project is not expected to affect these services. As noted above, fire protection water would be provided through the new reservoirs to be constructed for the proposed project. It is also possible that a private security contractor would be contracted to provide additional security within the development.

### **6.7.2 Probable Impacts**

Based on information contained in the Kohanaiki Resort Community Final Environmental Impact Statement and the nature of the proposed project, significant impacts to the level of police and fire protection services provided in the project area are not expected to result from the project.

### **6.7.3 Proposed Mitigation Measures**

Measures to minimize potential adverse impacts on police and fire protection are not warranted. As noted in Section 6.2, sufficient water supply and pressure would be provided within the development for fire protection purposes and a private security contractor may provide security for the park.

## **6.8 HEALTHCARE FACILITIES**

### **6.8.1 Existing Conditions**

Existing and planned health care facilities in the vicinity of and/or serving the Kohanaiki Mauka development area include the State Department of Health run Kona Hospital, located in Kealahou; the Lucy-Henriques Medical Center in Waima; the Kailua-Kona Fire Station; the Captain Cook Fire Station; and the newly constructed South Kohala Fire Station.

### **6.8.2 Probable Impacts**

The proposed development is not expected to significantly affect existing health care facilities. However, there could be a need for emergency services by workers within the development. The existing facilities presently have the capacity and capability to handle any emergency care requirements that might be needed by workers at the project site.

### **6.8.3 Proposed Mitigation Measures**

Development of the proposed commercial/light industrial subdivision is not expected to significantly add to the requirements for emergency or daily medical care facilities in the Kohanaiki or West Hawaii area. As such, no additional burden on public or privately provided medical care and services is expected to result from the proposed project.

## **6.9 SCHOOLS AND EDUCATION FACILITIES**

### **6.9.1 Existing Conditions**

### **6.9.2 Probable Impacts**

The public schools serving the subject property area would be unaffected by the establishment of the commercial/light industrial subdivision, as there is not residential component to the

proposed project.

### **6.9.3 Proposed Mitigation Measures**

Because the proposed action would not impact public schools, mitigation measures to minimize potential adverse impacts are not warranted.

## **6.10 RECREATIONAL FACILITIES**

### **6.10.1 Existing Conditions**

There are five public parks located in the area of the proposed project. These include: Old Kona Airport Park; Spencer Beach Park, Hapuna State Beach Park, Waikoloa Beach Resort at Anaehoomalu Bay and Wauloli Beach Park adjacent to the Natural Energy Laboratory. Acquisition of 615.9 ocean front acres is being completed by the U.S. National Park Service for development of the Kaloko-Honokohau National Historic Park.

Other existing and planned recreational resources serving the Kohanaiki area have been described in detail in the Kohanaiki Resort Community Final Environmental Impact Statement and other later studies (Helber, Hastert, Van Horn & Kimura, 1986a).

### **6.10.2 Probable Impacts**

Development of the proposed commercial/light industrial subdivision is not expected to effect the recreational resources of the area. While the project is located mauka of the proposed national park, the hydrology report done for the project indicates no impact to coastal waters from residential cesspools and agricultural activities, suggesting negligible adverse impacts to coastal waters would occur in association with the proposed project.

### **6.10.3 Proposed Mitigation Measures**

Since no significant adverse impacts to recreational facilities are anticipated, measures to minimize potential adverse impacts are not warranted.

# C H A P T E R 7

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

## **CHAPTER 7 – RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS AND POLICIES, AND CONTROLS FOR THE AFFECTED AREA**

### **7.0 INTRODUCTION**

The applicable governmental land use plans, policies and controls affecting the proposed project include Chapter 205 (HRS) Land Use Commission Rules (Title 15, subtitle 3, Chapter 15), the Hawaii State Plan, State Agriculture Functional Plan, State Conservation Lands Functional Plan, State Historic Preservation Functional Plan, the recently updated Hawaii County General Plan, Hawaii County Zoning and Hawaii Coastal Zone Management Program. Following granting of the requested State Land Use Boundary Amendment Petition and subsequent zoning requests to the County, the proposed project would be consistent with the above noted plans and land use controls. The proposed project's relationship to these plans, policies and controls is described in the sections that follow.

### **7.1 CHAPTER 205 (HRS) LAND USE COMMISSION RULES**

Approximately 42 acres of the proposed project property are situated within State Land Use Conservation District. The developers of the proposed project will be petitioning the State Land Use Commission (SLUC) for a District Boundary Amendment to reclassify the property to Urban to allow the proposed mixed use subdivision to proceed. As noted previously, a portion of the adjoining property has been reclassified from Conservation to Urban, and other Urban lands are found on the makai side of Queen Kaahumanu Highway (Kohanaiki Resort Community), as well as at the site of the Kaloko Industrial Subdivision.

The proposed district boundary amendments conform to the State of Hawaii Land Use Commission Rules (Hawaii Administrative Rules, Title 15, subtitle 3, Chapter 15). Decision making criteria for boundary amendments are summarized as follows:

- A. The proposed boundary must be reasonable.
  - Updated revisions to the Hawaii County General Plan redesignate the proposed project property from Extensive Agriculture and Conservation to



Urban Expansion.

- Lands adjacent to the proposed project site are designated Urban by the State Land Use Commission.
- The proposed project would be contiguous with existing Urban Lands and provides for a logical extension of the region's urbanized areas.
- The proposed project would provide an ideal site for commercial and light industrial activities that would service approved and planned resort, residential, recreational and commercial activities in the North Kona-South Kohala area.

B. The proposed boundary amendment must conform to the Commission's standards for determining Urban District Boundaries. The standards are addressed as follows:

**Standard:** (1) It (the urban district) shall include lands characterized by "city-like" concentrations of people, structures, streets, urban level of services and other related uses.

**Response:** The proposed project site area is presently in the process of being urbanized.

Development of the Kohanaiki Resort Community, on the makai side of Queen Kaahumanu Highway, directly across from the proposed project, as well as other approved projects in the area, will give the region the urbanized appearance referred to in the standard. Similarly, the presence of the Kaloko Industrial Park one mile south of the proposed project site, and the Keahole Airport and HOST Park just to the north, have already begun the urbanization of the region, of which the proposed project would be an integral and important part. The proposed project has been designed to service future approved and planned urbanized developments in the region.

**Standard:** (2) It (the urban district) shall take into consideration the following specific factors:

(2)(A) Proximity to centers of trading and employment except where the development would generate new centers of trading and employment.

Response: The proposed project will be located near existing and planned commercial, light industrial, recreational and residential centers that are or will be centers of trading and employment. Although the proposed project will be a center of trade and employment, it will not of itself be a major center relative to the existing and planned businesses that it will serve.

(2)(B) Substantiation of economic feasibility by the Petitioner.

Response: The market study (Appendix A) indicates a significant demand and market for the commercial/light industrial subdivision proposed. Development costs have been estimated to be comparable to other projects in similar locations, of similar scale and with similar markets to serve. These factors substantiate the economic feasibility of the proposed project.

(2)(C) Proximity to basic services such as sewers, water, sanitation, schools, parks and police and fire protection.

Response: The North Kona sewer system is planned to be extended to the proposed project site; water service is presently available and commitments from the County Department of Water Supply have been obtained; existing County police and fire protection services are adequate to handle the proposed project; the proposed project will not impact the schools or parks of the region.

(2)(D) Sufficient reserve areas for urban growth in appropriate locations based on a ten (10) year projection.

Response: The project site lands have been redesignated from Extensive Agriculture and Conservation to Urban Expansion under the revised Hawaii County General Plan. The proposed project site is also adjacent to lands presently designated Urban by the State Land Use Commission. Sufficient areas adjacent to and in the vicinity of the project site are available for future urban expansion if required.

Standard: (3) Lands included (within the urban district) shall be those with satisfactory topography and drainage and reasonably free from danger of floods, tsunami and unstable soil conditions and other adverse environmental effects.

Response: The topography of the site is ideal for urban development with slopes of about 10

percent. Existing drainage areas will remain in open space while drainage from the project site will be handled via leach fields and septic tanks designed in accordance with applicable State Department of Health and Land and Natural Resources and County Department of Public Works standards. The soils of the project site are generally stable and suitable for the type of development proposed. There is little danger of floods at the project site, and the site is outside the tsunami zone. Analyses indicate that the proposed project will not have any significant adverse environmental impacts.

**Standard: (4)** In determining urban growth for the next ten years, or in amending the boundary, land contiguous with existing urban areas shall be given more consideration than noncontiguous lands, and particularly when indicated for future urban use on the Hawaii County General Plan.

**Response:** The proposed project site is adjacent to lands that are designated Urban by the State Land Use Commission. Present revisions to the Hawaii County General Plan redesignate the land Urban Expansion.

**Standard: (5)** It (urban district) shall include lands in appropriate location for new urban concentrations and shall give consideration to areas of urban growth as shown on the state and county general plans.

**Response:** Lands adjacent to the project site are designated Urban as are lands on the makai side of Queen Kaahumanu Highway. A new resort community is planned for the urban lands makai of the highway and other urban uses are in the immediate vicinity of the project site. The Hawaii County General Plan is being revised to show the project lands as an urban expansion area.

**Standard: (6):** Not Applicable.

**Standard: (7)** It (urban district) shall not include lands, the urbanization of which will contribute toward scattered spot urban development, necessitating unreasonable investment in public infrastructure or support services.

**Response:** The proposed project site is contiguous with urban lands and in the immediate vicinity of lands planned for urban growth. Present and proposed infrastructure systems can presently service the project site or can be efficiently extended to serve the project site. Similarly, the project site will not require unreasonable investment in support services.

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**Standard: (8) Not Applicable.**

The Hawaii State Plan (Chapter 226, Hawaii Revised Statutes, as amended) establishes a set of goals, objectives and policies that are to serve as long-range guidelines for the growth and development of the state. The Plan is divided into three parts. Part I (Overall Theme, Goals, Objectives and Policies); Part II (Planning, Coordination and Implementation); and Part III (Priority Guidelines). Part II elements of the State Plan pertain primarily to the administrative structure and implementation process of the Plan. As such, comments regarding the applicability of this part to the proposed project are not appropriate. Amendments to State Land Use District boundaries must be consistent with the goals, objectives and policies of the Hawaii State Plan. The proposed Kohanaiki Mauka commercial/light industrial subdivision is in consonance with the provisions of the Hawaii State Plan as described below.

#### **7.1.1 Overall Theme, Goals, Objectives and Policies**

The Hawaii State Plan lists three "Overall Themes" relating to: (1) Individual and family self-sufficiency; (2) Social and economic mobility; and (3) Community or social well-being [Section 226-3 (1-3)]. These themes are viewed as "basic functions of society" and goals toward which government must strive. To guarantee the elements of choice and mobility embodied in the three themes, three goals were formulated [Section 226-4 (1-3)]:

- (1) A strong, viable economy, characterized by stability, diversity and growth that enables fulfillment of the needs and expectations of Hawaii's present and future generations.
- (2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems and uniqueness, that enhances the mental and physical well-being of the people.
- (3) Physical, social and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring and of participation in community life.

**Response:** The proposed Kohanaiki Mauka commercial/light industrial subdivision would contribute to the attainment of the three goals. The project would provide direct short- and long-term employment opportunities for the present and future residents of West Hawaii in

general and specifically the Kailua-Kona area; the proposed project would generate increased State and County tax revenues; the project would contribute to the stability, diversity and growth of local and regional economies; and the archaeological, historic and natural site features would be protected. Key elements of the proposed project relative to the above noted goals are that the proposed project would provide additional business (light industry) siting location opportunities for existing and new businesses; that it would provide these siting location opportunities in a planned setting wherein design, operation and maintenance and environmental protection provisions can be effectively, efficiently and economically controlled; that it would provide these siting opportunities close to existing and planned residential developments, such that travel times are minimized and yet separated from planned or existing residential developments, such that the activities within the proposed project are not a nuisance to residential communities; and the proposed project, by enabling employees to work relatively close to their homes, would enhance the sense of community responsibility and participation.

Specific objectives, policies and priority directions of the State Plan most relevant to the proposed project are discussed below:

**226-6 Objectives and Policies for the Economy - General**

Objective:

(a)(1) To increase and diversify employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people.

(a)(2) A steadily growing and diversified economic base that is not overly dependent on a few industries.

Policies:

(b)(6) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.

(b)(9) Foster greater cooperation and coordination between the public and private sectors in developing Hawaii's employment and economic growth opportunities.

(b)(10) Stimulate the development and expansion of economic activities which will benefit areas with substantial or expected employment problems.

(b)(11) Maintain acceptable working conditions and standards for Hawaii's workers.

(b)(13) Encourage businesses that have favorable financial multiplier effects within Hawaii's economy.

(b)(16) Foster a business climate in Hawaii – including attitudes, tax and regulatory policies and financial assistance programs – that is conducive to the expansion of existing enterprises and the creation and attraction of new business and industry.

**Response:** The proposed Kohanaiki Mauka project would provide increased business siting opportunities for existing and new businesses in the West Hawaii region. This in turn would contribute toward increased employment, income and job choice opportunities for Big Island residents, thereby leading to improved living standards for those residents. The development of the proposed project would also increase the opportunities to control the working conditions of the businesses that locate in the development, stimulate the development and expansion of businesses in an area that has experienced employment problems, increase the business opportunities for businesses having favorable financial multiplier effects and provide a climate conducive to the expansion of existing businesses and the creation of new business and industry.

**226-10 Objectives and Policies for the Economy – Potential Growth Activities**

**Objective:**

(a) Planning for the State's economy with regard to potential growth activities shall be directed toward achievement of the objective of development and expansion of potential growth activities that serve to increase and diversify Hawaii's economic base.

Policies:

(b)(2) Expand Hawaii's capacity to attract and service international programs and activities that generate employment for Hawaii's people.

(b)(3) Enhance and promote Hawaii's role as a center for international relations, trade, finance, services, technology, education, culture and the arts.

(b)(5) Promote Hawaii's geographic, environmental, social and technological advantages to attract new economic activities into the State.

(b)(6) Provide public incentives and encourage private initiative to attract new industries that best support Hawaii's social, economic, physical and environmental objectives.

Response: The proposed project would assist in the achievement of the above State objectives by providing additional business siting location capacity that would generate increased employment; assist in enhancing and promoting Hawaii's role as a center for international and domestic relations, trade, finance, services and technology, and promote the State's geographic, environmental, social and technological advantages, especially given the project's close location relative to the Natural Energy Laboratory of Hawaii (NELH) and the Hawaii Ocean Science and Technology (HOST) Park; and granting of the requested petition and future zoning requests would represent the extent of public incentives required to encourage the developers to attract new industries and businesses that would best support the State's social, economic, physical and environmental objectives.

**7.1.2 Planning, Coordination and Implementation**

As indicated previously, this part of the Hawaii State Plan pertains to the administrative structure and implementation process of the Plan. As such, comments are not deemed appropriate.

**7.1.3 Priority Guidelines**

The purpose of this part of the Plan is to establish overall priority guidelines to address areas

of statewide concern. The Plan notes that the State shall strive to improve the quality of life for Hawaii's present and future population through the pursuit of desirable courses of action in five major areas of statewide concern which merit priority attention: Economic development, population growth and land resource management, affordable housing, crime and criminal justice and quality education. The priority guidelines applicable to the proposed project are discussed below:

**226-103 Economic Priority Guidelines**

(a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaii's people and achieve a stable and diversified economy.

(a)(1) Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.

(a)(2) Encourage the expansion of technological research to assist industry development and support the development and commercialization of technological advancements.

(a)(8) Provide public incentives and encourage private initiative to develop and attract industries which promise long-term growth potentials....

(a)(10) Enhance the quality of Hawaii's labor force and develop and maintain career opportunities for Hawaii's people....

**226-104 Population Growth and Land Resources Priority Guidelines**

(a)(2) Manage a growth rate for Hawaii's economy that will parallel future employment needs for Hawaii's people.

(a)(4) Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.

(b)(2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.



(b)(12) Utilize Hawaii's limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs while ensuring the protection of the environment and the availability of the shoreline, conservation lands and other limited resources for future generations.

**Response:** The proposed Kohanaiki Mauka project would comply with and assist in the achievement of the above stated economic priority guidelines and objectives. Granting the requested State Land Use Boundary Amendment Petition and future zoning requests would provide the means by which the developers would make available investment capital for the industrial park. Further, the industrial park could become an adjunct to the HOST Park and NELH by providing increased business siting location opportunities for businesses developing new technologies at the HOST Park and NELH; the developers would develop the project in a manner that would attract industries that promise long-term growth potentials thereby enhancing the quality and quantity of Hawaii's labor force; the development would provide employment opportunities paralleling future employment needs; encourage private investment on a neighbor island; and profitably utilize marginal agricultural lands for urban uses.

## 7.2 STATE FUNCTIONAL PLANS

The Hawaii State Plan directs the appropriate state agencies to prepare functional plans for their respective program areas. There are 12 State Functional Plans that serve as the primary implementing vehicle for the goals, objectives and policies of the Hawaii State Plan. The Functional Plans that are applicable to the proposed project are discussed below:

### 7.2.1 State Agriculture Functional Plan

The focus of the State Agriculture Functional Plan, prepared by the State Department of Agriculture, is toward lands "suitable and used (or potentially usable) for agricultural production". Such lands are primarily found within the State Agriculture District in areas identified as important agricultural lands.

**Response:** Approximately 28 acres of the subject property presently lie within State Agriculture District lands. However, these lands have not been classified in the Agricultural

Lands of Importance to the State of Hawaii (ALISH) classification. Further, the land types (a'a and pahoehoe lavas) and the soils classifications (E289 and E319) indicate the lack of suitability of the lands for agricultural purposes. The site has little or no soil except for that which has been wind-blown onto the site and exists in cracks and crevices of the lavas. Because of these factors, plus those associated with the arid climate of the area and general lack of sufficient water supplies for agricultural purposes, the project property has marginal agricultural potential.

#### **7.2.2 State Conservation Lands Functional Plan**

The Conservation Lands Functional Plan is prepared and maintained by the State Department of Land and Natural Resources (DLNR). The Plan defines and attempts to address areas of statewide concerns set forth under Part III, Priority Guidelines of the Hawaii State Plan. These areas include watersheds, terrestrial habitat, ocean habitat, areas with endangered species, natural streams, shoreline, open space, natural areas, air and water quality sensitive areas and scenic, historic and cultural sites.

Response: The proposed Kohanaiki Mauka commercial/light industrial subdivision contains no watershed areas, sensitive terrestrial habitats, ocean habitats, areas with endangered species, natural streams, shoreline, air or water quality sensitive areas or historic or cultural sites. It does, however, contain open space, natural areas and scenic vistas. A primary reason for the preparation of this EIS is to use it to support a petition filed with the State Land Use Commission to seek a district boundary reclassification for the subject property from the current Conservation designation to Urban designation. The basic premises of this action are that adequate mitigative measures have been proposed to allow the proposed development to proceed with minimal impact to the site's natural and physical characteristics; that the proposed action is consistent with planned or existing adjoining property uses and the redesignation of the land to urban expansion designation in the Hawaii County General Plan; and that sufficient need has been demonstrated, via the marketing study conducted specifically for the proposed project, for the long-term economic development and success of the proposed project.

### **7.2.3 State Historic Preservation Functional Plan**

The State Historic Preservation Functional Plan is also prepared and maintained by the State Department of Land and Natural Resources. An archaeological survey of the proposed project site was conducted to locate, describe and determine the significance of the historic and archaeological sites within the project boundaries. Throughout the survey process, close coordination was maintained with the State Historic Sites Section of DLNR and the County of Hawaii Planning Department. The results of the survey indicate that the proposed project site does not contain any historic or archaeological sites of significance as determined through the survey process.

### **7.2.4 The State Energy Functional Plan**

The State Energy Functional Plan has five main objectives: A) to moderate the growth in energy demand through conservation and energy efficiency; B) displace oil and fossil fuels through alternate and renewable energy resources; C) promote energy education and legislation; D) support for an integrated energy management and development program; and E) provide for energy emergency preparedness.

The Kohanaiki Mauka project is consistent with the State Energy Functional Plan in that the developers recognize it is in their economic self interest to adopt the most cost effective, energy saving technology available. For the lots to be used by the owners, energy efficient technologies, such as waste heat recovery systems, energy efficient fluorescent lamps, and power conditioning equipment will be evaluated as part of their facility and planning design.

While the developer cannot require tenants to adopt specific technologies as part of the facility design, all commercial and light-industrial facilities are required to adhere to the Hawaii County Building Code, which contains specific provisions regarding construction of mechanically cooled buildings and energy conservation.

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

### 7.3 HAWAII COUNTY GENERAL PLAN

The updated Hawaii County General Plan is the policy document for the long-range comprehensive development of the island of Hawaii and provides direction for balanced growth of the County. The Plan contains goals, policies and standards concerning twelve functional areas, as well as a series of land use maps referred to as General Plan Land Use Pattern Allocation Guide (LUPAG) Maps. The present LUPAG Map designations for the property are Urban Expansion. The designation allows development of the proposed project to be consistent with the Hawaii County General Plan. Future County actions to be requested include requesting the County to zone the property Limited Industrial (ML-3a).

Goals and policies to which the Kohanaiki Mauka project is relevant and consistent are:

#### ECONOMIC GOALS

- Provide residents with opportunities to improve their quality of life.
- Economic development and improvement shall be in balance with the physical and social environments of the island of Hawaii.
- The County of Hawaii shall strive for diversity and stability in its economic system.
- The County shall provide an economic environment which allows new, expanded, or improved economic opportunities that are compatible with the County's natural and social environment.

#### *Policies*

- The County of Hawaii shall strive for diversification of its economy by strengthening existing industries and attracting new endeavors.

**Response:** The Kohanaiki Mauka project was initiated by local businessmen for the purpose of relocating and expanding existing business. The project contributes to the diversification of the County economy by supporting small businesses and providing sites for industrial activity.

- An active liaison between the County and the private sector should be encouraged with respect to the County's requirements for establishing business on the island.

**Response:** The proposed joint water source development between the developer and the County demonstrates the viability of the government and private sector working together to solve community problems.

#### **ENVIRONMENTAL QUALITY GOALS**

- Maintain and, if feasible, improve the existing environmental quality of the island.

**Response:** The Kohanaiki Mauka Environmental Impact Statement provides information to the County which facilitates the maintenance of environmental quality.

#### **FLOOD CONTROL AND DRAINAGE GOALS**

- Control Pollution.
- Reduce surface water and sediment runoff.

**Response:** The development of the proposed project will be consistent with all federal, State and County guidelines for drainage, including mitigation measures for surface water and sediment runoff and pollution control.

#### **WATER GOALS**

- Water system improvements and extensions shall promote the County's desired land use development pattern.

**Response:** The water system to service the proposed Kohanaiki Project provides additional source to an area designated as Urban Expansion in the updated Hawaii County General Plan, therefore promoting the County's desired land use pattern. Uses allowed under the Urban Expansion designation include: "a mix of high density, medium density, low density, industrial and/or open designations in areas where new settlements may be desirable, but where the specific settlement pattern and mix of uses have not yet been determined."

## INDUSTRIAL GOALS

- Designate and allocate industrial areas in appropriate proportions and in keeping with the social, cultural, and physical environments of the County.
- Promote and encourage the rehabilitation of industrial areas which are serviced by basic community facilities and utilities.

### *Policies*

- It shall be the policy of the County to achieve a broader diversification of local industries by providing opportunities for new industries and existing industries.
- Industrial development shall be located in areas adequately served by transportation, utilities, and other amenities. Redeveloping or newly developing areas shall be developed in concert with programmed public and privately funded infrastructure to meet the expected needs.

Response: The Kohanaiki Mauka project is located in an area appropriate to and in keeping with the industrial goals of the County. Near existing industrial uses and situated on an area designated for urban expansion, the project can be adequately serviced by existing transportation corridors and utilities. The project is proposed in concert with projected growth in West Hawaii and will support existing businesses that serve the area. In addition, the Kohanaiki Mauka project will provide industrial sites in an area where there is strong pent up and unmet demand for industrial space during the short term.

## 7.4 HAWAII COUNTY ZONING

The present County zoning designation of the subject property is Open. As noted above, other nearby parcels have been zoned industrial, as well as the Kohanaiki Resort Community lands that have been variously zoned residential, commercial and resort. Following SLUC boundary amendment, the developers would apply for a Zone Change (ML-3a) from Hawaii County to allow development of the one- to three-acre light industrial parcels .

## 7.5 HAWAII COASTAL ZONE MANAGEMENT PROGRAM, CHAPTER 205A, HRS

The objectives of the Hawaii Coastal Zone Management (CZM) Program, as set forth in

Chapter 205A (HRS), include the protection and maintenance of valuable coastal resources. Hawaii County Planning Commission, Rule 9, Special Management Area, has been enacted under authority of Chapter 205A (HRS) to implement the State Coastal Zone Management Program. The proposed boundary amendment request conforms to applicable CZM state and County objectives respectively as follows:

#### STATE OBJECTIVES

##### Objective for Historic Resources

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

Response: As indicated in Sections 2.2.1.10 and 3.3.10 of this EA, archaeological investigations of the proposed project site revealed no surface archaeological features of historic or cultural value on the site. There is the possibility that subsurface features may exist and an archaeological monitoring team will be on call during site grading and preparation work should subsurface features be found. Work will be halted until the significance of those features can be determined. If it is determined that the features are culturally significant, appropriate preservation measures would be taken prior to the continuation of construction activities.

##### Objective for Scenic and Open Space Resources

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

Response: Reclassification of the petition area will not result in the degradation of the region's coastal scenic and open space resources. Coastal scenic resources will not be affected as the proposed project is located over one mile inland from the coastline. Open space and a landscape buffer will be incorporated into the project design to ensure the smooth visual integration of the project and mauka views.

##### Objective for Coastal Ecosystem

Protect valuable coastal ecosystem from disruption and minimize adverse

impacts on all coastal ecosystems.

**Response:** The proposed project is not expected to have any effect on the coastal ecosystems. Storm run-off from the project will be discharged into leach fields and septic tanks following required and appropriate treatment such that the groundwater resources flowing beneath the project site are unaffected; and industrial wastewaters, if any, will also receive appropriate treatment prior to discharge into the initial self-contained treatment plant and/or discharge into the County wastewater collection, treatment and disposal system. Treatment of wastewater prior to disposal in the leach fields and septic tanks will ensure that the coastal and anchialine ponds and marine environment makai of the project site are unaffected by the proposed project.

#### Objective for Coastal Hazards

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

**Response:** The proposed project site is outside the tsunami and storm wave hazard area. Similarly, there are no streams in the project area and erosion and subsidence are not a hazard at the project site.

#### **7.6 COUNTY OF HAWAII CZM SPECIAL MANAGEMENT AREA (SMA) RULES**

The proposed project is situated outside the Special Management Area (SMA) as defined by the County, and, as such, is not subject to the provisions of the County SMA rules and regulations (Rule 9, Hawaii County Planning Commission) or Chapter 205A HRS. An SMA Use permit will not be required for project development.

#### **7.7 STATE ENVIRONMENTAL IMPACT STATEMENT REQUIREMENTS**

Section 343-5(a)(7) of Chapter 343, HRS, states that "Except as otherwise provided, an environmental assessment shall be required for actions that" ... "Propose any reclassification of any land classified as conservation district by the State Land Use Commission under Chapter 205." Because the subject property falls within the SLUC Conservation and Agriculture Districts, the provisions of Chapter 343, HRS and Title 11, Department of Health,



Chapter 200, Environmental Impact Statement Rules, apply to the proposed project. This EIS has been prepared and is submitted pursuant to the provisions of Chapter 343.

Upon acceptance of this EIS and approval of the requested State Land Use Boundary Petition and subsequent State and County permitting requests, the proposed project would conform with relevant State and County Land Use regulations, as well as other appropriate regulations.

C H A P T E R 8

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CONTEXTUAL ISSUES

## CHAPTER 8 - CONTEXTUAL ISSUES

### 8.0 RELATIONSHIP BETWEEN SHORT TERM USES AND MAINTENANCE OF LONG TERM PRODUCTIVITY

As discussed in previous sections of this document, the Kohanaiki Mauka Property is a vacant parcel of land characterized by lava flows with pockets of vegetation in various areas. As an environmental resource, the value of the land is currently defined by open space. Long term use of the property for a commercial/light industrial subdivision has been demonstrated in this document to be a valuable resource for those supplying goods and services in West Hawaii. The benefits of developing the property for light industrial and commercial use to present and future residents of West Hawaii include the economic opportunities that will result from the development.

Retention of the property in open space to preserve its open space character is not considered to be a viable long-term productive use due to the demonstrated need for additional light industrial and commercial space in West Hawaii and the proximity of the land to existing and planned residential and resort development.

Potential short term uses of the property, other than open space, is limited due to the lack of infrastructure required to support additional residential development or even recreational use (roadways, parkways, pedestrian paths).

### 8.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of the property for light industrial and commercial uses would result in irreversible and irretreivable commitment of natural and economic resources. These commitments include the land, potable water, the capital, construction material and labor needed to implement the project. These commitments should be weighed against the projected socio-economic benefits resulting from the proposed project as opposed to retaining the site as open space.

## **8.2 OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES**

In this document, the proposed document has been thoroughly examined and evaluated in terms of the existing system of land use controls, plans, goals and objectives at both the State and County levels of government. The proposed project has been demonstrated to be generally consistent with many elements of the regulatory system. However, there are inherent conflicts and contradictions within the system which cannot be circumvented. Preservation of open space and development of diversified business and industry are not goals that can easily be attained in the face of demands from a growing population and economy. Air quality cannot be protected without resolution that includes transportation improvements.

The proposed project addresses these critical issues by providing socio-economic benefits for the current and future residents of West Hawaii while effectively mitigating potential adverse environmental and social impacts. The project has been demonstrated to be generally consistent with the Hawaii State Plan and Functional Plans, the Hawaii County General Plan, the Keahole to Kailua and various community plans goals, objectives and policies concerning the future growth of the West Hawaii region.

In particular, the proposed project supports the Keahole to Kailua Plan by providing industrial expansion in the Kaloko area, as called for in Section 3.3.2 C in the plan.

## **8.3 UNRESOLVED ISSUES**

As in many Environmental Impact Statements in Hawaii, the major unresolved issue involves cumulative impacts. While the West Hawaii region has been the focus of considerable planning efforts on the part of State and County agencies, as well as major private land owners, there is an uncertainty as to the cumulative result of these plans. In addition, the interaction of these plans and their collective impact upon issues such as the phasing of regional infrastructure development and the location of public and private facilities such as a university campus, a regional hospital, and regional roadways.

As noted in the text, the Kohanaiki Mauka project comprises less than 3.7 percent of the total

of 1,900 industrial acreage proposed in the 1988 West Hawaii Regional Plan. In term of cumulative impact, the proposed project's overall addition to cumulative impacts in the regional is relatively small. Adequacy of potable water, a continuing issue in West Hawaii, is not expected to be an concern with the pending agreement with the County for joint development of a water source in the Hualalai area.

Although State, County and private landowner plans have yet to be resolved, the public review process of various plans provides a forum for discussion and evaluation of these cumulative issues. The submission and publication of this EIS will contribute to the resolution of these pending issues.

C H A P T E R 9

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PARTIES CONSULTED AND THOSE PARTICIPATING  
IN THE PREPARATION OF THE EIS

## CHAPTER 9 - PARTIES CONSULTED AND THOSE PARTICIPATING IN THE PREPARATION OF THE EIS

### 9.0 PARTICIPANTS IN THE DRAFT EIS PREPARATION PROCESS

This Draft EIS was prepared for Kamaaina Eight Partners by PBR HAWAII. The following list identifies individuals and organizations who were involved in the preparation of the report and their respective contributions.

#### PBR HAWAII

Tom Witten, ASLA	Vice President, PBR HAWAII
James Leonard	Manager, PBR HAWAII Hilo Office and Principal in Charge
Ramona Mattix, AICP	Project Planner
Guy Tsutsui	Cartographer
Laura Paulson	Graphic Design

#### Technical Consultants

Steve Bowles	Hydrology
The Hallstrom Group	Market Analysis
Imata & Associates	Engineering
Archeological Consultants of Hawaii	Archaeology
Pacific Planning & Engineering	Traffic

The EIS has been prepared in response to a State Land Use Commission Decision and Order of April 8, 1991 determining that the proposed Kohanaiki Mauka project would require an EIS pursuant to Chapter 343, HRS. The Environmental Impact Statement Notice (EISPN) for Kohanaiki Mauka was published in the OEQC Bulletin by the Office of Environmental Quality Control on May 23, 1991. The agencies and organizations listed below were sent copies of the OEQC notice together with a copy of the EISPN, a summary of the project and a cover letter soliciting comments. A total of 9 agencies/organizations responded to the request for comments and are identified in the list below with an asterisk (\*). Copies of the correspondence and responses are reproduced in Section 10.

#### FEDERAL AGENCIES

Army - DAFE (Engineering Facilities USACH)  
Navy  
Department of Interior, Parks Division

Regional Division, U.S. Environmental Protection Agency  
Soil Conservation Service\*  
U.S. Fish and Wildlife Service  
U.S. Army Corps of Engineers  
U.S. Coast Guard

#### STATE AGENCIES

Department of Agriculture\*  
Department of Defense  
Department of Education  
Department of Health\*  
Department of Land and Natural Resources\*  
DLNR State Historic Preservation Officer  
Department of Business, Economic Development and Tourism  
DBED Library  
Housing Finance and Development Corporation\*  
Department of Transportation\*  
State Archives  
State Energy Office  
Office of State Planning\*  
University of Hawaii Environmental Center

#### COUNTY OF HAWAII

Planning Department  
Department of Parks and Recreation\*  
Department of Public Works\*  
Department of Water Supply\*  
University of Hawaii - Hilo Campus Library

#### NON-GOVERNMENTAL ORGANIZATIONS

American Lung Association  
Hawaiian Electric and Light Company  
Hawaiian Telephone  
Office of Hawaiian Affairs  
Sierra Club, Hawaii Chapter  
The Nature Conservancy, Hawaii Chapter



**MEDIA**

Honolulu-Star Bulletin  
Honolulu Advertiser  
West Hawaii Today  
Hawaii Tribune Herald

**LIBRARIES**

U.H. Hamilton Library, Hawaiian Collection  
Legislative Reference Bureau  
Kailua-Kona Library

C H A P T E R 10

COMMENTS RECEIVED DURING THE EIS PREPARATION  
NOTICE PERIOD AND RESPONSES



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII  
 25 AUPUNI STREET • HILO, HAWAII 96720  
 TELEPHONE (808) 969-1421 • FAX (808) 969-6994

MAY 18 1991



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII  
 25 AUPUNI STREET • HILO, HAWAII 96720  
 TELEPHONE (808) 969-1421 • FAX (808) 969-6994

MAY 10 1991  
 COPY

May 15, 1991

March 22, 1991

PBR Hawaii  
 ATTENTION: MR. JAMES LEONARD  
 101 Aupuni Street, Suite 130  
 Hilo, HI 96720

KOHAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT  
 PREPARATION NOTICE AND SUMMARY  
 TAX MAP KEY 7-3-9:15  
 FILE BA-7-006-0055

This is in response to your transmittal letter of May 6, 1991 regarding the subject document.

Please refer to the attached copy of our letter of March 22, 1991 to the Office of State Planning regarding the State Land Use Boundary Amendment (A91-665) for our comments and requirements.

Should you have any questions, please contact our Water Resources and Planning Section.

*H. William Sewate*  
 Manager

WA

Attach.

... Water brings progress...

Office of State Planning  
 State Capitol  
 Honolulu, HI 96819

STATE LAND USE BOUNDARY AMENDMENT (A91-665)  
 KAHUWA EIGHT  
 TAX MAP KEY 7-3-09:15

For your information, the applicant has obtained rights to a commitment for thirty (30) units of water at 600 gallons per day per unit through participation in the Kaulakua Source Agreement program. To secure the water commitment, the prevailing facilities charge needs to be paid by the applicant. The prevailing facilities charge, which is subject to change, is \$1,000 per unit or \$54,000 for thirty (30) units.

The applicant has mentioned in the application that onsite and offsite storage reservoirs and pipelines will be constructed to accommodate the fire-flow and domestic-flow requirements of the proposed development. Also mentioned was the need for further source development for future phases of the proposed development.

Given the above information, we have no objections to the subject request at this time. However, it is requested that the applicant provide more information regarding the water needs of the future phases of the development.

*H. William Sewate*  
 H. William Sewate  
 Manager

WA

cc - Kamaaina Eight - c/o Robert D. Triantos, Esq.  
 Planning Department

BA 7-006-0055  
 ... Water brings progress...



June 18, 1991

Mr. H. William Sewake  
Department of Water Supply  
County of Hawaii  
25 Aupuni Street  
Hilo, HI 96720

SUBJECT: KOHIANAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Sewake:

Thank you for your letter of May 15, 1991 concerning the above project. We are including a section in the Draft EIS which will discuss the potential water use impacts associated with industrial development. Details regarding water use will be provided.

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A full discussion of water will be available in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PBR HAWAII

Ramona Mallix  
Project Planner

MAIL 3 051

104 FORT STREET MAIL SUITE 300 HONOLULU, HAWAII 96813 TEL: (808) 521-5411 FAX: (808) 521-1802  
PUBLISHED BY THE HONOLULU GOVERNMENT OFFICE OF THE CITY AND COUNTY OF HONOLULU





**OFFICE OF STATE PLANNING**

Office of the Governor

1111 KUALA, HONOLULU HAWAII 96813 TELEPHONE 535-1341 FAX 535-1342

June 7, 1991

JUN 14 1991

Mr. James Leonard  
PDR Hawaii  
101 Aupuni Street, Suite 310  
Hilo, Hawaii 96720

Dear Mr. Leonard:

Subject: Comments on Environmental Impact Statement Preparation  
Notice for Kohanaiki Mauka  
Kohanaiki, North Kona, Hawaii  
TRK: 7-3-9: 15

We have reviewed the Preparation Notice (EISP/N) for the proposed industrial project, which is the subject of a state land use reclassification petition (A91-665) filed by landowner Kamaaina Eight, a Hawaii general partnership. The following comments have been prepared for your consideration.

Landowner's Name

The EISP/N states that the property is owned by Kamaaina Eight Partnership of Kailua-Kona. However, the records at the State Land Use Commission indicate that the proper name is Kamaaina Eight Partners, a Hawaii general partnership. We note that your document for publication in the ODFC Bulletin similarly misspells the applicant's name.

Project Location

The EISP/N states that the project location is at Kohanaiki Mauka. Our review of the U.S. Geological Survey maps for this area indicates that the project is located in the ahupuaa of Kohanaiki. While the proposed project is known as the Kohanaiki Mauka project, there is no location known as Kohanaiki Mauka.

Surrounding Land Uses

In light of the effect that this project may have on the resort uses being planned by Mansay Hawaii, Inc., for other properties in the Kohanaiki ahupuaa, a more accurate and up-to-date description of that project should be provided. The EISP/N's use of an EIS published five years ago as the source for the proposed resort's project description is not appropriate when other, more current sources are available. For example, the subject project should be discussed in the context of the County of Hawaii Planning Department's Keahole to Kailua Development Plan prepared by R.M. Towill Corporation in November 1990.

Also, the proximity of the project to Kalahele-Ikonoiki National Historical Park and any potential impact on park resources should be noted.

Mr. James Leonard  
Page 2  
June 7, 1991

Project Description

The EIS should describe the phasing of the project and the development schedule.

The need for the project should be justified.

The integration of the project infrastructure with those of surrounding projects should be addressed in some detail. Figure A (Concept Plan "A") is difficult to evaluate without such information.

Summary of Project Impacts

Information on the biological resources of the site appear to be inadequate. It is not clear whether flora and fauna surveys have been or will be conducted on the project site. In light of the presence of rare, endangered, and newly discovered terrestrial and subterranean species in the district, it is highly recommended that such surveys be conducted and their results disclosed in the EIS.

Specific information should be provided on water requirements, sewage disposal requirements, electrical requirements, and the ability of existing or planned systems to accommodate those needs in a schedule compatible with the project's development schedule.

We continue to be concerned about the runoff, potential groundwater contamination, and visual impacts associated with this project.

Thank you for this opportunity to review the EISP/N. Should you have any questions, please contact the Land Use Division at 548-2066.

Sincerely,

*Harold S. Myslinski*  
Harold S. Myslinski  
Director

cc: State Land Use Commission  
National Park Service  
DWR, DWRM



June 18, 1991

Mr. Harold Matsumoto, Director  
Office of State Planning  
State of Hawaii  
State Capitol  
Honolulu, HI- 96813

**SUBJECT: KOHANAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT**

Dear Mr. Matsumoto:

Thank you for your letter of June 7, 1991 concerning the above project. As a result of your comments we have revised the applicant name and made clear that the designation Kohanaiki Mauka is one devised by the applicant. Impact of the project upon the surrounding land use is addressed in the Draft EIS. Details regarding the project description, phasing and infrastructure connection will also be discussed.

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Information will be provided on water requirements, sewage disposal, and electrical requirements of the proposed project. In addition, there will be specific material included in the Draft EIS which relates to runoff, groundwater contamination, and visual impact.

In terms of flora and fauna studies, we are relying on existing studies which indicate that the habitat afforded by the proposed project site does not support the rare, endangered, or newly discovered terrestrial and subterranean species mentioned in your letter. Because the proposed project is limited in scope (installation of infrastructure) and size (70 acres), we believe these studies to be adequate. A full discussion will be available in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PBR HAWAII

Ramona Mallix  
Project Planner

4401-5-91

1022 FIVE SEVENTEETH STREET, SUITE 300 HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5400 FAX: (808) 521-5402  
TELETYPE: (808) 521-5400 MAILING ADDRESS: P.O. BOX 1080 HONOLULU, HAWAII 96808-0108



COPY

JUN 13 1991

Kohalaiki Mauka EIS  
Page 2  
May 31, 1991

May 31, 1991

Mr. Burke Matsuyama  
Kaamalea Eight Partnership  
73-4354 Maunaloa Highway  
Kaliua-Kona, Hawaii 96740

Dear Mr. Matsuyama:

**SUBJECT: COMMENTS TO ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR  
KOHANAHI MAUKA TRK 7-3-09.15, NORTH KONA, HAWAII (May 6, 1991)**

24

It is the Department of Health's understanding that Kaamalea Eight Partnership is requesting reclassification of Conservation land (42 acres) and Agricultural land (20 acres) to urban land. The project site, Kohalaiki Mauka, is located in North Kona, Hawaii, approximately five miles north of Kailua-Kona. The proposed reclassification would allow the establishment of light commercial and industrial development which may include the installation and operation of underground storage tanks and the potential generation of hazardous wastes from commercial printers.

**UNDERGROUND STORAGE TANKS:**

1. Owners and operators of underground storage tanks (USTs) who store petroleum products or hazardous substances in USTs are subject to the federal UST rules and regulations as set forth in Title 40 of the Code of Federal Regulations Part 280 (Attachment A). These regulations include requirements for:
  - A. Design, Construction, Installation, and Notification;
  - B. General Operating Requirements;
  - C. Release Detection;
  - D. Release Reporting, Investigation and Confirmation;
  - E. Release Response and Corrective Action;
  - F. Changes-in-Service and Closure; and
  - G. Financial Responsibility Requirements (Attachment B).
2. Owners of new USTs must notify the Department of Health's Solid & Hazardous Waste Branch - Underground Storage Tank Section of the existence of such USTs within 30 days of bringing such USTs into use. The attached notification form is used to comply with this requirement (Attachment C).

3. The installation of UST systems containing flammable and combustible liquids is also subject to regulation by the Hawaii Fire Department. The Hawaii Fire Department should be contacted regarding any county requirements that may exist governing UST systems.

**HAZARDOUS WASTE:**

A commercial/light industrial development center may have rental space leased to small businesses that generate hazardous waste in their operations, e.g. automotive vehicle maintenance and repair, painting, printers and allied trade. Wastes such as solvents, paints, thinners, and oils may be generated depending on the types of business leasing the commercial spaces. These establishments are responsible for the management and disposal of their hazardous waste in accordance with 40 Code of Federal Regulations 6.260-270 (Attachment D). Landowners should also be aware of potential liabilities in the event of property contamination from hazardous materials and/or wastes.

Should you have any questions related to our comments please contact Ms. Grace Simmons of the Solid and Hazardous Waste Branch at 543-8225.

Sincerely,

*James C. Leyvin*  
FOR JOHN C. LEYVIN, M.D.  
Director of Health

C. James Leonard, PBR Hawaii



1025 KALANANĀHUI DRIVE  
HONOLULU, HAWAII 96813  
TELEPHONE: (808) 551-1100  
FAX: (808) 551-1102

June 18, 1991

Dr. John C. Lewin, Director  
Department of Health  
State of Hawaii  
1250 Punchbowl St.  
Honolulu, HI 96813

SUBJECT: KOHIANAKI MAUKA ENVIRONMENTAL IMPACT STATEMENT

Dear Dr. Lewin:

Thank you for your letter of May 31, 1991 concerning the above project. We are including a section of the Draft EIS which will discuss the potential impacts of underground storage tanks and hazardous wastes which could occur on a commercial/light industrial project.

A full discussion will be available in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PURJIAWAI

Ramona Matix  
Project Planner

40001.1.WY

1025 KALANANĀHUI DRIVE, HONOLULU, HAWAII 96813 TELEPHONE: (808) 551-1100 FAX: (808) 551-1102







**Department of Parks and Recreation**

25 Aupuni Street, Room 210 • Hilo, Hawaii 96720 • (808) 941-8311

MAY 2 2 1991

Imamu Nijon  
Chumalingi Kamaka  
Director

Alan R. Parker  
Deputy Director

DEPARTMENT OF PARKS & RECREATION  
COUNTY OF HAWAII

MAY 2 2 1991

Date April 12, 1991

May 15, 1991

PDR Hawaii  
Mr. James Leonard  
101 Aupuni Street, Ste. 310  
Hilo, Hawaii 96720

Subject: Kohanaiwi Hauka - EIS Preparation Notice  
TRK: 7-3-09:15 (Light Industrial/Commercial Use)

Attached is a copy of our memo to the Planning Department on a State Land Use boundary amendment application for the project.

If any questions should arise, please do not hesitate to contact us.

Sincerely,

*Alan Parker*  
for Charmaine L. Kamaka  
Director

Encl. - April 12, 1991 Memo

TO: PLANNING DEPARTMENT  
FROM: DEPARTMENT OF PARKS & RECREATION  
RE:  CHANGE OF ZONE APPLICATION  
 SPECIAL PERMIT APPLICATION  
 ZONA USE PERMIT  
 SLU BOUNDARY AMENDMENT (Agriculture and Conservation to Urban)

FOR: Kamaina Light TRK 7-3-09:15

We have no adverse comments to offer on the subject application.

The following comments are offered for your consideration:

We question whether the proposed industrial use would be compatible to proposed resort/open uses to the west and open use (golf course) to the south. The Keahole to Kailua Development Plan also designates areas to the south for open/residential use and areas to the east for residential and golf course development. Neither of these uses would be complimented by industrial use.



PLANNING  
BUREAU  
DEPARTMENT OF RECREATION

June 18, 1991

Ms. Charmaine L. Kamaka, Director  
Department of Parks and Recreation  
County of Hawaii  
25 Aupuni Street, Room 210  
Hilo, HI 96721

SUBJECT: KOHANA'IKI MAUKA ENVIRONMENTAL IMPACT STATEMENT

Dear Ms. Kamaka:

Thank you for your letter of May 15, 1991 concerning the above project. We are including a section of the Draft EIS which will discuss the potential impacts of industrial land use as related to surrounding land uses, and as compatible with the Keahole to Kailua Development Plan.

A full discussion will be available in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PBR HAWAII

Ramona Mattox  
Project Planner

ENCL. 8, W-1

1007 KURE STREET, SUITE 301, HONOLULU, HAWAII 96813 TEL: (808) 521-5611 FAX: (808) 521-1102  
WWW.PBR.HI.GOV

JOHN WAIHEE  
GOVERNOR

MAY 25 1991



YUKIO KITAGAWA  
CHAIRPERSON, BOARD OF AGRICULTURE  
ILIMA A. PIHANAI  
DEPUTY TO THE CHAIRPERSON  
FAX: 548-6100

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

Mailing Address:  
P. O. Box 22159  
Honolulu, Hawaii 96821-2159

JOHN WAIHEE  
GOVERNOR

MAY 25 1991



YUKIO KITAGAWA  
CHAIRPERSON, BOARD OF AGRICULTURE  
ILIMA A. PIHANAI  
DEPUTY TO THE CHAIRPERSON  
FAX: 548-6100

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

Mailing Address:  
P. O. Box 22159  
Honolulu, Hawaii 96821-2159

May 22, 1991

May 22, 1991

Mr. James Leonard  
PBR Hawaii  
101 Aupuni Street, Suite 310  
Hilo, HI 96720

Mr. James Leonard  
PBR Hawaii  
101 Aupuni Street, Suite 310  
Hilo, HI 96720

98

Dear Mr. Leonard:

Dear Mr. Leonard:

Subject: Environmental Impact Statement Preparation Notice  
(EISPW) for Kohalaiki Mauka Industrial Park  
TMK: 7-3-09: 15 North Kona, Hawaii  
Area: approximately 70 acres

Subject: Environmental Impact Statement Preparation Notice  
(EISPW) for Kohalaiki Mauka Industrial Park  
TMK: 7-3-09: 15 North Kona, Hawaii  
Area: approximately 70 acres

The Department of Agriculture has reviewed the subject document  
and has no comments to offer at this time.

The Department of Agriculture has reviewed the subject document  
and has no comments to offer at this time.

Thank you for the opportunity to comment.

Thank you for the opportunity to comment.

Sincerely,

Sincerely,

*Yukio Kitagawa*  
YUKIO KITAGAWA  
Chairperson, Board of Agriculture

*Yukio Kitagawa*  
YUKIO KITAGAWA  
Chairperson, Board of Agriculture

c: DEQC

c: DEQC





June 18, 1991

Mr. Yukio Kitagawa, Chairperson, Board of Agriculture  
Department of Agriculture  
State of Hawaii  
1428 South King St.  
Honolulu, HI 96814-2512

**SUBJECT: KOIHAUAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT**

Dear Mr. Kitagawa:

Thank you for your letter of May 22, 1991 concerning the above project. A full discussion of potential agricultural impacts will be provided in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PBR HAWAII

*Raimona Matlix*  
Raimona Matlix  
Project Planner





STATE OF HAWAII  
 DEPARTMENT OF BUDGET AND FINANCE  
 HOUSING FINANCE AND DEVELOPMENT CORPORATION  
 500 ALA MOANA BLVD., SUITE 300  
 HONOLULU, HAWAII 96813  
 FAX: 808/548-2000



91:PLNG/1886jc

April 23, 1991

TO: The Honorable Harold S. Hasumoto  
 Office of State Planning

FROM: Joseph K. Conant  
 Executive Director

SUBJECT: Petition 191-665/Kamaaina Eight, Kohalaiki, H. Kona, Hawaii

Thank you for the opportunity to review the subject petition.

It does not appear that the proposed project will significantly impact housing. Nevertheless, we would like to point out that Policy B(3) of the State Housing Functional Plan seeks to ensure that projects which impact housing provide affordable rental housing opportunities for employees.

JTieka

cc: Honorable Haysashi, Hawaii County Planning Department

June 18, 1991

Mr. Joseph K. Conant, Executive Director  
 Department of Budget and Finance  
 Housing Finance and Development Corporation  
 State of Hawaii  
 Seven Waterfront Plaza, Suite 300  
 500 Ala Moana Blvd.  
 Honolulu, HI 96813

SUBJECT: KOHANAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Conant:

Thank you for your letter of April 23, 1991 concerning the above project. A full discussion of potential housing impacts will be provided in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PBR HAWAII

*Raimona Maltix*  
 Raimona Maltix  
 Project Planner

4800 .01 W51

100-1091-5-REPL STATE, 5000 001 001 HONOLULU HAWAII 96813-21 FAX 808/548-1802

COUNTY OF HAWAII  
HILO, HAWAII

DATE March 21, 1991

Memorandum

TO: Mr. Robert K. Yanabu, Division Chief, Engineering Division

FROM: Planning Director

*David M. [Signature]*  
COUNTY OF HAWAII  
ENGINEERING DIVISION

SUBJECT: Petition for an Amendment to State Land Use District Boundaries (A91-665)  
Applicant: Kawahina Eight  
Location: Kohalaiki, W. Kona, Hawaii  
TRK: 7-3-09:15

We have reviewed the subject application and our comments are as follows:  
(Please transmit them to the Office of State Planning.)

1. The Queen Kaahumanu Highway is a State road hence their comments on access should be followed, but we have the following thoughts:  
If this development is approved, signalization will be needed for the left-turn movements exiting the site, but Queen Kaahumanu Highway should not have frequent signalized intersections for this would interrupt the flow of traffic. Also, the subject site is too small and too close to the other future accesses to have a grade separated interchange. The site, therefore, should have lateral roads that extend to the adjacent properties in order to allow a future circulation of traffic that precludes the use of the Queen Kaahumanu Highway as an access. This scheme would be undesirable for a commercially zoned parcel.
2. Provide curbs, gutters and sidewalks.

DMH:st  
cc: DOT-Hilo  
ENG-Kona (T. Pack)



June 18, 1991

Mr. Robert K. Yanabu, Division Chief, Engineering Division  
Department of Public Works  
County of Hawaii  
25 Aupuni Street  
Hilo, HI 96720

SUBJECT: KOHANAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT  
Dear Mr. Yanabu:

Thank you for your letter of March 21, 1991 concerning the above project at the time an Environmental Assessment was included in the State Land Use Petition. A full discussion of potential impacts of the proposed project concerning access and traffic will be provided in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PBR HAWAII

*Ramona Mallix*  
Ramona Mallix  
Project Planner

4908 HAWAII

OFFICE OF STATE PLANNING AND DEVELOPMENT HAWAII  
100 SOUTH KALANANUOUI AVENUE, HILO, HAWAII 96720  
TELEPHONE: (808) 935-2100 FAX: (808) 935-1102



0 1231

UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

SOIL  
CONSERVATION  
SERVICE

P. O. BOX 50004  
HONOLULU, HAWAII  
96850

June 4, 1991

Mr. James Leonard  
PBR HAWAII  
101 Apuni Street, Suite 310  
Hilo, Hawaii 96720

Dear Mr. Leonard:

Subject: Environmental Impact Statement Preparation Notice (EISP) -  
Kohalaiki Mauka Project, Kailua-Kona, Hawaii

We have reviewed the Kohalaiki Mauka Environmental Impact Statement  
Preparation Notice and Summary and have no objections to the overall  
proposed project. We would, however, like to offer the following  
comments:

- 1) We would like to suggest that xerophytic vegetation be used  
throughout the proposed project to reduce the use of water for  
irrigation.
- 2) The area of the proposed project is predominantly lava and therefore  
has a low erosion hazard. However, because of the high percolation rate  
of lava lands, there is a potential for negative impacts to the  
underlying groundwater of the area.

Thank you for the opportunity to comment on this proposed project. We  
would appreciate reviewing the draft Environmental Assessment when it is  
completed.

Sincerely,

  
WARREN H. LEE  
State Conservationist

ACTING



June 18, 1991


Mr. Warren M. Lee, State Conservationist  
United State Department of Agriculture  
Soil Conservation Service  
P.O. Box 50004  
Honolulu, HI 96850

SUBJECT: KOHANAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Lee:

Thank you for your letter of June 4, 1991 concerning the above project. A full discussion of  
potential impacts of the proposed project relating to water use, vegetation, and groundwater will  
be provided in the Draft EIS, and we welcome your comments on that document.

Sincerely,

PUR HAWAII  
  
Rainier Matix  
Project Planner

4MPL 12 W41

1012 1001 5 1991 11 31 MAIL - JULIE W. HONOLULU HAWAIIANESSE TELEPHONE NUMBER 521 5411 FAX NUMBER 521 4800  
ORGANIZATION: UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE



JUN 19 1991  
PHILIPPS BRADY HEDRICK

MAKING A POST-COMPLETION  
CHECK OF THE PROJECT

STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
P. O. BOX 211  
HONOLULU, HAWAII 96813

STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
P. O. BOX 211  
HONOLULU, HAWAII 96813

JUN 14 1991

REF:OCEA:MK

File No.: 91-475  
Doc. No.: 0497E

Ms. Ramona Mattix, Project Planner  
PBR Hawaii  
1042 Fort Street Mall, Suite 300  
Honolulu, Hawaii 96813

Dear Ms. Mattix:

SUBJECT: Kohanaiki Mauka Environmental Impact Statement  
Preparation Notice and Summary

Thank you for giving our Department the opportunity to comment on this matter. We have reviewed the materials you submitted and have no comments at this time.

Thank you for your cooperation in this matter. Please feel free to call me or Roy Schaefer at our Office of Conservation and Environmental Affairs, at 548-7837, if you have questions.

Very truly yours,

*William W. Paly*  
William W. Paly



June 10, 1991

Mr. William W. Paly, Chairperson  
Board of Land and Natural Resources  
P.O. Box 621  
Honolulu, HI 96809

SUBJECT: KOHANAIKI MAUKA ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Paly:

Thank you for your letter of June 14, 1991 concerning the above project. A full discussion of potential impacts of the proposed project relating to land and resource use will be provided within the Draft EIS, and we welcome your comments on that document

Sincerely,

PBR HAWAII

*Ramona Mattix*  
Project Planner

Ramona Mattix  
Project Planner

4/20/91 11:53

POSTAGE WILL BE PAID BY ADDRESSEE  
PBR HAWAII  
1042 FORT STREET MALL, SUITE 300  
HONOLULU, HAWAII 96813  
PH: 548-7837 FAX: 548-7837





**Planning Department**

25 Apunani Street, Room 109 • Hilo, Hawaii 96720 • (808) 961-8785

Lorraine R. Inouye  
Mayor  
Norman K. Hiyashi  
Director  
Ted Nagasaka  
Deputy Director

Mr. James Leonard  
Page 2  
June 24, 1991

June 24, 1991

Mr. James Leonard  
PBR HAWAII  
101 Apunani Street, Suite 310  
Hilo, HI 96720

Dear Mr. Leonard:

State Land Use Boundary Amendment SLU 91-1 (A91-665)  
Petitioner: Kamaaina Eight  
Environmental Impact Statement Preparation Notice  
for Kohaniki Mauka

TRK: 7-3-9:15

Thank you for the opportunity to offer comments on the EISPN for Kohaniki Mauka. The following are our preliminary comments for your consideration:

**I. APPLICANT AND DEVELOPMENT SUMMARY**

The General Plan designation should be included in this section.

**II. PROPOSED GOVERNMENT ACTION**

Future actions should be clarified to show that the County Council makes the ultimate decision on a change of zone. Plan Approval must also be received from the Planning Department.

**IV. PURPOSE OF THIS DOCUMENT**

Is the document going to be used as supportive information for the change of zone application? If so, this needs to be stated.

The General Plan Land Use Pattern Allocation Guide (LUPAG) Map designation is Open along Queen Kaahumanu Highway.

**VII. PROJECT DESCRIPTION**

Detailed of conceptual master plans should be included in the EIS in addition to the Concept Plan.

The project description should include discussion of the intended area to be serviced by the requested commercial/industrial proposal. Since the site is serviced by a single access road more than one mile in length, additional trips can be expected from adjoining parcels of land.

The proposed interior road affects more than the parcel identified in the EIS.

The EIS should identify the range of commercial and industrial uses intended to be established. Any market studies or needs assessment should be included as part of the EIS.

Project phasing and construction timetable should be addressed in the EIS.

Infrastructure proposed for the project should also include fire protection needs as part of the water demand, sewage system requirements, solid waste disposal and off-site roads including intersection improvements to Queen Kaahumanu Highway.

**VIII. SUMMARY OF PROBABLE IMPACTS**

The biological surveys, historical sites survey, traffic impact analysis report and all other studies need to be included in the EIS. A hydro-geological report of groundwater movement and potential effects of the project on coastal and groundwater water quality should be conducted and included in the EIS. Accordingly, the discussion on wastewater disposal should be expanded.

The "generic" mitigation measures should be elaborated upon to allow the reader to understand its meaning.

Socio-economic impacts and impacts to surrounding planned and existing land uses should be discussed in detail.

**X. SUMMARY OF ALTERNATIVES CONSIDERED**

All alternatives considered should be part of the EIS and its impacts discussed individually. Mitigation for all

Mr. James Leonard  
Page 3  
June 24, 1991

XI. SUMMARY OF COMPATIBILITY WITH LAND USE PLANS AND POLICIES

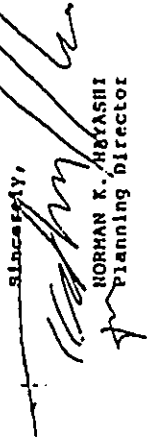
The EIS should identify the particular goals and policies which affect the proposed project and its consistency thereto.

XII. NECESSARY APPROVALS AND PERMITS

Plan Approval should be included in the permit or approval list. Building and Grading Permits are issued by the Department of Public Works.

Should you have any questions regarding the above, please feel free to contact Connie Kiriu or Alice Kawaha of this office at 961-8288.

Sincerely,



NORMAN K. HAYASHI  
Planning Director

CRK:lm  
2189D





June 27, 1991

Mr. Norman K. Hayashi, Director  
Hawaii County Planning Department  
25 Aupuni Street, Room 109  
Hilo, HI 96720

**SUBJECT: KOHANA'IKI MAUKA ENVIRONMENTAL IMPACT STATEMENT**

Dear Mr. Hayashi:

Thank you for your letter of June 24, 1991 concerning the above project. As a result of your comments, the DEIS reflects the General Plan designation and the future actions required of County Council and the County Planning Department. The document will be used in support of a zoning application, and is so stated.

As to the balance of your letter on an item by item basis:

**Project Description**

Since the project site is relatively small, and the preferred concept, as well as the alternatives, are not complex, a more detailed "master plan" was not deemed necessary. The DEIS will contain a market study, engineering analysis and traffic study which examine the issues of intended area of service, range of commercial and industrial use, as well as infrastructure needs.

The conceptual alternatives reviewed for the proposed project provided for an opportunity to furnish a joint-development access related to the parcel. Initial discussions have not been fruitful, but should such an access be contemplated, additional approvals and environmental studies will be required.

The project would proceed as one phase and the costs are estimated at approximately \$13 million dollars. The DEIS supplies this information.

**Summary of Probable Impacts**

An archaeological survey, traffic report, and hydro-geological study were conducted for the DEIS. Due to the limited area of the parcel and existing studies, no biological survey was done for the subject property, however, a full discussion is included in the relevant portions of the DEIS.

FOR MORE INFORMATION, PLEASE CONTACT THE HAWAII COUNTY PLANNING DEPARTMENT AT (808) 935-1100.

"Generic" mitigation measures were more fully defined as a result of your comments.

An entire chapter of the DEIS is devoted to socio-economic impacts. In terms of existing land uses, planning considerations included work with adjacent land owners, and a full discussion of consistency with the General Plan and the K in K Plan will be discussed in the DEIS.

**Summary of Alternatives Considered**

Given the size and constraints inherent in the site, alternatives were confined to road placement and lot configuration.

**Summary of Compatibility With Land Use Plans and Policies**

Chapter 7 in the DEIS involves a complete discussion of compatibility with all land use plans and policies affecting the site.

**Necessary Approvals and Permits**

Plan approval has been included, and the proper department referred for building and grading permits.

Thank you for your complete and thoughtful response to the preparation notice.

Sincerely,

PBR HAWAII

*Ramona Mattix*  
*Nathaniel*

Ramona Mattix  
Project Planner

04/11/91

C H A P T E R 11

---

COMMENTS RECEIVED DURING THE DRAFT EIS  
COMMENT PERIOD AND RESPONSES

**CHAPTER 11- COMMENTS RECEIVED DURING THE DRAFT EIS REVIEW PERIOD AND RESPONSES**

**11 PARTIES RESPONDING TO THE DRAFT EIS AND RESPONSES**

The Final EIS was prepared following the issuance of the Kohanaiki Mauka Draft Environmental Impact Statement (DEIS). Notice of the circulation of the DEIS published in the OEQC Bulletin by the Office of Environmental Quality Control on July 8, 1991. The agencies and organizations listed below were sent copies of the DEIS and a cover letter soliciting comments. A total of 16 agencies/organizations responded to the request for comments and are identified in the list below with an asterisk (\*). Copies of the correspondence and responses are reproduced as part of Chapter 11.

**FEDERAL AGENCIES**

Army - DAFE (Engineering Facilities USACH)\*  
Navy\*  
Department of Interior, Parks Division  
Regional Division, U.S. Environmental Protection Agency  
Soil Conservation Service  
U.S. Fish and Wildlife Service  
U.S. Army Corps of Engineers  
U.S. Coast Guard

**STATE AGENCIES**

Department of Agriculture  
Department of Defense\*  
Department of Education  
Department of Health\*  
Department of Land and Natural Resources\*  
DLNR State Historic Preservation Officer\*  
Department of Business, Economic Development and Tourism\*  
DBED Library  
Housing Finance and Development Corporation\*  
Department of Transportation\*  
State Archives  
Department of Accounting and General Services\*  
State Energy Office  
Office of State Planning  
Office of Environmental Quality Control\*  
University of Hawaii Environmental Center

**COUNTY OF HAWAII**

Planning Department\*  
Department of Parks and Recreation  
Department of Public Works  
Department of Water Supply\*  
University of Hawaii - Hilo Campus Library

**NON-GOVERNMENTAL ORGANIZATIONS**

American Lung Association\*  
Hawaiian Electric and Light Company  
Hawaiian Telephone\*  
Office of Hawaiian Affairs  
Sierra Club, Hawaii Chapter  
The Nature Conservancy, Hawaii Chapter  
Native Hawaiian Legal Corporation\*

**MEDIA**

Honolulu-Star Bulletin  
Honolulu Advertiser  
West Hawaii Today  
Hawaii Tribune Herald

**INTERESTED PERSONS**

J. Michel Kaisser, Holualoa Management Corp., Kailua-Kona, HI

**LIBRARIES**

U.H. Hamilton Library, Hawaiian Collection  
Legislative Reference Bureau  
Kailua-Kona Library

MAY 18 1991



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII  
25 AUPUNI STREET • HILO, HAWAII 96720  
TELEPHONE (808) 935-1421 • FAX (808) 935-6596

May 15, 1991

PBR Hawaii  
ATTENTION: MR. JAMES LEONARD  
101 Aupuni Street, Suite 130  
Hilo, HI 96720

KOHAWAIKI MAUIKA ENVIRONMENTAL IMPACT STATEMENT  
PREPARATION NOTICE AND SUMMARY  
TAX MAP KEY 7-3-9:15  
FILE BA-7-006-0055

This is in response to your transmittal letter of May 6, 1991 regarding the subject document.

Please refer to the attached copy of our letter of March 22, 1991 to the Office of State Planning regarding the State Land Use Boundary Amendment (A91-665) for our comments and requirements.

Should you have any questions, please contact our Water Resources and Planning Section.

H. William Sewate  
Manager

WA

Attach.

... Water brings progress...

MAY 18 1991  
dy. ps  
COPY



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII  
25 AUPUNI STREET • HILO, HAWAII 96720  
TELEPHONE (808) 935-1421 • FAX (808) 935-6596

March 22, 1991

Office of State Planning  
State Capitol  
Honolulu, HI 96819

STATE LAND USE BOUNDARY AMENDMENT (A91-665)  
KAWAII  
TAX MAP KEY 7-3-09:15

For your information, the applicant has obtained rights to a commitment for thirty (30) units of water at 600 gallons per day per unit through participation in the Kealahou Source Agreement program. To secure the water commitment, the prevailing facilities charge needs to be paid by the applicant. The prevailing facilities charge, which is subject to change, is \$1,000 per unit or \$54,300 for thirty (30) units.

The applicant has mentioned in the application that onsite and offsite storage reservoirs and pipelines will be constructed to accommodate the fire-flow and domestic-flow requirements of the proposed development. Also mentioned was the need for further source development for future phases of the proposed development.

Given the above information, we have no objections to the subject request at this time. However, it is requested that the applicant provide more information regarding the water needs of the future phases of the development.

H. William Sewate  
Manager

WA

cc - Kamaaina Eight - c/o Robert D. Triantos, Esq.  
Planning Department

BA 7-006-0055  
H. William Sewate





JUL 10 1991



EDWARD Y. INCHARDOP  
Lieutenant Colonel  
Hawaii Air National Guard  
Contracting & Engineering Officer  
State of Hawaii, Department of Defense  
3949 Diamond Head Road  
Honolulu, Hawaii 96816-4495



STATE OF HAWAII  
DEPARTMENT OF DEFENSE  
OFFICE OF THE ADJUTANT GENERAL  
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816-4495

July 8, 1991

Engineering Office

Ms. Esther Ueda  
State Land Use Commission  
Room 104, Federal Building  
355 Merchant Street  
Honolulu, Hawaii 96813

Dear Ms. Ueda:

==

Subject: Kohanaiki Mauka

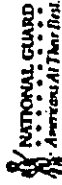
Thank you for providing us the opportunity to review the above subject project.  
We have no comments to offer at this time regarding this project.

Sincerely,

*Jerry M. Matsuda*

Jerry M. Matsuda  
Lieutenant Colonel  
Hawaii Air National Guard  
Contracting & Engineering Officer

cc: Mr. Burke Matsuyama  
Kamaaina Eight Partners  
Mr. James Leonard  
PBR Hawaii  
OEQC



NATIONAL GUARD  
American Air Force

July 26, 1991

Mr. Jerry M. Matsuda  
Lieutenant Colonel  
Hawaii Air National Guard  
Contracting & Engineering Officer  
State of Hawaii, Department of Defense  
Office of the Adjutant General  
3949 Diamond Head Road  
Honolulu, Hawaii 96816-4495

SUBJECT: KOHANAIKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Lieutenant Matsuda,

Thank you for your letter of July 8, 1991 concerning the above project. We appreciate the time and attention given to review the document. Should you have any further comments or concerns, please do not hesitate to contact me or Mr. James Leonard, Project Manager

Sincerely,

PBR HAWAII

*Ramona Matix*

Ramona Matix  
Project Planner

0401 21WS1

OFFICE OF THE ADJUTANT GENERAL  
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816-4495  
TELEPHONE: (808) 535-1100 FAX: (808) 535-1100

39 Uluani St., Hilo, HI 96720 • Telephone (808) 935-1206, Fax (808) 935-7474  
73-4177 Kilauea St., Kailua-Kona, HI 96740 • Telephone (808) 325-5339

**AMERICAN LUNG ASSOCIATION of Hawaii**  
The Christmas Seal People®

July 10, 1991

State Land Use Commission  
Federal Building, Room 104  
355 Merchant Street  
Honolulu, Hawaii 96813

Gentlemen:

Subject: Draft EIS  
Kohanaiki Mauka

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

1. Page 39, Sec 4.2.5.1: The third paragraph cites the "preponderant Northeast tradewinds" as the reason for good air quality in Hawaii. This may be true for most parts of Hawaii, but in West Hawaii the tradewinds contribute to the transport of volcanic air pollutants into the area causing an almost continuous air pollution problem. Typically, daytime winds are light onshore southwesterlies while nighttime winds are light downslope drainage winds, neither of which are very efficient at removing air pollution.
2. Page 39, Sec 4.2.5.2: This "probable impacts" section simply notes that the proposed subdivision will be an "indirect" source of air pollution due to its inherent generation of motor vehicle activity. No effort is made to quantify the magnitude of this impact. The Traffic Impact Assessment Report prepared for this project found that traffic conditions along Queen Kaahumanu Highway will be highly congested by 1999 and that the proposed project will contribute to that congestion. With this finding, it would seem incumbent upon the impact analyst to attempt to quantify pollutant levels for comparison with state and federal air quality standards. Even if the project's contribution is small, if it were found to be contributing to violations of state or federal standards, then that contribution becomes significant.
3. Page 40, Sec 4.2.5.3: The second paragraph appears to come to an unsubstantiated conclusion of no significant impact and therefore no requirement for mitigation measures. The failure to quantify cumulative impact yet conclude "insignificant" impact and provide no mitigation represent serious shortcomings in this DEIS.

Based on the aforementioned comments, we find the DEIS unacceptable and respectfully suggest that you make a similar determination. These shortcomings can and should be corrected before the EIS is accepted.

Sincerely,  
*Ann H. Nies*  
Ann H. Nies  
West Hawaii Program Assistant

cc: OEQC  
Kamaaina Eight Partners  
PPBR Hawaii



July 25, 1991

Ms. Ann M. Nies  
West Hawaii Program Assistant  
American Lung Association  
39 Uluani St.  
Hilo, HI 96740

**SUBJECT: KOHANAUKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT**

Dear Ms. Nies:

Thank you for your comments concerning the above project. We have reviewed your concerns and are responding according to the order in your letter.

1. Page 39, Sec. 4.2.5.1: In general, the Northeast tradewinds are a major contributor to the excellent air quality in the State, however, your point is well taken that West Hawaii is shielded from the trades due to its location in the lee of the island's mountains, Mauna Kea, Mauna Loa and Hualalai. Wind patterns are primarily affected by differential cooling of land and sea. We will incorporate this information in the final EIS.
2. Page 36, Sec. 4.2.5.2: Motor vehicle activity resulting from businesses locating on the site, since the project is developed, was considered "indirect", as the project itself will not generate long term air pollutants.
3. Page 40, Sec. 4.2.5.3: We reviewed the traffic and air quality reports of the two largest proposed projects in West Hawaii, the State project at Kealahou, and the Queen Liliuokalani Trust (QLT) project, to determine the relative "significance" of air quality impacts associated with the Kohanauki Mauka project. Together, these two larger projects will generate over 95,000 trips daily, with approximately 8,000 trips occurring during the pm peak hour. (Please refer to the Final EIS for each of these projects). In comparison, the Kohanauki Mauka project is estimated to generate about 620 trips during the pm peak hour, or approximately 7% of the total attributed to the two larger projects.

In addition, the air quality modeling studies done for both Kealahou and QLT indicate that, even during congested air circumstances when meteorologic conditions are "worst case", it is unlikely that federal and State air quality standards would be violated, however, carbon monoxide

concentrations could occasionally exceed State standards at congested intersections. No other AAQS violations due to these large projects were anticipated. In light of these findings, the anticipated congestion of Queen Kaahumanu Highway (whether or not the Kohanauki Mauka project goes forward), and the planned regional improvements for traffic circulation in the West Hawaii region, we determined that the proposed project impact on air quality would likely be insignificant.

Quantifying the cumulative air quality impact of all development planned for West Hawaii is outside the scope of this EIS, however, the traffic analysis provided for the project furnishes baseline information for agencies, such as yours, wishing to investigate overall impacts. This issue is discussed in section 8.2 of the Kohanauki Mauka DEIS.

If we can be of further assistance to you, or if you should have any questions, or further comments please do not hesitate to contact me or James Leonard, Project Manager.

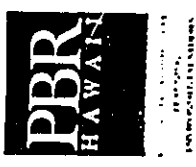
Sincerely,

PBR-HAWAII

Ramona Mattix  
Project Planner

4/11/91 10:41 AM





1000 KALANIAN'OLUHANA DRIVE  
HONOLULU, HAWAII 96813  
(808) 535-1119

July 26, 1991  
Mr. Teuane Tomimaga  
State Public Works Engineer  
Department of Accounting and General Services  
State of Hawaii  
P.O. Box 119  
Honolulu, HI 96810

**SUBJECT: KOHANA'IKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT**

Dear Mr. Tomimaga:

Thank you for your letter of July 19, 1991 concerning the above project. We appreciate the time and attention given to review the document. Should you have any further comments or concerns, please do not hesitate to contact me or Mr. James Leonard, Project Manager.

Sincerely,

PBR HAWAII  
*James Leonard*  
James Leonard  
Project Planner

4/20/91 jtw

FOR INFORMATION OF THE PUBLIC, THE FOLLOWING INFORMATION IS BEING MADE AVAILABLE TO THE PUBLIC BY THE DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES, STATE OF HAWAII.

v  
(P)1768.1

*Out of Acc. 119  
P.O. Box 119  
96810  
P-24  
1/20/91*

JUL 19 1991

State Land Use Commission  
Federal Building, Room 104  
335 Merchant Street  
Honolulu, Hawaii 96813

Attention: Ms. Esther Ueda

Gentlemen:

Subject: Kohanaiki Mauka  
Kohanaiki, North Kona, Hawaii  
Draft EIS

Thank you for the opportunity to review the subject document. We have no comments to offer.

Should there be any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 548-7192.

Very truly yours,

*Teuane Tomimaga*  
TEUANE TOMIMAGA  
State Public Works Engineer

RY:jk  
cc: Kamaaina Eight Partners  
PBR Hawaii  
OEOC

July 22, 1991



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
STATE HISTORIC PRESERVATION DIVISION

July 22, 1991

Mr. Brian Choy, Director  
Office of Environmental Quality Control  
220 South King Street, Fourth Floor  
Honolulu, Hawaii 96813

Dear Mr. Choy:

SUBJECT: Historic Preservation Review -- Draft Environmental Impact Statement for  
Kohalaiki Hauka Commercial/Light Industrial Subdivision (Kamaaina Eight  
Partners)  
Kohalaiki, North Kona, Hawaii  
THK: 7-3-09: 15

Thank you for the opportunity to review this Draft EIS. We have a number of concerns about the archaeological inventory survey conducted in the project area. Neither the DEIS nor the inventory report provides enough information for us to agree that the project will have "no effect" on significant historic sites. It is our recommendation that the inventory report be revised to provide this additional information and be resubmitted.

Comments follow concerning the archaeological inventory survey (Letter Report, Kennedy to Leonard, April 22, 1989), and we also include a note on an apparent error on the geology of the area in the Draft EIS which could affect historic site findings.

Archaeological Inventory Survey:

Before we can evaluate the accuracy of the conclusion that no historic sites are present in the project area, we will need more information about how the survey was conducted and a discussion about why no historic sites were found in this particular strip of land. We also feel that additional field work is needed to determine if historic or human remains lie in the lava tubes which may run beneath the project area. The inventory report should be revised to address these concerns and to include the results of additional field work. This revised report should be reviewed by our office and, if approved, should be appended to the final EIS.

1. Survey Methods. The section discussing survey methods should give the amount of time it took the three man crew to survey the parcel and the number of east-west sweeps made. Were the crew members spaced 1 meter apart in an area where ground visibility is described as "excellent"? Is there a typographical error in the report? If the sweeps were 1 meter apart, it would have taken approximately 38 sweeps to cover the parcel.

Mr. Brian Choy, Director  
July 22, 1991  
Page 2

7. Discussion of Archaeological Background. It is particularly important for this report to discuss why no historic sites were found in an area where we generally expect some historic remains, even if in low numbers. The author briefly presents a list of archaeological work conducted in the area and suggests that most of these studies found sites, including caves, structures and burials. He does not, however, give a clear summary of known site types and site distribution patterns in nearby areas at comparable elevations and in similar terrain. This kind of summary should be the basis for discussing why no historic remains were found in the project area. If the lava flows or the predominance of flow types differ from the neighboring areas, this could help explain a relative absence of sites.

3. Mitigation Measures for Unidentified Lava Tubes. The report states that portions of the subject property contain subsurface lava tubes whose entrances are located outside the property boundaries. To mitigate adverse effects on historic remains or burials that could be in these tubes, the author recommends that an archaeologist monitor ground preparation activities according to a monitoring program. We do not agree that this is an acceptable means of inventorying or treating probable historic sites, particularly when the likelihood of burials is relatively high. Once heavy equipment has crushed or broken the roof of a lava tube and the monitor can inspect the lava tube, the historic or human remains could be badly damaged. We ask instead that an inventory survey be conducted of these tubes at this point in the process to determine if they contain significant historic sites, even if the tubes must be entered from openings on the neighboring property. During the survey, it will be crucial to map the course of the lava tube to locate where or if it passes beneath the project area and where any historic remains may lie along its course. Until this is done, we will assume that the project area has not undergone an adequate inventory of historic sites.

We also note an error in the Draft EIS section discussing the geology of the area (page 22). The DEIS states that "the project site is dominated by the lava flows that emanated from Hualalai in 1800-1801." At first we thought this might explain the absence of historic remains in the project area but, after checking our records, it was clear that the 1800-1801 flows lie to the north and that the project area is underlain by older flows which could contain archaeological sites of some antiquity.

If you have any questions about this review, please call Holly McEdlowney at 597-0008.

Sincerely,  
*[Signature]*

DDM HIBBARD, Administrator  
State Historic Preservation Division



PLANNING  
DEPARTMENT  
HAWAII

September 2, 1991

Mr. Don Hibbard,  
Administrator  
State Historic Preservation Division  
Department of Land & Natural Resources  
33 South King Street, 6th Floor  
Honolulu, HI 96813

SUBJECT: KOHAWAIKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Hibbard:

Thank you for your letter of July 22, 1991 concerning the above project. We appreciate the time and attention given to review the document. We are addressing your comments in the order followed in your letter.

117

1. Survey Methods

Just as you noted, there was a typographical error in the report, as crew members were spaced 10 meters, not 1 meter apart. This error will be corrected in the text.

2. Discussion of Archaeological Background

The Archaeological Report will be updated to include historical survey information of the Ahupua'a and the project area, as well as a distribution analysis.

3. Mitigation Measures for Unidentified Lava Tubes

The comment regarding unidentified lava tubes with off site entrances raises a number of difficult issues. Among these are legal questions outside the legislated EIS process such as liability, right-of-entry, and responsibility of disposition.

Beyond the potential legal implications of documentation and survey of off-site lava tube areas, a number of practical considerations impede such mitigative mapping. There are thousands of caves and tubes on the Island of Hawaii. Many run for miles underground, and they often divide, and sub-divide, or

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September 2, 1991  
Mr. Don Hibbard  
Page Two

are blocked, only to continue at another point. Any complete survey of an extensive off-site system of lava tubes would take months and substantial financial resources. Also, determining which entrance feature can be linked to a specific tube is difficult. When interior transects are made, only extremely rough estimates can be made of property boundaries above. Further, there are no guidelines indicating what the perimeter of a "adequate survey" might be.

We would like to point out that, at the time of the survey, the area surrounding the property was visually scanned to determine if tube openings were located near the project boundaries and none were found. Seven caves found on the property were no larger than a meter or two and no evidence of cultural material was found. There is no reason to assume major caves or tubes occur beneath the project site, however, the possibility is there, which is why we recommended site monitoring of ground preparation.

We believe the mitigation measures proposed are reasonable and adequate, particularly given the lack of historic or cultural features found on site, the size of the site, and the extent of the project. We are not aware of any similar mapping requirements, such as those suggested in your letter, on any of the much larger proposed developments in West Hawaii.

Regarding your comment on the geology of the area, in rechecking our map information we note that, although near the lava flows emanating from the Hualalai eruption of 1800-1801, the project is situated on prehistoric flows. A clarification on this point will be made in the Final EIS.

Should you have any further comments or concern please don't hesitate to contact myself or Ms. Ramona Hattix, Project Planner. Sincerely,

*Ramona Hattix*  
JAMES H. LEONARD  
Project Manager  
PBR HAWAII - Hilo Office

cc: R. Hattix  
436\1dh.dcl

**GTE Hawaiian Tel**

*Beyond the call*

GTE Hawaiian Telephone Company  
P.O. Box 2200 Honolulu, Hawaii 96811 (808) 461-1611

JUL 24 1991

Mr. James Leonard  
PBR Hawaii  
101 Aupuni Street, #310  
Hilo, Hawaii 96720

Subject: Review of the Kohanaiki Mauka  
Environmental Impact Statement (EIS)

Dear Mr. Leonard:

Thank you for the opportunity to comment on the above referenced  
Environmental Impact Statement (EIS).


We are naturally concerned with the telecommunication service  
requirements of the subject area. The EIS does not provide suf-  
ficient information on the future use of the proposed reclassi-  
fied lands; i.e., the number and type of industrial/commercial  
units from which estimates can be made for the number of fender  
pairs.

To ensure telecommunication service to the proposed area, sites  
must be made available to GTE Hawaiian Tel via land acquisi-  
tion/easements. In order to support two (2) 914 EX HETRO ( pair  
gain units) and at least 1500 lines, approximately 600 to 900  
square feet of land will be required. A greater line-quantity  
would require a larger pair gain unit and a parcel of land con-  
taining 8,000 to 10,000 square feet.

The importance of having land available for the pair gain units  
cannot be overemphasized. We would appreciate the inclusion of  
the above stated requirements in the EIS.

Should you have any questions, please call me at 546-3464.

Sincerely,

  
Walter H. Matsumoto  
Operations Manager  
OSP Engineering



July 26, 1991


Mr. Walter M. Matsumoto  
Operations Manager  
OSP Engineering  
GTE Hawaiian Telephone Company  
P.O. Box 2200  
Honolulu, Hawaii 96841

SUBJECT: KOHANAIKI MAUKA DRAFT ENVIRONMENTAL IMPACT  
STATEMENT

Dear Mr. Matsumoto:

Thank you for your letter of July 24, 1991 concerning the above project. We appreciate the time  
and attention given to review the document. Unfortunately, we are unable to provide the exact  
number and type of industrial/commercial units which may locate on the proposed project site,  
as the future tenants are not determined at this time. Kamaaina Eight Partners certainly shares  
your concern that adequate telecommunication service be ensured. They are committed to  
working closely with GTE Hawaiian Telephone to facilitate service to the area. Your support  
requirements will be included in the Final EIS. Should you have any further comments or  
concerns, please do not hesitate to contact me or Mr. James Leonard, Project Manager.

Sincerely,

PBR HAWAII  
  
Ramona Matix  
Project Planner

4 JUL 23 1991

INDUSTRIAL TELEPHONE SERVICE  
HAWAIIAN TELEPHONE COMPANY  
P.O. BOX 2200 HONOLULU, HAWAII 96841

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31





DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
1500 (FORM 2-78)  
FT SHAFTER HAWAIIAN ISLANDS

REPLY TO  
ATTENTION OF  
August 5, 1991

Planning Division

State Land Use Commission  
Room 104 Federal Building  
355 Merchant Street  
Honolulu, Hawaii 96813

Attention: Ms. Esther Ueda

Dear Sir or Madam:

We have reviewed the Draft Environmental Impact Statement (DEIS) for Kohalaiki Mauka, Kohalaiki, North Kona, Hawaii (TMK 3-7-09: 15). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. DA permit requirements are not applicable.

b. According to the Federal Emergency Management Agency's Flood Insurance Rate Map, Panel 1551660001-1900, dated July 16, 1990, the project site is in Zone X - unshaded (areas determined to be outside of the 500-year flood plain).

Sincerely,

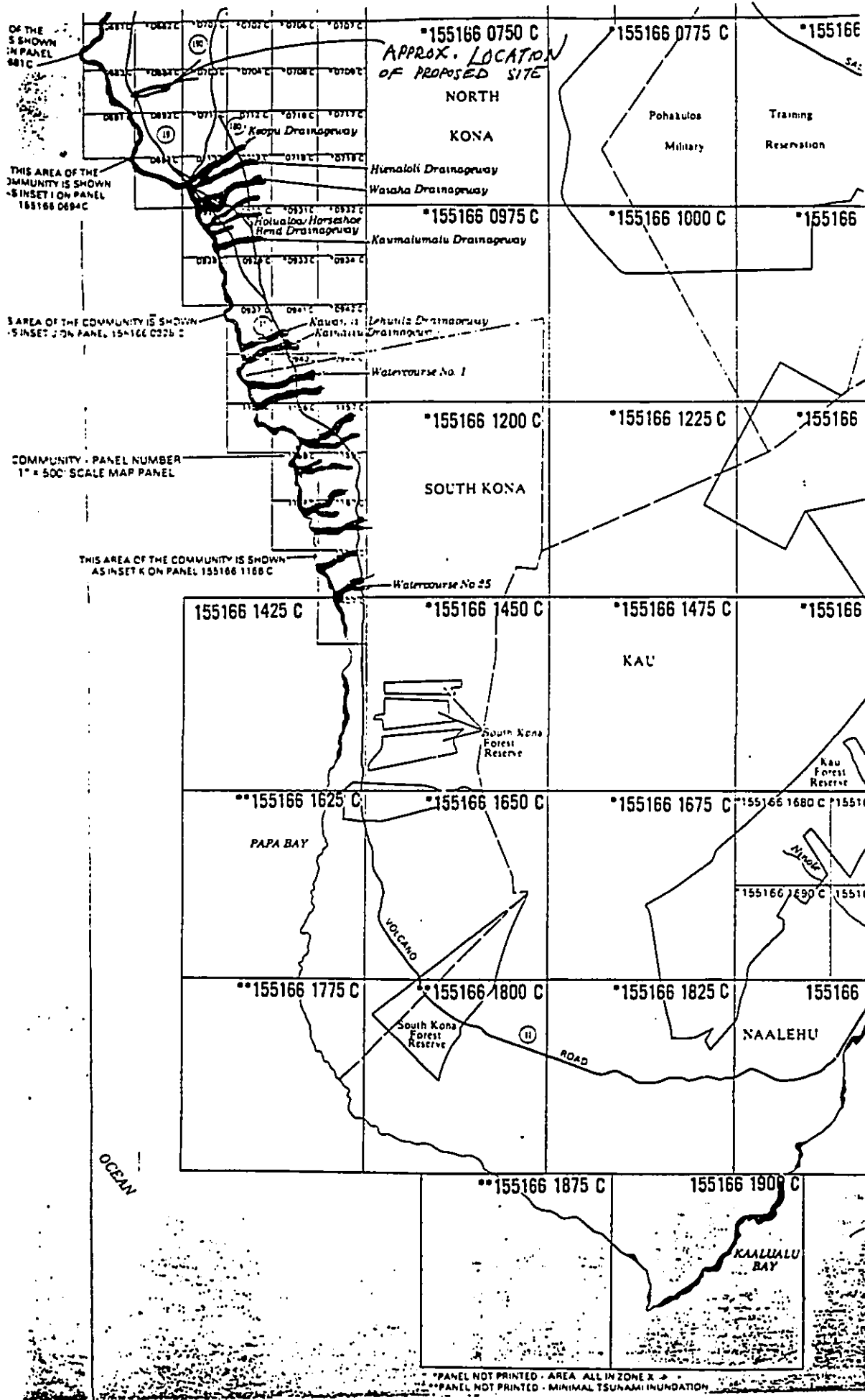
*KJYp*

Kinuk Cheung  
Director of Engineering

Enclosure

Copies Furnished:

Kamaaina Eight Partners  
Attention: Mr. Burke Matuyama  
73-4354 Mamoahoa Highway  
Kailua-Kona, Hawaii 96740





1000 BELLEVILLE BLVD  
HAWAII  
HONOLULU HAWAII

September 4, 1991

Kisuk Cheung, Director  
of Engineering  
Department of Army  
U.S. Army Engineer District  
Building 230  
Fort Shafter, Hawaii 96858-5440

SUBJECT: KOHAWAIIKI MAUKA DRAFT ENVIRONMENT IMPACT STATEMENT

Dear Mr. Cheung:

Thank you for your letter of August 5, 1991 concerning the above project. We appreciate the time and attention given to review the document and your confirmation that the Department of Army permit requirements are not applicable to this project.

Should you have any further comments or concerns, please do not hesitate to contact either myself or Ms. Ramona Hattix, Project Planner.

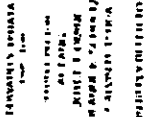
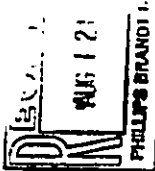
Sincerely,

*Ramona Hattix*

JAMES LEONARD  
Project Manager  
PBR HAWAII - Hilo Office

cc: R. Hattix

4361kc.del



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
1001 KALANOAU DRIVE II  
HONOLULU, HAWAII 96813-0001  
August 8, 1991

Ms. Brian Choy  
Page 7  
August 8, 1991

HWY-PS 2.8195

b. The 5% annual growth rate used to project ambient traffic is significantly lower than rates used for other studies in the area.

The forecasts for this corridor from the Island of Hawaii Long Range Highway Plan are considered conservative as they do not reflect many of the new proposed developments for the area. Yet the forecasts are two to three times higher than those used in the TIAR.

c. The TIAR states that the access road is shared with the adjoining lot. Traffic from this lot should be included in the intersection analysis.

d. The AM peak hour should also be evaluated. Impacts to our facility may be critical during the commuter peak, with employees entering the project site.

2. Until the designated interchange in the project vicinity is constructed, the developer shall provide a fully channelized intersection.

3. Our present policy prohibits the installation of traffic signals along Queen Kaahumanu Highway.

4. The developer should commit to providing those roadway improvements required by his project.

5. Additional regional traffic mitigation measures required as a cumulative result of this and other projects in the area should also be provided by the developer. The developer should participate in the funding and construction of such regional traffic improvements on a pro-rata basis, as determined by the State Department of Transportation.

6. All utilities within the Queen Kaahumanu Highway rights-of-way shall be placed underground and outside the edge of the pavement. Bikepaths and highway landscaping should also be discussed.

7. Plans for construction work within the State highway rights-of-way must be submitted for our review and approval. All costs incurred for roadway improvements shall be borne by the developer.

MEMORANDUM

TO: Brian Choy, Director  
Office of Environmental Quality Control

FROM: Edward Y. Hirata, Director  
Department of Transportation

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT  
KOHANA'IKI HAUKA MIXED USE DEVELOPMENT,  
KOHANA'IKI, NORTH KONA, HAWAII  
THK: 7-3-9: 15

Thank you for your transmittal requesting our review of the draft EIS for the proposed development.

We have the following comments:

1. The Traffic Impact Assessment Report (TIAR) should be revised and resubmitted for our evaluation.

a. The report should evaluate the access connection to a two-lane frontage road.

Queen Kaahumanu Highway is being planned as a high-speed, limited access highway with frontage roads and interchanges at selected locations. Access to the highway will be allowed only at major interchanges; all other roadways will have to access onto a system on frontage roads on both sides of the highway.

An engineering study is currently underway to determine the location of these interchanges along the highway, from Kailua to Kawaihae. Additional rights-of-way are required at these designated interchange sites.

Mr. Brian Choy  
Page 3  
August 8, 1991

HWY-PS / R199



8. Direct diversion of surface water runoff onto Queen Kaahumanu Highway will not be permitted.

9. The developer should coordinate with adjacent developers to determine the location of their interconnecting internal roadway system and other related infrastructure.

✓bc: PBR Hawaii

September 20, 1991

Mr. Ed Y. Harada,  
Director  
Department of Transportation  
869 Punchbowl Street  
Honolulu, HI 96813-5097

SUBJECT: KOHAWAIIKI HAUKA DRAFT IMPACT STATEMENT

Dear Mr. Harada:

Thank you for your letter of August 21, 1991 regarding the above project. We are responding to your comments in the order presented in that letter.

1. Traffic Impact Assessment Report (TIAR)

As requested, the Traffic Impact Assessment Report (TIAR) is being revised. An updated TIAR re-examining the future connections to the frontage road, annual growth rates for the area, and a.m. peak hour projection will be included within the final EIS and submitted for your evaluation under a separate cover.

2. Designated Interchange

As noted in the Draft EIS and TIAR, a fully channelized intersection will be constructed to provide access to the project until such time as a designated interchange and frontage road system is constructed.

3. Traffic Signals

Your policy prohibiting installation of traffic signals along Queen Kaahumanu Highway is noted.

4&5 Roadway Improvements

The developer will provide for needed roadway improvements required at the intersection with Queen Kaahumanu Highway. At such time that a frontage road system is constructed to a designated interchange, the developer expects to participate for such regional traffic improvements on a prorata basis, as determined by the State Department of Transportation.

6. Utilities within Highway ROW

All project utilities that are within the Queen Kaahumanu Highway right-of-way will be placed underground and outside the edge of pavements. As currently planned, power and communication lines would extend to the project site directly from the utility lines which run near the edge of the highway right-of-way. The issue of bikeways and landscape improvements will be discussed further within the Final EIS.

7. Plans for Construction

Plans for construction work within the State Highway right-of-way will be submitted to the State DOT for review and approval prior to construction.

8. Surface Water Runoff

The site grading and internal roadway system will be engineered such that there is no surface water runoff onto Queen Kaahumanu Highway.

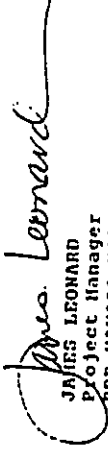
9. Coordination with Adjacent Developers

Representatives of the Kaamaina Eight Partners have discussed with the adjoining property owners, the location of the internal roadway system and other related infrastructure issues. The possibility of a joint development of an accessed roadway along the common boundary, as shown in Figure 6A, was also pursued. The

adjacent property owners (Lee Trust), however, have no plans for development on their property at this time. Therefore, the access roadway is currently planned to be entirely within the Kaamaina Eight property, as shown within Figure 6B and 6C. Provisions, however, will be made to provide for internal access to the adjoining property near the highway and at locations consistent with the regional roadway system, as described within the County of Hawaii Keahole to Kailua Development Plan, September 1989.

We thank you for the time spent to review the Draft EIS and TIAR documents and look forward to working together in refining the circulation and access plans for the proposed Kohanaki Hauka Project. If you have any questions or concerns, please do not hesitate to contact either myself or Ms. Ramona Mattix, Project Planner at our Honolulu Office.

Sincerely,

  
JAMES LEONARD  
Project Manager  
FBR HAWAII-Hilo Office

436Leh.De1

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STATE OF HAWAII  
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM  
LAND USE COMMISSION  
Room 111, The Federal Building  
Honolulu, Hawaii 96813  
Telephone: 485-4111

ADMINISTRATIVE  
SERVICES DIVISION

Mr. James Leonard  
August 20, 1991  
Page Two

AUG 21 1991

August 20, 1991

Mr. James Leonard  
PBR Hawaii  
161 Aupuni Street  
Suite 310  
Hilo, Hawaii 96720

Dear Mr. Leonard:

Subject: LUC docket No. A91-665/Kamaaina Eight, A Hawaii  
General Partnership

We have reviewed the Draft Environmental Impact Statement ("DEIS") for the subject docket and find that the following needs to be clarified or provided.

1. Coastal water quality impacts: The DEIS does not contain a discussion of possible impacts to nearby coastal areas. Page 27 of the DEIS states that increased paved areas of the proposed development would increase surface water run-off and that industrial uses could include activities which may generate substances that could leach into the groundwater.  
The Hydrologic Report, appendix E, discusses only the groundwater impacts of the proposed development. A discussion of non-point source pollution and possible off-shore and groundwater pollution should be provided.
2. Economic Impacts: the DEIS should contain a discussion of direct jobs generated by the proposed development.
3. Housing impacts: the DEIS states that potential new housing units required by employees have not been analyzed. Although the proposed development does not contain a proposal for residential units, the DEIS should address the potential demand for new housing that will be generated.

4. Water Demand: the DEIS states that a water commitment of 18,000 gallons per day has been obtained from the County of Hawaii for Phase 1 of the proposed development. However, the DEIS should indicate the total amount of water required for full build-out of the proposed project.
5. Solid waste: no figure for solid waste generation is provided. The Final EIS should provide a figure for the amount of solid waste to be generated by the proposed development.
6. Wastewater: no total for wastewater generated by the proposed development is provided. The Engineering Report, appendix B, states that after January 1990, the use of cesspools will not be allowed by the Department of Health (DOH).
7. Development Phasing and Timing: According to Title 11, DOH Chapter 200, EIS rule 11-200-17 (e)(5), the phasing and timing of the proposed development should be provided. On page 17 the total development cost is presented as \$13,000,000. However, there is not breakdown of these costs and the phase in which these costs will be incurred. The Final EIS should provide a breakdown of the development costs into its component and phase parts (i.e. drainage, water supply, roadway improvement, etc.).

If you have any questions, please call Steve Tagawa of my staff at 548-8101.

Sincerely,

*Esther Ueda*

ESTHER UEDA  
Executive Officer

EU:to

cc: Robert Triantos, Esq.  
OFQC



PLANNING  
BUREAU  
OF  
RESOURCES  
MANAGEMENT

September 25, 1991

Ms. Esther Ueda  
Executive Officer  
Department of Business,  
Economic Development & Tourism  
State Land Use Commission  
Room 104, Old Federal Building  
335 Merchant Street  
Honolulu, Hawaii 96813

**SUBJECT: KOHANAIKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT**

Dear Ms. Ueda:

Thank you for your letter of August 20, 1991 regarding the above project. We are responding to your comments in the order presented in that letter.

1. Coastal Water Quality Impacts

In Section 4.1.2.3 the EIS states that due to drainage improvements, and adequate treatment and disposal facilities which adhere to Department of Health guidelines, there will be no significant adverse impact on the brackish lens, therefore, no adverse impact is anticipated on coastal water quality. In both the EIS (page 28, paragraph 2) and the Hydrologic Analysis (Appendix E, page E-2) discussions, the dispersion rate and groundwater discharge flow that may potentially impact coastal waters is fully addressed, as the brackish lens is the source of dispersion toward the coast.

In terms of non-point, off-shore and groundwater pollution, only surface run off is considered a potential origin of pollutants, since other adequate drainage, treatment and disposal facilities would mitigate potential impacts on-site. Potential non-point source pollutants would be limited to vehicular oil leakage on roadways, landscape fertilizers, herbicides and pesticides. Road runoff would be directed to dry wells in accordance to Department of Health standards, since the Department of Transportation requires that no runoff flow to the highway. Actual surface runoff is low in volume due to the area climate and is highly unlikely to flow directly into the ocean.

WATER QUALITY IMPACTS ON THE KAHALA COASTAL WATERS

Ms. Esther Ueda  
**SUBJECT: KOHANAIKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT**  
September 25, 1991  
Page 2

or groundwater due to the rapid permeability of the lava in the area, as evidenced by dispersion rates.

2. Economic Impacts

The Traffic Impact Assessment Report estimates the Kohanaiki project will employ between 575 and 705 people (page D-7, paragraph 2). This calculation was used to develop traffic generation figures, however in terms of economic impacts, we believe that employee number estimate is not a reliable method for determining direct jobs generated by the tenants in the proposed development. As noted on page 49, the project itself would generate temporary construction jobs, and a few operational jobs. For the most part, the developers intend to relocate their own businesses on the project site, so many jobs would be transferred, rather than created.

In the market study done for the EIS, estimation of actual "direct" jobs, i.e. employment opportunities offered by economic activity generated on site is about 1,150 positions. This figure is considered the "upper level" of a range of employment opportunities. The assumption in the market study was that the project would be "quasi-industrial", that is, similar to Kaloko Industrial Park with a mix of commercial and industrial tenants. In reality, the location of the project site is likely to attract primarily industrial tenants. Information about phasing and employment generation have been added to Section 5.0.2 which reflects the range and timing of employment related to the project. In essence, a little over 100 employment opportunities per year would be generated by the project. Once again, it is expected a substantial number of these employment opportunities will be taken by employees of existing businesses that relocate to the site.

Since the Kohanaiki Mauka project represents less than 3.7 percent of the 1,900 proposed industrial acres listed in the 1988 West Hawaii Regional Plan, it is anticipated the proposed development will generate a less proportional impact on direct job creation.

3. Housing Impacts

Section 5.2.3 of the EIS indicates that estimating potential demand for housing from new employees (necessarily defined as those from out-of-State, or from other islands) is difficult, as discussed above, because determining direct job creation by new businesses locating on the project site is not easily confirmed. Additional information has been provided in Section 5.0.2 (see above discussion on employment impacts) regarding the employment opportunities estimated to be generated by the project.





Ms. Esther Ueda  
SUBJECT: KOHANA'IKI MAUKA DRAFT  
ENVIRONMENTAL IMPACT STATEMENT  
September 25, 1991  
Page 3

The premise of the Kohanaiki Mauka EIS in terms of housing is that the significant demand for housing in West Hawaii is created by the population growth related to resort development in the area. The proposed project represents less than 3.7 percent of the 1,900 proposed industrial acres listed in the 1988 West Hawaii Regional Plan, and a substantial number of jobs will be those associated with relocation of existing businesses, it is anticipated the project will generate a less proportional impact on direct job creation and, therefore, fewer impacts on housing.

In terms of mitigation, the County of Hawaii has recently proposed a "Unified Impact Fees Ordinance" directed toward developments having infrastructure expansion demands. Projects would be assessed a fee proportional to impact on County infrastructure. Thus far, no housing requirements have been enacted by the State or Hawaii County for commercial or industrial projects in West Hawaii. The unified impact fee, or similar legislation, would be a fair and equitable mitigation for any impact the Kohanaiki Mauka project may have on regional infrastructure systems and demand for housing.

4. Water Demand

127

For Phase I of the project, the water demand is estimated at an average of 18,000 gallons per day (gpd). Phase II water requirements are calculated at 148,000 gpd, a total of 166,000 gpd for the entire project, based on County Department of Water Supply estimates. These figures are included in the final EIS.

5. Solid Waste

Based on an average of 7 pounds of solid waste per person per day, an estimated range of 4,928 to 8,050 pounds/day (704 to 1,150 employees) of solid waste will be generated at project build-out. This information is incorporated in the final EIS.

6. Wastewater

The wastewater generated from the project will be in the range of approximately 24,640 to 40,250 gpd, based on 35 gallons per person per day (704 to 1,150 employees).

7. Development Phasing and Timing

A breakdown of costs and phasing of the Kohanaiki Mauka project are included in Section 2.5 of the Final EIS. Estimates as to tenant occupancy and employment creation are provided in Section 5.0.2, Employment and Economic Condition.

Ms. Esther Ueda  
SUBJECT: KOHANA'IKI MAUKA DRAFT  
ENVIRONMENTAL IMPACT STATEMENT  
September 25, 1991  
Page 4

The additional data provided above has been incorporated in the final EIS. If you have any further questions or concerns, please do not hesitate to contact James Leonard, Project Manager at our Hilo office.

Sincerely,

PBR HAWAII



Ramona Mattix, AICP  
Project Planner

Lorraine R. Inouye  
Mayor  
Nimman K. Hayashi  
Director

AUG 22 1991

Planning Department

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720 • (800) 961-8259

Ms. Esther Ueda  
August 21, 1991  
Page 2

August 21, 1991

Ms. Esther Ueda  
State Land Use Commission  
Federal Building, Room 104  
355 Merchant Street  
Honolulu, HI 96813

Dear Ms. Ueda:

State Land Use Boundary Amendment 91-1  
Applicant: Kawahina Eight Partners  
Request: Conservation/Agricultural to Urban  
Draft Environmental Impact Statement  
TKR: 7-3-9115

The following are our comments on the Draft Environmental Impact Statement (DEIS) prepared for the above-described application:

1. Page 11  
Plan Approval is granted by the Planning Department rather than the County Council.
2. Page 14 and Figure 6A  
If main access roadway includes adjacent parcel to the north, then that parcel should also be included as part of the project. To what extent have the adjacent landowners been approached on this concept?
3. Page 14  
Other industrial zoned lands in the area should include the Liliuokalani Trust Industrial Subdivision-Phase II and the 9.9-acre Isemoto Industrial Subdivision.
4. Page 18 Alternatives Considered  
A more detailed discussion is needed on the applicant's investigation of other possible alternatives and the

Justification for rejecting the options. The DEIS states that "Known feasible alternatives to the proposed project are limited to those that would allow the objectives of the proposed project to be met . . ." "The purpose of the proposed project is to provide a commercial/light industrial subdivision in the North Kona area . . ." It seems that analysis has occurred in a reverse manner where the conclusion has already been reached and the statements are built to support the project.

The DEIS suggests that the "relatively long and narrow configuration of the property" precludes feasible residential development. Why doesn't this same assumption also apply to commercial and industrial development, if not more so?

Alternative land uses should be analyzed as it relates to the proposed golf course and resort uses in the vicinity.

5. Page 34 Flora

The DEIS should further disclose which projects have been surveyed for floral resources and where these projects are located. The applicant has chosen not to conduct a floral survey due to the limited area of the parcel and existing studies. We would like to point out that floral surveys have been conducted for parcels and projects much smaller in size and scope.

6. Page 50 Water

The project needs to include water demand needs. Only Phase I has water commitments and the remaining phase is dependent on a joint agreement with the county for development of an additional water source. The DEIS should set forth the projected timetable for water availability in this situation. Have funds been appropriated to proceed?

7. Page 60 Hazardous Waste

Since the parcel is located mauka of the Kaloko-Honokohau National Historic Park and the Kohalaiki Resort development, which contains numerous pond complexes, the DEIS should address potential impacts on the coastal waters and possible mitigative measures, such as water quality monitoring.



Ms. Esther Ueda  
August 21, 1991  
Page 3

The EIS should analyze the impacts, if any, on the adjacent parcel for the proposed golf course.

8. Page 65

Page 2 refers to the recently updated General Plan Land Use Pattern Allocation Guide (LUPAG) map (1989). However, page 65 refers to draft revisions to the General Plan.

9. Page 76 General Plan

The EIS should expand the extent of uses allowed under the Urban Expansion designation. The General Plan goals and policies to which the project is consistent needs to be listed.

Kohalaiki is not listed under 'Industrial Areas' within the General Plan's Land Use element.

10. Page 76 County zoning

The present zoning is also unplanned for the subject property. The DEIS reads "Following SLUC and County General Plan redistricting . . . What is meant by General Plan redistricting?"

11. Page 81 (Section 8.2)

The DEIS notes . . . the (K to K?) and . . . Perhaps this portion of the sentence is a typographical error.

12. Page 81 Unresolved Issues

The adequacy of potable water should be listed as an unresolved issue and should also be mentioned in Chapter 1.

13. Figure 3 State Land Use and Page 68

The area immediately south of the project site should be labeled "C"-Conservation. It appears that this area could be mistaken to be within the Urban District. Only the proposed golf course lands and the Kaloko Light Industrial Subdivision are classified Urban.

Ms. Esther Ueda  
August 21, 1991  
Page 4

Accordingly, the parcel is not truly contiguous. It should also be noted that there's still available acreage within the Kaloko Light Industrial Subdivision for future demand (Phase 3 and 4 - 101+ acres).

14. Page 64 (6.10.2)

The document contains the following bold letters: "LOCATION OP PARKS TO SITE HERE". Perhaps the intent was to include more information in this section.

Thank you for the opportunity to provide comments on the DEIS. Should you have any questions or concerns, please feel free to contact Connie Kiriu or Alice Kawaha of this office.

Sincerely,

NORMAN K. HAYASHI  
Planning Director

CRK:RMO  
2826D

cc: Kamaaina Eight Partners  
PBR Hawaii  
OPQC



Mr. Norman K. Hayashi, Director  
 SUBJECT: KOHANAIKI MAUKA DRAFT  
 ENVIRONMENTAL IMPACT STATEMENT  
 September 25, 1991  
 Page 2

September 25, 1991

Mr. Norman K. Hayashi, Director  
 Hawaii County Planning Department  
 25 Aupuni Street, Room 109  
 Hilo, Hawaii 96720

SUBJECT: KOHANAIKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Hayashi:

Thank you for your letter of August 21, 1991 concerning the above project. We are responding to the comments in your letter in the order presented in that letter.

1. Inaccuracy - Plan approval by the Planning Department is noted in the Final EIS text.
2. Traffic - Representatives of the Kamaaina Eight Partners have discussed with the adjoining property owners, the location of the internal roadway system and other related infrastructure issues. The possibility of a joint development of an access roadway along the common boundary, as shown in Figure 6A, was also pursued. The adjacent property owners (Lee Trust), however, have no plans for development on their property at this time. Therefore, the access roadway is currently planned to be entirely within the Kamaaina Eight property, as shown within Figures 6B and 6C. Provisions will be made to provide for internal access to the adjoining property near the highway, and at locations consistent with the regional roadway system, as described within the County of Hawaii Keahole to Kailua Development Plan, September 1989.
3. Inaccuracy - The other industrial zoned lands in the area have been incorporated in the Final EIS.
4. Alternatives Considered - The parcel was purchased by the Kamaaina Eight Partners specifically to provide for the expansion of their business in the Kona area. This in itself limited the alternatives to be considered. The parcel configuration confines the potential for residential development because marketable residential products require more sensitive

RECEIVED - HAWAII COUNTY PLANNING DEPARTMENT - SEPTEMBER 25, 1991

siting on the land than do industrial or commercial lots. Siting considerations are restricted because of the long and narrow configuration of the parcel.

5. Flora - The primary resources consulted for the flora information were the Helbert Haskert and Kimura Environmental Impact Statements for Kohanaiki and O'o'ma II. We referred to the accepted EIS's for Isemito and McClean industrial projects, however, no flora studies were completed specifically for these environmental reports. Given the barren nature of the site and the information available, we believe the floral characteristics of the site have been fairly represented in the EIS.
6. Water - The timetable for a joint water source development agreement with the County will be contingent upon the timing for land use approvals. At this time the applicant, in consultation with the Department of Water Supply, has submitted a subdivision application (No. 91-136) to consolidate a quarter acre area with the Department's Keouu site in order to serve as a future water source development site. The applicant plans to enter into a formal agreement with the County of this well site following SLUC approval of the Boundary Amendment Petition and prior to their rezoning application to the County.
7. Hazardous Waste - The hydrological report completed for the project indicated that the residential cesspools and agricultural activities mauka of the proposed project have not contributed any increase in the nitrogen and phosphorus levels in coastal waters. Because the project will be constructed to comply with all federal, State and County regulations regarding hazardous wastes, no potential adverse impacts on coastal waters is anticipated. Information has been added to Section 6.5 to reflect this conclusion.
8. Inaccuracy - This inconsistency regarding the updated Hawaii County General Plan has been corrected in the text.
9. General Plan Information - Land uses allowed under Urban expansion have been included in the text. Goals and policies applicable to the project have also been incorporated.
10. Inaccuracy - The phrase: "County General Plan Redistricting" has been deleted.
11. Typographical error - The reference to the Keahole to Kailua Plan has been expanded.
12. Unresolved issues - Adequacy of potable water is not expected to be an issue with the pending agreement with the County for joint development of a water source in the Hualalai area.

RECEIVED - HAWAII COUNTY PLANNING DEPARTMENT - SEPTEMBER 25, 1991

Mr. Norman K. Hayashi, Director  
SUBJECT: KOHANAUKI MAUKA DRAFT  
ENVIRONMENTAL IMPACT STATEMENT  
September 25, 1991  
Page 3

13. State Land Use - The parcel is adjacent to the Urban District of the proposed golf course lands near the Kaloko subdivision. Figure 3 has been revised to show the Conservation designation.

Your time and effort to review the draft EIS is greatly appreciated.

Sincerely,

PBR HAWAII



Ramona Matix, AICP  
Project Planner



AUG 22 1991

BRIAN J. CHOY  
Director

STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
216 SOUTH KING STREET  
FOURTH FLOOR  
HONOLULU, HAWAII 96819

August 20, 1991

Ms. Esther Ueda  
State Land Use Commission  
335 Merchant Street, Room 104  
Honolulu, Hawaii 96813

Dear Ms. Ueda,

SUBJECT: Draft Environmental Impact Statement for Kohanaki  
Mauka, Kohanaki, North Kona, Hawaii

132

Thank you for the opportunity to review the Draft Environmental Impact Statement for the Kohanaki Mauka Project. We have the following comments:

1. A concise discussion of all unresolved issues should be included in the summary sheet of the EIS; and
2. The overall cumulative impact of all the projects in the vicinity of the site should be examined.

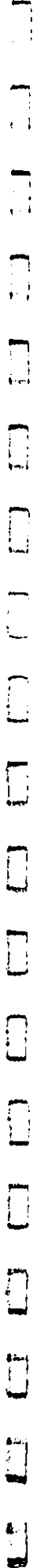
If you have any questions, please feel free to call Jeyan Thirugananam at 586-4185. Thank you.

Sincerely,

*Brian J. Choy*

Brian J. J. Choy  
Director

C: Kaama'ina Eight Partnership





PLANNING  
BUREAU  
HAWAII  
August 27, 1991

Mr. Brian Choi, Director  
Office of Environmental Quality Control  
2220 South King Street, 4th Floor  
Honolulu, HI 96813

SUBJECT: KOHANA'IKI HAUKA DRAFT ENVIRONMENT IMPACT STATEMENT

Dear Mr. Choi:

Thank you for your letter of August 20, 1991 regarding the above project. We are responding to your comments in the order presented in that letter.

1. Unresolved Issues

As requested, we are including a discussion of unresolved issues in the summary portion of the EIS. The material is taken from the lengthier discussion found in Section 8.3.

2. Cumulative Impact

As noted in Section 8.3, Cumulative Impact is one of the unresolved issues associated with the EIS, as it is with other EIS's addressing the proposed developments in West Hawaii. While there are numerous commercial and industrial projects "on the drawing boards", it is impossible to obtain definite, or even approximate information as to how many of these projects will actually reach fruition. The largest commercial and industrial proposal for the region, the SHUC Petition of the Queen Liliuokalani Trust (QLT), comprising approximately 1,108 acres, has only recently received State land entitlement for a portion of their project. At approximately 70 acres, the Kohanaiki Hauka project represents less than 1% of the size of the QLT proposal. In terms of cumulative impact, we believe the Kohanaiki Hauka project would have negligible, adverse, social and environmental impacts, when compared to other proposed developments.

The West Hawaii Regional Plan, written in 1988, shows 1,900 acres proposed for industrial development and allocates approximately 100 acres to QLT. By way of comparison, the Kohanaiki Hauka project represents 0.31 of this total. Again, we are led to the conclusion that, regardless of the difficulty in estimating the number of projects that will meet fruition, any additive affect of the Kohanaiki Hauka project on the social and environmental conditions in West Hawaii would be quite modest.

UNRESOLVED ISSUES DISCUSSION OF UNRESOLVED ISSUES

August 27, 1991  
Mr. Brian Choi  
Page Two

We hope we have addressed your concerns adequately. Should you have any comments or concerns, please do not hesitate to contact either myself and Ms. Ramona Mattix, Project Planner.

Sincerely,

*James Leonard*

JAMES LEONARD  
Project Manager  
PBR HAWAII-HILO OFFICE

cc: R. Mattix

4361bc.deis



# DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

AUG 2 2 1991

STATE OF HAWAII  
DEPARTMENT OF BUSINESS,  
ECONOMIC DEVELOPMENT & TOURISM  
335 MERCHANT STREET, ROOM 110  
HONOLULU, HAWAII 96813

91:948c

August 21, 1991

Ms. Esther Ueda  
State Land Use Commission  
335 Merchant Street, Room 104  
Honolulu, Hawaii 96813

Dear Ms. Ueda:

Subject: Draft Environmental Impact Statement (DEIS)  
for Kohanaiiki Hauka

Thank you for requesting our review and comments on the above DEIS.

We note that while the project is expected to result in increased electrical demand (page 40: 4.2.5.2), no estimates of additional electricity demand are presented in the DEIS. We believe it is appropriate to estimate the level of demand that will result from the fully developed industrial lots and the "integrated, high amenity retail and service commercial center" (page 7: 1.3). Given an estimate of increase in electrical demand, we might question the accuracy at this time of the statement that "sufficient HIELCO generating capacity exists to serve the planned facilities" (page 61: 6.6.2).

We request that the Environmental Impact Statement (EIS) explain in as much detail as possible the project's energy impacts and the energy-efficient design/technologies and renewable energy sources that will be used to help meet its energy requirements.

In addition, we request that the EIS examine the project's consistency with applicable energy provisions of the State Plan (Section 226-1A, HRS) and the State Energy Functional Plan. The requirement for an evaluation of the project's energy impacts in the DEIS is spelled out in the enclosed excerpt from the DEQC Bulletin.

Thank you for the opportunity to provide comments.

Sincerely,

Maurice H. Kaya  
Energy Program Administrator

HIK/PEL:do  
Enclosure  
cc: Burke Matsuyama  
James Leonard



September 27, 1991

Mr. Maurice H. Kaya  
Energy Program Administrator  
Department of Business, Economic  
Development & Tourism  
335 Merchant Street, Rm. 110  
Honolulu, HI 96813

SUBJECT: KOHANAIIKI HAUKA ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Kaya:

Thank you for your letter of August 21, 1991 concerning the above project. We appreciate the time and attention given to review this document. We are addressing your comments in the order followed in your letter.

1. Projected Energy Demand.

Given the level of planning performed at this time it is difficult to project the total project energy demand with any degree of accuracy. A general rule of thumb applied by HIELCO suggests that 8-10 watts/sq. ft capacity be planned for light industrial uses and 12 watts/sq. ft for retail commercial uses. Using these guidelines total project power requirements would be approximately 9,500 KW.

2. Sufficient HIELCO Generating Capacity.

The statement within the DEIS (page 61: 6.6.2) that "sufficient HIELCO generating capacity exists to serve the planned facilities" is based on earlier discussions with representatives of HIELCO's Engineering Department. We note that there are several other projects in the area of significantly larger scale whose power requirements are being planned for by HIELCO. These include the 1,107 acre Queen Liliuokalani Trust project, the 1000 unit residential project at Haniniowali, and the Kohanaiiki Resort Community, Resort Community (1986), their total project energy demands were estimated to be approximately 35 MW. In relation to this and other projects planned for the area, the potential impact to the area energy requirements of the proposed project would be minimal.

DISPATCHED TO THE HONOLULU TELETYPE CENTER FOR TRANSMISSION TO THE HONOLULU TELETYPE CENTER

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September 27, 1991  
Mr. Maurice Kaya  
Page 2

3. Energy Efficient Design Technology.

The subject DEIS was prepared in support of a Boundary Amendment Petition to the SUC. As noted, at this point in the planning process there has been no consideration of the individual design of commercial or light industrial facilities or the equipment therein. The developers recognize that it is in their economic self interest to adopt the most cost effective energy saving technology available. Energy efficient technologies, such as waste heat recovery systems, energy efficient fluorescent lamps, and power conditioning equipment will be evaluated as part of their facility planning and design. Other lots, beyond those to be used by the property owners, would be leased or sold to other businesses who would make improvements according to their specific needs.

The applicant can not require those developing individual projects within the proposed subdivision to adopt specific technologies as part of their facility design. Such technologies need to be evaluated, as far as their practicality and cost effectiveness, on a project by project basis. All commercial and light-industrial facilities, however, would be required to adhere to the Hawaii County Building Code in submitting their plans to the County Building Department for approval. The County Building Code contains specific provisions within Chapter 53 pertaining to building energy conservation for mechanically cooled buildings. Exterior lighting would adhere to the County requirements which promote energy efficient low-sodium lamps for exterior lighting fixtures.

4. Consistency with the State Plan and State Functional Plan.

The project's consistency with the State Plan and State Energy Functional Plan will be addressed within Chapter 7 of the Final EIS.

September 27, 1991  
Mr. Maurice Kaya  
Page 3

Again, I thank you for your comments to the Kohalaiki Hauka DEIS. Should you have any additional comments or concerns, please contact either myself or Ms. Ramona Hattix, Project Planner, of our Honolulu Office.

Sincerely,

*James H. Leonard*  
FOR HAWAII

James H. Leonard  
Managing Director  
Hilo Office

cc: R. Hattix



**NATIVE  
HAWAIIAN  
LEGAL  
CORPORATION**

**AUG 23 1991**

Kama'aina Eight Partnership  
c/o James Leonard  
August 22, 1991  
Page 2

Via Facsimile and Regular Mail

August 22, 1991

Kama'aina Eight Partnership  
c/o James Leonard  
PBR Hawaii  
101 Aupuni Street, Suite 310  
Hilo, Hawaii 96720

Re: Reclassification of Lands at Kohanaiki Mauka,  
North Kona, Hawaii for Light Industrial Park

Dear Mr. Leonard:

Our office is currently representing the Pai 'Ohana, a native Hawaiian family that resides within the historic Kaloko-Honokohau Federal Park. The Pai family are fishermen, and, for several generations, have been caretakers of a heiau and fish-trap within the park. Historically, the Pai family have gathered 'opae (shrimp) in the anchalane ponds along the Kohanaiki coast, the area where the Kohanaiki resort is currently being proposed. As the resort would directly impact on their interests, the Pai family have intervened in the county planning commission's SMA permit hearing to protect their traditional and customary rights to gather 'opae.

Further, the Pai 'Ohana use these 'opae as bait for larger fish which live in the ko'a, or fishing grounds offshore of Kohanaiki. In order to locate these ko'a, the Pai family use reference markers on land to line themselves with the ko'a offshore.

I am writing you this letter to request a copy of any archaeological surveys prepared by your firm in connection with the above development. My clients are concerned that many of these markers may be obstructed or even worse, obliterated by the development of the industrial park. We are unsure of the exact location of those markers and will not be able to fully determine the nature and extent of these markers until we talk more with our clients. Nevertheless, we are prepared to seek relief, by intervention

if necessary, to protect our clients' interest. We would appreciate whatever assistance you could provide to us in this matter.

Very truly yours,

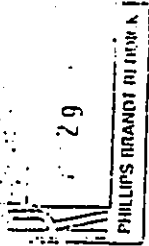
PAUL F. NAHOA LUCAS

PPNL:spk  
lp1ltr5:91.0011  
cc: Esther Ueda, State LUC  
Office of Environmental  
Quality Control (OEQC)  
Malani Pai





PHILIPS BRANDT RIHONA



29

PHILIPS BRANDT RIHONA

August 27, 1991

Paul L.F. Hohoa Lucas  
Native Hawaiian Legal Corporation  
1270 Queen Emma Street, Suite 1004  
Honolulu, HI 96813

SUBJECT: STATE LAND USE PETITION FOR KOHANA'IKI MAUKA, NORTH  
KONA, HAWAII

Dear Mr. Lucas:

Thank you for your letter of August 22, 1991. Per your phone request, a copy of the Archaeological Survey prepared by Archaeological Consultants of Hawaii and a series of exhibits showing the project location has been sent to you under separate cover.

As it may have an impact on the potential development of the Kohanaiki Mauka Project Site, we would be interested in obtaining a further description of the type of fishing reference markers that may be in the area.

Should you need any further information on the subject project, please do not hesitate to contact myself (961-3333) or Ms. Ramona Hattix, Project Planner, at the PBR HAWAII, Honolulu Office (521-5631).

Sincerely,

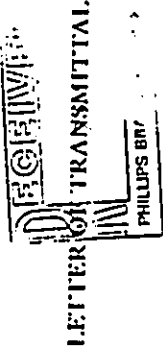
*James Leonard*  
JAMES LEONARD  
Project Manager

cc: T. Witten  
R. Hattix  
R. Triantos

436Lp1.slu



PHILIPS BRANDT RIHONA



PHILIPS BRANDT RIHONA

TO: Native Hawaiian Legal Rights Corp.  
1270 Queen Emma Street, #1004  
Honolulu, HI 96813

ATTN: Mr. Paul Lucas  
DATE: August 22, 1991  
PROJECT: Kohanaiki Mauka  
PROJECT NO.: 436

WE TRANSMIT:  Attached  Under Separate Cover  
VIA:  Mail  Delivery  Pick-up  Fax No.

Prints  Presentation Boards  Samples  
 Originals  Photographs  Product Literature  
 Reproductions  Report(s)  Change Order  
 Specifications  Copy of Letter

TRANSMITTAL ACTION:

As Requested  Action Indicated On Item Transmitted  
 For Your Use  For Signature and Return  
 For Review and Comment  For Signature As Noted Below  
 For Approval

COPIES	SETS	DATE	DESCRIPTION
1		8/22/91	Figures J-V Locating the Kohanaiki Mauka Project
1		4/22/89	Archaeological Reconnaissance Report

REMARKS: Per your request, we are sending the enclosed reference maps and

archaeological report for the proposed Kohanaiki Mauka Project.  
The approximately 70 acre site, located mauka of Queen Kaahumanu Highway and near Kaloko Light Industrial Park, is being planned for a mixed-use commercial and light-industrial subdivision.  
Please let me know if you need further information regarding the location of fishing reference markers that may be in the area.

COPIES TO: T. Witten  
R. Hattix

SIGNED: *James Leonard*  
JAMES LEONARD  
MANAGING DIRECTOR

If legible copies are not received, please call our office and we will retransmit the same at the soonest possible. Thank you



STATE OF HAWAII  
DEPARTMENT OF HEALTH

P. O. BOX 3119  
HONOLULU, HAWAII 96813

August 30, 1991

PHONE: 521-1111  
TELETYPE: 521-1111

IN REPLY, PLEASE REFER TO  
THE

EMDCW11

PH898M4

Ms. Esther Ueda  
August 30, 1991  
Page 2

Although not specifically stated in the draft Environmental Impact Statement (EIS), we note that the development is part of a larger plan which includes various types of developments. For this reason, we recommend that the final EIS include a commitment from the developer to create, or be a part of a regional or sub-regional wastewater system. Furthermore, the final EIS must include a realistic time schedule for the development and construction of this wastewater system as well as the elimination of the on-site wastewater systems.

Underground Injection Control (UIC)

It is our understanding that the North Kona Water System has discontinued use of the Waiala Stream as a source of potable water. Appendix B of the draft EIS discusses the use of drywells to address drainage requirements. The use of drywells in this manner would require an UIC permit to be issued by the Department. This permit requirement should be reflected in Section 1.9 of the EIS Necessary Approvals and Permits.

If you should have any questions regarding stormwater NPDES permits, please contact Mr. Walter West, Engineering Section of the Clean Water Branch, at 543-8309. Questions regarding wastewater disposal should be forwarded to Mr. Harold Yee, Wastewater Branch, at 543-8794. For questions regarding UIC permits, please contact Mr. William Wong, Safe Drinking Water Branch, at 543-8258.

Very truly yours,

*John C. Lewin*

JOHN C. LEWIN, M.D.  
Director of Health

C: Kamaaina Eight Partners  
PDR Hawaii  
Office of Environmental Quality Control

Ms. Esther Ueda  
State Land Use Commission  
Room 104 Federal Building  
355 Merchant Street  
Honolulu, HI 96813

Dear Ms. Ueda:

Subject: Draft Environmental Impact Statement  
Kohalaiki Mauka, Hawaii  
IHK: 7-3-09:15

Pursuant to a letter mailed to your office dated August 26, 1991, (Ref. No. 91-3-227X), the subject description incorrectly referenced the draft Environmental Impact Statement for Mahukona, Hawaii, which should have read Kohalaiki Mauka, Hawaii. We apologize for any inconvenience this may have caused.

We have reviewed the subject project and have the following comments:

National Pollutant Discharge Elimination System (NPDES)

For the subject construction activity involving clearing, grading and excavation of more than five (5) acres of total land area a stormwater NPDES permit application should be submitted to the Director of Health at least 90 days before the date on which construction is to commence.

Wastewater Disposal

It has been determined that the project is located within the proposed non-critical wastewater disposal area, as determined by the Hawaii County Wastewater Advisory Committee. The Department of Health concurs with the proposed method of wastewater treatment and disposal which utilizes on-site individual septic tanks and leach fields. Domestic wastewater disposal by means of this method of on-site wastewater system is acceptable provided that the wastewater system meets all of the applicable requirements of the Department of Health Administrative Rules, Chapter 11-67, "Wastewater Systems."



PLANNING  
BUREAU OF RESOURCES

September 27, 1991

Dr. John C. Lewin, Director  
State Department of Health  
P.O. Box 3378  
Honolulu, Hawaii 96801

**SUBJECT: KOHANA'IKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT**

Dear Dr. Lewin:

Thank you for your letter of August 30, 1991 concerning the above project. We are responding to the comments in your letter in the order presented in that letter.

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**National Pollutant Discharge Elimination System (NPDES)**

The requirement of a stormwater NPDES permit application is duly noted and will be pursued by the applicant at the appropriate time.

**Wastewater Disposal**

The Final EIS includes information regarding the condition that the onsite wastewater system meets all applicable requirements of the Department of Health Administrative Rules, Chapter 11-62, Wastewater Systems. Section 6.3 in the Draft EIS states that connection to the regional wastewater system is the intent of the applicants.

The applicant intends to participate with other developments in the area in connecting to a regional system when this is available. The time schedule and construction of the conversion and connection to this system is dependent on the availability of connectors in the area. It is anticipated this would not occur until well after the completion of the proposed project.

REQUIREMENTS WILL BE MET BY THE PROJECT DEVELOPER THROUGH THE PROPOSED CONSTRUCTION OF A REGIONAL WASTEWATER SYSTEM.

Your letter suggests that the proposed development is "part of a larger plan which includes various types of developments". Although the plan provides for the inclusion of arterial and mid-lateral roads, as shown in the County's Keahole to Kailua Development Plan, the project is limited to the 70 acre commercial and light industrial development, as shown.

**Underground Injection Control**

The need for a UIC permit application is reflected in Section 1.9 as requested.

Your time and effort to review the draft EIS is greatly appreciated.

Sincerely,

PBR HAWAII

Ramona Matix, AICP  
Project Planner

4/20/91

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PHILLIPS BRANDI REDDICK  
PHOTO REPRODUCED FROM ORIGINAL

STATE OF HAWAII  
DEPARTMENT OF BUDGET AND FINANCE  
HOUSING FINANCE AND DEVELOPMENT CORPORATION  
1515 WILSON AVENUE, SUITE 200  
HONOLULU, HAWAII 96813  
933 (808) 531-6100

September 12, 1991

Ms. Esther Ueda  
State Land Use Commission  
355 Merchant Street, Room 104  
Honolulu, Hawaii 96813

Dear Ms. Ueda:

Re: Draft Environmental Impact Statement for Kohalaiki Mauka,  
North Kona, Hawaii

Thank you for the opportunity to review the subject report.

Policies A(3) and B(3) of the State Housing Functional Plan seek to ensure that projects which impact housing provide an adequate amount of affordable homeownership or employee rental housing opportunities. Therefore, we believe that any housing impacts generated by the proposed project should be mitigated.

Sincerely,

Joseph K. Conant  
Executive Director

c: Office of Environmental Quality Control  
Burke Matsuyama, Kamaaina Eight Partners  
James Leonard, PBR Hawaii





PLANNING  
BUREAU  
FOR  
REGIONAL DEVELOPMENT

September 24, 1991

Mr. Joseph K. Conant, Executive Director  
Department of Budget and Finance,  
Housing Finance and Development Corporation  
Seven Waterfront Plaza, Suite 300  
500 Ala Moana Blvd.  
Honolulu, HI 96813

SUBJECT: KOHANA'IKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Conant:

Thank you for your letter of September 12, 1991 concerning the above project. One of the primary objectives of the project is to meet "the additional commercial and light industrial area needs of the current property owners, in particular, their transportation and trucking businesses." The market study for the project confirms there is a current pent-up demand for this type of project, as commercial tenants are competing for industrial space in West Hawaii.

Additional information has been provided in Section 5.0.2 regarding the employment opportunities estimated to be generated by the project. It is estimated that employment opportunities could range from a high of 1,150 to a low of 704 over a period of six years, somewhat over 100 employment opportunities per year. The 1,150 figure, which was derived from the market study, assumed a "quasi-industrial" project similar in tenant mix to Kaloa Industrial Park. In actuality, it is likely the lower figure is more realistic because the project location would primarily attract industrial tenants. Further, it is expected a substantial number of the employment opportunities will be taken by employees of existing businesses that relocate to the site.

Since the Kohanaiki Mauka project represents less than 3.7 percent of the 1,900 proposed industrial acres listed in the 1988 West Hawaii Regional Plan, it is anticipated the proposed development will generate a less proportional impact on direct job creation. In terms of mitigation, the County of Hawaii has recently proposed an Unified Impact Fee policy directed toward developments having infrastructure expansion demands. Projects would be assessed a fee proportional to impact on County infrastructure. To date, no housing requirements have been

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HOUSING FINANCE AND DEVELOPMENT CORPORATION  
SEVEN WATERFRONT PLAZA, SUITE 300  
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Mr. Joseph K. Conant, Executive Director  
SUBJECT: KOHANA'IKI MAUKA DRAFT ENVIRONMENTAL IMPACT STATEMENT  
September 25, 1991  
Page 2

exacted by the State or Hawaii County for commercial or industrial project in West Hawaii. We believe the unified impact fee, or similar legislation, would be a fair and equitable methodology to address any impact the Kohanaiki Mauka project may have on regional infrastructure systems and demand for housing.

Your time and effort to review the draft EIS is greatly appreciated.

Sincerely,

PBR HAWAII

Ramona Mattix, AICP  
Project Planner

4/20/91, 11:51

C H A P T E R 12

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A P P E N D I X A

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MARKET STUDY OF THE PROPOSED  
KOHANA'IKI MAUKA MIXED USE SUBDIVISION

**Updated Market Study  
of the  
PROPOSED KOHANAIKI MAUKA  
MIXED-USE SUBDIVISION**

**Located at Kohanaiki,  
North Kona, Hawaii**

The  
Hallstrom  
Appraisal  
Group.  
Inc.

January 11, 1991

James E. Hallstrom, Jr., MAI SRPA  
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Mr. Burke Matsuyama  
c/o Matsuyama Food Mart  
73-435B Mamalahoa Highway  
Kailua-Kona, Hawaii 96740

Updated Market Study of the Proposed Kohanaiki  
Mauka Mixed-Use Subdivision,  
North Kona, Hawaii

Dear Mr. Matsuyama:

At your request, we have updated the research, analysis and reporting of our May 31, 1989 market study which addressed the demand for commercial and industrial development within a 70.376 acre holding located at Kohanaiki, North Kona, two miles south of the Keahole Airport. The site, identified on State of Hawaii tax maps as Third Division Tax Map Key 7-3-09, Parcel 15, stretches upslope from the Queen Kaahumanu Highway adjacent to the existing Kaloko Industrial Park.

A multi-lot subdivision of the property is proposed, featuring a circa nine-acre retail/commercial site along the highway (exploiting the frontage characteristics available), with varied-sized industrial lots further mauka commensurate with abutting uses.

Conforming to our 1989 analysis, the purpose of this update effort is:

"... to determine whether current and projected West Hawaii economic, population and market trends call for additional inventory to be added to the commercial and industrial land base. And, if so, to assess if the subject property is an appropriate site for future development of this type."

Continuing the trends beginning in mid-decade, the leeward area of the Big Island remains in an unparalleled economic growth phase; a movement which is anticipated to continue over the next two-plus

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Mr. Burke Matsuyama  
January 11, 1991  
Page 2

decades. Market activity and public land use decisions over the past 20 months (since our previous study) have supported the strong-growth conclusions we expressed at that time.

We persist in our opinion the evolution and expansion of the West Hawaii market created by the in-migration of up to 30,000 new residents and the development of more than 40,000 resort and residential units during the next twenty years, will place enormous strains on real property use decisions.

In support of the existing and "approved" resort communities along the Kona-Kohala shoreline, which are intended to be the economic foundation of the regional market, vast amounts of land must be master-planned for integral primary and other uses, including residential, commercial, industrial and public service. The failure to provide for any one of this use-type sectors could threaten the viability of the regional economy, stymie future expansion, and detract from lifestyle quality.

Recognizing the critically-"linked" nature of land use decisions, the State and County have produced a series of long-range planning guidelines for West Hawaii and the subject neighborhood during the past year. A significant issue in this update is whether the proposed Kohanaiki Mauka Subdivision continues to be supportive of public development objectives.

Our analysis indicates the subject design is in accord with these land use plans and in a strong location to capitalize on forecast "limited-supply" market conditions emerging in the industrial market. Our 1989 study noted the ready availability of infrastructure to service the proposed subject development, and its proximity to the existing urban core. We believe the 70.4 acre subject site has the potential to meet portions of what we foresee as a short-term need in the industrial segment, and be a superior site for an interceptor/destination thematic commercial center. The property enjoys a central location between the airport and Kailua-Kona, in an area where significant development has been undertaken or proposed in recent years; is within the region identified by County Planners for expansion under the Keahole to Kailua Development Plan; and has direct frontage on the most important thoroughfare in West Hawaii.

Our update investigation followed the format of the study program of 20 months ago, which included inspection of existing and proposed industrial and commercial projects in the region, interviews with area brokers active in these market sectors, the identifying of macro-economic trends which contribute to future spatial need level, and perusal of data published in the interim regarding pertinent West Hawaii and statewide real property issues.

The results from our research and analysis are reported in the ensuing narrative report, which is identical in presentation to the May 1989 document. Where appropriate, as indicated through the updating program, we have excerpted and/or enhanced sections taken from that report. However, the industrial and regional retail market studies represent a revised application using a more advanced analytical technique based on timely data. Again, the body of the presentation follows a brief Introduction and Summary of Conclusions, and our overall focus has been on trends in the commercial and industrial vacant land markets.

Mr. Burke Matsuyama  
January 11, 1991  
Page 3

The update study clearly reveals the market trends anticipated in our 1989 assignment have been manifest, with finished space and site demand levels continuing strong, and supply levels muted. We therefore hold to our then-stated conclusion:

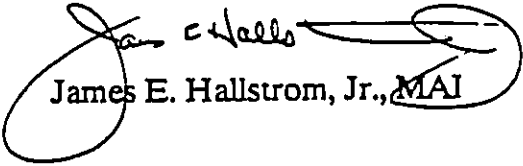
"Based on investigation findings and analysis indicators, it is our opinion the industrial land sector is and will continue strong in West Hawaii, with a need for additional acreage in the inventory over the short-term. While large amounts of finished space has been built over the past several years, market demand for commercial development and zoned sites in the region remains high. We believe the subject property is an appropriate location to meet both general and specific market needs and planning goals."

All opinions contained in this report are subject to the standard limiting conditions and assumptions of The Hallstrom Appraisal Group, Inc., in addition to any others specifically cited herein. All work undertaken for this assignment has been completed in conformance with the Code of Professional Ethics and Standard Practices of Professional Conduct of the American Institute of Real Estate Appraisers (AIREA) and the Society of Real Estate Appraisers (SREA).

We appreciate the opportunity to be of service to your venture. Please contact us if further analysis or detail of the enclosed study is required.

Respectfully submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

  
James E. Hallstrom, Jr., MAI

JEH/rwh/as



The  
Hallstrom  
Appraisal  
Group.  
Inc.

Updated Market Study of the  
**PROPOSED KOHANAIKI MAUKA MIXED-USE SUBDIVISION**

Located at  
Kohanaiki, North Kona, Hawaii

Prepared for  
Mr. Burke Matsuyama

January 1991

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## INTRODUCTION

The focus of our current update assignment is, as in our 1989 study, to determine if the proposed commercial/industrial subdivision of the 70.376 acre subject holding is supported by current market demand trends, and is a reasonable and prudent use of the site given prevailing public land use guidelines and the characteristics of the property. Of particular interest are economic, real property sector, and land use policy movement over the past 20 months.

The following report, presented in accordance with the format of our May 1989 publication, contains the results of our research and analysis programs addressing the update study issues.

Again, our efforts have focused on four basic questions:

1. What is the current and projected economic and population status of West Hawaii, and how will this effect demands for real property uses?
2. What is the level of demand for industrial-developable acreage in the region, and are existing inventory supplies sufficient to meet market needs?
3. What is the level of demand for commercially-developable acreage in the region, and are existing inventory supplies sufficient to meet market needs?
4. If a demand for further industrial and/or commercial acreage can be shown, is the subject property an appropriate location for such development?

Answering these question is a step-by-step process which leads through the market study assignment, moving from the general (the macro-economy of West Hawaii) to the specific (the subject site). Each step builds on the preceding efforts, culminating in a

**comprehensive market-based foundation against which to judge the subject property and its proposed subdivision.**

**We have utilized a marginally modified six-step program in this update study, as follows:**

- 1. Subject Property Data and Description**
- 2. Overview of West Hawaii**
- 3. Analysis of the Industrial Market Sector**
- 4. Analysis of the Thematic/Destination Commercial Market Sector**
- 5. Analysis of the West Hawaii Retail and Service/Commercial Market Sector**
- 6. Appropriateness of the Subject Property for the Proposed Development**

**If the update effort again shows that West Hawaii is likely to continue the wide-spread economic and population growth trends evidenced since the mid-1980s, with demand for industrial and commercial land uses outpacing available supply, and that the subject has the characteristics necessary to be competitive in meeting market needs and community goals, it can be reasonably asserted the proposed mixed-use subdivision of the property is supportable.**

**The results of our analysis are presented in the body of this report, adhering to the six-step study program outlined above, following a Summary of Conclusion and brief discussion on assumptions and terms used in the document.**

## SUMMARY OF CONCLUSIONS

Based on inspection of the subject holding and our investigation and analysis of the appropriate real property market sectors, we have reached the following conclusions regarding the proposed Kohanaiki Mauka Mixed-Use Subdivision:

1. **The Subject Property** -- The site is prominently located along the region's major thoroughfare, in an area which is planned to provide the expansion area for the future growth of the Kailua-Kona community. Favorable traits of the parcel include superior access and exposure characteristics, strong costal view panoramas, and proximity to many existing and proposed urban use-types.

Owing to its soil conditions, narrow shape, and the abutting industrial development, we consider the subject poorly suited for master-planned residential or agricultural use. Conversely, given its advantageous locational and access traits, it is well suited for moderately-intensive industrial and commercial use.

2. **The Regional Market** -- West Hawaii, particularly the North Kona and South Kohala Districts, has been in the midst of a significant expansion cycle that is quickly transforming the previously desolate lava fields and mauka farmlands into urban communities fueled by tourism dollars and general economic growth.

Virtually every aspect of the regional real estate market has strengthened since the mid-1980s following a stagnate period earlier in the decade. Especially strong activity has been evident in the residential, resort and bulk acreage sectors, with the demand for supporting industrial and commercial uses also reaching record levels in recent years.

The combination of intensive investor interest and governmental policies promoting reasonable growth in West Hawaii has laid a significant foundation for continued economic upward movement in coming decades.

Public master plans calling for extensive pods of urban development have been forwarded, and large holdings have been reclassified to permit mixed-use projects. The substantial, on-going capital expenditures by developers of approved planned communities insures a vigorous market into the foreseeable future.

Studies by State and County agencies, other professional analysts, and ourselves, estimate that up to 45,000 new jobs will be created in County-wide as a result of west Hawaii business growth over the next two decades; some 20,000 to 30,000 in tourism-related services, and 15,000 to 20,000 in general and supporting businesses.

It is estimated nearly 60,000 new residents will be drawn to North Kona and South Kohala by the employment opportunities and favorable regional lifestyle during the next 20 years, creating the need for up to 22,000 additional housing units in a market which is at present acutely under serviced by upwards of 3,000 homes.

While other areas worldwide are experiencing economic downturns, the State of Hawaii remains vibrant, with a minimum overall annual growth rate of 2.5 to 3.0 percent forecast for 1991-92. Unemployment in the State is at the lowest level in the nation, with construction and investment activity levels in West Hawaii at or above all-time levels.

Against this backdrop, the prospects of escalating demand for industrial and commercial development are strongly favorable. Each new resident, additional tourist, and expanding business will generate the need for further supporting inventory.

Further, as the community continues its evolution to a modern urban economy, a broader spectrum of industrial and commercial use-types will be desired; services which may currently be unavailable or poorly met.

The combination of these demand factors will be to create a large enough market to allow the development of on-island businesses previously limited to



Honolulu or the mainland; there historically being insufficient local demand to justify a West Hawaii location.

3. **The West Hawaii Industrial Market** -- Since mid-1986, the demand for industrial development in West Hawaii has significantly increased. Over the last five years an estimated 60 acres of vacant sites have been sold on the market, and 717,900 square feet of finished space have been absorbed. This follows a notably slow activity period from 1980 through mid-decade.

The recent growth in demand is attributable to several factors:

- The general economic expansion in the region fueled by tourism and residential development;
- The offering of competitive fee simple sites served to counteract a historic under-supply of desirable lands and finished space that had dampened local business goals; and,
- The commitment of governmental agencies to support additional urban development in West Hawaii, including industrial acreage necessary to service the community.

At present, the sector is in a marginally under-supplied state. While substantial construction has been undertaken, is in progress or proposed for the region (particularly at the Kaloko Industrial Park), all available sites and finished space are quickly being absorbed upon offering, and a shortage of inventory will develop in the near-term unless additional new lands are developed.

Apart from any latent demands which may exist, we forecast the moderate demand for additional industrial development in West Hawaii (North Kona/South Kohala) over the next two decades, from 1990 to 2010, will be circa 282.8 acres of finished sites, and 3,079,000 square feet of gross floor space.

This demand was quantified based on the spatial needs of residents and tourist-serving businesses under various scenario models, and excludes any specialized

or atypical demand created at the Keahole Airport, HOST Park or the Honokohau and Kawaihae harbors.

All vacant sites have been absorbed through "original" sales, and less than 25 acres remain available for near-term development. These sites and the finished space thereon (the existing regional supply) will be fully built-out and leased/occupied within an 18-month to two-year period based on demand statistics, with market needs thereafter forced to wait until the subdivision of "new" (currently proposed) projects or additional phases of existing parks.

While significant inventory additions are being considered, more than half of the raw, bulk acreage presently being forwarded for general industrial development in West Hawaii would have to be actualized if there is to be sufficient supply to meet the net spatial demands projected. Hampering the ability of the planned supply to meet current and near-term market demand, much of the proposed acreage is within extensive master-planned communities, and several years (or longer) of land use approvals and infrastructure development will be required before inventory would come on-market.

Based on our analysis, indicating a currently vigorous sector having highly favorable long-term growth prospects, we have concluded there is demonstrable demand for the subject project in the West Hawaii industrial market. Particularly as there appears to be a potential shortage of supply over the mid-term (two to four years) during which the subject would be developed.

If the Kohanaiki Mauka Mixed-Use Subdivision is constructed as planned with opening by mid-1992, during an anticipated sector inventory shortfall, we forecast it could achieve absorption at reasonable prices within 36 to 45 months.

4. **The Thematic/Destination Commercial Market** -- Over the last decade this high-amenitied, comprehensive retail development type has proven highly successful on the outer-islands when established design and locational criteria are followed. Such complexes provide a wide-range of retail and dining opportunities from economy to upscale classes within integrated thematic facilities aggressively promoted to both tourists and residents.

Generally, oriented around a "Hawaii-flavored" design, the centers attract vast numbers of patrons through an environment which "captures" them for extended periods; the complex being a destination in itself. Successful examples in the sector typically generate higher sales per square foot and space lease rents than neighboring "general" retail projects.

Often thematic developments become major community employment, tax base, and entertainment centers. However, to be accepted by the market, a facility must have sufficient cumulative attraction (or "critical mass") to qualify as a destination alternative. It must be creatively designed and built, and it must be vibrantly marketed and operated.

The "best" location for this project type is along a major regional or resort arterial, adjacent to or within a resort development, near a support/residential community, and offering some superior trait (ocean frontage, view, or exceptional theme) which will help establish it in the consumer's mind.

We believe the proposed commercial lot in the subject project has favorable characteristics in support of such development and West Hawaii in a booming regional market which is significantly under-served relative to Maui and Kauai. Additionally, the larger spatial requirements of a thematic/destination center would result in faster absorption of the large parcel, and serve as a greater asset to the community relative to general retail use.

It is our conclusion, an appropriate use of the eight to ten-acre commercial portion of the subject property fronting the highway would be through development of a 150,000 square foot (plus or minus) integrated, high-amenitied, retail and service/commercial center having a historic, marine or Hawaiian theme.

5. **The West Hawaii Retail and Service/Commercial Market** -- Following the down-cycle of the early 1980s the West Hawaii retail/service commercial sector surged in mid-decade, with construction and absorption reaching record levels. Since 1984, nearly 350,000 square feet of retail/service space has been offered on the market with virtually all absorbed in a rapid manner.

While a significant portion of the demand evidenced was "latent" (or pent-up) awaiting the economic turn-around, much can be attributed to the evolving urbanization of the community being supportive of modern projects and entrepreneurs who recognized the exceptional consumer potentials in the area.

Given the successful absorption rates and rental levels achieved at the newer, competitive complexes, developer and investor interest in pursuing additional inventory construction, and the per square foot sales being experienced by the shops in the quality projects, there is strong support for further retail/service space in the study area.

Long-term demand quotients are similarly favorable, with explosive residential and tourism growth projected, many individuals of which will be highly-motivated, upper-income consumers.

Currently, for the most part, this sector is in a relatively balanced supply/demand state. However, there is an increasing scarcity of desirable sites in greater Kailua-Kona, and by mid-decade the market will have to look elsewhere for available lands.

Fueling this movement is the extreme congestion which increasingly plaques the central Kailua shopping district, a factor many of the long-term ("rural") residents disdain. Additionally, as residential growth is being directed to areas outside of the (notably in a northerly direction), it is logical the retail/service uses would follow.

In accordance with trends seen on other islands in the State (notably Oahu and Maui), we have quantified demand for "Class A" retail and service/commercial development in West Hawaii from 1990 to 2010 at 1,555,000 square feet of finished space, or just under 120 net acres of finished sites (up to 160-plus gross acres of land area).

Office space needs will contribute up to 30 acres of net additional commercial land demands.

Following the current "breather" in finished space development (only two major projects are scheduled for completion in 1991), we anticipate much of the forecast demand will occur over the mid-term, 1994 through the end of the decade, as the coastal resorts expand, regional residential communities are developed, and governmental land use plans are implemented.

As a "general", free-standing commercial entity offering standard products and services (fast food, convenience, gas, other) oriented towards tourists, area residents and other passersby, we believe the subject commercial site overlooking Queen Kaahumanu Highway could support only some 20,000 to 35,000 square feet of retail and service/commercial development, on less than two acres of the site. Space absorption would require 12 to 24 months.

6. **Appropriateness of the Subject Project** -- If necessary infrastructure services are available, we believe the market is reasonably supportive of the proposed subject project from both a short and long-term perspective. In fact, given the recent hyper-activity in the West Hawaii real estate market, it is likely the components would be absorbed at rates quicker by investors and speculators than at the rate demonstrated by end-user demand only.

Additionally, the project appears appropriate within the greater overall regional planning concept:

- It has strong existing access to the region's major thoroughfare, and will front on several proposed north/south connector roadways;
- It enjoys a proximate location to existing and proposed urban pods and end-users of industrial and retail products and services;
- There are numerous fundamental public transportation and governmental-sponsored economic investment projects nearby to support tenant businesses;
- The striated, mixed-use design, is in keeping with both market desires and now-accepted community planning goals;

- The project is commensurate with the public goals and objectives expressed in both the State of Hawaii West Hawaii Regional Plan and the County of Hawaii Keahole to Kailua Development Plan;
- Although a relatively minor project in size, the subject is supportive of private planning efforts being undertaken/proposed by major landowners in the region, and with State plans at Kealahou as well;
- We are not aware of any significant community and/or market opposition to the proposed development; and,
- Upon "build-out", economic activity at the subject site will generate upwards of 1,150 employment opportunities (circa 400 "commercial" and 750 "industrial") and significant tax benefits to the State and County.

Further, as has been demonstrated historically in the regional industrial market, it is not healthy to have all available inventory within one or two major developments (particularly if offered on a leasehold basis). This creates an unfavorable "monopoly" situation which could harm the market if master-plan changes are made, emphasis is re-directed to other components of the project, or financial difficulties are encountered. Our experience endorses a diversified ownership base in the industrial and commercial sectors.

7. **Conclusion** -- Based on our update analysis, we remain convinced the proposed Kohanaiki Mauka Mixed-Use Subdivision plan is a reasonable use of the subject property from a market-based perspective. Under a competitive development and promotional program, the project should be full absorbed within 36 to 45 months of its opening.

Short and long-term market and general economic data for the West Hawaii region continue highly favorable, and the increase in population and economic activity will create substantial demand for industrial uses. Research indicates the holding is in an excellent position to capitalize on the emerging thematic/destination commercial sector.

**DEFINITION OF TERMS, LIMITING CONDITIONS AND ASSUMPTIONS,  
AND GENERAL ECONOMIC BACKGROUND**

**Definition of Terms**

Various special terms are used in this report. These terms are defined in the following paragraphs to assist in understanding special appraisal terminology.

Market Value

"Market value" is defined as the most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- a. buyer and seller are typically motivated;
- b. both parties are well informed or well advised, and acting in what they consider their own best interest;
- c. a reasonable time is allowed for exposure in the open market;
- d. payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and
- e. the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Highest and Best Use

The "highest and best use" is that use which may be reasonably expected to yield the highest net return to the land over a given period of time. This use must be legal and in

compliance with the regulations and ordinances within the police power of the City, County, and State including health regulations, zoning ordinances, building code requirements, etc.

#### Hawaiian Terms

The Hawaiian words "mauka" and "makai" are commonly used in the islands as indicators of direction. The word "mauka" means toward the mountains and "makai" means toward the ocean. From the location of the subject property, "mauka" refers to an easterly direction while "makai" refers to a westerly direction. Similarly, "Kohala" indicates north and "Kona" or "Kau" indicates south.

#### Fee Simple

"Fee Simple" is defined as absolute ownership unencumbered by any other interest or estate; subject only to the limitations of eminent domain, escheat, police power, and taxation.

#### Leasehold and Leasehold Interest

A "leasehold" is defined as a property held under tenure of lease representing the right to the use and occupancy of real property by virtue of a lease agreement. It is the right of a lessee to use and enjoy real estate for a stated term and upon certain conditions such as the payment of rent. A positive "leasehold interest" generally only exists when economic rent exceeds contract rent.

#### Leased Fee Interest

A "leased fee" or "lessor's interest" is the ownership interest in a property encumbered by a lease agreement. It is the right to receive both fixed contractual income and future renegotiated income during the term of the lease, and the right to receive the reversionary interest in the property at the termination of the lease.



### **Limiting Conditions and Assumptions**

**The research, analysis, and conclusions for valuation or market studies, performed by The Hallstrom Appraisal Group, Inc., are subject to and influenced by the following:**

1. The report expresses the opinion of the signers as of the date stated in the letter of transmittal; and in no way has been contingent upon the reporting of specified values or findings. It is based upon the then present condition of the national and local economy and the then purchasing power of the dollar.
2. Legal descriptions used within the report are taken from official documents recorded with the State of Hawaii, Bureau of Conveyances, or have been furnished by the client, and are assumed to be correct. No survey is made for purposes of the report.
3. Any sketches, maps, plot plans, and photographs included in the report are intended only to show spatial relationships and/or assist the reader in visualizing the property. They are not measured surveys or maps and we are not responsible for their accuracy or interpretive quality.
4. It is assumed that the subject property is free and clear of any and all encumbrances other than those referred to herein, and no responsibility is assumed for matters of a legal nature. The report is not to be construed as rendering any opinion of title, which is assumed to be good and marketable. No title information or data regarding easements which might adversely affect the use, access, or development of the property, other than that referenced in the report, was found or provided. The property is analyzed as though under responsible ownership and competent management.
5. Any architectural plans and/or specifications examined assume completion of the improvements in general conformance with those documents in a timely and workmanlike manner.
6. Preparation for, attendance, or testimony at any court or administrative hearing in connection with this report shall not be required unless prior arrangements have been made therefor.

7. If the report contains an allocation of value between land and improvements, such allocation applies only under the existing program of utilization. The separate valuations for land and building must not be used in conjunction with any other purpose and are invalid if so used.
8. If the report contains a valuation relating to a geographical portion or tract of real estate, the value reported for such geographical portion relates to such portion only and should not be construed as applying with equal validity to other portions of the larger parcel or tract; and the value reported for such geographical portion plus the value of all other geographical portions may or may not equal the value of the entire parcel or tract considered as an entity.
9. If the report contains a valuation relating to an estate in land that is less than the whole fee simple estate, the value reported for such estate relates to a fractional interest only in the real estate involved, and the value of this fractional interest plus the value of all other fractional interest may or may not equal to the value of the entire fee simple estate considered as a whole.
10. It is assumed that there are no hidden or inapparent conditions of the property, subsoil, or structures which would render it more or less valuable; we assume no responsibility for such conditions or for engineering which might be required to discover such factors.
11. Nothing in the report should be deemed a certification or guaranty as to the structural and/or mechanical (electrical, heating, air-conditioning, and plumbing) soundness of the building(s) and associated mechanical systems, unless otherwise noted.
12. Information, estimates, and opinions provided by third parties and contained in this report were obtained from sources considered reliable and believed to be true and correct. However, no responsibility is assumed for possible misinformation.
13. Possession of the report, or a copy thereof, does not carry with it the right of publication, and the report may not be used by any person or organization except the client without the previous written consent of the appraiser, and then

only in its entirety. If the client releases or disseminates the reports to others without the consent of the appraiser, the client hereby agrees to hold the appraiser harmless, and to indemnify the analysts from any liability, damages, or losses which the analysts might suffer, for any reason whatsoever, by reason of dissemination of the report by the client. Further, if legal action is brought against the analyst by a party other than the client concerning the report or the opinions stated therein, the client agrees, in addition to indemnifying the analysts for any damages or losses, to defend said analysts in said action at client's expense. However, nothing herein shall prohibit the client or analysts from disclosing said report or opinions contained therein as may be required by applicable law.

14. Disclosure of the contents of this report is governed by the By-Laws and Regulations of the Appraisal Institute. Neither all nor any part of the contents of this report (especially any conclusions as to value, the identity of the appraisers or the firm which they are connected, or any reference to the Appraisal Institute or to the MAI or SRPA designations) shall be disseminated to the public through advertising media, public relations media, news media, sales media, or any public means of communication without the prior consent and approval of the appraisers.
15. Unless otherwise stated in this report, the existence of hazardous material, which may or may not be present on the property, was not observed by the appraiser. The appraiser has no knowledge of the existence of such materials on or in the property. The appraiser, however, is not qualified to detect such substances. The presence of substances such as asbestos, urea-formaldehyde foam insulation, or other potentially hazardous materials may affect the value of the property. The value estimate is predicated on the assumption that there is no such material on or in the property that would cause a loss in value. No responsibility is assumed for any such conditions, or for any expertise or engineering knowledge required to discover them. The client is urged to retain an expert in this field, if desired.

**General Economic Background**

The economic background for the State of Hawaii and the County of Hawaii are included in the Addenda as Exhibit I. This section contains numerous tables which outline population, income, employment, and economic trends affecting the subject property.

**SECTION ONE: SUBJECT PROPERTY DATA AND DESCRIPTION**

**Tax Map Key/Legal Description**

The subject property is designated on State of Hawaii Tax Maps as Third Division, Tax Map Key 7-3-09, Parcel 15.

A State of Hawaii tax map showing the approximate location of the subject is displayed on the following page.

We have not been furnished with a comprehensive metes and bounds legal description for the subject holding. The project acreage is referred to in survey records as:

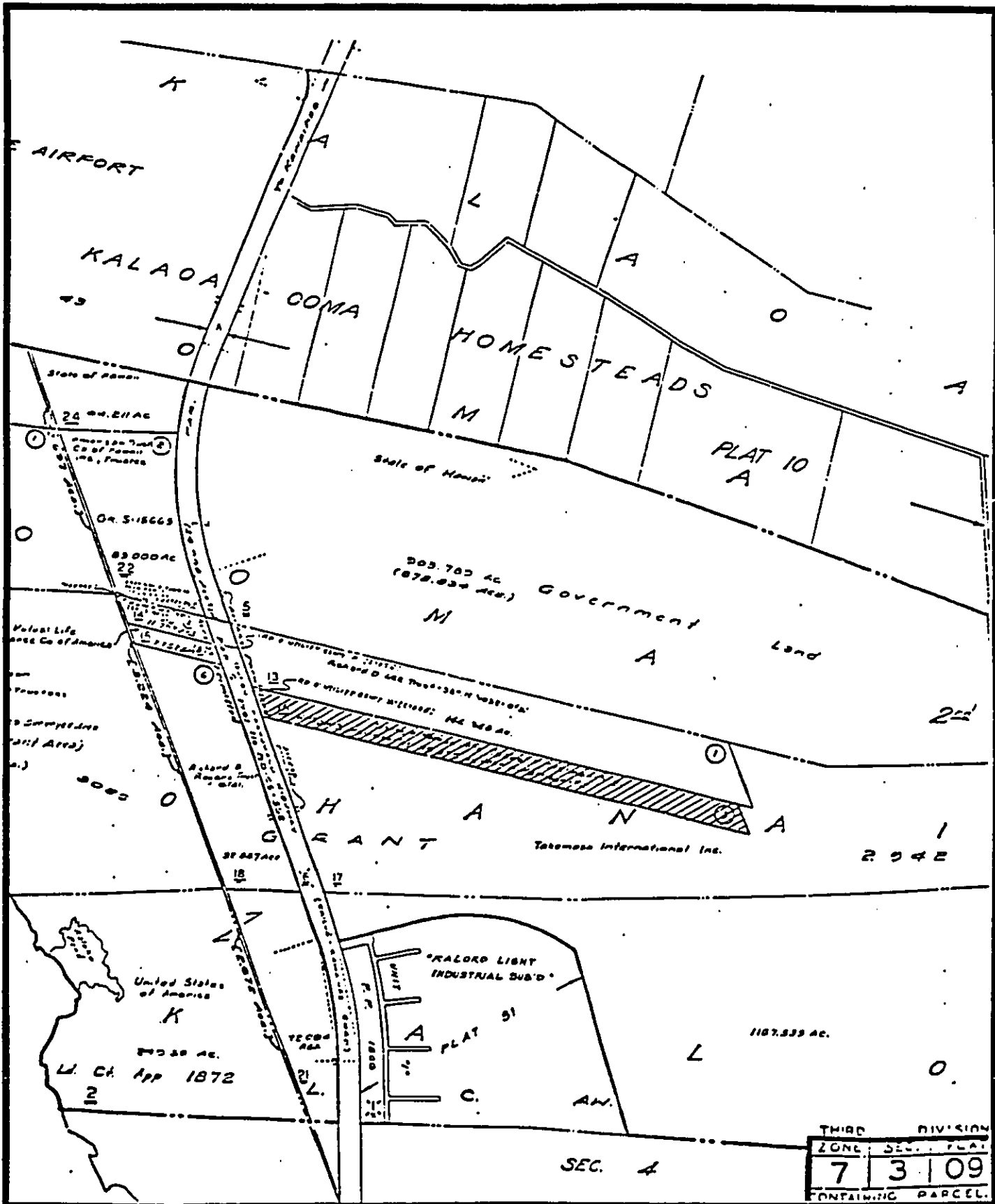
"Parcel 3, Land situated at Kohanaiki, North Kona, Island of Hawaii, Hawaii, being a portion of grant 2942 to Hulikoa."

**Easements and Restrictions**

To the best of our knowledge there is only one recorded easement currently affecting the subject property beyond the designated access location constraints which apply to all properties fronting the Queen Kaahumanu Highway (State).

A 6,756 square foot "non-exclusive easement for road and utility purposes" runs the length of the subject's highway frontage from the southerly boundary to the permissible vehicular access point of the property. We do not believe the easement will have any substantial impact on the developability of the site.

Additionally, as part of its General Plan periodic updating program, the County of Hawaii has recommended that an open space/landscaped corridor along the highway frontage be implemented. It is assumed any development of the subject acreage would incorporate this feature, which would include the above-mentioned easement.



PROPERTY LOCATION MAP  
 TAX MAP KEY 7-3-09, Parcel 15  
 Kohalaiki, North Kona, Hawaii

### **State Land Use Classification**

The State Land Use (SLU) classifications, administered by the State Land Use Commission, establish the basic legal framework of land uses in the State of Hawaii. The SLU categorizes real property into four broad "Districts"--Conservation, Agriculture, Rural and Urban.

The Counties are required to confine their land use designations (General Plan and Zoning) within the stated intents of the SLU district constraints.

The subject acreage is currently SLU split-classified. The makai portion of the property (lower 60 percent fronting the highway) is within an Conservation District. The upper 40 percent of the holding is within an Agricultural District.

These designations are typical of the lands in the region prior to urbanization efforts. In fact, the subject area agricultural lands are considered as minimally productive, and most of the mauka-fronting holdings along the highway have minimal attributes worthy of strict conservation guidelines.

The existing designations require changes to "Urban" before the proposed subdivision can be developed. Such use would concur with the West Hawaii Regional Plan formulated by the State, which calls for expansion of the greater Kailua-Kona urban pod northerly toward the airport, focusing on commercial and industrial exploitation of the highway corridor.

### **Hawaii County General Plan**

The Hawaii County General Plan is implemented to control the overall growth pattern of the Big Island, and is intended to provide general guidelines for the County zoning designations. The Plan, which is in the midst of its periodic updating, is to serve as a long-term (10 to 25 year) master-planning resource identifying and servicing evolving land use needs.

Under the recently revised plan approved in late 1990, the entire Keahole Point to Kailua-Kona area (including the subject parcel) has been re-classified as Alternate Urban Expansion, capable of supporting the growing Kailua-Kona community. These

revisions, changing the historic conservation designation, permits the subject subdivision.

### **County Zoning**

The Hawaii County Zoning Ordinances are designed to standardize the improvements of residential, agricultural, industrial, and other proposed uses in accordance with accepted planning guidelines and community standards. Allowable densities, building heights, set backs, and parking requirements are among the issues addressed.

The subject property is now split-zoned; "Open", a highly restrictive classification in the makai portion of the site; and, "Unplanned", a transitory designation in the mauka section.

This designation would need to be changed to a mixture of "MG", "CV" or "V" type zonings in order for commercial or industrial uses to be developed. In light of the Planning Department's expressed support of such uses in the greater Keahole Point area, we do not perceive this re-classification to be problematic.

### **Utilities and Access**

The availability of necessary infrastructure systems to service the proposed subject development and any mitigation measures required are addressed at length in the Environmental Assessment of Kohanaiki Mauka, December 1990. Please refer to that document for further information. It is our assumption sufficient competitive services will be available to permit the proposed development in a timely manner.

### **Property Description**

The elongated, rectangularly-shaped subject property is located circa four miles north of urban Kailua-Kona and four miles south of the Keahole Airport, in the North Kona District of Hawaii County, State of Hawaii. The 70.376-acre holding has about 540 lineal feet of frontage along Queen Kaahumanu Highway, and is approximately 7,260 feet in depth.



Sloping upwards to mauka, the site begins at highway level, and the overall topography is relatively even given the angle of slope. Geological strata is comprised of a'a and pahoehoe lava, and the parcel is generally barren with the exception of scattered bunch grass pockets (throughout) and bougainvillea bushes which have been planted within the highway right-of-way. Soil conditions are very poor, as is typical for the region.

As noted, Keahole Point is within a "kekaha", or desert, and the climate is hot and dry. Hualalai provides an excellent barrier from the tradewinds that plague more northerly coastal areas.

Excellent panoramas are available from the site towards the ocean and across Honokohau Bay. The lush upper slopes of Hualalai are also visible.

While most nearby lands are presently in feral condition (as is the subject) extensive development is proposed for almost all sites in the region. To the north, the infrastructure for the HOST park has recently been emplaced, and beyond that holding lies the NELH (Natural Energy Laboratory Hawaii) and the Keahole Airport zone.

Across the highway, the proposed 470-plus acre Kohanaiki Resort has obtained preliminary approvals and is anticipated to begin construction within the next several years. Further south is the proposed Kaloko-Honokohau National Historic Park, of which the National Park Service completed the final stage of land acquisition in 1990, and the Honokohau Small Boat Harbor. Southerly adjacent to the holding is the Kaloko Industrial Park.

Directly mauka of the subject are private and State-owned lands, with no significant short-term plans for development being forwarded at this time. Long-term proposals within the Keahole to Kailua Development Plan call for a "second city" urban center in the middle elevations of the mountainside, focusing on commercial and public uses. Other mauka holdings are to be developed with a golf course and residential and ancillary subdivision (TSA and Lanihau).

#### **Proposed Development**

As currently proposed, the Kohanaiki Mixed-Use Subdivision would consist of a series of fee simple graded lots, extending off an access roadway stretching upslope from the

existing Queen Kaahumanu right-of-way. The upper portions of the holding will be transversed in the future by planned mauka north/south connector routes.

A circa nine-acre retail parcel would anchor the project on the highway, with industrial lots ranging in size upwards from one-half acre extending to the upper elevations of the property, single or double loaded of the ascending access road. Comprehensive descriptions of the master plan are provided by others in the Environmental Impact Statement.

## SECTION TWO: SUBJECT SECTOR OVERVIEW

### West Hawaii Economic Summary

The subject property is located near the westerly coastline of the Island of Hawaii, about four miles south of Kailua, Kona. The map on the following page displays the relationship of the site and the major landmarks in the area.

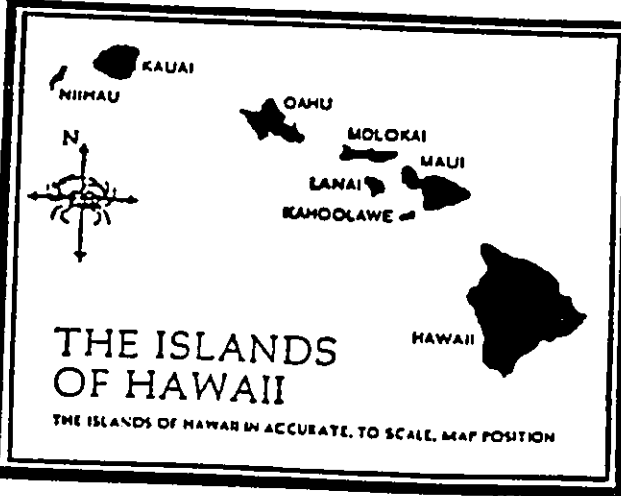
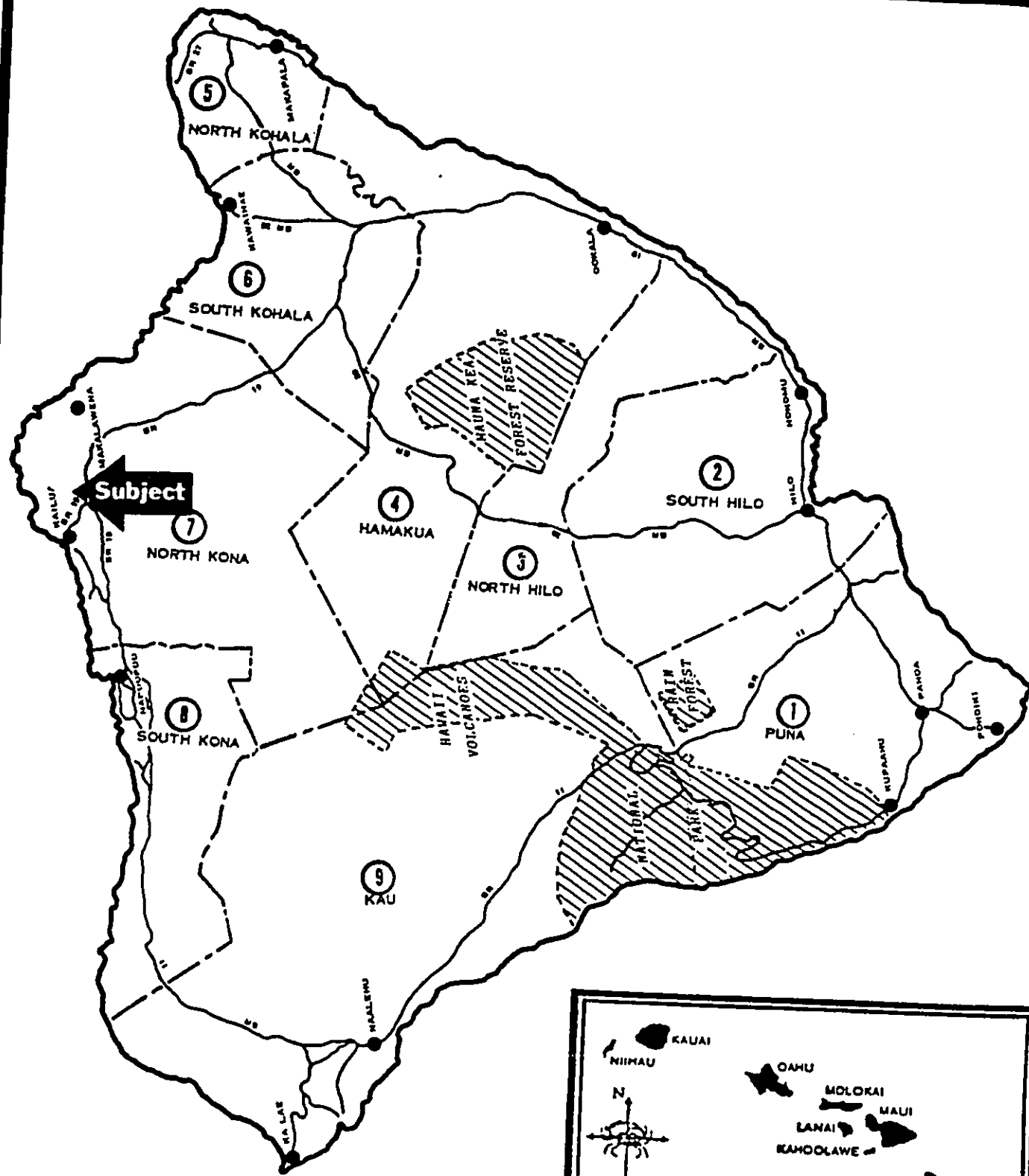
Due to the geographical boundaries presented by the Kohala Mountains, Mauna Kea and Hualalai; traditional district associations; and, common climatic and economic characteristics; the districts of North Kona and South Kohala, commonly referred to as "West Hawaii", are considered as comprising the Economic Market Sector (EMS) of the subject holding. The other portions of the Island differ from this sector in regard to climate, soil and terrain conditions; historic and projected land uses; and historical and long-term economic growth potentials. While agricultural and conservation uses dominate the County's other seven districts (outside of urban Hilo), South Kohala and North Kona are undergoing consistent transition from agricultural to resort, residential and other urban development types. A comprehensive review of this area follows.

At the leading edge of the West Hawaii economy are the expanding shoreline resort developments, which through direct and secondary employment and capital investment are anticipated to stimulate demand for supporting land uses in the region, including industrial, residential and commercial. The focus of our study is the coastal corridor extending from Kailua-Kona to Kawaihae, a stretch of approximately 33.5 miles which encompasses the subject holding. This lava strewn region of the Island, is arid, sparsely vegetated and has relatively uniform development potentials. Queen Kaahumanu Highway, and the properties near or fronting both sides thereon (including the subject), are generally considered the mauka (or inland) boundary of the sub-market corridor.

### The South Kohala District

Stretching from sea level to a height of 7,000 feet, the South Kohala district encompasses the majority of the west and southwestern slopes of Mauna Kea and the Kohala Mountains in the north-central portion of the Island of Hawaii. The district had

# ISLAND OF HAWAII



a resident population of 4,607 according to the 1980 U.S. Census, divided somewhat equally between the upland Waimea-Kamuela area and the coastal plain surrounding Kawaihae Bay. 1990 first quarter population estimates for the district range upward of 11,000 residents, an increase of 138.77 percent during the decade. The subject holding is located in the central/makai area of the district.

Historically, the present districts of North and South Kohala were considered as a single unit, with their greatest claim being the birthplace and early headquarters of Kamehameha I (the unifier of the Islands). The construction of the Pu'ukohala Heiau along the shores of Kawaihae Bay, one of many historic sites in the area, led to his gaining complete control of Hawaii. The harbor provided by the bay was the point where Kamehameha cleared all foreign arrivals to the islands. Englishmen brought the first cattle and horses to the region, early on establishing the ranching use and culture dominant in the area. Other prominent figures in the district's history include missionaries Lorenzo Lyons and Elias Bond, as well as John Palmer Parker, founder of the expansive Parker Ranch. While the character of Kohala has changed greatly through history, the relative isolation of the area has served to protect many of the ancient Hawaiian and early historic sites from destruction due to development. There are 11 sites in the area designated for protection and restoration by the County General Plan.

The district of South Kohala has two distinct physical environments; the upper elevation areas (2,000 to 7,000 feet above sea level), centered in Waimea, and characterized by grass-matted rolling hills with cooler temperatures and emphasis on agricultural and residential land uses; and, the coastal plain stretching from the shoreline up-slope to Waikoloa Village, which is typified as an arid region with Kiawe trees, sparse vegetation and scattered resort-oriented development.

The coastal areas have an average temperature range of 73 to 90 degrees, with less than ten inches of rainfall per year. Temperatures decrease and rainfall increases at higher elevation levels, with Waimea receiving 40 inches of rain per year, and having an average temperature range of 62 to 67 degrees.

The watershed of the area is similarly divided. The Waimea Village watershed extends to the Kohala Mountains, which have high rainfall figures. Intermittent streams from this range flow into the Waimea area where they then turn westerly and dissipate into

the permeable lava flows of Mauna Kea, which run down the arid western slope to the Kawaihae-Aneho'omalu shoreline. This area has few defined channels and infrequent stream flows. The Waimea region is generally more susceptible to flooding than the lower slopes and coastal plain; however, high intensity storms periodically flood Mamalahoa Highway from Kawaihae to Puako, with the beachfront areas subject to inundation. The entire coastline of South Kohala is susceptible to tsunami action.

Due to the topographical extremes evident in the district, South Kohala has 17 "Natural Beauty" sites so designated by County General Planners. Typically, the sites are centered around the shoreline, with eight bays and three beach areas listed. The white sand beaches of this district represent the majority of extensive strands on the Island.

The primary economic activities in the area are cattle ranching, diversified agriculture, and the rapidly expanding tourism industry. Cattle interests utilize a majority of the district acreage, with pastures located along the upper slopes of Mauna Kea, stretching seaward. The largest of the holdings in the area is the Parker Ranch, with approximately 230,000 acres of grazing supporting roughly 45-50,000 head. Silage crops, such as corn and sorghum, cover increasing acres of previously grazing land. These crops are utilized by the cattle feed lot operations.

Additional farming is centered around Waimea, considered one of the Big Island's most productive areas. Cabbage, celery, lettuce, and other vegetables are grown in abundance, as well as melons and floral products. Experimentation using other diversified crops is widespread. The State maintains an agricultural research facility in the Lalamilo Agricultural Subdivision nearby the Waimea Airport. The agricultural industry is viewed as a potential economic growth sector for the mauka, or up-country areas of the district; however, the competition for resources and land, brought about by tourism and residential development; the inconsistency of historic supply and demand levels for agricultural products in the State; and, the lack of sufficient inexpensive water supply, hampers the general large-scale expansion of farming.

According to State officials, there are approximately 2,100 acres currently cultivated in the Waimea area. This represents over 57 percent of the potential for arable production farming in the region.

Tourism, which is rapidly becoming the primary employer and economic force in the district, is geared toward the highly desirable warm, dry climate prevalent at lower elevations and along the coast. The renowned Mauna Kea Beach Resort, established in 1965, was the early, long-reigning foundation of the industry. Featuring an 18-hole Robert Trent Jones championship golf course, the luxurious 310-room Westin Mauna Kea hotel, condominium units, house lots, and other amenities, the 1,000-acre Rockefeller-financed resort began the now strongly-emerging movement to make South Kohala one of the neighbor island's favorite resort playgrounds. This development, which was purchased in 1988 by Seibu, is enacting plans for large-scale, long-term expansion, with a second golf course and another luxury class hotel proposed in a sister development, the South Kohala Resort, at Hapuna Beach.

The Mauna Lani Resort (its golf course opened in 1981, and an exclusive 351-room resort hotel in Spring 1983), has quickly moved into a rival position with the Mauna Kea Resort. This 3,200-acre development features a full line of resort amenities, high-priced condominiums and single family lots, and one of the world's classic oceanfront golf courses. This community is in the midst of an aggressive second-phase expansion program, featuring the Ritz Carlton, Mauna Lani Hotel and an additional course.

Mauna Lani has emerged as the most exclusive destination community in the State. Currently, there is an exceptionally strong demand for house lots and condominiums at the resort, with prices for oceanfront lots reaching five million dollars and finished multi-family units at an average approaching one million dollars. Extensive prospective buyer lists await new projects, which will include a marina development.

The third major existing resort development in the District is located in the expansive 31,000-acre Trans Continental's Waikoloa holding which stretches up-slope from Anaehoomalu Bay to above the 2,600-foot elevation level. The 1,300-acre beachfront resort currently contains the 543-room Royal Waikoloan Hotel, and the 1,244-room Hyatt Regency Waikoloa, the most expensive and grandiose hotel facility operating in the State. The residential/resort community of Waikoloa Village is located approximately eight miles inland from the oceanfront development.

Low-density residential and a single multi-family project (Puako Beach Apartments) are scattered along other shoreline areas.

While other resort districts in the State experienced stagnation during the 1980 through early 1984 recession, with virtually no inventory development (hotel or condominium units) or other construction evident, South Kohala's visitor plant underwent large-scale expansion. Three upper-class hotels (Mauna Lani Bay, the Royal Waikoloan, and The Hyatt Regency) and four condominium projects (Mauna Lani Terrace, Mauna Lani Point, Waikoloa Shores, and the Villas at Mauna Kea) were completed or announced in the period. Due to the climatic characteristics, scenic attributes and amenities available to the district, South Kohala is seen by many experts as being one of the focal points in State tourism over the long-term. Currently, there are approximately 3,200 hotel rooms and 461 condominium units (completed or firmly proposed) within the coastal resort region. A minimum of 5,000 and 3,500 additional hotel and condominium units, respectively, are additionally projected for the area by the end of the century.

Significant demand for further single-family resort homesite development is also indicated.

Kawaihae, with a current resident population of approximately 2,000 is the second largest community in the district. The residentially-oriented village has limited commercial facilities, with the inter-island port of Kawaihae being the major industrial land use and focal point in the community.

Commercial activity in South Kohala is centered in Waimea and within the resorts, with lesser development in Kawaihae and Waikoloa Village. Major projects in Waimea include the Parker Ranch Shopping Center, the Kamuela Country Store complex, and strip-commercial developments along the main highways servicing the town.

The two major transportation facilities in the district are the deep-water port at Kawaihae and inter-island airport at Waimea. The former is anticipated to increase in importance as the area develops, particularly if long-term plans for manganese nodule processing on the Island are actualized. A secondary, minimally-used commuter airstrip serving the Waikoloa and Mauna Lani Resorts was opened in 1984 along Queen Kaahumanu Highway near the vacation areas. It is now solely used for sightseeing helicopter operations.

Public facilities located in South Kohala include the Waimea Medical Center, fire stations at Kawaihae and Waimea, and several public and private schools.



Recreation in the district is geared toward public and private facilities along the coast, maximizing the recreational potential of the ocean. The limited number of other quality beach facilities in the Country places a premium on South Kohala's available parks, particularly Hapuna Beach State Park, considered one of the finest in the State. State and County parks are found at various elevations throughout the district with several hunting preserves in the upper elevations.

Central Urban Area: Waimea -- Waimea is situated in the saddle between the Kohala Mountains to the north, and Mauna Kea to the south, approximately 20 to 30 minutes driving time from the subject. Despite the small size of the town and generally cool temperatures, the eastern portion is considerably damper than the western sector.

Established in order to supply support facilities for the Parker Ranch and to provide a cool, quiet retreat from warmer Island climes, Waimea-Kamuela has a permanent resident population of just under 4,000 persons within the 652 acre census-defined village. An additional 1,200 to 1,500 persons live in the ranching and farming community surrounding the town center.

The often fog-shrouded eastern area is less desirable for residential purposes according to the area's populace. Topography is typically rolling hills throughout; however, the northern eastern portion of the community has a generally steeper slope with cut-pads required for home construction. The south and western portions of Waimea have a more even topography, consisting of rolling hills interspersed with plain areas. The entire region is further tilted as to gradually slope westerly toward Kawaihae Bay.

Among the amenities of Waimea Village not specifically mentioned in the preceding discussion of the South Kohala District overall are the Kahilu Community Theater, one of the finest performance auditoriums in the State, and the Hawaii Preparatory Academy (HPA), a respected private school. Currently having an enrollment of nearly 650, HPA provides boarding facilities and is a major draw for residents of the area.

There are a variety of restaurants, shopping and service businesses in the community, with overnight accommodations available at the Kamuela Inn and the Parker Ranch Lodge.

Residential development in town is on lots ranging in size from 10,000 square feet to 20-plus acres, with the majority of parcels in the one-half to three-acre range. Primary interests in the community are farming, equestrian, and other outdoor-related activities, taking advantage of the area's unique cool, mountain-like atmosphere. The range lands near Waimea have become much sought after for high-priced gentlemen/equestrian estate developments.

#### The North Kona District

The Kona region, a primary component of West Hawaii, is divided into the North and South Kona districts, which stretch along the coastal plain and eastern flanks of Mauna Loa and Hualalai for nearly 80 miles. Relatively young geologically, the topography is characterized by lava flows gently sloping from the shoreline to the upper elevations of the inland mountains. Mauna Loa, seasonally snow-capped and an active volcano, is the second highest Pacific-island peak with a 13,677 foot summit.

Generally, temperatures in North Kona decrease and rainfall and vegetation increase the further mauka the location. Along the relatively barren coastal plain temperatures average from 72 to 80 degrees, with rainfall between 25 and 50 inches annually. In the central elevations of the district, from 500 to 2,300 feet above sea level, temperatures are approximately five degrees lower than at the coastline, with 60 to 70 inches of rain per year. The sunny Kona mainly coastline appeals to tourists and retirees, resulting in intensive resort-type development between Kailua-Kona and the Keauhou Resort; while the large majority of permanent residents historically have preferred the cooler, agriculturally-oriented central elevation areas. Land above the 4,000-foot level is typically ohia-lehua and fern rain forest, and sparsely populated.

Kailua-Kona and Kealahou, the major communities in North Kona today, were significant native Hawaiian settlements; central villages of the large indigenous population which once resided along the Kona Coast. Captain Cook first landed on Hawaii at Kealahou Bay in January 1779, and was later killed there.

The town of Kailua (somewhat recently renamed Kailua-Kona) was made capital of Kamehameha the Great's kingdom in 1812. In 1820, the first missionaries arrived, and soon oranges, grapes, cattle, horses and other crops were established. The safe

harborage available in the numerous coastal coves resulted in much whaling trade during the early decades of the 19th Century.

The 1980 census reported a total of 13,748 residents in North Kona, with current estimates ranging upward of 33,400, an increase of 142.94 percent in ten years. In 1980, Kailua-Kona, one of the state's larger non-Oahu communities, recorded a population of 4,751; with Kealahou and Holualoa, the district's next two largest towns at 1,033 and 1,243, respectively. As a whole, the region grew by 8,916 residents, or 184.52 percent from 1970 figures; which was 8.56 percent above 1960 levels. Governmental planners forecast a population for North Kona of over 30,000 by the end of 1990. On a percentile basis, the district has been the fastest growing in the State over the past 15 years.

Tourism is the primary business activity in North Kona, and the major economic stimulus for the entire District. Agriculture, still the main focus of South Kona, has been relegated to a secondary status in the North. Currently, there are approximately 4,600 transient units available in North Kona, comprising over 50 percent of the Island's total inventory.

Visitor arrivals, an important economic indicator in the North Kona district, have fluctuated on the "big Island" over the past several years. In 1989, a record 1.3 million tourists (westbound and eastbound) stayed an average of 4.7 days each, spending more than \$792 million. The unprecedented and generally anticipated growth was a product of several factors, among which were continued lower airfares and economic strength, and the opening of the Hyatt Regency Waikoloa. Continuing this trends, the first three quarters of 1990 have shown a continuing increase in numbers of visitors, with year-end figures anticipated to be up more than 10 percent. The Stanford Research Institute (in studies prepared for the State) estimated the visitor count will increase to between 1.6 and 2.5 million annually by the end of the century. We concur with County estimates at the 1.8 to 2.1 million level. Figures such as these, enhanced by the quality of inventory development to date, encourage continued investment in all West Hawaii economic sectors. Average length of visitor stay is also expected to increase over present levels to circa six days during the next two decades.

Many industries--real estate, commercial, service-oriented, and retail in particular--have benefited and expanded due to the income generated through tourism. Property values,

in general, have increased significantly over the past decade, a result of the influx of visitor, resident and retiree capital. This sharp rise in land prices has created concern in the agricultural community; however, the increased market size and additional public services have off-set some of these difficulties.

While the historic base of North Kona was ranching, fishing and diversified agriculture, the past decade has seen a transition in the socioeconomic character of the region from an agrarian lifestyle to a resort and residentially-oriented community designed to meet the increasingly urbanized employment needs in the tourism-spurred Kailua-Kona to Keauhou development corridor. Yet, as tourism is generally oriented toward the warm sea coast area, away from upland residential/agricultural neighborhoods, a continued harmony between agricultural and urban/resort development is anticipated.

Ranching, considered a poor use of the rocky and relatively expensive land in the District, has given way to a variety of sub-tropical and temperate crop production agricultural uses, although (for tax purposes) many bulk acreage holdings are still marginally classified as grazing. There are expansive macadamia nut orchards in both North and South Kona, with avocados, coffee, citrus and floral/nursery products also cultivated. Commercial and charter fishing is traditional and continuing economic activity, and a strong identification source for the Kailua-Kona community.

The Big Island has become a focal point in the United States' search for alternative energy sources. A recent (now terminated) project successfully converting ocean temperature differences into energy (Ocean Thermal Energy Conversion) was conducted off Keahole Point. Other tests underway are investigating geothermal, biomass, solar energy and wind turbine power.

Keahole Airport, the State's newest facility, is located approximately eight miles north of Kailua-Kona and has been handling direct mainland flights (via United Airlines) since July 1983. Expanded boat anchorage has been made available at Honokohau Small Boat Harbor. Adjacent to the airport, the 547-acre Hawaii Ocean Sciences and Technology (HOST) Park has been recently completed. This project, funded by the State, will offer private enterprises the opportunity to exploit the potentials of the North Kona coastal waters and create many professional level jobs for the community.

The North Kona water system is primarily supplied by five wells at Kahaluu and Waiaha Stream, with the Kahaluu wells providing the bulk of the water. Additional wells are currently in the drilling and testing stages at Kahaluu and at kalaoa (above the airport). At present, source output capacity is approximately nine to eleven million gallons per day, a figure which has recently grown with the addition of a new well in the area. However, a recent attempt at another well drilling in the field was unsuccessful. Most residences in the Kona area are serviced by individual sewerage (cesspool) facilities, with urban Kailua-Kona and Keauhou being serviced through municipal sewerage systems. Power and telephone utilities are available along major roadways throughout the district.

Central Urban Area: Kailua-Kona to Keauhou Corridor -- Kailua-Kona, the population center of West Hawaii, is developed with hotels, condominiums and commercial services generally directed toward the visitor industry. In addition to tourism, the village is the commercial hub for the residential and agricultural developments in the surrounding areas.

The corridor between Kailua Village and Keauhou, stretching from the shoreline up-slope to Mamalahoa Highway, is in a state of evolution, with properties along the ocean being improved with condominiums and high density residential projects. The cooler mauka areas are being developed into single-family residential subdivisions as State Land Use (SLU) and County zoning designations are changed to permit such improvement, and water is made available. Commercial frontage improvement has been along Alii Drive, Palani Road and Kuakini Highway.

The extent of development in Kailua-Kona has been heavily concentrated at the northerly end of the town, resulting in extreme traffic congestion at the Palani Road/Queen Kaahumanu Highway, and Kuakini Highway/Alii Drive intersections. The condition particularly plagues the quality and suitability of access to the Kona Industrial subdivision.

The 2,000-acre Keauhou resort area is in the midst of its third phase of development with planned residential and condominium development centered around the existing hotels, resort multi-family project and the Keauhou Golf and Country Club. To date, 1,330 hotel rooms and more than 1,200 condominium units have been constructed in the project. Extensive non-tourist commercial development has been successful at

Keauhou within the Keauhou Shopping Center. This is an example of the gradual change taking place as businessmen and retailers move into the corridor from traditional Kealahou and Captain Cook locales. The strong demand for lots in Keauhou Estates, and units at the adjoining Hale Kehau and other nearby luxury-oriented condominiums, within an exclusive residential community fronting the golf course, also illustrates the upscale transitional trends in the region. The Kona Lagoon Hotel in the resort has been closed for renovation for several years in anticipation of eventually merging it and the adjacent Keauhou Beach Hotel into a "super-hotel" project; a project now on hold. The Kona Surf Hotel has also been recently refurbished, and an additional 27 holes of golf are planned.

Educational facilities are provided by elementary and secondary schools located immediately north of Kailua-Kona, with an additional school midway between Kailua-Kona and Keauhou. A high school is located approximately 12 miles south of the village. All schools have bus service. Police and fire protection are located in Kailua-Kona.

Kona Village Resort, a 62-acre holding currently improved only with a 150-room hotel, 12 miles north of Kailua, is the only other resort area in the North Kona district. The isolated village, which has historically achieved high occupancy rates is a polynesian-style low-intensity retreat facility. The Village is located within the Kaupulehu ahupuaa, along the shores of Kahawai Bay. The lessees of the vast holding have begun infrastructure development to support sister intermediate-sized resorts featuring two gold courses and two luxury hotels.

#### Sub-Market Sector -- The Kailua-Kona to Kawaihae Coastal Corridor

Arid and sparsely vegetated, the lava-strewn coastal corridor stretching from the northerly boundary of Kailua-Kona to Kawaihae is considered the economic and employment focus of West Hawaii, and thus is of import to the subject holding. The tourism-based expansion of the region will fuel demand for residential, industrial, commercial and other urban land uses in the greater Kailua-Kona community. Properties within this 33.5-mile strip, of which Queen Kaahumanu Highway is the general mauka (or inland) frontage border, share similar climatic, soil, topographical, infrastructure and development potential characteristics. South of this currently under-developed corridor, the Kailua-Kona urban area and commensurate land-uses

dominate. Northerly, past Kawaihae, the general slope of the land increases, as does precipitation and wind velocity, and ranching land uses predominate.

Pre-westernization, this region of the leeward Hawaii coastline was populated only along the shoreline, with fishing villages scattered among the various coves and byas in the area. Developed fishponds, natural brackish anchialine pools (which are found only in this area and on southwest Maui), and the ocean provided sustenance for the villages. However, the communities were plagued periodically by lava flows from Hualalai and Mauna Loa which continued until 1859. The corridor was considered as one of nine deserts, or "kekaha" within the island chain by ancient Hawaiians.

Following the decline of native villages in the late 19th Century, the region was barren and void of development save for sporadic use as second home, vacation retreats or fishing encampments. Two factors have contributed to the dramatic change undergone in recent years as the corridor has moved from an isolated unimproved area to being one of the most desirable visitor destinations in the State.

First, was the establishment of the Mauna Kea Beach Resort and Hotel, which opened in 1965. A world-class facility developed by the Rockefeller family, it illustrated the adaptability of the corridor's physical features to well-designed projects. Furthermore, along with the Kona Village Resort, which opened in 1966, it exposed the tourist industry to the positive climatic and recreational traits of the region.

The second factor contributing to the current vitalization of the area was the construction of quality public facilities, notably the completion of Queen Kaahumanu Highway through the coastal lava flows (connecting Kailua-Kona and Kawaihae) and the opening of Keahole Airport.

A wide two-laned, high-speed thoroughfare, the Highway has opened previously inaccessible shoreline areas to use and development and stabilized the region by permitting high-speed travel between Kawaihae and Kailua-Kona. Queen Kaahumanu Highway extends south from the corridor to beyond central Kailua-Kona, joining Kuakini Highway at Holualoa.

Despite these positive influences which should stimulate wide-spread development, the corridor is currently (to a large degree) undeveloped and in feral condition. A'a and

Pahoehoe lava comprise the substratum throughout the region, with scattered soil pockets near the shoreline and further mauka. For the most part, the area is unarable and not conducive to crop production in its existing state. Although more recent flows are void of vegetation, the older lava supports pili grass, kiawe trees and haole koa, among other species.

Of the existing land uses evident in this sub-sector, resort-oriented development is foremost. Discussed within the previous district overview presentation, the four major existing resort-type holdings are summarized as follows:

<u>Project Name</u>	<u>Kona Village</u>	<u>Waikoloa Beach Resort</u>	<u>Mauna Lani</u>	<u>Mauna Kea Beach</u>
Size in Acres	62 (1)	1,383	3,200	1,000
Year Opened	1966	1981	1982	1965
Hotel Rooms:				
Existing	150	1,786	863	310
Under Construction/ Proposed (2)	--	700*		300
Condominium Units:				
Existing	--	120	196	40
Under Construction/ Proposed (2)	--	908	46	--

- (1) Up to 600 nearby acres have been approved for resort development, but not as part of existing project.
- (2) With construction anticipated to commence within two years.

Generally, the resort operators are optimistic regarding both short- and long-term tourism potentials in the area. All of the projects are of high quality, with four of the five existing hotels being considered as among the most exclusive in the State ("Luxury" class). Room tariffs, dining costs and condominium unit prices are commensurately high.

The demand by developers for resort type land uses in the region has increased dramatically, with eight proposed resort projects having sought land use approvals during the past four years, or announced plans to pursue such.

Four of the proposed developments have achieved needed government approvals, and are beginning intensive development during 1990-91: Kohanaiki, Kukio Beach,



Kaupulehu, and the South Kohala Resort (a component of Mauna Kea Beach properties). These projects would contain up to 3,850 hotel rooms, 3,450 condominium units and 1,000 residential lots, and create an additional 6,000 to 10,000 employment opportunities.

The secondary major land use in the corridor is industrial, with parks developed at either end of the sector in Kailua-Kona and Kawaihae, and a third fronting the mauka side of Queen Kaahumanu Highway between Keahole Airport and the Honokohau Small Boat Harbor. The Kaei Hana II park, located in Kawaihae, is centered around spatial needs created by the inter-island port and rural Kohala areas, while the Kona Industrial Subdivision has evolved into a quasi-commercial area with a wide variety of tenant types. The Kaloko Light Industrial Subdivision, is a general industrial park which has become the focal point of industrial construction and investment in West Hawaii over the past three years. The West Hawaii Concrete and Allied Aggregates quarries and batching plants are also located on the mauka side of the Highway nearby the Kaloko industrial development. Southerly adjacent to the airport is the Hawaii Ocean Science and Technology (HOST) Park, an industrially-zoned, State-sponsored subdivision limited to marine-related uses.

Each of these projects is a major long-term employment center.

The only "commercial" constructions in the corridor, outside of the resorts, are at Honokohau Harbor (Gentry's Kona Marina and the Texaco fuel dock facility which are both considered light industrial projects), the Puako Trade Center, and the Kawaihae Shopping Center. "Commercial" development has become the mainstay of the Kona Industrial Subdivision.

With the exception of the small Puako community (population of 257 in 1980), situated between the Mauna Lani and Mauna Kea Beach Resorts makai of the subject property, residential uses in the Kailua-Kona to Kawaihae corridor are limited to scattered second homes and retreats along the shoreline or in residential development mauka of the corridor. In the Kalaoa/Kealakehe areas, there are numerous residential and agricultural subdivisions. For the most part, the non-resort oceanfront homes situated along the various picturesque bays of the North Kona/South Kohala shoreline (outside of Puako) are not serviced by County utilities. In all, the full-time resident population of the corridor is less than 1,000. This is due to the scarcity of available housing, and

"zoned" properties permitting development, and a lack of water service. A 40-lot luxury-oriented development, "Kona Bay Estates" with lot sizes ranging from 7,052 to 26,337 square feet, was fully marketed in 1985 on an oceanfront site at the extreme southerly portion of this market sub-sector near Kailua town.

Public land uses in the corridor include: the Keahole Airport, servicing West Hawaii, a 780-acre project zone approximately 22 miles south of the subject holding; Honokohau Harbor, a 165-berth small boat harbor three miles south of the airport; and, the Kailua-Kona community solid waste disposal station (dump), with the Humane Society adjacent, mauka of the Highway mid-way between the airport and Kailua-Kona. Additionally, the Natural Energy Laboratory is located on 10.25 acres at Keahole Point between the ocean and the airport, and as previously noted, the first phase of HOST park was finished by the State near the laboratory, and awaits tenant improvements.

The only truly agricultural land use in the area is within Phase I of the 206-acre Keahole Agricultural Park, across Queen Kaahumanu Highway from the Airport, containing 36 leaseable lots. Aquaculture is also being developed adjacent to the Natural Energy Laboratory on a quasi-experimental basis and is anticipated at the HOST facility.

There are five public parks in the sector. The best developed are the Old Kona airport Park (sporting fields, beach facilities, meeting house, canoe sheds) located at the southerly end of the corridor, and the County's Spencer Beach Park and Hapuna State Beach Parks (one and three miles south of Kawaihae, respectively), which are improved with picnic and other facilities. A public-use beach park is included in the Waikoloa Beach Resort development on Anaehoomalu Bay. The fourth public area, Wawaloli Beach Park, is adjacent to the Natural Energy Laboratory and is unimproved.

The close proximity of the subject properties to the Hapuna (considered one of the finest sandy beaches in the State) and Spencer parks is a favorable marketing trait.

Additionally, the U.S. National Park Service is in the process of completing acquisition of 615.9 oceanfront acres along Honokohau Bay (north of the small boat harbor) for development of the Kaloko-Honokohau National Historic Park.

In summation, this sub-region of the Economic Market Sector is generally under developed; however, as it evolves over the next two decades, a significant economic base will be created resulting in increased demand for housing and service opportunities throughout West Hawaii. The significant majority of private capital invested in the area has been within the existing destination resorts along the coastline and in the upland residential areas of Kalaoa/Kealahou, and is anticipated to increase many fold over the next twenty years. The expansion of urban Kailua-Kona will utilize the southerly portions of the defined corridor (between Kailua-Kona and the Keahole Airport) for a variety of uses, notably industrial. All available indicators point to the continuing dominance of resort-oriented development in the northerly portions of the corridor.

Climatic traits that are desirable among tourists and residents; the increasing demand for quality neighbor island resort destinations created by the expanding visitor industry and the deterioration of Waikiki; the demand for vast amounts of support services; and, the desires of governmental planners, are among the positive characteristics which contribute to the trend toward further development in this sub-market sector.

#### Current Subject Economic Market Sector (EMS) Trends

There have been two substantial trends in the EMS Real Estate market in recent years.

First, over the past five years there has been a rapid absorption of "gentlemen/equestrian estates" in the mauka areas of West Hawaii. These one to 40 acre lots in full-amenitied subdivision, which have security gates/guardhouses, equestrian facilities, community recreational areas, and strict covenants, range in price from \$100,000 to \$600,000. More than 500 of these choice lots have been sold or reserved since late 1984, prior to which no such developments were available. The success of these developments has served to up the prices for even isolated agricultural lands.

Secondly, the EMS has become the focal point of resort development, and capital investment thereto, in Hawaii. It is estimated that from 50 to 60 percent of all resort units (hotels and condominiums) constructed in the State over the next two decades will be within the existing and proposed coastal resort communities along the Kohala/Kona

shoreline. This development is anticipated to spur the economic base of the region past West Maui, so that only urban Honolulu can boast of a larger inventory.

The impact of this trend has been to escalate the demand for real estate in all West Hawaii sectors, both by developers following the flow of capital and governmental guidance, and by residents and ancillary businesses who would serve the resorts employ and support needs. The Signal Puako community is intended to service segments of this demand.

Because of this unprecedented anticipated expansion, stimulated to a large degree by County land use planners, a healthy economy and tourism industry, and the scarcity of desirable bulk acreage resort-potential sites elsewhere in the State, historic West Hawaii indicators alone cannot provide the full degree of insights necessary for quality analysis, as there will be synergistic impacts beyond the limited statistics available for a research base.

The velocity of absorption for resort-developable sites and finished inventory, "depth" of demand trends, long-term viability of developed destination resorts, and other contributing factors to the West Hawaii tourism industry have now become dependant upon statewide timing and economic conditions. Only when the EMS inventory has substantially increased, in say eight to 12 years, will the sector be established enough to permit analysis using West Hawaii data only.

Major international concerns have or are investing heavily in the EMS resort properties, including UAL (parent company of United Airlines, Transcontinental Regent Hotels, Princess Hotels, Nansay, Barnwell Industries, Seibu and the Tokyu Corporation.

As of mid-1986, there were only four major land holdings in the coastal corridor having some form of resort-type classifications: Mauna Kea Beach, Mauna Lani, Waikoloa, and the proposed National Historic Park acreage at Honokohau. While commonly aware of other properties which were seeking destination designations, the consensus of opinion among informed professionals was that approvals for these sites were many years away.

However, in a bid to expand and solidify the economic base of the Big Island, the approval process was subsequently accelerated far-beyond historic precedent for any Hawaii locale.

In light of the booming tourism industry in the State, the excellent climatic and scenic characteristics of the EMS sites, and the fact that there are no other feasible uses for many of these desolate lava holdings, re-classification to permit resort development seems both prudent and an excellent investment in the County's economic future.

At a minimum, it would appear that upwards of 20,000 to 25,000 total resort units in the Kailua-Kona to Kawaihae corridor will have received approvals (State Land Use and County General Plan and Zoning) by the end of this year, or about two-thirds the number of visitor units currently in Waikiki. If all proposed projects are approved, the total could surpass 30,000. This figure does not include the proposed Mahukona (in North Kohala), Papa Bay (South Kona) or the proposed Hawaiian Riviera (in Kau) resorts.

While, in the interest of preserving quality, it is doubtful if developers would construct the total number of units approved (Mauna Kea Beach and Mauna Lani have expressed a commitment to low density development), the now potential unit totals remains nonetheless staggering.

In addition to the existing "major" Keauhou-Kona, Mauna Kea Beach, Mauna Lani and Waikoloa Beach communities, the coastal region will also contain at least three and as many as seven new "intermediate" destination projects by the turn of the century. And, there are "resorts" on the Island outside the EMS at Punaluu, Hilo (Banyan Drive), and proposed in South Kona, Kau and North Kohala. By the year 2000, the Big Island could contain up to 14 intermediate and major destination projects, a vacation area (Hilo), and several minor retreats.

In comparison, Kauai has only one destination resort (Princeville) and two vacation areas (Poipu and Coconut Grove), Molokai has only one destination resort (Kalua Koi), Oahu has three resorts (Turtle Bay, Makaha Valley, and the under-construction Ko Olia), and Maui has four destination communities (Kaanapali, Kapalua, Wailea and Makena).

### **SECTION THREE: THE WEST HAWAII INDUSTRIAL MARKET**

The presentation of our analysis of the West Hawaii industrial market sector is divided into three general subsections: quantification of demand, identification of supply, and correlation of indicators.

In the first chapter, demand is analyzed from both a long and short-term perspective; the former using resident and tourism population requirements as a basis for determining additional industrial spatial needs, the latter based on absorption levels currently being achieved in study area subdivisions.

The level of existing and proposed industrial acreage supply is addressed in the second portion of the analysis. The demand/supply quotients are then compared in the third portion to arrive at a conclusion of need (or lack thereof) for further designation of industrial lands in West Hawaii.

#### **Quantification of Demand**

##### **Long-Term Indicators**

Being in the midst of a transformation from an agrarian-based to "modern" community, historic industrial demand levels for West Hawaii are not fully indicative of probable future occurrence or appropriate for projecting long-term regional space needs. Significant new services and products will be required by the coastal resorts, expanding Kailua businesses, and State-sponsored developments at the HOST Park, Keahole Agricultural Park, Keahole Airport and Honokohau Harbor.

Additionally, the growing resident and tourism populations will create economies of scale allowing "industrial" businesses previously located on Oahu or the mainland to relocate to and operate efficiently in West Hawaii.

We believe the best method for determining the level of projected spatial needs for the study region is through the use of per capita spatial demand trends.

**Fundamentally, demand for industrial development is a direct function of consumer demand for the finished product or service. As population levels (resident and tourist) increase the need for additional services is proportionately created.**

**By ascertaining an appropriate "per square foot of industrial development per person" allowance, and applying this ratio against forecast population levels, the regional demand for industrial space over time can be quantified.**

**Owing to its isolated island status, a precise measurement of direct market (consumer) requirements can be made. This is a highly accurate and desirable method unavailable to "linked" mainland urban centers wherein market demand overlaps between sectors and identification of an exact "impact radius" is virtually impossible.**

**All industrial and commercial real property demand is a product of base consumer needs, and the most efficient projection process is one which can identify the breadth of consumer shares.**

**There are three steps in completing this forecasting model:**

- 1. Project consumer population levels**
- 2. Estimate per capita spatial demand ratios**
- 3. Test model scenarios**

**The various model scenarios tested identify the most probable market demand ranges for further West Hawaii industrial development.**

#### **1. Consumer Population Levels**

**Demand for West Hawaii industrial space is a function of two ultimate constituent consumer groups, local residents and tourists visiting the area.**

**Table 1 displays our projections for these demographic categories during our 20-year time frame 1990 to 2010.**

**TABLE 1**

**PROJECTED DE FACTO POPULATION LEVELS  
IN WEST HAWAII 1990 TO 2010**

Year	1990	1995	2000	2005	2010
<b>RESIDENT POPULATION</b>					
South Kohala	11,000	15,750	21,200	26,800	33,400
% Average Annual Change	%	8.64%	6.92%	5.28%	4.93%
North Kona	33,400	48,700	56,000	62,800	69,500
% Average Annual Change	%	9.16%	3.00%	2.43%	2.13%
Total Resident Population	44,400	64,450	77,200	89,600	102,900
% Average Annual Change	%	9.03%	3.96%	3.21%	2.97%
<b>TOURIST POPULATION</b>					
Average Daily Visitor Count	16,592	23,014	30,719	35,342	38,630
% Average Annual Change	%	7.74%	6.70%	3.01%	1.86%
<b>TOTAL REGIONAL DE FACTO POPULATION</b>					
POPULATION	60,992	87,464	107,919	124,942	141,530
% Average Annual Change	%	8.68%	4.68%	3.15%	2.66%

Source: Various, and The Hallstrom Appraisal Group, Inc.



Resident population forecasts are based on:

- "Series MK" projections prepared by the State of Hawaii Department of Business and Economic Development;
- Estimates by the County of Hawaii Planning Department;
- Resident housing demand forecasts by the US Department of Housing and Urban Development; and,
- Estimates prepared by various private consultants and developers for use in land use change petitions (typically within EIS).

The most critical of these sources are the first two, as State and County agencies control the land use approval process and base their decisions (in part) on these figures.

However, historically, the State and (notably) the County projections have consistently understated actual population growth levels. And, in interviews, State statisticians acknowledge there is a need to revise the MK figures upward as the population is expanding more rapidly than anticipated.

Generally, our concluded forecasts are slightly more optimistic than the public agency figures.

The tourism population levels were estimated based on analyses undertaken by (of for) the State and County, the Hawaii Visitors Bureau, and based on extensive experience in the Statewide and West Hawaii visitor industries. The tourism totals are the average daily visitor census during the projection year.

Together, the resident and tourist totals combine to form the effective "de facto" population of consumers in the study area.

## 2. Per Capita Spatial Demand Trends

The best indicators of appropriate industrial demand requirements for an urban island economy can best be drawn from the experience of Oahu, which though historically

under-supplied, provides useful insight in to the probable growth trends of the outer islands.

Table 2 displays the industrial space per capita demand trends for the City and County of Honolulu for the period 1978 through 1990 (year-end estimates). For comparative purposes, demand is expressed on a de facto (resident and tourist) population basis.

The total developed industrial space of 31,261,000 square feet, equates to a de facto per person ratio of 32.87 square feet at year-end 1990.

This compares with nationwide estimates by the Urban Land Institute and others which indicate a range of 25 to 35 square feet per person is appropriate for an urban economy.

Applying the Oahu figures to West Hawaii requires some analysis.

In many respects, being the center of the State economy and home to the majority of residents, Oahu would be expected to have an atypically high amount of industrial development in order to support statewide consumers. Conversely, in order to provide a service to West Hawaii, a similar-sized plant as would be found in a larger metropolitan area may be required even though the population is far less; pushing upwards the per capita space ratios.

Reviewing trends on Maui and Kauai, and in Hilo, we have concluded an appropriate per capita finished spatial allowance for West Hawaii would be in the range of 25 to 30 per square feet per person in the de facto population (tourist and resident).

Based on the market data, we anticipate spatial demand to increase at a rate of one percent ("moderate" growth) to two percent ("extraordinary" growth) compounded annually during the study period.

### 3. Application of the Model

By multiplying the de facto population forecasts by the per capita spatial trends, we can estimate the probable demand for finished industrial space in West Hawaii. This figure can be translated into underlying acreage requirements through use of an appropriate Floor Area Ratio (FAR).

TABLE 2

SUMMARY OF INDUSTRIAL SPACE DEVELOPMENT  
ON OAHU 1977 TO 1990

<u>Year</u>	<u>Industrial Floor Space Area (Leaseable Sq. Ft.)</u>	<u>De Facto Population of Island</u>	<u>Ratio of Industrial Space Per Person</u>
1977	22,819,000	793,285	28.77
1978	23,412,000	801,527	29.21
1979	23,976,000	817,511	29.33
1980	24,780,000	823,826	30.08
1981	25,645,000	825,443	31.07
1982	---	840,945	---
1983	---	859,895	---
1984	---	868,770	---
1985	28,929,999	876,380	33.01
1986	28,159,000	894,170	31.49
1987	28,644,000	905,260	31.64
1988	29,714,000	922,950	32.19
1989	30,582,000	936,548	32.65
1990	31,261,000	951,000	32.87

Compounded Annual Growth Rate for 1977 through 1990	2.45%	1.40%	1.03%
Average Annual Addition for 1977 through 1990	649,385	12,132	

Note: Complete data not available for all study years. 1990 figures are year-end estimates.

Source: State of Hawaii Department of Business and Economic Development,  
Hawaii Real Estate, and  
The Hallstrom Appraisal Group, Inc.

We have tested six demand scenarios, as presented on Tables 3 through 8, using the following assumptions:

<u>Current Per Capita Spatial Demand</u>	<u>Growth Rate</u>	<u>Table No.</u>
Moderate	Stable	3
Moderate	Moderate	4
Moderate	Rapid	5
Optimistic	Stable	6
Optimistic	Moderate	7
Optimistic	Rapid	8

The results from the analysis are summarized on Table 9, the shaded scenarios are those we consider most representative of probable occurrence. The lighter shade depicting the lower end of the spectrum, the darker shade the upper end.

The indicated mid-point demand conclusion is shown at the bottom of the table.

Based on our analysis, we estimate the total demand for finished industrial space in West Hawaii from 1990 to 2000 to be 1,595,561 square feet, or an average of nearly 160,000 square feet annually. This equates to a *net* demand for industrial lands of 146.5 acres during the decade, or 14.7 acres per year.

During the period 2000 to 2010, the total additional space demand is forecast at 1,484,160 square feet and 136.3 acres.

The cumulative demand over the next twenty years in the study region (1990 through 2010) would be at 3,079,721 square feet and 282.8 net site acres.

Assuming a typical 75 percent efficiency ratio in development, the *gross* acreage demand over the next ten years would be circa 195 total acres, and 182 acres from 2000 to 2010; or 377 acres during the two decade period.

**TABLE 3 PROJECTED INDUSTRIAL SPACE DEMAND  
IN WEST HAWAII 1990 TO 2010  
SCENARIO ONE: Moderate Demand Level, Stable Growth**

Year	De Facto West Hawaii Population	Per Capita Industrial Space	Total Required Gross Industrial Floor Space Area
1990	60,992	25.00	1,524,800
1995	87,464	25.00	2,186,600
2000	107,919	25.00	2,697,975
2005	124,942	25.00	3,123,550
2010	141,530	25.00	3,538,250

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 4**    **PROJECTED INDUSTRIAL SPACE DEMAND**  
**IN WEST HAWAII 1990 TO 2010**  
*SCENARIO TWO: Moderate Demand Level, Moderate Growth*

Year	De Facto West Hawaii Population	Per Capita Industrial Space	Total Required Gross Industrial Floor Space Area
1990	60,992	25.00	1,524,800
1995	87,464	26.28	2,298,554
2000	107,919	27.63	2,981,320
2005	124,942	29.04	3,628,311
2010	141,530	30.53	4,320,459

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 5 PROJECTED INDUSTRIAL SPACE DEMAND  
IN WEST HAWAII 1990 TO 2010  
SCENARIO THREE: Moderate Demand Level, Extraordinary Growth**

Year	De Facto West Hawaii Population	Per Capita Industrial Space	Total Required Gross Industrial Floor Space Area
1990	60,992	25.00	1,524,800
1995	87,464	27.63	2,416,412
2000	107,919	30.53	3,294,891
2005	124,942	33.74	4,215,540
2010	141,530	37.29	5,277,094

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 6 PROJECTED INDUSTRIAL SPACE DEMAND  
IN WEST HAWAII 1990 TO 2010  
SCENARIO FOUR: *Optimistic Demand Level, Stable Growth***

Year	De Facto West Hawaii Population	Per Capita Industrial Space	Total Required Gross Industrial Floor Space Area
1990	60,992	30.00	1,829,760
1995	87,464	30.00	2,623,920
2000	107,919	30.00	3,237,570
2005	124,942	30.00	3,748,260
2010	141,530	30.00	4,245,900

Source: The Hallstrom Appraisal Group, Inc.



**TABLE 7 PROJECTED INDUSTRIAL SPACE DEMAND  
IN WEST HAWAII 1990 TO 2010**  
*SCENARIO FIVE: Optimistic Demand Level, Moderate Growth*

Year	De Facto West Hawaii Population	Per Capita Industrial Space	Total Required Gross Industrial Floor Space Area
1990	60,992	30.00	1,829,760
1995	87,464	31.54	2,758,265
2000	107,919	33.15	3,577,584
2005	124,942	34.85	4,353,973
2010	141,530	36.63	5,184,551

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 8 PROJECTED INDUSTRIAL SPACE DEMAND  
IN WEST HAWAII 1990 TO 2010**  
*SCENARIO SIX: Optimistic Demand Level, Extraordinary Growth*

Year	De Facto West Hawaii Population	Per Capita Industrial Space	Total Required Gross Industrial Floor Space Area
1990	60,992	30.00	1,829,760
1995	87,464	33.15	2,899,694
2000	107,919	36.64	3,953,869
2005	124,942	40.49	5,058,648
2010	141,530	44.74	6,332,513

Source: The Hallstrom Appraisal Group, Inc.

**SUMMARY OF PROJECTED INDUSTRIAL SPACE DEMAND SCENARIOS  
FOR WEST HAWAII 1990 THROUGH 2020**

All Figures in Gross Square Feet

TOTAL SPACE DEMAND			
Scenario	1	2	6
Year	Moderate Demand Stable Growth	Moderate Demand Moderate Growth	Optimistic Demand Extraordinary Growth
1990	1,524,800	1,524,800	1,829,760
1995	2,186,600	2,298,554	2,899,694
2000	2,697,975	2,981,320	3,953,869
2005	3,123,550	3,628,311	5,058,648
2010	3,538,250	4,320,459	6,332,513
PERIODIC DEMAND			
Scenario	1	2	6
Year	Moderate Demand Stable Growth	Moderate Demand Moderate Growth	Optimistic Demand Extraordinary Growth
1990	661,800	773,754	1,069,934
1995	511,375	682,766	1,054,175
2000	425,575	646,991	1,104,779
2010	414,700	692,148	1,273,865
CUMULATIVE STUDY PERIOD DEMAND			
Scenario	1	2	6
Year	Moderate Demand Stable Growth	Moderate Demand Moderate Growth	Optimistic Demand Extraordinary Growth
1990	661,800	773,754	1,069,934
1995	1,173,175	1,456,520	2,124,109
2000	1,598,750	2,103,511	3,228,888
2010	2,013,450	2,795,659	4,502,753
CONCLUDED STUDY MID-POINT DEMAND			
Finished Space Demand in Square Feet		Finished (Net) Site Demand in Acres (1)	
Total	Periodic	Total	Cumulative
1990	1,677,280	154.0	---
1995	2,524,288	231.8	77.8
2000	3,272,841	300.5	146.5
2005	3,986,521	366.1	212.1
2010	4,757,001	436.8	282.8

(1) Assuming average FAR of .25.

Source: The Hallstrom Appraisal Group, Inc.

### Short-Term Demand Indicators

The recent market experience of West Hawaii industrial inventory (sites and finished space) is insightful into the general near-term health of the sector.

The key factors are the velocity of absorption for offered product, and vacancy rates in completed developments. If projects are quickly "sold-out" and tenant turnover rate is low, it can be asserted the market is in a healthy condition.

Cumulative absorption and vacancy rates for study area projects for the period 1978 to 1990 are summarized on Table 10.

Most notably, since mid-decade virtually all inventory released on the market has been successfully absorbed, and the vacancy rate for finished projects is relatively low in consideration of the number of projects which have come "on-line" since 1987.

In fact, the vast majority of unoccupied space is within recently completed buildings in the Kaloko Industrial Park which are still in the original lease-up (or sales) stage. For established improvements the effective vacancy rate is estimated at less than one percent.

In each of the last eight years, demand for finished industrial space has increased, a trend which brokers anticipate to stabilize at about the current levels over the near-term.

There are no vacant, developable industrial sites still in "original" sales; all offered properties have been absorbed (although many sites are still unimproved or available on a re-sale basis).

Brokers and project spokespersons interviewed expressed confidence in the short-term status of the West Hawaii industrial market, noting the large number of interested investors and tenants/users in raw land, serviced sites and finished space.

Further, they point to an increasing diversity of business-types emerging in the region, services and products previously unavailable, which are fueling demand beyond expected levels. Most felt there was a pressing need to pursue additional development

**TABLE 10**  
**SUMMARY OF ESTIMATED ABSORPTION AND VACANCY RATES**  
**FOR INDUSTRIAL SPACE IN WEST HAWAII 1978 TO 1990**

Year	Annual Finished Space Absorption (in Sq. Ft.)	Effective Vacancy Rate (% of Market)
1978	89,600	3.50%
1979	94,500	1.00%
1980	39,800	2.00%
1981	16,300	2.50%
1982	28,800	2.00%
1983	43,100	1.00%
1984	57,300	0.50%
1985	68,700	1.00%
1986	85,700	2.00%
1987	108,600	3.00%
1988	142,200	3.50%
1989	173,400	4.00%
1990	208,000	4.00%

Note: 1990 figures are year-end estimates. Kaloko Industrial Park finished space inventory began to enter market in 1985-86. Recent "high" vacancy rates reflective of initial lease-up.

Source: Various, and The Hallstrom Appraisal Group, Inc.

over the near-term, as (if economic conditions continue) there will be a shortage of competitive inventory before mid-decade.

The following sub-section addressing supply, provides further discussion on absorption and pricing trends in the existing industrial subdivisions.

Overall, short-term demand levels are unmistakably positive, and indicate probable market acceptance for a competitively developed project.

#### Demand Conclusions

The West Hawaii industrial market is currently in a strong demand period, with available inventory of finished sites and floor space being absorbed at record rates. Indications are this trend will continue unabated over the near-term.

Over the long-term, sector prospects are also highly favorable, as the regional economy expands under the influence of resort development, associated employment opportunities, and an anticipated large in-migration of residents.

During the next two decades an additional 3,079,721 square feet of floor space and 282.8 net acres of underlying sites (377 gross acres) will be required to meet anticipated demand levels.

#### **Identification of Supply**

##### Existing Supply

There are currently five major industrial developments in West Hawaii. An overview of the inventory offered and their general status is individually summarized in the following paragraphs.

##### **The Kona Industrial Subdivision**

Currently encompassing approximately 52 acres on the northerly edge of the Kailua-Kona community, at the southern end of the Kailua-Kona to Kawaihae corridor, the Kona Industrial Subdivision is scheduled to undergo expansion in the near future, with

Increment VI, part of a circa 100-acre area proposed for mixed commercial/office/industrial use. Historically, this development has been the most significant industrial complex on Hawaii's leeward coast, and an important economic factor in Kailua-Kona.

A total of 53 lots, ranging in size from 1.0 to 6.1 acres, were developed during the first five increments from 1960 through 1981. The fee landowners and master lessor are the Trustees of the Liliuokalani Trust (First Hawaiian Bank).

It required 18 years (1970-1988) for all 53 lots to be absorbed by the market, or at a rate of 2.94 lots per year. Peak demand was during the mid to late 1970s, at about three times this rate. From 1983, demand virtually ceased until wide-spread commercial development began dominating the demand for park sites at mid-decade. The lots are leased basically ungraded, with the lessor providing all on-site infrastructure improvements.

The subdivision has been the source of sporadic controversy since its inception due to two factors: tenant-types allowed, and ground lease rent increases. In some respects, the issues are related.

The original zoning designation of the project (ML-1a) is generally considered one of the most broad classifications within the County of Hawaii Zoning Ordinance. While the legislative attempt was to provide warehouse, operational and limited store frontage for wholesaler/distributors and light industrial uses, the actual experience has been the proliferation of non-conforming retail, restaurant and other commercially-oriented lessees. The result of this retail tenant influx (more concerned with lower rents relative to available commercial facilities than in appearances) was that space lease rents escalated to levels that while still-readily acceptable to commercial users, were high for industrial tenants. Attempts to expedite enforcement of the zoning codes have proven unsuccessful. The problem of non-conforming commercial uses becoming major tenants in industrially-zoned developments (potentially damaging legitimate commercial space developers), is common in the outer islands.

The project has moved almost entirely away from its original light industrial use commitment. All of the improvements constructed in the past five years have been of the retail/commercial type, with minimum "true" industrial space developed.

Acknowledging this unstoppable trend, portions of the Park have been re-zoned from industrial (MG-1A) to commercial (CV-10), which will be the prevailing designations for future phases.

The controversies surrounding rent renegotiation are common in all Hawaii real property sectors. The rapid appreciation of land over the last decade has resulted in current market level rents many-fold above earlier fixed-term periods. For industrial tenants in the Kona complex, the appreciation effect was worsened by the general economic recession experienced earlier in the decade which limited consumer demand. Many lessees were reportedly of the opinion that the fee owners considered the ability of the non-conforming commercial tenants to pay higher rents during the renegotiation process, which was eventually decided through an appointed arbitration panel. The indicated per square foot fee simple value for land in the subdivision (upon which renegotiated rents are based) has escalated at an annually compounded rate of over 11 percent between the first rent renegotiations in 1977 and the most current transactions.

While the declining desirability of the Park for industrial uses (which was near all-time lows in 1985-87) has ebbed, and "prices" paid for lots have rebounded somewhat, the subdivision no longer holds a predominant position in the market it did prior to 1984-85.

The most recent lease rent re-openings have been based on fee simple site values of up to \$20 per square foot, or nearly double the levels evident during the mid-decade down period. While this is a significant increase, the appreciation rate is below the general West Hawaii real estate market level.

The owners, the Queen Lilioukalani Trust (QLT), have recognized the concerns brought about by the problematic leasing structure and have moved to modify existing and proposed agreements (to some degree). Also, they have moved to adapt future expansion designs, in order to recapture market share.

Evidence of this change is the recently revised master plans for Increments VI and VII of the subdivision, which have been on hold for more than six years.

A major draw-back to further industrial development at the Park is the extremely poor and increasingly congested access to the project, a concern for truckers, workers and



consumers. While somewhat more acceptable for commercial users, the problematic access (with the access onto Queen Kaahumanu Highway considered dangerous by many) is exceptionally undesirable for industrial tenants. The larger numbers of vehicles attracted by commercial development in the Park further exacerbates the problem.

For all practical purposes, the Park remains "industrial" in regards to name and long-passed historic development only, ceasing to be a competitive alternative in the industrial market sector beyond finished space leasing programs in existing warehouse buildings. Brokers active in the Park stated warehouse/industrial space currently achieves prices of \$.45 to \$.85 per square foot monthly (triple net) in accordance with quality and location. Retail space, which dominates the project, is currently leased in the range of \$.90 to \$1.25 per square foot per month.

With the exception of minor spaces in older, non-competitive projects, the Park has a vacancy rate of less than two percent.

As noted in the following section discussing proposed supply, the QLT has identified 234 acres of its 1,108-acre Keauhuolu holding (which stretches northerly and upslope from the existing park) for industrial or mixed industrial/business park use.

While it represents a significant addition, the marketability of the new increments, due to their leasehold tenure, may be impacted.

#### **The Kaloko Light Industrial Subdivision (also known as the Kaloko Industrial Park)**

The first phase of this development, comprising 55 one-acre lots was fully absorbed by the market (by mid-1989), and extensive improvement construction has been in progress for the last three years. The total marketing period for the initial increment sites was some 48 months, not including pre-sale efforts, equating to an absorption rate of 1.15 lots/acres per month.

However, this average rate over the total sales period of the subdivision is something of a misnomer, as demand escalated significantly beginning in late 1987. At that time, only 24 lots had been sold over the 30 months the sites were originally offered (excluding pre-sale), or at a rate of .80 lots per month. Over the following 18 months,

31 lots were successfully marketed, equalling an absorption rate of 1.72 lots/acres per month.

Several factors contributed to this upsurge in demand beyond the general health of the West Hawaii economy and real estate market, among the most critical:

1. The sites are sold on a fee simple basis, which most purchasers/developers consider far superior to the uncertainties associated with leasehold ownership (as at the Kona Industrial Subdivision).
2. The project is closer to critical economic assets, including the Keahole Airport, Kawaihae Harbor and the coastal resort zones.
3. Access to the subdivision (via Queen Kaahumanu Highway) is vastly superior to that at the increasingly congested Kona Industrial Subdivision, which has an exceptionally poor and dangerous traffic pattern for oversized vehicles.
4. It has become apparent much of the growth in the greater Kailua-Kona region will take place in the corridor stretching north of the village to Keahole Point, and the Kaloko location is in the central area of this expansion zone.

The most recent (and last sales) in the project achieved prices of \$20 to \$23 per square foot, or \$875,000 to \$1,000,000 per acre, up more than three-fold from the original offering prices in 1984-85. The broker representing the developer stated the then relatively high original price levels of circa \$6.50 per square foot were a major factor in the early failure of the Park to receive market acceptance, as there were few businesses capable of absorbing such large "up-front land costs".

However, a strengthening and expanding economy, coupled with the vibrant long-term outlook for West Hawaii influenced many businesses and investors to accept the risk associated with the location.

Many of the first sales at Kaloko were to the end-user concerns, but much of the latter spurt in demand was attributable to speculators and developers who hope to either turn the lots for profit at a later date, or construct improvements to be leased to smaller tenants.

Construction is proceeding very rapidly in the subdivision, with no less than seven major buildings currently being erected.

Currently, space lease rental rates range from \$.60 to \$.75 per square foot monthly (triple net) for warehouse space, upwards to \$.70 for \$.90 per square foot for "showroom" space.

Although the initial increment is now fully absorbed, and recent demand strong, the Park developers are vacillating regarding plans to pursue further phases, as "they didn't make a whole lot of money" from the first phase, stated a Park spokesman, "infrastructure costs were higher and the absorption period longer" than originally anticipated. Apparently there has been interest in bulk purchase of the remaining expansion acreage, and a "lot of people calling" regarding individual lot opportunities, but the developers have been focusing on other projects to be located on contiguous mauka holdings.

#### **Kaei Hana II**

A development planned to eventually encompass a total of 82.182 acres, the Kaei Hana II Industrial Subdivision near Kawaihae Harbor has leased all 23.885 acres available for short-term development since original subdivision offering in 1968. The project is owned in fee and administered by the State Department of Hawaiian Home Lands, one of many projects on ceded native lands. The site was originally planned for development with a nuclear power plant by the Hawaii Electric and Light Company, a concept abandoned in the late 1960s. The acreage then began to be used for industrial purposes. The property is zoned for light industrial use.

Located at the extreme northerly end of the Kailua-Kona to Kawaihae coastal corridor, the emphasis of the subdivision is on general industrial and warehouse type uses. The primary attribute of the Kawaihae location, a rapidly emerging crossroads community, is the inter-island Port of Kawaihae (operated by the State of Hawaii Department of

Transportation Harbors Division) which services the expanding leeward Hawaii region. The completion of Queen Kaahumanu Highway enhanced the market area serviced by port users.

A total of ten lots, ranging in size from 1.000 to 6.513 acres, have been leased in the project; five of which have been improved. The sales period required to market the absorbed lots was nearly 20 years, resulting in an average annual market demand of only .50 lots, or circa 1.2 acres per year. However, the project (due to the extent of the previously planned use) was opened "ten to 15 years ahead of schedule," and effective development did not begin until 1978; resulting in the relatively low absorption rate.

As all of the readily available subdivided lots in the "initial" phase of this Hawaiian Home Lands (HHL) industrial development have been absorbed by the market, emphasis is now on development of warehouse and showroom space, and secondary (or speculative) investment.

The remainder of the "zoned" average at Kaei Hana II will be absorbed into the HHL-submitted master plan, covering 2,500 acres mauka of the park, which calls for an additional 154 acres of industrial development. However, this expansion and other efforts to meet the apparent market demand are stymied by the lack of water services available for further subdivision and the wait associated with the approval process.

Several space lease rental opportunities are being offered at Kaei Hana II.

The first building within the Hokuloa Trade Center, has been completed. Floor space in the 20,000 square foot steel frame warehouse is being offered at \$.50 per square foot monthly triple net, and expectations are that all the area will be fully leased within six months.

Construction of the second improvement, with an additional 30,000 square feet of similar quality space, has been placed on hold. The final 100,000 square feet, as planned, will be housed in a four-story office building; however, the developer is prepared to "build to suit".

When finished, the Center, which is currently attracting small quasi-industrial/commercial and service tenants, will have a total gross leasable area of 150,000 square feet, and cost an estimated \$4 million.

Pre-leasing of space to be developed on a 2.83 acre site in the subdivision is being offered by the KID Co. Construction has yet to begin, and final development plans have not been announced.

An 8,000 square foot warehouse building (on a one acre site) "sold" twice in the past two years. The leasehold improvement transacted for \$320,000 in August 1988, and again for \$450,000 in April 1990. Some finish work was completed in the interim.

The increase interest at Keai Hana II is a direct result of:

- An expanding population in Kawaihae, specifically at Kohala Ranch; in North Kohala, whose residents must pass by the development to reach employment centers; and, in Waimea, the largest urban center in the region only ten miles distant.
- The continued large-scale development of resort communities along the South Kohala coast, particularly at Waikoloa Beach and Mauna Lani. This has created a wide-spectrum of demand for construction, operational and tourist-oriented services.
- In concert with above factors, the importance of the Kawaihae Harbor is growing, creating a demand for warehouse, shipping, final processing and other industrial/manufacturing businesses.

Resulting from the pace of construction and the apparent real property market stimuli, Kawaihae has rapidly evolved from a somewhat deserted port-side village to a regional center of secondary, or support, economic activity. Developable acreage at Keai Hana II considered as one of the few short-term alternatives to meet existing and anticipated industrial use demands.

### **Honokohau Small Boat Harbor**

Overlooking the Honokohau Small Boat Harbor, Gentry's Kona Marina is a highly successful commercial/marine industrial development which achieved full occupancy shortly after opening in 1985. Tastefully designed, the complex has improved the appearance and status of the harbor, and tenants have generally expressed pleasure with the sales ratios experienced.

As a result of the absorption velocity, plans were forwarded in 1985-86 to develop Phase II of the project in short order, however, these have been shelved for the present. Barring expansion of the harbor, there is not sufficient marina-oriented demand for a major increase in such facilities. And the State has abandoned plans to significantly enlarge the marina basin, although a tentative project to realign the existing moorings will create more slips.

The approximately 35,000 square feet of gross improvement area (not including the boat stack-storage facility in the project) is located on 4.083 acres leased by developer, Gentry-Pacific, Ltd., from the State of Hawaii Department of Transportation, Harbors Division on April 8, 1983 (Document Number H-82-4).

A second, circa 8,000 square foot, stucco and tile marine-oriented facility along the southerly side of the basin opened in 1987-88, and was absorbed in a rapid manner. To some degree, the two-story improvement was a coalescing of existing harbor use needs, including:

- the "Flying Seafood Fish Processing" weigh station and ice/processing house;
- the "Lurex Hawaiian Lures" plant and distribution point;
- Fishing Charter offices;

- Texaco gas station and fuel dock;
- the Hawaiian Sailing Academy offices; and,
- a sundry store.

Interviewed tenants felt that with the exception of some additional "office" space for charters and administrative uses, the demand for commercial/industrial development at the harbor is limited to repair and chandlery services, and further construction will not be necessary until the basin is enlarged at some future date.

#### **Hawaiian Ocean Science and Technology (HOST) Park**

The initial infrastructure in this 547 acre state-sponsored development at Keahole Point was completed during the past year. However, the market response for Park sites has been very poor. This is attributable to the restrictive nature of the uses allowed, which must be oriented towards exploitation of the near shore marine resources of West Hawaii.

For the most part, such use-types, are dependant upon newly developed or applied technology, and have difficulty absorbing high land costs in their budget.

Most analysts consider it likely the HOST Park will achieve market acceptance over the long-term as the demand for marine-related products and services is further developed and the economics of the industry improved. Studies published prior to construction called for an absorption period of five to ten years.

Since HOST is considered a capital expenditure providing a long-term primary economic catalyst for the Big Island and the entire island chain, plans are being advanced for the state to co-sponsor or subsidize some early development in the Park.

Owing to its highly-specific market niche, this project is an anomaly, and does not reflect on the general status of the West Hawaii industrial real estate sector, either by providing competing supply or through dilution of demand.

### Proposed Supply

There are numerous industrial projects proposed for West Hawaii over the coming decade(s). These planned developments are summarized on Table 11.

Cumulatively, the "general market" subdivisions will contain some 736 gross acres of industrial lands, which would equate to circa 550 net acres (or less) of finished sites.

If all were approved and constructed in a timely manner, together they would represent circa 30-plus years of inventory; or a sufficient amount to meet market demand until the year 2020 and beyond.

However, it is likely not all will be readily approved or all ventures will have adequate funds or inclination to pursue timely development. Further, nearly 67 percent (491 acres) of the acreage represents minor components within just three massive mixed-use communities which will require years of infrastructure and other on-site development before inventory is made available on the market.

It is apparent, there is a looming near to mid-term shortage of fee simple industrial lands which will occur as the last portions of the existing projects are filled and before the major proposed developments come on line.

### Supply Conclusions

Despite the development of some 717,900 square feet of finished industrial space in West Hawaii over the past five years, the overall supply situation is mixed.

There are no sites being offered in any existing project for "original" sale (all having been absorbed), and there are fewer than 20 vacant lots (containing less than 25 acres) throughout the Keahole to Kailua corridor available for development. Coupled with a vibrant demand level, this has resulted in strongly escalating prices since 1988.

Owing to the high level of construction activity at Kaloko Industrial Park, there apparently will be sufficient finished floor space to meet market demand for up to 18 months to two years.



TABLE 11  
SUMMARY OF MAJOR PROPOSED INDUSTRIAL PROJECTS  
IN WEST HAWAII

Project Name	Location	Planned Inventory		Estimated Opening Date	Comments
		Approx. Gross Acreage	Estimated Floor Space (1) (in Sq Ft)		
<b>PROBABLE "MARKET" PROJECTS</b>					
Honokohau Industrial Park	North Kona	60	294,030	1992	Subject Property.
Kohalaiki Mauka Industrial Park	North Kona	60	490,050	1992-93	Adj. to Koloko Ind. Park.
Kaloko Industrial Park Phase II	North Kona	125	1,020,938	1992 or later	
Keauhou (QLT) Project	North Kona	234	1,911,195	1993	Expansion of Kona Ind. Sub. and other nearby lands. (2)
Hawaiian Home Lands Project	North Kohala	154	1,257,795	1993 or later	Expansion of Kael Hana II Park.
Lanihau Project	North Kona	103	841,253	1994 or later	Adj. to subject.
<b>SPECIALIZED OR UNCERTAIN PROJECTS</b>					
Mauna Lani Resort	South Kohala	105	857,588	1991-92	In resort use only.
Waikoloa Resort	South Kohala	250	2,041,875	Unknown	May be withdrawn from plan.
Signal Puako Project	South Kohala	50	408,375	Unknown	May be withdrawn from plan.
Kawaihae Harbor Project	South Kohala	N/A	N/A	Mid-1990's	Potential State-sponsored park.
Ooma Project	North Kona	50	408,375	Unknown	Support for HOST Park.

(1) Assuming FAR of .25, unless other indicators available.

(2) Includes master-planned areas calling for mixed-use industrial/business park development, which may also house commercial users.

Source: County Planning Department, Various EIS, and The Hallstrom Appraisal Group, Inc.

If all proposed projects are approved, long-term supply quotients appear adequate throughout the study period. However, there are concerns whether the major mixed-use "communities" will bring industrial component inventory "on-line" soon enough to continue a stable supply condition after the existing product is fully improved and absorbed.

#### Correlation of Indicators

*Demand* for industrial development in West Hawaii has been at record levels in recent years, and virtually every private and public projection calls for increasing demand as the regional economy and de facto population base (resident and tourist) expands over the coming two decades.

We estimate the cumulative demand for additional "general" industrial space in the study area between 1990 and 2010 will be at 3,079,721 square feet of finished floor area, 282.8 net acres of finished sites, and some 377 gross acres of raw land area.

These estimates are exclusive of specialized market demand components such as primary uses associated with the function of Keahole Airport, Honokohau Small Boat Harbor and the HOST Park.

Additions to supply have been brisk in regard to finished space inventory since 1987, and a vigorous though stable supply/demand ratio has been achieved in this sector.

However, there have been no major offerings of finished, developable lots since the Kaloko Industrial Park was fully absorbed in 1988-89.

Further, there are fewer than 25 vacant acres of finished lots in the critical Keahole-Kailua Corridor (which could contain up to 275,000 square feet of floor area) available for short-term development.

This existing supply equates to less than two years of market demand needs.

Substantial additions are proposed for West Hawaii during the coming decade, with some 736 gross acres to be contained in major announced general industrial projects.

Upon build-out these lands could support circa 5.8 million square feet of finished space, or the equivalent of 30-plus years of regional demand.

Yet, most of these "industrial/business parks" would be within bulk acreage master-planned communities currently in the land approval process, and are a minimum of three to five years (or longer) removed from being able to offer competitive inventory. Extensive infrastructure investments must be made, and pressure to move quickly forward initially with residential development will be strong.

Increasing demand quotients coupled with a potentially erratic supply (with only immediate near-term and more removed long-term inventory) may result in supply shortages during the early to mid-years in the decade; after the existing product is fully absorbed but before major additions come on-line.

Smaller projects able to utilize in-place infrastructure systems and facing less community review concern are necessary to meet this potential mid-term supply shortfall.

Additionally, it has been historically demonstrated in the West Hawaii industrial market that it is not "healthy" to have all or most inventory within one or two major projects; particularly if offered on a less-desirable leasehold basis as proposed for the major early decade addition by the Queen Liliuokalani trust. This creates an unfavorable "monopoly" condition which could harm the market. Our experience endorses a diversified ownership base for the regional industrial market.

Based on our analysis, focusing on the rapidly expanding demand demonstrated through timely sales/leasing activity and population-based statistical projections, we believe there is significant market support for the 55-acre industrial component of a well-developed and aggressively promoted Kohanaiki Mixed-Use Subdivision. Its planned timing, with inventory to be offered within two years, is particularly propitious in light of prevailing supply trends.

**Under current conditions, we would anticipate the one-half acre and larger lots would be absorbed within 36 to 45 months of subdivision completion.**

**At present, selling prices for the fee simple lots would be anticipated to be in the range of \$12 to \$18 per square foot.**

#### SECTION FOUR: THEMATIC/DESTINATION COMMERCIAL DEVELOPMENT

Over the past decade, a new commercial market sector has emerged on the outer islands, the thematic or resort oriented shopping center or project. Generally located in close proximity to existing destination or vacation areas, the "villages" are designed to appeal to and service both the local resident and tourist populations.

To date, there are no strong modern examples of such on Oahu, although a notably feasible attempt along this line was made at the Kahuku Sugar Mill in the early 1980s.

Thematic/Resort master-planned projects differ from general (or strip) commercial centers in many regards, most notably:

1. They contain quality dining facilities; unlike general projects which are typically limited to fast-food or similar type/quality restaurants (if any at all). These facilities serve as a type of secondary anchor tenants, and enhance sales of adjoining retail tenants, as diners stroll through the shops before or after their meals.
2. Retail tenants are mixed, with tourist-oriented shops (souvenirs, t-shirts, gifts, etc.), those appealing to residents (markets, sundry, drugstores), and ones that attract both consumer types (clothing, crafts and speciality shops). General commercial centers usually focus only on one market, or make half-hearted attempts to provide a cross-appeal situation.
3. The buildings are typically oriented around a central courtyard, with parking on the exterior of the premises; as opposed to general centers which are often elongated structures with parking throughout the project near the door of the stores.
4. Entertainment opportunities (theaters, nightclubs, museums, stages) are often available, again attracting both visitor and resident.

5. **The land area required to support the levels of floor space available is greater than for the more dense general projects.**
6. **Often these centers have specific themes (usually Hawaiiana or similar) which are used to create both a continuity within the development and provide an attractive, marketable product.**
7. **They are generally larger than other commercial centers in the community.**
8. **The projects are meant to be self-contained destinations where the consumer may find a wide-variety of shopping "entertainment". (Studies continuously show that shopping is far and away the number one entertainment type in America.)**
9. **More so than a general center, thematic/resort projects typically have superior access/frontage/exposure traits, with high visibility along major traffic arterials. The most successful are within, or fronting or nearby a resort community.**

In some respects, the success of this commercial development-type was somewhat unexpected. Most of the complexes were envisioned as appealing solely to the tourist market. However, it rapidly became evident that a well-designed, multi-service center provided residents with enjoyable shopping, dining and recreational opportunities otherwise unavailable in the community.

While many large "mainland-style" shopping malls have met with mixed results in the outer islands, thematic/resort centers for the most part have experienced high levels of success, with several new projects recently opening or proposed on Maui, Kauai and the Big Island.

The key element in the market acceptance of the centers is in the ability to appeal to both the resident and tourism consumer. The former providing a stable (though often low-key) day-to-day demand; the latter, a much more affluent sector with greater amounts of discretionary expenditures.

Few residents are desirous of patronizing shopping facilities which feature only souvenir and visitor-oriented items, such not being part of their lifestyle needs, and there being an inherent aversion to being seen in a "tourist trap" situation.

Conversely, tourists do not undertake the expense of travelling to Hawaii merely to spend their time in standardized malls which are likely inferior to those available "back home". Also, as the tourist market becomes more sophisticated, and continues its upscale movement, the simplistic souvenir shops in cluttered centers become less competitive; with visitors expecting more refined amenities.

By creating a complete retailing, dining and entertaining atmosphere it is likely the tourist will spend more time in the center, and the resident will return more frequently. Both of these factors result in greater numbers of sales...the primary focus of a commercial facility.

From a developer's perspective, thematic/resort centers are more costly to construct than strip projects, due to the larger land area commitments, open space requirements, amenities embraced, and necessary intensive marketing campaigns. However, as presented following, the lease rents obtained are always higher than those received through similarly located standard developments.

"Destination" commercial projects also hold a greater appeal to public planning agencies, as they are located on larger sites with strong access traits, and are more able to provide adequate parking, tasteful design, landscaping/open space, and evolve as a true community asset.

In the following sections we summarize the attributes of various thematic/resort complexes located in Maui and Kauai, and discuss the ideal characteristics for such a project.

Currently, the only primary examples of this type of commercial development are found on the islands of Maui and Kauai. It is interesting the latter has enjoyed such success with these complexes despite its limited resident population and visitor plant size; a factor worthy of note in assessing the subject market. West Hawaii has only one comparable development, although several others are currently under construction or in planning. A summary of the locational, facility, and operational characteristics of the existing and proposed projects comprising the destination thematic/resort market sector is shown on Table 12.

TABLE 12  
SUMMARY OF THEMATIC/DESTINATION SHOPPING CENTERS  
IN THE STATE OF HAWAII

Project Name	Location	Gross Leasable Sq. Ft.	Site Size in Acres (1)	Thematic Orientation	Proximate Developed Resort	Proximate Community	Frontage Traits	Market Acceptance	Amenities	Effective Occupancy Ratio	Estimated Average Annual Sales Per Sq Ft (2)			
											Minimum Monthly per Sq Ft	1988	1989	1990
<b>EXISTING</b>														
Whalers Village	West Maui	68,000	8.51	Resort/Museum	Kaanapali	Lahaina	Resort Arterial	Excellent	O,C,D	100%	\$3.50-\$6.00	\$600	\$645	\$725
Wailea Shopping Village	South Maui	34,643	10.53	Resort	Wailea	Kihui	Resort Arterial	Good	C,D	100%	\$2.50-\$5.00	\$375	\$430	\$525
The Cannery	West Maui	63,400	8.14	Neo-rustic	Kaanapali	Lahaina	Regional Arterial	Average	Enclosed	100%	\$2.75-\$4.25	\$350	\$390	\$475
The Marketplace	Central Kauai	65,570	7.56	Sugar Mill	Cocunut Plantation	Kapa	Regional Arterial	Excellent	C,D,E	100%	\$2.75-\$5.00	\$400	\$455	\$530
Kaual Village	Central Kauai	114,089	7.95	Local Agriculture	Cocunut Plantation	Kapa	Regional Arterial	Appears Positive	C,D,E	100%	\$2.25-\$3.75	Opened in 1990		
Kiuhaha Shopping Village	South Kauai	38,041	5.85	Resort	Poipu	Koloa	Resort Arterial	Good	C,E	100%	\$2.00-\$4.25	\$360	\$435	\$510
Princeville Shopping Ctr.	East Kauai	47,945	5.75	Resort	Princeville	Hanalei	Regional Arterial	Good	C,E	100%	\$1.75-\$3.50	\$350	\$395	\$440
Keauhou Shopping Village	West Hawaii	75,000	11.35	Resort	Keauhou	Kailua-Kona	Resort Arterial	Excellent	C,D,E	100%	\$2.25-\$4.00	\$385	\$450	\$500
<b>UNDER-CONSTRUCTION/PROPOSED</b>														
Sea Village	West Maui	45,000+	17.00	Resort/Marine	Kaanapali	Lahaina	Resort Arterial		C,D,E					
Kings Shops	West Hawaii	56,000	7.00	Historic/Plantation	Waikoloa Beach	None	Resort Arterial		C,D,E					
Unnamed	West Hawaii	Up to 150,000	9.60	Historic	Kohala (proposed)	Kailua-Kona	Regional Arterial		C,D,E					
The Shops at Mauna Lani	West Hawaii	N/A	N/A	Historic/Resort	Mauna Lani	None	Resort Arterial		C,D,E					

Amenities Key: O=Oceanfront, C=Interior Courtyard/Plaza, D=Thematic Displays, E=Entertainment.

(1) The Wailea and Keauhou sites are planned for additional phases, the Sea Village project will contain extensive general resort and employee parking.

(2) Estimated based on discussions with tenants, management and owners.

Source: The Hallstrom Appraisal Group, Inc.



We believe the makai, highway fronting portion of the subject property, has the specific potential to be exploited through thematic/destination commercial development. It will have excellent exposure characteristics, with extensive frontage along Queen Kaahumanu Highway, and is at the heart of the proposed urban expansion area covered by the Keahole to Kailua Development Plan.

Beyond the physical attributes of the holding, significant market support will be provided by the proposed Kohanaiki Resort and numerous bulk-acreage upslope residential communities. the planned National Historic Park at Kaloko-Honokohau, and a developed HOST Park, will add to the destination attractions of the region.

Additionally, significant numbers of purchase-oriented tourists and potential resident consumers pass by each day, with virtually all West Hawaii visitors driving past the location at least several times during their stay.

The success of thematic/resort commercial centers lies in their ability to attract a substantial share from both local resident and tourist consumer sectors. This is vital for neighbor island or rural Oahu locations, where the resident population may be insufficient to otherwise support numerous large Class-A facilities.

If desirably developed, thematic/resort centers create an inherent "critical mass" or synergy level, wherein the individual tenant components increase the mutual draw and attraction for the consumer. This maximizes the competitiveness of the project with other less-amenitized or smaller complexes.

Also, from a public agency perspective, destination commercial centers can provide more complete planning opportunities, with adequate landscaping, open space buffers, parking and desirable traffic patterns, that may not be possible on smaller, congested, or more disparate central urban sites. The ability to amortize such traits over a larger tenant base allows their inclusion, while a smaller project cannot afford the amenities/facilities.

Based on our study of this commercial type, it is our opinion the following qualities in a facility would result in a successful thematic/resort center:

- **Be located on an area's main thoroughfare, with strong exposure/frontage attributes, and ease of access. This would insure both residents and passer-by tourists would be exposed to the facility.**
- **Front, be within or proximate to, a resort community. This provides a ready and stable consumer base, and a market identification.**
- **Have in excess of 50,000 square feet of leasable area. Such levels are necessary to fully create the level of critical mass attraction. Similarly, a site of six to ten acres is most desirable, allowing a low-density, open appearance.**
- **Provide a wide-selection of tenants. A choice mix would be a selection of major retail anchor tenants, at least three restaurants as secondary anchors, and a diverse clothing/souvenir/arts and craft retailer base. Additionally, some upper floor office space would be desirable.**
- **Have a thematic attraction. This would include extensive landscaping, water features, points of interest and displays. It would additionally provide the design motif for the structures, which should be oriented towards a central courtyard area.**

It is our belief that were a tasteful commercial complex developed in the "Keahole to Kailua" area along Queen Kaahumanu Highway having these attributes, it would prove attractive to both tenants and consumers, and have the long-term stability which a project appealing to only either residents or tourists would lack.

**SECTION FIVE: THE WEST HAWAII RETAIL/SERVICE  
COMMERCIAL MARKET**

As previously noted, the West Hawaii commercial/real estate sector is still in its infancy, in the midst of a transitional period paralleling the general economy. Historically, the study area required minimal integrated ("true") commercial development, as businesses were agrarian or neighborhood-oriented.

With the on-going evolution of Kona/Kohala into a "modern", diversified urban community oriented towards service and support businesses, the need for commercial floor space will greatly expand.

This trend would be typical of the "life-cycle" of a transitional community such as West Hawaii in its move to urbanization.

First, the market shows interest in critical foundational businesses (in this instance tourism) and basic residential demand. The expansion of these sectors over the past decade-plus in the study area has been substantial.

Secondly, primary supporting land uses, specifically base retail and industrial development, is pursued. This phase has been evidenced in West Hawaii since mid-decade, with rapid expansion of available inventory and purchase interest.

Thirdly, diversified urban uses come to the fore, including office, service commercial and similar development, master-planned mixed-use communities and specialized economic efforts (such as the HOST Park). We believe Kona/Kohala is emerging into this stage of the cycle, and reasonably anticipate it will enjoy the same level of eventual market acceptance as the preceding sectors.

Due to the lack of sufficient historic data to identify these current trends, analysis requires some subjective insights and cogent linking of available indicators. We have employed a similar methodology as was used in Section Three to quantify

supply/demand indicators for retail and service/commercial development in West Hawaii.

Our inquiry into the subject market sector is divided into the following sub-sections:

1. Quantification of Demand
2. Identification of Supply
3. Correlation of Indicators

#### Quantification of Demand

##### Long-Term Demand

We have estimated the demand for retail/service commercial development in West Hawaii using the per capita spatial technique identified in the preceding industrial market study.

Our analysis employs the same de facto population projections as were shown on Table 1.

Against these forecasts, we have applied a per capita square foot allowance based on three sources:

1. The level of demand evidenced on Oahu since 1977 within the retail and service sectors as shown on Tables 13 (retail) and 14 (service). The aggregate indicated level of spatial demand for these two uses in greater Honolulu is currently at 14.24 square feet per person, and has escalating at rates near one percent annually compounded;

TABLE 13

SUMMARY OF RETAIL/SHOPPING CENTER SPACE  
ON OAHU 1977 TO 1990

<u>Year</u>	<u>Total Retail Stores</u>	<u>Retail/Center Floor Space Area (1) (Leaseable Sq. Ft.)</u>	<u>De Facto Population of Island</u>	<u>Ratio of Shopping Center Space Per Person</u>
1977	4,305	7,422,000	793,285	9.36
1978	4,512	7,492,000	801,527	9.35
1979	---	7,806,000	817,511	9.55
1980	---	7,953,000	823,826	9.65
1981	---	8,537,000	825,443	10.34
1982	5,193	---	840,945	---
1983	5,733	---	859,895	---
1984	6,393	---	868,770	---
1985	6,683	9,014,000	876,380	10.29
1986	6,829	9,180,000	894,170	10.27
1987	7,050	9,280,000	905,260	10.25
1988	7,300	9,460,000	922,950	10.25
1989	7,520	9,612,000	936,548	10.26
1990	7,761	9,884,000	951,000	10.39
<b>Compounded Annual Growth Rate for 1977 through 1990</b>				
	4.52%	2.21%	1.40%	0.80%
<b>Average Annual Addition for 1977 through 1990</b>				
	266	189,385	12,132	

Note: Complete data not available for all study years. 1990 figures are year-end estimates.

(1) Includes all significant "Neighborhood, Strip, Specialty, Community, Regional and Super Regional" malls and centers. Excludes hotels.

Source: State of Hawaii Department of Business and Economic Development,  
Hawaii Real Estate, and  
The Hallstrom Appraisal Group, Inc.

TABLE 14

SUMMARY OF SERVICE ESTABLISHMENTS AND SERVICE SPACE  
ON OAHU 1977 TO 1990

<u>Year</u>	<u>Total Service Establishments</u>	<u>Service Floor Space Area (1) (Leaseable Sq. Ft.)</u>	<u>De Facto Population of Island</u>	<u>Ratio of Service Space Per Person</u>
1977	4,703	2,911,000	793,285	3.67
1978	4,990	2,944,000	801,527	3.67
1979	---	3,002,000	817,511	3.67
1980	---	3,021,000	823,826	3.67
1981	---	3,052,000	825,443	3.70
1982	6,124	---	840,945	---
1983	6,314	---	859,895	---
1984	6,295	---	868,770	---
1985	6,516	3,242,000	876,380	3.70
1986	6,766	3,308,000	894,170	3.70
1987	6,921	3,384,000	905,260	3.74
1988	7,189	3,488,000	922,950	3.78
1989	7,304	3,621,000	936,548	3.87
1990	7,512	3,758,000	951,000	3.95
<b>Compounded Annual Growth Rate for 1977 through 1990</b>				
	3.61%	1.97%	1.40%	0.57%
<b>Average Annual Addition for 1977 through 1990</b>				
	216	65,154	12,132	

Note: Complete data not available for all study years. 1990 figures are year-end estimates.

(1) Includes all significant "Business and Health" services, excludes hotels.

Source: State of Hawaii Department of Business and Economic Development,  
Hawaii Real Estate, and  
The Hallstrom Appraisal Group, Inc.

2. Urban Land Institute surveys which illustrate a typical per capita spatial allowance for commercial development of all types (including office space) 12 to 18 square feet per person for metropolitan areas having 100,000 residents or less; and,
3. The historic and on-going experiences on Maui, Kauai and in Hilo.

We consider the Oahu retail and service commercial per capita ratios to be appropriate for a free-standing island market, as these businesses are more intimately tied to direct regional consumer needs than are office demands which may service an extended area.

In fact, as a significant amount of retail space serving the Waikiki tourist community is located in hotel projects (a limited inventory type in West Hawaii), the figures may be overly-conservative for study projections.

The economic benefits and intensity brought about by tourism and the visitor population within an isolated island economic structure, place the study region in a higher demand position than for a typical similar-sized metropolitan area on the mainland, and thus conclude the ULI data is an understatement of probable occurrence.

We have therefore tested per capita demand ranges of:

- ten to twelve square feet per person of retail demand for the projected regional de facto population; and,
- two to four square feet per person of service commercial demand for the projected regional de facto population.

Compounded annual growth rates of zero percent ("stable"), one percent ("moderate") and two percent ("extraordinary") were applied against the ratios over time.

This forecasting model resulted in six scenarios as follows:

<u>Current Per Capita Spatial Demand</u>	<u>Growth Rate</u>	<u>Table No.</u>
Moderate	Stable	15
Moderate	Moderate	16
Moderate	Rapid	17
Optimistic	Stable	18
Optimistic	Moderate	19
Optimistic	Rapid	20

The results from the analysis are summarized on Table 21, the shaded scenarios are those we consider most representative of probable occurrence; the light shade showing the lower end of the expected range, the darker shade the upper end.

The indicated mid-point demand conclusion is shown at the bottom of the table.

Based on our analysis, we estimate the total (mid-point) demand for finished retail and service/commercial space in West Hawaii from 1990 to 2000 to be 807,945 square feet, or an average of just over 80,000 square feet annually. This equates to a net demand for retail lands of 61.8 acres during the decade, or 6.2 acres per year.

During the period 2000 to 2010, the total additional space demand is forecast at 747,267 square feet and 57.2 acres.

The cumulative demand over the next twenty years in the study region (1990 through 2010) would be at 1,555,212 square feet and 119 net site acres.

Assuming a typical 75 percent efficiency ratio in development, the gross acreage demand over the next ten years would be circa 82 total acres, and 78 acres from 2000 to 2010; or upwards of 160 acres during the two decade period.

#### Short-Term Demand

As with the industrial sector, the key factors of inquiry in the retail and service commercial markets are the velocity of absorption for offered product, and vacancy rates in completed developments. If projects are quickly "sold-out" and tenant turnover rate is low, it can be asserted the market is in a healthy condition.



**TABLE 15**  
**PROJECTED RETAIL AND SERVICE/COMMERCIAL SPACE DEMAND**  
**IN WEST HAWAII 1990 TO 2010**  
*SCENARIO ONE: Moderate Demand Level, Stable Growth*

Year	De Facto West Hawaii Population	Per Capita Commercial Space	Total Required Gross Commercial Floor Space Area
1990	60,992	12.00	731,904
1995	87,464	12.00	1,049,568
2000	107,919	12.00	1,295,028
2005	124,942	12.00	1,499,304
2010	141,530	12.00	1,698,360

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 16**  
**PROJECTED RETAIL AND SERVICE/COMMERCIAL SPACE DEMAND**  
**IN WEST HAWAII 1990 TO 2010**  
*SCENARIO TWO: Moderate Demand Level, Moderate Growth*

Year	De Facto West Hawaii Population	Per Capita Commercial Space	Total Required Gross Commercial Floor Space Area
1990	60,992	12.00	731,904
1995	87,464	12.61	1,103,306
2000	107,919	13.26	1,431,034
2005	124,942	13.94	1,741,589
2010	141,530	14.65	2,073,820

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 17**  
**PROJECTED RETAIL AND SERVICE/COMMERCIAL SPACE DEMAND**  
**IN WEST HAWAII 1990 TO 2010**  
*SCENARIO THREE: Moderate Demand Level, Extraordinary Growth*

Year	De Facto West Hawaii Population	Per Capita Commercial Space	Total Required Gross Commercial Floor Space Area
1990	60,992	12.00	731,904
1995	87,464	13.26	1,159,878
2000	107,919	14.65	1,581,548
2005	124,942	16.20	2,023,459
2010	141,530	17.90	2,533,005

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 18**  
**PROJECTED RETAIL AND SERVICE/COMMERCIAL SPACE DEMAND**  
**IN WEST HAWAII 1990 TO 2010**  
**SCENARIO FOUR: Optimistic Demand Level, Stable Growth**

Year	De Facto West Hawaii Population	Per Capita Commercial Space	Total Required Gross Commercial Floor Space Area
1990	60,992	16.00	975,872
1995	87,464	16.00	1,399,424
2000	107,919	16.00	1,726,704
2005	124,942	16.00	1,999,072
2010	141,530	16.00	2,264,480

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 19**  
**PROJECTED RETAIL AND SERVICE/RETAIL SPACE DEMAND**  
**IN WEST HAWAII 1990 TO 2010**  
*SCENARIO FIVE: Optimistic Demand Level, Moderate Growth*

Year	De Facto West Hawaii Population	Per Capita Commercial Space	Total Required Gross Commercial Floor Space Area
1990	60,992	16.00	975,872
1995	87,464	16.82	1,471,075
2000	107,919	17.68	1,908,045
2005	124,942	18.59	2,322,119
2010	141,530	19.54	2,765,094

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 20**  
**PROJECTED RETAIL AND SERVICE/COMMERCIAL SPACE DEMAND**  
**IN WEST HAWAII 1990 TO 2010**  
**SCENARIO SIX: *Optimistic Demand Level, Extraordinary Growth***

Year	De Facto West Hawaii Population	Per Capita Commercial Space	Total Required Gross Commercial Floor Space Area
1990	60,992	16.00	975,872
1995	87,464	17.68	1,546,503
2000	107,919	19.54	2,108,730
2005	124,942	21.59	2,697,946
2010	141,530	23.86	3,377,340

Source: The Hallstrom Appraisal Group, Inc.

**TABLE 21 SUMMARY OF PROJECTED RETAIL AND SERVICE/COMMERCIAL SPACE DEMAND SCENARIOS FOR WEST HAWAII 1990 THROUGH 2020**

All Figures in Gross Square Feet

TOTAL SPACE DEMAND					
Scenario	1	2	6		
Year	Moderate Demand Stable Growth	Moderate Demand Moderate Growth	Optimistic Demand Stable Growth	Optimistic Demand Extraordinary Growth	
	1990	731,904	731,904	975,872	
	1995	1,049,568	1,103,306	1,399,424	1,546,503
	2000	1,295,028	1,431,034	1,726,704	2,108,730
	2005	1,499,304	1,741,589	1,999,072	2,697,946
2010	1,698,360	2,073,820	2,264,480	3,377,340	
PERIODIC DEMAND					
Scenario	1	2	6		
Year	Moderate Demand Stable Growth	Moderate Demand Moderate Growth	Optimistic Demand Stable Growth	Optimistic Demand Extraordinary Growth	
	1990	317,664	371,402	423,552	570,631
	1995	245,460	327,728	327,280	562,227
	2000	204,276	310,555	272,368	589,216
	2005	199,056	332,231	265,408	679,394
2010					
CUMULATIVE STUDY PERIOD DEMAND					
Scenario	1	2	6		
Year	Moderate Demand Stable Growth	Moderate Demand Moderate Growth	Optimistic Demand Stable Growth	Optimistic Demand Extraordinary Growth	
	1990	317,664	371,402	423,552	570,631
	1995	563,124	699,130	750,832	1,132,858
	2000	767,400	1,009,685	1,023,200	1,722,074
	2005	966,456	1,341,916	1,288,608	2,401,468
2010					
CONCLUDED STUDY MID-POINT DEMAND					
		Finished Space Demand in Square Feet			
		Periodic	Cumulative		
Total		65.3	65.3		
1990	853,888				
1995	1,283,421	429,533	429,533		
2000	1,661,833	378,412	807,945		
2005	2,021,560	359,727	1,167,672		
2010	2,409,100	387,540	1,555,212		
		Finished (Net) Site Demand in Acres (1)			
		Periodic	Cumulative		
Total		65.3	65.3		
1990					
1995	32.9	32.9	32.9		
2000	29.0	61.8	61.8		
2005	27.5	89.4	89.4		
2010	29.7	119.0	119.0		

(1) Assuming average FAR of .30.

Source: The Hallstrom Appraisal Group, Inc.

Cumulative absorption and vacancy rates for study area projects for the period 1978 to 1990 are summarized on Table 22.

Owing to current tendencies to place much of the service commercial demand into retail shopping malls or associated complexes, the data is considered insightful for both use-types.

Much of the activity occurring early in the recent upsurge beginning in mid-decade, was pent-up (or latent) demand resulting from several years of near-stagnation in the sector due to lack of developed inventory. Many retailers and service providers recognized the under-serviced nature of West Hawaii and were quick to seize opportunities for re-location, formation or expansion provided by the "new" projects.

Most notably, since 1985-86, virtually all inventory released on the market has been successfully absorbed, and the vacancy rate for finished, established projects (those having completed original lease-up) is relatively low. These trends are further discussed in the following sub-section addressing regional supply.

There is no doubt that West Hawaii was historically woefully under-supplied from a retail and service perspective. The prevailing "farmer/rural mentality" exhibited strong consumer patronage levels and did not require a diverse selection of goods and services.

The best evidence of this viewpoint is demonstrated by the prevalence of retail and service tenants locating in "industrial" areas and relatively low-quality structures; projects that would never have been accepted for such use by mainland consumers. Reflecting the upscale, urbanized movement of the regional community, the significant share of new businesses as well as many re-locating established operations, have chosen the modern "class A" shopping centers.

Though the rapid absorption period of 1986-88 fueled by substantial latent demand has ebbed, the overall, short-term demand trends for retail and service commercial development in West Hawaii continue to be positive, and indicate market acceptance would be probable for a competitively developed project.



**TABLE 22**  
**SUMMARY OF ESTIMATED ABSORPTION AND VACANCY RATES**  
**FOR COMMERCIAL SPACE IN WEST HAWAII 1978 TO 1990**

Year	Annual Finished Space Absorption (in Sq. Ft.)	Effective Vacancy Rate (% of Market)
1978	18,900	2.00%
1979	23,400	1.50%
1980	21,700	1.00%
1981	8,400	3.00%
1982	12,800	2.50%
1983	14,000	3.00%
1984	21,600	0.50%
1985	35,000	0.50%
1986	43,200	3.50%
1987	52,000	3.00%
1988	84,600	2.50%
1989	63,200	2.00%
1990	45,800	1.50%

Note: 1990 figures are year-end estimates. Kaloko Industrial Park finished space inventory began to enter market in 1985-86. Recent "high" vacancy rates reflective of initial lease-up.

Source: Various, and The Hallstrom Appraisal Group, Inc.

Interviewed brokers asserted the slackening in absorption is a result of diminished supply levels, not tenant demand, and that the 1989-90 figures would be higher if quality space had been made available.

### **Identification of Supply**

#### **Existing Supply**

The major urban centers in West Hawaii, Kailua-Kona and Waimea, currently contain the significant portion of the available commercial inventory; both improved space and vacant, "zoned" properties.

Historically, Waimea (due to Parker Ranch influence) and Kealahou/Kainaliu (serving the surrounding agricultural community) were the most commercially developed towns, with strip improvements located along the Hawaii Belt Highway and other major thoroughfares. These commercial (retail/service) developments have efficiently met the demands of the proximate residents in past years, but are not considered as either comparable or competitive with potential commercial use of the subject property. It has been the growth of Kailua-Kona in the past decade, and the projections for its continued urbanization, which has stimulated mass business migration to the near-coastal area of the village fronting Palani Road, Alii Drive and Kuakini Highway.

Since mid-decade the Kailua-Kona to Keauhou urban corridor has been experiencing a substantial expansion of available commercial space inventory, and these trends are considered as having impact on the potential for similar-type subject use.

In discussing retail/service space and land supply and demand, it is necessary to acknowledge the differentiation in the orientation of available properties. Although use-types may cater to a limited market of cross-over clientele, a market dichotomy exists between tourism and resident oriented businesses. Restaurant operations typically are targeted towards service of both visitors and the local populace, with overall emphasis dependent upon location.

Tourism-oriented commercial development in Kailua-Kona is centered along Alii Drive, from Kuakini Highway to the Kona Hilton. Secondary facilities are located in

the hotels within the Keauhou-Kona resort. The operations are intended to serve the more than 4,000 transient vacation units along the coastal plain in the corridor.

With the exception of the converted Kona Inn shopping mall and the arcade at the Hotel King Kamehameha, the Alii Drive commercial improvements are one- and two-story low-rise structures containing up to 25,000 square feet of leasable area. Tenant turnover rates are moderate (in comparison to typical retail market segments), fluctuating in accordance with the fortunes of the Island's tourism industry. As indicative of the strong economy, there are currently few vacant spaces.

Additionally, as discussed in the Section Three of this report, a significant portion of the improvements in the Kona Industrial Subdivision are utilized by often non-conforming commercial tenants. The availability of such less expensive space (particularly as the "rural-lifestyle" area residents have historically shown no displeasure in frequenting the light industrial subdivision) hampered the demand for standard-quality commercial space. As the lower rents in the subdivision permit lower overhead and price levels, this trend was difficult to overcome. Only as the movement of capital into the region and the economic orientation of the populace has moved upscale has there been an increasing demand for higher quality, Class-A projects.

Over the past five years, there has been an unparalleled escalation in the level of commercial construction activity in Kailua-Kona; responding both to the historic pent-up demand for retail and restaurant services for residents and tourists, and in anticipation of the demand being created by development of the coastal resorts which will stimulate both consumer populations.

During this period, numerous projects have been constructed or proposed within the Kona urban area, which is the focus of an study. The major entries have been:

1. **Lanikai Center** -- The first phase of this project opened in 1987. When completed the complex will be the among the largest on the Big Island, having a net leasable are of some 347,000 square feet. The site is bounded by Palani Road and Queen Kaahumanu Highway. According to the developer, the 87,461 square feet in the initial increment has been fully leased, at rates ranging from \$2.50 to \$4.00 per square foot monthly vs. 8 to 10% of gross sales. Longs and Foodland are the first anchor

tenants in what will eventually contain three department stores and parking for 1,800 cars. Total project cost is estimated at \$56 million.

2. **Waterfront Row** -- Located on an oceanfront site just south of the Kona Inn Shopping Village, the tenants in this project have opened during the past year (approval problems forced the completion date back from late 1986 as originally planned). The scaled-down \$4.5 million complex contains a total of 33,343 square feet of gross rentable area, and is preliminarily planned to house three restaurants and three retail bays. All of the space has been leased. The size of this project was reduced due to stringent parking requirements.
3. **Developments in the Kona Industrial Park** -- Recognizing the apparent demand for commercial development in Kailua-Kona, and acknowledging the scarcity of quality frontage sites, several developers have acquired sites within the Kona Industrial Park which front Queen Kaahumanu Highway and undertaken construction of commercial complexes. Although access from the Highway is limited, pure commercial uses were not permitted under original park zoning restrictions and traffic in the area is heavily congested, these projects have nonetheless received approvals and general market acceptance.

Among the significant complexes:

- A) **Kaahumanu Plaza I** is a 45,350 square foot facility constructed on a 75,576 square foot site at the corner of Queen Kaahumanu Highway and Kaiwi Street. All 12 bays were pre-leased in 1987-88 at prices ranging from \$.70 to \$.83 per square foot monthly.
- B) **Kaahumanu Plaza II**, at the Queen Kaahumanu Highway entrance to the Kona Industrial Subdivision, was completed in 1990. It follows the successful Plaza I development summarized above. The U-shaped, three building (one of which is two stories) complex contains 31,000 square feet of leasable space, and 88 parking stalls. Rental rates are at \$.75 to \$.85 per square foot

monthly, triple net, and about 85 percent of the space is spoken for, including the "prime" locations.

- C) Aloha Kona Center contains 21,000 square feet of leasable area, on a 1.75 acre site on Queen Kaahumanu Highway "behind" the Pay 'N Save store. Total construction costs were reported at \$1 million, and all of the spaces are leased except one smaller bay. Rents ranged from \$1.60 to \$2.00 per square foot monthly.
  - D) Palm Terrace opened in late 1987. All of this 20,663 square foot improvement is leased. The underlying site contains 1.73 acres. The space was rented at \$.75 to \$1.00 per square foot monthly.
4. The 6,000 square foot Coconut Grove Marketplace, on a .579 acre site across Alii Drive from the Hugos Restaurant/Kona Hilton enclave, was also opened in 1990. The ground floor retail space was quickly leased, but brokers report difficulty in finding a second floor restaurant tenant. The ground floor rental rates were circa \$3 per square foot per month, against percentage of gross sales. Tenants are oriented towards the tourist trade.
- The \$440,000 project has 3,400 square feet of ground floor retail space, and 2,600 square feet of second floor restaurant area.
5. Several existing complexes are offering retail-type space elsewhere in the Kona Industrial Subdivision, ranging in size from 500 to 10,000 square feet, and rents ranging from \$.60 to \$1.10 per square foot monthly.
6. Within the Kaloko Industrial Park, which has for the most part avoided the "commercial" orientation prevalent at the Kona project, commercial/showroom/warehouse type space is being offered in several facilities. The 1,647 to 1,952 square foot "units" are being sold on a fee simple condominium basis, with starting prices beginning at \$135,000.

### Proposed Supply

There are numerous commercial (office, retail and service) projects proposed for West Hawaii over the coming decade(s). These planned developments are summarized on Table 23.

Cumulatively, the projects will contain over 900 gross acres of industrial lands, which would equate to circa 675 net acres of finished sites.

A total of nearly 5.148 million square feet of floor space is envisioned for the complexes.

If all were approved and constructed in a timely manner, together they would represent in excess of 30 years of inventory. This is sufficient amount to meet market demand until well into the next century unless West Hawaii (through some extraordinary, unforeseen circumstance) becomes a major metropolitan area.

More than 60 percent of the proposed inventory (including the subject) is to be located within the middle-elevation section of the Keahole to Kailua Development corridor and will be dependant upon the integration of large-scale public and private development efforts. The failure to manifest current plans could potentially endanger the adequacy of commercial supply in the region over the long term.

Generally, apart from the very remote possibility for a *minimal* "tight" supply situation which could develop in several years if all of the remaining vacant major Kailua sites are developed and absorbed before the infrastructure systems for the master-planned communities are completed, we do not foresee a shortfall of commercial inventory supply during the study period.

### **Correlation of Indicators**

*Demand* for development in West Hawaii in *retail* and *service commercial* sectors have experienced exceptionally high ("record") levels of demand in recent years.

TABLE 23

**SUMMARY OF MAJOR PROPOSED COMMERCIAL PROJECTS  
IN WEST HAWAII**

Project Name	Location	Planned Inventory		Estimated Opening Date
		Approx. Gross Acreage	Estimated Floor Space (1) (in Sq Ft)	
Old Kailua Town Center	North Kona	6	50,000	1990-91
Kings Shops @ Waikoloa Resort	South Kohala	10	56,000	1991
Lanikai Center Phase II	North Kona	24	235,000	1992
Keolu Shopping Plaza Phase II	North Kona	12	115,000	1992
Unnamed Kailua-Kona Center	North Kona	9	88,209	1993
Y.O. Project	North Kona	12	117,612	1993-94
Kona Coast Shopping Center Phase II	North Kona	10	98,010	1993-94
Kohalaiki Mauka Center	North Kona	9	100,000	1993-94
Hawaiian Home Lands Project	North Kohala	35	343,035	1994 or later
Signal Puako Project	South Kohala	25	245,025	1994 or later
Lanikai Project	North Kona	262	1.5 million-plus	1994 or later
Kealahou Project	North Kona	450	2.0 million-plus	1994 or later
Subject Commercial Area	North Kona	30	392,000	1995 or later
Various Resort Projects (2)	North Kona/ South Kohala	N/A	200,000-plus	1993 and beyond

(1) Assuming FAR of .30, unless other indicators available.

(2) Includes resort retail centers at Kohalaiki, Kukio Beach, Kaupulehu, Mauna Lani and Mauna Kea/South Kohala Resort.

Source: County Planning Department, Various EIS,  
and The Hallstrom Appraisal Group, Inc.

As with industrial uses, virtually every private and public projection calls for increasing commercial-oriented demand as the regional economy and de facto population base (resident and tourist) expands over the coming two decades.

We estimate the cumulative demand for additional retail and service/commercial space in the study area between 1990 and 2010 will be at 1,944,015 square feet of finished floor area, equating to 148.8 net acres of finished sites, and some 200 gross acres of raw land area.

Additions to supply have been brisk in regard to finished space inventory since mid-decade, and a vigorous though stable supply/demand ratio has been achieved in the commercial market sectors.

Although zoning codes may allow non-commercial uses in "commercial" lands (and vice versa), we estimate the existing available site supply equates to less than three to five years of market demand needs.

Substantial commercial (retail, service/commercial and office) additions are proposed for West Hawaii during the coming decade, with some 900 gross acres of general industrial lands, equating to some 675 net developable acres, to be contained in major announced projects. Upon build-out these lands could support upwards of 5.5 million square feet of finished space, or the equivalent of more than 30-plus years of regional demand.

Notably, however, much of the currently proposed "commercial" sites are within the urban core area envisioned by County Planners in the Kealekehe mauka region. Much of the zoned lands would be put to office, business park, research and development, public facilities and other non-retail uses.

Owing to the level of potentially competitive supply, presently proposed, and its location outside the accepted "shopping district" of Kailua-Kona, it is our opinion the subject could not anticipate being a focus of general retail or service/commercial development over the coming decade.



Its retail potential would be a function of its ability to attract passersby through a strip-center (fast food, convenience, gas station) development. Under this scenario, a complex of under 35,000 square feet is most reasonable from a market perspective.

**SECTION VI: APPROPRIATENESS OF THE SUBJECT SITE  
FOR THE PROPOSED USE**

The subject update analysis, as presented foregoing, supports the published conclusions of our mid-1989 study finding the property is a reasonable and favorable location for retail and industrial development as proposed. We have nominally modified our stated opinions, summarized below, to account for any evolutions in the market, but they remain basically unchanged.

**Industrial Use**

It is our opinion that approximately 85 percent of the interior (mauka portion) of the subject property is well-suited for industrial development, based on the following criteria:

1. The parcel is within the Keahole to Kailua area designated by the County for future urban expansion of the Kailua-Kona community. The plan acknowledges that expanding village and adjoining residential districts will inevitably grow into the open coastal corridor stretching north from the town to the Keahole Airport.

In its final West Hawaii Regional Plan (November 1989), the State of Hawaii Office of State Planning designated the Keahole to Kailua Corridor as one of the "Subregional Planning Areas". These nodes are intended to be expansion zones for existing communities, providing a "mix of uses in order to support resort development, housing development, industrial development, agricultural development, and a host of ancillary services that will be generated" (page 22).

Specifically, the plan calls for "directing future regional urbanization" to the greater subject area, stating:

**"The Keahole to Kailua-Kona area, which essentially involves in-filling the undeveloped area south of the airport, is logical given its proximity to the existing urbanized areas and the availability of infrastructure."  
(Page 22)**

2. Owing to the quality and future expansion capabilities of the Queen Kaahumanu Highway, the subject has access characteristics which are far superior to most other locations available for industrial use. While increased traffic congestion plagues central Kailua-Kona, the Highway remains (for the most part) an open corridor in the Kohanaiki area. Ease of access is of critical concern for the oversized vehicles which frequent an industrial subdivision.
3. Industrial development of the subject is compatible with other proximate use-types.
4. The holding is close-by a variety of public and private facilities which would benefit from having additional support acreage available nearby, including Keahole Airport, Honokohau Small Boat Harbor, Keahole Agricultural Park, the HOST Park, and the proposed Kohanaiki Resort.
5. The shape of the parcel, nearby industrial uses, and its poor soil conditions makes it undesirable for master-planned residential or agricultural development.
6. There is a demonstrated current demand for industrial development in the vicinity, as evidenced at the Kaloko Light Industrial Subdivision.

To best maximize its market share, the industrial portion of the subject should be subdivided to allow flexibility for site purchasers, with lots ranging in size from 20,000 square feet to several acres.

Based on current market trends, we would anticipate the project could achieve fee simple selling prices of \$12 and up per square foot (in accordance with size), and be fully absorbed by the market within 36 to 42 months of offering.

## **Commercial Use**

Based on our analysis, we believe the portion of the subject site fronting Queen Kaahumanu Highway could viably be put to commercial uses (retail, restaurant, service) at this time.

The issue becomes which type of commercial development can best capitalize on the site's inherent advantages, minimize its disadvantages, and provide the best short and long-term opportunities for economic success.

Additionally, public planning concerns and market acceptance potentials are critical points.

The subject property has several distinct locational advantages:

1. It has excellent access and frontage characteristics along West Hawaii's main thoroughfare, along which thousands of tourists and residents must pass each day while traveling from urban Kailua-Kona to the existing (and proposed) coastal resorts and Keahole Airport.
2. It has sufficient area to permit a large-scale, full-amenitied development.
3. It is across the highway from an approved resort community (Kohanaiki) which should commence development within a short time, and a second proposed resort (Ooma) that together could potentially place more than 3,500 resort and residential units within one mile.

The major disadvantage of the site is its outlying location, being some six miles removed from the Kailua-Kona urban core. There are no existing proximate uses which could enhance the draw of a commercial facility on the property apart from the destinations (airport, resorts, Kailua-Kona) elsewhere along the corridor.

Therefore, a commercial development of a portion of the holding must attract consumers either from the passer-by universe, or through creation of a desirable destination, as there is no independent reason they would otherwise visit the site.

As demonstrated in our study of the current West Hawaii commercial market, there has been a veritable explosion in the level of development and demand for commercial space over the past three years. This is due both to the pent-up demand which had been unmet during the unstable economic times at the beginning of the decade, and the prospects of a wide-spread community expansion riding on the heels of the planned coastal resort investment.

While the new projects have achieved excellent occupancy levels (for the most part), significant further inventory development is planned, and we question the short-term depth of market demand for large amounts of additional space beyond the announced complexes. Also, it is apparent that most developers seek to build in the existing urban areas, where there is a distinct level of community synergy and acknowledged consumer recognition.

We believe that a significant standard-type, strip commercial complex may not be competitive on the subject property until the urban area expands further towards the Keahole Point area. Although select use-types could prosper in the location, such as a gas station, convenience store, or fast-food restaurant; but these would require less than 35,000 square feet of leasable space, utilize little of the prime site, and may not justify the cost of developing the infrastructure necessary to support them. Additionally, we doubt if the County, which is attempting to preserve the visual integrity of the Queen Kaahumanu Highway, would favorably view such development; it being disparate and generally unattractive. The open space, buffering and other requirements the County would likely impose may impact the viability of the project. Finally, if considered in the context of being at the northerly "gateway" to the Kailua-Kona community, this type of complex may not provide the best or most appealing feature possible.

On a long-term basis, as the Kalaoa-Kealekehe area is further populated, and the Kohanaiki (and possibly Ooma) resorts are constructed, there would exist a demand for standard commercial uses on the subject site, with estimates of 115,000 to 160,000 square feet of leasable area in the realm of possibility by the year 2010. Such would require eight to over 11 acres of the property. Over the short-term (within five years), we are doubtful if more than 20,000 to 35,000 square feet of space could be supported on less than two acres of the property.

Conversely, we are optimistic about the potential use of a portion of the subject property for development as a thematic/resort commercial center. In addition to its advantageous qualities discussed foregoing (notably its prime Highway frontage), the subject could contain such scale of development, meeting community needs, without exacerbating the already acute traffic problems which plague the existing Palani Road commercial area of Kailua-Kona.

With such a large site, a development could achieve the critical mass necessary to become an independent destination, and in light of the still somewhat limited retail and restaurant opportunities available in West Hawaii (relative to comparable neighbor island areas) has acceptable levels of competition and an enhanced potential for success.

Also, due to its location, the center would be the first major facility which travelers coming from the northerly resorts and airport would encounter. This "intercept" quality cannot be over stressed, particularly if accessibility is easy and exposure maximized. Return users would likely prefer such traits relative to the congested nature of downtown Kailua-Kona, and due to the vast distances from the northerly coastal resorts to town the "closer" subject location is that much more enhanced.

The subject property is in a creditable location for exploiting both the existing and anticipated expanding tourist and resident consumer markets, the latter particularly if the development contained services (retail and restaurant) in an attractive setting. As a sidelight, being removed from the urban core, the center would not be as subject to the turmoils created by certain undesirable activities which plague the Alii Drive tourist-oriented commercial areas.

It is our opinion the County would favorably view highway-fronting thematic/resort improvement on a large, or destination, scale, as it would provide unique commercial opportunities in the community, an additional attraction for visitors, and an upscale retail center in an area where demand will increase dramatically over the next two decades. The development would be able to support the type of visual amenities sought by the County for the area, meet proposed General Plan goals, and overall provide a strong entrance to the Ooma community.

Therefore, it is our opinion, the most efficient commercial use of the subject on a near-term basis would be as a large-scale thematic/resort center in excess of 150,000 net leasable square feet, situated on a circa eight to ten acre portion of the subject. This would make the center a premiere retailing and restaurant facility in West Hawaii attracting both visitors and residents in an area planned for extensive enlargement of both consumer types.

Beyond the standard range of tenants envisioned, as described foregoing, the Kohanaiki Mauka commercial site would prove particularly appealing for:

1. A local handicraft center. Such stores have been very successful at Volcano National Park and in Holualoa, however access to both is awkward for West Hawaii tourists. The proposed National Historic Park at Kaloko-Honokohau (one mile south) would help provide the proper setting for this use.
2. A post office. The existing Kailua-Kona station is at capacity, and its near-airport, easy access location makes the subject an excellent site. Additionally, a post office serves to attract large numbers of local residents (as evidenced at Princeville Shopping Center and Azeka's in Kihei, Maui) to the center.
3. A marina/aquaculture product pavilion. This would provide an informational as well as retail outlet for products from the nearby HOST and Keahole Agricultural Parks.

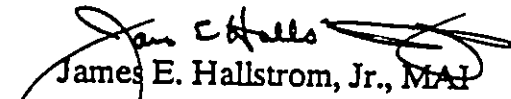
Other potential tenants could be: a bicycle rental shop for guests to use on the Ooma, Kohanaiki, HOST part and Kaloko-Honokohau national historic park roadway systems; a gas station, discretely placed; and a fish store specializing in local catches.


## CERTIFICATION

The undersigned do hereby certify that, to the best of our knowledge and belief, the statements of fact contained in this report are true and correct. It is further certified that the reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are our personal, unbiased professional analyses, opinions, and conclusions. We further certify that we have no present or prospective interest in the property that is the subject of this report, and have no personal interest or bias with respect to the parties involved. Our compensation is not contingent on a predetermined value or direction in value that favors the client, the amount of the value estimate, the attainment of a stipulated result, or the occurrence of a subsequent event. The appraisal analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute and the Uniform Standards of Professional Appraisal Practice. The use of this report is subject to the requirements of the Appraisal Institute relating to review by duly authorized representatives. The undersigned certify that they have made personal inspections of the property that is the subject of this report, and that no other persons provided significant professional assistance.

The Appraisal Institute conducts programs of continuing education for their designated members. As of the date of this report, James E. Hallstrom, Jr., has completed the requirements of the continuing education program of the Appraisal Institute.

THE HALLSTROM APPRAISAL GROUP, INC.

  
James E. Hallstrom, Jr., MAI

  
Tom W. Holliday

1896AR01



**ADDENDA**

**GENERAL DESCRIPTION**

Admitted as the 50th State in 1959, Hawaii has grown into a major Pacific Basin market with a diversified economy that belies traditional thought. A strategic port-of-call for both westbound and eastbound goods and tourists, the "Aloha State" actively pioneers the fields of energy, land management, and realization of multi-ethnic ideals.

Massive volcanic eruptions from the ocean floor created the 1,610-mile long archipelago administered by the State of Hawaii, consisting of seven major and 124 minor islands and coral atolls. The major islands, Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, and Niihau, account for more than 98 percent of the 6,450 square miles of land enclosed by 70 miles of coastline.

Located 20 degrees north of the equator and 2,400 miles west of the U.S. Mainland, the islands' complex geological form works in harmony with balmy tropical ocean to create an ecological greenhouse providing fresh water, temperate climate, fertile land, and cultivating abundant flora and fauna. Land forms stretch 13,800 feet in height from seasonally snow-capped Mauna Kea on the Big Island, to the plummeting depths of the Pacific close offshore. Hawaii offers one of the wettest spots on earth and one of the sunniest. The cultural make-up of the islands offer equally appealing extremes. These contrasts, both physical and cultural, have shaped Hawaii's past and are setting the pattern for its future.

Rapid growth since World War II has typified the civilian population numbering 971,500 as of July 1988, a 47.2 percent increase since 1970--twice the rate experienced nationally. Military personnel and dependents account for the remainder of the 1,098,200 resident population. With no ethnic majority, a myriad of culturally oriented schools, churches, and businesses abound, offering a commonwealth of information and heritage which provide economic stimulus and stability. A 1986 ethnic population study by the Department of Health estimated persons of Caucasian and Japanese descent made up nearly one-half the population, representing 23.4 and 23.0 percent of the State total respectively. The

remainder is divided between Part Hawaiian, Filipino, Chinese, Korean, Negro and persons representing other ethnic lineages.

### **INDUSTRY AND INCOME**

Experiencing the same general growth trend exhibited throughout the western United States during the last two decades, personal income in Hawaii reached an all time high of \$21.6 billion in 1989, a 5.8 percent increase over the previous year and up 98 percent from 1979. This resulted in an average income of \$18,306 per capita, according to the U.S. Department of Commerce, almost doubling 1979's \$9,506 mark.

With business experiencing brisk growth, the number of employment opportunities has also increased. There were 507,800 occupied jobs in 1989, and with 523,800 people currently employed out of an active labor force of 537,700, the average unemployment rate remains low; at 2.6 percent (as of April 1989). Throughout the recession of the early 1980s, Hawaii experienced the lowest unemployment rates in the nation.

### **Visitor Industry**

Attracted by the amenities of the islands, record numbers continue to visit Hawaii; 6,641,800 people in 1989 contributing \$9.6 billion to the economy. Latest 1988 statistics show that an average of 9.0 and 5.0 days are spent in Hawaii by westbound and eastbound visitors, respectively. Due largely to an official Japanese government policy encouraging international travel as a means of reducing its trade surplus, the Hawaii Visitors Bureau anticipates over two million Japanese nationals in 1990, participating in conventions, business ventures, and recreation. In 1988, Japanese tourists alone spent an average of \$586 per day.

The hotel industry employs some 213,300 persons directly (versus a 1960 figure of 4,330), and has shown a relatively steady growth over the last ten years. The 1988 occupancy rates were 78.5 percent, a 3.2 percent dip under the 1987 rate, attributed to the characteristics of Japanese tourists who typically stay a shorter time than most and prefer double occupancy

hotel accommodations. This regression was optimistically expected to recover in 1990 to fill the 68,200 estimated hotel rooms and maybe even topple record occupancy rates.

The weakening of the U.S. dollar on international markets has made Hawaii less expensive to foreign visitors. Eastbound visitors from Japan and the South Pacific presently comprise over 19 percent of all tourists to the State. Conversely, the weakened dollar has made foreign destinations more expensive to U.S. vacationers, hence domestic vacation sites throughout the United States, Hawaii included, are expected to reap the benefits of this trend.

These factors combined with periodic airline industry fare wars, facilitate travel to the islands, bespeak continued short-term growth within Hawaii's visitor industry. The selective targeting of upscale markets provides reason to believe that long-term growth potential exists. The overall outlook for Hawaii's visitor industry is positive.

#### **Trade**

Closely related to tourism is the trade industry, particularly local retail and wholesale, which amounted to \$19.24 billion in 1988.

The trade industry, the State's largest employer offering more than 127,600 job opportunities, also includes imports and exports.

#### **Government**

Long recognized as a strategically placed military outpost, the Defense Department has traditionally been a major employer; however, various Federal, State and County departments have annually infused vast sums into the economy, so that all levels of the public sector expended over \$9.2 billion in 1988.

The federal government employed 33,450 in 1988, a figure basically static since the end of the Vietnam War, while spending \$2.56 billion for defense and \$2.40 billion in other services, up 4.2 percent over the previous year.

Current political and fiscal policies kept growth negligible on the State and County levels for the first half of the 1980s, with the number employed at approximately 60,000; 1989's 67,000 is up from the previous year's figure of over 65,700. Expenditures increased from 3.5 billion in 1988 to 3.8 billion during 1989.

#### Manufacturing

Sugar and pineapple continue to be the major refined products of Hawaii, accounting for \$529 million of the agriculture industry's \$2.2 billion in sales. After recovering from the instability brought on by the expiration of the Federal Sugar Act, famine, and following glut during the mid-70s, the processing of sugarcane remains an integral island industry. Competition from other sweetener sources (corn syrup, sugar beets, and the latest influx of artificial sweeteners) and producing third world countries has severely hampered the Hawaii industry in past years. Government restrictions on foreign sugar imports have helped preserve Hawaii's sugar industry. Sugar employs 2,950 people and produced a gross revenue of \$337.5 million in 1988, a 3.2 percent decrease in jobs coupled with a 4.8 percent heightening in gross revenues over the previous year.

Hawaii's pineapple industry, likewise, once world dominating, is experiencing extreme competition from foreign producers. Dole, a major pineapple producer, has severely cut back production and packaging operations in the State, as indicated by the closing of its Molokai plantation. During 1983, the Del Monte Corporation closed its Iwilei Cannery operation. Between 1967 and 1983, land acreage in production and work force each dropped 46 percent, while improved technology held production decreases to only 26 percent during those same years. Sales of \$191.7 million with 2,050 employed in 1988 indicated a 5.5 percent decrease in sales over the previous year. Given available information about rising world production capacity, it appears unlikely that the local

pineapple industry will dramatically expand. Equally unlikely, however, is any sudden decline.

Diversified manufacturing (garment, petroleum refining, cement products, etc.) accounts for the remaining portion of the industry. Considered Hawaii's greatest opportunity for economic diversification, in an effort to lessen Hawaii's dependence on tourism, this widespread industry employing 22,300 in 1988 has declined over the last decade; however, has shown increases since 1984. From a high of \$1.97 billion in sales generated in 1981, the industry has seen that fall to \$1.6 billion in 1988.

#### **Construction**

Having struggled through severe setbacks as a result of the nationwide recession in 1982 and 1983, the construction industry reached \$2.5 billion in completions in 1988. With the end of construction strikes in the early months of 1985, the industry has recovered from lagging completions recorded in 1984. The increase in foreign investment, coupled with the redevelopment of existing property has increased the dollar amount of construction by almost 26 percent in 1988. With a work force of 26,800, public and private authorized construction has clearly recovered from the slump of the early 1980s.

#### **LAND AND DEVELOPMENT**

With only 4.1 million acres of gross land area on the six major islands, land is modern Hawaii's most valuable commodity. In order to utilize this precious resource most efficiently, the State Plan of Hawaii and the County Zoning Codes were enacted with long-range development, urban planning and conservation being the major problems confronted.

Only 171,214 acres are currently in urban use. The other major uses are: conservation, 1.97 million acres; agriculture, 1.96 million acres; and the rural areas of 10,196 acres.

Each year the community is becoming increasingly aware of the need for environmentally sound development and prudently planned recreation and conservation areas.

### **ECONOMIC OUTLOOK**

Since statehood, the economic base of Hawaii has been marked by rapid growth. Despite the multitude of disruptions which have affected both markets and consumers on the U. S. mainland, the islands, while experiencing many of the same difficulties, have witnessed tremendous increases in inventories and revenues. Over the past five years annual growth rates have stabilized at about national averages in nearly all of the major industries, and most indicators point to a continuing upswing in this still-expanding market.

To reach a level of energy stability, Hawaii has embarked on a course to limit dependence on costly importation of oil. Funding for a variety of projects capitalizing on the environmental possibilities of solar, geothermal, hydroelectric, and wind along with substantial conservation measures have all shown promise for this topical problem.

Air carriers have banded together and applied to have fuel storage facilities expanded greatly so visitor influx will not be interrupted despite periods of shortages. Tourism provides need for an incalculable number of services: consumers for local products and retailing, and investors or future residents to meet and expand the needs of the marketplace.

While soaring interest rates slowed construction considerably on the mainland and harmed state residential authorization levels in 1980-1982, large foreign capital investments and the ever-increasing need for commercial (retail, office, hotel) space have kept activity at relatively high levels. Acute shortage levels of housing keep this market escalating. Recent figures indicate a 2.3 percent increase to \$53.86 billion in 1989 over the \$52.5 billion in loans recorded in 1988.

Having its three major industries (tourism, retail, government) subject to the fluctuations and uncontrollable insouciant decisions of the distant U.S. mainland and Japanese

economies, has forced Hawaii to seek expansion of visitor markets in Europe and Asia, and toward further diversification of island industry. Entrepreneurs look for a future where reward is not based upon the availability of leisure-time dollars or the expensive importation of raw materials, but on the constructive use of Hawaii's few, yet abundant, resources and invaluable location.

Toward this end, industrial capabilities are being expanded in such areas as petroleum refining, cement making, steel and aluminum fabrication and manufacturing, various electronic services, and garment and furniture manufacturing. These growth industries, coupled with the trend-setting ideas that have traditionally marked the multi-cultural state; energy, oceanic and astronomical research, international free trade zones, information and advanced studies clearing houses, have added to the stable growth patterns which appear in the forecast of a new decade of economic vitality.



# STATISTICAL SUMMARY OF HAWAII'S ECONOMY

		1984	1985	1986	1987	1988	Percent Change	
							1986-'87	1987-'88
<b>RESIDENT POPULATION (As of July 1st)</b>								
Civilian	Number	1,035,700	1,049,900	1,063,600	1,082,000	1,098,200		
Military Dependents	Number	911,300	929,300	939,300	959,000	971,500	1.7	1.3
Armed Forces	Number	67,100	64,300	66,200	64,800	69,900	2.1	1.3
<b>CIVILIAN LABOR FORCE</b>								
Employment	Number	57,300	56,400	58,100	58,100	56,800	-2.1	7.9
Unemployment	Number	472,000	479,000	492,000	513,000	516,000	0.0	-2.2
	Percent	445,000	452,000	468,000	493,000	500,000	4.3	0.6
		5.6	5.6	4.8	3.8	3.2	5.3	1.4
<b>INCOME</b>								
Gross State Product	\$ Millions	15,826.5	16,813.8	18,036.2	19,713.1	21,587.4	-20.8	-15.8
Total Personal Income	\$ Millions	13,629.3	14,589.0	15,608.3	16,844.9	18,398.8	9.3	9.5
Per Capita Personal Income	Dollars	13,157	13,814	14,675	15,569	16,753	7.9	9.2
<b>CONSUMER PRICE INDEX</b>								
Food Items	1982-84 = 100	103.5	106.8	109.4	114.9	121.7	6.1	7.6
Housing	1982-84 = 100	103.6	107.8	110.0	114.1	120.3	5.0	5.9
	1982-84 = 100	103.1	106.0	108.4	115.0	123.0	3.7	5.4
<b>MANUFACTURING SALES</b>								
Sugar	\$ Millions	2,281.0	2,184.7	1,907.0	2,089.6	2,172.2	6.1	7.0
Pineapple (Processed)	\$ Millions	393.5	358.8	376.7	354.5	337.5	9.6	4.0
Petroleum	\$ Millions	249.5	171.7	184.9	202.9	191.7	-5.9	-4.8
Diversified Manufacturing	\$ Millions	1,118.9	1,115.9	780.0	943.9	1,036.3	9.7	-5.5
<b>TOTAL DIVERSIFIED AGRICULTURE</b>								
Crops (Pineapple & Sugar Excluded)	\$ Millions	519.6	538.3	565.4	588.3	606.7	21.0	9.8
Livestock Products	\$ Millions	207.8	215.7	231.2	240.0	256.8	4.0	3.1
Fresh Pineapple	\$ Millions	117.4	132.9	147.8	152.3	165.2	3.8	7.0
	\$ Millions	87.0	82.8	83.4	87.7	88.6	3.0	10.4
	\$ Millions	47.6	50.8	53.5	48.5	55.3	5.2	1.0
<b>CONSTRUCTION</b>								
Construction Completed	\$ Millions	1,227.2	1,429.6	1,810.0	2,002.9	2,529.0	-9.3	14.0
Private Construction Authorizations	\$ Millions	616.9	862.1	1,055.2	1,134.2	1,579.0	10.7	26.3
Residential	\$ Millions	383.4	562.3	533.0	603.5	817.6	7.5	39.2
Non-Residential	\$ Millions	233.5	299.8	522.2	533.8	761.4	12.7	36.2
Government Contract Awards	\$ Millions	563.2	496.3	722.1	516.6	922.7	2.2	42.6
Construction Employment	Number	15,800	17,150	18,950	20,950	23,250	-28.5	78.6
Housing Inventory (April 1st)	Number	359,107	364,436	370,545	378,519	385,299	10.6	11.0
<b>TRADE</b>								
Foreign Exports	\$ Millions	316.9	388.8	231.1	392.8	572.6	70.0	45.8
Foreign Imports	\$ Millions	1,397.9	1,553.1	1,425.4	1,559.6	1,559.1	9.3	0.0
Retail Sales	\$ Millions	6,541.9	8,957.2	9,445.2	9,691.4	10,434.9	2.2	12.9
Wholesale Sales	\$ Millions	6,134.0	6,056.5	6,391.5	7,265.0	8,349.4	13.7	14.3
<b>FEDERAL GOVERNMENT</b>								
Defense Expenditures	\$ Millions	4,331.7	4,568.0	4,600.0	4,778.0	4,919.0	3.9	3.0
Non-Defense Expenditures	\$ Millions	2,052.9	2,159.5	2,033.0	2,220.1	2,319.0	9.2	4.5
Civilian Employment	Number	2,278.8	2,408.5	2,567.0	2,557.9	2,600.0	-0.4	1.6
		32,100	32,400	32,100	32,800	33,450	2.2	2.0
<b>FINANCE (As of Dec. 31st)</b>								
Bank Deposits	\$ Millions	7,183.9	8,232.6	9,473.2	10,396.4	11,549.8	9.7	11.1
Bank Loans	\$ Millions	4,698.1	5,098.0	5,861.3	6,330.4	7,765.0	8.0	22.7
Deposits of All Financial Institutions	\$ Millions	12,626.5	12,911.7	13,172.7	14,795.6	18,123.5	12.3	22.5
Loans of All Financial Institutions	\$ Millions	10,426.8	9,953.5	9,731.6	10,859.2	14,932.2	11.6	37.5
Debits to Demand Deposits	\$ Millions	91,805.8	95,870.4	109,931.7	121,926.3	133,916.2	10.9	9.8
Investments of Insurance Companies	\$ Millions	2,704.1	2,680.3	3,060.7	2,864.4	3,082.8	-6.4	7.6
<b>TRANSPORTATION</b>								
Air Passenger Movements	Thousands	26,517	27,227	29,646	31,298	32,895.2	5.6	5.1
Interisland	Thousands	15,364	15,757	16,680	17,615	17,929.9	5.5	1.8
Overseas	Thousands	11,153	11,470	12,966	13,693	14,955.4	5.6	9.2
Air Cargo Movements	Thousand Tons	286.5	267.1	307.3	345.9	395.3	12.6	14.3
Interisland	Thousand Tons	111.5	101.7	114.7	122.5	130.2	6.8	6.3
Overseas	Thousand Tons	175.0	165.4	192.6	223.4	265.1	16.0	18.7
<b>UTILITIES</b>								
Telephone Lines in Service	Thousands	460.3	474.0	487.0	513.2	537.6	5.4	4.8
Volume of Electricity Sold	Million KWH	6,351.8	6,379.1	6,754.4	7,013.0	7,385.0	3.7	5.5
Volume of Gas Sold	Million Therms	47.8	48.3	48.2	50.0	50.5	3.7	1.0
<b>STATE AND LOCAL GOVERNMENTS</b>								
Revenues	\$ Millions	2,793.9	2,975.4	3,212.2	3,534.1	3,843.8	10.2	8.6
Expenditures	\$ Millions	2,633.1	3,122.4	3,243.4	3,469.1	3,677.7	7.0	6.0
<b>TAX COLLECTIONS</b>								
Federal	\$ Millions	3,655.4	3,723.0	4,206.6	4,747.8	5,061.5	16.3	17.3
State	\$ Millions	1,791.5	2,116.8	2,337.0	2,800.1	3,310.8	21.2	17.9
Counties	\$ Millions	1,331.6	1,441.6	1,562.2	1,924.4	2,124.7	23.2	11.6
	\$ Millions	343.3	365.6	397.4	412.3	422.0	3.7	2.4

Source: Bank of Hawaii - Hawaii 1989 Annual Economic Report

SELECTED ECONOMIC INDICATORS

	Unit	RECENT TREND				CURRENT STATISTICS (Latest Available Data)			
		1987	1988	1989	% Change 88/87	% Change 89/88	Period	1990	Annual % Change
<b>UNITED STATES</b>									
Gross National Product (GNP)	\$ Billions	4,524.3	4,880.6	5,234.0	7.9	7.2	1st Qtr.*	5,442.0	7.8
GNP in 1982 Dollars	\$ Billions	3,853.7	4,024.4	4,144.1	4.4	3.0	1st Qtr.*	4,195.8	2.1
Civilian Labor Force	Millions	119.9	121.7	123.9	1.5	1.8	May	125.0	1.1
Civilian Employment	Millions	112.4	115.0	117.4	2.3	2.1	May	118.4	1.1
Civilian Unemployment Rate	Percent	6.2	5.5	5.3	—	—	May	5.3	—
CPI-U	1982-84 = 100	113.6	118.3	124.0	4.1	4.8	May	129.2	4.5
<b>HAWAII</b>									
Civilian Labor Force	Thousands	513.0	510.0	522.6	-0.6	2.5	Apr.	537.7	4.6
Employment	Thousands	493.0	500.0	507.8	1.4	1.6	Apr.	523.8	5.4
Unemployment Rate	Percent	3.8	3.2	2.9	—	—	Apr.	2.6	—
Personal Income	\$ Millions	16,832	18,388	20,358	9.2	10.7	4th Qtr. 1989	21,130	10.8
Per Capita Personal Income	Dollars	15,556	16,774	18,306	7.8	9.1	1989	18,306	9.6
Honolulu CPI-U	1982-84 = 100	114.9	121.7	128.7	5.9	5.8	2nd-half 1989	131.1	6.2
Visitor Arrivals	Thousands	5,799.8	6,142.4	6,641.8	5.9	8.1	Jan.-Apr.	2,248.6	2.6
Hotel Occupancy Rates	Percent	81.1	78.5	79.0	-3.2	0.6	Apr.	76.2	2.4
Sugar	\$ Millions	339.7	337.5	342.1	-0.6	1.4	1989	342.1	1.4
Pineapple	\$ Millions	251.8	247.0	—	-1.9	—	1989	241.9	-2.1
Diversified Manufacturing	\$ Millions	595.1	606.7	657.9	1.9	8.4	Jan.-Mar.	172.8	-5.6
Construction Completed	\$ Millions	2,002.9	2,529.0	3,193.1	26.3	26.3	Jan.-Mar.	868.2	26.3
Private Authorizations	\$ Millions	1,134.2	1,579.1	1,830.7	39.2	19.1	Jan.-Apr.**	615.5	18.3
Residential	\$ Millions	600.5	817.6	1,074.4	36.2	32.0	Jan.-Apr.**	440.3	67.2
Non-Residential	\$ Millions	533.8	761.5	801.3	42.7	5.2	Jan.-Apr.**	175.2	-31.8
Retail Sales	\$ Millions	9,690.4	10,939.0	12,172.7	12.9	11.3	Jan.-Mar.	3,485.3	8.5
Federal Government Spending	\$ Millions	4,778.0	4,571.7n	—	—	—	—	—	—
Defense	\$ Millions	2,220.1	2,071.7n	—	—	—	1989	2,313.5	7.2
Non-Defense	\$ Millions	2,557.9	2,600.0n	—	—	—	1988	2,600.0	—
Diversified Agriculture	\$ Millions	239.7	256.8	—	7.1	—	1988	256.8	7.0
Mortgages Recorded	\$ Millions	6,509.0	7,159.4	10,465.0	10.0	46.2	Jan.-Apr.	4,828.4	100.0
State Tax Collections	\$ Millions	1,924.4	2,128.7	2,450.0	10.6	15.1	Jan.-Apr.	826.0	-4.7

\*Quarterly percent change at annual rates

\*\*Must January-March only.

n Not comparable to earlier years.

Source: Bank of Hawaii - Business Trends, May/June 1989

### GENERAL DESCRIPTION

Nearly twice the combined size of the State's other land areas, the island of Hawaii, which comprises the 4,038 square miles of the County of Hawaii, is commonly referred to as the "Big Island" and is the southeastern most landform of the Hawaiian archipelago.

Featuring diverse climates, topography, and scenic beauty, environments range from lush, tropic jungles to barren, sparsely vegetated lava flows. Geographically, the land stretches from the seasonally snow-capped heights of 13,796 foot Mauna Kea to sunken coral beds offshore of black sand beaches. With a constantly changing face, the island is the only land area in the country which is still growing (thanks to the volcanic action) while at the same time being fiercely eroded by heavy rain storms, raging surf, blistering drought conditions, and daily tradewinds.

Archaeological history suggests Hawaii was the first site of inhabitation for Polynesians migrating to the islands circa 750 A.D. King Kamehameha, the monarch who united Hawaii under one rule, was born in Kohala and died in Kona, on the island's west coast. Captain Cook, the first European to set foot in the islands, was killed at Hawaii's Kealahou Bay in 1779. The Big Island is rich in cultural and religious history, having more than two hundred designated historic sites, with more being realized as urban expansion continues to take place.

Once the center of a thriving native population, numbers peaked at 73,325 residents during 1930. Mostly farm laborers, this number was reduced drastically in the 1940s due to intensive mechanization efforts by the plantations. Since 1970, when population totals stood at 63,800, there has been an average increase of approximately three percent per year, resulting in a 1988 total resident population of 117,500. The Kona Coast, site of new industrial and resort centers, has experienced the greatest growth.

### INCOME AND INDUSTRY

The Big Island of Hawaii suffered through a period which saw the unemployment rates soar to a staggering 11.2 percent in 1976 and stayed well above the national average through 1978. There were 51,950 jobs on Hawaii in 1988 leaving the unemployment rate at 5.0 percent, down 0.5 percentage points from the previous year.

As on all the State's islands, development first took place along the seacoast, with natives and early settlers taking advantage of the abundance of marine food available and ease of transportation along the seashore. In recent history, agriculture has played a more important economic role. A variety of experimental ventures resulted in sugar production and cattle ranching emerging as viable leaders in the industry, with more diversified crops such as macadamia nuts, coffee, papayas, and flowers also experiencing substantial growth.

The refinement of 266,574 tons of sugar was reported in 1988, with the remainder of agricultural pursuits netting 134.6 million dollars, up 17.8 million dollars from 1987.

The past decade has seen the emergence of a new industry--tourism. In 1960 there were a mere 627 hotel rooms available in the county. By 1970 the number had jumped to 3,435, an increase of 548 percent. As of 1988, there were 8,171 hotel units in inventory, or an increase of 137.9 percent since 1970. The influx of visitors has also spawned a massive increase in retail trade, as evidenced by the newly constructed restaurants and shopping plazas which have sprung up in the shadows of the island's world renowned resort hotels.

The establishment of two South Kohala resorts during the general recessionary period of 1981-1983 and the direct Mainland-Kona flights now available are additional indicators of the area's strength.

Per capita income has risen over 82 percent during the past decade, reaching a level of \$12,455 per person for 1987, the latest figures available. The island's total income jumped \$86.4 million, from \$1.30 billion to \$1.43 billion, from 1986 to 1987, an increase of 10 percent.

### **CONSTRUCTION**

In 1981, the industry reached an all time high of \$102.1 million after more than a decade of steady growth. The four years that followed showed stabilization in the \$80 million per year range, with 1985 reporting \$81.1 million in completed construction. However, increasing demands by a rapidly expanding economy soon surpassed this confinement when in 1988 a total of \$162.8 million in construction was reported.

Through 1988, there were 44,700 residential units on the island, with just over 85 percent of them being of the single family variety.

### **RECREATION**

Offering diversions ranging from the world's finest sport fishing to high altitude skiing on the slopes of Mauna Kea, the Island of Hawaii is truly one of the world's best recreational spots. Countless thousands of heavily jungled acres beckon the camping and hiking enthusiasts, while less vigorous types pursue sailing, golf, and tennis at any one of several resort complexes.

The balmy climate lends a healthful air to everything, and recreational running and walking is an activity enjoyed by most Island residents. While the recent volcanic nature of the Island limits its number of sandy beaches, which are green and black as well as white, swimming and surfing remain among the favorite outdoor sports.

## HAWAII COUNTY

Year	Employment <sup>1</sup>	Resident Population <sup>2</sup>	Construction Put in Place ( <i>\$ Millions</i> )	Retail Trade ( <i>\$ Millions</i> )	Bank Debits ( <i>\$ Millions</i> )	Diversified Agriculture ( <i>\$ Millions</i> )	Sugar Production (Tons)	Hotel Room Inventory (Number)	Hotel Occupancy Rates <sup>3</sup>	Housing Inventory (Number)
1965	23,120	61,700	15.8	81.5	478.5	16.1	456,124	1,387		
1966	23,930	60,800	15.7	88.7	495.0	17.9	419,900	1,790		18,392
1967	24,530	60,600	15.8	81.0	528.9	18.8	439,772	2,188		18,479
1968	25,990	61,300	15.5	89.8	576.7	20.3	455,435	2,480		18,585
1969	26,590	63,200	21.7	101.9	644.5	20.9	439,321	3,166		18,664
1970	27,050	63,800	31.2	116.9	784.7	24.6	431,134	3,435		18,778
1971	28,150	67,000	31.8	123.5	877.7	25.5	464,601	4,241	68.3	18,972
1972	28,500	70,000	37.0	138.7	1,008.3	28.1	423,327	4,796	62.9	20,061
1973	29,500	73,900	42.1	156.7	1,159.7	31.8	422,536	5,234	61.9	21,648
1974	29,900	74,000	43.5	175.1	1,357.8	32.2	390,000	5,348	62.3	23,578
1975	31,150	77,400	55.2	199.9	1,481.2	35.8	412,019	6,045	61.2	25,252
1976	32,900	80,700	56.2	223.0	1,556.4	41.6	388,478	5,929	59.9	26,694
1977	34,350	82,800	51.9	236.5	1,754.3	44.2	373,527	6,002	56.0	28,131
1978	33,950	85,900	63.1	277.7	2,009.7	54.7	387,459	6,093	58.1	29,453
1979	34,350	89,400	80.3	325.7	2,495.7	65.6	388,341	5,889	65.4	30,579
1980	40,850	93,000	98.6	360.5	2,945.0	78.1	367,046	6,705	58.5	32,293
1981	42,150	97,000	102.1	392.1	2,908.6	86.9	384,234	7,167	51.0	34,215
1982	42,700	100,200	78.7	441.3	2,915.0	89.1	369,086	7,469	44.9	36,180
1983	44,050	102,600	78.1	476.8	2,864.8	91.8	341,857	7,149	44.0	37,738
1984	44,900	107,000	80.5	519.7	3,214.3	91.0	390,820	7,511	46.3	39,702
1985	46,150	109,400	81.1	564.5	3,502.2	101.8	319,441	7,280	55.6	39,762
1986	47,500	111,200	95.8	574.9	3,948.6	113.9	329,170	7,324	58.5	40,820
1987	50,750	114,800	124.8	617.0	4,412.8	116.8	291,864	8,823	62.9	41,944
1988	51,950	117,500	162.8	742.6	4,796.6	134.6	266,574	8,171	61.5	43,756
									56.4	44,700

<sup>1</sup> Job basis through 1970, Person basis 1970 forward. <sup>2</sup> Including military personnel and their dependents. <sup>3</sup> Pinnell, Kerr, Forster

Source: Bank of Hawaii - 1989 Hawaii Annual Economic Report

The  
Hallstrom  
Appraisal  
Group.  
Inc.

### PROFESSIONAL BACKGROUND AND SERVICES

The Hallstrom Appraisal Group, Inc. is a Honolulu based independent professional service organization that provides a wide scope of real estate counseling services throughout the State of Hawaii with particular emphasis on valuation studies. The purpose of the firm is to assist clients in formulating realistic real estate decisions. It provides solutions to complex issues by delivering thoroughly researched objective analyses in a timely manner. Focusing on specific client problems and needs, and employing a broad range of tools including after-tax cash flow simulations and feasibility analyses, the firm minimizes the financial risks inherent in the real estate decision making process.

The principals of the firm have been professionally trained, are experienced in Hawaiian real estate, and are actively associated with the Appraisal Institute, a nationally recognized appraisal and real estate counseling organization.

The real estate appraisals prepared by The Hallstrom Appraisal Group accomplish a variety of needs, and function to provide professional value opinions for such purposes as mortgage loans, investment decisions, lease negotiations and arbitrations, condemnations, assessment appeals and the formation of policy decisions. Valuation assignments cover a spectrum of property types including existing and proposed resort and residential developments, industrial properties, high rise office buildings and condominiums, shopping centers, subdivisions, apartments, residential leased fee conversions, special purposes properties and vacant acreage, as well as property assemblages and portfolio reviews.

**PROFESSIONAL QUALIFICATIONS OF JAMES E. HALLSTROM JR., MAI, SRPA**

**Business Background**

- President, The Hallstrom Appraisal Group, Inc., Honolulu, Hawaii
- Vice President, The Hallstrom Property Group, Inc., Honolulu, Hawaii
- Former Senior Vice President and Treasurer, Hastings, Martin, Hallstrom and Chew, Ltd., Honolulu, Hawaii
- Former Vice President, Pacific Area Realty, Ltd., Honolulu, Hawaii
- Former Real Property Appraiser and Analyst; Administration, Inc., a subsidiary of C. Brewer and Company, Limited, Honolulu, Hawaii
- Former Partner, Hallstrom and Gentner, Madison, Wisconsin
- Former Senior Real Property Appraiser and Analyst, Opitz Realty, Madison, Wisconsin

**Education**

- M.S. (Real Estate Appraisal and Investment Analysis) 1971, University of Wisconsin at Madison
- B.A. (Economics) 1969, Brigham Young University at Provo
- Additional Real Estate Studies include credit for the following:
  - AIREA Course IA - Basic Appraisal Principles, Methods and Techniques
  - Course IB - Capitalization Theory and Techniques
  - Course II - Urban Properties
  - Course II-3 - Standards of Professional Practice
  - Course VI - Introduction to Real Estate Investment Analysis
  - Comprehensive Exam - Composite Examination Prior to Being Awarded MAI Designation
  - SREA Course 101 - Introduction to Appraising Real Property
  - Course 201 - Principles of Income Property Appraising
  - Course R-2 - Residential Case Study
- Numerous professional seminars and clinics

Currently certified under the American Institute of Real Estate Appraisers, and The Society of Real Estate Appraisers, Continuing Education Programs

Instructor for Society of Real Estate Appraisers Course 101, "Introduction to Appraising Real Property" and Course 201, "Principles of Income Property Appraising"

Contributing author to the "Hawaii Real Estate Investor" magazine

Qualified expert witness - Federal, State and District Courts

**Current Association Memberships**

- MAI Designation (1976) - American Institute of Real Estate Appraisers (AIREA), Chapter President for the year 1982
- SRPA Designation (1975) - Society of Real Estate Appraisers (SREA), Chapter President for the year 1980-81
- Realtor - Honolulu Board of Realtors; Hawaii Association of Realtors



## PROFESSIONAL QUALIFICATIONS OF THOMAS W. HOLLIDAY

### Business Background

Senior Analyst, The Hallstrom Appraisal Group, Inc., Honolulu, Hawaii

Staff Appraiser, Davis-Baker Appraisal Co., Avalon, Santa Catalina Island, California

### Education

B.A. (Communications/Journalism) 1978 California State University at Fullerton

SREA Course 201- Principles of Income Property Appraising

Numerous professional seminars and clinics.

Contributing author to Hawaii Real Estate Investor, Honolulu Star Bulletin

### Pertinent Hawaii Experience

#### Market Studies

<u>Assignment</u>	<u>Location</u>
Proposed National Historic Park at Koloko-Honokohau	North Kona, Hawaii
Proposed Kohanaiki Resort	North Kona, Hawaii
Proposed Ooma Resort	North Kona, Hawaii
Proposed Kona 44 Development	North Kona, Hawaii
Proposed Waikii Ranch Subdivision	South Kohala, Hawaii
Marina Supply/Demand Study	State, West Hawaii
Turtle Bay Resort Holdings	Kahuku, Oahu
Proposed Pankow Kakaako Development	Honolulu, Oahu
State Of Hawaii Luxury Hotels	All Major Islands
Kaanapali Condominium Market	Kaanapali, Maui
Condominium Vacation Rental Study	West Maui
Proposed Wailuku Mill Industrial Park	Wailuku, Maui
Proposed Makena View Estates Subd.	Wailea, Maui
Proposed Executive Centre Hotel	Honolulu, Oahu
Rural Oahu Condominium Market	Wailua, Oahu
Timeshare Market Analysis	State and Waikiki
Multiple Tourism Industry Analyses	State, and All Major Islands

Professional Qualifications of  
Thomas W. Holliday (Continued)

Assignment

Hotel Appraisals

Sheraton Princeville  
Kona Hilton Beach & Tennis Resort  
Turtle Bay Hilton  
Hyatt Regency Waikiki  
Maui Marriott  
Inter-Continental Maui  
Proposed Hanalei Plantation Hotel  
Islander on the Beach  
Diamond Head Beach Hotel  
Proposed Executive Centre Hotel  
Outrigger Waikiki  
Outrigger East  
Outrigger West  
Outrigger Malia  
Outrigger Surf

Reef Hotel  
Reef Towers  
Reef Lanais  
Waikiki Village  
Waikiki Tower  
Edgewater Hotel  
Edgewater Lanais  
Coral Seas  
Waikiki Surf Main  
Waikiki Surf West  
Waikiki Surf East  
Seaside Surf  
Ala Wai Terrace  
Prince Kuhio Hotel

Condominium Appraisals

Kaanapali Royal  
Sands Of Kahana  
Kahana Outrigger  
Hono Koa

Kona Coffee Villas  
Proposed Malu Malu  
Proposed Kapalaoa  
Waikiki Banyan

Other West Hawaii Assignments

Valuation Appraisals

Mauna Loa Mac. Nut Orchards (5,580 acres)  
Lands of Kapua (15,500 acres)  
Proposed National Historic Park at Koloko-Honokohau (1,340 acres)  
Waikii Ranch (3,045 acres)  
Taiyo Fudosan North Kona Holdings (210 acres)  
Kailua-Kona Post Office  
SeaMountain at Punaluu Resort Expansion  
Leases Under the Kona Hilton Hotel  
A.D. Bentley Kailua-Kona Oceanfront Estate  
Paris Estate South Kona Holdings  
Nakamura Estate North Kona Holdings  
Waimea Village Inn  
Proposed Dillingham Medical Center  
Proudfoot South Kona Holding (110 acres)

Other Assignments

History of Waikii Ranch  
Agricultural Use Study for Waikii Ranch  
Public Cost/Benefit Study for the Proposed Kohanaiki Resort  
Public Cost/Benefit Study for the Proposed Ooma Resort  
Econometric Analysis of the Proposed Ooma Resort

A P P E N D I X B

ENGINEERING REPORT FOR KOHANA'IKI MAUKA

ENGINEERING REPORT

KOHANAIKI MAUKA

A PROPOSED COMMERCIAL AND LIGHT INDUSTRIAL SUBDIVISION

SITUATED AT KOHANAIKI, NORTH KONA,

ISLAND OF HAWAII, HAWAII

TAX MAP KEY: 3RD DIV. 7-3-09: 15

Prepared By

Imata and Associates, Inc.

May 1989

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ENGINEERING REPORT ON KOHANAIKI MAUKA  
PROPOSED COMMERCIAL AND LIGHT INDUSTRIAL SUBDIVISION  
SITUATED AT KOHANAIKI, NORTH KONA, ISLAND OF HAWAII, HAWAII

INTRODUCTION

KOHANAIKI MAUKA is a proposed commercial and light industrial subdivision located mauka of Queen Kaahumanu Highway approximately 3.8 miles north of Kailua, Kona and consists of 70.376 acres.

This report represents the result of a study conducted to describe the existing conditions and identify the Engineering alternatives or the engineering requirements for the proposed development.

SOILS

The soil of the parcel is predominantly rLW with lesser areas of rLV and rPYD; rLW is Pahoehoe lava flows, rLV is Aa lava flows and rPYD is Punaluu extremely rocky peat. The topsoil of the Punaluu soil series is poor with Pahoehoe lava at depth of less than 10 inches. (Plate 1)

WATER SYSTEM

The existing water system, consisting of a 0.3 million gallon reservoir along Palani Road at elevation 325 ft. and 12 inch ductile iron waterlines from the reservoir down Palani Road and along Queen Kaahumanu Highway, can supply the proposed project. (Plate 2)

ENGINEERING REPORT ON KOHANAIKI MAUKA  
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The projects total water system shall consist of new 12 inch ductile iron waterlines connecting the existing water line along Queen Kaahumanu Highway to a new concrete reservoir at elevation 325 feet within the proposed project. The water then is pumped to another concrete reservoir at an elevation of 570 feet minimum. The upper reservoir shall be 0.3 million gallon and require offsite acquisition of road and utility accesses and a reservoir site. The lower tank would need to be 0.3 million gallon if built incrementally or 0.1 million gallon if built concurrently with the upper 0.3 million gallon reservoir.

The developer has obtained 30 water units. Each water unit or commitment is equivalent to 600 gallons per day. The Department of Water Supply has informally approved the water requirement for Phase I of the subdivision. Phase I being one 9.6 acre commercial lot, one 1.9 acre industrial lot and four 3.8 acre industrial lots, where each lot would utilize 5 units of water or 3,000 gallons per day. Projects or improvements requiring more than the allotted 5 units per lot shall be deferred until additional water units have been purchased. There are additional water commitments available at this time.

The potable water requirement is dependent upon the type of industrial projects anticipated. Currently, the owner anticipates low water usage facilities, such as trucking and storage facilities.

The fire flow requirement of the project is 2,000 gallons per minute for two hours. This high flow requirement can be accommodated with 12 inch waterlines and large concrete reservoirs.



#### WASTE WATER SYSTEM

There is no municipal or private waste water system in the immediate area and none is proposed for the near future.

We recommend individual waste water system or systems for each lot. Each system shall be capable of disposing a maximum of 800 gallons of waste water per day and shall be constructed and maintained by each lot owner.

The individual waste water system shall be a septic tank and leaching field meeting the requirements of the Department of Health. The use of cesspools after January 1990 shall not be approved by the Department of Health as an acceptable method of disposing of wastes.

#### ELECTRICAL & TELEPHONE

There are existing utility poles along the mauka edge of Queen Kaahumanu Highway for the transmission of power and communication. The telephone system can directly utilize the existing lines, however the power lines are of high voltage and require reduction in voltage before consumer usage.

Several alternatives for providing power to the site were investigated, some alternatives as being cost prohibitive were disregarded. One alternative falling within this category was an underground distribution line from the existing Kaloko Industrial Subdivision substation approximately 4,500 feet away.

The ultimate solution in supplying power for the project is a substation. The substation can be constructed within the project or on a nearby parcel by an individual developer or

jointly by several developers. The construction timing and usage of power is the major criteria in deciding when to build the substation. The substation is a major cost item but its cost can be recaptured, the cost being a refundable item to a developer. For the first five years after being constructed all the revenues generated by the substation shall be refunded to the developer up to the cost of the substation excluding land costs.

It is estimated that the total cost of the substation will be recaptured if the majority of the lots are using power. The current anticipated usage by the developer for Phase I, however, is below the recapture usage. In view of low anticipated early usage, a temporary distribution line installed on the existing poles along Queen Kaahumanu maybe advantageous to the development. The cost for this temporary distribution line, a time deferment, is non-refundable but may insure the complete recapture of the substation cost constructed later and the low initial outlay of capital maybe an alternative to be considered. This temporary alternative requires state and federal approvals.

#### DRAINAGE

There are no well-defined drainageways or drainage outlets on the site. The soil conditions make runoff non-existent and the Federal Insurance Rate Maps (FIRM) show no flooding areas.

The recommended option to dispose of storm waters are drywells. The drywells will be located within the 60 foot right-of-way, 20 feet deep and capable of percolating approximately six to eight cubic feet of water per second. The

drainage improvements along with the roadway and water system will be dedicated to the appropriate government agency upon completion.

The preliminary calculations show that the spacing of the drywells approximately seven hundred and fifty feet apart would be adequate to percolate the runoff of the improved sixty feet wide roadway and portion of the adjacent lots. Each individual lot shall include in its improvement plans additional drainage improvements to dispose of the additional water the lot improvements generate.

Drywells require Department of Health approvals. The initial approval to construct and the final approval to operate the drywell is required. The services of a geologist and a soils engineer, in addition to a civil engineer are required in obtaining the approvals.

#### ROADWAYS

All the roadways within the subdivision shall be a minimum sixty foot wide to comply with the Hawaii County Subdivision Ordinance for commercial and industrial subdivision.

The dedicable roadway section shall consist of two twelve foot wide vehicular travel ways with a road structure of two inches thick asphalt concrete pavement over four inches thick aggregate base course and six inches thick subbase course. The paved swale section on each side of the traveled way shall be eighteen feet wide with a structure of one and one-half inch thick asphalt concrete pavement over four and one-half inch thick

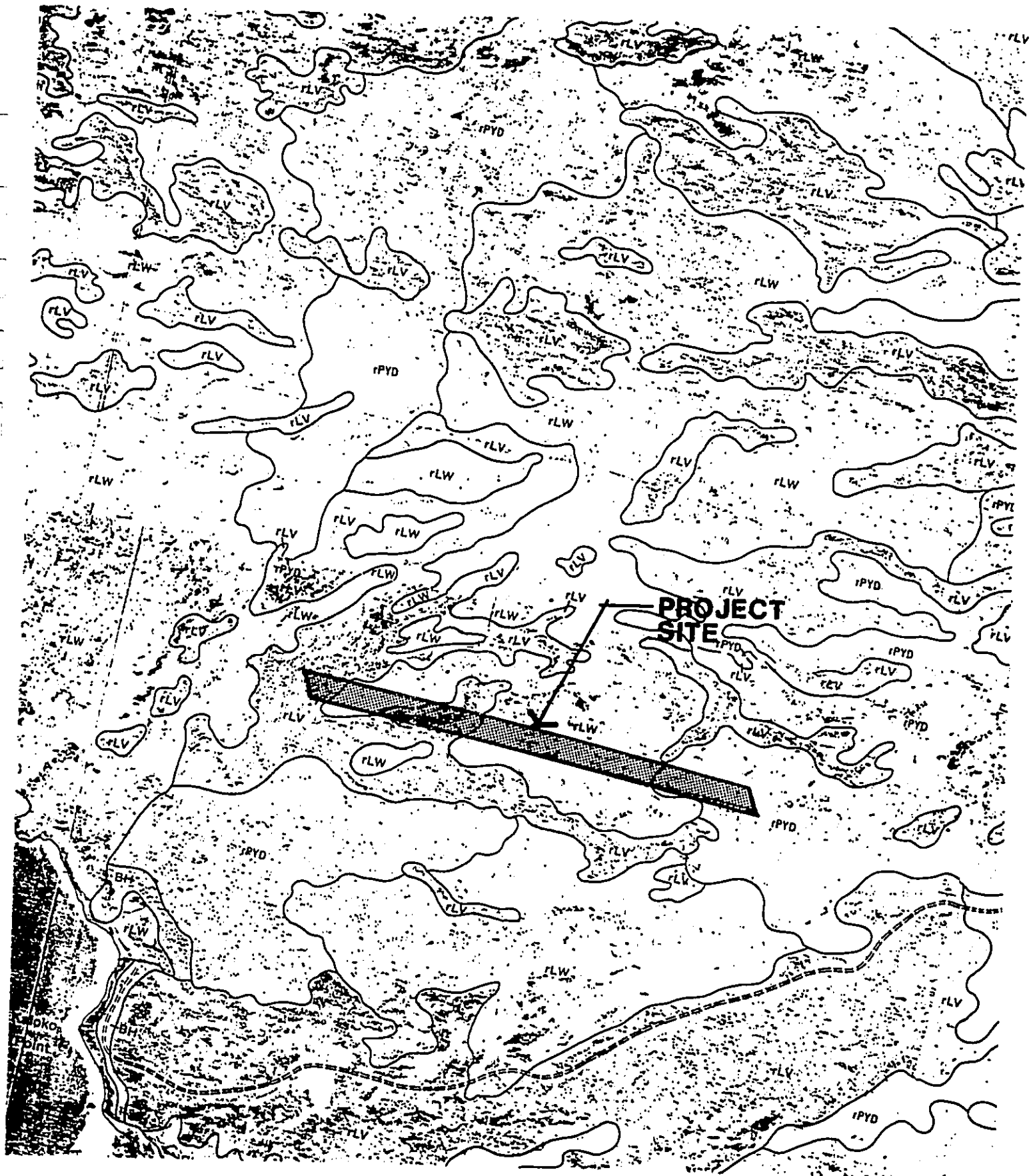
base course. (Plate 3) The paved swale shall be a requirement due to the steep grades.

Documents for construction easements, to construct the roadways, and subdivision of the adjacent parcel are also required before this project's final subdivision approval and the dedication of the roadways to the County can be completed.

#### RECOMMENDATIONS

Further topographic information and boundary verification is required. The field data will provide the basis for establishing the final horizontal configuration of the subdivision, as well as the roadway profiles and other vertical considerations.

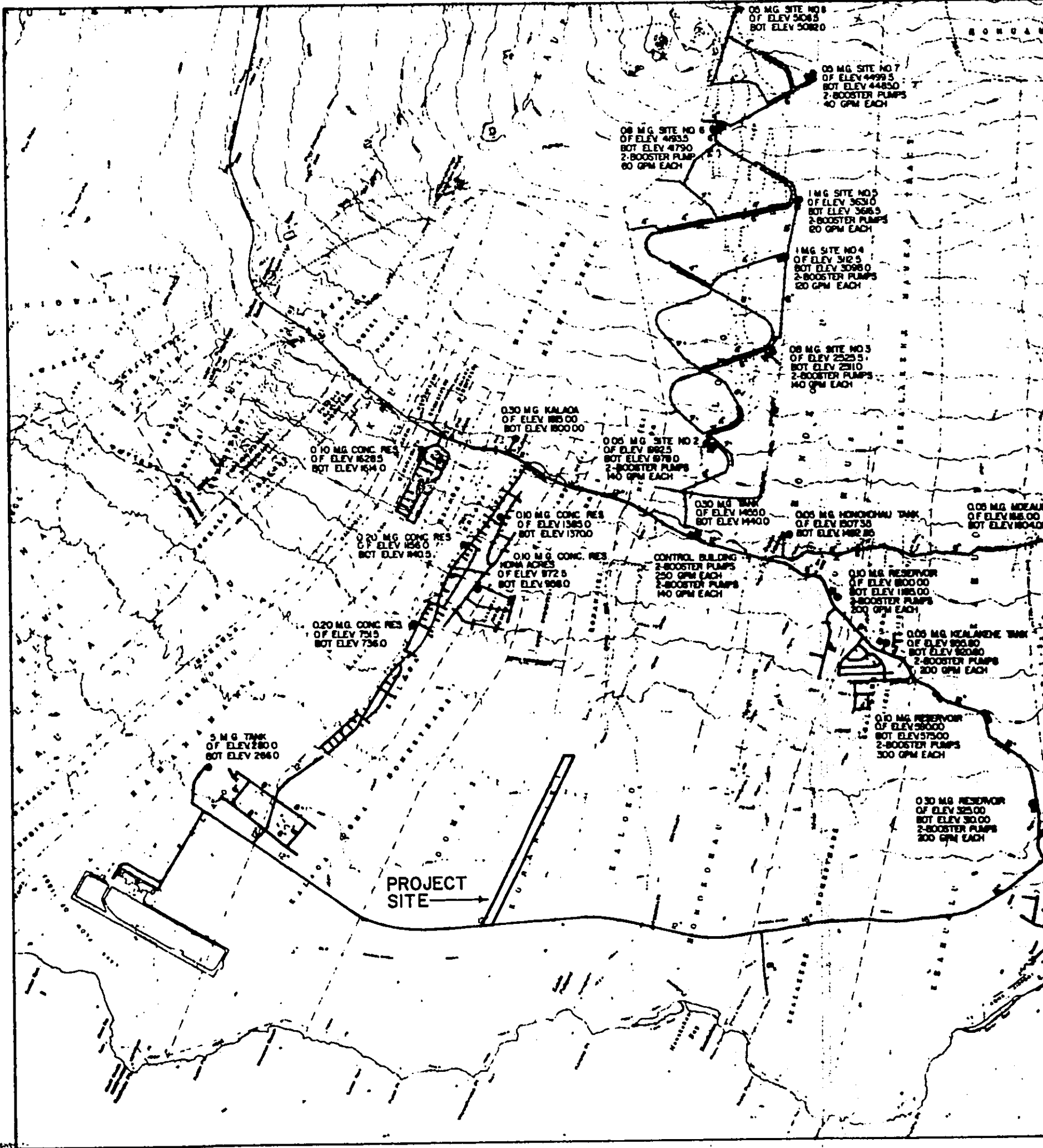
Additionally, it is important to determine the type and amount of businesses to be incorporated in the initial phases of the project as this will allow for further refinement of engineering considerations and requirements.



**PLATE 1**  
**KOHANAIKI MAUKA**  
**SOIL SURVEY**

SOURCE: UNITED STATES DEPARTMENT OF AGRICULTURE,  
 SOIL CONSERVATION SERVICE, SOIL SURVEY OF  
 ISLAND OF HAWAII, STATE OF HAWAII, DEC. 1973





HONOLULU TRACTS

20 MG SITE NO 7  
OF ELEV 4499.5  
BOT ELEV 4485.0  
2 BOOSTER PUMPS  
40 GPM EACH

SITE NO 5  
ELEV 3630  
ELEV 3665  
BOOSTER PUMPS  
40 GPM EACH

ITE NO 4  
ELEV 3025  
ELEV 3060  
BOOSTER PUMPS  
40 GPM EACH

SITE NO 3  
ELEV 2525  
ELEV 2510  
BOOSTER PUMPS  
40 GPM EACH

0.05 MG MOEALOA TANK  
OF ELEV 1845.00  
BOT ELEV 1804.00

0.10 MG RESERVOIR  
OF ELEV 1800.00  
BOT ELEV 1765.00  
2 BOOSTER PUMPS  
300 GPM EACH

0.05 MG KEALAKEHE TANK  
OF ELEV 1805.80  
BOT ELEV 1802.80  
2 BOOSTER PUMPS  
300 GPM EACH

0.10 MG RESERVOIR  
OF ELEV 1800.00  
BOT ELEV 1755.00  
2 BOOSTER PUMPS  
300 GPM EACH

0.30 MG RESERVOIR  
OF ELEV 325.00  
BOT ELEV 30.00  
2 BOOSTER PUMPS  
300 GPM EACH

0.05 MG MOEALOA TANK  
OF ELEV 1845.00  
BOT ELEV 1804.00

20 MG WAHAHA TANK OF ELEV 1576.00  
10 MG WAHAHA TANK OF ELEV 1576.00  
WAHAHA PUMP STATION NO. 1 - CAP 100 GPM  
WAHAHA SAND FILTER

0.05 MG WAHAHA TANK  
OF ELEV 1576.50  
BOT ELEV 1508.00

PLAIA BOOSTER PUMP SYSTEM  
2-CAP 100 GPM  
1-CAP 300 GPM

HOLILOA PUMP STA. NO. 2  
2-CAP 100 GPM  
1-CAP 300 GPM

0.10 MG TANK  
OF ELEV 824  
BOT ELEV 808.5

0.1 MG RESERVOIR  
BOT ELEV 1123.00  
PRV OF ELEV 1140.00

0.2 MG MOEALOA TANK  
OF ELEV 1845.00  
BOT ELEV 1804.00

0.2 MG KAHALILU TANK  
OF ELEV 1233.00  
BOT ELEV 1233.00

0.5 MG KAHALILU TANK  
OF ELEV 833.50 - BOT ELEV 834  
0.1 MG KAHALILU TANK  
OF ELEV 834.50 - BOT ELEV 834

10 MG RESERVOIR  
OF ELEV 325.00  
BOT ELEV 375.00

10 MG KAHALILU TANK  
OF ELEV 821.00  
BOT ELEV 381.00

0.30 MG KAHALILU TANK  
OF ELEV 325.00  
BOT ELEV 308.50

0.2 MG KAHALILU TANK  
OF ELEV 1329.30  
BOT ELEV 1300.00

KAHALILU PUMP SITE  
2-CAP 100 GPM  
1-CAP 300 GPM

KAHALILU WELL NO. 1  
CAP 1000 GPM

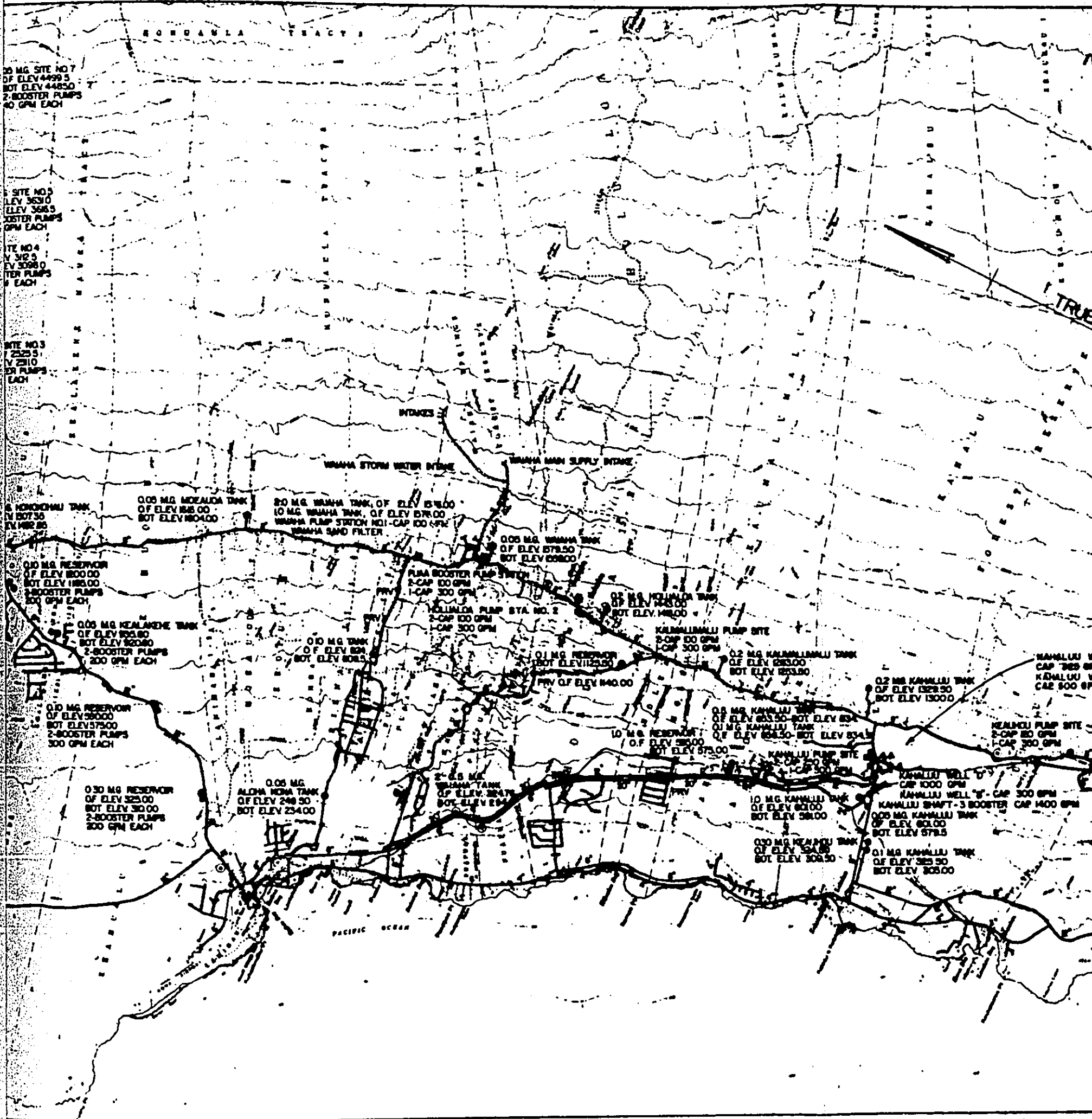
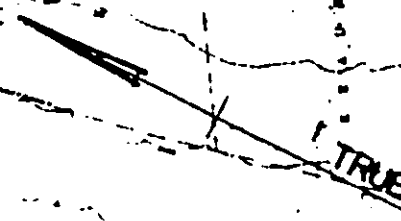
KAHALILU WELL NO. 2 - CAP 300 GPM  
KAHALILU SHAFT - 3 BOOSTER CAP 1400 GPM

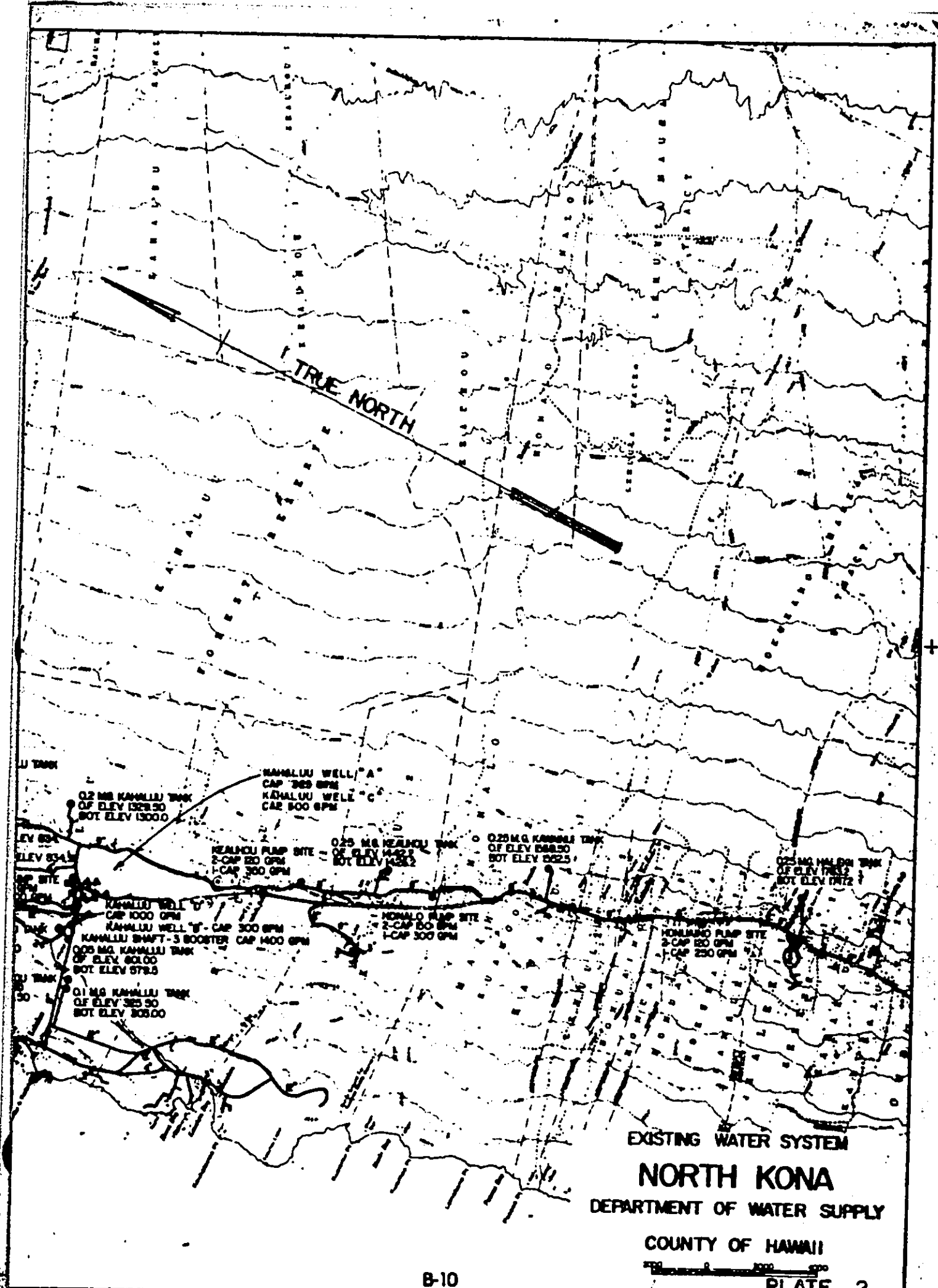
0.05 MG KAHALILU TANK  
OF ELEV 801.00  
BOT ELEV 579.5

0.1 MG KAHALILU TANK  
OF ELEV 325.50  
BOT ELEV 308.00

KAHALILU W  
CAP 300 GPM  
KAHALILU W  
CAP 500 GPM

PACIFIC OCEAN





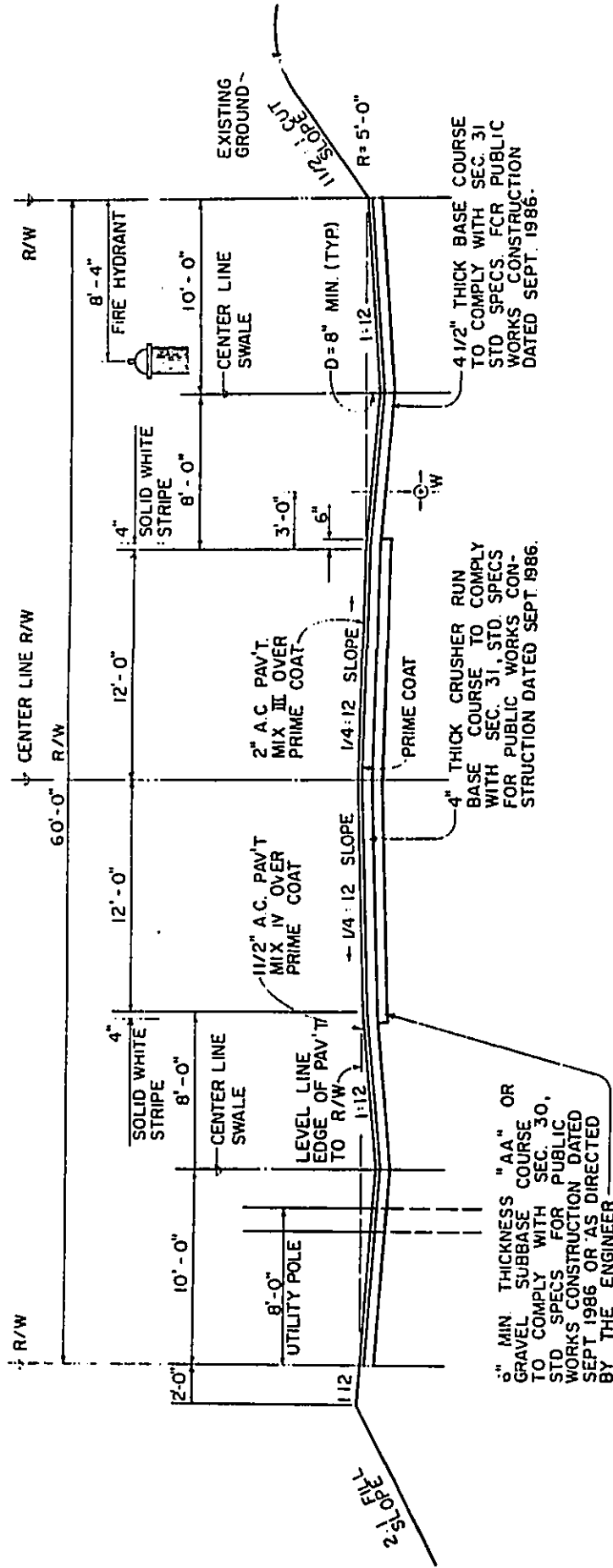
EXISTING WATER SYSTEM  
**NORTH KONA**  
 DEPARTMENT OF WATER SUPPLY

COUNTY OF HAWAII

B-10

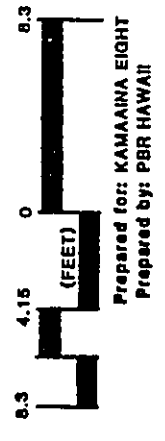
PLATE 2





# TYPICAL 60'-0" ROADWAY SECTION

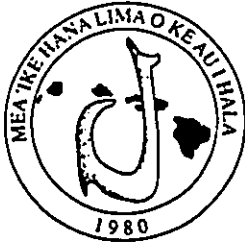
PLATE 3  
 KOHANA'IKI MAUKA  
 TYPICAL ROADWAY SECTION



A P P E N D I X C

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ARCHAEOLOGICAL SURFACE  
RECONNAISSANCE REPORT



ARCHAEOLOGICAL CONSULTANTS  
of  
HAWAII

59-624 Pupukea Rd.  
Haleiwa, Hawaii 96712  
(808) 638-7442

JOSEPH KENNEDY  
Archaeologist

Mr. James Leonard  
Managing Director  
PBR Hawaii -Hilo  
101 Aupuni St.  
Hilo HI. 96720

August 12, 1991

RE: Surface Reconnaissance of the Proposed Industrial Development at Kohanaiki, North Kona, Hawaii, TMK: 7-3-09: 15. (REVISED 8-12-91)

Dear Mr. Leonard:

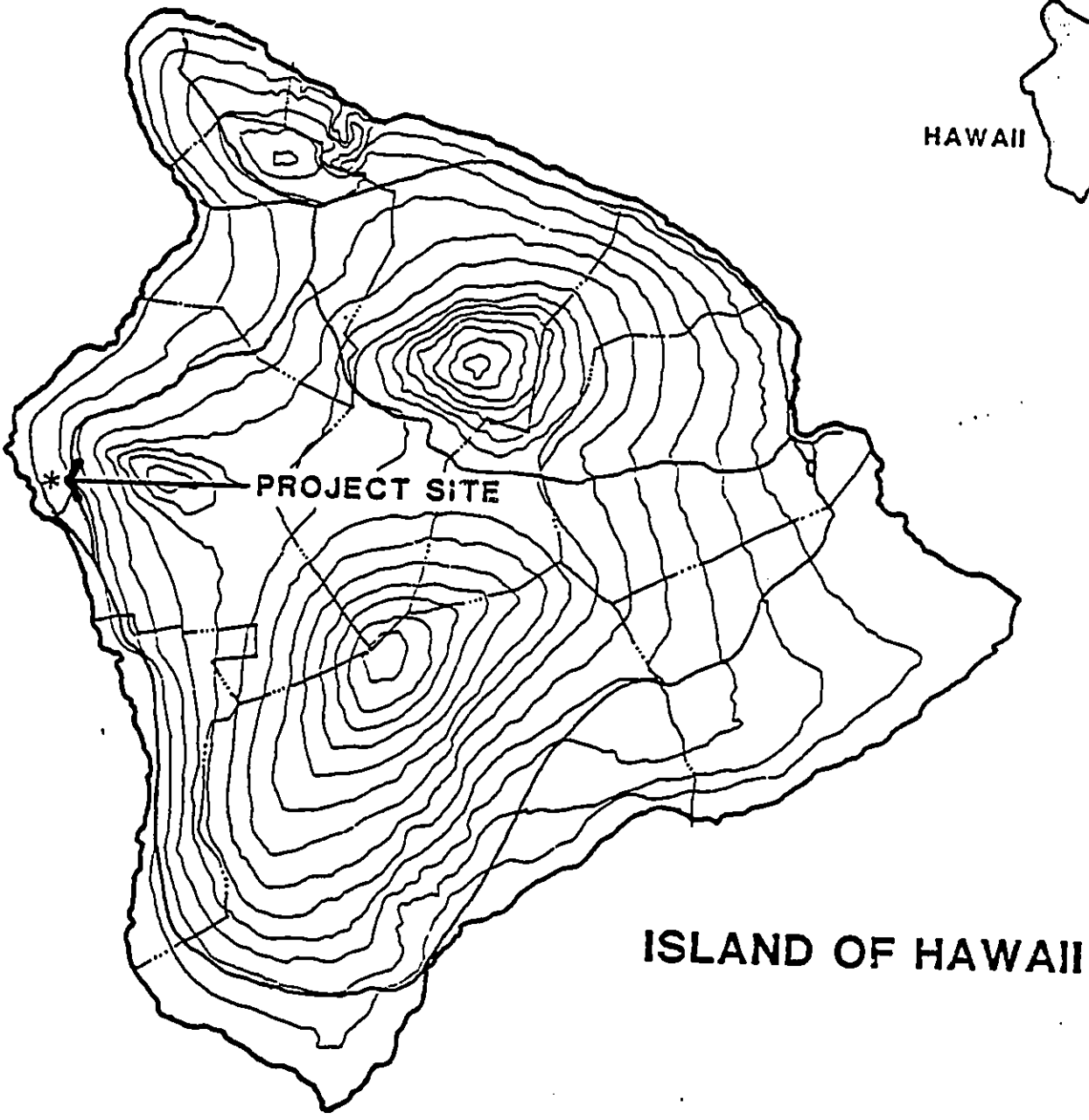
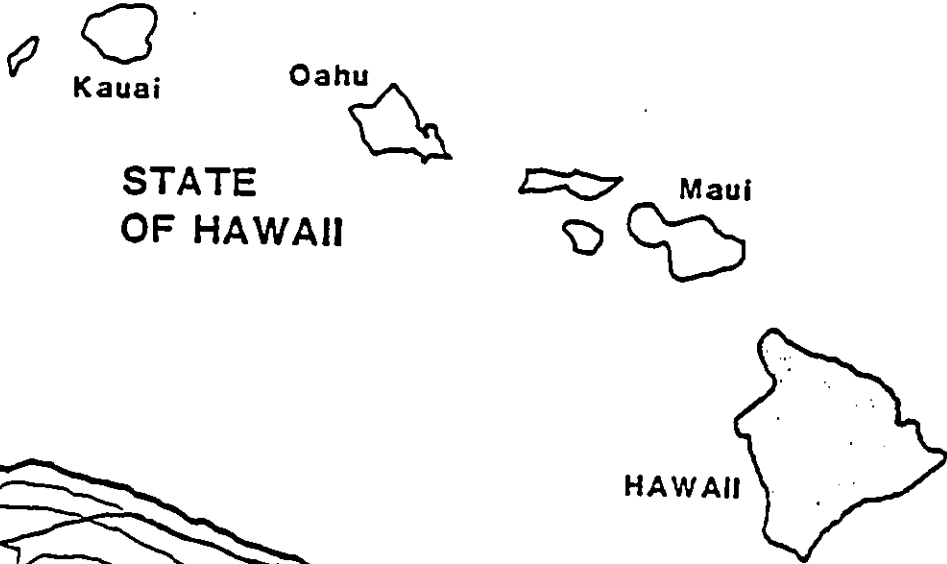
At the request of your office, Archaeological Consultants of Hawaii, Inc. has conducted a surface reconnaissance at the above location; our results are as follows.

**SUMMARY**

After an on-foot, sweep examination by a three man team, no surface features were observed on the subject property. In addition, seven caves were examined to term and were determined to be devoid of cultural materials. While no archaeological features were discovered either above ground or in the caves, some further work (monitoring) has been recommended.

**PHYSICAL SETTING, METHODOLOGY, PREVIOUS ARCHAEOLOGICAL WORK**

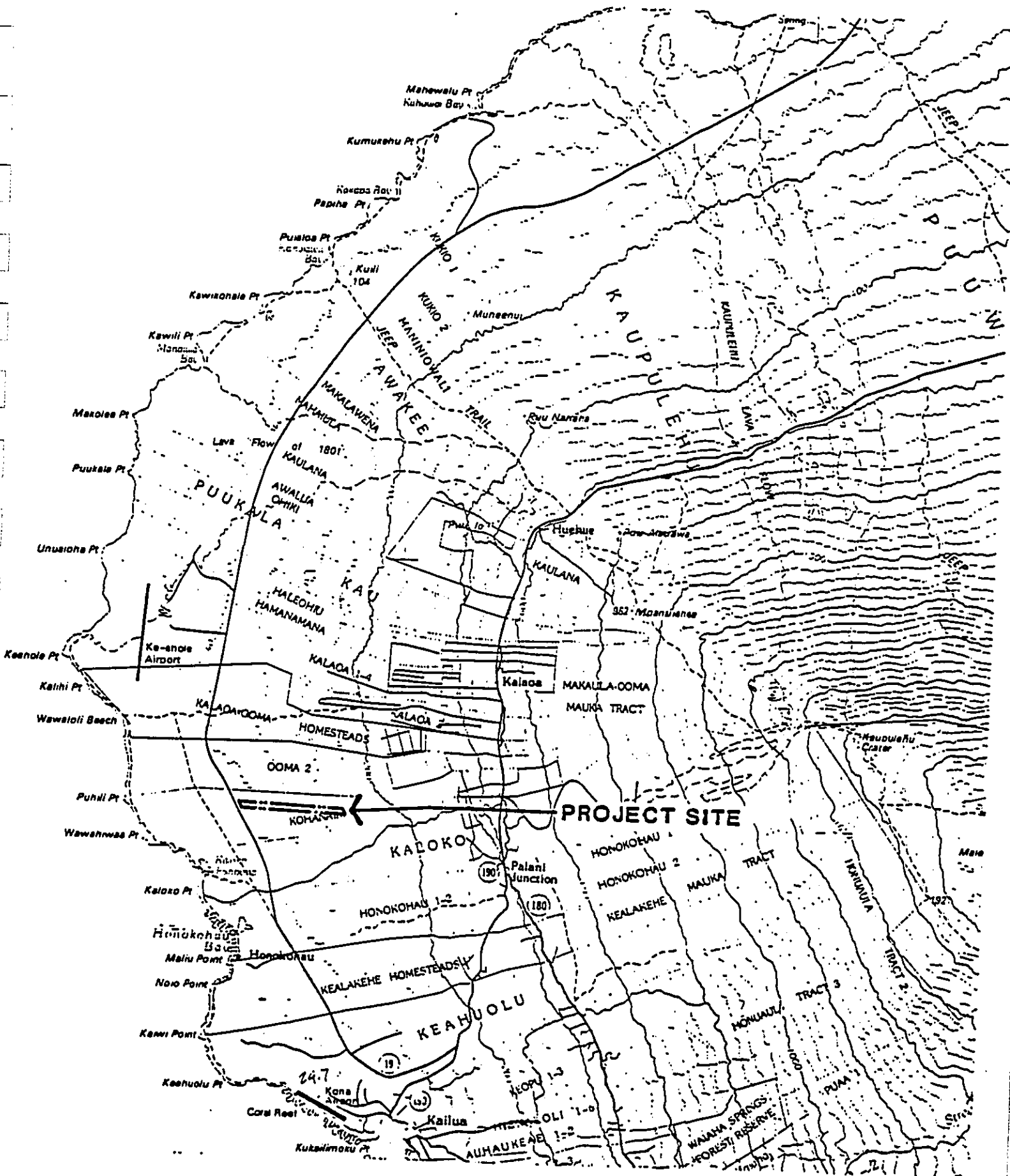
The subject property is located in the general area of West Hawaii known as Kekaha. Specifically, the area in question is a narrow strip (500 ft. wide X 7260 ft. long.) in the ahupua'a of Kohanaiki. There is very little vegetation on the property and no water. Visibility is excellent. The surface of this land is covered with two different types of lava - pahoehoe and a'a.



**LOCATION MAP**  
**KOHANAIKI MAUKA**

C-2





**REGIONAL MAP  
KOHANAIKI MAUKA**

C-3



James Leonard  
August 12, 1991  
Page 2  
Kohanaiki Report

The area in question was surveyed on-foot by a three man team, spaced ten to fifteen meters apart, making a number of east/west sweeps. When caves were encountered along survey routes they were examined to term; none of the seven we examined was of appreciable depth or length.

#### PREVIOUS ARCHAEOLOGY

In order to understand possible reasons for the lack of archaeological sites in the 500 ft. X 7260 ft. strip of land surveyed in Kohanaiki, known site types and site distribution patterns in nearby areas at comparable elevations and in similar terrain have been closely examined. The subject parcel lies in the transitional or "barren zone" of the western slopes of Hualalai; lava flows are from recent (post-Pleistocene) basaltic pahoehoe and a'a of the prehistoric member of the Hualalai volcanic series (McDonald, et al 1983). This parcel of land is oriented in an east-west direction, with it's altitude rising from approximately 30 to 150 ft. above sea level. There is no soil, no water, and little vegetation.

The area of North Kona has been studied intensely by archaeologists, especially with the rapid development of recent years. Results of these archaeological surveys have generally found evidence of settlement in distinct environmental zones. The majority of sites have been found either on the coast where exploitation of marine resources was possible, or in the higher altitudes which receive greater rainfall, have soils developed, and are suitable for agricultural pursuits.

Davis (1977:19) divided North Kona into three zones: 1) the coastal zone- barren, rocky shorelines, isolated bays with coralline beach formations, inland ponds, brackish basal water, localized fresh-water springs, and strand vegetation; 2) the transitional or barren zone-frequently barren non-disintegrated lavas, arid conditions, extremely limited dry scrub vegetation occurring in kipuka surrounded by recent lavas, and virtually no soil development; and 3) the upland forest zone- moderate soil development, variable but adequate moisture from rainfall, and well developed mixed-broadleaf forest vegetation.

James Leonard  
August 12, 1991  
Page 3  
Kohanaiki Report

Prehistorically, the barren zone is thought to have been occupied on a part-time basis, as an area which was passed through as people moved back and forth between the agricultural areas in the higher elevations and the coast. The most significant sites which have been recorded in this transition zone are the numerous lava tube occupation caves, some of which were sources of drinking water, found dripping from the cave's ceiling. Aside from these modified lava-tube sinks and shelter caves, other common sites in this zone include ahu (stone cairns or stacked rocks), low stone platforms, low walled shelters (frequently C-shaped), and adze quarries (Ching 71, Davis 77, others).

Four archaeological surveys have been conducted nearby the project area, at similar elevations and in similar terrain, and are particularly relevant here (see map): Kalaoa-Ooma (Davis 77, Hammatt and Folk 80), Kohanaiki (Rosendahl 85, Donham March 86, July 86), Kaloko (Soehren 80), and Kohanaiki-Kaloko (Kennedy 83, 84).

In Kalaoa-Ooma, at an altitude of 200-400 ft. a.s.l., twenty-two site complexes and isolated archaeological features have been found, including 12 major habitation caves in collapsed lava-tube sinks, 2 shelters in lava bubbles, one surface shelter, 24 ahu, eight platforms, six walled enclosures, a core-filled rock wall, and a historic ahupua'a boundary wall (Davis 77). Hammatt and Folk (1980) excavated 12 sites in this project area and showed that without exception, the major prehistoric activity occurred within sheltered areas around natural sinks and within lava tubes. In two major cave sites, and three smaller ones, occupation was limited to within 100 feet of entrance; platforms, sleeping enclosures, walls, a paved walkway, hearths, artifacts, shell midden, burials, and petroglyphs were taken as evidence of occupation.

In 1980, Soehren conducted an archaeological reconnaissance in Kaloko, on land adjacent to Queen Kaahumanu highway. Three stepping stone trails were found crossing a lava, as well as two ahu, and a major lava tube complex. Evidence of occupation was found under two natural arches, chiefly shellfish and areas cleared for sleeping. This lava tube was interpreted as a temporary shelter (Soehren 1980).

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In 1983 and 1984, the author conducted a reconnaissance and intensive archaeological survey for the proposed Kaloko golf course. The project area stretched across the ahupua'a of Kohanaiki and Kaloko, from an altitude of approximately 80 to 140 feet a.s.l. In it, 45 cave openings, 200 chambers, 4 walls, 5 enclosures, 13 platforms, 9 ahu, 2 trails and 2 petroglyphs were recorded. One occupation cave (site 49) contained a "modest yet constant source of collectable water" (Kennedy 1984:94). Interestingly, nearly all of the identified sites in the proposed Kaloko golf course were found in the southern part of that project area, on the southern side of a historic rock boundary wall between the lands of Kohanaiki and Kaloko. The northern part of the proposed Kaloko golf course borders the upper half of the present project area in Kohanaiki.

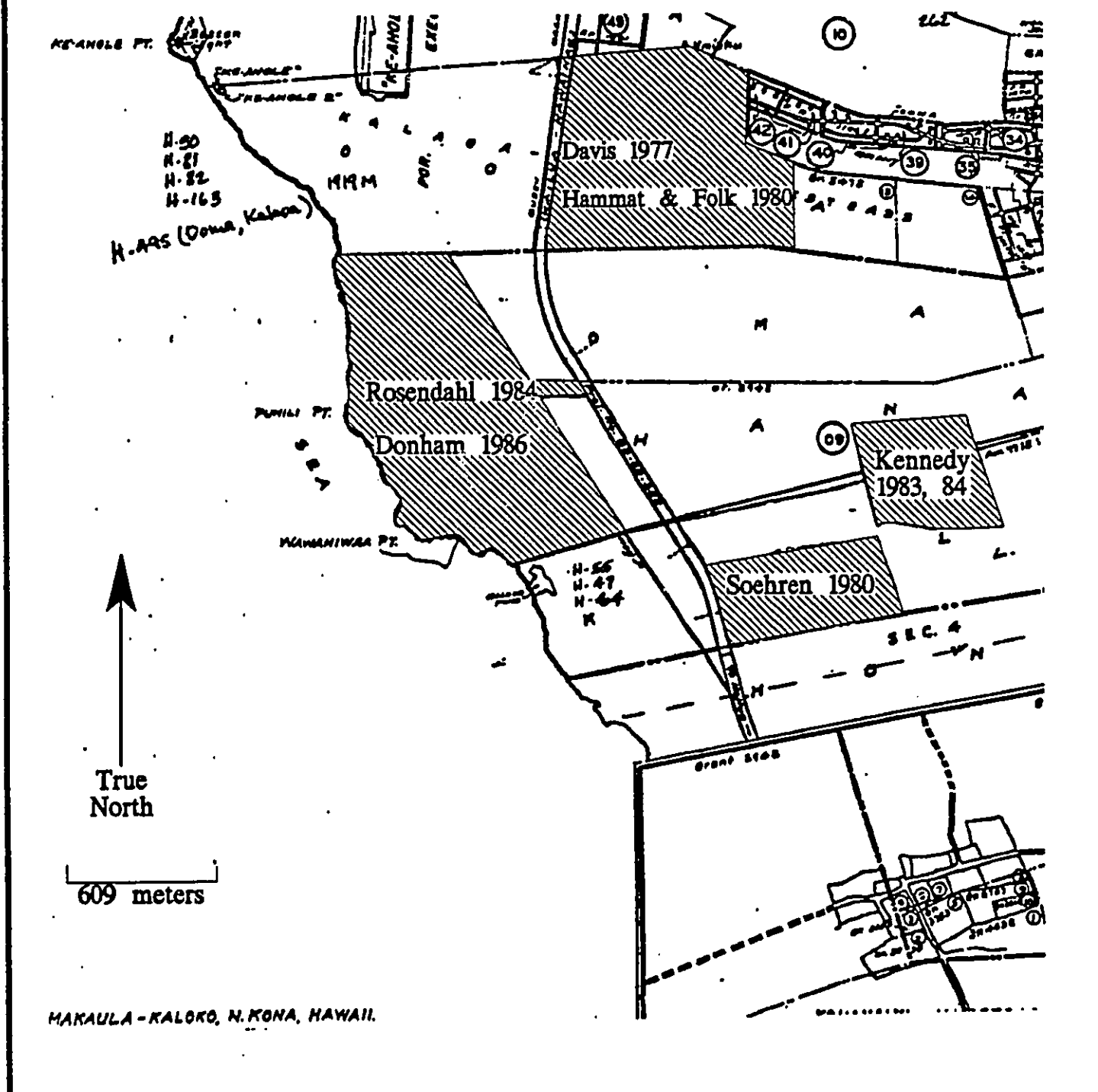
Archaeological reconnaissance for the Kohanaiki development project was conducted by Rosendahl and Donham in 1985 and 1986. The coastal areas of Kohanaiki and Ooma 2 were surveyed, as well as a small strip of land between Queen Kaahumanu highway and Mamalahoa trail. 105 sites were found in this project area, nearly half of which are complexes. Habitation sites represent over half of the identified sites and include 17 habitation complexes, 13 habitation/ceremonial and/or burial complexes, and 18 temporary habitation sites. The majority of sites and features located were concentrated in the immediate coastal zone, within 100 to 1200 feet of the shoreline with a noticeable paucity of sites in the northern half of the project area. Inland sites occurred with greater frequency in the southern half of the project area, where the terrain was said to be more conducive to habitation and movement (Donham 1986:11).

Given the frequent occurrence of lava tube shelters, ahu, platforms, and temporary surface shelters in this "barren zone" of North Kona, one would expect to have found similar sites in the project area surveyed in Kohanaiki. But no such sites were found. A careful examination of site distribution patterns has shown that lava tube sinks, ahu, and temporary shelters, although common in the altitude and type of terrain, are also frequently clustered together in a rather limited area. In both Kalaea-ooma, and in Kaloko, the distribution of occupation cave sites follows lines which run down from the volcano, and are not evenly or randomly spaced across a certain zone of elevation.



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Archaeology In Nearby Areas At Similar Altitudes In Similar Terrains



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Kohanaiki Report

The two parcels surveyed which are nearest to the project area (the easement of the Kohanaiki Development Project, and the northern portion of the Kaloko Golf Course) both display a stark paucity of archaeological sites in the land area which borders or comes closest to the project area. In the Kohanaiki Development Project reconnaissance report it was stated that the site density was greater in the southern part of that parcel, where "the terrain was said to be more conducive to habitation and movement" (Donham 1986:11). If there were relatively few people living in the northern part of the coastal area of Kohanaiki, perhaps there was little demand for housing between the coast and the forest zone.

No sites of any kind were found on this narrow piece of land in Kohanaiki. If people were traveling from Kaloko pond on the coast to the forest zone, perhaps they traveled through Kaloko, where there was a cave with dripping water, rather than to walk up this dry, arid, strip of lava in Kohanaiki.

To the best of our knowledge, there has been no previous work conducted on the subject property. However, an archaeological site flag and metal permanent marker (PHRI T-88 1-4-89) did appear along one of our survey sweeps. After careful examination of the general area, we were unable to identify any site or feature whatsoever. Efforts to identify this site through communications with PHRI were unsuccessful.

#### CONCLUSIONS AND RECOMMENDATIONS

As mentioned earlier, no surface features were present on the subject property; in addition, no cultural material was observed in any of the seven caves we examined.

This information notwithstanding, we did notice that portions of the subject property contain subsurface lava tubes whose entrances are located outside the property boundaries. It is our opinion that heavy equipment is likely to break through the thin lava crust and expose portions of these tubes during ground preparation activities. Therefore we recommend that an archaeological monitoring program be enacted during ground preparation at this site.

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A P P E N D I X D

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KOHANA'IKI MAUKA  
TRAFFIC IMPACT ASSESSMENT REPORT

KOHANAIKI MAUKA

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TRAFFIC IMPACT ASSESSMENT REPORT

JUNE 1989

PACIFIC PLANNING & ENGINEERING, INC.

TRAFFIC IMPACT ASSESSMENT REPORT

FOR

KOHANAUKI MAUKA

KOHANAUKI, NORTH KONA, HAWAII

TMK: 7-3-9:15, 3rd Tax Division

June 1989

Prepared for:

PBR Hawaii, Inc.

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## EXECUTIVE SUMMARY

This traffic study identifies and evaluates the probable impact of traffic generated by the proposed Kohanaiki Mauka Project in the year 1999 when the proposed project is expected to be fully occupied.

The Kohanaiki Mauka Project is a proposed commercial and industrial subdivision in West Hawaii. The project site is located on Queen Kaahumanu Highway between Keahole Airport and Kailua Town.

This traffic report describes the impact on the intersection of the proposed access road with the existing Queen Kaahumanu Highway. Impacts are assessed during the 3:15 to 4:15 pm time period, when the proposed project traffic is expected to have the greatest impact on the existing highways.

### Conclusions and Recommendations

The proposed Kohanaiki Mauka Project is *not* expected to have a significant traffic impact on Queen Kaahumanu Highway when the project is fully occupied in 1999.

The analysis indicates that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The results of the analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development in the area continues as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, the left turn movement from Queen Kaahumanu Highway into the project access road will operate with average delays, LOS C. Thus traffic along the highway will not be delayed beyond normal driving conditions. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

If the intersection of Queen Kaahumanu Highway and the project access road is left unsignalized by the year 1999, project traffic will experience extreme delays in attempting left turns onto Queen Kaahumanu Highway. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity and at an acceptable level-of-service.

To mitigate the impacts of the proposed Kohanaiki Mauka Project, we recommend the following:

- Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left-turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway. The intersection recommendations are shown in Figure 8.

- Signalize the intersection of Queen Kaahumanu Highway with the project access road when future traffic volumes meet signal warrants.

## PROJECT DESCRIPTION

The Kohanaiki Mauka Project is a proposed commercial and industrial subdivision in West Hawaii. The project site is located east (mauka) of Queen Kaahumanu Highway between Keahole Airport and Kailua Town, on an approximately 70-acre lot, identified by Tax Map Key: 7-3-9:15, 3rd Tax Division. The proposed project site is in a lava field 2 miles from the closest residential subdivision. The project location and roadway network in the vicinity are shown in Figure 1.

The project will consist of about 10 acres of commercial use and 55 acres of light industrial use. The project will be built in phases with about 27 acres to be developed by 1993, 22 acres by 1995, and 22 acres by 1998. The project is assumed to be fully occupied by 1999. When fully developed, the project will employ 575 to 705 employees. The project site plan is shown on Figure 2.

Access to the project site will be from an existing DOT permitted access location along Queen Kaahumanu Highway. The access road will be a paved 2-lane road with two 12 foot lanes and a 60-foot right-of-way. The permitted access is shared with the adjoining lot to the north. The vehicular access permitted opening is 80 feet wide.

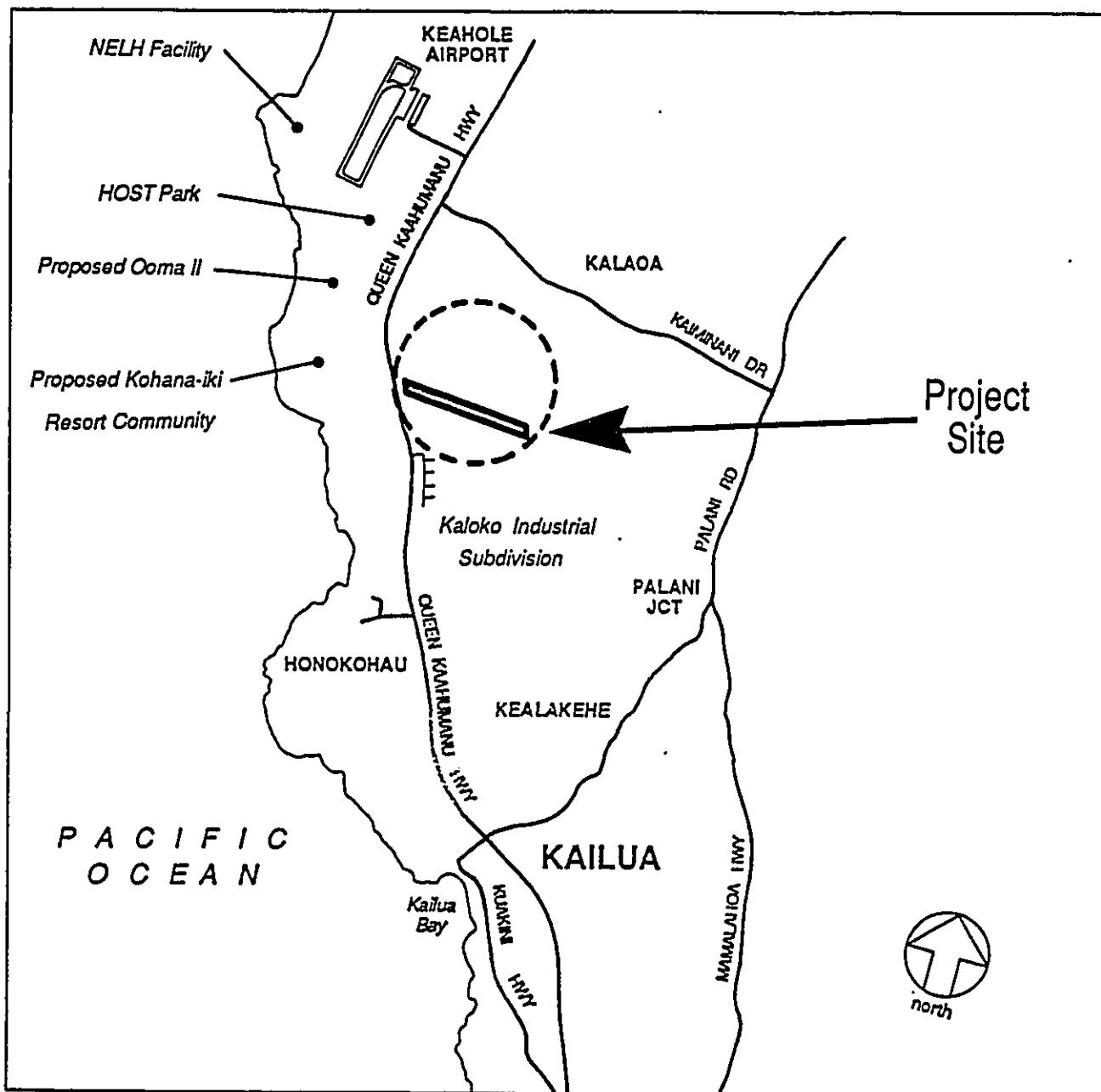
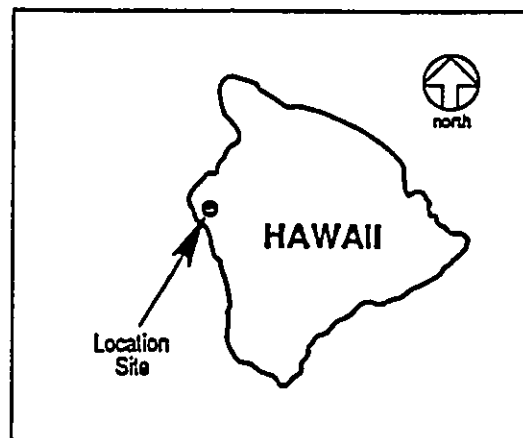
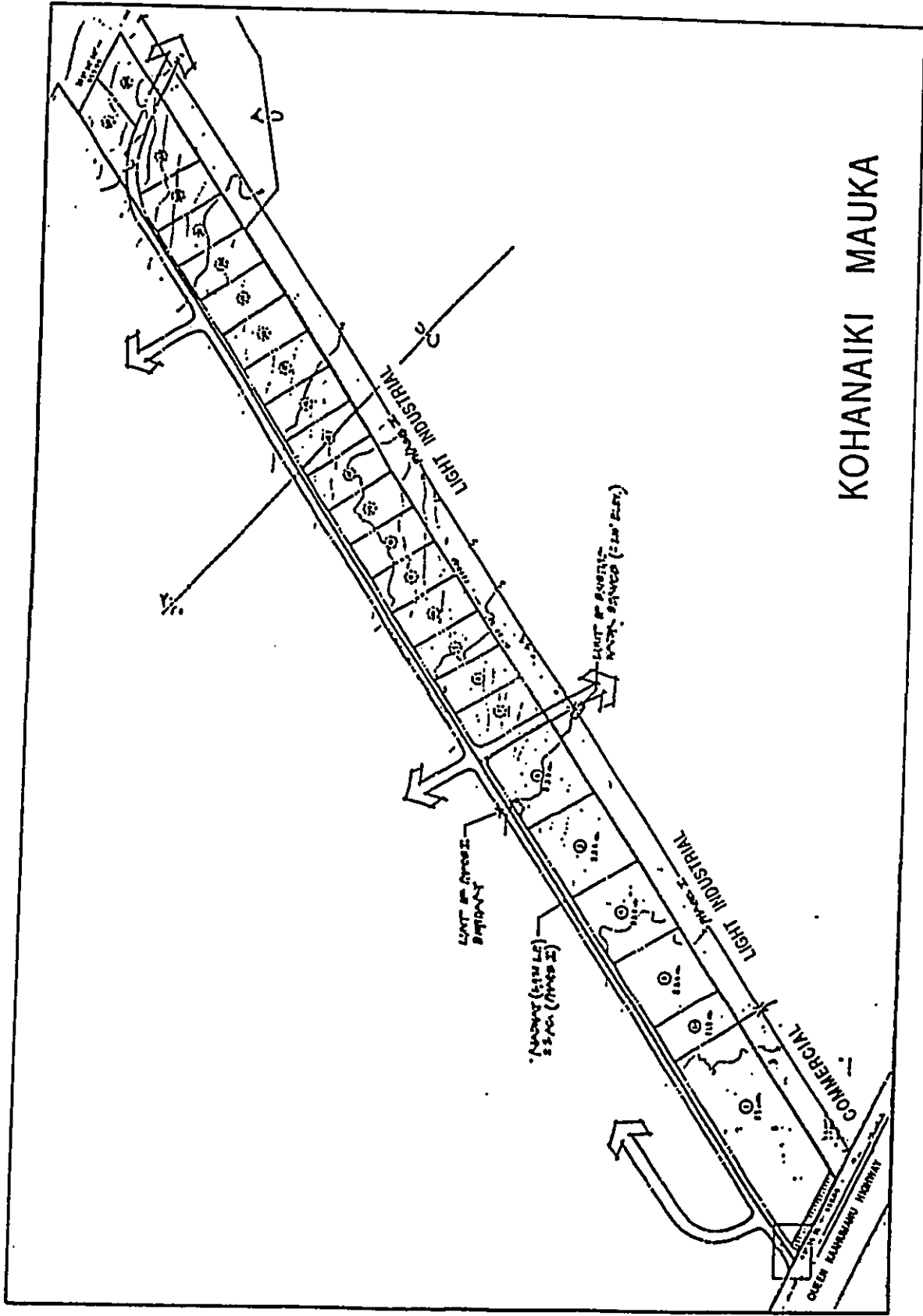


Figure 1. Project Location





KOHANAIKI MAUKA

Figure 2. Project Site Plan

## EXISTING CONDITIONS

An inventory of existing conditions was conducted to better understand the traffic impact of the proposed project. The review included the land uses in the area, roadway facilities in the area, and traffic conditions. The study focuses on the proposed intersection of the project access road with Queen Kaahumanu Highway.

### Area Conditions

The West Hawaii area is a rapidly developing area. There are many proposed resort developments and thus increasing employment opportunities. Between 1980 and 1987, the population of the North Kona District increased by 50% from about 13,700 to 20,500 people.

The land uses immediately surrounding the project consist mostly of undeveloped land. The area is characterized by large barren masses of lava and patches of vegetation. The terrain is varied and ranges from level to sloping. Presently, the two major State land use classifications in the area are "conservation" and "agricultural".

About two miles to the north of the proposed project is Keahole Airport which is owned and operated by the State Department of Transportation, Airports Division. The airport presently consists of a terminal, parking facilities, and a 6,500 foot runway. Keahole Airport is planned to be expanded by the State Department of Transportation to accommodate the forecasted increase in passengers to and from West Hawaii. Passengers enplaning and deplaning is forecasted to increase from 1,486,000 passengers in 1985 to

3,715,000 passengers in the year 2000. This is an increase of about 150%. To accommodate this increase, the runway is planned to be lengthened to 11,000 feet and the terminal facilities will be expanded, according to DOT Airports Division.

The Kaloko Light Industrial Subdivision Expansion is located mauka of Queen Kaahumanu Highway about a mile south of the Kohanaiki Mauka Project. The industrial subdivision consists of 250 acres of land. This project is planned to be completed in four phases. Presently the first phase of 55 lots of a total 194 lots has been developed. No other phases have been approved by the State Land Use Commission at this time and thus traffic generated by additional phases was not included in this report.

The Natural Energy Laboratory of Hawaii (NELH) and the Hawaii Ocean Science and Technology Park (HOST Park) are State owned. These facilities are located (west) makai of Queen Kaahumanu Highway about one to two miles north of the project site.

NELH is a research facility which conducts research in Ocean Thermal Energy Conversion and other activities. HOST Park will provide the necessary infrastructure for commercial applications of the high-tech projects.

NELH presently employs about 100 people. When fully developed, this facility will employ about 390 people. HOST Park is expected to accommodate 78 acres of Campus Industrial use which includes laboratories, educational facilities, and other uses which do not require the use of ocean water. The remaining 385 acres will be for Ocean Water Commercial uses such as mariculture, marine biotechnology, and renewable energy. At present, HOST Park has no tenants. This project is expected to be completely occupied by the year 1999.



### Roadway Facilities

The project is located between Queen Kaahumanu Highway to the West and Mamalahoa Highway to the East.

Queen Kaahumanu Highway is a major roadway through the area and leads to Kawaihae in the North and Kailua in the South. It is a two-lane rural arterial highway, built within a 240 foot right-of-way with a 24 foot wide pavement and 6 foot paved shoulders. There is a 55 miles per hour (mph) posted speed limit fronting the project site. Queen Kaahumanu Highway is maintained by the State Department of Transportation (SDOT). The major intersections along Queen Kaahumanu Highway are channelized with left-turn storage lanes for safety and to maximize roadway capacity. The intersections are unsignalized except at the junction with Palani Road in Kailua.

Mamalahoa Highway, which runs parallel to Queen Kaahumanu Highway, serves the upland areas between Waimea and North Kona. The State highway, built over a former horse-and-buggy trail is a sub-standard roadway with pavement width varying between 18 and 24 feet.

### Traffic Volumes

Traffic volume data from SDOT was used to determine traffic trends on Queen Kaahumanu Highway. Figure 3 summarizes the trend in Average Daily Traffic (ADT) along Queen Kaahumanu Highway at Keahole Airport Road, north of the project access road. The plotted data shows a steady increase in traffic on the order of five percent (5%) per year.

Peak traffic on Queen Kaahumanu Highway occurs between 11:00 am and 12:00 pm in the morning and between 3:15 and 4:15 pm in the afternoon fronting the project site. Traffic during the morning is less than during the afternoon peak hour. Traffic volumes at the study intersection were taken during the afternoon peak hour at the intersection of Queen Kaahumanu Highway and Kaiminani Drive on Tuesday, April 11, 1988. Traffic volumes were also taken at the intersection of Queen Kaahumanu Highway and Palani Road during the same time period. The manual counts are shown in Appendix B.

Five hundred nineteen (519) vehicles were recorded heading towards Kailua-Kona and 380 vehicles were recorded heading towards Kawaihae. The direction split is approximately 40% / 60%. The recorded volumes are shown on Figure 4.

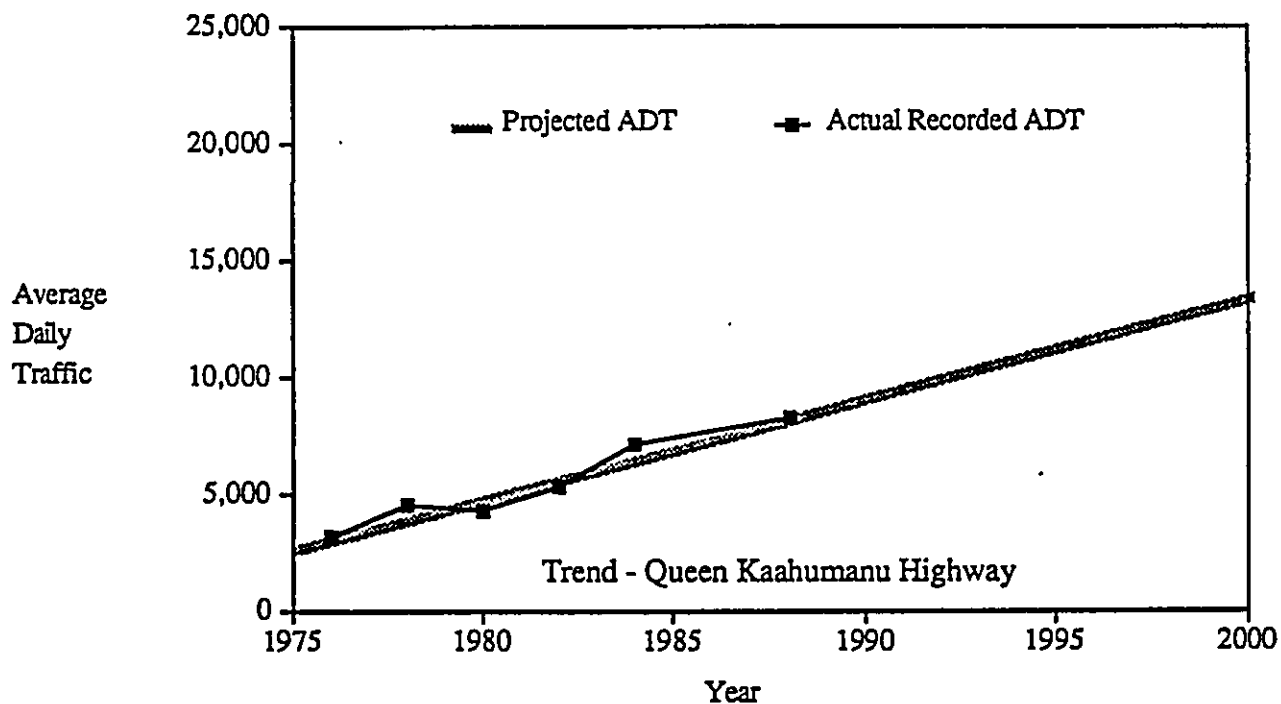
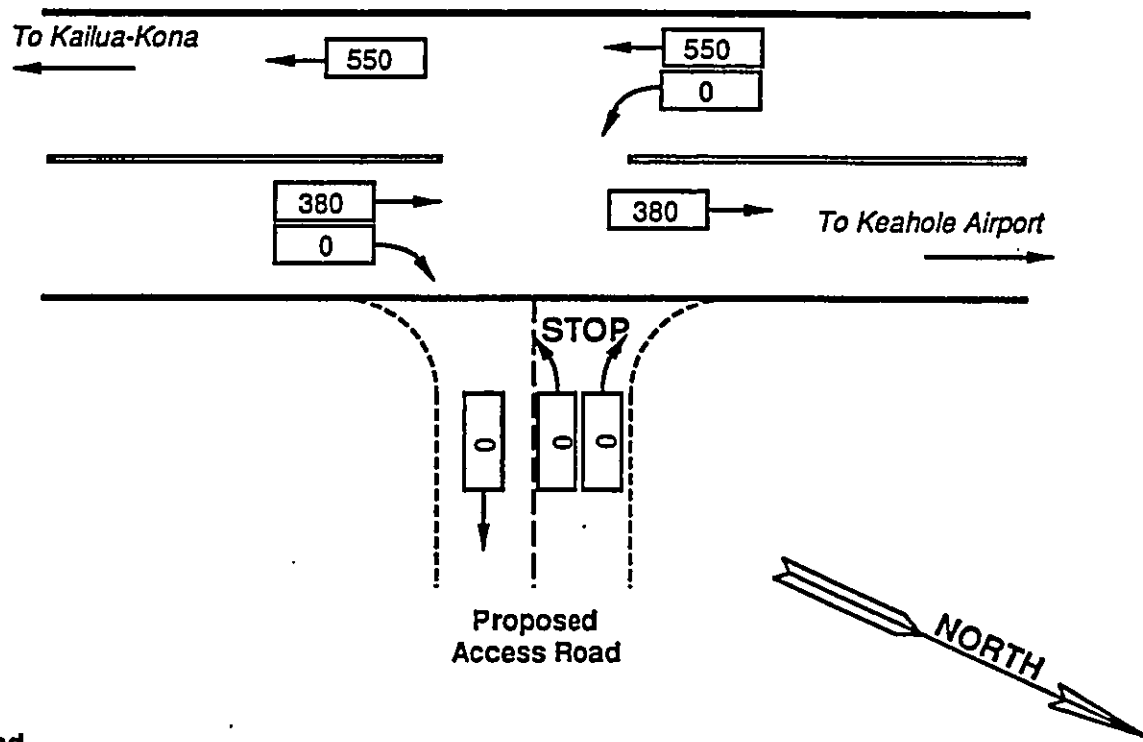


Figure 3. Trend in ADT along Queen Kaahumanu Highway at Keahole Airport Road

# Queen Kaahumanu Highway



## Legend



 Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 4. Existing Afternoon Peak Hour Traffic Volumes

## FUTURE CONDITIONS

A research of planned developments and improvements to transportation facilities was conducted to estimate the future traffic conditions in the immediate area.

### Future Land Uses Surrounding Project

The Kohana-iki Resort Community is located on a 470 acre site makai of Queen Kaahumanu Highway directly across from the Kohanaiki Mauka Project. This development is an integrated resort including two resort hotels for a total of 700 rooms, 800 resort condominium units, an 18-hole golf course, a recreational clubhouse complex, a 150 slip marina, 200 single family units for permanent residents, 150 multi-family units of support housing, and 33,000 square feet of leasable commercial floor space. The Kohana-iki Resort Community development is assumed to be completed by the year 1999.

### Roadway Facilities

Queen Kaahumanu Highway is planned to be widened from a two-lane highway to a four-lane divided highway by the State Department of Transportation (SDOT). The highway will be widened from Kawaihae Road to Palani Road. As of the date of this report, funding has not been approved and there is no set schedule for the construction of this facility.

## PROJECTED TRAFFIC CONDITIONS

Traffic generated by the proposed project was added to the forecasted 1989 ambient traffic to estimate future traffic conditions in the year 1999, when the project is expected to be fully occupied.

### Ambient Traffic Forecast

Ambient traffic is the traffic which would occur regardless of whether the proposed project were built or not. The future ambient traffic was estimated based on the expected traffic due to developments in the immediate area to the year 1999 and the traffic growth trend on Queen Kaahumanu Highway.

Among the developments that are approved by government agencies and expected to be completed are the Kohana-iki Resort Community, HOST Park, and Keahole Airport Expansion. Traffic generated by the Kohana-iki Resort Community was estimated based on a traffic study by M&E Pacific. Traffic from HOST Park and Keahole Airport were estimated based on two traffic studies by Parsons Brinckerhoff. Based on the above reports traffic for the year 1999 was estimated.

Traffic counts by the State Department of Transportation (SDOT) shows that average daily traffic has been increasing by 5% annually, as discussed in the section on "Existing Conditions." This growth can be attributed to an increase in the amount of tourists and developments in West Hawaii. The growth rate on Queen Kaahumanu Highway generally reflects traffic increases from developments outside or beyond the study area.

The traffic generated from developments in the immediate area of the project and the ambient traffic increase were added together to obtain the forecasted traffic in the year 1999 without the project. The resultant ambient traffic volumes are shown in Figure 5.

Project Generated Traffic

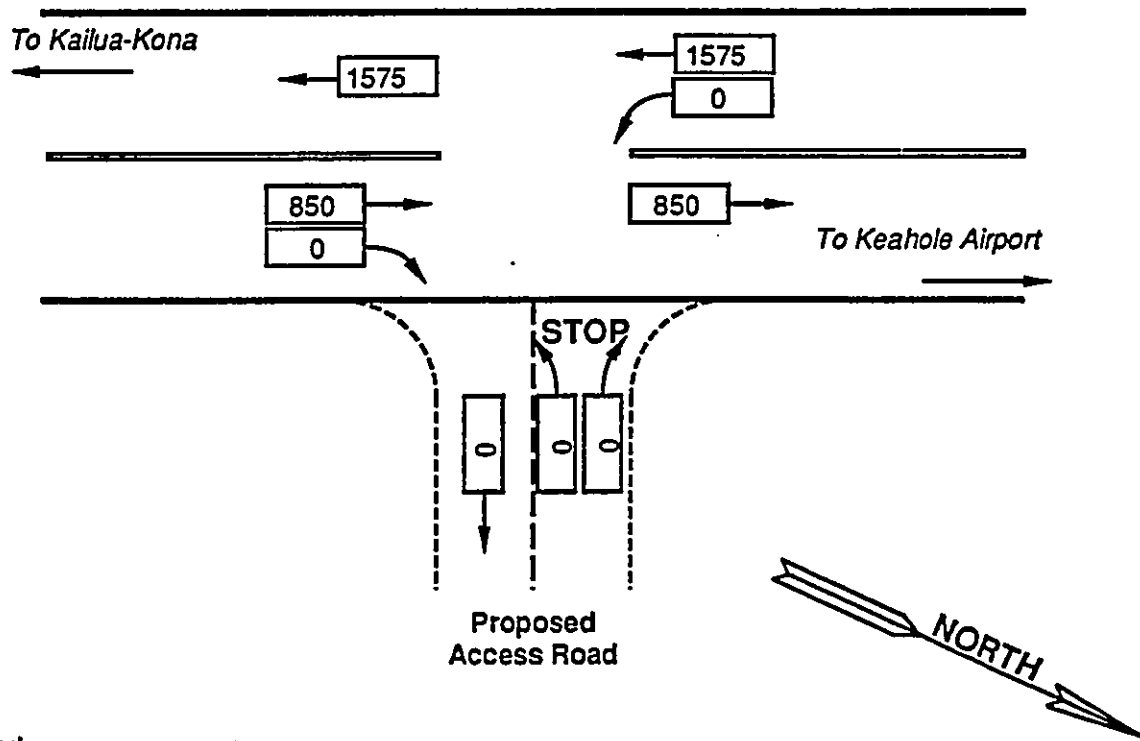
The traditional three-step procedure of trip generation, trip distribution and traffic assignment was used to estimate traffic from the proposed project.

The trip generation step estimates the number of trips which would enter and exit the proposed project during the afternoon peak hour. The number of trips were estimated from the ITE Trip Generation Report (Fourth Edition, 1987) for 51,000 square feet of leasable area of commercial and 54 acres of industrial land use. The estimated number of trips for the project is shown in Table 1, below.

Table 1. Trip Generation for Kohanaiki Mauka Project

<u>Land Use</u>	<u>Units</u>	<u>ITE Rates</u>		<u>No. of Trips</u>	
		<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Commercial (1000 sq ft leasable area)	51	2.39	2.39	125	125
Industrial (Acreage)	54	2.22	4.62	<u>120</u>	<u>250</u>
<b>Total Number of Trip Ends</b>				<b>245</b>	<b>375</b>

# Queen Kaahumanu Highway



## Legend

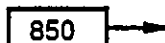

 Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 5. Ambient Afternoon Peak Hour Traffic Volumes

The trip distribution step assigns trips to their expected origins and destinations. Trips to and from the proposed project are expected to originate near population centers from the districts of South Kohala, North Kona, and South Kona.

The distribution of population and households of West Hawaii was used to distribute the project generated trips. It was estimated that approximately 40% of the population is located North of the proposed project and 60% to the South. Based on this information, it was estimated that 40% of the vehicles will be arriving from the North or Kawaihae direction and 60% from the South or Kailua-Kona direction.

The traffic assignment step assigns trips to a specific route on the roadway network that will take the driver from origin to destination. All project traffic was assigned to Queen Kaahumanu Highway, the only available roadway to and from the project. The resultant assignment of project generated trips is shown below and in Figure 6.

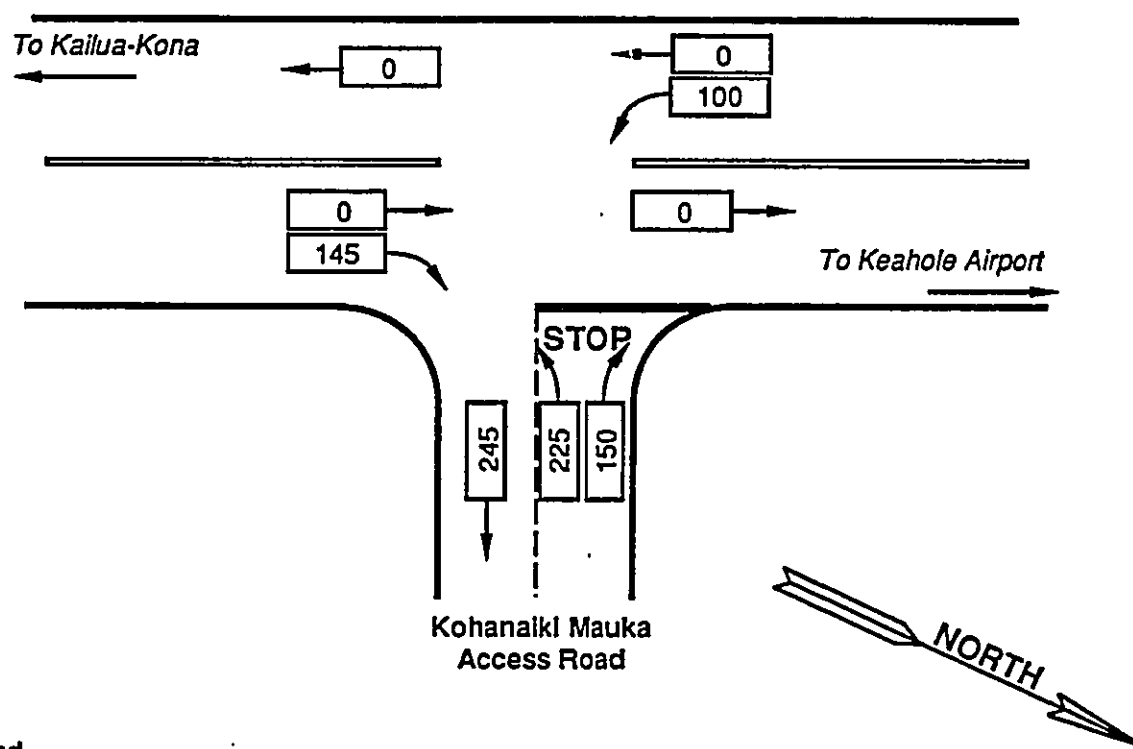
	Inbound	Outbound
Queen Kaahumanu Highway, North	40%	40%
Queen Kaahumanu Highway, South	60%	60%

Total Traffic

The ambient traffic volumes in Figure 5 were added to the project generated volumes in Figure 6 to obtain the total forecast volumes shown in Figure 7.



### Queen Kaahumanu Highway



**Legend**


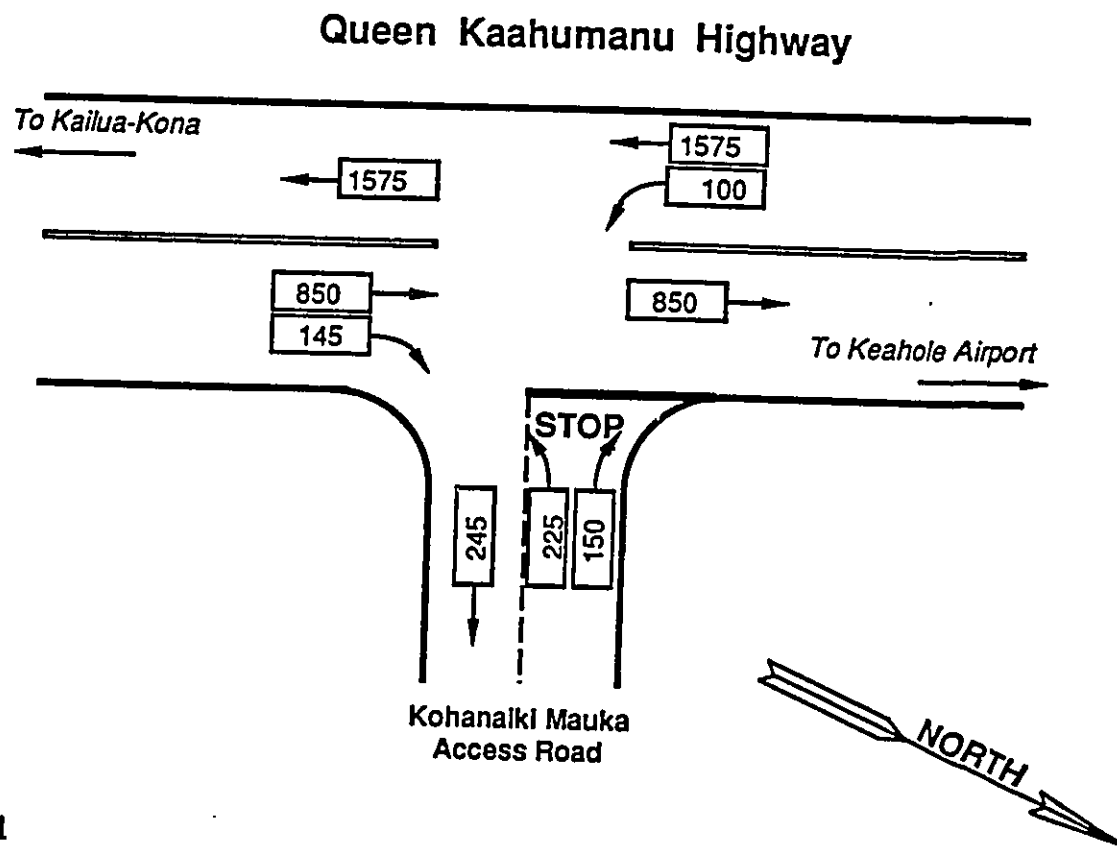

 Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 6. Project Generated Trips



**Legend**

850 → Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm

Volumes have been rounded off to the nearest 5

Figure 7. Total Traffic

## TRAFFIC IMPACT ANALYSIS

### Queen Kaahumanu Highway

Impacts from the proposed project were measured by the change in the traffic's level-of-service of Queen Kaahumanu Highway without and with the project. The capacity of these roads was estimated in accordance with the latest Highway Capacity Manual, Special Report 209 (1986) analysis techniques.

Level-of-service is classified into six categories ranging from LOS A, where motorists can drive at their desired speed, to LOS F, where motorists experience heavily congested flow with traffic demand exceeding capacity. The capacity of a two-lane rural road occurs at LOS E. The definition of LOS for two-lane rural highways is given in Appendix A.

The present estimated capacity of the two-lane Queen Kaahumanu Highway is about 2550 vehicles per hour in both directions during the afternoon peak hour. The results of the analysis are shown in Table 2 below.

Table 2. Level-of-Service of Queen Kaahumanu Highway

	1989		1999 Without Project		1999 With Project	
	<u>Volume</u> <sup>1</sup>	<u>LOS</u>	<u>Volume</u> <sup>1</sup>	<u>LOS</u>	<u>Volume</u> <sup>1</sup>	<u>LOS</u>
Kaahumanu (2 Lanes)	1010	C	2610	F	3010	F
Kaahumanu (4 Lanes)	n/a	n/a	2610	D	3010	D

<sup>1</sup>Volume is based on the peak 15 minute volume during the peak hour.

The results of the analysis show that even without the project, Queen Kaahumanu Highway will be over capacity by the year 1999. With Queen Kaahumanu Highway widened to four lanes, the capacity of the highway is increased to about 3500 vehicles per hour and would operate below capacity.

#### Project Intersection

Impacts from the proposed project were measured by the change in level of service (LOS) for specific turning movements *with* and *without* the project. The existing traffic volumes, the ambient traffic volumes, and the total forecast traffic volumes were analyzed. These traffic conditions are shown in Figures 4, 5, and 7, respectively.

Impacts on traffic resulting from the proposed Kohanaiki Mauka Project were measured by the Level-of-Service (LOS) at the intersection of Queen Kaahumanu Highway with the project access road. The analysis was done for unsignalized intersections in accordance with the latest TRB Highway Capacity Manual, Special Report 209 (HCM) (1986) analysis techniques. The methodology yields levels of service ranging from A to F (summarized in Appendix A). The LOS for the traffic movements at an intersection is classified into six categories ranging from little or no delay (LOS A) to extreme delays (LOS F). The results of the analysis are summarized on Table 3.

The results indicate that by the year 1999 traffic along Queen Kaahumanu Highway will not be delayed beyond normal driving conditions at the study intersection. The left turn movement from Queen Kaahumanu Highway into the project access road will operate at average delays and level-of-service. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

Table 3. LEVEL OF SERVICE

<u>Intersection</u>		<u>1989</u>	<u>1999 w/o Project</u>	<u>1999 w/ Project</u>
Queen Kaahumanu Highway - Project Access Road				
Project Access Road	LT	n/a	n/a	F
	RT	n/a	n/a	B
Queen Kaahumanu Highway	LT	n/a	n/a	C

LT - left turn      RT - right turn      n/a - not applicable (presently there is no intersection)

Signalization of Study Intersections

Due to the expected delays for the minor streets, the study intersections were analyzed as signalized intersections for two and four lane conditions on Queen Kaahumanu Highway. The Planning Analysis technique from the HCM was used to estimate the capacity of the signalized intersections.

Planning analysis uses an intersection's critical volume to determine whether an intersection will be over, near, or under capacity. The critical volume measures intersection capacity using the volume of conflicting traffic movements. A critical volume of less than 1200 vehicles indicates that an intersection is under capacity, between 1200 and 1400 vehicles indicates near capacity, and greater than 1400 vehicles indicates over capacity.

The results of the analysis, shown in Table 4, indicate that if Queen Kaahumanu Highway remains a two lane highway the signalized study intersection would operate over

capacity. If Queen Kaahumanu Highway is widened to four lanes, the study intersection would operate under capacity, indicating that the intersection requires four lanes to successfully accommodate the increase in traffic.

**Table 4. Critical Volumes and Capacity Level**  
**Planning Analysis--Intersection of Queen Kaahumanu Highway & Project Road**

<u>Intersection</u>	2000 w/ Project	
	<u>Critical Vol.</u>	<u>Capacity Level</u>
Two-lane Undivided	1800	Over
Four-lane Divided	1010	Under

Percentage of Kohanaiki Mauka Traffic on Queen Kaahumanu Highway

Traffic due to the Kohanaiki Mauka Project will increase traffic on the Queen Kaahumanu Highway. At the north leg of the intersection of Queen Kaahumanu Highway and the project access road, the traffic will increase by about 10% during the afternoon. At the south leg, the traffic will increase by 15%. Table 5 below shows the volumes and percent increases. The further from the project site, project generated traffic will decrease as a percentage of traffic on Queen Kaahumanu Highway.

**Table 5. 1999 Traffic Volume Increase Due to Kohanaiki Mauka**

<u>Approach</u>	<u>Without Project</u>	<u>With Project</u>	<u>% Incr.</u>
North Leg (Two directions)	2425	2675	10%
South Leg (Two directions)	2425	2795	15%

## CONCLUSION AND RECOMMENDATIONS

The proposed Kohanaiki Mauka Project is *not* expected to have a significant traffic impact on Queen Kaahumanu Highway when the project is fully occupied in 1999.

The analysis indicates that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The results of the analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development in the area continues as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, the left turn movement from Queen Kaahumanu Highway into the project access road will operate with average delays, LOS C. Thus traffic along the highway will not be delayed beyond normal driving conditions. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

If the intersection of Queen Kaahumanu Highway and the project access road is left unsignalized by the year 1999, project traffic will experience extreme delays in attempting left turns onto Queen Kaahumanu Highway. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity and at an acceptable level-of-service.

To mitigate the impacts of the proposed Kohanaiki Mauka Project, we recommend the following:

• Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left-turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway. The intersection recommendations are shown in Figure 8.

• Signalize the intersection of Queen Kaahumanu Highway with the project access road when future traffic volumes meet signal warrants.



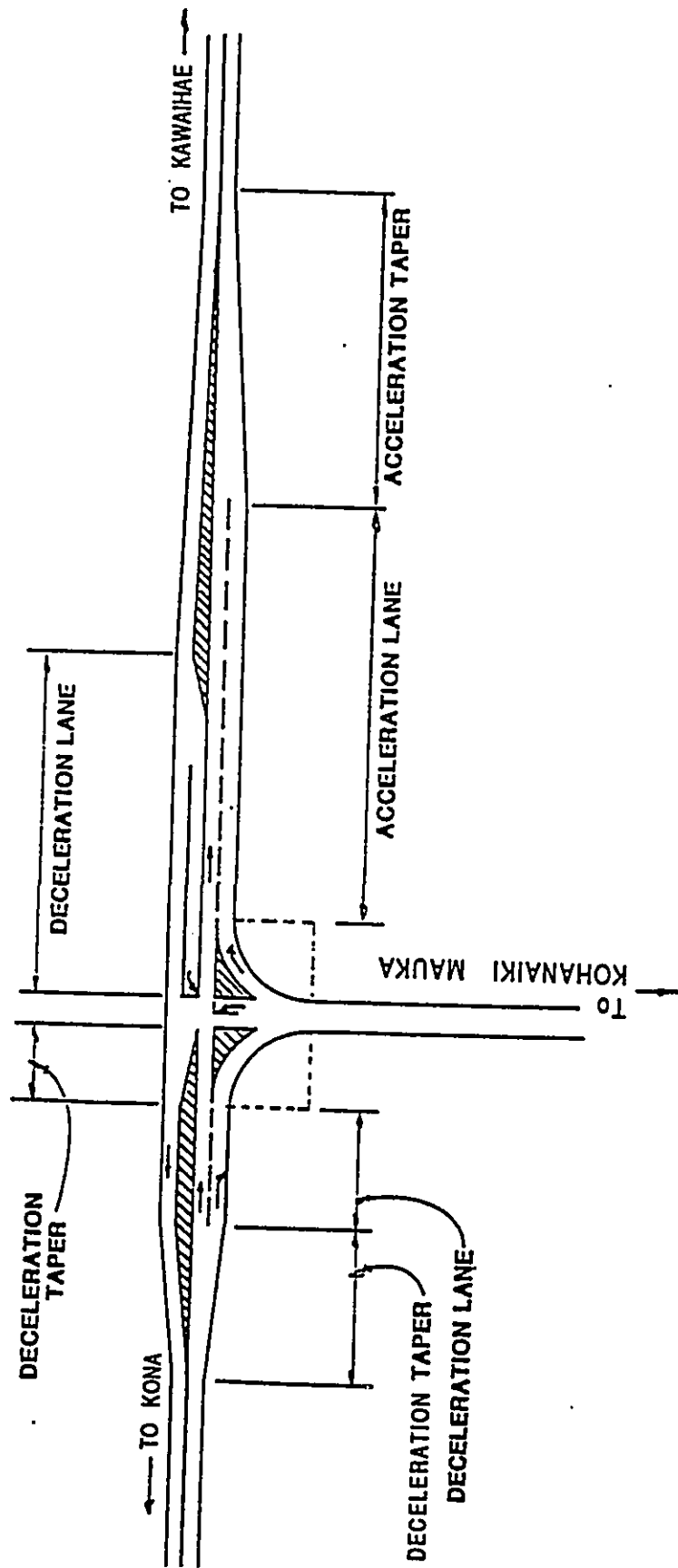


Figure 8. Schematic Intersection Layout

APPENDIX A

Definition of Level-of-Service  
for  
Unsignalized Intersections  
and  
Two-lane Rural Highways

APPENDIX A  
DEFINITION OF LEVEL-OF-SERVICE

For unsignalized intersections, the traffic most impacted will be the minor or cross-street with the stop or yield control. The major roadway will have the right-of-way. The level-of-service is the amount of delay expected for the average vehicle desiring to cross or enter the major road. The following gives a general description of the measure.

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with level-of-service A representing the best operating conditions and level-of-service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level-of-service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level-of-service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

## TWO-LANE HIGHWAYS

The highest quality of traffic service occurs when motorists are able to drive at their desired speed. Without strict enforcement, this highest quality, representative of *level-of-service A*, would result in average speeds approaching 60 mph on two-lane highways. ...almost no platoons of three or more vehicles are observed. Drivers would be delayed no more than 30 percent of the time by slow-moving vehicles.

*Level-of-service B* characterizes the region of traffic flow wherein speeds of 55 mph or slightly higher are expected on level terrain. Drivers are delayed up to 45 percent of the time on the average.

*Level-of-service C* results in noticeable increases in platoon formation, platoon size, and frequency of passing impediment. Average speed still exceeds 52 mph on level terrain... While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles.

*Level-of-service D* traffic approaches unstable traffic flow. ...passing becomes extremely difficult. Mean platoon sizes of 5 to 10 vehicles are common, although speeds of 50 mph can be maintained under ideal conditions. Maximum service flow rates of 1,800 passenger cars per hour, total in both directions, can be maintained under ideal conditions. This is the highest flow rate that can be maintained for any length of time over an extended section of level terrain without a high probability of breakdown.

*Level-of-service E* is defined as traffic flow conditions having a percent time delay of greater than 75 percent. Passing is virtually impossible under these conditions, and platooning becomes intense when slower vehicles or other interruptions are encountered. The highest attainable volume under E is the capacity of the highway. Under ideal conditions, capacity is 2800 pcph, total in both directions. This value decreases as the directional split of traffic changes from a 50/50 split to 0/100.

When traffic demand exceeds capacity, *Level-of-service F* is heavily congested flow. Volumes are lower than capacity, and speeds are below capacity speed.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

APPENDIX B

TRAFFIC COUNT DATA

Date: April 11, 1989

Location: Queen Kaahumanu Highway @ Kaiminani Drive

Time (pm)	Queen Kaahumanu Highway				Kaiminani Drive		Total All Approaches
	Southbound		Northbound		Westbound		
	LT	TH	TH	RT	LT	RT	
3:00-3:15	11	69	42	17	18	12	169
3:15-3:30	17	103	64	26	18	14	242
3:30-3:45	14	116	69	27	21	13	260
3:45-4:00	29	94	67	21	29	10	250
4:00-4:15	16	119	69	37	19	16	276
4:15-4:30	18	100	69	22	22	6	237
4:30-4:45	<u>17</u>	<u>104</u>	<u>64</u>	<u>41</u>	<u>26</u>	<u>7</u>	<u>259</u>
Peak Hour Total	76	432	269	111	87	53	1028

Location: Queen Kaahumanu Highway @ Palani Road

Time (pm)	Queen Kaahumanu Highway						Palani Road						Total All Approaches
	Southbound			Northbound			Westbound			Eastbound			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
3:15-3:30	31	85	96	41	55	30	30	62	19	73	75	63	660
3:30-3:45	21	88	102	49	65	28	27	65	25	72	87	60	689
3:45-4:00	44	83	86	63	67	27	36	76	24	61	114	62	743
4:00-4:15	42	90	115	37	59	33	36	62	38	62	108	83	765
4:15-4:30	<u>33</u>	<u>91</u>	<u>120</u>	<u>42</u>	<u>67</u>	<u>37</u>	<u>38</u>	<u>79</u>	<u>24</u>	<u>79</u>	<u>105</u>	<u>81</u>	<u>796</u>
Peak Hour Total	140	352	423	191	258	125	137	282	111	274	414	286	2993



The following updated Traffic Impact Assessment and summary letter responds to issues raised by the State Department of Transportation, Highways Division concerning the Draft Environmental Impact Statement for Kohanaiki Mauka.

TRAFFIC IMPACT ASSESSMENT REPORT

FOR

KOHANAIKI MAUKA

KOHANAIKI, NORTH KONA, HAWAII  
TMK: 7-3-9:15, 3rd Tax Division

October 8, 1991

Prepared for:

PBR Hawaii, Inc.

Prepared by:

Pacific Planning & Engineering, Inc.  
1221 Kapiolani Boulevard, Suite 740  
Honolulu, Hawaii 96814

D-37

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## FOREWORD

Pacific Planning and Engineering, Inc. (PP&E) completed this traffic impact assessment report in June 1989. After the Department of Transportation (D.O.T.) reviewed this report, it issued a letter listing their concerns about the study. Appendix C contains the D.O.T. letter dated August 8, 1991 (ref. HWY-PS 2.8195). Pacific Planning and Engineering, Inc. has addressed the comments issued by D.O.T. in a letter report dated October 7, 1991. PPE's letter report is contained in Appendix D.

## EXECUTIVE SUMMARY

This traffic study identifies and evaluates the probable impact of traffic generated by the proposed Kohanaiki Mauka Project in the year 1999 when the proposed project is expected to be fully occupied.

The Kohanaiki Mauka Project is a proposed commercial and industrial subdivision in West Hawaii. The project site is located on Queen Kaahumanu Highway between Keahole Airport and Kailua Town.

This traffic report describes the impact on the intersection of the proposed access road with the existing Queen Kaahumanu Highway. Impacts are assessed during the 3:15 to 4:15 pm time period, when the proposed project traffic is expected to have the greatest impact on the existing highways.

### Conclusions and Recommendations

The proposed Kohanaiki Mauka Project is *not* expected to have a significant traffic impact on Queen Kaahumanu Highway when the project is fully occupied in 1999.

The analysis indicates that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The results of the analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development in the area continues as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, the left turn movement from Queen Kaahumanu Highway into the project access road will operate with average delays, LOS C. Thus traffic along the highway will not be delayed beyond normal driving conditions. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

If the intersection of Queen Kaahumanu Highway and the project access road is left unsignalized by the year 1999, project traffic will experience extreme delays in attempting left turns onto Queen Kaahumanu Highway. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity and at an acceptable level-of-service.

To mitigate the impacts of the proposed Kohanaiki Mauka Project, we recommend the following:

- Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left-turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway. The intersection recommendations are shown in Figure 8.

- Signalize the intersection of Queen Kaahumanu Highway with the project access road when future traffic volumes meet signal warrants.

## PROJECT DESCRIPTION

The Kohanaiki Mauka Project is a proposed commercial and industrial subdivision in West Hawaii. The project site is located east (mauka) of Queen Kaahumanu Highway between Keahole Airport and Kailua Town, on an approximately 70-acre lot, identified by Tax Map Key: 7-3-9:15, 3rd Tax Division. The proposed project site is in a lava field 2 miles from the closest residential subdivision. The project location and roadway network in the vicinity are shown in Figure 1.

The project will consist of about 10 acres of commercial use and 55 acres of light industrial use. The project will be built in phases with about 27 acres to be developed by 1993, 22 acres by 1995, and 22 acres by 1998. The project is assumed to be fully occupied by 1999. When fully developed, the project will employ 575 to 705 employees. The project site plan is shown on Figure 2.

Access to the project site will be from an existing DOT permitted access location along Queen Kaahumanu Highway. The access road will be a paved 2-lane road with two 12 foot lanes and a 60-foot right-of-way. The permitted access is shared with the adjoining lot to the north. The vehicular access permitted opening is 80 feet wide.



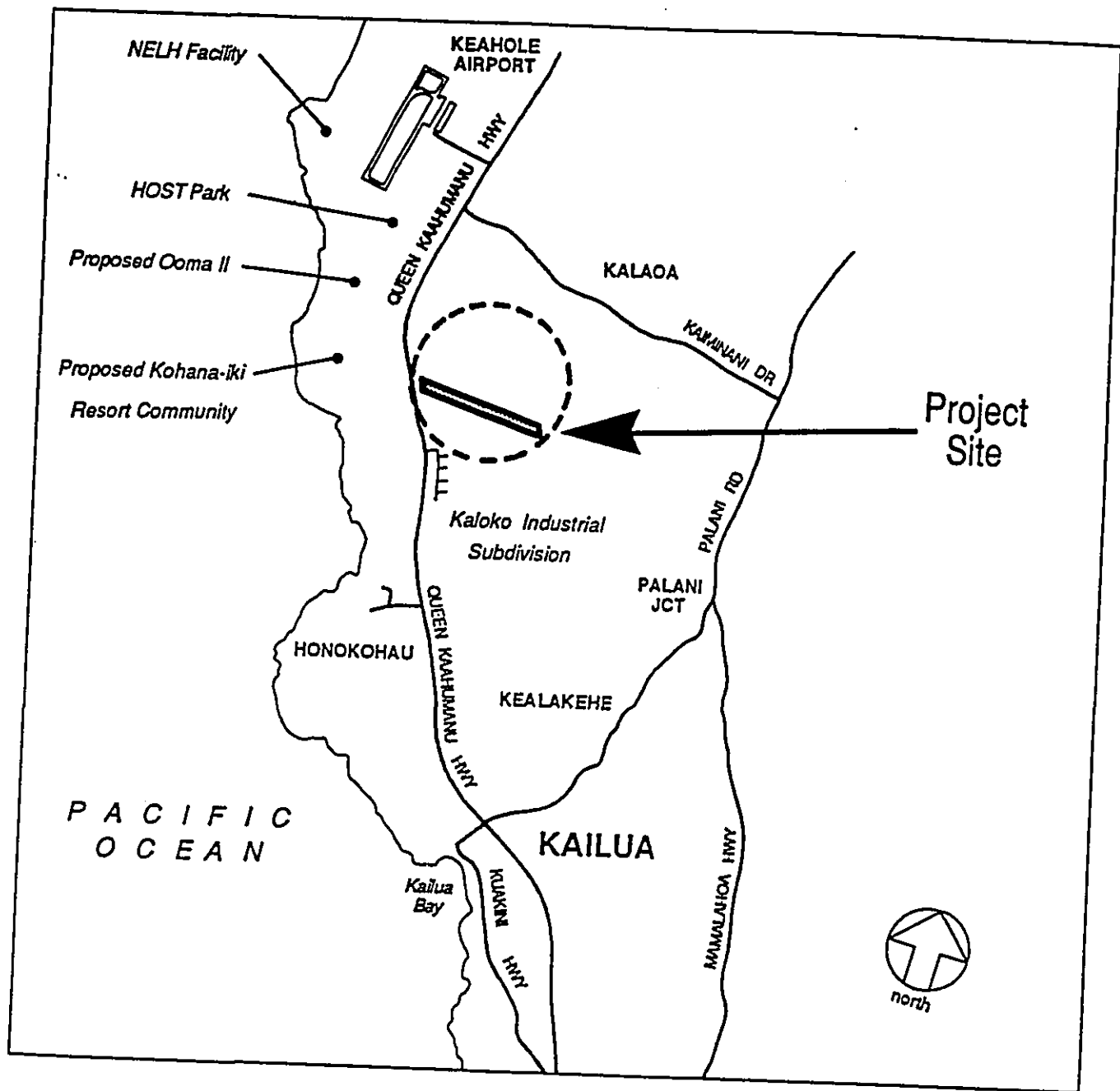
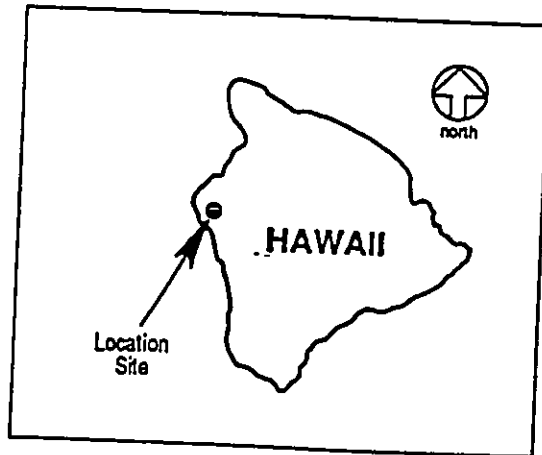
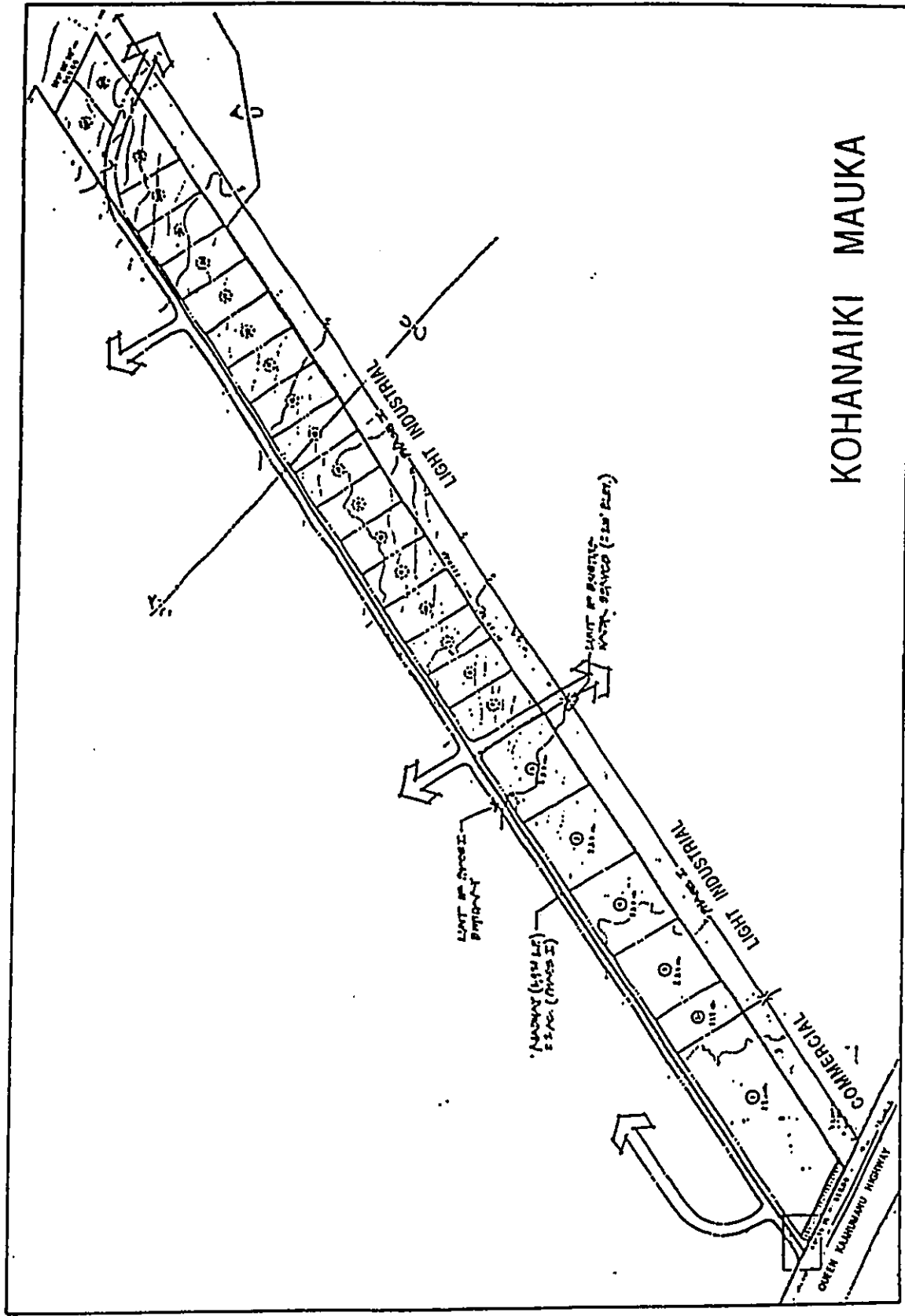


Figure 1. Project Location





KOHANAIKI MAUKA

Figure 2. Project Site Plan

## EXISTING CONDITIONS

An inventory of existing conditions was conducted to better understand the traffic impact of the proposed project. The review included the land uses in the area, roadway facilities in the area, and traffic conditions. The study focuses on the proposed intersection of the project access road with Queen Kaahumanu Highway.

### Area Conditions

The West Hawaii area is a rapidly developing area. There are many proposed resort developments and thus increasing employment opportunities. Between 1980 and 1987, the population of the North Kona District increased by 50% from about 13,700 to 20,500 people.

The land uses immediately surrounding the project consist mostly of undeveloped land. The area is characterized by large barren masses of lava and patches of vegetation. The terrain is varied and ranges from level to sloping. Presently, the two major State land use classifications in the area are "conservation" and "agricultural".

About two miles to the north of the proposed project is Keahole Airport which is owned and operated by the State Department of Transportation, Airports Division. The airport presently consists of a terminal, parking facilities, and a 6,500 foot runway. Keahole Airport is planned to be expanded by the State Department of Transportation to accommodate the forecasted increase in passengers to and from West Hawaii. Passengers enplaning and deplaning is forecasted to increase from 1,486,000 passengers in 1985 to

3,715,000 passengers in the year 2000. This is an increase of about 150%. To accommodate this increase, the runway is planned to be lengthened to 11,000 feet and the terminal facilities will be expanded, according to DOT Airports Division.

The Kaloko Light Industrial Subdivision Expansion is located mauka of Queen Kaahumanu Highway about a mile south of the Kohanaiki Mauka Project. The industrial subdivision consists of 250 acres of land. This project is planned to be completed in four phases. Presently the first phase of 55 lots of a total 194 lots has been developed. No other phases have been approved by the State Land Use Commission at this time and thus traffic generated by additional phases was not included in this report.

The Natural Energy Laboratory of Hawaii (NELH) and the Hawaii Ocean Science and Technology Park (HOST Park) are State owned. These facilities are located (west) makai of Queen Kaahumanu Highway about one to two miles north of the project site.

NELH is a research facility which conducts research in Ocean Thermal Energy Conversion and other activities. HOST Park will provide the necessary infrastructure for commercial applications of the high-tech projects.

NELH presently employs about 100 people. When fully developed, this facility will employ about 390 people. HOST Park is expected to accommodate 78 acres of Campus Industrial use which includes laboratories, educational facilities, and other uses which do not require the use of ocean water. The remaining 385 acres will be for Ocean Water Commercial uses such as mariculture, marine biotechnology, and renewable energy. At present, HOST Park has no tenants. This project is expected to be completely occupied by the year 1999.

### Roadway Facilities

The project is located between Queen Kaahumanu Highway to the West and Mamalahoa Highway to the East.

Queen Kaahumanu Highway is a major roadway through the area and leads to Kawaihae in the North and Kailua in the South. It is a two-lane rural arterial highway, built within a 240 foot right-of-way with a 24 foot wide pavement and 6 foot paved shoulders. There is a 55 miles per hour (mph) posted speed limit fronting the project site. Queen Kaahumanu Highway is maintained by the State Department of Transportation (SDOT). The major intersections along Queen Kaahumanu Highway are channelized with left-turn storage lanes for safety and to maximize roadway capacity. The intersections are unsignalized except at the junction with Palani Road in Kailua.

Mamalahoa Highway, which runs parallel to Queen Kaahumanu Highway, serves the upland areas between Waimea and North Kona. The State highway, built over a former horse-and-buggy trail is a sub-standard roadway with pavement width varying between 18 and 24 feet.

### Traffic Volumes

Traffic volume data from SDOT was used to determine traffic trends on Queen Kaahumanu Highway. Figure 3 summarizes the trend in Average Daily Traffic (ADT) along Queen Kaahumanu Highway at Keahole Airport Road, north of the project access road. The plotted data shows a steady increase in traffic on the order of five percent (5%) per year.

Peak traffic on Queen Kaahumanu Highway occurs between 11:00 am and 12:00 pm in the morning and between 3:15 and 4:15 pm in the afternoon fronting the project site. Traffic during the morning is less than during the afternoon peak hour. Traffic volumes at the study intersection were taken during the afternoon peak hour at the intersection of Queen Kaahumanu Highway and Kaiminani Drive on Tuesday, April 11, 1988. Traffic volumes were also taken at the intersection of Queen Kaahumanu Highway and Palani Road during the same time period. The manual counts are shown in Appendix B.

Five hundred nineteen (519) vehicles were recorded heading towards Kailua-Kona and 380 vehicles were recorded heading towards Kawaihae. The direction split is approximately 40% / 60%. The recorded volumes are shown on Figure 4.

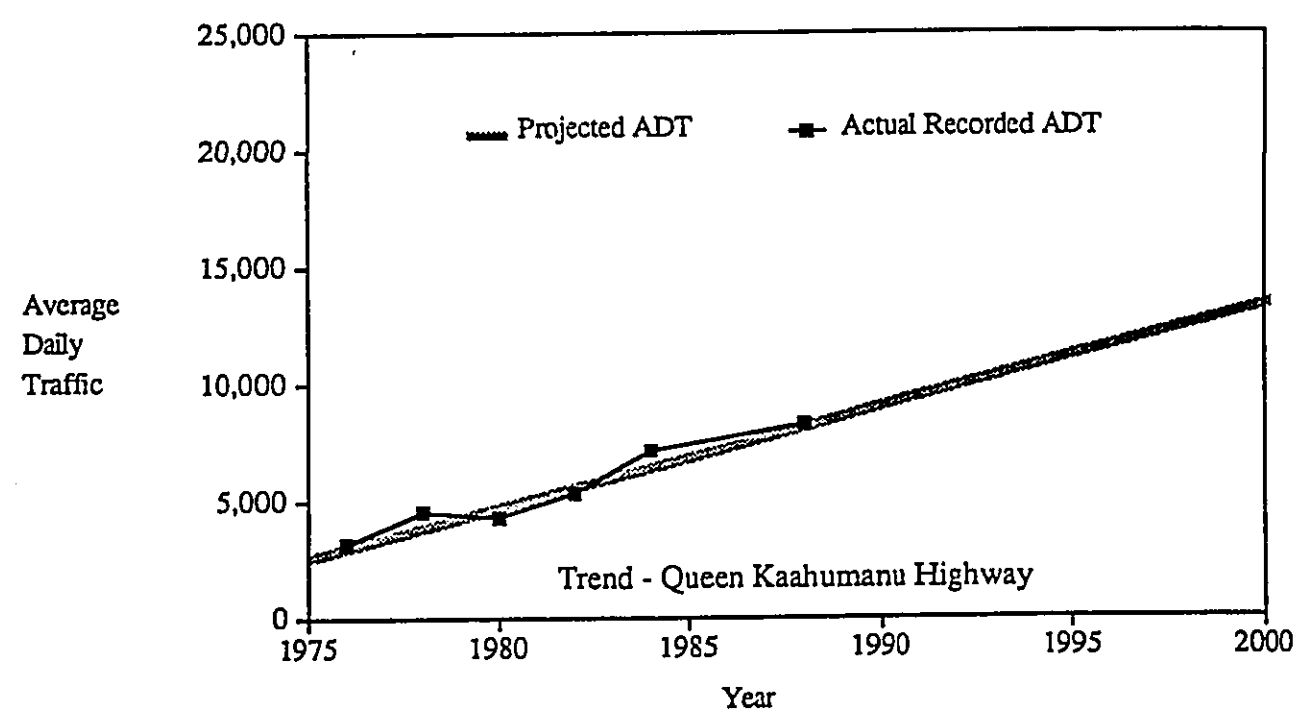
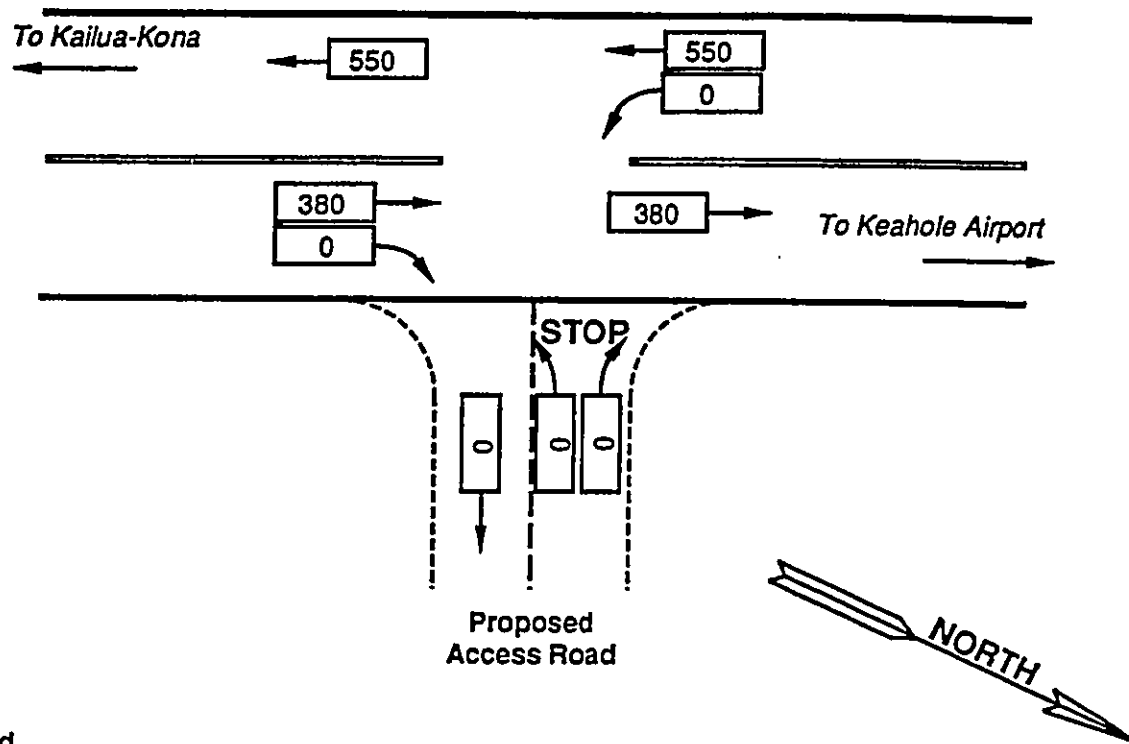


Figure 3. Trend in ADT along Queen Kaahumanu Highway at Keahole Airport Road

### Queen Kaahumanu Highway



**Legend**

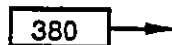

 Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 4. Existing Afternoon Peak Hour Traffic Volumes

## FUTURE CONDITIONS

A research of planned developments and improvements to transportation facilities was conducted to estimate the future traffic conditions in the immediate area.

### Future Land Uses Surrounding Project

The Kohana-iki Resort Community is located on a 470 acre site makai of Queen Kaahumanu Highway directly across from the Kohanaiki Mauka Project. This development is an integrated resort including two resort hotels for a total of 700 rooms, 800 resort condominium units, an 18-hole golf course, a recreational clubhouse complex, a 150 slip marina, 200 single family units for permanent residents, 150 multi-family units of support housing, and 33,000 square feet of leasable commercial floor space. The Kohana-iki Resort Community development is assumed to be completed by the year 1999.

### Roadway Facilities

Queen Kaahumanu Highway is planned to be widened from a two-lane highway to a four-lane divided highway by the State Department of Transportation (SDOT). The highway will be widened from Kawaihae Road to Palani Road. As of the date of this report, funding has not been approved and there is no set schedule for the construction of this facility.



## PROJECTED TRAFFIC CONDITIONS

Traffic generated by the proposed project was added to the forecasted 1989 ambient traffic to estimate future traffic conditions in the year 1999, when the project is expected to be fully occupied.

### Ambient Traffic Forecast

Ambient traffic is the traffic which would occur regardless of whether the proposed project were built or not. The future ambient traffic was estimated based on the expected traffic due to developments in the immediate area to the year 1999 and the traffic growth trend on Queen Kaahumanu Highway.

Among the developments that are approved by government agencies and expected to be completed are the Kohana-iki Resort Community, HOST Park, and Keahole Airport Expansion. Traffic generated by the Kohana-iki Resort Community was estimated based on a traffic study by M&E Pacific. Traffic from HOST Park and Keahole Airport were estimated based on two traffic studies by Parsons Brinckerhoff. Based on the above reports traffic for the year 1999 was estimated.

Traffic counts by the State Department of Transportation (SDOT) shows that average daily traffic has been increasing by 5% annually, as discussed in the section on "Existing Conditions." This growth can be attributed to an increase in the amount of tourists and developments in West Hawaii. The growth rate on Queen Kaahumanu Highway generally reflects traffic increases from developments outside or beyond the study area.

The traffic generated from developments in the immediate area of the project and the ambient traffic increase were added together to obtain the forecasted traffic in the year 1999 without the project. The resultant ambient traffic volumes are shown in Figure 5.

Project Generated Traffic

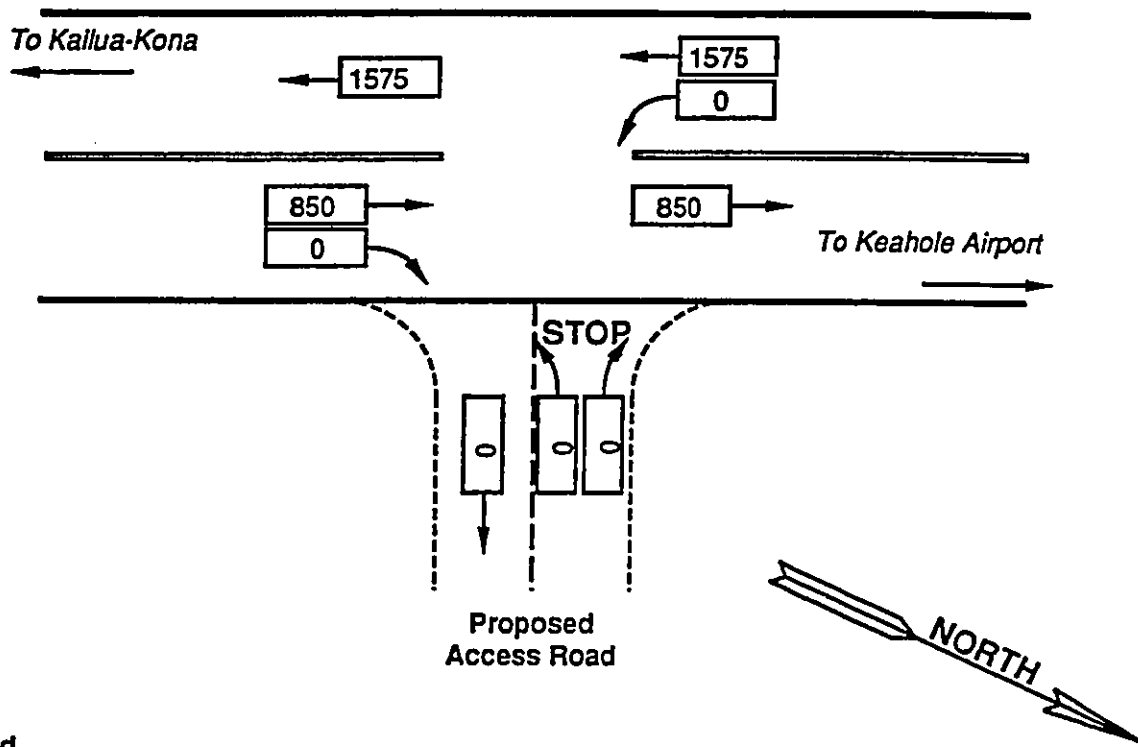
The traditional three-step procedure of trip generation, trip distribution and traffic assignment was used to estimate traffic from the proposed project.

The trip generation step estimates the number of trips which would enter and exit the proposed project during the afternoon peak hour. The number of trips were estimated from the ITE Trip Generation Report (Fourth Edition, 1987) for 51,000 square feet of leasable area of commercial and 54 acres of industrial land use. The estimated number of trips for the project is shown in Table 1, below.

Table 1. Trip Generation for Kohanaiki Mauka Project

<u>Land Use</u>	<u>Units</u>	<u>ITE Rates</u>		<u>No. of Trips</u>	
		<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Commercial (1000 sq ft leasable area)	51	2.39	2.39	125	125
Industrial (Acreage)	54	2.22	4.62	<u>120</u>	<u>250</u>
<b>Total Number of Trip Ends</b>				<b>.245</b>	<b>375</b>

### Queen Kaahumanu Highway



**Legend**

850 → Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 5. Ambient Afternoon Peak Hour Traffic Volumes

The trip distribution step assigns trips to their expected origins and destinations. Trips to and from the proposed project are expected to originate near population centers from the districts of South Kohala, North Kona, and South Kona.

The distribution of population and households of West Hawaii was used to distribute the project generated trips. It was estimated that approximately 40% of the population is located North of the proposed project and 60% to the South. Based on this information, it was estimated that 40% of the vehicles will be arriving from the North or Kawaihae direction and 60% from the South or Kailua-Kona direction.

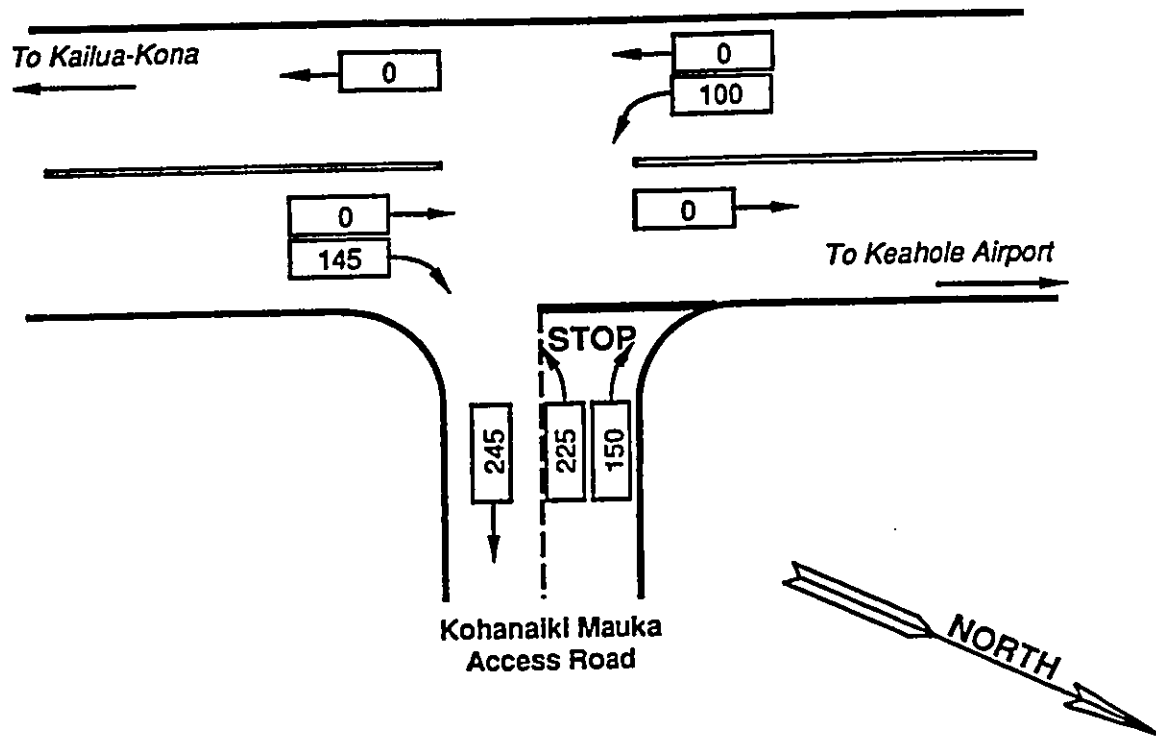
The traffic assignment step assigns trips to a specific route on the roadway network that will take the driver from origin to destination. All project traffic was assigned to Queen Kaahumanu Highway, the only available roadway to and from the project. The resultant assignment of project generated trips is shown below and in Figure 6.

	Inbound	Outbound
Queen Kaahumanu Highway, North	40%	40%
Queen Kaahumanu Highway, South	60%	60%

Total Traffic

The ambient traffic volumes in Figure 5 were added to the project generated volumes in Figure 6 to obtain the total forecast volumes shown in Figure 7.

### Queen Kaahumanu Highway



**Legend**

245 → Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 6. Project Generated Trips

# Queen Kaahumanu Highway

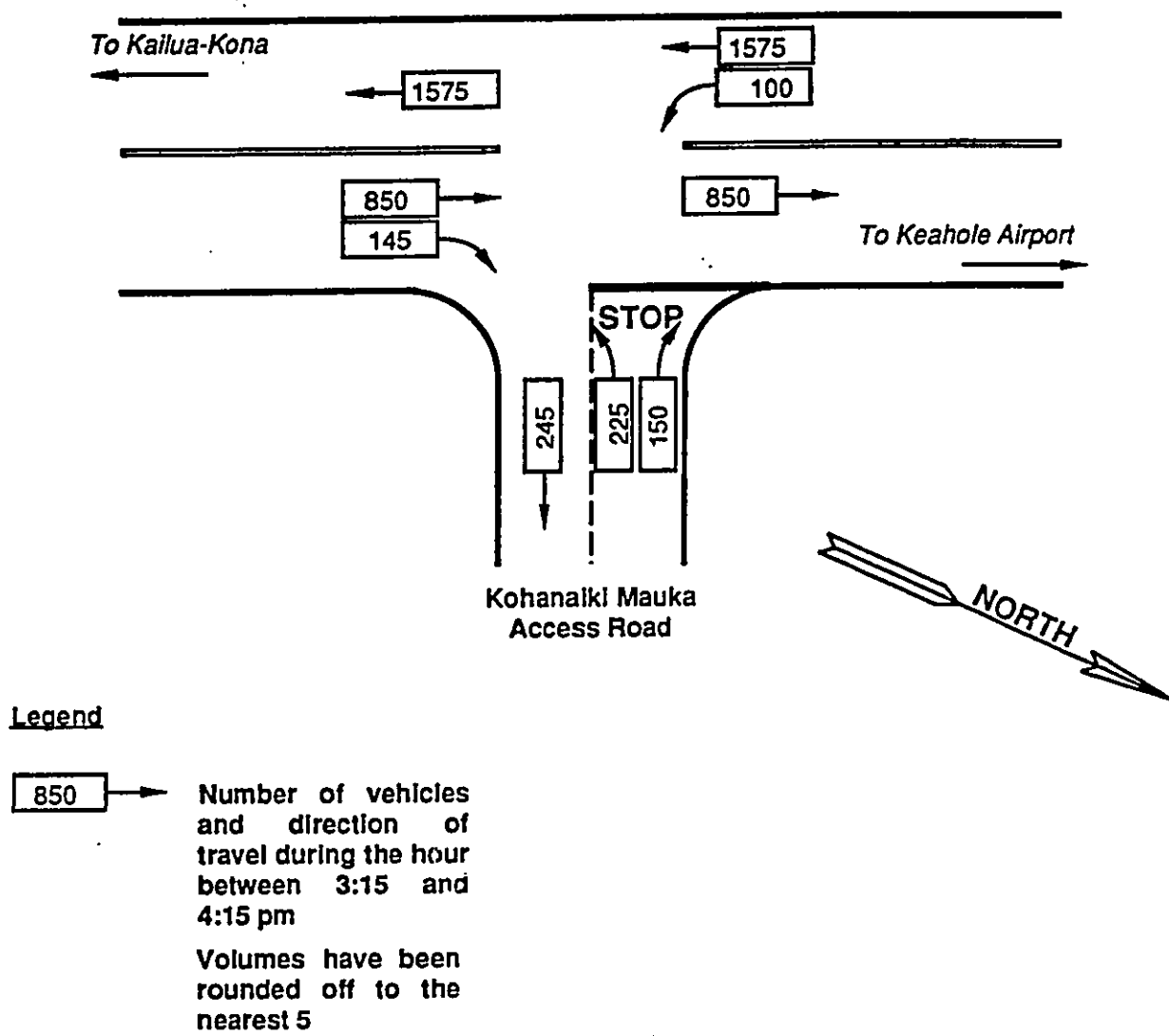


Figure 7. Total Traffic

## TRAFFIC IMPACT ANALYSIS

### Queen Kaahumanu Highway

Impacts from the proposed project were measured by the change in the traffic's level-of-service of Queen Kaahumanu Highway without and with the project. The capacity of these roads was estimated in accordance with the latest Highway Capacity Manual, Special Report 209 (1986) analysis techniques.

Level-of-service is classified into six categories ranging from LOS A, where motorists can drive at their desired speed, to LOS F, where motorists experience heavily congested flow with traffic demand exceeding capacity. The capacity of a two-lane rural road occurs at LOS E. The definition of LOS for two-lane rural highways is given in Appendix A.

The present estimated capacity of the two-lane Queen Kaahumanu Highway is about 2550 vehicles per hour in both directions during the afternoon peak hour. The results of the analysis are shown in Table 2 below.

Table 2. Level-of-Service of Queen Kaahumanu Highway

	1989		1999 Without Project		1999 With Project	
	<u>Volume</u> <sup>1</sup>	<u>LOS</u>	<u>Volume</u> <sup>1</sup>	<u>LOS</u>	<u>Volume</u> <sup>1</sup>	<u>LOS</u>
Kaahumanu (2 Lanes)	1010	C	2610	F	3010	F
Kaahumanu (4 Lanes)	n/a	n/a	2610	D	3010	D

<sup>1</sup>Volume is based on the peak 15 minute volume during the peak hour.

The results of the analysis show that even without the project, Queen Kaahumanu Highway will be over capacity by the year 1999. With Queen Kaahumanu Highway widened to four lanes, the capacity of the highway is increased to about 3500 vehicles per hour and would operate below capacity.

#### Project Intersection

Impacts from the proposed project were measured by the change in level of service (LOS) for specific turning movements *with* and *without* the project. The existing traffic volumes, the ambient traffic volumes, and the total forecast traffic volumes were analyzed. These traffic conditions are shown in Figures 4, 5, and 7, respectively.

Impacts on traffic resulting from the proposed Kohanaiki Mauka Project were measured by the Level-of-Service (LOS) at the intersection of Queen Kaahumanu Highway with the project access road. The analysis was done for unsignalized intersections in accordance with the latest TRB Highway Capacity Manual, Special Report 209 (HCM) (1986) analysis techniques. The methodology yields levels of service ranging from A to F (summarized in Appendix A). The LOS for the traffic movements at an intersection is classified into six categories ranging from little or no delay (LOS A) to extreme delays (LOS F). The results of the analysis are summarized on Table 3.

The results indicate that by the year 1999 traffic along Queen Kaahumanu Highway will not be delayed beyond normal driving conditions at the study intersection. The left turn movement from Queen Kaahumanu Highway into the project access road will operate at average delays and level-of-service. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.



Table 3. LEVEL OF SERVICE

<u>Intersection</u>		<u>1989</u>	<u>1999 w/o Project</u>	<u>1999 w/ Project</u>
Queen Kaahumanu Highway - Project Access Road				
Project Access Road	LT	n/a	n/a	F
	RT	n/a	n/a	B
Queen Kaahumanu Highway	LT	n/a	n/a	C

LT - left turn      RT - right turn      n/a - not applicable (presently there is no intersection)

---

Signalization of Study Intersections

Due to the expected delays for the minor streets, the study intersections were analyzed as signalized intersections for two and four lane conditions on Queen Kaahumanu Highway. The Planning Analysis technique from the HCM was used to estimate the capacity of the signalized intersections.

Planning analysis uses an intersection's critical volume to determine whether an intersection will be over, near, or under capacity. The critical volume measures intersection capacity using the volume of conflicting traffic movements. A critical volume of less than 1200 vehicles indicates that an intersection is under capacity, between 1200 and 1400 vehicles indicates near capacity, and greater than 1400 vehicles indicates over capacity.

The results of the analysis, shown in Table 4, indicate that if Queen Kaahumanu Highway remains a two lane highway the signalized study intersection would operate over

capacity. If Queen Kaahumanu Highway is widened to four lanes, the study intersection would operate under capacity, indicating that the intersection requires four lanes to successfully accommodate the increase in traffic.

**Table 4. Critical Volumes and Capacity Level**  
**Planning Analysis--Intersection of Queen Kaahumanu Highway & Project Road**

<u>Intersection</u>	2000 w/ Project	
	<u>Critical Vol.</u>	<u>Capacity Level</u>
Two-lane Undivided	1800	Over
Four-lane Divided	1010	Under

Percentage of Kohanaiki Mauka Traffic on Queen Kaahumanu Highway

Traffic due to the Kohanaiki Mauka Project will increase traffic on the Queen Kaahumanu Highway. At the north leg of the intersection of Queen Kaahumanu Highway and the project access road, the traffic will increase by about 10% during the afternoon. At the south leg, the traffic will increase by 15%. Table 5 below shows the volumes and percent increases. The further from the project site, project generated traffic will decrease as a percentage of traffic on Queen Kaahumanu Highway.

**Table 5. 1999 Traffic Volume Increase Due to Kohanaiki Mauka**

<u>Approach</u>	<u>Without Project</u>	<u>With Project</u>	<u>% Incr.</u>
North Leg (Two directions)	2425	2675	10%
South Leg (Two directions)	2425	2795	15%

## CONCLUSION AND RECOMMENDATIONS

The proposed Kohanaiki Mauka Project is *not* expected to have a significant traffic impact on Queen Kaahumanu Highway when the project is fully occupied in 1999.

The analysis indicates that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The results of the analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development in the area continues as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, the left turn movement from Queen Kaahumanu Highway into the project access road will operate with average delays, LOS C. Thus traffic along the highway will not be delayed beyond normal driving conditions. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

If the intersection of Queen Kaahumanu Highway and the project access road is left unsignalized by the year 1999, project traffic will experience extreme delays in attempting left turns onto Queen Kaahumanu Highway. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity and at an acceptable level-of-service.

To mitigate the impacts of the proposed Kohanaiki Mauka Project, we recommend the following:

• Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left-turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway. The intersection recommendations are shown in Figure 8.

• Signalize the intersection of Queen Kaahumanu Highway with the project access road when future traffic volumes meet signal warrants.

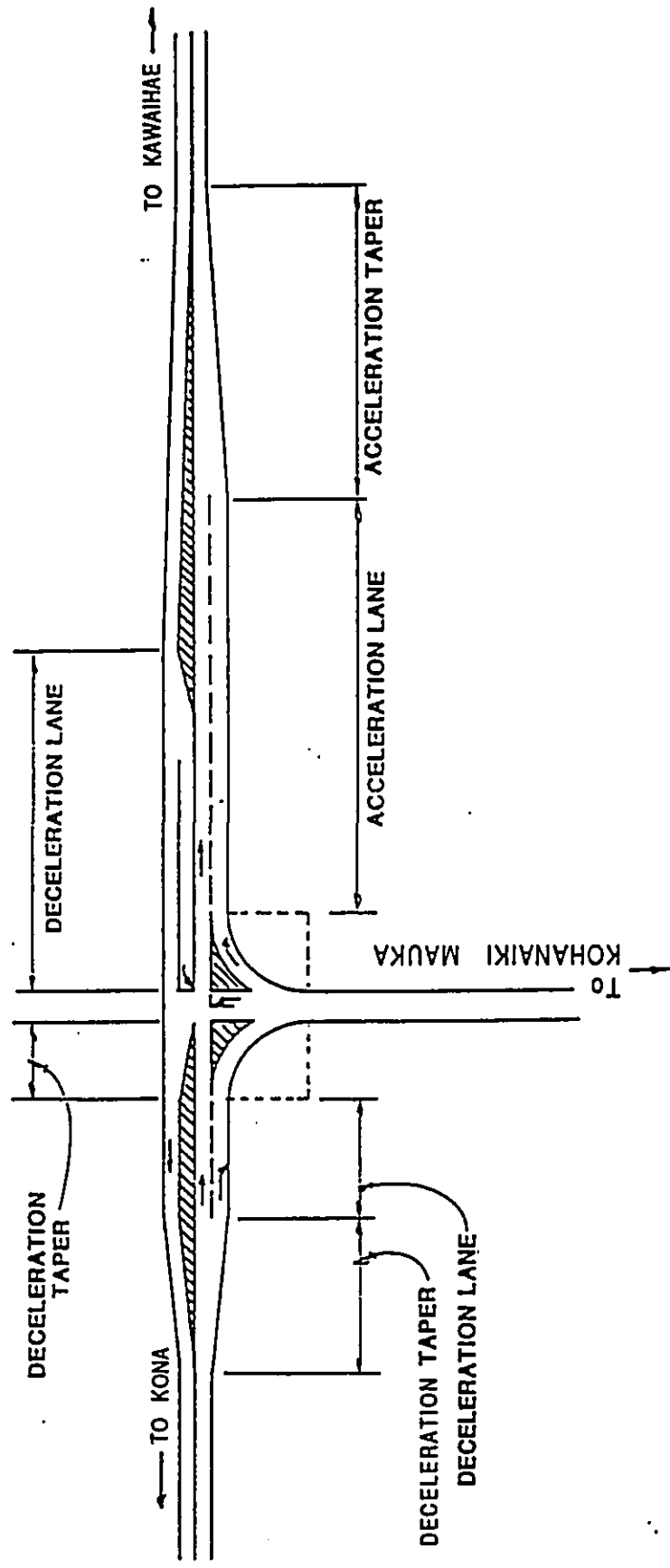


Figure 8. Schematic Intersection Layout

APPENDIX A

Definition of Level-of-Service  
for  
Unsignalized Intersections  
and  
Two-lane Rural Highways

APPENDIX A  
DEFINITION OF LEVEL-OF-SERVICE

For unsignalized intersections, the traffic most impacted will be the minor or cross-street with the stop or yield control. The major roadway will have the right-of-way. The level-of-service is the amount of delay expected for the average vehicle desiring to cross or enter the major road. The following gives a general description of the measure.

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with level-of-service A representing the best operating conditions and level-of-service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.



Level-of-service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level-of-service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

## TWO-LANE HIGHWAYS

The highest quality of traffic service occurs when motorists are able to drive at their desired speed. Without strict enforcement, this highest quality, representative of *level-of-service A*, would result in average speeds approaching 60 mph on two-lane highways. ...almost no platoons of three or more vehicles are observed. Drivers would be delayed no more than 30 percent of the time by slow-moving vehicles.

*Level-of-service B* characterizes the region of traffic flow wherein speeds of 55 mph or slightly higher are expected on level terrain. Drivers are delayed up to 45 percent of the time on the average.

*Level-of-service C* results in noticeable increases in platoon formation, platoon size, and frequency of passing impediment. Average speed still exceeds 52 mph on level terrain... While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles.

*Level-of-service D* traffic approaches unstable traffic flow. ...passing becomes extremely difficult. Mean platoon sizes of 5 to 10 vehicles are common, although speeds of 50 mph can be maintained under ideal conditions. Maximum service flow rates of 1,800 passenger cars per hour, total in both directions, can be maintained under ideal conditions. This is the highest flow rate that can be maintained for any length of time over an extended section of level terrain without a high probability of breakdown.

*Level-of-service E* is defined as traffic flow conditions having a percent time delay of greater than 75 percent. Passing is virtually impossible under these conditions, and platooning becomes intense when slower vehicles or other interruptions are encountered. The highest attainable volume under E is the capacity of the highway. Under ideal conditions, capacity is 2800 pcph, total in both directions. This value decreases as the directional split of traffic changes from a 50/50 split to 0/100.

When traffic demand exceeds capacity, *Level-of-service F* is heavily congested flow. Volumes are lower than capacity, and speeds are below capacity speed.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

APPENDIX B

TRAFFIC COUNT DATA

Date: April 11, 1989

Location: Queen Kaahumanu Highway @ Kaiminani Drive

Time (pm)	Queen Kaahumanu Highway				Kaiminani Drive		Total All Approaches
	Southbound		Northbound		Westbound		
	LT	TH	TH	RT	LT	RT	
3:00-3:15	11	69	42	17	18	12	169
3:15-3:30	17	103	64	26	18	14	242
3:30-3:45	14	116	69	27	21	13	260
3:45-4:00	29	94	67	21	29	10	250
4:00-4:15	16	119	69	37	19	16	276
4:15-4:30	18	100	69	22	22	6	237
4:30-4:45	<u>17</u>	<u>104</u>	<u>64</u>	<u>41</u>	<u>26</u>	<u>7</u>	<u>259</u>
Peak Hour							
Total	76	432	269	111	87	53	1028

Location: Queen Kaahumanu Highway @ Palani Road

Time (pm)	Queen Kaahumanu Highway						Palani Road						Total All Approaches
	Southbound			Northbound			Westbound			Eastbound			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
3:15-3:30	31	85	96	41	55	30	30	62	19	73	75	63	660
3:30-3:45	21	88	102	49	65	28	27	65	25	72	87	60	689
3:45-4:00	44	83	86	63	67	27	36	76	24	61	114	62	743
4:00-4:15	42	90	115	37	59	33	36	62	38	62	108	83	765
4:15-4:30	<u>33</u>	<u>91</u>	<u>120</u>	<u>42</u>	<u>67</u>	<u>37</u>	<u>38</u>	<u>79</u>	<u>24</u>	<u>79</u>	<u>105</u>	<u>81</u>	<u>796</u>
Peak Hour													
Total	140	352	423	191	258	125	137	282	111	274	414	286	2993

APPENDIX C

D.O.T.'s Letter Dated August 8, 1991

JOHN WAIHEE  
GOVERNOR

*and copy to [unclear] P-02*  
*[Signature]*  
EDWARD Y. HIRATA  
DIRECTOR



DEPUTY DIRECTORS  
AL PANG  
JOYCE T. OMINE  
JEANNE K. SCHULTZ  
CALVIN M. TSUDA

IN REPLY REFER TO:

HWY-PS  
2.8195

AUG 21 1991

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
800 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813-5097 '91 AGO 12 P12:56  
August 8, 1991

OFF. OF ENVIRONMENTAL  
QUALITY CONTROL

MEMORANDUM

TO: Brian Choy, Director  
Office of Environmental Quality Control

FROM: Edward Y. Hirata, Director  
Department of Transportation *[Signature]*

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT  
KOHANAIKI MAUKA MIXED USE DEVELOPMENT,  
KOHANAIKI, NORTH KONA, HAWAII  
TMK: 7-3-9: 15

Thank you for your transmittal requesting our review of the draft  
EIS for the proposed development.

We have the following comments:

1. The Traffic Impact Assessment Report (TIAR) should be revised  
and resubmitted for our evaluation.
  - a. The report should evaluate the access connection to a  
two-lane frontage road.

Queen Kaahumanu Highway is being planned as a  
high-speed, limited access highway with frontage roads  
and interchanges at selected locations. Access to the  
highway will be allowed only at major interchanges; all  
other roadways will have to access onto a system on  
frontage roads on both sides of the highway.

An engineering study is currently underway to determine  
the location of these interchanges along the highway,  
from Kailua to Kawaihae. Additional rights-of-way are  
required at these designated interchange sites.

Mr. Brian Choy  
Page 2  
August 8, 1991

HWY-PS 2.8195

- b. The 5% annual growth rate used to project ambient traffic is significantly lower than rates used for other studies in the area.

The forecasts for this corridor from the Island of Hawaii Long Range Highway Plan are considered conservative as they do not reflect many of the new proposed developments for the area. Yet the forecasts are two to three times higher than those used in the TIAR.

- c. The TIAR states that the access road is shared with the adjoining lot. Traffic from this lot should be included in the intersection analysis.
- d. The AM peak hour should also be evaluated. Impacts to our facility may be critical during the commuter peak, with employees entering the project site.
2. Until the designated interchange in the project vicinity is constructed, the developer shall provide a fully channelized intersection.
3. Our present policy prohibits the installation of traffic signals along Queen Kaahumanu Highway.
4. The developer should commit to providing those roadway improvements required by his project.
5. Additional regional traffic mitigation measures required as a cumulative result of this and other projects in the area should also be provided by the developer. The developer should participate in the funding and construction of such regional traffic improvements on a prorata basis, as determined by the State Department of Transportation.
6. All utilities within the Queen Kaahumanu Highway rights-of-way shall be placed underground and outside the edge of the pavement. Bikepaths and highway landscaping should also be discussed.
7. Plans for construction work within the State highway right-of-way must be submitted for our review and approval. All costs incurred for roadway improvements shall be borne by the developer.

Mr. Brian Choy  
Page 3  
August 8, 1991

HWY-PS 2.8195

8. Direct diversion of surface water runoff onto Queen Kaahumanu Highway will not be permitted.
9. The developer should coordinate with adjacent developers to determine the location of their interconnecting internal roadway system and other related infrastructure.



APPENDIX D

PP&E's Letter Report Dated October 7,1991

**PACIFIC PLANNING**  
ENGINEERING, INC.

October 7, 1991

Mr. James Leonard  
PBR Hawaii  
101 Aupuni Street, Suite 310  
Hilo, Hawaii 96720

**Subject: Kohanaiki Mauka Traffic Study**

Dear Mr. Leonard:

The following is in response to the Department of Transportation (DOT) letter dated August 8, 1991 (ref. HWY-PS 2.8195) in review of the June 1989 Traffic Impact Report included within the Kohanaiki Mauka Draft EIS:

**Comment 1a:** The report should evaluate the access connection to a two-lane frontage road.

**Response:** The Department of Transportation's policy is for Queen Kaahumanu Highway to be a limited access facility with a system of frontage roads and therefore no signalization. We understand that DOT is in the process of studying the Queen Kaahumanu Corridor and developing a frontage road system.

To reasonably evaluate the access connection to a two-lane frontage road, information will be needed from the DOT such as the completion date of the frontage road, the land uses that will be served by the frontage road, and where the frontage road will connect to other roadway facilities (i.e. interchanges, arterial roads, etc.).

D-77

Mr. James Leonard

October 7, 1991

Page 2

Based on discussions with DOT staff, the needed information has not been developed yet. Currently, there is no plan or schedule for the construction of a frontage road in the vicinity of the project. Their best guess when the frontage road may be completed is the year 2005, which is after the projected completed date of the project.

**Comment 1b:** The 5% annual growth rate used to project ambient traffic is significantly lower than rates used for other studies in the area.

**Response:** Our methodology to forecast traffic was based upon adding the existing traffic volumes, new traffic based on the historical traffic growth rate on Queen Kaahumanu Highway, and new traffic generated by future developments in the vicinity of the subject project.

A 5% per year growth rate was used to increase through traffic along Queen Kaahumanu Highway. We also added traffic generated by future developments such as the Queen Lilioukalani Trust, Kealakehe Planned Community, and other projects.

The sum of the existing traffic volumes, the increase in through traffic on Queen Kaahumanu Highway, and nearby projects results in a growth rate of about 20% per year.

**Comment 1c:** The Traffic Impact Assessment Report states that the access road is shared with the adjoining lot. Traffic from this lot should be included in the intersection analysis.

**Response:** At this time, the owners of the adjoining lot have no firm plans for the development of their land. Therefore, it is difficult to estimate traffic volumes without identification of

Mr. James Leonard  
October 7, 1991  
Page 3

their proposed land uses and a timetable for potential development.

**Comment 1d:** The AM peak hour should be evaluated.

**Response:** We have forecasted traffic for the morning peak hour and have revised the afternoon peak hour based on more current information. The details of the assessment are shown in the attachment.

The results of the analysis indicate that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development continues in the area as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, drivers attempting to enter or exit the project will experience extreme delays, LOS F. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity.

To mitigate the impacts of the proposed Kohanaiki Mauka project, we recommend the following:

- Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway.

Mr. James Leonard  
October 7, 1991  
Page 4

- Based on discussions with the DOT staff, the frontage road system is expected to be completed after the proposed project. The intersection will need to be signalized to prevent extreme delays for entering and exiting traffic. During the interim period until the frontage road system can be implemented, we recommend signalizing the intersection of Queen Kaahumanu Highway with the project access road when warranted.

Comments 2 through 9 within the DOT letter were addressed in the Final EIS.

If you have any questions, please call me.

Best regards,

*Conrad Higashionna*

Conrad Higashionna, PE

Enclosure

## ATTACHMENT - FORECAST & ANALYSIS

### Existing Traffic Conditions

Twenty-four hour traffic counts taken at station C-8-M located at the 95 mile post sign along Queen Kaahumanu Highway in 1988 were obtained from the State Department of Transportation (DOT) Highways Division. Based on the data, the peak commuter morning traffic period generally occurs between 6:00 am - 9:00 am. The peak afternoon traffic period generally occurs between 3:00 pm - 5:00 pm. Morning traffic counts from the 1988 DOT traffic counts and afternoon counts from 1989 PPE counts were used as the baseline condition upon which future estimated traffic volumes were added.

### Future Conditions

The land uses surrounding the proposed project which is expected to generate additional traffic at the study intersection by the year 1999 are: Keahole Airport, Hawaii Ocean Science & Technology Park (HOST), Kaloko Light Industrial Subdivision, Kealakehe Planned Community and Keahuolu Lands Development.

### Future Traffic Without Project

Future traffic without the project was forecasted by increasing the existing traffic volumes by a historical growth rate and adding the additional traffic generated by the other developments. The annual growth in traffic along Queen Kaahumanu Highway was found to be approximately 5% a year. The existing morning peak hour traffic volumes at the study intersection were increased by 55% (5% x 11 years). The existing afternoon peak hour traffic volumes at the study intersection were increased by 50% (5% x 10 years).

The three step procedure of trip generation, trip distribution and assignment was used to forecast traffic from the other developments. The forecasts were also based on the traffic study for each development.

**Future Traffic With Project**

Future traffic with the project was forecasted by adding traffic generated by the Kohanaiki Mauka project to the forecasted traffic without the project.

The three-step procedure of trip generation, trip distribution, and traffic assignment was used to forecast peak hour traffic generated by the proposed project.

The number of trips were estimated from the ITE Trip Generation Report (Fifth Edition, 1991) and is shown in Table 1.

Table 1. Trip Generation for the Kohanaiki Mauka Development

Land Use	Units	AM Peak Hour		PM Peak Hour	
		Enter	Exit	Enter	Exit
Kohanaiki Mauka					
Light Industrial (acres)	54	289	32	52	320
Commercial (1,000 sq. ft.)	52	32	31	125	125
	<i>Total</i>	<i>321</i>	<i>63</i>	<i>177</i>	<i>445</i>

The distribution of trips for the project traffic was based upon predicted origins and destinations considering estimates of population and existing travel patterns. The resulting distribution patterns for the project generated traffic was 40% North and 60% South.

Trips generated by the project were assigned to the roadway network based upon existing travel patterns. Table 2 and 3 displays the existing traffic and the resultant traffic forecast in 1999 without and with the project generated traffic for the morning and afternoon peak hours.

Table 2. Weekday Morning Peak Hour Forecast Traffic

<u>Intersection</u>		1988 <u>Existing</u>	1999 <u>Without Project</u>	1999 <u>With Project</u>
<i>Queen Kaahumanu Hwy. and Project Access Road</i>				
Queen Kaahumanu Highway				
North Bound	TH	302	1235	1235
	RT	n/a	n/a	193
South Bound	LT	n/a	n/a	128
	TH	351	909	909
Project Access Road				
West Bound	LT	n/a	n/a	38
	RT	n/a	n/a	25

n/a - not applicable

Table 2. Weekday Afternoon Peak Hour Forecast Traffic

<u>Intersection</u>		1989 <u>Existing</u>	1999 <u>Without Project</u>	1999 <u>With Project</u>
<i>Queen Kaahumanu Hwy. and Project Access Road</i>				
Queen Kaahumanu Highway				
North Bound	TH	380	1094	1094
	RT	n/a	n/a	106
South Bound	LT	n/a	n/a	71
	TH	550	1594	1594
Project Access Road				
West Bound	LT	n/a	n/a	267
	RT	n/a	n/a	178

n/a - not applicable



## Traffic Impacts

Queen Kahumanu Highway and the study intersection were analyzed to determine the relative impact of the Kohanaiki Mauka project on the roadway system. The analysis was conducted for existing conditions, and 1999 forecasted conditions without and with the project.

## Analysis Results

The results of the intersection analysis are summarized and shown in Tables 6 and 7.

Table 6. Weekday Morning Analysis Results for Study Intersection

<u>Analysis</u>		<u>1991 Existing</u>	<u>1993 Without Project</u>	<u>1993 With Project</u>
<i>Two Lane Highway Analysis</i>				
Queen Kaahumanu Highway		C	E	F
<i>Multi-Lane Highway Analysis(4 lanes)</i>				
Queen Kaahumanu Highway				
North Bound		n/a	B	B
South Bound		n/a	A	A
<i>Unsignalized Intersection Analysis</i>				
Queen Kaahumanu Highway				
South Bound	LT	n/a	n/a	E
<i>Project Access Road</i>				
West Bound	LT	n/a	n/a	F
	RT	n/a	n/a	D
<i>Planning Analysis For Signalized Intersections</i>				
2-lanes along Queen Kaahumanu Hwy.		n/a	n/a	over capacity
4-lanes along Queen Kaahumanu Hwy.		n/a	n/a	under capacity

n/a - Not Applicable

# CORRECTION

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

## Traffic Impacts

Queen Kahumanu Highway and the study intersection were analyzed to determine the relative impact of the Kohanaiki Mauka project on the roadway system. The analysis was conducted for existing conditions, and 1999 forecasted conditions without and with the project.

## Analysis Results

The results of the intersection analysis are summarized and shown in Tables 6 and 7.

Table 6. Weekday Morning Analysis Results for Study Intersection

<u>Analysis</u>		<u>1991 Existing</u>	<u>1993 Without Project</u>	<u>1993 With Project</u>
<b>Two Lane Highway Analysis</b>				
Queen Kaahumanu Highway		C	E	F
<b>Multi-Lane Highway Analysis(4 lanes)</b>				
Queen Kaahumanu Highway				
North Bound		n/a	B	B
South Bound		n/a	A	A
<b>Unsignalized Intersection Analysis</b>				
Queen Kaahumanu Highway				
South Bound	LT	n/a	n/a	E
<b>Project Access Road</b>				
West Bound	LT	n/a	n/a	F
	RT	n/a	n/a	D
<b>Planning Analysis For Signalized Intersections</b>				
2-lanes along Queen Kaahumanu Hwy.		n/a	n/a	over capacity
4-lanes along Queen Kaahumanu Hwy.		n/a	n/a	under capacity

n/a - Not Applicable

**Table 7. Weekday Afternoon Analysis Results for Study Intersection**

<u>Analysis</u>	<u>1991 Existing</u>	<u>1993 Without Project</u>	<u>1993 With Project</u>
<b>Two Lane Highway Analysis</b>			
Queen Kaahumanu Highway	D	F	F
<b>Multi-Lane Highway Analysis(4 lanes)</b>			
Queen Kaahumanu Highway			
North Bound	n/a	A	B
South Bound	n/a	B	C
<b>Unsignalized Intersection Analysis</b>			
Queen Kaahumanu Highway			
South Bound	LT	n/a	n/a
			D
<b>Project Access Road</b>			
West Bound	LT	n/a	n/a
	RT	n/a	n/a
			F
			F
<b>Planning Analysis For Signalized Intersection</b>			
2-lanes along Queen Kaahumanu Hwy.	n/a	n/a	over capacity
4-lanes along Queen Kaahumanu Hwy.	n/a	n/a	under capacity

n/a - Not Applicable

### Conclusion and Recommendations

The results of the analysis indicate that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels, LOS E to LOS F, even without the project. If development continues in the area as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, drivers attempting to enter or exit the project will experience extreme delays, LOS E to LOS F. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity.

To mitigate the impacts of the proposed Kohanaiki Mauka project, we recommend the following:

- Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway.
- Based on discussions with the DOT staff, the frontage road system is expected to be completed after the proposed project. The intersection will need to be signalized to prevent extreme delays for entering and exiting traffic. During the interim period until the frontage road system can be implemented, we recommend signalizing the intersection of Queen Kaahumanu Highway with the project access road when warranted.

The following updated Traffic Impact Assessment and summary letter responds to issues raised by the State Department of Transportation, Highways Division concerning the Draft Environmental Impact Statement for Kohanaiki Mauka.

TRAFFIC IMPACT ASSESSMENT REPORT

FOR

KOHANAIKI MAUKA

KOHANAIKI, NORTH KONA, HAWAII

TMK: 7-3-9:15, 3rd Tax Division

October 8, 1991

Prepared for:

PBR Hawaii, Inc.

Prepared by:

Pacific Planning & Engineering, Inc.  
1221 Kapiolani Boulevard, Suite 740  
Honolulu, Hawaii 96814

D-37

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## FOREWORD

Pacific Planning and Engineering, Inc. (PP&E) completed this traffic impact assessment report in June 1989. After the Department of Transportation (D.O.T.) reviewed this report, it issued a letter listing their concerns about the study. Appendix C contains the D.O.T. letter dated August 8, 1991 (ref. HWY-PS 2.8195). Pacific Planning and Engineering, Inc. has addressed the comments issued by D.O.T. in a letter report dated October 7, 1991. PPE's letter report is contained in Appendix D.

## EXECUTIVE SUMMARY

This traffic study identifies and evaluates the probable impact of traffic generated by the proposed Kohanaiki Mauka Project in the year 1999 when the proposed project is expected to be fully occupied.

The Kohanaiki Mauka Project is a proposed commercial and industrial subdivision in West Hawaii. The project site is located on Queen Kaahumanu Highway between Keahole Airport and Kailua Town.

This traffic report describes the impact on the intersection of the proposed access road with the existing Queen Kaahumanu Highway. Impacts are assessed during the 3:15 to 4:15 pm time period, when the proposed project traffic is expected to have the greatest impact on the existing highways.

### Conclusions and Recommendations

The proposed Kohanaiki Mauka Project is *not* expected to have a significant traffic impact on Queen Kaahumanu Highway when the project is fully occupied in 1999.

The analysis indicates that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The results of the analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development in the area continues as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, the left turn movement from Queen Kaahumanu Highway into the project access road will operate with average delays, LOS C. Thus traffic along the highway will not be delayed beyond normal driving conditions. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

If the intersection of Queen Kaahumanu Highway and the project access road is left unsignalized by the year 1999, project traffic will experience extreme delays in attempting left turns onto Queen Kaahumanu Highway. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity and at an acceptable level-of-service.

To mitigate the impacts of the proposed Kohanaiki Mauka Project, we recommend the following:

- Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left-turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway. The intersection recommendations are shown in Figure 8.
- Signalize the intersection of Queen Kaahumanu Highway with the project access road when future traffic volumes meet signal warrants.

## PROJECT DESCRIPTION

The Kohanaiki Mauka Project is a proposed commercial and industrial subdivision in West Hawaii. The project site is located east (mauka) of Queen Kaahumanu Highway between Keahole Airport and Kailua Town, on an approximately 70-acre lot, identified by Tax Map Key: 7-3-9:15, 3rd Tax Division. The proposed project site is in a lava field 2 miles from the closest residential subdivision. The project location and roadway network in the vicinity are shown in Figure 1.

The project will consist of about 10 acres of commercial use and 55 acres of light industrial use. The project will be built in phases with about 27 acres to be developed by 1993, 22 acres by 1995, and 22 acres by 1998. The project is assumed to be fully occupied by 1999. When fully developed, the project will employ 575 to 705 employees. The project site plan is shown on Figure 2.

Access to the project site will be from an existing DOT permitted access location along Queen Kaahumanu Highway. The access road will be a paved 2-lane road with two 12 foot lanes and a 60-foot right-of-way. The permitted access is shared with the adjoining lot to the north. The vehicular access permitted opening is 80 feet wide.

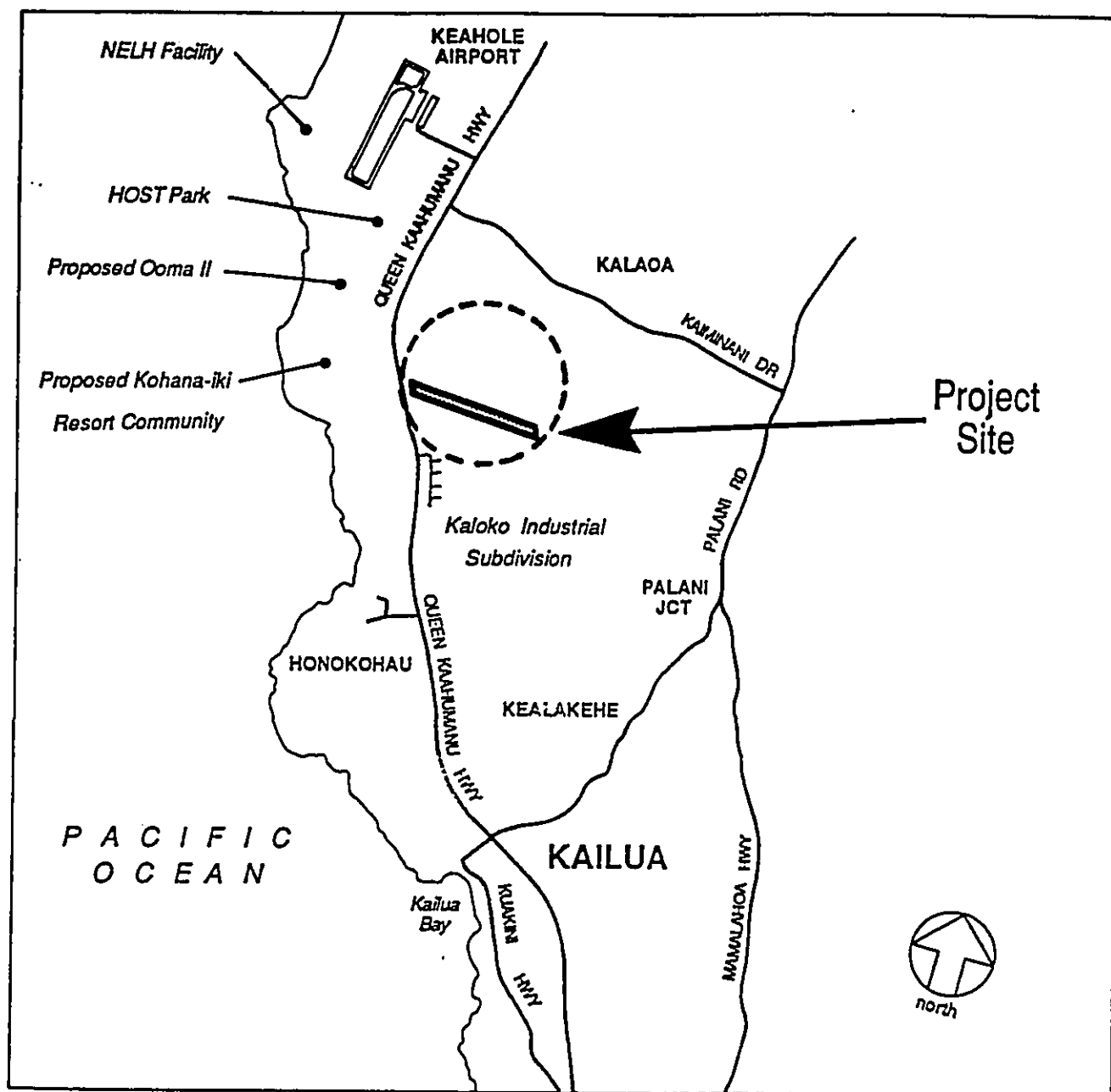
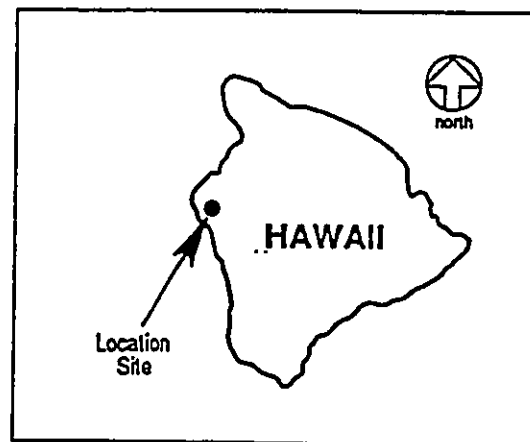
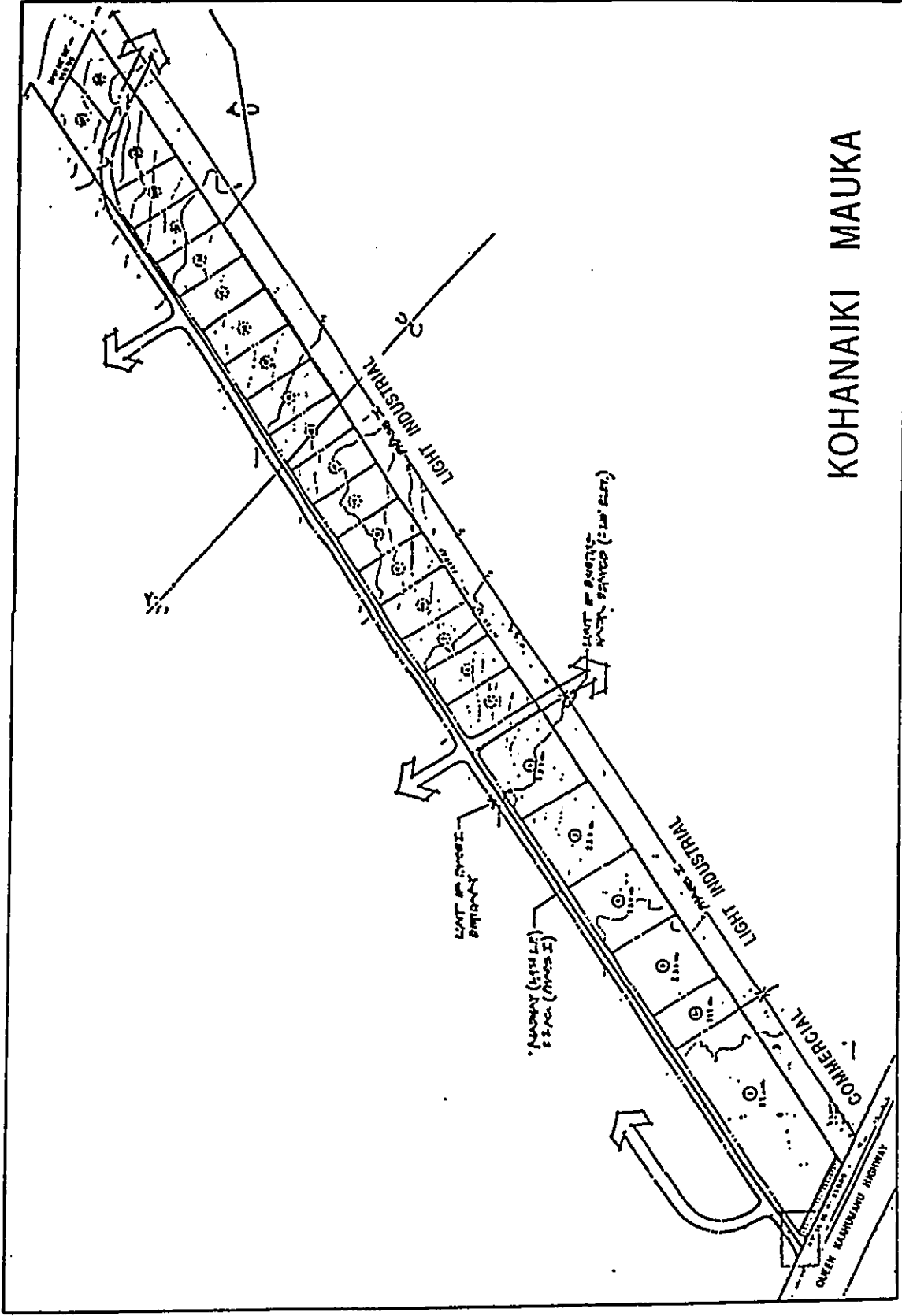


Figure 1. Project Location



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



KOHANAIKI MAUKA

Figure 2. Project Site Plan

## EXISTING CONDITIONS

An inventory of existing conditions was conducted to better understand the traffic impact of the proposed project. The review included the land uses in the area, roadway facilities in the area, and traffic conditions. The study focuses on the proposed intersection of the project access road with Queen Kaahumanu Highway.

### Area Conditions

The West Hawaii area is a rapidly developing area. There are many proposed resort developments and thus increasing employment opportunities. Between 1980 and 1987, the population of the North Kona District increased by 50% from about 13,700 to 20,500 people.

The land uses immediately surrounding the project consist mostly of undeveloped land. The area is characterized by large barren masses of lava and patches of vegetation. The terrain is varied and ranges from level to sloping. Presently, the two major State land use classifications in the area are "conservation" and "agricultural".

About two miles to the north of the proposed project is Keahole Airport which is owned and operated by the State Department of Transportation, Airports Division. The airport presently consists of a terminal, parking facilities, and a 6,500 foot runway. Keahole Airport is planned to be expanded by the State Department of Transportation to accommodate the forecasted increase in passengers to and from West Hawaii. Passengers enplaning and deplaning is forecasted to increase from 1,486,000 passengers in 1985 to



3,715,000 passengers in the year 2000. This is an increase of about 150%. To accommodate this increase, the runway is planned to be lengthened to 11,000 feet and the terminal facilities will be expanded, according to DOT Airports Division.

The Kaloko Light Industrial Subdivision Expansion is located mauka of Queen Kaahumanu Highway about a mile south of the Kohanaiki Mauka Project. The industrial subdivision consists of 250 acres of land. This project is planned to be completed in four phases. Presently the first phase of 55 lots of a total 194 lots has been developed. No other phases have been approved by the State Land Use Commission at this time and thus traffic generated by additional phases was not included in this report.

The Natural Energy Laboratory of Hawaii (NELH) and the Hawaii Ocean Science and Technology Park (HOST Park) are State owned. These facilities are located (west) makai of Queen Kaahumanu Highway about one to two miles north of the project site.

NELH is a research facility which conducts research in Ocean Thermal Energy Conversion and other activities. HOST Park will provide the necessary infrastructure for commercial applications of the high-tech projects.

NELH presently employs about 100 people. When fully developed, this facility will employ about 390 people. HOST Park is expected to accommodate 78 acres of Campus Industrial use which includes laboratories, educational facilities, and other uses which do not require the use of ocean water. The remaining 385 acres will be for Ocean Water Commercial uses such as mariculture, marine biotechnology, and renewable energy. At present, HOST Park has no tenants. This project is expected to be completely occupied by the year 1999.

### Roadway Facilities

The project is located between Queen Kaahumanu Highway to the West and Mamalahoa Highway to the East.

Queen Kaahumanu Highway is a major roadway through the area and leads to Kawaihae in the North and Kailua in the South. It is a two-lane rural arterial highway, built within a 240 foot right-of-way with a 24 foot wide pavement and 6 foot paved shoulders. There is a 55 miles per hour (mph) posted speed limit fronting the project site. Queen Kaahumanu Highway is maintained by the State Department of Transportation (SDOT). The major intersections along Queen Kaahumanu Highway are channelized with left-turn storage lanes for safety and to maximize roadway capacity. The intersections are unsignalized except at the junction with Palani Road in Kailua.

Mamalahoa Highway, which runs parallel to Queen Kaahumanu Highway, serves the upland areas between Waimea and North Kona. The State highway, built over a former horse-and-buggy trail is a sub-standard roadway with pavement width varying between 18 and 24 feet.

### Traffic Volumes

Traffic volume data from SDOT was used to determine traffic trends on Queen Kaahumanu Highway. Figure 3 summarizes the trend in Average Daily Traffic (ADT) along Queen Kaahumanu Highway at Keahole Airport Road, north of the project access road. The plotted data shows a steady increase in traffic on the order of five percent (5%) per year.

Peak traffic on Queen Kaahumanu Highway occurs between 11:00 am and 12:00 pm in the morning and between 3:15 and 4:15 pm in the afternoon fronting the project site. Traffic during the morning is less than during the afternoon peak hour. Traffic volumes at the study intersection were taken during the afternoon peak hour at the intersection of Queen Kaahumanu Highway and Kaiminani Drive on Tuesday, April 11, 1988. Traffic volumes were also taken at the intersection of Queen Kaahumanu Highway and Palani Road during the same time period. The manual counts are shown in Appendix B.

Five hundred nineteen (519) vehicles were recorded heading towards Kailua-Kona and 380 vehicles were recorded heading towards Kawaihae. The direction split is approximately 40% / 60%. The recorded volumes are shown on Figure 4.

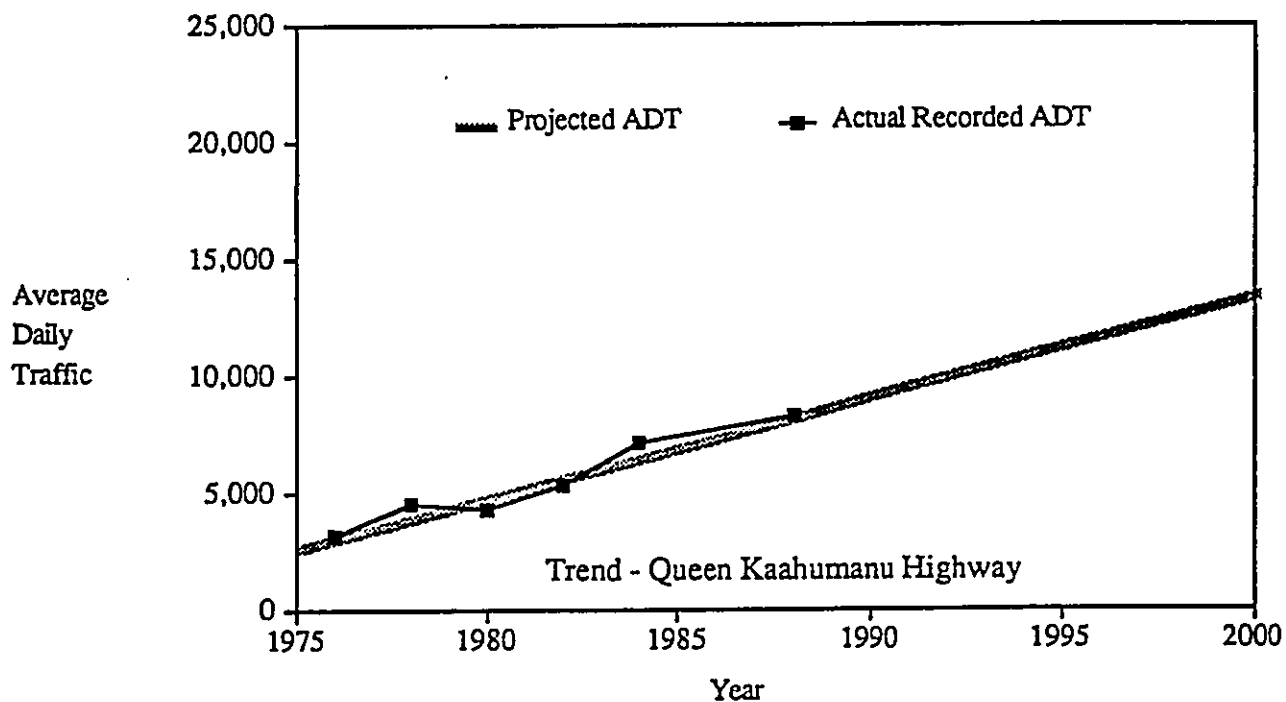
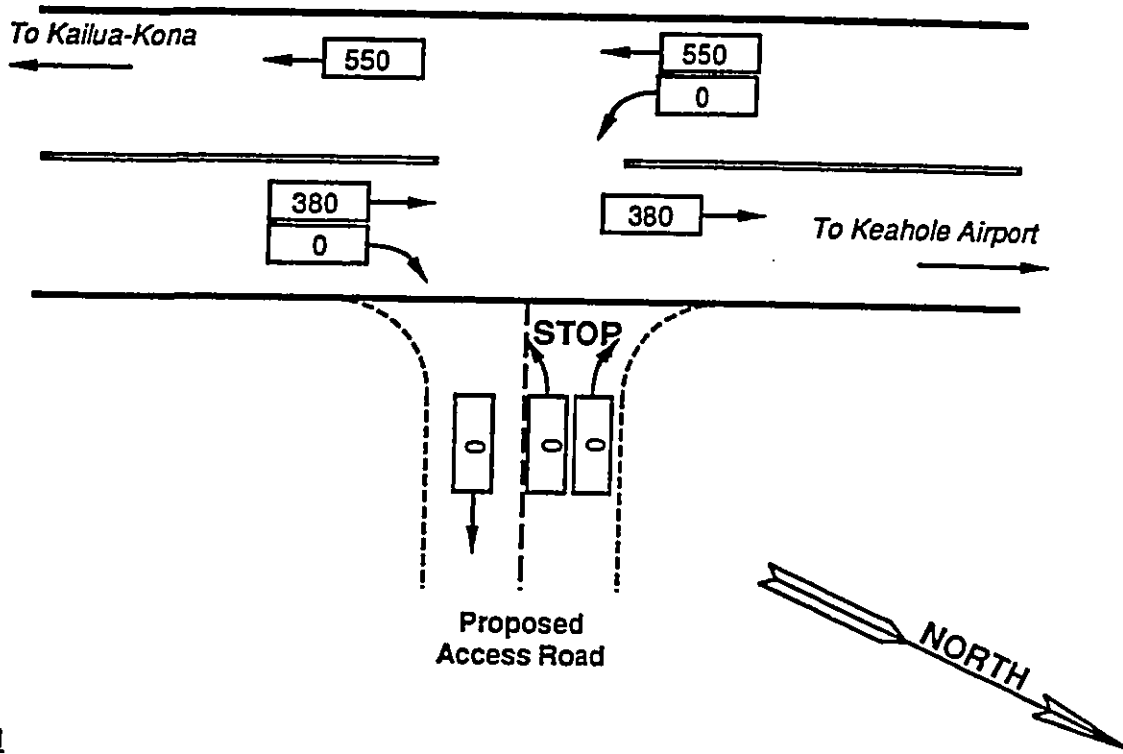


Figure 3. Trend in ADT along Queen Kaahumanu Highway at Keahole Airport Road

# Queen Kaahumanu Highway



**Legend**



 Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 4. Existing Afternoon Peak Hour Traffic Volumes

## FUTURE CONDITIONS

A research of planned developments and improvements to transportation facilities was conducted to estimate the future traffic conditions in the immediate area.

### Future Land Uses Surrounding Project

The Kohana-iki Resort Community is located on a 470 acre site makai of Queen Kaahumanu Highway directly across from the Kohanaiki Mauka Project. This development is an integrated resort including two resort hotels for a total of 700 rooms, 800 resort condominium units, an 18-hole golf course, a recreational clubhouse complex, a 150 slip marina, 200 single family units for permanent residents, 150 multi-family units of support housing, and 33,000 square feet of leasable commercial floor space. The Kohana-iki Resort Community development is assumed to be completed by the year 1999.

### Roadway Facilities

Queen Kaahumanu Highway is planned to be widened from a two-lane highway to a four-lane divided highway by the State Department of Transportation (SDOT). The highway will be widened from Kawaihae Road to Palani Road. As of the date of this report, funding has not been approved and there is no set schedule for the construction of this facility.

## PROJECTED TRAFFIC CONDITIONS

Traffic generated by the proposed project was added to the forecasted 1989 ambient traffic to estimate future traffic conditions in the year 1999, when the project is expected to be fully occupied.

### Ambient Traffic Forecast

Ambient traffic is the traffic which would occur regardless of whether the proposed project were built or not. The future ambient traffic was estimated based on the expected traffic due to developments in the immediate area to the year 1999 and the traffic growth trend on Queen Kaahumanu Highway.

Among the developments that are approved by government agencies and expected to be completed are the Kohana-iki Resort Community, HOST Park, and Keahole Airport Expansion. Traffic generated by the Kohana-iki Resort Community was estimated based on a traffic study by M&E Pacific. Traffic from HOST Park and Keahole Airport were estimated based on two traffic studies by Parsons Brinckerhoff. Based on the above reports traffic for the year 1999 was estimated.

Traffic counts by the State Department of Transportation (SDOT) shows that average daily traffic has been increasing by 5% annually, as discussed in the section on "Existing Conditions." This growth can be attributed to an increase in the amount of tourists and developments in West Hawaii. The growth rate on Queen Kaahumanu Highway generally reflects traffic increases from developments outside or beyond the study area.

The traffic generated from developments in the immediate area of the project and the ambient traffic increase were added together to obtain the forecasted traffic in the year 1999 without the project. The resultant ambient traffic volumes are shown in Figure 5.

Project Generated Traffic

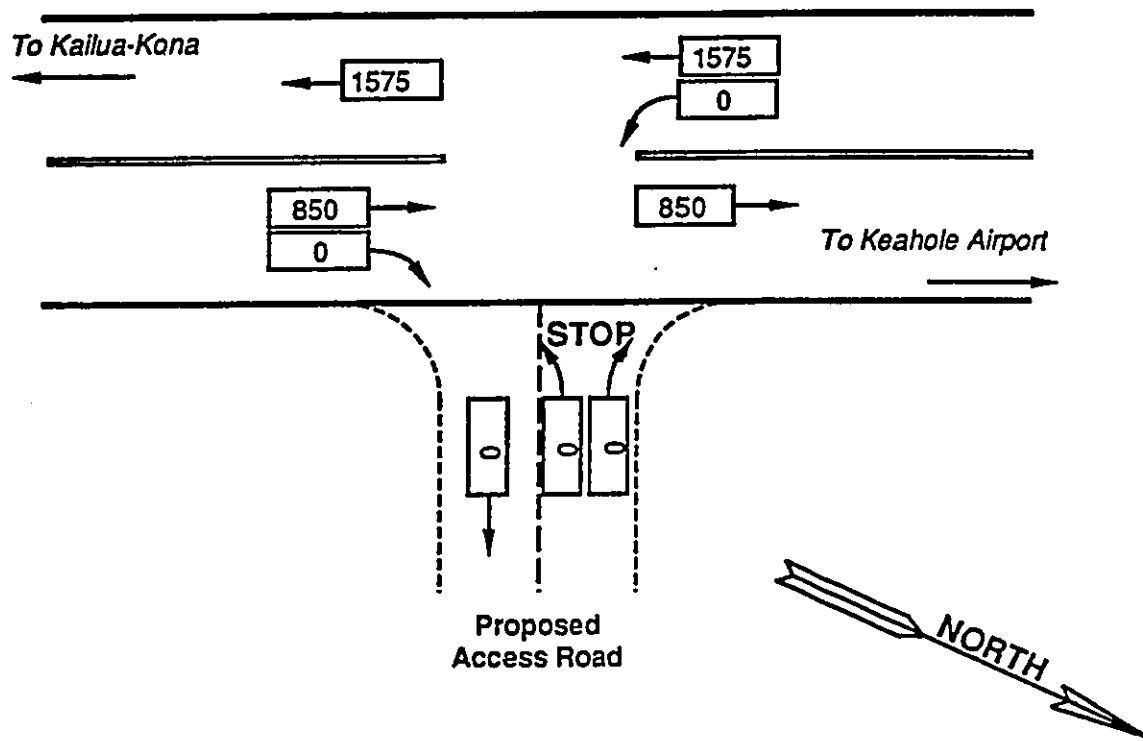
The traditional three-step procedure of trip generation, trip distribution and traffic assignment was used to estimate traffic from the proposed project.

The trip generation step estimates the number of trips which would enter and exit the proposed project during the afternoon peak hour. The number of trips were estimated from the ITE Trip Generation Report (Fourth Edition, 1987) for 51,000 square feet of leasable area of commercial and 54 acres of industrial land use. The estimated number of trips for the project is shown in Table 1, below.

Table 1. Trip Generation for Kohanaiki Mauka Project

<u>Land Use</u>	<u>Units</u>	<u>ITE Rates</u>		<u>No. of Trips</u>	
		<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Commercial (1000 sq ft leasable area)	51	2.39	2.39	125	125
Industrial (Acreage)	54	2.22	4.62	<u>120</u>	<u>250</u>
<b>Total Number of Trip Ends</b>				<b>245</b>	<b>375</b>

### Queen Kaahumanu Highway



**Legend**



 Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 5. Ambient Afternoon Peak Hour Traffic Volumes



The trip distribution step assigns trips to their expected origins and destinations. Trips to and from the proposed project are expected to originate near population centers from the districts of South Kohala, North Kona, and South Kona.

The distribution of population and households of West Hawaii was used to distribute the project generated trips. It was estimated that approximately 40% of the population is located North of the proposed project and 60% to the South. Based on this information, it was estimated that 40% of the vehicles will be arriving from the North or Kawaihae direction and 60% from the South or Kailua-Kona direction.

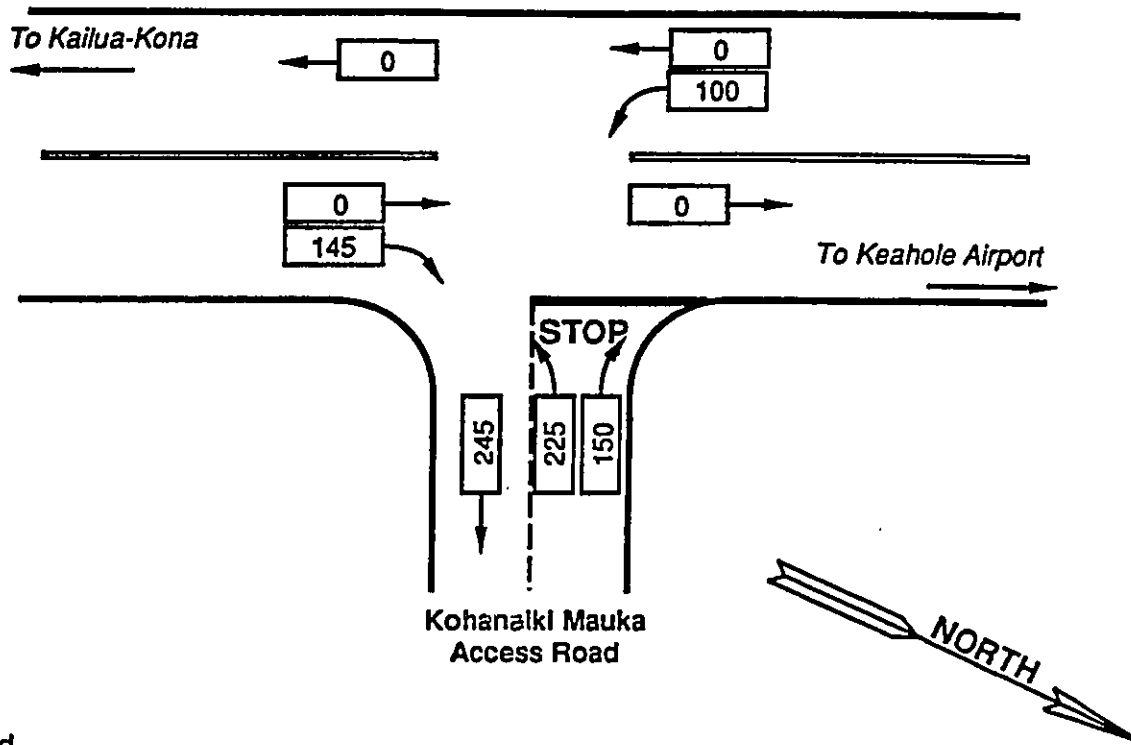
The traffic assignment step assigns trips to a specific route on the roadway network that will take the driver from origin to destination. All project traffic was assigned to Queen Kaahumanu Highway, the only available roadway to and from the project. The resultant assignment of project generated trips is shown below and in Figure 6.

	Inbound	Outbound
Queen Kaahumanu Highway, North	40%	40%
Queen Kaahumanu Highway, South	60%	60%

Total Traffic

The ambient traffic volumes in Figure 5 were added to the project generated volumes in Figure 6 to obtain the total forecast volumes shown in Figure 7.

### Queen Kaahumanu Highway

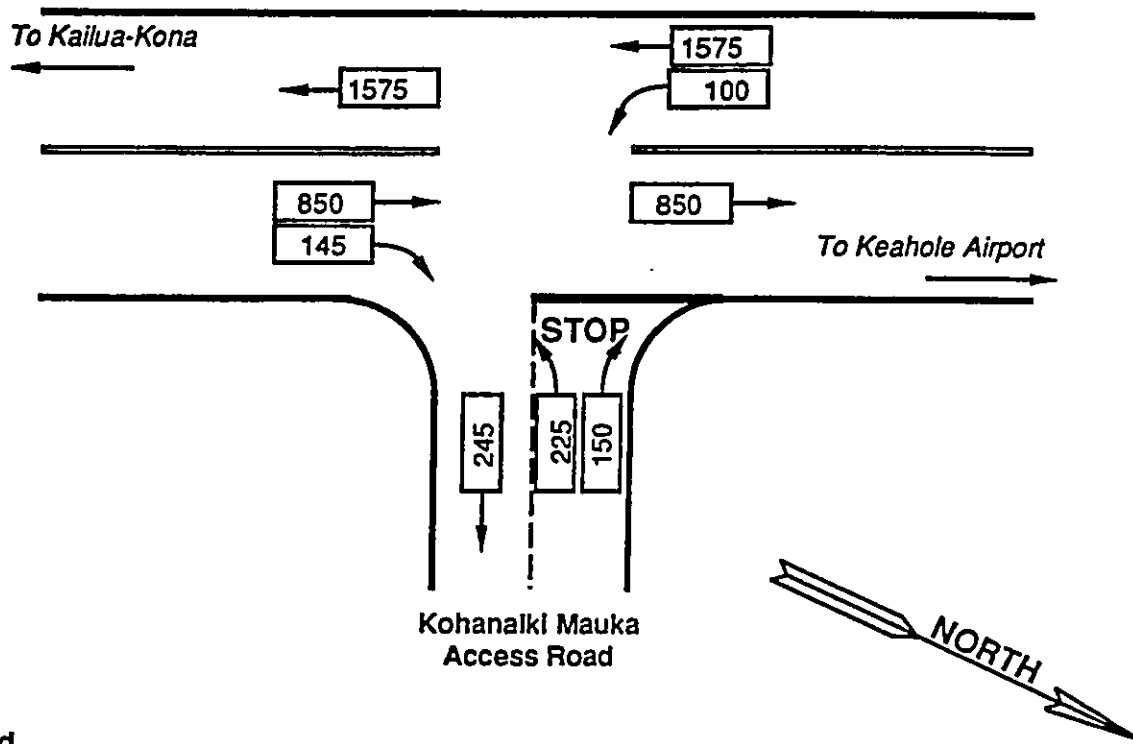


**Legend**

245 → Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm  
 Volumes have been rounded off to the nearest 5

Figure 6. Project Generated Trips

# Queen Kaahumanu Highway



## Legend

850 → Number of vehicles and direction of travel during the hour between 3:15 and 4:15 pm

Volumes have been rounded off to the nearest 5

Figure 7. Total Traffic

## TRAFFIC IMPACT ANALYSIS

### Queen Kaahumanu Highway

Impacts from the proposed project were measured by the change in the traffic's level-of-service of Queen Kaahumanu Highway without and with the project. The capacity of these roads was estimated in accordance with the latest Highway Capacity Manual, Special Report 209 (1986) analysis techniques.

Level-of-service is classified into six categories ranging from LOS A, where motorists can drive at their desired speed, to LOS F, where motorists experience heavily congested flow with traffic demand exceeding capacity. The capacity of a two-lane rural road occurs at LOS E. The definition of LOS for two-lane rural highways is given in Appendix A.

The present estimated capacity of the two-lane Queen Kaahumanu Highway is about 2550 vehicles per hour in both directions during the afternoon peak hour. The results of the analysis are shown in Table 2 below.

Table 2. Level-of-Service of Queen Kaahumanu Highway

	1989		1999 Without Project		1999 With Project	
	<u>Volume</u> <sup>1</sup>	<u>LOS</u>	<u>Volume</u> <sup>1</sup>	<u>LOS</u>	<u>Volume</u> <sup>1</sup>	<u>LOS</u>
Kaahumanu (2 Lanes)	1010	C	2610	F	3010	F
Kaahumanu (4 Lanes)	n/a	n/a	2610	D	3010	D

<sup>1</sup>Volume is based on the peak 15 minute volume during the peak hour.



The results of the analysis show that even without the project, Queen Kaahumanu Highway will be over capacity by the year 1999. With Queen Kaahumanu Highway widened to four lanes, the capacity of the highway is increased to about 3500 vehicles per hour and would operate below capacity.

#### Project Intersection

Impacts from the proposed project were measured by the change in level of service (LOS) for specific turning movements *with* and *without* the project. The existing traffic volumes, the ambient traffic volumes, and the total forecast traffic volumes were analyzed. These traffic conditions are shown in Figures 4, 5, and 7, respectively.

Impacts on traffic resulting from the proposed Kohanaiki Mauka Project were measured by the Level-of-Service (LOS) at the intersection of Queen Kaahumanu Highway with the project access road. The analysis was done for unsignalized intersections in accordance with the latest TRB Highway Capacity Manual, Special Report 209 (HCM) (1986) analysis techniques. The methodology yields levels of service ranging from A to F (summarized in Appendix A). The LOS for the traffic movements at an intersection is classified into six categories ranging from little or no delay (LOS A) to extreme delays (LOS F). The results of the analysis are summarized on Table 3.

The results indicate that by the year 1999 traffic along Queen Kaahumanu Highway will not be delayed beyond normal driving conditions at the study intersection. The left turn movement from Queen Kaahumanu Highway into the project access road will operate at average delays and level-of-service. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

Table 3. LEVEL OF SERVICE

<u>Intersection</u>		<u>1989</u>	<u>1999 w/o Project</u>	<u>1999 w/ Project</u>
Queen Kaahumanu Highway - Project Access Road				
Project Access Road	LT	n/a	n/a	F
	RT	n/a	n/a	B
Queen Kaahumanu Highway	LT	n/a	n/a	C

LT - left turn      RT - right turn      n/a - not applicable (presently there is no intersection)

Signalization of Study Intersections

Due to the expected delays for the minor streets, the study intersections were analyzed as signalized intersections for two and four lane conditions on Queen Kaahumanu Highway. The Planning Analysis technique from the HCM was used to estimate the capacity of the signalized intersections.

Planning analysis uses an intersection's critical volume to determine whether an intersection will be over, near, or under capacity. The critical volume measures intersection capacity using the volume of conflicting traffic movements. A critical volume of less than 1200 vehicles indicates that an intersection is under capacity, between 1200 and 1400 vehicles indicates near capacity, and greater than 1400 vehicles indicates over capacity.

The results of the analysis, shown in Table 4, indicate that if Queen Kaahumanu Highway remains a two lane highway the signalized study intersection would operate over

capacity. If Queen Kaahumanu Highway is widened to four lanes, the study intersection would operate under capacity, indicating that the intersection requires four lanes to successfully accommodate the increase in traffic.

**Table 4. Critical Volumes and Capacity Level**  
**Planning Analysis--Intersection of Queen Kaahumanu Highway & Project Road**

<u>Intersection</u>	2000 w/ Project	
	<u>Critical Vol.</u>	<u>Capacity Level</u>
Two-lane Undivided	1800	Over
Four-lane Divided	1010	Under

Percentage of Kohanaiki Mauka Traffic on Queen Kaahumanu Highway

Traffic due to the Kohanaiki Mauka Project will increase traffic on the Queen Kaahumanu Highway. At the north leg of the intersection of Queen Kaahumanu Highway and the project access road, the traffic will increase by about 10% during the afternoon. At the south leg, the traffic will increase by 15%. Table 5 below shows the volumes and percent increases. The further from the project site, project generated traffic will decrease as a percentage of traffic on Queen Kaahumanu Highway.

**Table 5. 1999 Traffic Volume Increase Due to Kohanaiki Mauka**

<u>Approach</u>	Without	With	%
	<u>Project</u>	<u>Project</u>	
North Leg (Two directions)	2425	2675	10%
South Leg (Two directions)	2425	2795	15%



## CONCLUSION AND RECOMMENDATIONS

The proposed Kohanaiki Mauka Project is *not* expected to have a significant traffic impact on Queen Kaahumanu Highway when the project is fully occupied in 1999.

The analysis indicates that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The results of the analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development in the area continues as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, the left turn movement from Queen Kaahumanu Highway into the project access road will operate with average delays, LOS C. Thus traffic along the highway will not be delayed beyond normal driving conditions. The right turn movement from the project access road will operate at good level-of-service with little delays. The left turn movement from the project, however, will operate with extreme delays, LOS F.

If the intersection of Queen Kaahumanu Highway and the project access road is left unsignalized by the year 1999, project traffic will experience extreme delays in attempting left turns onto Queen Kaahumanu Highway. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity and at an acceptable level-of-service.

To mitigate the impacts of the proposed Kohanaiki Mauka Project, we recommend the following:

• Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left-turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway. The intersection recommendations are shown in Figure 8.

• Signalize the intersection of Queen Kaahumanu Highway with the project access road when future traffic volumes meet signal warrants.

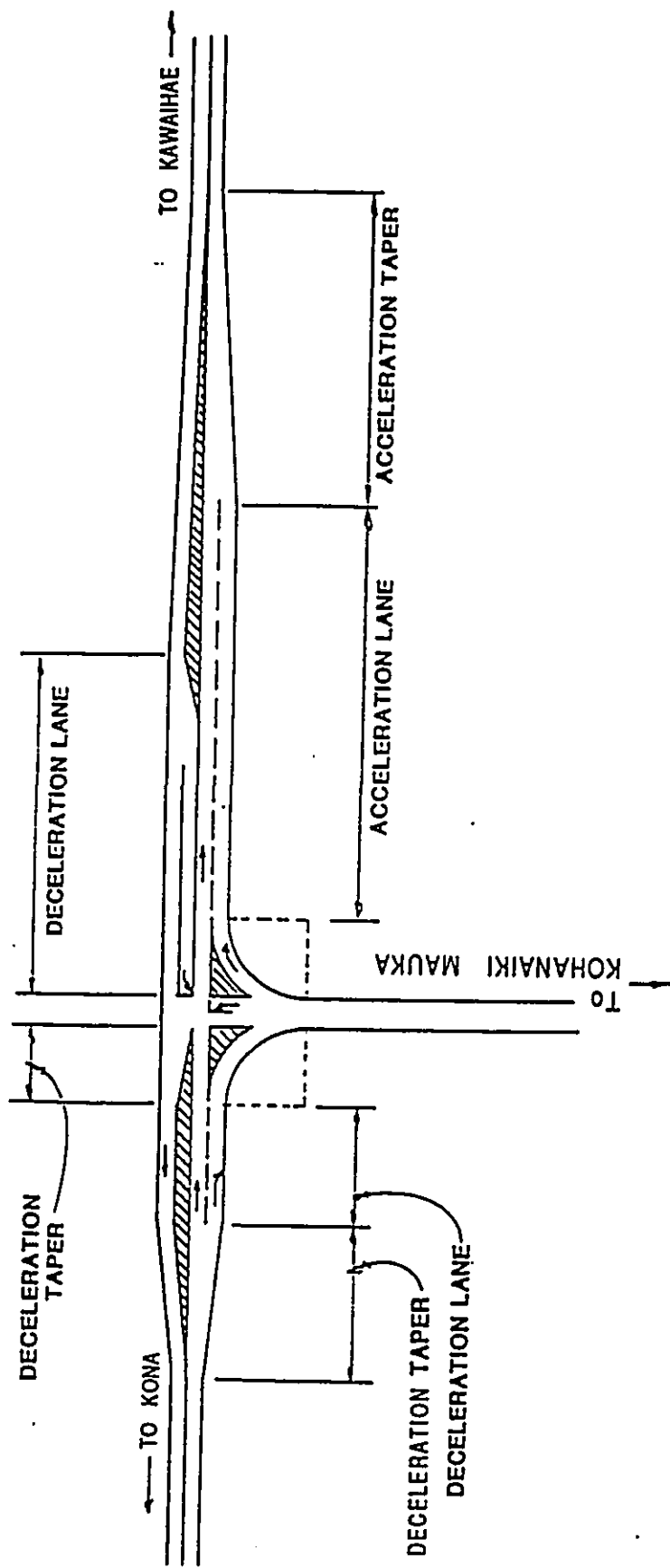


Figure 8. Schematic Intersection Layout

APPENDIX A

Definition of Level-of-Service  
for  
Unsignalized Intersections  
and  
Two-lane Rural Highways

APPENDIX A  
DEFINITION OF LEVEL-OF-SERVICE

For unsignalized intersections, the traffic most impacted will be the minor or cross-street with the stop or yield control. The major roadway will have the right-of-way. The level-of-service is the amount of delay expected for the average vehicle desiring to cross or enter the major road. The following gives a general description of the measure.

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with level-of-service A representing the best operating conditions and level-of-service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level-of-service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level-of-service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

## TWO-LANE HIGHWAYS

The highest quality of traffic service occurs when motorists are able to drive at their desired speed. Without strict enforcement, this highest quality, representative of *level-of-service A*, would result in average speeds approaching 60 mph on two-lane highways. ...almost no platoons of three or more vehicles are observed. Drivers would be delayed no more than 30 percent of the time by slow-moving vehicles.

*Level-of-service B* characterizes the region of traffic flow wherein speeds of 55 mph or slightly higher are expected on level terrain. Drivers are delayed up to 45 percent of the time on the average.

*Level-of-service C* results in noticeable increases in platoon formation, platoon size, and frequency of passing impediment. Average speed still exceeds 52 mph on level terrain... While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles.

*Level-of-service D* traffic approaches unstable traffic flow. ...passing becomes extremely difficult. Mean platoon sizes of 5 to 10 vehicles are common, although speeds of 50 mph can be maintained under ideal conditions. Maximum service flow rates of 1,800 passenger cars per hour, total in both directions, can be maintained under ideal conditions. This is the highest flow rate that can be maintained for any length of time over an extended section of level terrain without a high probability of breakdown.

*Level-of-service E* is defined as traffic flow conditions having a percent time delay of greater than 75 percent. Passing is virtually impossible under these conditions, and platooning becomes intense when slower vehicles or other interruptions are encountered. The highest attainable volume under E is the capacity of the highway. Under ideal conditions, capacity is 2800 pcph, total in both directions. This value decreases as the directional split of traffic changes from a 50/50 split to 0/100.

When traffic demand exceeds capacity, *Level-of-service F* is heavily congested flow. Volumes are lower than capacity, and speeds are below capacity speed.  
REFERENCE: Highway Capacity Manual (Special Report 209, 1985)



APPENDIX B

TRAFFIC COUNT DATA

Date: April 11, 1989

Location: Queen Kaahumanu Highway @ Kaiminani Drive

Time (pm)	Queen Kaahumanu Highway				Kaiminani Drive		Total All Approaches
	Southbound		Northbound		Westbound		
	<u>LT</u>	<u>TH</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>RT</u>	
3:00-3:15	11	69	42	17	18	12	169
3:15-3:30	17	103	64	26	18	14	242
3:30-3:45	14	116	69	27	21	13	260
3:45-4:00	29	94	67	21	29	10	250
4:00-4:15	16	119	69	37	19	16	276
4:15-4:30	18	100	69	22	22	6	237
4:30-4:45	<u>17</u>	<u>104</u>	<u>64</u>	<u>41</u>	<u>26</u>	<u>7</u>	<u>259</u>
Peak Hour Total	76	432	269	111	87	53	1028

Location: Queen Kaahumanu Highway @ Palani Road

Time (pm)	Queen Kaahumanu Highway						Palani Road						Total All Approaches
	Southbound			Northbound			Westbound			Eastbound			
	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>	
3:15-3:30	31	85	96	41	55	30	30	62	19	73	75	63	660
3:30-3:45	21	88	102	49	65	28	27	65	25	72	87	60	689
3:45-4:00	44	83	86	63	67	27	36	76	24	61	114	62	743
4:00-4:15	42	90	115	37	59	33	36	62	38	62	108	83	765
4:15-4:30	<u>33</u>	<u>91</u>	<u>120</u>	<u>42</u>	<u>67</u>	<u>37</u>	<u>38</u>	<u>79</u>	<u>24</u>	<u>79</u>	<u>105</u>	<u>81</u>	<u>796</u>
Peak Hour Total	140	352	423	191	258	125	137	282	111	274	414	286	2993

APPENDIX C

D.O.T.'s Letter Dated August 8,1991

OCT- 7-91 MON 11:51

JOHN WAIHEE  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
800 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813-5097  
August 8, 1991

*Handwritten notes:* AUG 12 12:56 P-02  
*Signature:* Edward Y. Hirata

EDWARD Y. HIRATA  
DIRECTOR  
DEPUTY DIRECTORS  
AL PANG  
JOYCE T. OMINE  
JEANNE K. SCHULTZ  
CALVIN M. TSUDA

IN REPLY REFER TO:

HWY-PS  
2.8195

AUG 21 1991

DFC. Q. E. I.  
QUALIT. CONTROL

MEMORANDUM

TO: Brian Choy, Director  
Office of Environmental Quality Control

FROM: Edward Y. Hirata, Director  
Department of Transportation *[Signature]*

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT  
KOHANAIKI MAUKA MIXED USE DEVELOPMENT,  
KOHANAIKI, NORTH KONA, HAWAII  
TMK: 7-3-9: 15

Thank you for your transmittal requesting our review of the draft EIS for the proposed development.

We have the following comments:

1. The Traffic Impact Assessment Report (TIAR) should be revised and resubmitted for our evaluation.
  - a. The report should evaluate the access connection to a two-lane frontage road.

Queen Kaahumanu Highway is being planned as a high-speed, limited access highway with frontage roads and interchanges at selected locations. Access to the highway will be allowed only at major interchanges; all other roadways will have to access onto a system on frontage roads on both sides of the highway.

An engineering study is currently underway to determine the location of these interchanges along the highway, from Kailua to Kawaihae. Additional rights-of-way are required at these designated interchange sites.

Mr. Brian Choy  
Page 2  
August 8, 1991

HWY-PS 2.8195

- b. The 5% annual growth rate used to project ambient traffic is significantly lower than rates used for other studies in the area.

The forecasts for this corridor from the Island of Hawaii Long Range Highway Plan are considered conservative as they do not reflect many of the new proposed developments for the area. Yet the forecasts are two to three times higher than those used in the TIAR.

- c. The TIAR states that the access road is shared with the adjoining lot. Traffic from this lot should be included in the intersection analysis.
- d. The AM peak hour should also be evaluated. Impacts to our facility may be critical during the commuter peak, with employees entering the project site.
2. Until the designated interchange in the project vicinity is constructed, the developer shall provide a fully channelized intersection.
3. Our present policy prohibits the installation of traffic signals along Queen Kaahumanu Highway.
4. The developer should commit to providing those roadway improvements required by his project.
5. Additional regional traffic mitigation measures required as a cumulative result of this and other projects in the area should also be provided by the developer. The developer should participate in the funding and construction of such regional traffic improvements on a prorata basis, as determined by the State Department of Transportation.
6. All utilities within the Queen Kaahumanu Highway rights-of-way shall be placed underground and outside the edge of the pavement. Bikepaths and highway landscaping should also be discussed.
7. Plans for construction work within the State highway right-of-way must be submitted for our review and approval. All costs incurred for roadway improvements shall be borne by the developer.

Mr. Brian Choy  
Page 3  
August 8, 1991

HWY-PS 2.8195

8. Direct diversion of surface water runoff onto Queen Kaahumanu Highway will not be permitted.
9. The developer should coordinate with adjacent developers to determine the location of their interconnecting internal roadway system and other related infrastructure.

APPENDIX D

PP&E's Letter Report Dated October 7,1991

**PACIFIC PLANNING**  
▲   ▲  
& E N G I N E E R I N G . I N C

October 7, 1991

Mr. James Leonard  
PBR Hawaii  
101 Aupuni Street, Suite 310  
Hilo, Hawaii 96720

**Subject: Kohanaiki Mauka Traffic Study**

Dear Mr. Leonard:

The following is in response to the Department of Transportation (DOT) letter dated August 8, 1991 (ref. HWY-PS 2.8195) in review of the June 1989 Traffic Impact Report included within the Kohanaiki Mauka Draft EIS:

**Comment 1a:** The report should evaluate the access connection to a two-lane frontage road.

**Response:** The Department of Transportation's policy is for Queen Kaahumanu Highway to be a limited access facility with a system of frontage roads and therefore no signalization. We understand that DOT is in the process of studying the Queen Kaahumanu Corridor and developing a frontage road system.

To reasonably evaluate the access connection to a two-lane frontage road, information will be needed from the DOT such as the completion date of the frontage road, the land uses that will be served by the frontage road, and where the frontage road will connect to other roadway facilities (i.e. interchanges, arterial roads, etc.).

D-77



Mr. James Leonard  
October 7, 1991  
Page 2

Based on discussions with DOT staff, the needed information has not been developed yet. Currently, there is no plan or schedule for the construction of a frontage road in the vicinity of the project. Their best guess when the frontage road may be completed is the year 2005, which is after the projected completed date of the project.

**Comment 1b:** The 5% annual growth rate used to project ambient traffic is significantly lower than rates used for other studies in the area.

**Response:** Our methodology to forecast traffic was based upon adding the existing traffic volumes, new traffic based on the historical traffic growth rate on Queen Kaahumanu Highway, and new traffic generated by future developments in the vicinity of the subject project.

A 5% per year growth rate was used to increase through traffic along Queen Kaahumanu Highway. We also added traffic generated by future developments such as the Queen Lilioukalani Trust, Kealakehe Planned Community, and other projects.

The sum of the existing traffic volumes, the increase in through traffic on Queen Kaahumanu Highway, and nearby projects results in a growth rate of about 20% per year.

**Comment 1c:** The Traffic Impact Assessment Report states that the access road is shared with the adjoining lot. Traffic from this lot should be included in the intersection analysis.

**Response:** At this time, the owners of the adjoining lot have no firm plans for the development of their land. Therefore, it is difficult to estimate traffic volumes without identification of

Mr. James Leonard  
October 7, 1991  
Page 3

their proposed land uses and a timetable for potential development.

**Comment 1d:** The AM peak hour should be evaluated.

**Response:** We have forecasted traffic for the morning peak hour and have revised the afternoon peak hour based on more current information. The details of the assessment are shown in the attachment.

The results of the analysis indicate that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels even without the project. If development continues in the area as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.

By the year 1999 with the project, drivers attempting to enter or exit the project will experience extreme delays, LOS F. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity.

To mitigate the impacts of the proposed Kohanaiki Mauka project, we recommend the following:

- Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway.

Mr. James Leonard  
October 7, 1991  
Page 4

- Based on discussions with the DOT staff, the frontage road system is expected to be completed after the proposed project. The intersection will need to be signalized to prevent extreme delays for entering and exiting traffic. During the interim period until the frontage road system can be implemented, we recommend signalizing the intersection of Queen Kaahumanu Highway with the project access road when warranted.

Comments 2 through 9 within the DOT letter were addressed in the Final EIS.

If you have any questions, please call me.

Best regards,

*Conrad Higashionna*

Conrad Higashionna, PE

Enclosure

## ATTACHMENT - FORECAST & ANALYSIS

### Existing Traffic Conditions

Twenty-four hour traffic counts taken at station C-8-M located at the 95 mile post sign along Queen Kaahumanu Highway in 1988 were obtained from the State Department of Transportation (DOT) Highways Division. Based on the data, the peak commuter morning traffic period generally occurs between 6:00 am - 9:00 am. The peak afternoon traffic period generally occurs between 3:00 pm - 5:00 pm. Morning traffic counts from the 1988 DOT traffic counts and afternoon counts from 1989 PPE counts were used as the baseline condition upon which future estimated traffic volumes were added.

### Future Conditions

The land uses surrounding the proposed project which is expected to generate additional traffic at the study intersection by the year 1999 are: Keahole Airport, Hawaii Ocean Science & Technology Park (HOST), Kaloko Light Industrial Subdivision, Kealakehe Planned Community and Keahuolu Lands Development.

### Future Traffic Without Project

Future traffic without the project was forecasted by increasing the existing traffic volumes by a historical growth rate and adding the additional traffic generated by the other developments. The annual growth in traffic along Queen Kaahumanu Highway was found to be approximately 5% a year. The existing morning peak hour traffic volumes at the study intersection were increased by 55% (5% x 11 years). The existing afternoon peak hour traffic volumes at the study intersection were increased by 50% (5% x 10 years).

The three step procedure of trip generation, trip distribution and assignment was used to forecast traffic from the other developments. The forecasts were also based on the traffic study for each development.

**Future Traffic With Project**

Future traffic with the project was forecasted by adding traffic generated by the Kohanaiki Mauka project to the forecasted traffic without the project.

The three-step procedure of trip generation, trip distribution, and traffic assignment was used to forecast peak hour traffic generated by the proposed project.

The number of trips were estimated from the ITE Trip Generation Report (Fifth Edition, 1991) and is shown in Table 1.

Table 1. Trip Generation for the Kohanaiki Mauka Development

<u>Land Use</u>	<u>Units</u>	<u>AM Peak Hour</u>		<u>PM Peak Hour</u>		
		<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>	
<b>Kohanaiki Mauka</b>						
Light Industrial (acres)	54	289	32	52	320	
Commercial (1,000 sq. ft.)	52	32	31	125	125	
		<i>Total</i>	<i>321</i>	<i>63</i>	<i>177</i>	<i>445</i>

The distribution of trips for the project traffic was based upon predicted origins and destinations considering estimates of population and existing travel patterns. The resulting distribution patterns for the project generated traffic was 40% North and 60% South.

Trips generated by the project were assigned to the roadway network based upon existing travel patterns. Table 2 and 3 displays the existing traffic and the resultant traffic forecast in 1999 without and with the project generated traffic for the morning and afternoon peak hours.

**Table 2. Weekday Morning Peak Hour Forecast Traffic**

<u>Intersection</u>		<u>1988 Existing</u>	<u>1999 Without Project</u>	<u>1999 With Project</u>
<i>Queen Kaahumanu Hwy. and Project Access Road</i>				
Queen Kaahumanu Highway				
North Bound	TH	302	1235	1235
	RT	n/a	n/a	193
South Bound	LT	n/a	n/a	128
	TH	351	909	909
Project Access Road				
West Bound	LT	n/a	n/a	38
	RT	n/a	n/a	25

n/a - not applicable

**Table 2. Weekday Afternoon Peak Hour Forecast Traffic**

<u>Intersection</u>		<u>1989 Existing</u>	<u>1999 Without Project</u>	<u>1999 With Project</u>
<i>Queen Kaahumanu Hwy. and Project Access Road</i>				
Queen Kaahumanu Highway				
North Bound	TH	380	1094	1094
	RT	n/a	n/a	106
South Bound	LT	n/a	n/a	71
	TH	550	1594	1594
Project Access Road				
West Bound	LT	n/a	n/a	267
	RT	n/a	n/a	178

n/a - not applicable

## Traffic Impacts

Queen Kahumanu Highway and the study intersection were analyzed to determine the relative impact of the Kohanaiki Mauka project on the roadway system. The analysis was conducted for existing conditions, and 1999 forecasted conditions without and with the project.

## Analysis Results

The results of the intersection analysis are summarized and shown in Tables 6 and 7.

Table 6. Weekday Morning Analysis Results for Study Intersection

<u>Analysis</u>	<u>1991 Existing</u>	<u>1993 Without Project</u>	<u>1993 With Project</u>
<b>Two Lane Highway Analysis</b>			
Queen Kaahumanu Highway	C	E	F
<b>Multi-Lane Highway Analysis(4 lanes)</b>			
Queen Kaahumanu Highway			
North Bound	n/a	B	B
South Bound	n/a	A	A
<b>Unsignalized Intersection Analysis</b>			
Queen Kaahumanu Highway			
South Bound	LT	n/a	E
<b>Project Access Road</b>			
West Bound	LT	n/a	F
	RT	n/a	D
<b>Planning Analysis For Signalized Intersections</b>			
2-lanes along Queen Kaahumanu Hwy.	n/a	n/a	over capacity
4-lanes along Queen Kaahumanu Hwy.	n/a	n/a	under capacity

n/a - Not Applicable

Table 7. Weekday Afternoon Analysis Results for Study Intersection

<u>Analysis</u>		<u>1991 Existing</u>	<u>1993 Without Project</u>	<u>1993 With Project</u>
<b>Two Lane Highway Analysis</b>				
Queen Kaahumanu Highway		D	F	F
<b>Multi-Lane Highway Analysis(4 lanes)</b>				
Queen Kaahumanu Highway				
North Bound		n/a	A	B
South Bound		n/a	B	C
<b>Unsignalized Intersection Analysis</b>				
Queen Kaahumanu Highway				
South Bound	LT	n/a	n/a	D
Project Access Road				
West Bound	LT	n/a	n/a	F
	RT	n/a	n/a	F
<b>Planning Analysis For Signalized Intersection</b>				
2-lanes along Queen Kaahumanu Hwy.		n/a	n/a	over capacity
4-lanes along Queen Kaahumanu Hwy.		n/a	n/a	under capacity

n/a - Not Applicable

### Conclusion and Recommendations

The results of the analysis indicate that the increase in ambient traffic along Queen Kaahumanu Highway will be the main cause of congestion on the highway by the year 1999. The analysis indicates that the two lanes of Queen Kaahumanu Highway will be operating at congested levels, LOS E to LOS F, even without the project. If development continues in the area as forecasted, Queen Kaahumanu Highway may need to be widened to four lanes.



By the year 1999 with the project, drivers attempting to enter or exit the project will experience extreme delays, LOS E to LOS F. If signalized (and with Queen Kaahumanu Highway widened to four lanes), the study intersection will operate below capacity.

To mitigate the impacts of the proposed Kohanaiki Mauka project, we recommend the following:

- Fully channelize the proposed intersection of the project access road with Queen Kaahumanu Highway with left turn storage lanes for safety and to maximize roadway capacity at each approach. Deceleration and acceleration lanes are also recommended, due to the high speed of traffic on this stretch of highway.
- Based on discussions with the DOT staff, the frontage road system is expected to be completed after the proposed project. The intersection will need to be signalized to prevent extreme delays for entering and exiting traffic. During the interim period until the frontage road system can be implemented, we recommend signalizing the intersection of Queen Kaahumanu Highway with the project access road when warranted.

A P P E N D I X E

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HYDROLOGICAL REPORT

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FAX 885-7851

June 21, 1991

KOHANAIKI MAUKA - Hydrogeologic Impacts of the proposed commercial/light park.

### BACKGROUND:

The proposed commercial/light industrial park will extend as a narrow strip of land from elevation 60 feet at Queen Kaahumanu Highway to an elevation of about 500 feet. The land is underlain by young unweathered lavas, erupted from the northwest rift zone of Hualalai. These lavas consist of aa type with clinkers at the surface and are underlain by thin bedded pahoehoe flows. All of the lavas are very permeable, both in the vertical and horizontal direction.

The property has a general slope of about 4 to 6 per cent at the surface. Of significance, the land surface is very flat (1%) just makai of the highway. There is virtually no soil cover on the land and the soil that is there is very thin and stony. The lack of soil combined with very light rainfall (20 inches) sustains only a very sparse amount of dryland type vegetation.

### HYDROGEOLOGY AND WATER QUALITY:

The aquifer which underlies the subject property consists of a basal lens containing brackish water. Water quality analyses for wells located up gradient at Kona Palisades and Kaloko mauka (see Well Location Map) are attached. The Liliuokalani Trust exploration well is drilled to an elevation of about minus 80 feet and produces water quality of about 85 per cent sea water. A water quality map attached (from the Keahole to Kailua Plan) shows the regional salinity distribution expressed as total chlorides. All of the proposed project lies seaward and down gradient of the Underground Injection Control line of the State Department of Health.

As indicated in the attached water quality analyses, the nitrogen and phosphorus level at the surface of the basal lens is less the 0.2 mg/l for each element. No water quality data is presently available for the natural background waters located makai of the project. In studies performed under similar hydrogeologic conditions at Keahole Point (Appendix 1 attached), the natural nitrate nitrogen barely exceeds 1.0 mg/l. The nitrate nitrogen contribution here and elsewhere along the coastline is most probably related to the exotic nitrogen fixing plant specie such as Kiawe (*Prosopis pallida*).

E-1

P.O. Box 1656 • Kamuela, Hawaii 96743

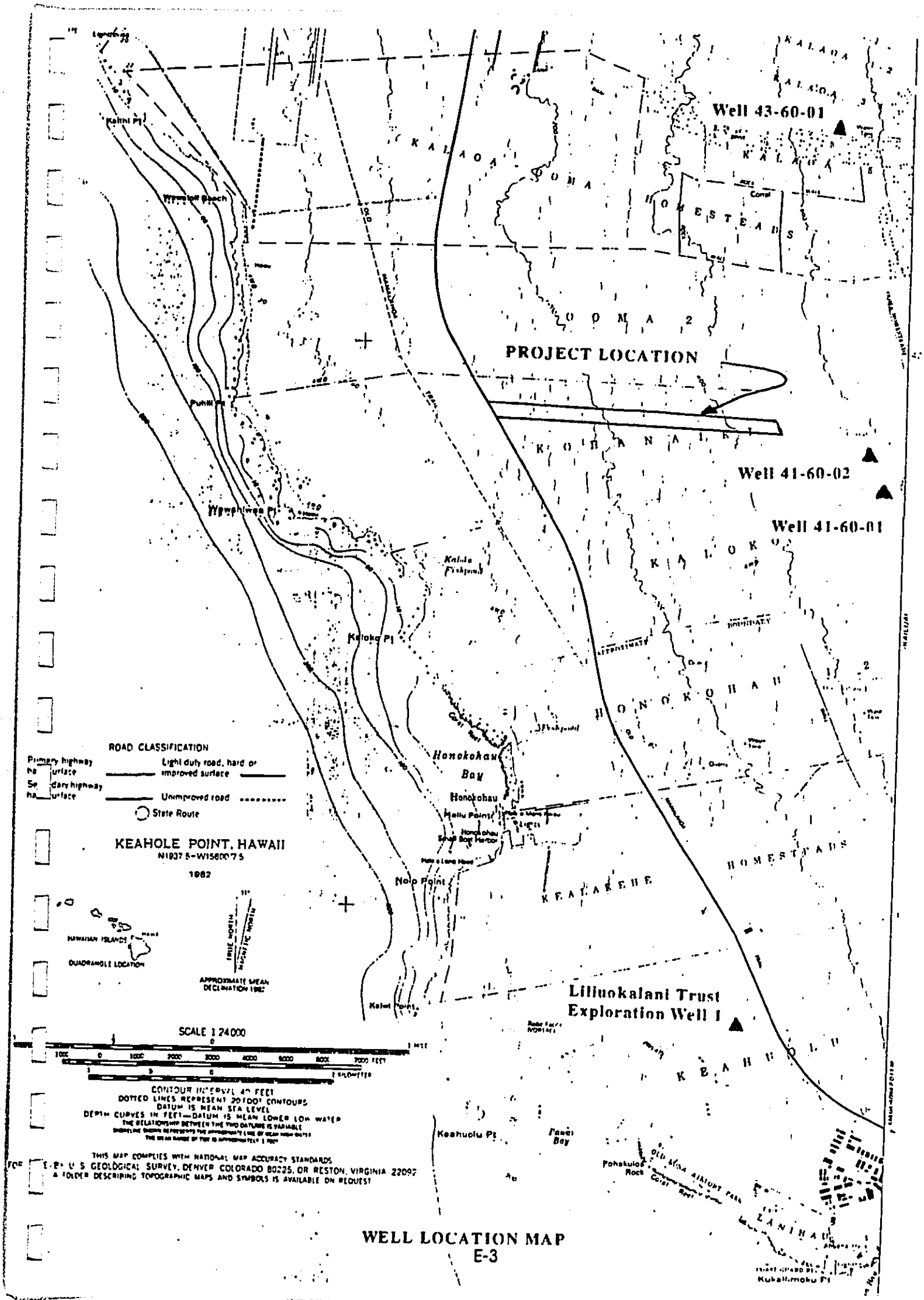
The groundwater flow towards the sea is strongly influenced by the flat lying, thin bedded lavas makai of the highway and tidal fluctuations which may exceed an amplitude of 1 foot near the shore. The groundwater flow inland of the highway is estimated at from 2 to 3 mg/l (million gallons daily) per mile of aquifer width parallel to the highway.

The actual groundwater discharge of the basal lens to the sea does not seem to focus at any particular location between Kailua Village and Keahole Point. Brackish discharge is clearly evident at the mauka perimeter of Honokahau Harbor, as well as both of the fishponds, during low tides. No measurements of this discharge has ever been made, and it is doubtful that these locations represent the majority of the groundwater flow. Most probably, the majority of the groundwater discharge occurs as diffused and highly mixed flow along the entire shoreline.

#### PROBABLE IMPACT OF THE PROPOSED LAND USE

Grading and road construction on the parcel will cause local (in parcel) runoff. Runoff will be confined to each lot and along the roadways by means of shallow dry wells. All rainfall presently falling on the parcel will remain as local recharge to the basal lens.

Each lot will be required to handle its wastewater product on site. Appropriate treatment will be approved as required. No sewerage is anticipated. It is important to note that the residential cesspools and agricultural activities mauka of the parcel and the Kaloko wells have not contributed to an increase in nitrogen or phosphorus in the brackish lens. While a small addition of treated sanitary waste water is expected, disposal of waste water by means of properly constructed drain fields should have little or no significant impact on the brackish lens. Toxic waste or fuels should be confined or removed from the site as required or approved by the State Department of Health.



**ROAD CLASSIFICATION**

- Primary highway surface
- Secondary highway surface
- Light duty road, hard or improved surface
- Unimproved road
- State Route

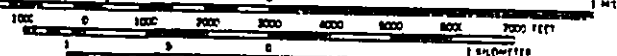
**KEAHOLE POINT, HAWAII**  
 N1937 5-W1560075

1982



APPROXIMATE MEAN DECLINATION 1982

SCALE 1:24,000



CONTOUR INTERVAL 40 FEET  
 DOTTED LINES REPRESENT 20 FOOT CONTOURS  
 DATUM IS MEAN SEA LEVEL  
 DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER  
 THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE  
 SHOWING DEPTH AS POSITIVE AND APPROXIMATELY 1.00 FEET  
 THE MEAN SURFACE OF TIDE IS APPROXIMATELY 1.00 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
 U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092  
 A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

**WELL LOCATION MAP**  
 E-3

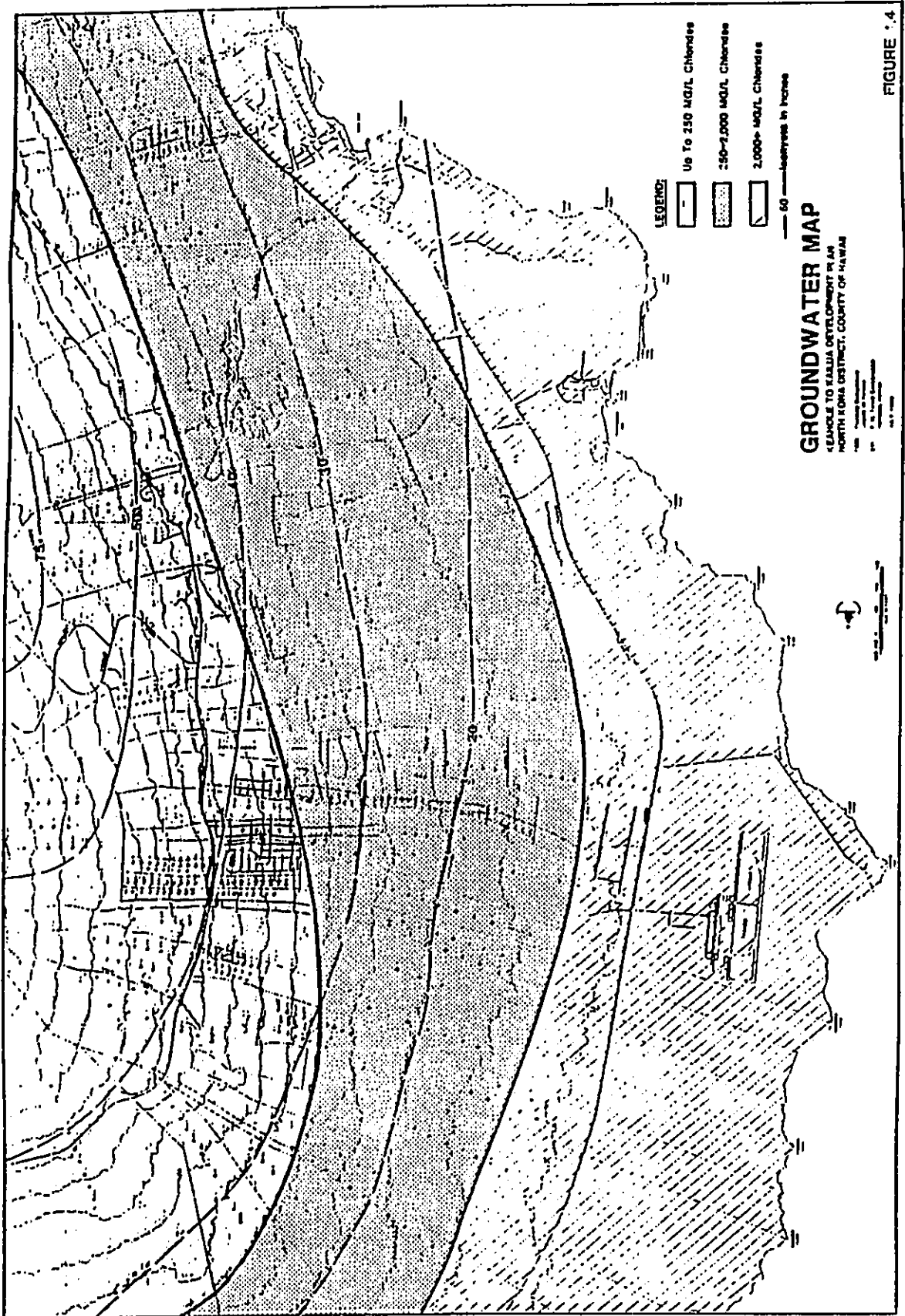


FIGURE 4

FROM THE KEAHOLE TO KAILUA DEVELOPMENT PLAN  
 DRAFT 9/89

ANALYTICAL LABORATORIES  
 J. Brown Chemical Corporation  
 2001 10th Street, Denver, CO 80202  
**ATORY ANALYSIS REPORT**

NO. 1335  
 DATE 07-11-84  
 PAGE 1 OF 1

ATTN: Mr. STEPHEN BOWLES  
 PROJECT: Irrigation Water - Kalahe Gull Course (End of 8 hours pumping)  
 SAMPLED BY: Stephen Bowles SAMPLING DATE: 07-09-84 TIME: 3:05 PM  
 RECEIPT DATE: 07-11-84 TIME: 10:00

DATE SAMPLE ANALYZED	TIME SAMPLE ANALYZED	SAMPLE TYPE	SAMPLE DESCRIPTION	UNITS	RESULTS
07/09/84			KALOHA WELL #2		
TOTAL NITROGEN	mg/L				0.10
PHOSPHORUS	mg/L				0.100
POTASSIUM	mg/L				30
CALCIUM	mg/L				14
MAGNESIUM	mg/L				187
TOTAL HARDNESS (by Calculation)	mg/L CaCO <sub>3</sub>				199
SODIUM	mg/L				2201
TOTAL DISSOLVED SOLIDS	mg/L				2022
pH					8.01
CHLORIDES	mg/L				1120
SALINITY	ppt				1.9
CONDUCTIVITY	µmhos/cm				3525

WELL 41-60-02

TABLE 1

LABORATORY REMARKS: Sample analyzed according to "Methods for Chemical Analysis of Water and Wastes", U.S. Environmental Protection Agency, March 1976 and/or "Microbiological Methods for Monitoring the Environment", U.S. Environmental Protection Agency, August, 1978.  
 \*NOTE: Sample analyzed 2 times.

ANALYTICAL LABORATORIES  
 J. Brown Chemical Corporation  
 2001 10th Street, Denver, CO 80202  
**ATORY ANALYSIS REPORT**

NO. 1340  
 DATE 07-11-84  
 PAGE 1 OF 1  
 COLLECTED COPY 07-11-84

ATTN: Mr. STEPHEN BOWLES  
 PROJECT: Irrigation Water - Kalahe Gull Course  
 SAMPLED BY: Mr. Stephen Bowles SAMPLING DATE: 07-09-84 TIME: 10:00  
 RECEIPT DATE: 07-11-84 TIME: 08:00

DATE SAMPLE ANALYZED	TIME SAMPLE ANALYZED	SAMPLE TYPE	SAMPLE DESCRIPTION	UNITS	RESULTS
07/11/84			BALCONO WELL #1		
TOTAL NITROGEN	mg/L				0.04
PHOSPHORUS	mg/L				0.100
POTASSIUM	mg/L				20
CALCIUM	mg/L				23
MAGNESIUM	mg/L				78
TOTAL HARDNESS (by Calculation)	mg/L CaCO <sub>3</sub>				101
SODIUM	mg/L				0.400
TOTAL DISSOLVED SOLIDS	mg/L				1100
pH					8.02
CHLORIDES	mg/L				0.300
SALINITY	ppt				0.0
CONDUCTIVITY	µmhos/cm				00 2100

WELL 41-60-01

TABLE 3

LABORATORY REMARKS: Sample analyzed according to "Methods for Chemical Analysis of Water and Wastes", U.S. Environmental Protection Agency, March 1976 and/or "Microbiological Methods for Monitoring the Environment", U.S. Environmental Protection Agency, August, 1978.  
 \* QUANTITIES  
 \*\* COLLECTED

**APPENDIX 1**

**PROPOSED PROTOTYPE TESTING PROGRAM  
LAND DISPOSAL BY INJECTION WELLS OF OCEAN  
WATER EFFLUENT AT SEACOAST TEST FACILITY,  
KEAHOLE POINT, HAWAII ISLAND**

**JUNE 1980**



APPENDIX I

PROPOSED PROTOTYPE TESTING PROGRAM  
LAND DISPOSAL BY INJECTION WELLS OF OCEAN  
WATER EFFLUENT AT SEACOAST TEST FACILITY,  
KEAHOLE POINT, HAWAII, ISLAND

June 1980

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Prepared by the University of Hawaii

Research Corporation

APPENDIX TABLE 1. GROUNDWATER LEVEL AND QUALITY FIELD MEASUREMENTS, KEAHOLE POINT, HAWAII ISLAND

Station	Time	Water Temp. °F	pH	Salinity ‰	Water Level Above Datum (MSL, in.)
<u>3/25/80</u>					
SM	1220	71	7.85	7.0	
SA	1220	71	7.80	7.0	18.72
MM	1150	73	7.4	9.0	
MA	1150	73	7.8	9.0	14.88
NM	1050	73	7.9	10.0	
NA	1050	73	8.4	9.7	11.88
SM	1745	70.0	8.0	7.1	
SA	1745	69.5	8.0	7.1	15.0
MM	1710	73.0	8.0	8.9	
MA	1710	73.0	7.85	9.0	10.13
NM	1650	73.0	7.15	9.4	
NA	1650	73.0	8.10	9.4	9.13
SM	2400	69.3	8.0	7.0	
SA	2400	69.3	8.05	7.0	25.32
NM	2335	72.2	7.60	9.1	
NA	2300	72.2	7.95	8.9	20.38
<u>3/26/80</u>					
SM	0700	70.0	7.70	6.8	
SA	0700	70.0	8.10	6.8	15.96
MM	0645	73.0	7.95	8.3	
MA	0645	73.0	8.10	9.1	10.88
NM	0620	72.8	7.45	9.5	
NA	0620	72.8	7.85	9.5	10.38
SM	1400	71	8.1	7.1	
SA	1400	71	8.1	7.7	21.0
MM	1330	72.8	8.1	8.6	
MA	1330	72.8	8.0	8.6	17.88
NM	1300	73.0	7.70	9.0	
NA	1300	75.0	8.40	9.4	17.0

APPENDIX TABLE 1-Continued

Station	Time	Water Temp. °F	pH	Salinity ‰	Water Level Above Datum (MSL, in.)
<u>4/07/80</u>					
SM	1225	70.0	7.5	6.9	
SA	1225	70.0	7.8	7.0	12.12
MM	1300	73.5	8.05	9.0	
MA	1300	73.0	8.00	10.0	5.0
NM	1345	78.5	8.20	9.4	
NA	1345	74.5	8.50	9.1	2.38
<u>4/24/80</u>					
SM	0930	71.0	7.8	6.8	11.5
SA	0930	70.0	7.9	6.8	11.5
MM	1010	73.5	7.95	8.2	8.1
MA	1010	73.5	7.9	9.2	8.1
NM	1050	73.0	7.5	8.6	9.1
NA	1100	74.0	8.1	9.2	9.1

NOTE: SM = South Main, 4.82 ft above MSL, 604 ft from shoreline  
 SA = South Auxillary, 4.82 ft above MSL, 604 ft from shoreline  
 MM = Middle Main, 1.22 ft above MSL, 308 ft from shoreline  
 MA = Middle Auxillary, 3.04 ft above MSL, 249 ft from shoreline  
 NM = North Main, 5.75 ft above MSL, 377 ft from shoreline  
 NA = North Auxillary, 1.87 ft above MSL, 295 ft from shoreline.

APPENDIX TABLE 2. GROUNDWATER QUALITY LABORATORY MEASUREMENTS<sup>†</sup>,  
KEAHOLE POINT, HAWAII ISLAND

Loca- tion	NO <sub>3</sub> -NO <sub>2</sub> as N	Cl	HCO <sub>3</sub> as Alk. CaCO <sub>3</sub>	SO	Na	Mg	K	Ca	Salin- ity ‰	Sal./ Cl
<u>3/24/80</u>										
SM	1.04	3600	78	500	2275	244	78	79	6.5	1.81
SA	1.04	3700	82	---	---	---	---	---	---	---
MM	0.94	4800	80	650	3310	388	103	105	9.0	1.88
MA	0.97	4800	82	---	---	---	115	---	---	---
NM	0.73	5300	96	750	3440	425	115	114	9.8	1.85
NA	0.58	5000	84	---	---	---	---	---	9.3	1.86
<u>4/07/80</u>										
SM	1.10	3560	79	525	2373	228	78	88	6.9	1.94
MM	1.06	4730	81	700	2925	325	100	114	9.0	1.90
NM	0.44	5000	104	800	3380	438	110	122	9.4	1.88
<u>4/24/80</u>										
SM	1.10	3690	81	550	2308	228	75	88	6.8	1.84
MM	0.96	4630	84	700	2860	325	100	114	8.2	1.77
NM	0.78	4880	99	800	3380	425	113	122	8.6	1.76
Kalaoa Well	0.16	520	80	71	406	48	16	20	---	---

WELL 43-60-01

\*All values reported in mg/l unless noted otherwise.