

COPY

PLANNING DEPARTMENT  
25 AUPUNI STREET

COUNTY OF HAWAII  
HILO, HAWAII 96720

FILE COPY

September 5, 1986

Helber, Bastert, Van Horn and Kimura  
Crosvenor Center, FRI Tower  
732 Bishop Street, Suite 2590  
Honolulu, HI 96813

Gentlemen:

Final EIS - Kohana-iki Resort Community

We have reviewed the Final EIS for the proposed Kohana-iki Resort Community.

Chapter 343, E.R.S., requirements were triggered by the filing of a petition to amend the county General Plan from Conservation and Open designations to Resort, Open, Medium and Low Density Urban designations.

We find that the Final EIS adequately addresses both the content and procedural requirements of Chapter 343, ERS, and thus determine the EIS to be acceptable.

In so accepting the EIS, we would note that a detailed analysis of the impacts which may occur as a result of the proposed marina will be addressed through a Supplemental EIS at the time when an application for a Corps of Engineer's permit to construct the marina is made. It is our understanding from the Environmental Quality Council that such a procedure is permissible.

Further, other issues which remain unresolved at this early conceptual planning stage, and as is outlined in the Final EIS (Pg 1-5), will be resolved in the context of subsequent regulatory approvals.

Helber, Haatert, Van Horn and Kimura  
September 5, 1986  
Page 2

Should you have any questions, please do not hesitate to contact us.

Sincerely,

*Virginia Goldstein*  
for ALBERT LONG LYMAN  
Planning Director

VKG:aeB

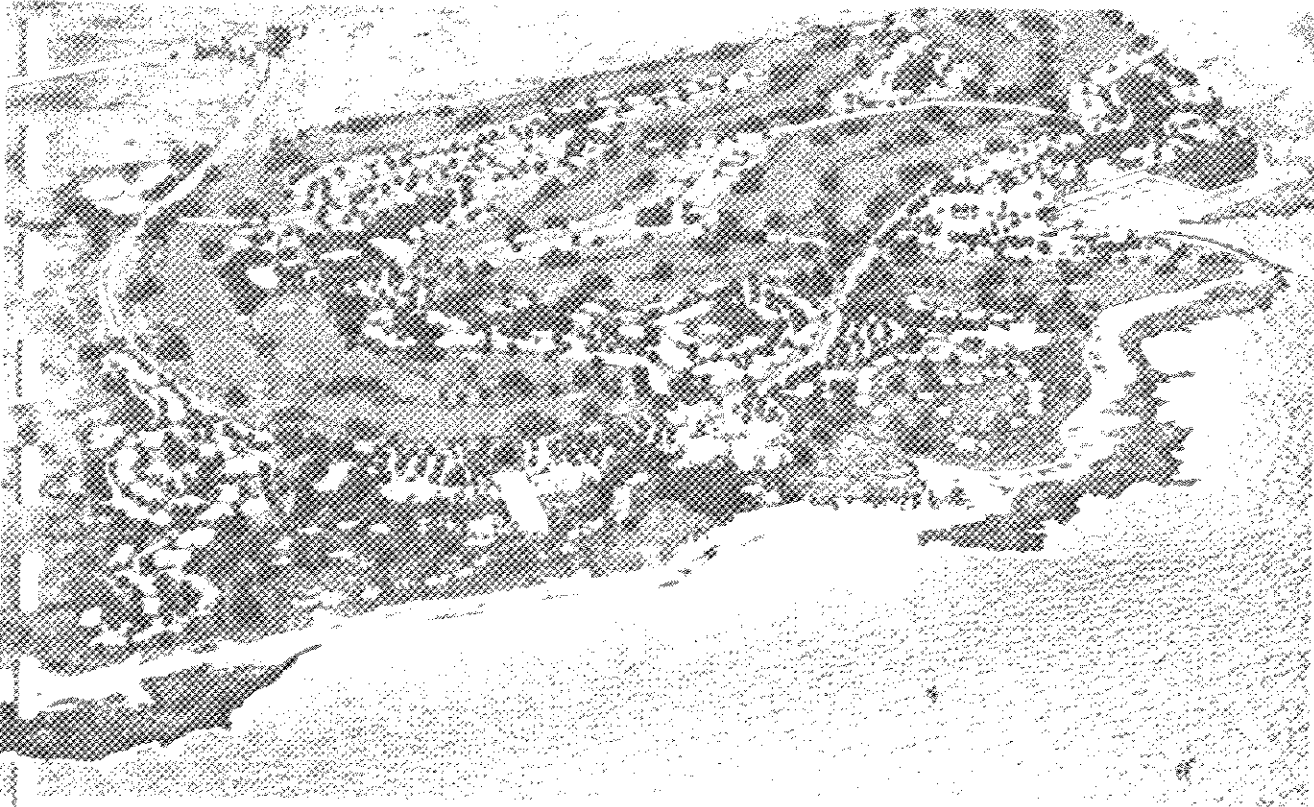
cc: ✓ OROC  
LUC

SEP 10 1986  
10 10 1986

**FILE COPY**

**KOHANA-IKI RESORT COMMUNITY**  
Kohana-iki, North Kona, Hawaii

**AUGUST 1986**



**FINAL  
ENVIRONMENTAL  
IMPACT  
STATEMENT**

PREPARED FOR: KONA BEACH DEVELOPMENT VENTURE  
PREPARED BY: HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS  
FOR SUBMITTAL TO: PLANNING DEPARTMENT, COUNTY OF HAWAII

**K  
O  
H  
A  
N  
A  
I  
K  
I**

FINAL  
ENVIRONMENTAL IMPACT STATEMENT  
August 1986

**KOHANA-IKI RESORT COMMUNITY**  
**Kohana-iki, North Kona, Hawaii**


TMK:  
3-7-3-09: 03 & 16

Prepared for:  
Kona Beach Development Venture, L. P.

Prepared by:  
Helber, Hastert, Van Horn & Kimura, Planners

For Submission to:  
Hawaii County Planning Department  
and  
Land Use Commission, State of Hawaii

Prepared Pursuant to:  
Chapter 343, Hawaii Revised Statutes

Submitted by:  
  
Mark H. Hastert

## TABLE OF CONTENTS

	Page
<b>CHAPTER I INTRODUCTION AND SUMMARY.....</b>	<b>I-1</b>
1.1 Project Summary.....	I-1
1.2 Statement of Purpose and Need for Action.....	I-1
1.3 Description of Proposed Action.....	I-1
1.4 Summary of Impacts.....	I-1
1.5 Summary of Mitigative Measures.....	I-4
1.6 Alternatives Considered.....	I-5
1.7 Unresolved Issues.....	I-5
1.8 Compatibility with Land Uses Plans and Policies.....	I-6
1.9 Necessary Permits and Approvals.....	I-7
 <b>CHAPTER II PROJECT DESCRIPTION.....</b>	 <b>II-1</b>
2.1 Location.....	II-1
2.2 Existing Uses.....	II-1
2.3 Project Rationale.....	II-2
2.4 Development Concept.....	II-4
2.5 The Master Plan.....	II-4
2.6 Project Phasing.....	II-9
 <b>CHAPTER III RELATIONSHIP OF THE PROPOSED PROJECT TO EXISTING PUBLIC PLANS, POLICIES AND CONTROLS.....</b>	 <b>III-1</b>
3.1 Hawaii State Plan.....	III-1
3.2 State Functional Plans.....	III-10
3.3 State Land Use Law.....	III-14
3.4 Hawaii County General Plan.....	III-21
3.5 Kona Regional Plan.....	III-26
3.6 Hawaii County Zoning.....	III-26
3.7 Special Management Area Regulations.....	III-29
 <b>CHAPTER IV DESCRIPTION OF THE AFFECTED ENVIRONMENT, PROBABLE ENVIRONMENTAL CONSEQUENCES, AND PROPOSED MITIGATING MEASURES.....</b>	 <b>IV-1</b>
4.1 Physical Environment.....	IV-1
4.1.1 The Region.....	IV-1
4.1.2 Climate.....	IV-1
4.1.3 The Site.....	IV-3
4.1.4 Surrounding Land Uses and Ownership.....	IV-3
4.1.5 Access.....	IV-6
4.1.6 Physiography and Soils.....	IV-8
4.1.7 Drainage.....	IV-9
4.1.8 Air Quality.....	IV-10
4.1.9 Nearshore Marine Environment.....	IV-11

**TABLE OF CONTENTS**

(Continued)

4.1.10	Noise .....	IV-13
4.1.11	Natural Hazards.....	IV-16
4.1.12	Aesthetics.....	IV-17
4.1.13	Flora.....	IV-19
4.1.14	Terrestrial Fauna.....	IV-21
4.1.15	Anchialine Ponds.....	IV-22
4.1.16	Historic and Archaeologic Resources.....	IV-25
4.1.17	Recreational Amenities.....	IV-28
4.2	Socioeconomic Environment .....	IV-30
4.2.1	Population.....	IV-30
4.2.2	Economy .....	IV-31
4.2.3	Employment .....	IV-31
4.2.4	Housing.....	IV-32
4.2.5	Probable Impacts.....	IV-33
4.3	Public Facilities, Infrastructure and Services .....	IV-38
4.3.1	Transportation Facilities.....	IV-38
4.3.2	Water Supply .....	IV-41
4.3.3	Wastewater Treatment and Disposal.....	IV-45
4.3.4	Solid Waste Disposal.....	IV-48
4.3.5	Police Protection .....	IV-49
4.3.6	Fire Protection .....	IV-49
4.3.7	Health Care.....	IV-50
4.3.8	Power and Communications.....	IV-51
4.3.9	Schools and Libraries.....	IV-52
<b>CHAPTER V ALTERNATIVES TO THE PROPOSED ACTION .....</b>		<b>V-1</b>
5.1	Introduction.....	V-1
5.2	No Action Alternative.....	V-1
5.3	Major Resort.....	V-1
5.4	Retreat Resort .....	V-2
5.5	Analysis and Conclusion .....	V-3
<b>CHAPTER VI IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES.....</b>		<b>VI-1</b>
<b>CHAPTER VII RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY.....</b>		<b>VII-1</b>
<b>CHAPTER VIII OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES .....</b>		<b>VIII-1</b>
<b>CHAPTER IX CONSULTED PARTIES AND PARTICIPANTS IN THE DEIS PREPARATION PROCESS.....</b>		<b>IX-1</b>
<b>CHAPTER X COMMENTS AND RESPONSES RECEIVED DURING PREPARATION OF THE DEIS.....</b>		<b>X-1</b>

TABLE OF CONTENTS

(Continued)

CHAPTER XI REFERENCES ..... XI-1

CHAPTER XII COMMENTS AND RESPONSES RECEIVED DURING  
PREPARATION OF THE FEIS..... XII-1

APPENDICES

- A. Market Study and Highest and Best Use Analysis. Prepared by The Hallstrom Appraisal Group, Inc. James E. Hallstrom Jr., Project Manager. July 1985.
- B. Full Archaeological Reconnaissance Survey. Prepared by Paul H. Rosendahl, Ph.D., Inc. Theresa K. Donham, Supervisory Archaeologist. May 1986.
- C. Botanical Survey. Prepared by Char and Associates. Winona P. Char, Principal Investigator. June 1986.
- D. Terrestrial Faunal Survey. Prepared by Char and Associates. Maile S. Kjargaard, Principal Investigator. June 1986.
- E. Near-Shore Marine Environment and Anchialine Pond Resource Impact Analysis. Prepared by OI Consultants, Inc. Dr. David Ziemann, Project Manager. June 1986.
- F. Preliminary Engineering Utilities Report. Prepared by M & E Pacific, Inc. James Kumagai, Ph.D, Project Manager. June 1986.
- G. Marina Market Study. Prepared by The Hallstrom Appraisal Group, Inc. James E. Hallstrom Jr., Project Manager. May 1986.
- H. Oceanographic Environment and Conceptual Feasibility Evaluation for Kohanaiki Marina. Prepared by Edward K. Noda & Associates. Elaine Tamaye, Project Manager. May 1986.
- I. Public Economic Benefit Study for the Proposed Kohanaiki Resort. Prepared by The Hallstrom Appraisal Group, Inc. James E. Hallstrom Jr., Project Manager. June 1986.
- J. Aircraft Noise Exposure Analysis. Prepared by Gordon Bricken and Associates. Gordon Bricken, Project Manager. June 1986.

## TABLE OF CONTENTS

(Continued)

### LIST OF TABLES

1.	Distances to Important Activity Centers.....	II-1
2.	Proposed Land Use Summary.....	II-9
3.	Selected LUPAG Map Designation Descriptions.....	III-22
4.	Population Growth: North Kona.....	IV-31
5.	Selected Labor Force Characteristics: North Kona.....	IV-32
6.	Selected Housing Characteristics: North Kona.....	IV-33
7.	Operational Employment.....	IV-34
8.	Traffic Generation.....	IV-39
9.	Highway Traffic Counts.....	IV-40
10.	Projected Water Demand.....	IV-44
11.	Estimated Wastewater Flows.....	IV-46
12.	Estimated Student Enrollment.....	IV-53

### LIST OF FIGURES

1.	Project Location Map.....	II-1
2.	Preliminary Land Use Plan.....	II-5
3.	Preliminary Site Plan.....	II-6
4.	Preliminary Phasing Plan.....	II-10
5.	State Land Use Districts.....	III-15
6.	General Plan Land Use Pattern Allocation Guide Map.....	III-23
7.	Proposed LUPAG Map.....	III-25
8.	Land Use Concept Map (Draft Kona Regional Plan).....	III-27
9.	County Zoning.....	III-28
10.	North Kona Region Map.....	IV-2
11.	Site Photograph.....	IV-4
12.	Land Ownership.....	IV-5
13.	Environmental Constraints.....	IV-18
14.	Anchialine Ponds.....	IV-24
15.	Archaeological Sites.....	IV-27
16.	North Kona Water System.....	IV-43



K

O

H

A

N

A

I

K

I

CHAPTER I

## CHAPTER I

### INTRODUCTION AND SUMMARY

#### 1.1 PROJECT SUMMARY

- Applicant:** Kona Beach Development Venture L. P.  
562 California Avenue  
Wahiawa, Hawaii 96786
- Property Location:** Kohana-iki Ahupua'a, makai of the Queen Kaahumanu Highway. South of the Keahole Airport and approximately five miles north of Kailua-Kona. North Kona Judicial District, County of Hawaii.
- Tax Map Key:** Division 3, Zone 7, Section 3, Plat 09, Parcels 3 & 16.
- Size:** 470.13 Acres
- Action:** Applicant action. Application for General Plan amendment to recognize the Kohana-iki site as an Intermediate Resort and amend General Plan LUPAG maps to reflect proposed changes for subject parcels from current designations of Open and Conservation to Open and Intermediate Resort. The EIS prepared for this action will also be used to satisfy the requirements of the State Land Use Commission in a petition seeking a reclassification from the current Conservation District to the Urban District.
- Accepting Agency:** Hawaii County Planning Department
- Existing Land Use Regulations:** State Land Use District: Conservation  
County General Plan: Open and Conservation  
County Zoning: Open  
Special Management Area: Entire Site  
Shoreline Setback: 40' Coastal Setback
- Existing Land Uses:** Vacant and unimproved. Existing land use is limited to recreational uses in the coastal areas of the site.
- Proposed Land Uses:** Development of an integrated resort including two resort hotels (approx. 700 rooms); approximately 800 resort condominium units; an 18-hole golf course and recreational clubhouse complex; a 150-slip marina; 200 single-family house lots for permanent residents; and 150 multi-family units of support housing.

## 1.2 STATEMENT OF PURPOSE AND NEED FOR ACTION

The applicant seeks to develop an integrated resort on privately owned lands in North Kona, Hawaii County. To accomplish this, the applicant must first secure: 1) a General Plan amendment from the County of Hawaii; and, 2) a boundary reclassification from the State Land Use Commission.

The purpose of this Environmental Impact Statement (EIS) is to comply with the County and State land use permit requirements. Specifically, the County of Hawaii requires that all applicants for General Plan amendments complete an EIS pursuant to the requirements of Chapter 343, Hawaii Revised Statutes. The State Land Use Commission, although not statutorily required to do so, will often require an EIS for larger projects with the potential for significant environmental impact. Accordingly, this EIS has been prepared to satisfy both County and State regulations.

## 1.3 DESCRIPTION OF PROPOSED ACTION

The applicant proposes to develop an integrated destination resort on a 470-acre site located on the West Hawaii coastline between the Keahole Airport and the town of Kailua-Kona. The resort master plan provides for: 1) two coastal hotel sites for a total of 700 hotel rooms; 2) a range of resort condominium housing units for a total of 800 condominium units; 3) one 10-acre marina basin with provision for approximately 150 boat slips; 4) two commercial areas, each containing approximately 33,000 square feet of leasable commercial floor space; 5) one 18-hole championship golf course and recreation complex including tennis courts, swimming pools and health spas; 6) 200 single family residential house lots for permanent residents; and, 7) 150-multi-family apartment units for support housing. The proposed marina basin construction will require a permit from the U. S. Army Corps of Engineers. Because of the probable environmental consequences associated with harbor development, the Corps of Engineers will most likely require the applicant to prepare a supplemental federal EIS.

## 1.4 SUMMARY OF IMPACTS

### 1.4.1 Access

Direct access to the Queen Kaahumanu Highway will be needed to service the Kohana-iki Resort. Development of the highway access including a channelized intersection, will be closely coordinated with the State Highways Division to minimize disruption (Section 4.1.5).

### 1.4.2 Drainage

The change in land use created by the resort development will increase the amount of rainfall that is converted to surface runoff. The proposed drainage plan calls for the majority of the surface flow from the resort development to be directed to ponding areas and dry wells within the golf course, with excess

surface flow being discharged into the marina basin. The anchialine ponds in the coastal areas of the site will be protected from runoff by landscaped berms and/or cut-off ditches (Section 4.1.7).

#### **1.4.3 Near-shore Marine Environment**

The major impact to the near-shore environment will be the construction of the marina harbor. The full impacts of the proposed marina construction will be the subject of a federal supplemental environmental impact statement prepared pursuant to the granting of a U.S. Army Corps of Engineers permit. Preliminary studies prepared for this report indicate that the major harbor impact will be the destruction of a portion of the near-shore coral community. Another potential impact examined was the potential impact of increased sedimentation and nutrient loading resulting from site development. The near-shore assessment prepared for this report indicates that these factors would have minimal adverse impacts on the marine environment (Section 4.1.9).

#### **1.4.4 Noise**

A preliminary aircraft noise contour study was conducted for the proposed development which indicated that if there is any impact of aircraft noise on the resort development, it would only affect a small portion of the northwest corner of the site and would not exceed 65 Ldn (Section 4.1.10).

#### **1.4.5 Flora and Terrestrial Fauna**

Vegetation of the Kohana-iki site is sparse due to lack of soil cover and water. Vegetation cover and density will increase and changes in species composition will be introduced through landscaping and natural processes. The proposed development will result in the loss of native plants; however, these plants are found in similar habitats throughout the West Hawaii region, thus the probable impact on island-wide populations will not be significant.

The proposed development will alter the existing faunal habitats. The greatest potential impact to avifaunal habitats could be that associated with coastal development adjacent to the anchialine ponds.

#### **1.4.6 Anchialine Ponds**

1) The anchialine ponds are an important asset to the proposed resort project;  
2) No physical intrusion into the individual ponds is being proposed at the Kohana-iki site (with the possible exception of the two small ponds located in the vicinity of the proposed marina basin. The disposition of these ponds will be determined pending the completion of detailed engineering and environmental analyses prepared pursuant to an Army Corps permit application for marina construction).

Potential impacts to the pond resource include the potential for development related surface runoff to inundate the pond areas and the effect of increased nutrient levels in the ground water.

#### **1.4.7 Historical and Archaeological Resources**

A total of 105 sites were identified within the overall project area. The applicant intends to follow through with the archaeological consultant's recommendations concerning future field work and will continue to coordinate all archaeological work closely with both the State Historic Sites Office and the Hawaii County Planning Department (Section 4.1.16).

#### **1.4.8 Socioeconomic Considerations**

Many new employment opportunities will be created as a result of the construction and operation of the resort. A public economic benefit study prepared in conjunction with this report (Appendix I) indicates that significant net revenues will be generated in the form of increased State and County tax revenues (Section 4.2).

#### **1.4.9 Public Facilities, Infrastructure and Services**

The proposed project will result in additional demands for selected public facilities and services including fire and police protection, electrical and telephone services, and school and health care facilities. The applicant will provide all on-site infrastructural systems, including water supply, wastewater treatment and disposal, solid waste disposal, and drainage (Section 4.3).

### **1.5 SUMMARY OF MITIGATIVE MEASURES**

Mitigation measures to reduce potential significant environmental effects to insignificant levels will be taken in both during the construction phase of resort development and over the long-term during operation of the resort. A summary of important mitigative measures is presented below.

- o An anchialine pond management plan will be prepared in consultation with the Fish and Wildlife Service and the Army Corps of Engineers with the objective of preserving significant pond features and providing interpretive and educational opportunities to the public, where appropriate. Ponds identified at the site will be incorporated into the overall design of the resort. Care has been taken in the design of the on-site drainage plan to assure that no runoff is directed towards the pond areas. The waste water treatment plan recognizes the potential impact of related nutrient loading on the pond resource and proposes a system that will minimize the potential impact.
- o Archaeological sites recommended for preservation will be preserved while those recommended for further evaluation will receive more intensive study and/or be preserved. Close coordination with the State Historic Sites Office and the Hawaii County Planning Department will be maintained throughout the development process to assure the appropriate disposition of all significant sites.

- o The near-shore marine environment, like the anchialine ponds, is sensitive to impacts from drainage and nutrient loading. Shoreline modifications including extensive vegetation removal and structural modifications will be minimized. Adequate measures will be taken to minimize the potential impact of wastewater percolation and possible migration into coastal waters.
- o Any habitable areas which prove to be impacted by aircraft noise will be designed and constructed with necessary sound attenuation features to mitigate any adverse effects.

#### 1.6 ALTERNATIVES CONSIDERED

Three development alternatives were considered including the no-action alternative. The second alternative sought to increase the resort density by seeking a "Major Resort" designation from the Hawaii County Planning Department allowing for the development of 3,000 hotel rooms. The third alternative considered was to seek a "Retreat Resort" designation from the Planning Department which would provide for a maximum of 100 hotel rooms. All three alternatives fail to meet the applicant's objective of meeting a proven market demand matched with an acceptable economic return for a well planned intermediate sized, integrated destination resort near the town of Kailua-Kona.

#### 1.7 UNRESOLVED ISSUES

The General Plan amendment and the subsequent land use district boundary amendment are the initial first stage of approvals needed in order for the proposed Kohana-iki Resort to become a reality. Some issues, appropriately, remain unresolved at this initial phase of the planning process and will be resolved in the context of the subsequent regulatory approvals listed in Chapter 1.9. Significant unresolved issues remaining to be resolved are as follows:

- o Studies included in this EIS indicate that the proposed marina is supported by solid market demand. Additional studies have also confirmed preliminary engineering. As stated previously, a permit from the Army Corps of Engineers is required before any dredging can commence. The Army permit will be issued only in conjunction with an approved supplemental federal EIS detailing the environmental consequences of the proposed harbor development.
- o Details of the anchialine pond management plan recommended in Chapter 4.1.15 will be worked out with the appropriate agencies within the context of further detailed site planning and under the provisions for receiving a Special Management Area permit from the County of Hawaii.
- o Although it is presumed that all archaeological sites have been identified, a possibility exists that additional sites will be uncovered during site preparation. Should this occur, immediate precautions will be taken to inform the appropriate agencies and evaluate their discoveries.

- o The applicant will continue to work with the State Airports Division to insure that design and construction of all facilities will be compatible with Keahole Airport operations.
- o The engineering details and timing of the Queen Kaahumanu Highway intersection improvements must be coordinated with the State Highways Division prior to any undertaking any construction activities within the State right-of-way.
- o The applicant is proposing to construct a total of 150 on-site support housing units for employees of the resort. It is recognized that some additional housing or related community facilities may be required. The applicant is working closely with the Hawaii County Office of Housing and Community Development to determine what these requirements may be, if any.

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

Inherent conflicts are manifest in most public plans and policies. These conflicts arise out of a healthy pluralistic society in which the values of the individual are held higher than those of the collective society. Nowhere are these conflicts more evident than in the comprehensive State and County General Plans. Goals for providing affordable housing inevitably conflict with goals to preserve agricultural lands. Goals to preserve scenic areas in a natural condition conflict with goals to provide full employment for all who want to work. It is within this context of conflicting policy goals that the proposed project must be reconciled.

The Kohana-iki Resort Community represents a major private investment in the West Hawaii region. This investment, when coupled with an environmentally sensitive and aesthetically pleasing built environment promote the ideals of sound land use planning and is therefore consistent with existing land uses plans and policies. A detailed discussion of the relationship of the proposed project to existing public plans, policies and controls is presented in Chapter 3.

1.9 LISTING OF PERMITS AND APPROVALS

FEDERAL GOVERNMENT

U.S. Army Corps of Engineers: COE Permits for Marina basin construction and shoreline modification

STATE OF HAWAII

State Land Use District Boundary Amendment Petition--Conservation to Urban (in process): State Land Use Commission

Private Wastewater Treatment Certification/Permit: New Water Source and Drinking Water Distribution Systems Approvals: Department of Health

Conservation District Use Permit (roadway easement & improvements within shoreline setback): Department of Land & Natural Resources

CZM Consistency Review: Department of Planning and Economic Development

COUNTY OF HAWAII

General Plan Amendment (in process),

Zone Change Approval,

Special Management Area Use Permit,

Subdivision Approval: Planning Department

Grubbing, Grading, Excavation, and Stockpiling Permit; Outdoor Lighting Permit; Sign Permit, Building Permit: Department of Public Works

Water System Expansion Approval: Department of Water Supply



K

O

H

A

N

A

I

K

I

CHAPTER II

**CHAPTER II**  
**PROJECT DESCRIPTION**

**2.1 LOCATION**

The subject property lies within the Kohana-iki Ahupua'a on the leeward coast of the island of Hawaii, south of the Keahole Airport and approximately five miles north of the town of Kailua-Kona (Figure 1). Approximate distances and estimated travel time to important activity centers are presented in Table 1. Distances are measured from the midpoint of the subject site to the midpoint of the corresponding activity center. Trip times are estimated using the appropriate mode of transportation over the most direct route.

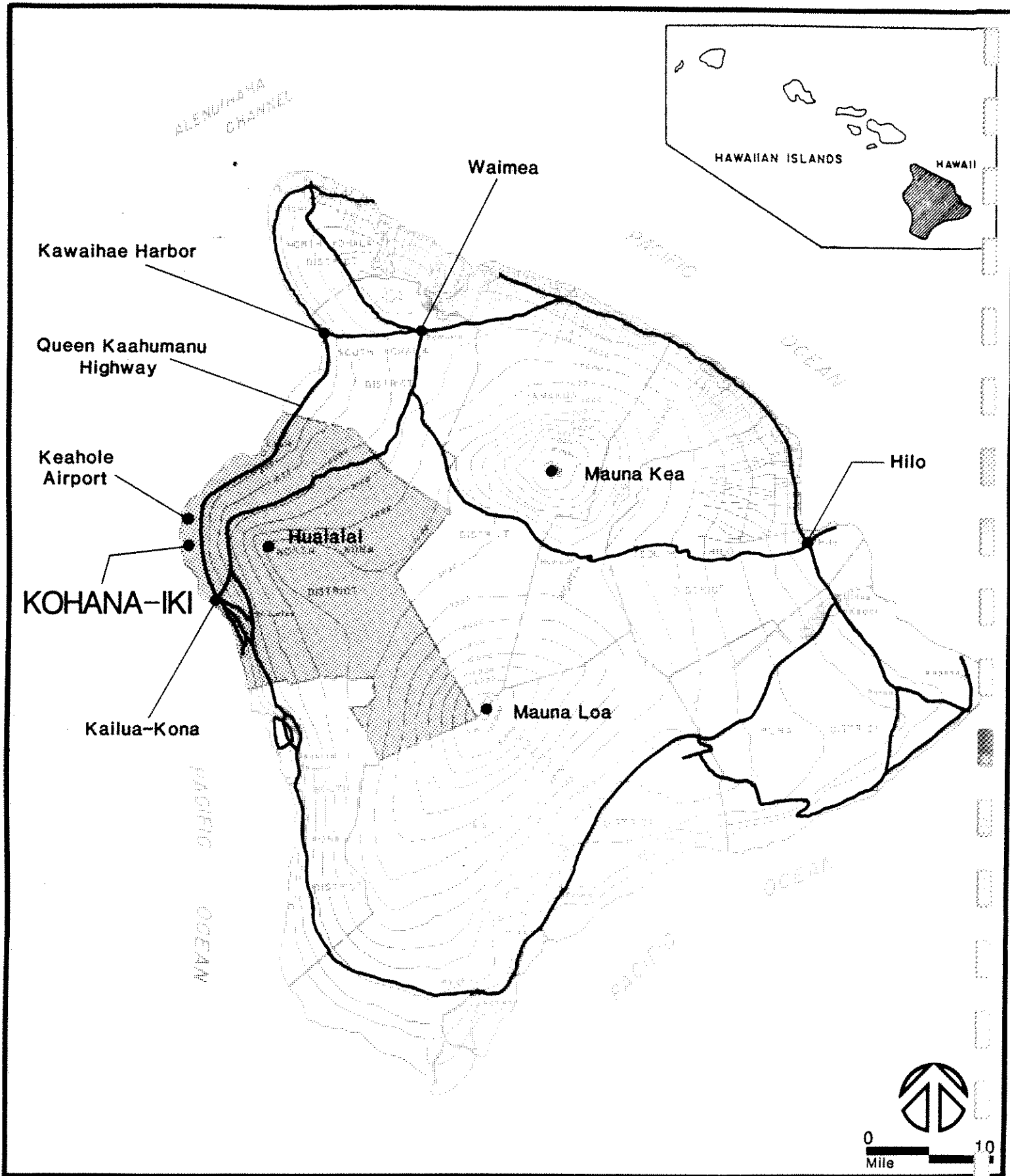
The Kohana-iki Resort is centrally located and readily accessible to a wide range of major activity centers, including those off-island. The estimated trip time from the major metropolitan area of Honolulu (via plane), is less than half that from Hilo (via car).

**Table 1: DISTANCES TO IMPORTANT ACTIVITY CENTERS**

<u>Activity Center</u>	<u>Distance (miles)</u>	<u>Trip Time</u>
Keahole Airport	2	5 min
Honokohau Harbor	2	10 min
Kailua-Kona	5	15 min
Kawaihae	27	30 min
Kamuela	37	45 min
Hilo	80	2 hrs
Honolulu	169	45 min
Los Angeles	2,500	5 hrs

**2.2 EXISTING USES**

**Existing Uses.** The project area is currently in its natural state, consisting of prehistoric lava flows covered by sparse vegetation composed of grasses and scattered shrubs. Along the coastline, the plant cover is dense with well-defined strand. The inland areas are dominated by a barren lava landscape. The site is unimproved except for several jeep trails (in poor condition). The coastal area is used by local residents for recreational activities such as surfing, fishing, diving and beachcombing.



Project Location Map  
**KOHANA-IKI**  
 Kona Beach Development Venture

Figure:

**HELBER, HASTERT, VAN HORN & KIMURA** PLANNERS  
 GROSVENOR CENTER • PRI TOWER • 733 BISHOP STREET SUITE 2590  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 545-2055

Important geographic and physical features of the site include Pine Trees Beach which is a popular local surfing spot, a large cluster of mangrove trees (the "Pine Trees") behind the beach and numerous anchialine ponds near the shoreline.

### 2.3. PROJECT RATIONALE

A Market Study and Highest and Best Use Analysis was prepared for the subject property in order to establish the most probable and efficient use of the subject site under current and anticipated market conditions (Hallstrom Appraisal Group, Inc., July 15, 1985). This report, included as Appendix A, identified the major potential uses of the property and detailed the probability of efficient realization for the identified potential uses of the property for which a market demand had been predicted. The results of the analysis were then correlated identifying those uses which would likely return the highest present value to the subject property based on market demand and pricing levels, and the timeliness of such developability.

**Resort Market.** The Market Study examined a range of land uses and determined that the greatest potential was found in resort uses "[R]esort development is anticipated to continue unabated in the Primary Economic Market Sector [Kailua-Kona to Kawaihae] over the next decade, with potentials for increased expansion levels above current trends should the economy remain strong." (Appendix A, Page 5).

The market analysis found that there was sufficient market demand to support resort development on well located sites. "[W]e are of the opinion that sufficient demand does exist for additional resort-integrated hotel facilities at sites having prime locational attributes... a golf course, and extensive on-site amenity development is seen as integral to planned resort improvement on the subject parcel" (ibid., page 6).

The results of the Highest and Best Use analysis indicated that integrated intermediate-class resort development would be the highest and best use of the subject property. Such development typically contains "[H]otel and resort condominium projects, a commercial village and lesser numbers of single family residential lots (when sufficient acreage is available). In order to be competitive, the resort complex must also contain a sandy beach frontage (preferably white), golf course(s), tennis and other recreational facilities within a unified atmosphere (ibid., page 166).

In concluding, the study indicated that the subject property could support a total of 700 resort hotel rooms, 800 resort condominiums, up to 114 single family house lots and 20,000 to 35,000+ sq. ft. gross leaseable area of resort commercial space; in addition to recreational amenities such as golf courses, tennis courts, and health spas.

**Marina market.** A marina market study was prepared for the Kohana-iki Resort by the Hallstrom Appraisal Group, Inc. in May 1986 (Appendix G). The objective of the report was to quantify the apparent demand (or lack thereof) for a small boat marina in the North Kona region, and the probable pricing/rental structure and absorption levels supportable for such a venture. The findings of the study

conclude that a small boat marina as component within the Kohana-iki Resort Community "is both an innovative and sound concept, supported by expressed, existing strong market demand for slips in the West Hawaii area. Such an undertaking would enhance the saleability of condominiums within the project and provide a significant marketing and guest base for hotel and commercial services."

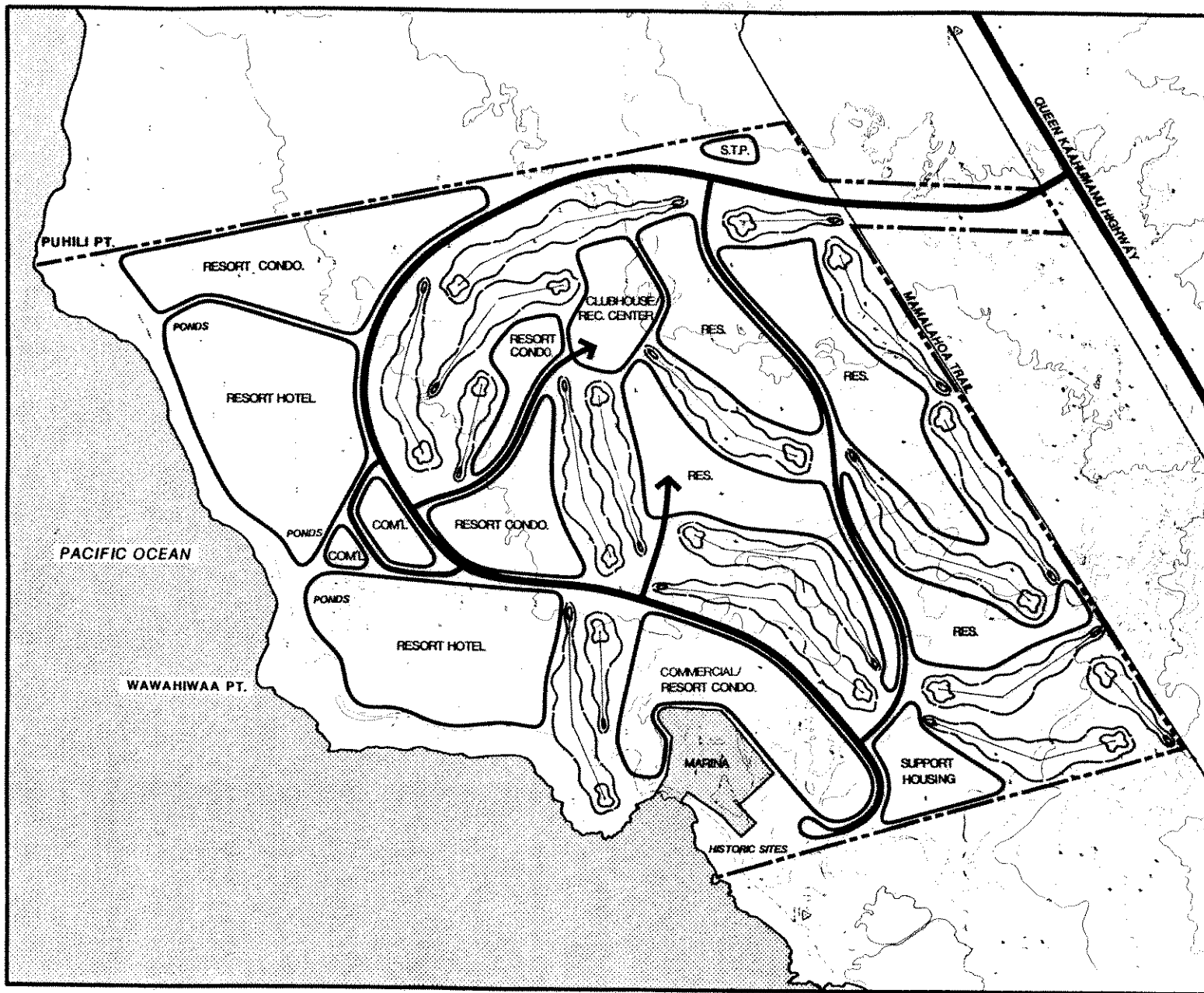
#### 2.4 DEVELOPMENT CONCEPT

The primary objective of the development concept is to create a vast resort playground equipped for the young sportive set which will provide quality accommodations and a variety of land and water-oriented recreational activities at reasonable prices. "The resort is planned to become an up-scale, active community, geared towards the emerging and lucrative middle-age visitor market. This would place the resort in stark contrast to the existing West Hawaii resorts (and throughout the State generally) which were developed with the older, established, "carriage trade" market sector as a focal point. Through the incorporation of numerous activity oriented amenities, the subject project will be exceptionally marketable to this target group, creating both an extreme short-term benefit (ready fulfillment of a currently unsatiated need) and long range acceptance factor as this age group matures and is unable to fill its activity desires in other resort communities designed for the less active foregoing generation" (Appendix A, Page 169).

Kohana-iki is planned to become a major hub of activity for both the visitors that come and stay and for residents of the Kona area. Its proximity to the major resort center of Kailua-Kona, a primary off-site amenity feature, will make it a popular recreational and social destination for local residents. The development will cater to a youthful clientele who may not be content with merely sitting on a beautiful white sand beach or playing a round of golf on a magnificent championship course overlooking the azure waters off the Kona coast. At the Kohana-iki Resort, they will find a full range of sports activities to pursue, including tennis, jogging, exercising, windsurfing, tennis, sailing, waterskiing, snorkeling, deep sea fishing and many others. In addition, organized daily and overnight excursions will be made to the volcanoes and other areas of interest.

#### 2.5 THE MASTER PLAN

The preliminary land use plan (Figure 2) and the related preliminary site plan (Figure 3) integrates three major activity centers, the Marina Village, the Resort Village complex adjacent to Pine Trees Beach, and the recreation center/ golf clubhouse--with two world-class hotels, a range of resort condominium accommodations and single family fairway homesites--into a dynamic and exciting resort experience.



### Preliminary Land Use Plan

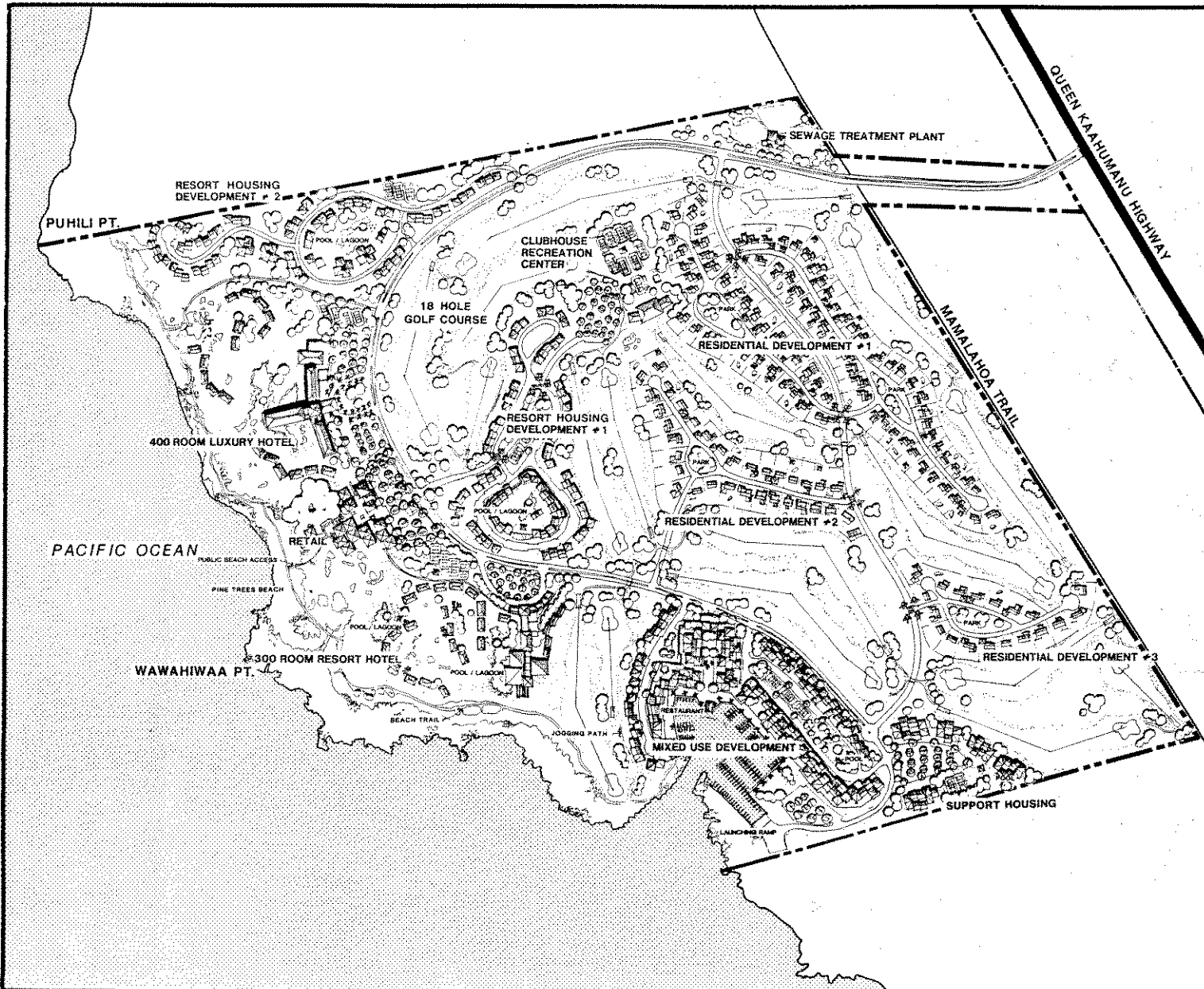
## KOHANA-IKI

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
BAGLEYBOND CENTER • PINE TOWER • 723 BAYVIEW STREET, SUITE 2000  
HONOLULU, HAWAII 96813 • TELEPHONE: (808) 543-2000



0 600' Figure: 2



Preliminary Site Plan

REFERENCE

Site Plan Prepared by:  
Wimberly Whisenand Allison Tong & Goo,  
Architects, Ltd.

**KOHANA-IKI**

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
GROUNDSHIP CENTER 408 KUYER 125 BERRY STREET SUITE 2000  
HONOLULU HAWAII 96813 TELEPHONE (808) 544-1255



0 600' Figure:

3

### **The Marina Village.**

- o The Marina Village will provide a primary focal point for the resort. Key design elements have been borrowed from examples of world class marina developments such as Port Grimaud in southwest France and Puerto Banus, Spain. Space for approximately 150 boats will be created in a man-made basin carved from the lava rock in a protected area south of Wawahiwa Point. The hustle and bustle provided by a working marina coupled with the residential and commercial activities planned for the Marina Village, combine to make this area of the Kohana-iki Resort truly different from any other resort development in Hawaii.

The marina area is bounded by golf course fairways to the north and west and by the historically significant Kaloko Fishpond to the south. Surrounding the approximately 10-acre marina basin will be the marina village with a mix of commercial and resort residential uses. Approximately 300 resort condominiums and 33,000 square feet of leaseable commercial space are planned for this area. Restaurants, discotheques, boutiques and other commercial activities will be situated at the street level ringing the marina basin while resort condominiums will be located above, overlooking the marina activities.

### **The Resort Village.**

- o Located between the two hotels and the main access to the Pine Trees beach, the Resort Village will provide a focal mixing point between residents and guests of the Kohana-iki Resort and residents of the greater Kona community. On-site and off-site residents will be attracted to the area on their way to and from the beach, for casual window shopping at the many boutiques and curio shops located within the village, for a meal or beverage at one of the oceanfront restaurants, or just to sight-see. Parking areas for beach-goers and shoppers will be incorporated into the village design.

### **The Clubhouse Recreation Center.**

- o A third locus of activity will be at the clubhouse recreation center located inland at about the 50 foot elevation (AMSL). The facility will serve as the principal activity center for land-based recreational amenities. Here will be located spas, weight rooms, indoor racket sport courts, and outdoor sports facilities such as tennis courts and swimming pools. The clubhouse will serve the needs of golfers as well, providing space for golf cart rental and pro shop. Jogging paths will originate from here and wind around the periphery of the golf course fairways and along the coastal areas.

### **Resort Hotels.**

- o Two resort hotels providing approximately 700 rooms have been planned for the coastal area of the site. The proposed hotels would be separated from each other by natural land features such as the anchialine ponds, (some of which would be incorporated into the hotel grounds) extensive landscaping, and the Resort Village commercial area discussed above. The hotel sites are



located on level ground approximately 400 to 600 feet inland from the shoreline. Access to each of the hotels will be provided by the main entrance boulevard.

#### **Resort Condominiums.**

- o Complementing the resort hotels, approximately 800 resort condominiums are planned throughout the site in three different locations. One grouping is planned to front the coastal area adjacent to the northern border of the site. A second cluster is planned to be located directly mauka of the resort hotels, located between the Resort Village and the clubhouse recreation center. A third grouping will be located within the Marina Village proper. The average densities for the condominiums will vary from 10 units per acre along the golf course fairways to 14 units per acre within the Marina Village.

#### **Fairway Homesites.**

- o Approximately 200 single family residential homesites will be developed in the upland areas of the site surrounded by golf course fairways. The average density for these parcels is estimated at 3 per acre. It is expected that these homesites will be purchased and developed as primary residences.

#### **Support Housing.**

- o A young and active labor force will be required to properly service the needs of the resort guests. An important element in the development concept is that the resort staff become a part of the resort, not merely on a nine-to-five basis. Approximately 150 apartments will be developed on a 10-acre site adjacent to the Marina Village. It is expected that employees with families will prefer to live off-site, therefore, the housing units will consist of a mix of studio and one bedroom apartments. Depending on market conditions prevailing at the time, these apartments may be either leased or sold in fee.

#### **Golf Course.**

- o Kohana-iki will boast one of the more dramatic golf courses on the Kona Coast. The 18-hole, par-72 championship course is a key recreational element of the development concept and has been designed for the enjoyment of even the most seasoned players. Magnificent vistas of Hualalai and the deep blue Pacific will be seen from every fairway. In addition to its recreational amenity, the course will serve as the principal landscape element within the resort by providing a major green open space. The course's open corridors are designed to highlight the undulating terrain; dramatize the resort's entry and arrival area; establish viewing corridors for the spectacular scenic ocean and mountain backdrops and to provide a common landscape element which ties together the various development parcels.

Table 2 below presents summary information on the various land uses discussed above

**Table 2: PROPOSED LAND USE SUMMARY**

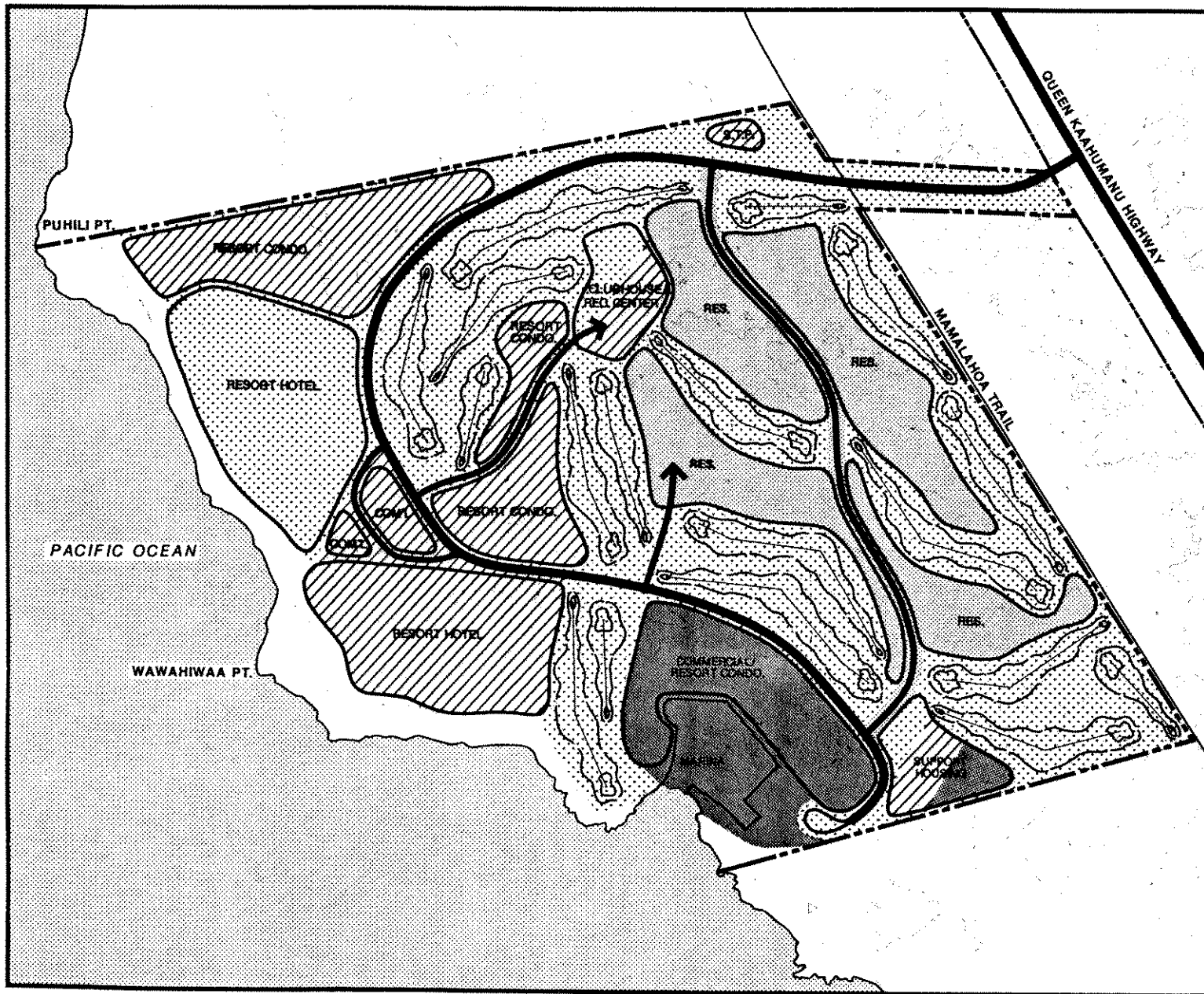
<u>Land Use</u>	<u>Gross Acreage</u>	<u>Density (Net)</u>	<u>Unit Count</u>
Resort Hotel:	62	20/ac.	700
Resort Condo.:	70	10/ac.	800
Residential:	73	3/ac.	200
Support Hsg:	10	30/ac.	150
Golf Course:	170		
Clubhouse/Rec Cntr.	8		
Resort Com'l:	6		
Marina Basin:	10		
Open Space/ Circulation:	61		
<b>TOTALS:</b>	<b>470</b>		<b>1,850</b>

## 2.6 PROJECT PHASING

The resort development will be phased to meet market demands and will coincide with the required infrastructure improvements including site access and roadways, installation of the water and electrical power systems, and the incremental phasing of the waste water treatment and disposal system. Figure 4 shows the approximate phasing of the resort.





Pending the necessary government approvals, one hotel site, a portion of the support housing, and the golf course will be developed within two years (Phase 1A). A portion of the major clubhouse/recreation complex will be constructed initially to support the golf course. This preliminary development phase will involve intersection improvements at the Queen Kaahumanu Highway intersection (Chapter 4.1.5), the construction of the main entrance boulevard, extensive grubbing, grading and construction activities for the golf course, hotel, and support housing facilities.

Once these facilities are in place, construction will commence on the second hotel site, the resort condominium developments, the Village Commercial center, the second increment of the support housing, and the centralized wastewater treatment plant (Chapter 4.3.3) (Phase 1B). The recreation/clubhouse center will also be completed. After these facilities are completed, development of the marina basin will begin and the final increment of the support housing will be completed (Phase 1C). The experience at other destination resorts around the State with respect to the market for single family residential homesites has been that the market is best when they are developed and marketed after the rest of the resort amenities are in place. Accordingly, the Kohana-iki fairway homesites will be developed as one of the final development phases (Phase 2).



### Preliminary Phasing Plan

#### LEGEND

-  Phase 1A
-  Phase 1B
-  Phase 1C
-  Phase 2

## KOHANA-IKI

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
SUNSHINE CENTER - 7TH FLOOR - 723 BISHOP STREET SUITE 2004  
HONOLULU, HAWAII 96813 TELEPHONE: (808) 549-1888



0 600' Figure: 4

K

O

H

A

N

A

I

K

I

CHAPTER III

2000-01-01

## CHAPTER III

### RELATIONSHIP OF THE PROPOSED PROJECT TO EXISTING PUBLIC PLANS, POLICIES AND CONTROLS

#### 3.1 THE HAWAII STATE PLAN

The Hawaii State Plan (Chapter 226 Hawaii Revised Statutes, as amended) establishes a set of goals, objectives and policies which are to serve as long-range guidelines for the growth and development of the State.

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

The proposed Kohana-iki Resort development is in consonance with the provisions of the Hawaii State Plan. The following section briefly describes the organization of the plan and analyzes the impacts of the project with respect to the relevant areas of the Plan.

The Plan is divided into three parts. Part I (Overall Theme, Goals, Objectives and Policies) consists of a three-tiered hierarchy of elements--an overall theme; goals; and objectives and policies--which collectively are intended to serve as a comprehensive guide for the future long-range development of the State.

Part II (Planning Coordination and Implementation) establishes a statewide planning system to coordinate and guide all major state and county activities and to implement the overall theme, goals, objectives, policies, and priority guidelines. Because this section pertains to the administrative structure and implementation process of the Plan, comments were not deemed appropriate.

Part III (Priority Directions) establishes overall priority guidelines to address areas of statewide concern. Part III was initially intended to be separate from Parts I and II of the State Plan and to be adopted by concurrent resolution--as were the State Functional Plans (Chapter 3.2). Because the State Legislature decided to incorporate them as Part III of the State Plan document, much of the language in the priority directions (renamed guidelines by the 1984 Legislature) was generalized to reflect the change in legal status from resolution to statute. Parts I and III of the State Plan are discussed below.

### 3.1.1 Part I. Overall Theme, Goals, Objectives and Policies.

The 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. These themes are viewed as "basic functions of society" and goals towards which government must strive. In order to guarantee the elements of choice and mobility embodied in the three themes, three state goals were formulated:

- (1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the 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 (Chapter 226-4 (1-3)).

**Comment:** The Kohana-iki Resort will contribute to the attainment of these goals. The project will provide direct--long-term employment for an estimated 1,525 residents and indirect employment for an additional 305 residents (Chapter 4.2.4). An Public Economic Benefit study prepared in conjunction with this EIS (Appendix I and Chapter 4.2.4) has identified a significant public benefit accruing to both the County and the State in the form of net increased tax annual revenues (estimated to be in excess of \$10 million per year). Contributing to the stability, diversity and growth of the local and regional economies, the Resort has been designed to create "a desired physical environment" that will attract residents and visitors alike. The archaeological, historic and natural site features will be protected, and where appropriate, enhanced to allow for increased public interaction with the unique history of the area.

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

#### 226-5 Objectives and Policies for Population.

##### Objective:

To guide population growth to be consistent with the achievement of physical, economic, and social objectives.

##### Policies:

- (2)(b) Encourage an increase of economic activities and employment opportunities on the Neighbor Islands consistent with community needs and desires.
- (3)(b) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.

- (4)(b) Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the islands (Chapter 226-5 (a) (b, 2-4))

**Comment.** The Hawaii County economy has shifted from an economy dominated by agriculture in 1960 to a more diversified economy with a significant service-oriented component (draft General Plan, page I-6). The visitor industry has played a vital and significant role in the diversification of the County's economy, particularly in the North Kona-South Kohala districts. The Kohana-iki Resort is expected to provide a total of 1,525 operational full-time-equivalent jobs upon completion. Indirectly, employment throughout the State will also be stimulated by the development.

Adequate support services and facilities are planned for the Kohana-iki Resort. State and County tax revenues generated by the resort development will contribute to the cost of providing services to visitors and residents.

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

##### Objective:

To Increase and diversify employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people.

##### Policies:

- (6)(b) Strive to achieve a sustained level of construction activity responsive to, and consistent with, state growth objectives.
- (11)(b) Promote economic activities, especially those which benefit areas with substantial unemployment problems.
- (14)(b) Encourage businesses that have favorable financial multiplier effects within Hawaii's economy.
- (15)(b) Promote and protect intangible resources in Hawaii, such as scenic beauty and the aloha spirit, which are vital to a healthy economy.

**Comment.** The Kohana-iki Resort will provide significant employment opportunities to residents of North Kona which will contribute towards increased income and job choice and improved living standards for Big Island residents. The construction of the 470-acre resort is expected to take place over a number of years and will be a significant contributor towards the maintenance of a healthy construction industry in Hawaii County and the State of Hawaii. With a growing population and historically high levels of unemployment, Hawaii County and the West Hawaii region will benefit from the projected increase in employment opportunities. The multiplier effects of both the construction and visitor industry are widely recognized as having favorable financial multipliers.

## 226-8 Objectives and Policies for the Economy--Visitor Industry.

### Objective:

A visitor industry that constitutes a major component of steady growth for Hawaii's economy.

### Policies:

- (5)(b) Ensure that visitor facilities and destination areas are carefully planned and sensitive to existing neighboring communities and activities.
- (6)(b) Develop the industry in a manner that will provide the greatest number of primary jobs and steady employment for Hawaii's people.
- (7)(b) Foster an understanding by visitors of the aloha spirit and the unique and sensitive character of Hawaii's cultures and values.

**Comment.** The proposed Kohana-iki Resort Community will be a world-class resort which will promote Hawaii's stature as an international visitor destination area. The development of the project in West Hawaii will add to the area's growing preeminence as a destination resort area. The diverse array of employment opportunities offered by the proposed resort will provide a major source of long-term primary jobs for West Hawaii residents. In doing so, the resort will further the policy of obtaining job training and allowing for upward mobility within the visitor industry. The proposed resort will truly be a "Hawaiian" resort in the traditional sense--one which reflects the island character through its design and service.

## 226-11 Objectives and Policies for the Physical Environment--Land Based, Shoreline and Marine Resources.

### Objectives:

- (a) Prudent use of Hawaii's land-based, shoreline, and marine resources.
- (b) Effective protection of Hawaii's unique and fragile environmental resources.

### Policies:

- (2)(b) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.
- (3)(b) Take into account the physical attributes of areas when planning and designing activities and facilities.
- (6)(a) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.
- (9)(b) Promote greater accessibility and prudent use of the shoreline for public recreational, educational, and scientific purposes.



**Comment.** The Kohana-iki site is one of incomparable natural beauty. The anchialine ponds present in the coastal areas of the site are known to be some of the finest examples of the resource in West Hawaii (Appendix E). The abundant and pristine nearshore waters are a diver's paradise. The coastal and upland physiographic conditions are severe and typical of much of the West Hawaii Coastal areas in the predominance of a'a and pahoehoe lava flows. Two of the primary goals in designing the resort master plan were to: (1) ensure compatibility between the various resort activities and the site's natural and ecological systems; and (2) take maximum advantage of the physical features of the site when planning and designing the resort facilities and amenities. An anchialine pond management program has been established to protect the ponds and their inhabitants from environmental impact and promote public awareness of the unique niche they provide in the local ecosystem. Development will be set back from the shoreline areas and public access will be enhanced to the popular "Pine Trees" beach area. On-site drainage systems have been designed to dispose of runoff on-site, preventing degradation of the pristine nearshore waters.

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

Objective:

The enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.

Policies:

- (1)(b) Promote the preservation and restoration of significant natural and historic resources.
- (2)(b) Provide incentives to maintain and enhance historic, cultural, and scenic amenities.
- (4)(b) Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.
- (5)(b) Encourage the design of developments and activities that complement the natural beauty of the islands.

**Comment.** The West Hawaii region is widely recognized for its scenic assets, natural beauty, and multi-cultural/historic resources. The Kohana-iki site, as mentioned above is a prime example of scenic and natural amenities. In addition, it is rich in archaeological resources from Hawaiian pre-history and the more recent past. An Archaeological Reconnaissance Survey (Appendix B) has been conducted with the close cooperation of the State Historic Sites Office, Department of Land and Natural Resources. Depending on the significance of each site, some will be integrated into the resort development by the inclusion of interpretive exhibits and trails, some will be placed within permanent preserves to protect their cultural significance and some will be excavated for their scientific value. Overall, the resort development plan is designed to accommodate the scenic, natural and cultural attributes into the integrated resort concept.

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

Objectives:

- (a) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.
- (b) Greater public awareness and appreciation of Hawaii's environmental resources.

Policies:

- (1)(b) Foster educational activities that promote a better understanding of Hawaii's limited environmental resources.
- (6)(b) Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.
- (8)(b) Foster recognition of the importance and value of land, air, and water resources to Hawaii's people and their cultures.

**Comment.** The land, water, and air resources of the Kohana-iki site are its principal assets. These features will be maintained and protected. The resort will provide increased access to the coastal areas fronting the site. This increased accessibility, in conjunction with the interpretive exhibits established for the anchialine ponds and archaeological sites, will foster the recognition of the importance and value of these resources to visitors to the resort.

**226-14 Objectives and Policies for Facility Systems--Solid and Liquid Wastes.**

Objective:

Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.

Policy:

- (2)(b) Encourage re-use and recycling to reduce solid and liquid wastes and develop a conservation ethic.

**Comment.** The Kohana-iki Resort will treat locally generated liquid wastes on-site through either a centralized plant servicing the entire resort or via individual pocket treatment plants servicing resort centers of activities. Both scenarios would produce an effluent which will be safe to use for golf course irrigation while serving to conserve and recycle water.

**226-16 Objectives and Policies for Facility Systems--Water.**

Objective:

- (a) Provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capabilities.
- (b) Relate growth activities to existing and potential water supply.

Policy:

- (6)(b) Promote water conservation practices.

**Comment.** The North Kona region is endowed with ample groundwater resources. Potable water for the resort will be obtained from the municipal water system via an agreement with the County of Hawaii to participate in the financing of source development and transmission infrastructure. Irrigation water will be augmented to the extent possible by treated effluent from the on-site sewage treatment system.

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

Objective:

Greater opportunities for Hawaii's people to secure reasonably priced, safe, sanitary, livable homes located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals.

Policies:

- (2)(b) Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.
- (3)(b) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.

**Comment.** In addition to working closely with the Hawaii County Office of Housing and Community Authority, the applicant will be providing on-site employee housing to meet the needs of a particular segment of the resort work force: young singles and couples. Approximately 150 studio and one-bedroom garden apartment units will be developed adjacent to the Marina Village for these employees.

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

Objective:

Provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

Policies:

- (2)(b) Provide a wide range of activities and facilities to fulfill the recreational needs of all diverse and special groups.
- (3)(b) Enhance the enjoyment of recreational experiences through safety measures, educational opportunities, and improved facility design and maintenance.
- (4)(b) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values.

- (5)(b) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.
- (6)(b) Assure the availability of sufficient resources to provide for future recreational needs.
- (7)(b) Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawaii's people.

**Comment.** The resort will provide a complete range of recreational amenities for guests and visitors alike. The enhanced beach access to the shoreline will increase the recreational opportunities available to North Kona residents.

**226-25 Objectives and Policies for Socio-Cultural Advancement--Culture.**

Objective:

The enhancement of cultural identities, traditions, values, customs, and arts of Hawaii's people.

Policies:

- (2)(b) Support activities and conditions which promote cultural values, customs, and arts that enrich the lifestyles of Hawaii's people.
- (4)(b) Encourage the essence of the aloha spirit in people's daily activities.

**Comment.** The Kohana-iki Resort has been planned as a Hawaiian resort that respects the social and natural environment in which it is placed. To the extent possible, visitors to the resort will be exposed to the Hawaiian culture and tradition through interpretive exhibits and displays. All significant sites of cultural importance will be preserved and where appropriate, interpreted for the public and resort guests.

**3.1.2 PART II. PRIORITY DIRECTIONS**

**226-103 Economic Priority Guidelines.**

- (1)(a) Stimulate the economy to provide needed jobs for Hawaii's people without stimulating unnecessary in-migration.
- (6)(a) Promote Hawaii as an attractive market for investment activities that benefit Hawaii's people.
- (2)(b) Protect the economic health and quality of the visitor industry.
- (3)(b) Maintain or enhance the quality of existing and future hotels and resort destination areas which conform with regional carrying capacities and state policies providing for adequate shoreline setbacks and beach access.

- (5)(b) Preserve and enhance Hawaii's significant natural environmental and scenic, historic, and cultural sites.
- (6)(b) Develop and maintain career opportunities in the visitor industry for Hawaii's people, with emphasis on managerial positions.
- (9)(b) Maintain and enhance visitor satisfaction.
- (10)(b) Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.
- (1)(f) Promote a consistent and stable level of construction activity.

**Comment:** The Kohana-iki Resort Community will provide a steady level of construction employment over a several year period, lead to the establishment of permanent full-time and part-time operational jobs, and stimulate employment growth in other sectors of Hawaii's economy. It is estimated that many employees will be Big Island residents, and that most of the remaining employees will be from other islands within the State. The resort master plan is designed to respect and enhance the existing natural features of the site.

#### 226-104 Population and Growth Distribution Guidelines.

- (2)(a) Encourage hiring of Hawaii's people by firms doing business in the State.
- (1)(b) Manage a growth rate for Hawaii's economy that will parallel future employment needs for Hawaii's people.
- (4)(b) Encourage major state investments to promote economic development and private investment to the Neighbor Islands, as appropriate.

**Comment.** The availability of quality employment opportunities to North Kona residents will become increasingly important as the residential population continues to increase. The Kohana-iki resort will become a major employer within the North Kona region. To the extent possible, the resort will employ local residents as they have historically provided the most stable and desirable employees.

#### 226-105 Hawaii's Land Resources.

- (1) Preserve and improve shoreline open spaces and scenic resources.

**Comment.** As discussed previously, the resort will preserve and improve shoreline open spaces and scenic resources. Access to the "Pine Trees" Beach will be improved so that it will be readily accessible to all segments of the local population.

### 3.2 STATE FUNCTIONAL PLANS

The Hawaii State Plan directs the appropriate State agencies to prepare functional plans for their respective program areas including; agriculture, transportation, conservation lands, housing, tourism, water resources, historic preservation, energy, recreation, education, higher education and health. The State Functional Plans serve as the primary implementing vehicle for the goals, objectives and policies of the Hawaii State Plan.

The plans set forth "...the policies, programs, and projects designed to implement the objectives of a specified field of activity when such activity is proposed, administered, or funded by an agency of the State" (Section 226-2 (10) Hawaii Revised Statutes (HRS)). Each functional plan contains objectives to be achieved and policies to be pursued within the specified areas. "... [S]uch policies shall address major programs and the location of major facilities" (Section 226-57 (b) HRS).

All twelve State Functional Plans have been adopted by the Hawaii State Legislature. These plans "...[S]hall be taken into consideration in amending the county general plans (Section 226-52(a)(por 3) HRS). It is important to note that the policies, objectives and implementing actions within the functional plans are not mandates for County or private actions. Rather, they should be viewed as a guides, fully recognizing the inherent competing policy interests between the twelve plans. The applicable functional plans have been reviewed and considered in the formulation of this General Plan amendment. Relevant sections of the twelve plans have been examined and are presented below.

#### 3.2.1 State Agriculture Functional Plan

The focus of the State Agriculture Functional Plan (prepared by the State Department of Agriculture) is towards lands "suitable and used (or potentially usable) for agricultural production. Such lands are found primarily within the State Agriculture District in areas identified as important agricultural lands (Page I-7). The subject property lies fully within the State Conservation District and has not been classified as containing important agricultural lands. The site has little or no soil--save for the areas within the narrow coastal strand and thus has marginal agricultural potential.

#### 3.2.2 State Conservation Lands Functional Plan

The Conservation Lands Functional Plan is prepared and maintained by the State Department of Land and Natural Resources, the agency charged with regulating land uses within the State Conservation District (such as the subject parcels). The Conservation Functional 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" (Page 5).

The Kohana-iki site contains no watershed areas or natural streams. It does, however, contain terrestrial habitats, a potentially significant plant life, shoreline, open space, natural areas, pristine air and water quality conditions, and an array of scenic, historic and cultural sites. In the offshore Kona waters, the endangered green sea turtle and the humpback whale may also be found. In short, the site is rich in natural, physical and cultural resources.

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 District. The basic premise of this action is that adequate mitigative actions have been proposed to allow the proposed resort development to take place with minimal impact to the site's natural, physical and cultural features.

### **3.2.3 State Health Functional Plan**

The State Health Functional Plan is prepared and maintained by the State Department of Health (DOH). The plans objectives, policies, and implementing actions "are intended to: 1) prevent disease and promote healthful lifestyles and environmental conditions; 2) ensure and promote appropriate provision and access to health care for the total community; 3) protect society from potential dangers (e.g., epidemics, hazardous environmental conditions or violent persons); and finally, 4) prevent environmental degradation and enhance the quality of the air, land, and water" (Page 5).

Implementing actions in the functional plan describe the Health Department's permit/approval processes that directly impact the proposed resort development. These include: operating the Chapter 343 HRS (environmental impact statement) process; administering permit processes for discharges into the air, surface water and ground water; and the review of private wastewater treatment systems. These subjects are discussed in the relevant sections of the EIS. Also addressed in the Health Functional Plan are implementing actions concerning the reuse of treated sewage effluent for irrigation purposes, excessive noise,, and the adequacy of health care facilities. These areas are also discussed in the relevant sections of this EIS.

### **3.2.4 State Historic Preservation Functional Plan**

The State Historic Preservation Functional Plan is prepared and maintained by the State Department of Land and Natural Resources (DLNR).

An archaeological survey of the the Kohana-iki site has been conducted (Appendix B) to locate, describe and determine the significance of the historic and archaeological sites within the project area. Throughout the survey process, close coordination has been maintained with the State Historic Sites Office and the County of Hawaii Planning Department. Mitigation measures have also been reviewed the same offices.

### 3.2.5 State Housing Functional Plan

The State Housing Functional Plan is prepared and maintained by the Hawaii Housing Authority, an agency administratively attached to the State Department of Social Services and Housing (DSSH). "The Implementing Actions of the plan focus on two broad areas on a statewide level: 1) Assisting the provision and maintenance of housing through government and private sector efforts; and 2) Suggesting research needed to make well informed housing decisions" (Page 5). Relevant Implementing Actions include:

A(2)(b) Encourage the use of opportunities and incentives in the State land use redistricting process to provide lands or homes for affordable or assisted housing development.

B(1)(a) Assess and delineate lands suitable for housing development.

B(1)(c) Encourage and assist in the development of rental housing for employees of large businesses and industries [including destination resorts] outside of urban areas.

The applicant is closely coordinating development activities with the Hawaii County Office of Housing and Community Development and will continue to do so. The Kohana-iki Resort Community will provide homesites for 200 single family dwellings that will be purchased as primary residences by present and prospective residents of North Kona. It is recognized that these homesites will be expensive and not affordable by the majority of housing consumers. The resort will also provide 150 dwelling units of on-site housing for employees. These are currently scheduled to be rental units consisting of studio and one-bedroom apartments oriented towards young single or married employees who wish to live in close proximity to their respective workplaces.

### 3.2.6 State Recreation Functional Plan

The State Recreation Functional Plan is prepared and maintained by the Department of Land and Natural Resources. The purpose of the Plan is "to assess present and potential demand and supply of outdoor recreation resources and to guide State and County agencies in acquiring or preserving lands of recreational value, providing adequate recreation facilities and programs, and ensuring public access to recreation areas" (Page 5).

As noted by the Hawaii County Department of Parks and Recreation (Personal Communication, 4 June 1986), the North Kona region is currently underserved by recreational facilities. In addition, public beach access to many areas along the West Hawaii coast is difficult at best.

The Kohana-iki Resort is planned to become a major recreational amenity for the North Kona region. The golf course and recreational complex (including indoor sport courts, tennis courts and swimming pools) will be available for public use on a daily-fee or membership basis. Public access to "Pine Trees" beach and Kohana-iki coastline in general, now only accessible by foot or four-wheel drive



vehicles, will be improved to allow access by all segments of the Kona community.

### 3.2.7 State Tourism Functional Plan

The State Tourism Functional Plan is prepared and maintained by the Tourism Office of the State Department of Planning and Economic Development (DPED). The overall theme of the Plan is : "the achievement of of a visitor industry that constitutes a major component of steady growth for Hawaii's economy" (Page 6). The Plan identifies major issues and problem areas and sets forth policies and actions "to insure against unplanned growth which could be damaging to the visitor industry and to the quality of life and well-being of the people of Hawaii" (ibid.). The plan addresses the following functional areas of the visitor industry: tourism promotion, physical development, employment and career development and community relations.

Objectives, policies, and implementing actions directed to the private sector concerning physical development are the most relevant and are discussed below.

#### OBJECTIVES:

- A. Maintenance and Enhancement of Hawaii's Share of Existing and Potential Visitor Markets.
- B. Development and Maintenance of a Well-Designed and Adequately Serviced Visitor Industry and Related Developments in Keeping With The Needs and Aspirations of Hawaii's People.
- C. Enhancement of Career and Employment Opportunities in the Visitor Industry

#### POLICIES:

- B(4) Ensure that visitor facilities and destination areas are carefully planned and sensitive to existing neighboring communities and activities.
- C(1) Develop the industry in a manner that will provide the greatest number of primary jobs and steady employment for Hawaii's people.
- D(3) Foster an understanding by visitors of the aloha spirit and the unique and sensitive character of Hawaii's cultures and values.

#### IMPLEMENTING ACTIONS:

- B(1)(a) Encourage the development of an orderly mix of visitor accommodations including full service hotels, condominium apartments, and some single family homes, in order to meet the lodging desires of the broad spectrum of our visitor guests.
- B(3)(b) Institute more expeditious resort development approval systems at the State, County and Federal levels while assuring opportunities for public input.

- B(3)(d) Encourage the clustering of hotels and resort condominium developments to provide open space and promote energy conservation.
- B(4)(a) Discourage the redistricting of land to "urban" classification where resort uses are proposed outside of designated visitor areas.
- B(4)(b) Ensure that new hotel and condominium projects be set back from the shoreline for access which facilitates and encourages public uses of those areas.
- B(4)(c) Ensure the construction, as necessary in connection with both new hotel and large resort condominium projects, of affordable dwelling units adequate to accommodate employee households.
- D(3)(a) Provide relevant interpretation of, and public access to, sites of archaeological significance whenever feasible, and establish a program to explain Hawaii's history and values to visitors and residents.

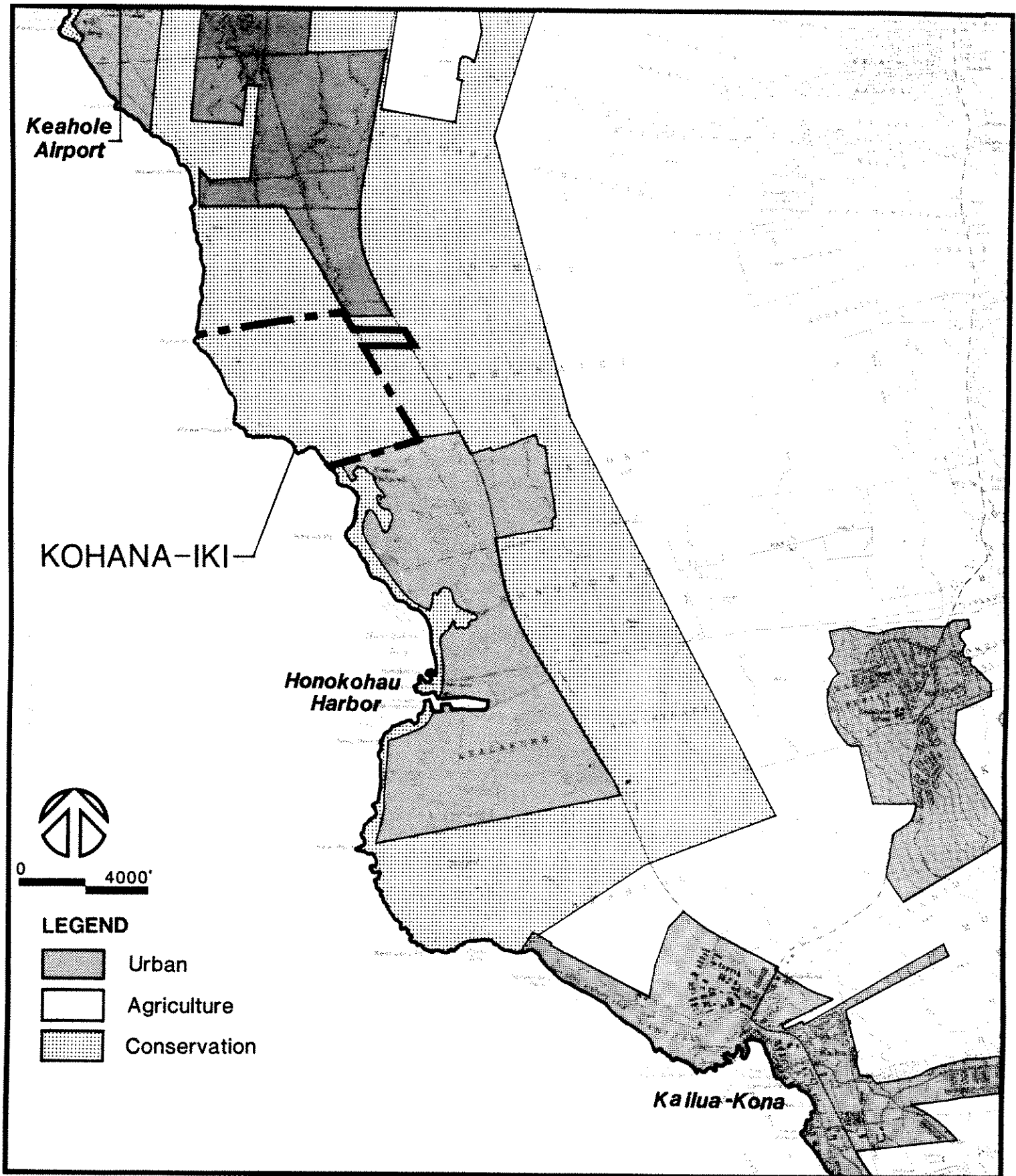
The objectives, policies and implementing actions of the Tourism Functional Plan provide guidelines for successful resort development in Hawaii. The Kohana-iki Resort will be a self-contained destination resort, similar in some respects to the existing resort areas along the South Kohala and North Kona coast. A major difference is Kohana-iki's location near a major urban center, Kailua-Kona and to the Keahole Airport and the greater Kailua-Kona community. It is also adjacent to the Kaloko Honokohau Visitor Destination Area identified by the State Tourism Functional Plan Technical Reference Document.

The resort is projected to become a major employer in the Kona area, providing a number of primary jobs and steady employment. The resort will contain an "orderly mix" of hotel, condominium and single family dwellings. Shoreline setbacks will be sufficient to "facilitate and encourage" public use of the shoreline area. As discussed under the Housing Functional Plan above, the applicant intends to provide on-site employee housing units to meet a particular segment of the employee need for "affordable housing." The applicant will continue to coordinate closely with the Hawaii County Office of Housing and Community Development to meet the projected housing needs of the resort workers.

Kohana-iki is graced with a number of natural and historically significant site features. Interpretive programs for similar site features established by other destination resort areas in West Hawaii have become very popular exhibits for both visiting guests and the general public. Wherever feasible, these interpretive exhibits will be incorporated into the resort master plan.

### 3.3 STATE LAND USE LAW

The entire 470-acre Kohana-iki site is situated within the State Land Use Conservation District (Figure 5). The applicant has petitioned the Land Use Commission for a District Boundary Amendment (Petition A86-599 (Kona Beach



State Land Use Districts  
**KOHANA-IKI**  
 Kona Beach Development Venture

Figure: 5

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
 GROSVENOR CENTER • PFI TOWER • 733 BISHOP STREET SUITE 2590  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 543-2055

Development Venture)) to reclassify the property to Urban to allow for the development of the proposed resort.

All lands in the State have been placed in one of four land use districts (Urban, Rural, Agriculture, and Conservation) by the State Land Use Commission (LUC), pursuant to Chapter 205 HRS--the State Land Use Law. Urban Districts are located to the north, encompassing the nearby Keahole Airport and the NELH/HOST Park Facilities, and to the south, encompassing the Koloko Light Industrial Subdivision, Honokohau Small Boat Harbor and the Kaloko Fishpond area (which abuts the southern boundary of the site). Agricultural districts are present at the Kona Agricultural Park, directly mauka of the Keahole Airport, and on much of the lands mauka of the Queen Kaahumanu Highway - above the 400 foot elevation.

The State Department of Land and Natural Resources (DLNR), the agency charged with regulatory control over all land uses within the State Conservation Districts, has established five (5) subzones within these districts. The subzones are arranged according to intensity of allowable use ranging from Protective (P), designating the most restrictive use, to Limited (L), Resource (R), and General (G), which serves to designate open space "where specific conservation uses may not be defined, but where urban uses would be premature". The fifth subzone is the Special (S) subzone (DLNR Title 13, Chapter 2). Two conservation subzones have been assigned to the site by the DLNR. The Resource Subzone encompasses the makai lands (approx. 33%), while the mauka lands lie within the General Subzone (approx. 66%).

The Hawaii High Technology Development Corporation (HTDC), developer of the 547-acre HOST Park which adjoins the northeast corner of the property, has recently received Urban districting from the LUC as well as Industrial Zoning and Special Management Area permits from Hawaii County.

### 3.3.1 Requirements for Boundary Amendments

The LUC District Regulations require that the application for a boundary amendment show that it is "reasonable, not violative of Section 205-2 [HRS] and consistent with the Interim Statewide Land Use Guidance Policies." The reasons for the requested changes in the State Land Use District Boundaries are discussed in Chapter 2.3 of this report. Section 205-17, HRS sets forth decision-making criteria for reclassification of district boundaries. The criteria are presented below (in italics) followed by a brief discussion of each criterion.

- (1) *"The extent to which the proposed reclassification conforms to the applicable goals, objectives, and policies of the Hawaii State Plan and relates to the applicable priority guidelines of the Hawaii State Plan and the adopted functional plans;"*

**Comment.** As discussed in Sections 3.1 and 3.2, the proposed resort development conforms with the goals, objectives and policies of the Hawaii State Plan and the guidelines of the State Functional Plans.

- (2) *"The extent to which the proposed reclassification conforms to the applicable district standards*

**Comment.** The applicable standards for an Urban and Conservation Districts are found in in Section 2-2 of the Land Use District Boundary Regulations. These are reprinted and discussed below.

Standards for the Urban District

- (1) Urban District. In determining the boundaries for the Urban District, the following standards will be used:
- (a) It shall include lands characterized by a "city-like" concentration of people, structures, streets, urban level of services and other related land uses.
  - (b) It shall take into consideration the following specific factors:
    - 1. Proximity to centers of trading and employment facilities except where the development would generate new centers of trading and employment.
    - 2. Substantiation of economic feasibility by the petitioner.
    - 3. Proximity to basic services such as sewers, water, sanitation, schools, parks, and police and fire protection.
    - 4. Sufficient reserve areas for urban growth in appropriate locations based on a ten (10) year projection.
  - (c) Lands included shall be those with satisfactory topography and drainage and reasonably free from the danger of floods, tsunami and unstable soil conditions and other adverse environmental effects.
  - (d) In determining urban growth for the next ten years, or in amending the boundary, lands contiguous with existing urban areas shall be given more consideration than non-contiguous lands, and particularly when indicated for future urban use on State or County General Plans."
  - (e) It shall include lands in appropriate locations for new urban concentrations and shall give consideration to areas of urban growth as shown on the State and County General Plans."
  - (f) Lands which do not conform to the above standards may be included in this District:
    - 1. When surrounded or adjacent to existing urban development; and

2. Only when such lands represent a minor portion of this District."
  - (g) It shall not include lands, the urbanization of which will contribute towards scattered spot urban development, necessitating unreasonable investment in public supportive services.
  - (h) It may include lands with a general slope of 20 percent or more which do not provide open space amenities and/or scenic values if the Commission finds that such lands are desirable and suitable for urban purposes and that official design and construction controls are adequate to protect the public health, welfare and safety, and the public's interests in the aesthetic quality of the landscape.

**Comment.** The State of Hawaii has invested substantial resources in developing the regional infrastructure of the West Hawaii area to improve the area's potential for resort development. The Keahole Airport, located approximately two miles to the north, the Queen Kaahumanu Highway running adjacent to the site, and the Honokohau Small Boat Harbor, two miles south of the site are examples of this investment. The site is contiguous to the Kaloko-Honokohau urban area to the south and shares a common boundary point with the recently redistricted HOST Park to the north.

The resort will become a major employment center for West Hawaii residents (Chapter 4.2.3). The project's economic feasibility has been supported by the detailed market assessment and highest and best use analysis prepared for the resort development (Appendix A). Basic infrastructure will be provided by the applicant. Public services such as parks, police and fire protection (Chapter 4.3) will be financed from significantly increased tax revenues generated by the resort development.

#### Standards for the Conservation District

3. Conservation Districts. In determining the boundaries for the Conservation District, the following standards shall apply:
  - (a) Lands necessary for protecting the watersheds, water sources and water supplies shall be included in this District except as otherwise provided for in other sections of these regulations.
  - (b) Lands susceptible to floods, and soil erosion, lands undergoing major erosion damage and requiring corrective attention by the State or Federal government, and lands necessary for the protection of the health and welfare of the public by reason of the land's susceptibility to inundation by tsunami and flooding, volcanic activity and landslides may be included in this District.
  - (c) Lands used for national or State parks may be included in this district.

- (d) Lands necessary for the conservation, preservation and enhancement of scenic, historic or archaeological sites and sites of unique physiographic or ecologic significance shall be included in this District except as otherwise provided for in other sections of these regulations.
- (e) Lands necessary for providing and preserving parklands, wilderness and beach reserves, and for conserving natural ecosystems of endemic plants, fish and wildlife for forestry, and other related activities to these uses shall be included in this District except as otherwise provided for in other sections of these regulations.
- (f) Lands having an elevation below maximum inland line of the zone of wave action, and marine waters, fish ponds and tidal pools of the State shall be included in this district unless otherwise designated in the district maps. All offshore and outlying islands of the State of Hawaii are classified as Conservation unless otherwise indicated.
- (g) Lands with topography, soils, climate or other related environmental factors that may not be normally adaptable or presently needed for urban, rural or agricultural use, shall be included in this District, except where such lands constitute areas not contiguous to the Conservation District.
- (h) Lands with a general slope of 20 percent or more which provide for open space amenities and/or scenic values shall be included in this District except as otherwise provided for in other sections of these regulations.

**Comment.** The subject parcels lie within a dry climatic zone, with no definable streams/drainage channels identified, and are adjacent to the ocean. Thus, this land is not located in an area in need of watershed or water supply protection. The land is gently-sloping, reasonably free from the dangers of flooding, landslides, tsunamis, unstable soil conditions. No forests exist on the site, nor endangered vegetation, the site is not presently used or planned for national or state parks, and it has little value for farming, flower gardening, nurseries, orchards, commercial timber, grazing or hunting. Recreational use is limited to a narrow beach zone with limited access.

- (3) *The impact of the proposed reclassification on the following areas of state concern:*
  - (A) *Preservation or maintenance of important natural systems or habitats;*
  - (B) *Maintenance of valued cultural, historical, or natural resources;*
  - (C) *Maintenance of other natural resources relevant to Hawaii's economy, including, but not limited to, agricultural resources;*

- (D) *Commitment of state funds and resources;*
- (E) *Provision for employment opportunities and economic development; and,*
- (F) *Provision for housing opportunities for all income groups, and gap groups.*

**Comment.** As discussed in the relevant sections of this EIS, the preservation and maintenance of the anchialine ponds and nearshore resource as well as the archaeological sites have been primary planning considerations. Studies conducted for this EIS indicate that with proper mitigative actions, these resources will be protected. No commitment of State funds or resources are required. A public economic benefit study (Appendix I) prepared for the resort, indicates a significant beneficial fiscal impact accruing to both State and County generated by resort construction and operation. As discussed Chapter 4.2.4, the applicant is aware of the need to provide housing opportunities for all income groups. In addition to providing 150 on-site support housing units for employees of the resort, the applicant is closely coordinating all development activities with the Hawaii County Office of Housing and Community Development.

### **3.3.2 Interim Statewide Land Use Guidance Policy**

The interim statewide land use guidance policy was repealed by Act 230 of the State Legislature in its 1985 session. Since the LUC District Regulations have not been amended to reflect this, the specific interim policies contained in the regulations may still need to be addressed. The policies are presented below followed by a brief discussion on their applicability to the proposed resort development.

- (1) Land use amendments shall be approved only as reasonably necessary to accommodate growth and development, provided there are no significant adverse effects upon agriculture, natural, environmental, recreational, scenic, historic, or other resources of the area.

**Comment.** As discussed elsewhere in this report, significant growth is projected for the West Hawaii region. The market assessment prepared for the EIS finds that the Kohana-iki Resort, as proposed herein, will be in a position to capture a significant share of the projected visitor industry growth in West Hawaii. This EIS has disclosed the impacts that might result from development of the proposed resort and details mitigative actions that will be taken to avoid or minimize any adverse environmental impacts.

- (2) Lands to be reclassified as an Urban District shall have adequate public services and facilities or as can be provided at reasonable cost by the petitioner.
- (3) Maximum use shall be made of existing services and facilities, and scattered urban development shall be avoided



- (4) Urban Districts shall be contiguous to an existing urban district or shall constitute all or part of a self-contained urban center.

**Comment.** As noted earlier, the Kohana-iki site is contiguous to existing Urban District lands and does not constitute scattered site development. As an integrated resort, Kohana-iki has been planned to be a self-contained urban resort community.

- (5) Preference will be given to amendment petitions which will provide permanent employment, or needed housing accessible to existing or proposed employment centers, or assist in providing a balanced housing supply for all economic and social groups.

**Comment.** The Kohana-iki Resort will provide significant long-term employment opportunities to West Hawaii residents. The applicant recognizes the need for employee housing. As discussed in Chapter 4.2.4, on-site employee housing will be an integral part of the development. In addition, the applicant is coordinating all development activities with the Hawaii County Office of Housing and Community Development.

- (6) In establishing the boundaries of the districts in each county, the Commission shall give consideration to the general plan of each county.

**Comment.** The relationship of the proposed Kohana-iki Resort and the Hawaii County General Plan is discussed in the following section (3.4). A General Plan amendment is currently being considered by the Hawaii County Planning Department.

- (7) Insofar as practicable conservation lands shall not be reclassified as urban lands.
- (8) The Commission is encouraged to reclassify urban lands which are incompatible with the interim statewide land use guidance policy or are not developed in a timely manner.

**Comment.** Based on analyses presented in this report, there are no compelling reasons for retaining the Kohana-iki site within the Conservation District.

### 3.4 HAWAII COUNTY GENERAL PLAN

The Hawaii County General Plan "is the policy document for the long-range comprehensive development of the island of Hawaii... [it] provides the direction for balanced growth of the County" (General Plan 1971, as amended). 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 LUPAG maps designate thirteen different land use categories throughout the County.. (It should be noted that the LUPAG Map boundaries are not to be interpreted in the same manner as, say, zoning map boundaries. The LUPAG Map designations are not intended to be specifically measurable.

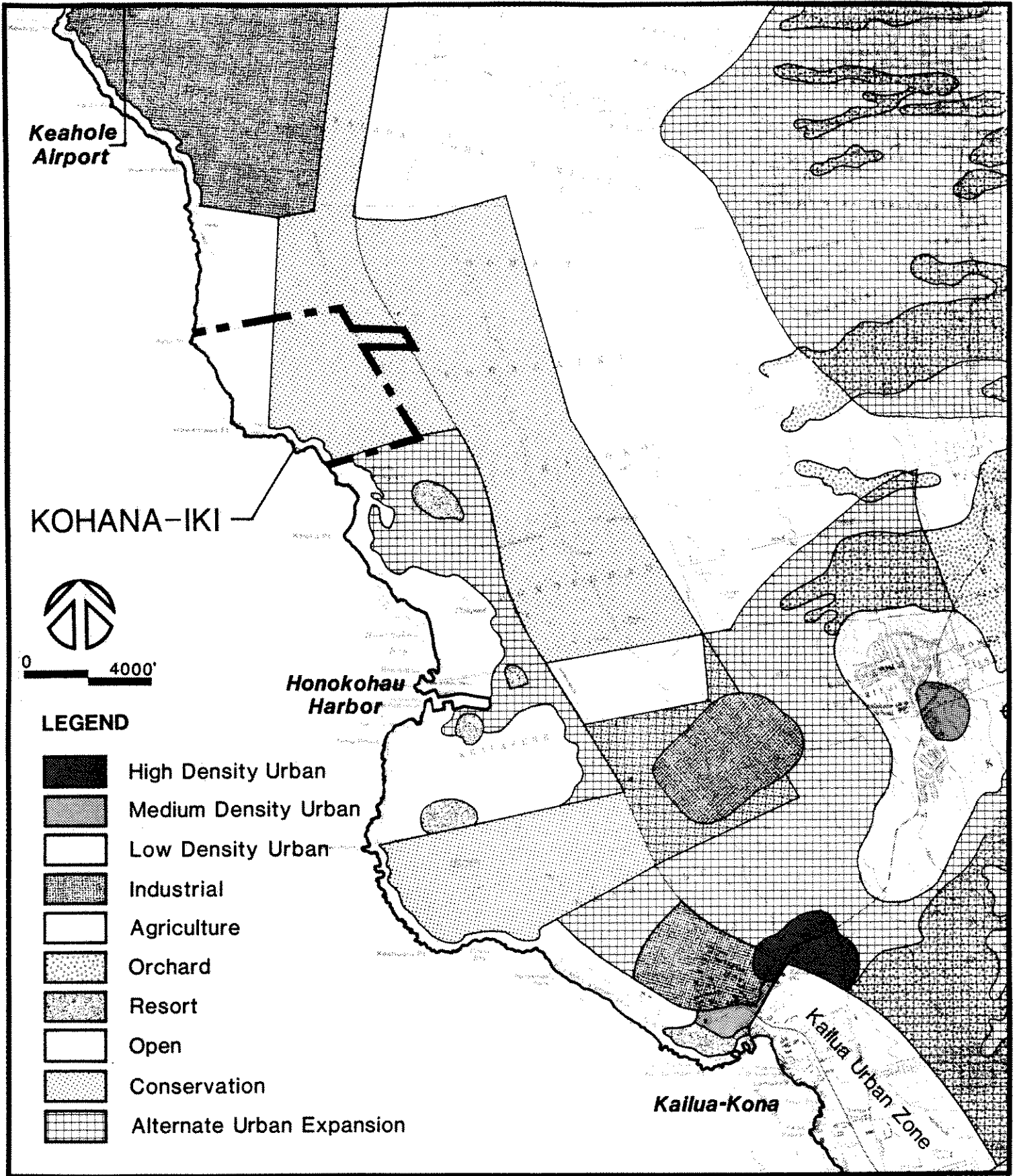
The current LUPAG map designates the project area as "Open" and "Conservation" (Figure 6). The Open designation is generally reserved for parks and historic sites, and other areas such as forest and water reserves and natural and scientific preserves. The Conservation designation is a subcategory of the Open category generally mapping State Land Use Conservation Districts (Table 3). The Keahole Airport and NELH facility, north of the subject property, have been designated "Industrial" save for a narrow strip of Open zoned land along the coastline.

**Table 3: SELECTED LUPAG MAP DESIGNATIONS**

<u>LUPAG Designation</u>	<u>Land Use Description</u>
Open Space:	Includes potential natural hazard areas; parks and historic sites; open space and recreation areas.
Conservation:	Forest and water reserves; natural and scientific preserves.
Major Resort:	Hotels and supporting services; Self-contained resort destination area. Maximum visitor units, 3,000 rooms. Resort acreage: 90 acres minimum.
Intermediate Resort:	Hotels and supporting services; Self-contained resort destination area. Maximum visitor units, 1,500 rooms. Resort acreage: 45 acres minimum.
Retreat Resort:	Maximum hotel and condominium-hotel units:100 rooms. Resort acreage: 15 acres minimum.
Medium Density Urban:	Village and neighborhood commercial and residential and related functions (3-story commercial; multiple residential at 35-11.6 units per acre; single-family residential at 5.8 units per acre).
Low Density Urban:	Residential neighborhood commercial and ancillary community and public uses

Source: Hawaii County General Plan

The General Plan designates several visitor destination resort areas in the North Kona district: Holualoa Makai (Minor Resort), Kailua (Major Resort), Keahou-Kahaluu (Major Resort), Kaloko-Honokohau (Intermediate Resort) and Kaupulehu (Retreat Resort). (Kaupulehu has since been redesignated as Intermediate Resort).



General Plan Land Use Pattern Allocation Guide Map

Figure: 6

**KOHANA-IKI**  
Kona Beach Development Venture

**HELBER, HASTERT, VAN HORN & KIMURA PLANNERS**  
GROSVENOR CENTER • PRI TOWER • 733 BISHOP STREET SUITE 2590  
HONOLULU, HAWAII 96813 TELEPHONE: (808) 545-2035

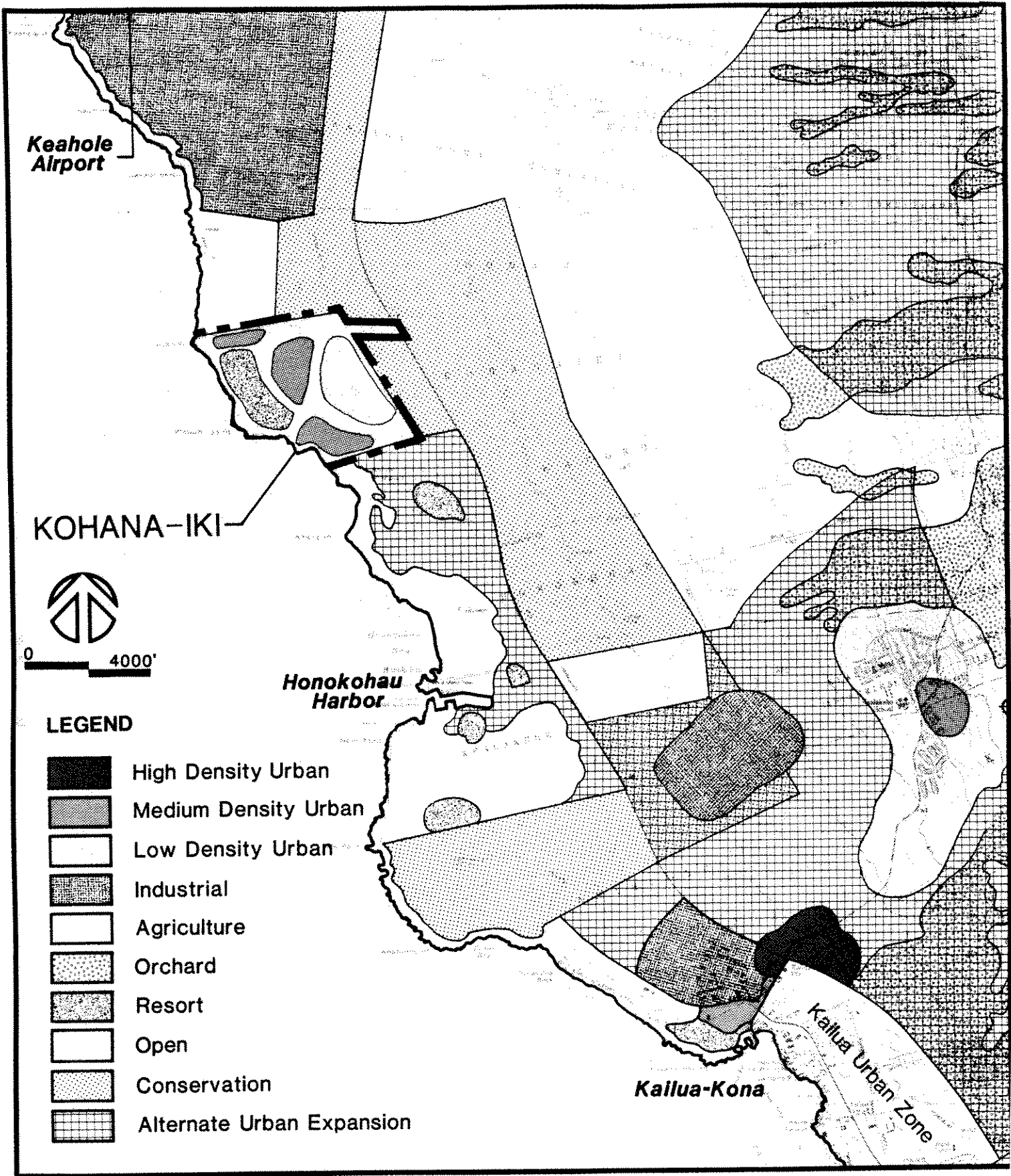
The Kaloko-Honokohau "Intermediate Resort" area adjoins the subject site directly to the south. This property has been designated by the U.S. Congress as a possible acquisition site for the National Park Service because of its historic and cultural significance as an early Hawaiian settlement. Other LUPAG land uses indicated on the site include "Alternate Urban Expansion" and "Open."

Subsequent to the last revision of the LUPAG maps, several land use changes have occurred in the vicinity of the subject property.

- o The 250-acre Kaloko Light Industrial Subdivision is located approximately one mile south of the site on the mauka side of the Queen Kaahumanu Highway on lands currently designated on the LUPAG maps as "Conservation."
- o The 546-acre Hawaii Ocean Science and Technology (HOST) Park (located just to the north of the property) has recently received a boundary change (from the State Conservation District to the Urban District) from the State Land Use Commission. The subsequent Zone Change and Special Management Permit issued by Hawaii County will result in an industrial zoning designation adjacent to the northeast corner of the subject property.
- o The owners of the 313-acre O'oma II lands, abutting the northern boundary of the subject, have filed both a State Land Use Boundary Amendment petition (seeking reclassification from the Conservation District to the Urban District) and an application to amend the Hawaii County General Plan (requesting redesignation from the present "Open" and "Conservation" LUPAG designations to "Intermediate Resort" and related uses).

**Requested Amendments.** In order to develop the Kohana-iki Resort Community as proposed herein, the applicant seeks to have portions of the subject property redesignated from Open and Conservation to Intermediate Resort, Medium Density Urban, Low Density Urban, and Open (Figure 7). The "Resort" designation along the coast encompasses the two hotel sites (700 hotel rooms). The three "Medium Density Urban" zones contain the proposed condominium developments and the proposed Marina Village. The "Low Density Urban" designation in the mauka area of the subject generally contain the proposed single family fairway homesites. The balance of the site including internal roadways, open space, and golf course falls within the "Open" designation.

On May 15, 1986, the Planning Department released a draft of the revised plan. Notably absent from the draft plan are: (1) any LUPAG map amendments; and (2) any new recommendations regarding designated resort sites. The LUPAG maps will be revised once the general policy framework of the revised General Plan has been established. General Plan language relative to the visitor industry, specifically related to land use designations, will be forthcoming pursuant to obtaining public input on the proposed General Plan revisions.



Proposed Land Use Pattern Allocation Guide Map

Figure: 7

**KOHANA-IKI**

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
 GROSVENOR CENTER • PBI TOWER • 733 BISHOP STREET SUITE 2590  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 545-2055

### 3.5 DRAFT KONA REGIONAL PLAN (KRP)

The draft Kona Regional Plan (Hawaii County, 1982, as amended) adopted by the Hawaii County Planning Commission in April 1984, is a medium range plan which implements the longer range General Plan and serves as a more precise guide in land use regulation. The plan is still in draft form as it has not yet been adopted as official county policy by the County Council. "The role of the Kona Regional Plan (KRP) is to serve as an implementing tool for the General Plan of the County of Hawaii... the [KRP] is not intended to supersede the General Plan nor pose additional developmental controls, but rather to guide the implementation of the General Plan... It should be clearly noted that the [KRP] is...not intended to function in a regulatory manner."

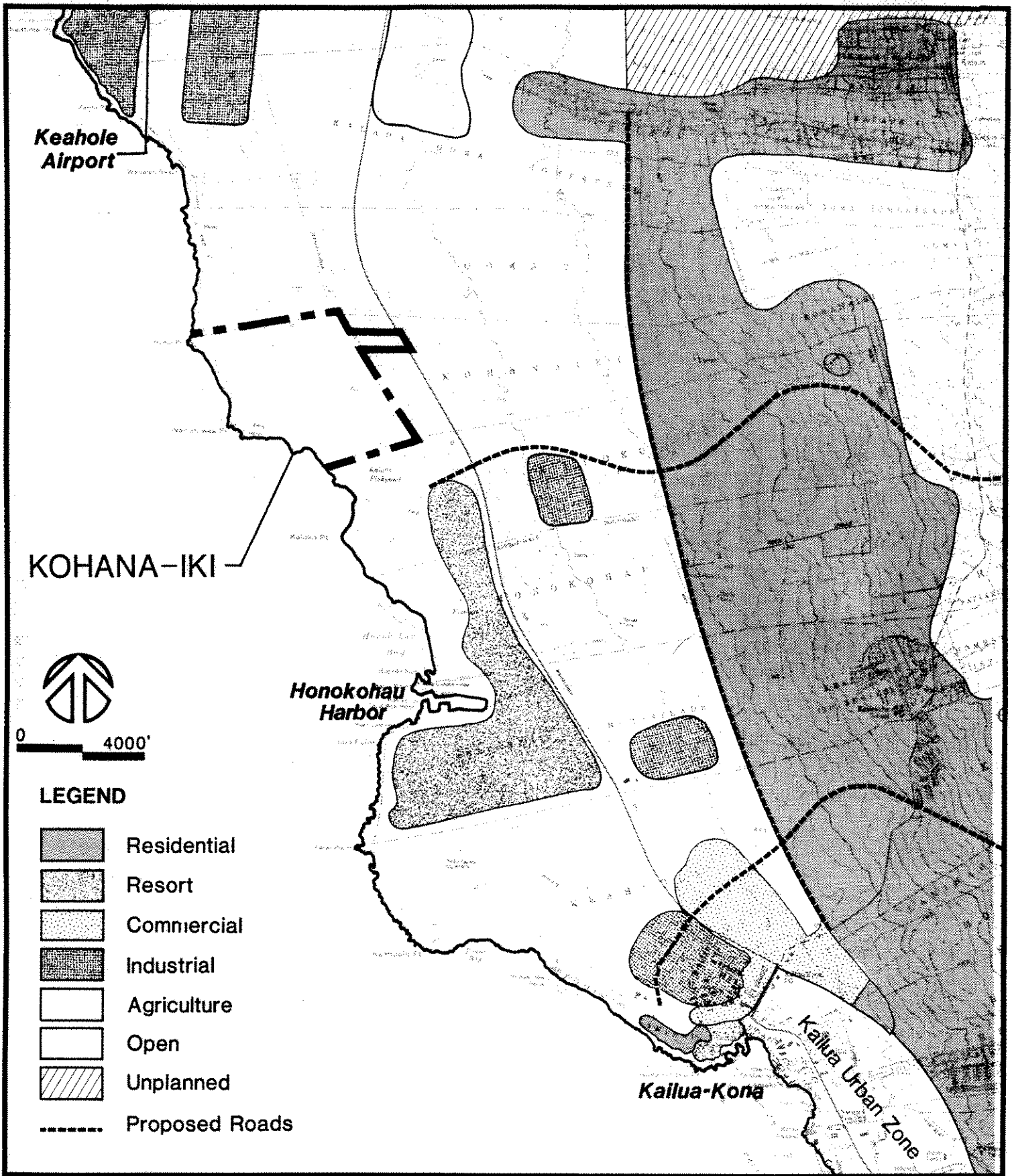
One of the major components of the KRP is the Land Use Concept Map (Figure 8). This map "[F]urther refines the broad LUPAG maps of the General Plan, after considering more detailed social, environmental and economic data of the area. It is not intended to be a parcel by parcel delineation of future land use but more by areas and by land use categories. These maps will be used in making specific zoning and other planning decisions". A review of Figure 8 indicates the current designation of the subject property as "Open". To the south of the subject lies a large area designated "Resort" encompassing the makai portions of the Kaloko, Honokohau and Kealakehe ahupua'as. One mile southeast of the subject property, mauka of the Queen Kaahumanu Highway is the 250-acre Kaloko Light Industrial Subdivision, designated as "Industrial" on the Land Use Concept Map.

Although the KRP does not specifically address the subject property, reference is made to the establishment of a municipal sewage treatment plant adjacent to the Honokohau Small Boat Harbor and the development of new source wells and transmission capacity for the provision of potable water to areas between Palani Road and Keahole Airport.

The economic element of the KRP includes a set of scenarios depicting potential growth trends in the Kona region to the year 2000 (since superseded by the draft General Plan Projections to the year 2005). Population was expected to increase from 20,000 residents in 1980 to between 33,200 and 43,300 by the year 2000, depending on the absorption rates of lands currently designated for urban development.

### 3.6 HAWAII COUNTY ZONING

The existing County zoning is presented in Figure 9. The subject property is currently zoned Open, as are the adjacent parcels and much of the surrounding areas. The Keahole Airport and the HOST Park/Natural Energy Laboratory, located to the north of the subject site, have been zoned Industrial. In order to implement the master development plan, the subject property must first be redesignated from the Conservation district to the Urban district and included in the County General Plan. Once the redistricting and the General Plan amendment have been approved, the applicant would then apply for a Zone



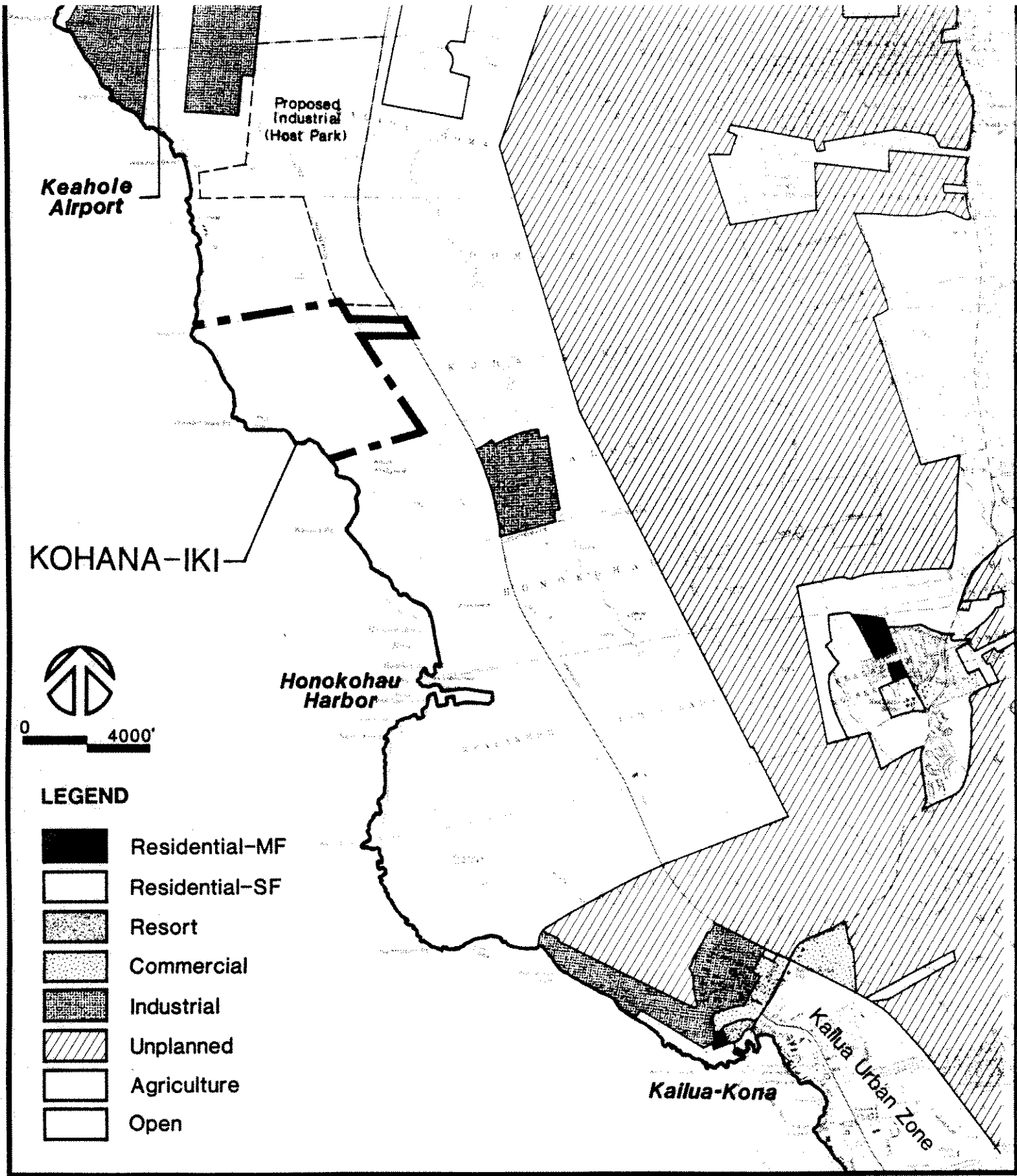
Land Use Concept Map (Kona Regional Plan)

Figure: 8

# KOHANA-IKI

Kona Beach Development Venture

**HELBER, HASTERT, VAN HORN & KIMURA** PLANNERS  
 GROSVENOR CENTER • PFI TOWER • 733 BISHOP STREET SUITE 2590  
 HONOLULU, HAWAII 96813 TELEPHONE : (808) 545-2055



County Zoning  
**KOHANA-IKI**  
 Kona Beach Development Venture

Figure: 9

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
 GROSVENOR CENTER • PFI TOWER • 733 BISHOP STREET SUITE 2590  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 545-2055



Change from Hawaii County to provide for a mix of resort, residential and commercial uses as indicated in the master plan.

### 3.7 SPECIAL MANAGEMENT AREA RULES AND REGULATIONS

The entire property falls within the "Special Management Area" (SMA) and is therefore subject to the SMA Rules and Regulations of the County of Hawaii (Chapter 205-A HRS and Rule No. 9, Hawaii County Planning Commission, December 1975, as amended). The intent of the SMA regulations is to assure adequate attention is paid to coastal resources and that development impacts are mitigated before damage occurs. Special controls on developments within the shoreline areas are necessary to avoid permanent losses of valuable resources and the foreclosure of management options, and to ensure that adequate access, by dedication and other means, to public owned or used beaches, recreation areas, and natural resources is provided.

Concurrent with the Zone Change application discussed above, the applicant would apply for a Special Management Area Use permit from the Hawaii County Planning Commission. Development of the proposed project would first require the approval of the Hawaii County Planning Commission by way of a SMA Permit.

CHAPTER IV

K

O

H

A

N

A

I

K

I

## CHAPTER IV

### DESCRIPTION OF THE AFFECTED ENVIRONMENT, PROBABLE ENVIRONMENTAL CONSEQUENCES, AND PROPOSED MITIGATING MEASURES

This chapter describes the affected environment within which the proposed Kohana-iki Resort Community is situated; identifies the probable environmental consequences of developing and operating the resort; and, where appropriate, presents measures to mitigate the identified environmental impacts.

Much of the substantive findings and conclusions presented in this chapter are summarized from technical reports prepared in conjunction with this planning effort and appended to this EIS.

#### **4.1 PHYSICAL ENVIRONMENT**

##### **4.1.1 The Region**

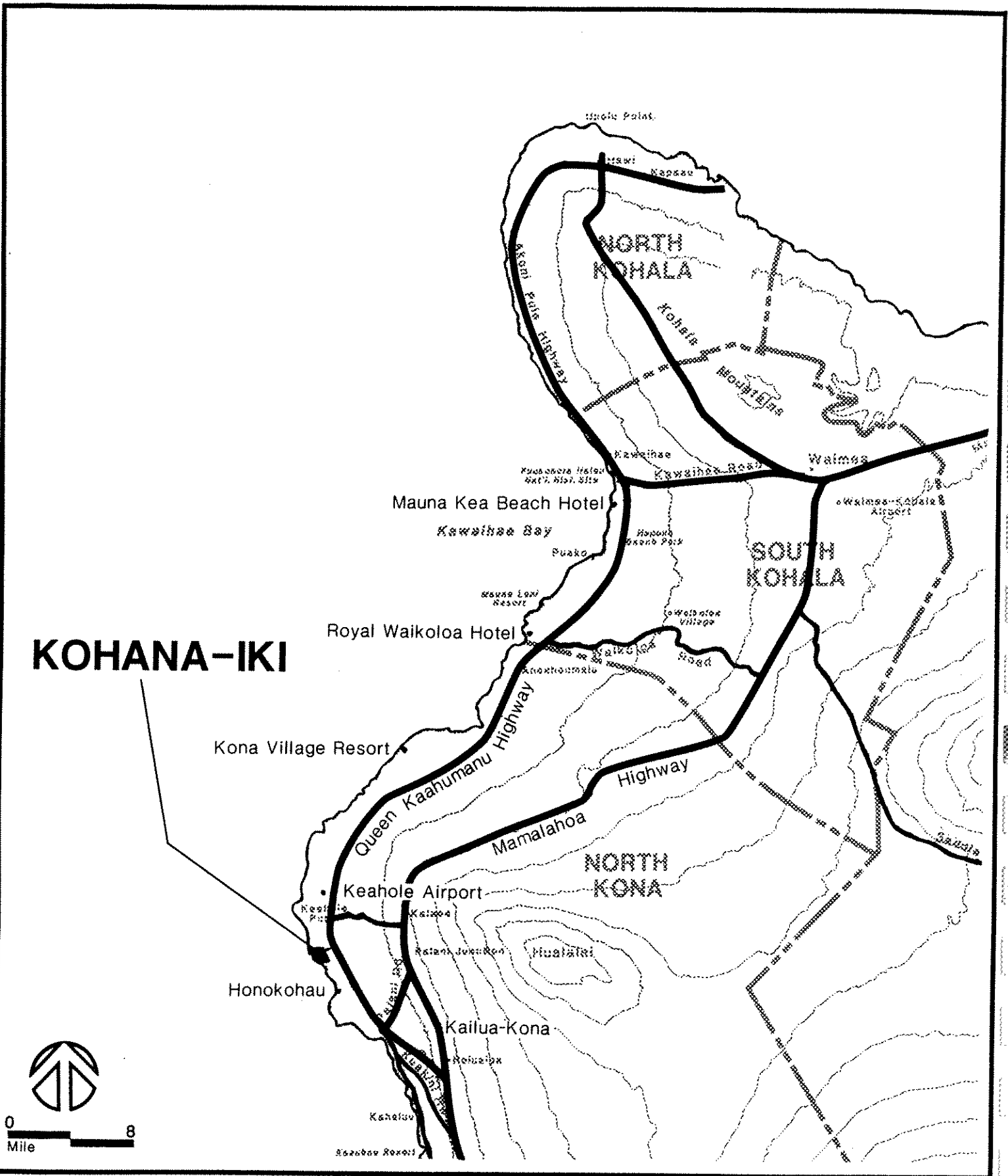
The appropriate planning region for the subject property lies within the North Kona Judicial District, one of nine judicial districts in Hawaii County. The North Kona district lies on the western coast of the island of Hawaii within a larger region known as "West Hawaii." The North Kona district extends from Anachoomalu Bay to Kealakekua Bay (Figure 10). The inland boundaries are defined by the land masses of Mauna Loa and Hualalai. The North Kona Judicial District includes Census Tract 215 (Kailua-Kona) and Census Tract 216 (the remainder).

The primary commercial center of the district (the largest in the West Hawaii Region) is located at Kailua-Kona, the second largest town on the island of Hawaii. Secondary urban centers are found in the communities of Holualoa, Honalo, Kainaliu, Keauhou and Kalaloa.

##### **4.1.2 Climate**

The climate of the North Kona area is semi-tropical and considered to be dry and arid with light rainfall. The average annual temperature is 75F with an average high of 83F and an average low of 67F. Average annual precipitation at Kailua-Kona is 25 inches. The geographic distribution of precipitation closely resembles the topographic contours of the land mass: a high rainfall belt lies between the 1,200 to 3,000 foot elevations on the leeward slopes of Hualalai and Mauna Loa, with zones of decreasing annual rainfall at lower elevations near the coast and at higher elevations, including the summit areas which are located above the rain-bearing trade wind regime.

The area is sheltered from the predominant trade wind system by the land masses of Mauna Loa, Mauna Kea and Hualalai. The prevailing pattern is diurnal with on-shore winds in the morning and early afternoon, often



North Kona Region  
**KOHANA-IKI**  
 Kona Beach Development Venture

Figure: 10

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
 GROSVENOR CENTER • PRI TOWER • 733 BISHOP STREET SUITE 2590  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 545-2055

collecting in a cloud bank at the higher elevations, before returning to offshore breezes in the late afternoon and evening. Calms are experienced approximately 30 percent of the time with typical wind velocities ranging between 3-14 knots (Figure 13). Relative Humidity is also generally stable year-round, the daily average ranging from 71% to 77% (Wilson Okamoto, 1981; Sato, et al. 1973).

#### 4.1.3 The Site

The project area consists of approximately 470 acres of open land situated on the west coast of the island of Hawaii, approximately two miles south of the Keahole Airport. The site is roughly rectangular in shape with the major axis paralleling the coastline. An additional parcel connects the northeast corner to Queen Kaahumanu Highway. An aerial photo of the site is presented in Figure 11. The property is lava covered and slopes gently upward from sea level to approximately 70 feet at the southern mauka corner, three-quarters of a mile inland. The subject property is described for taxation purposes as being located in Division 3, Zone 7, Section 3, Plat 09, Parcels 3 and 16.

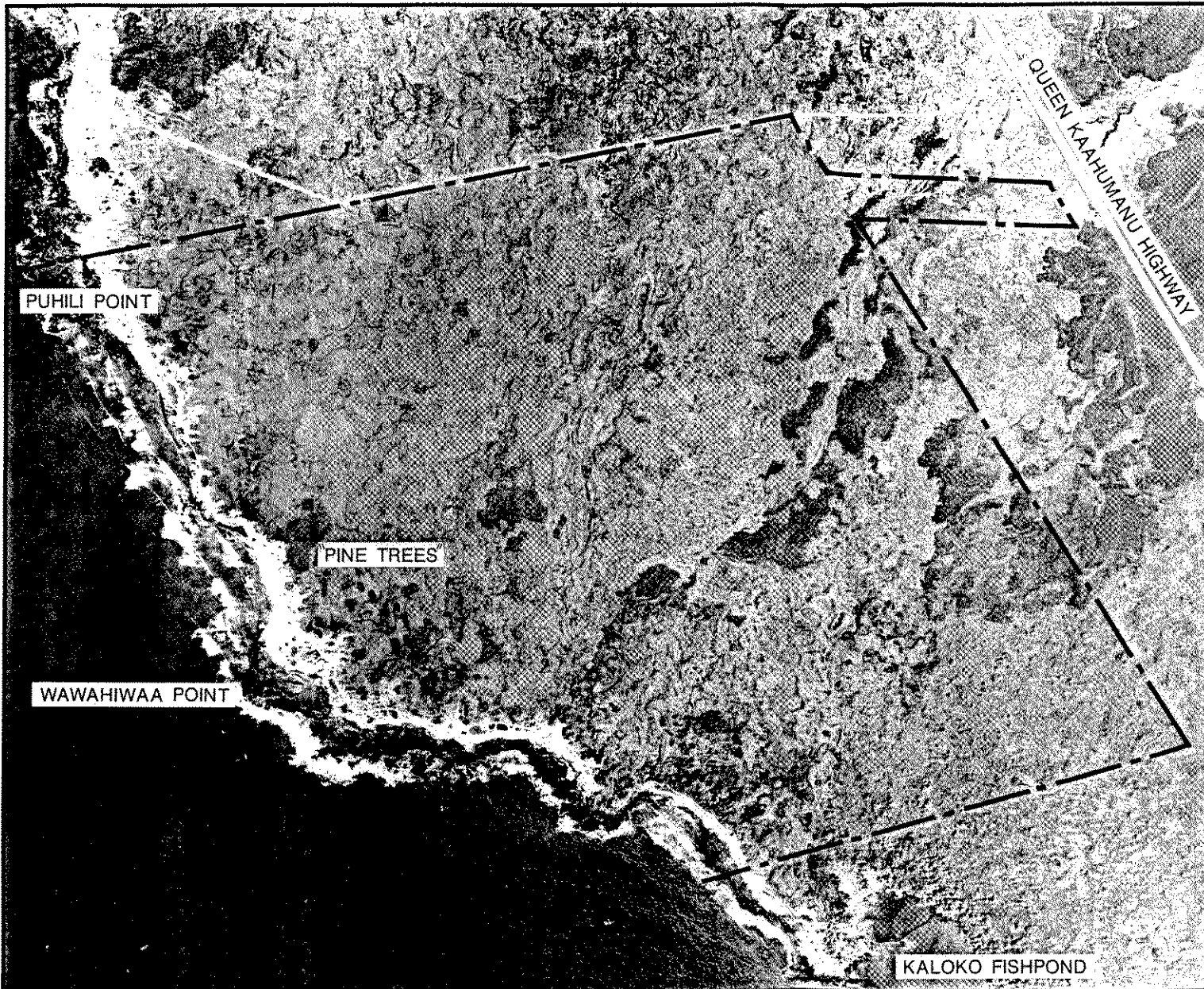
#### 4.1.4 Surrounding Land Uses and Ownership

The site is surrounded by land on three sides with the fourth side abutting the Pacific Ocean. Listed below are the surrounding land uses starting to the north and rotating clockwise (Figure 12).

'O'oma 2 Property (TMK 7-3-09:4). Adjacent to the northern border of the site lies a 313-acre parcel of land lying within the ahupua'a of 'O'oma 2. Owned by Kona Oceanfront Properties, this property shares many similarities to the subject property. Both consist of open and unimproved lava land lying makai of the Queen Kaahumanu Highway. For the most part, both share the same topographical relief. In contrast, the 'O'oma 2 property is not as popular as Kohana-iki for beach recreation, and the anchialine ponds has not been recorded.

NELH (TMK 7-3-43:3.4 & 5). The Natural Energy Laboratory of Hawaii (NELH) facility sits makai of the Keahole Airport. The 322-acre State of Hawaii-owned Laboratory is a publicly funded research facility which conducts research in Ocean Thermal Energy Conversion (OTEC) and cold-water aquaculture. It is currently the "only facility in the world pumping deep, cold, nutrient-rich, pure seawater ashore for use in OTEC, cold water aquaculture, and related projects" (DPED Annual Report, 1984). Access to the NELH facility from the Queen Kaahumanu Highway is via a paved two-lane road running around the southern perimeter of the airport runway.

The Keahole Airport (TMK 7-3-43: Por 03). Neighboring the NELH facility, and approximately two miles from the Kohana-iki site, is the Keahole Airport, which is State owned and operated. Opened in 1971 to replace the old Kona Airport (located adjacent to Kailua Town), the airport supports all interisland air carriers, taxis, and freight operations servicing the West Hawaii region. In 1983, direct mainland flights were introduced. The airport presently consists of a single 6,500 foot runway with associated terminal and parking facilities. In 1985 the airport experienced 93,879 aircraft operations (State D.O.T., 1986). (See 4.3.1 for a more detailed discussion of the Keahole Airport).



Site Photograph

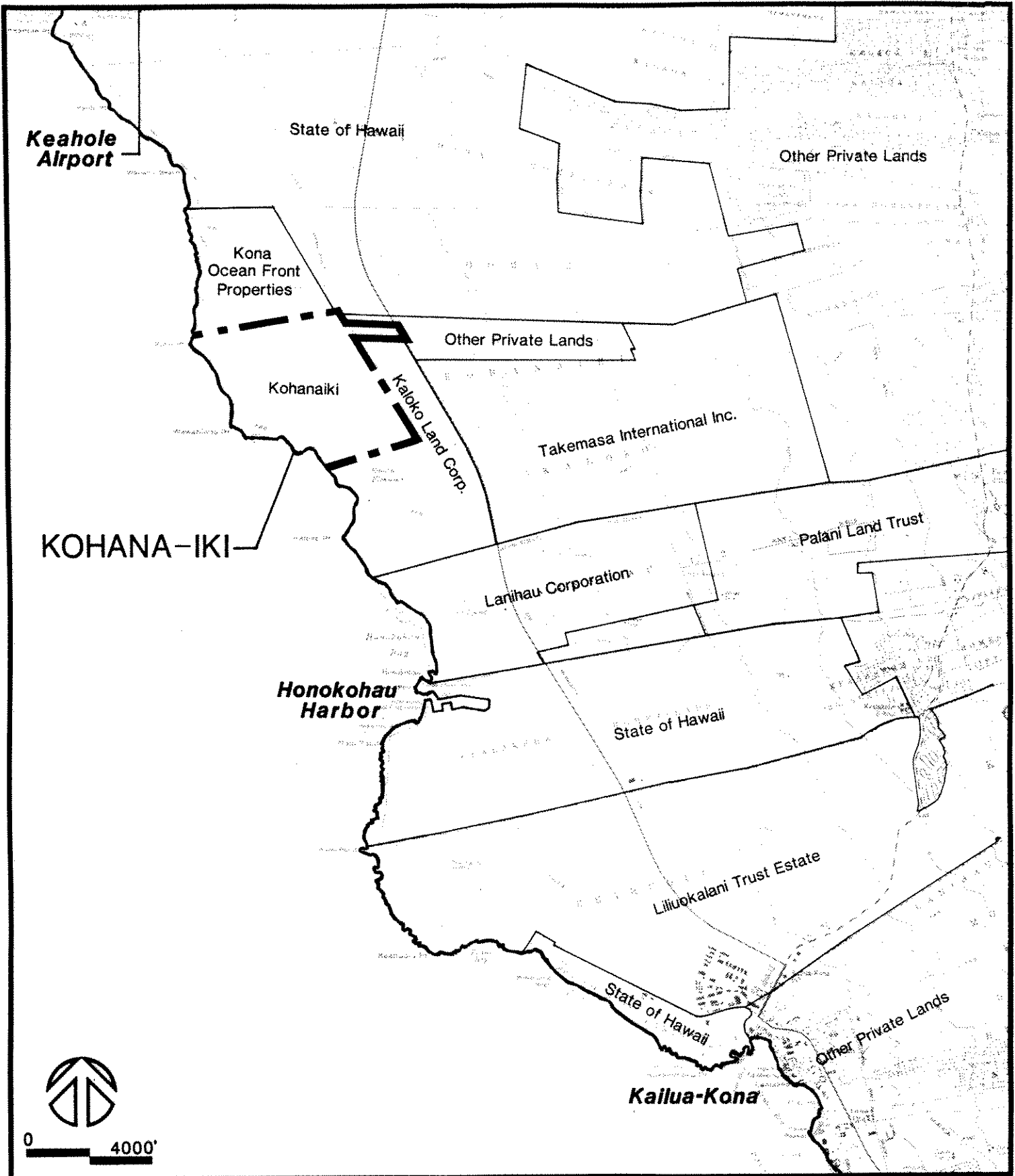
## KOHANA-IKI

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
 PROJECT CENTER, PM TOWER, 722 BISHOP STREET, SUITE 2500  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 542-2222



0 600' Figure: 11



Land Ownership  
**KOHANA-IKI**  
 Kona Beach Development Venture

Figure: 12

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
 GROSVENOR CENTER • PRI TOWER • 733 BISHOP STREET SUITE 2590  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 545-2055

HOST Park (TMK 7-3-09: Por 05 & 7-3-43: Por 03). Abutting the northeastern corner of the property is the 547-acre State-owned site of the proposed Hawaii Ocean Science and Technology Park (HOST Park). Currently scheduled to be operational by the summer of 1987, the developers of the HOST Park will provide the land and the cold water infrastructure necessary for high-tech projects which have successfully completed the research phase at the neighboring NELH facilities and are ready to begin commercial operations. According to current plans, the Park would support "...a minimum of 14 sites ranging up to 40 acres in size which could be absorbed within a five to ten year period" (Helber, Hastert, Van Horn & Kimura, 1985). Access to the HOST Park will be via the existing NELH access road.

Kaloko Land Corporation (TMK 7-3-9:18). Abutting the site to the east (between the Queen Kaahumanu Highway and the Mamalahoa Trail) and to the south is privately owned land owned by the Kaloko Land Corp., et al (See discussion on proposed National Park below). This is open and presently unused land. The remainder of the Kohana-iki Ahupua'a, mauka of Queen Kaahumanu Highway, is primarily owned by Takemasa International Inc., and is currently used for grazing and agriculture.

Kaloko Light Industrial Subdivision (TMK 7-3-9:01). Mauka of the highway, approximately one-mile south of the subject property is the 250-acre Kaloko Light Industrial Subdivision. The State Land Use Designation of this property was changed from Conservation to Urban in 1981. Takemasa International Inc. (T.I.I.), applied for and received approval to use this parcel for a light industrial subdivision which generally supports the commercial, agricultural and resort activities in North Kona. Presently the first phase of 55 lots has been developed. Access to the industrial subdivision is from the Queen Kaahumanu Highway.

Proposed Kaloko-Honokohau National Historical Park (TMK 7-03-9:2, & 7-4-08:10 & 25). The National Park Service is in the process of negotiating for the purchase of approximately 615 acres of privately owned lands (Kaloko Land Corp. and Lanihau Corporation) which is situated adjacent to the southern boundary of the subject property. The proposed park would include the area makai of the Queen Kaahumanu Highway from the Kaloko Fishpond to the Honokohau Small Boat Harbor.

#### 4.1.5 Access

##### 4.1.5.1 Existing Conditions

Direct access to the site is currently provided via the coastal trail which enters the property at the northwestern corner of the site. Two accesses are available to reach the coastal trail: from the paved NELH access road traversing the HOST Park lands near the airport and the adjacent 'O'oma 2 property; and via a jeep trail running along the northern border of the subject property which connects directly to the Queen Kaahumanu Highway at the northeastern corner of the site. These accesses are considered poor and only traversable in four wheel drive vehicles.



#### 4.1.5.2 Probable Impacts

The major access for the proposed development is planned through the 7.7-acre parcel (TMK 7-3-09:16) connecting the major parcel (TMK: 7-3-09:3) to the Queen Kaahumanu Highway. The State of Hawaii Right-of-Way Map (Kailua-Kawaihae Road, Section II, Sheet No. 3) indicates an approved access from the 7.7-acre parcel to the Queen Kaahumanu Highway. This access, shown on the Right of Way Map as 80 feet in width, is shared with the adjacent parcel to the north (TMK: 7-3-09:2) and negotiations are underway to jointly improve the access point. The State of Hawaii owns the 30-foot wide Mamalahoa Trail which bisects the 7.7-acre parcel from the major parcel. The applicant is in the process of applying to the State Board of Land and Natural Resources for both an easement over the Mamalahoa Trail and a Conservation District Use Permit for the roadway easement.

Detailed engineering of the internal roadway system (including the main access roadway) and the Queen Kaahumanu Highway intersection have not been prepared at this time. It is expected that the Kohana-iki Resort access roadway and intersection improvements will be similar to those of the Waikoloa and Mauna Lani Resorts in South Kohala and the proposed HOST Park project one mile to the north. Typically, these improvements involve full channelization which includes: 1) acceleration and deceleration lanes to and from the southbound lanes of the Queen Kaahumanu Highway; 2) separate right turn lanes from the development (eastbound) to the highway; and, 3) a separate left turn lane to separate turning traffic from northbound Queen Kaahumanu Highway traffic.

The detailed engineering plans for the access and all plans for work within the State highway right-of-way will be submitted to the Highways Division (State Department of Transportation) for review and approval at the appropriate time. The applicant acknowledges that all intersection improvement costs will be borne by the developer.

#### 4.1.5.3 Mitigation Measures

As presently planned, the main access roadway will cross the Mamalahoa Trail at one point. The Mamalahoa Trail is recognized as a major historical feature which once provided access to the small coastal communities along the Kona coast. Therefore, physical disturbance of the trail will be kept at a minimum. The actual point at which the roadway crosses the trail will be evaluated in terms of minimizing the impact to any unique or significant features of the trail (such as elevated sections of the trail across small gullies which illustrate the engineering prowess of mid-nineteenth century trail builders).

It is recognized that there is growing popular support for restoring the around-the-island trail system; no attempt will be made to impact north-south pedestrian movements along the trail. The applicant intends to utilize interpretive treatments at the trail crossing (similar to those used by the Mauna Lani and Waikoloa Resorts) including interpretive signage and possibly the use of lava pavers to simulate the actual trail bed.

#### 4.1.6 Physiography and Soils

##### 4.1.6.1 Physiography

The subject property is located on the western slope of Hualalai, a dormant shield-type volcano (elevation 8,271 feet) and one of three volcanoes on the island which have been volcanically active within historic times. The only recorded eruptions of Hualalai occurred circa 1800 - 1801. One of the eruptions, originating in the northwest volcanic rift zone at about the 1,600 foot level (in the vicinity of the Puhi o Pele Cinder Cone, just makai of the Mamalahoa Highway), generated a lava flow which extended to the shoreline just north of Keahole Point (Draft Kona Regional Plan, 1982).

The Keahole Point area (including the subject property) was formed by progressive layering of prehistoric lava flows from Hualalai. The lavas are primarily pahoehoe with thicknesses varying from 6 inches to 100 feet. The layers are very porous and contain numerous lava tubes, cracks, crevices, and fissures (R.M. Towill, 1976).

Dimensions. The Kohana-iki property is comprised of two tax parcels; the major parcel (TMK 7-3-09:3) is approximately 462.38-acres in size. The smaller parcel (TMK 7-3-09:16) is approximately 7.75-acres in size for a combined total acreage of 470.13 acres. The major parcel is roughly rectangular in shape with its longest side along the coastline (approximately 6,000 feet). Lot depth ranges from 4,800 feet along the northern boundary to approximately 3,000 feet along the southern boundary. Dimensions of the smaller parcel are approximately 300 feet by 1,330 feet.

Elevation of the property ranges from sea level at the coastline to approximately 70 feet above mean sea level (AMSL) at the Queen Kaahumanu Highway. The land slopes gently with slopes ranging on average from 0 to 5 percent. Localized mounds and depressions, characteristic of lava flows, are present throughout the site.

Coastal Pools. Numerous coastal pools lie along the coastal areas of the site. These ponds, often referred to as *anchialine* ponds (i.e., shoreline pools without surface connection to the sea, having waters of measurable salinity and showing tidal rhythms) are "known to occur variously around the world in lavas and elevated fossil reefs. In the Hawaiian Archipelago, these ponds exist almost exclusively along the shorelines of Hawaii and southwest Maui Islands" (Maciolek and Brock, 1974:1). A detailed description of these ponds, together with a discussion of probable impacts and mitigating measures, is presented in Appendix H and summarized in Chapter 4.1.14.

##### 4.1.6.2 Soils

The general soil map from the Soil Survey of Hawaii, Soil Conservation Service (1973) classifies the soil in the project area into three types: Pahoehoe lava, A'a lava, and the Punaluu extremely rocky peat series (Figure 4, Appendix F). The predominant soil type covering almost 70 percent of the project site is Pahoehoe lava. Pahoehoe has a billowy, glassy, and ropy surface that is relatively smooth. The erodibility factor for this soil type is nil, indicating no soil erosion or

sedimentation is produced. Pockets of the second type of lava, A'a, are also scattered throughout the site. This lava has a rough, spiny, or rubble-like surface. Again, the erodibility factor for this soil type is zero.

The third soil type is the Punaluu extremely rocky peat soil series. The Punaluu series is a well drained, thin, organic soil ranging in thickness from 0 to 12 inches. It is underlaid by Pahoe-hoe lava bedrock. The erodibility factor for this soil of 0.05 indicates that the erosion hazard is relatively slight. This soil is found in the southwest section of the project site, covering approximately 10 percent of the project site. Thus, the soil characteristics of the project site indicate that the southwest section is the only area where erosion may occur and the potential hazard from such erosion would be slight (M & E, Pacific, 1986:Appendix F, Page III-1 to 3).

A fourth land type, the Beach areas, are located along the coast. These are long, narrow, sloping areas of sand and gravel varying in color according to the material from which they were formed. The white sand beaches fronting the project area are comprised of coral and sea shells.

Agricultural Suitability. The Soil Conservation Service indicates that the property is not suited for agricultural use. The two lava types listed above have been given a Capability Class Rating of VIIIs defined as soils and landforms [which] have limitations that preclude their use for commercial plants, the primary limitation being that the soil is shallow, droughty, or stony. The Beach areas received a rating of VIIIw, indicating unsuitability for agricultural use primarily due to the fact that water in or on the soil interferes with plant growth or cultivation.

The University of Hawaii Land Study Bureau's Detailed Land Classification--Island of Hawaii classified the land forms into groupings similar to those mentioned above, and also indicated that the particular soil types were very poorly suited for agricultural uses. The subject property is not indicated on the Agricultural Lands of Importance to the State of Hawaii (ALISH) Maps prepared by the State Department of Agriculture, reflecting its severely limited potential for soil-based agricultural crop production.

#### 4.1.7 Drainage

Introduction. An analysis of storm drainage has been prepared for the Kohana-iki Resort (Chapter II, Appendix F). The following section summarizes relevant portions of the drainage study.

##### 4.1.7.1 Existing Conditions

Kohana-iki Watershed. The existing Kohana-iki watershed contains an area of approximately 3,680 acres and extends from the western slopes of Hualalai volcano to the coast (Figure 2, Appendix F). Elevations in the triangular-shaped watershed range from 4,800 feet to mean sea level and ground slope varies from 8 percent in the upper elevations to 1 percent near the coast. Average ground slope in the watershed is approximately 6 percent.

There are no perennial streams or well-defined water courses in the watershed due to a combination of meager rainfall and the lava landscape. Storm water primarily sheetflows downward from the upper parts of the watershed to Queen Kaahumanu Highway. Three culverts convey storm runoff across Queen Kaahumanu Highway into the project site (Figure 2, Appendix F). The design peak discharges for culverts 1, 2, and 3 are 2,200, 680, and 800 cubic feet per second (CFS).

As noted in Section 4.2.1 above, the project site is located on the semi-arid leeward side of the island and is sheltered from the rain-producing northeast tradewinds by Mauna Loa, Mauna Kea and Hualalai. The mean annual rainfall within the coastal project site is less than 20 inches. The wettest period of the year extending from May to September receives more than half of the total annual rainfall. Surface runoff occurs only under conditions of intense rainfall--events which occur only rarely.

Existing On-site Drainage. The project site was divided into seven drainage areas, including the drainage area between the Queen Kaahumanu Highway and the project site. The final discharge point for most of the storm runoff generated both on-site and above the property is the Kaloko Fishpond located on the coast near the southwest corner of the project (Figure 2, Appendix F). A total design peak flow of 2,800 cubic feet per second (CFS) is predicted to drain into the Kaloko Fishpond from a total drainage area of 3,634 acres. The balance of 617 CFS sheetflows into the coastal ponds and ocean beyond between Puhili Point and the coastline near the proposed marina site.

#### 4.1.7.2 Probable Impacts

The change in land use created by the resort development will increase the amount of rainfall that is converted to surface runoff. The proposed drainage plan (Figure 3, Appendix F) calls for the majority of the surface flow from resort development to be directed to ponding areas and dry wells within the golf course, with excess surface flow being discharged into the proposed marina basin. The anchialine ponds in the coastal areas will be protected from runoff by landscaped berms or cut-off ditches.

#### 4.1.7.3 Mitigative Measures

Care has been taken in the development of the drainage plan to assure that no surface runoff from surrounding resort development enters the pond areas. Runoff into the Kaloko Fishpond area will be reduced (from the current 2,800 CFS to 2,700 CFS) and the runoff into the prime beachfront areas will be lowered substantially after development.

### **4.1.8 Air Quality**

#### 4.1.8.1 Existing Conditions

The leeward side of the island of Hawaii has no air monitoring stations. The State Department of Health has monitoring stations in Hilo, about 60 miles east-southeast of the site, but the data collected are specific to these localities and cannot be correlated to the Kohana-iki site. It can be assumed that present air

quality is good most of the time. Exceptions occur during periods of heavy volcanic activity. In addition to increasing particulate levels, substantial increases in ambient concentrations of mercury and sulphur dioxide have been recorded during eruptions.

#### 4.1.8.2 Probable Impact

The major long-term impact on existing air quality conditions will be from vehicular emissions, principally carbon monoxide (CO), oxides of nitrogen (NOx), and photochemical oxidants (Ox). Secondary off-site long-term impacts will be attributable to increased pollutants generated by electrical power stations providing power to the proposed resort. The principal source of short-term impacts will be construction activity stemming from both vehicular emissions and fugitive particulate emissions from vehicular movement on unpaved roads.

Long-term impacts. An air quality impact analysis recently prepared as part of an environmental impact statement for another proposed West Hawaii resort (Belt, Collins & Associates, Kaupulehu Resort, April 1986) reported that vehicular emissions generated at full build-out (600 to 900 hotel units, 350 to 600 condominium units, 2 golf courses) would result in a net increase in emissions of all three major automobile pollutants. However, this increase would "still be in compliance with federal and state 1-hour standards. Compliance with the federal 8-hour standards can also be inferred..." (James W. Morrow, Air Quality Impact Analysis: Kaupulehu Resort, April 1986:I-7). Given the fact that the Kohana-iki and the Kaupulehu projects share similar vehicular traffic characteristics, it can be assumed that they will share similar vehicular emission impacts.

It should be noted that this assumption (that the Kohana-iki Resort-generated vehicular emissions will be within federal and state emission guidelines) does not address the cumulative impacts resulting from the development of the neighboring HOST Park and 'O'oma II Resort.

Short-term impacts. Construction activities such as site preparation, building, and on-site road construction will generate particulate emissions. Adequate dust control measures will be utilized (such as twice-daily watering of exposed areas and early landscaping) to prevent violations of state fugitive dust standards.

#### **4.1.9 Nearshore Marine Environment**

A description and impact analysis of the nearshore marine environment was prepared for this EIS by O.I. Consultants, Inc. and is appended to this report as Appendix H. References cited are included in Appendix H. A summary of the substantive findings and conclusions of their report is presented below.

##### 4.1.9.1 Existing Conditions

The nearshore waters off the subject property are pristine, with no stream discharges, industrial wastes, or domestic wastes affecting the area. They are classified as "AA" waters by the State Department of Health (Title 11, Chapter 54, Water Quality Standards). Near-shore waters are defined as "all coastal

waters lying within a defined reef area, all waters of a depth of ten fathoms, or waters up to a distance of 1,000 feet off-shore if there is no defined reef area and if the depth is greater than ten fathoms."

The nearshore marine environment off Kohana-iki, while supporting a coral and fish community which makes it a popular SCUBA diving spot (Hawaii DLNR, 1978), is not significantly different, either in species abundance, or diversity, from other areas of the western coast of the island of Hawaii. Studies of coral communities and associated fish populations have been conducted all along the leeward Hawaii island coast (Dollar, 1975; Kay, et al, 1977; Key, et al, 1971; Madden, 1980; Hayes, et al., 1982; Brock and Brock, 1974; Department of Fish and Game, Hawaii DLNR). While differing in details between various locations, the patterns of zones of corals and the associated fish species are a relatively constant feature of the coastline.

Threatened or endangered species. Two species of marine animals which have been declared threatened or endangered occur off the Kohana-iki coastline: the threatened green turtle (*Chelonia mydas*) and the endangered humpback whale (*Megaptera novaeangliae*).

#### 4.1.9.2 Probable Impacts

Marina Construction. As discussed in Chapter 2.6, the construction of the marina development will require the issuance of a U. S. Army Corps of Engineers permit and the preparation of a federal supplemental EIS, in addition to more detailed environmental and engineering studies. (A market study and preliminary engineering feasibility analysis have been prepared in conjunction with this EIS and are included as Appendices G and H, respectively). Marina design and related environmental impacts and mitigative measures related to the marina development discussed herein are meant to be of a general nature and are not intended to substitute for more detailed studies to be prepared in conjunction with the aforementioned federal supplemental EIS.

A Preliminary oceanographic environment and conceptual engineering feasibility evaluation for the proposed marina was conducted in June, 1986 by Edward K. Noda and Associates (Appendix H). This report updated a previous ocean engineering study prepared by previous owners of the property (Bretschneider and Gerritsen, Ocean Engineering Environment and Hydraulic Characteristics of a Proposed Small Craft Harbor for Kohanaiki, Hawaii, 1970). The Noda study validated the findings of the earlier Bretschneider report and provided additional information on waves and currents. The principal finding of the study was "...While detailed engineering studies would be required for final design and layout of the marina and entrance channel, the present scaled-down [from the earlier Bretschneider version] marina plan is conceptually feasible from a technical viewpoint." The study noted that although the presently proposed marina entrance is at the same location as previously recommended in the Bretschneider study, it is still directly exposed to southerly waves. The report suggested three alternative wave attenuation features in the vicinity of the entrance channel (Figures 12 A-B, Appendix H).

The construction of the marina basin will result in the destruction of a portion of the nearshore coral community. The entrance channel to the marina will be

constructed by dredging a portion of the offshore area to a depth required for the passage of small boats. This dredging activity will remove some portion of the existing coral community; in addition, some coral mortality may occur as the result of siltation generated by dredging activity.

Resort Development. Sedimentation potential will increase during the short-term grading and construction phases of the resort development. Minor changes in the baseline quality of the nearshore water may occur as a result of the utilization of treated effluent to irrigate the golf course. Increased opportunities for public access to the beaches and nearshore waters may be expected to reduce the present populations of certain marine and intertidal species of high commercial, subsistence or recreational value.

#### 4.1.9.3 Mitigation Measures

Marina. The impacts of marina construction on the nearshore environment will be reduced as much as possible by utilizing techniques and methods which generate the least amount of sediment. Construction of the marina basin will take place "in the dry" behind a shoreline berm which will not be removed until construction of the marina has been completed and sediment within the marina basin has had the opportunity to settle out of the water. During construction of the marina entrance channel, water quality conditions up- and down-stream of the construction activity will be monitored to assure compliance with construction conditions likely to be imposed by the U.S. Army Corps of Engineers in the process of granting a permit for such construction. When blasting is required, the size of charge, frequency of blasting, and timing will be established in consultation with representatives from the Corps of Engineers and the National Marine Fisheries Service, to assure no significant impacts to green turtles or humpback whales.

Resort Construction. Shoreline modifications including extensive vegetation removal, beach alteration, and structural modifications will be minimized. Adequate measures will be taken to minimize the potential impact of wastewater percolation and possible migration into coastal waters. (See discussion in Chapter 4.3.3.3: Wastewater Treatment and Disposal: Mitigative Measures).

#### 4.1.10 Noise

##### 4.1.10.1 Existing Conditions

A number of noise sources are present at the Kohana-iki site including aircraft noise, coastal "surf" noise and vehicular traffic noise along the Queen Kaahumanu Highway.

##### Aircraft Noise.

The primary source of man-made noise originates from air traffic operations at and near the Keahole Airport, located approximately two miles north of the subject property. A straight line projection of Runway 17's centerline crosses the northwest corner of the Kohana-iki site at Puhili Point--some 8,200 feet off the end of Runway 17. Straight-in approaches from the south to Runway 35 (used only under abnormal weather conditions) and straight-out departures from

Runway 17 therefore, do not necessitate an overflight of the subject property. The majority of aircraft utilizing the airport (approx. 80%) land and takeoff on Runway 17, travelling in a north to south direction. Most of the commercial and military air traffic leaving Keahole is bound for either Kahului or Honolulu, necessitating a right turn out to sea shortly after takeoff. (See Chapter 4.1.2 and Appendix J for general discussion of Keahole Airport, aircraft mix and flight operations). Other aircraft (such as commercial air tours and general aviation) may continue in a southerly direction after takeoff, overflying the subject property and having a greater impact on noise levels.

The Airports Division, State Department of Transportation, is the manager of the Keahole Airport facility. They have recently let contracts to update the original 1971 Keahole Airport Master Plan and to prepare detailed noise studies of existing and projected aircraft operations. These studies are expected to take approximately one year to complete with completion scheduled for Spring, 1987. The applicant, as an interested and adjacent landowner, is seeking to be an active participant in the Airport Master Plan and Noise Study planning process.

Preliminary Aircraft Noise Contour Study: 1985. In order to assess the present aircraft noise impacts to the Kohana-iki site, a preliminary mapping of existing noise contours was prepared by Gordon Bricken & Associates, consulting acoustical and energy engineers, in conjunction with this EIS (Figures 1 and 2, Appendix J). It is recognized that this is a preliminary noise study and is not intended to substitute for the detailed noise studies currently being prepared by the State DOT. The noise study is intended to indicate the relative magnitude of aircraft noise impact, however. The contour study used 1985 flight operations data (Tables 1A, 1B, Appendix J) and developed  $L_{dn}$  contours (60, 65, 70 and 75  $L_{dn}$ ) for two extreme flight track scenarios: 100 percent straight in-out flight operations; and 100 percent turning operations.

( $L_{dn}$  or "yearly day-night average sound level in decibels" is the principal metric used to measure aircraft noise, more specifically, "...the yearly average of the A-weighted sound level integrated over a 24-hour period. It also incorporates a 10 dB step function weighting to aircraft events between 10:00 P.M. and 7:00 A.M. to account for increased annoyance to noise during the night hours" (U. S. Department of Transportation, 1983).

Findings. The 100 percent turning operations contour map (Figure 1, Appendix J) indicates that the entire project site lies outside the 60  $L_{dn}$  contour indicating no impact to proposed resort operations. The 100 percent straight in-out operations contour map (Figure 2, Appendix J) shows a portion of the project site in the vicinity of Puhili Point lying within the 60 to 65  $L_{dn}$  contours indicating a potential impact to condominium activities currently planned for that area. As noted above, the majority of aircraft operations at the Keahole Airport use Runway 17--landing and taking-off in a southerly direction. A right turn out to sea shortly after take-off is the preferred route for almost all commercial air traffic; thus, it is likely that the actual condition will be much closer to that represented by 100 percent turning operation contour map.



### Coastal and Vehicular Noise Sources.

A Primary source of noise close to the shoreline is that naturally caused by wave action crashing against the beaches and lava boulders. A minor source of noise is produced from vehicular traffic moving along the Queen Kaahumanu Highway.

#### 4.1.10.2 Probable Impact

##### Airport Noise

The findings of the preliminary noise study indicate that a portion of the Puhili Point area may lie within the 60 to 65  $L_{dn}$  noise contour.

FAA Noise Impact Criteria. The Federal Aviation Administration has established guidelines relating to surrounding land use compatibility with airport facilities. This information is summarized in tabular form in Table 2A Appendix J. The FAA guidelines state that "all land uses are normally compatible with noise levels less than 65  $L_{dn}$ . Local needs or values may dictate further delineation based on local requirements or determinations" (U.S. Department of Transportation, 1981). The FAA guidelines classify areas within the 65 to 70  $L_{dn}$  contours as being incompatible with residential activities except "... where the community determines that residential uses must be allowed...". In these areas, the FAA guidelines suggest measures to achieve outdoor to indoor noise level reduction of at least 25 to 30 dB be incorporated into building codes and be considered in individual approvals. Thus, under the federal guidelines, there would not appear to be any noise impact to the Kohana-iki site even under the most extreme noise conditions.

State DOT Noise Impact Criteria. The State Department of Transportation maintains that the FAA guidelines are too permissive relative to acceptable land uses within the 60 to 65  $L_{dn}$  contour. This policy was initially set during the preparation of aircraft noise studies for the 1981 Honolulu International Airport Master Plan update. "Although the FAA guidelines do not recommend that special measures be taken or studies be performed in areas exposed to noise of less than 65  $L_{dn}$ , the  $L_{dn}$  noise exposure range of 60 to 65 has nevertheless been considered in the Honolulu analysis. It is generally accepted that residential development without special acoustical insulation is compatible with aircraft noise levels of 65  $L_{dn}$  or lower, but this may not be true in Honolulu.

"Because of the open living environment in Honolulu and because no residential building insulation is needed for heating purposes, the level of aircraft noise may have to be lower than elsewhere before land use compatibility can be ensured" (Peat, Marwick, Mitchell & Co., Honolulu International Airport and Environs Master Plan, June 1981:E-15). The State position relative to compatible land uses is summarized in tabular form in Table 2B, Appendix J. All land uses below the 60  $L_{dn}$  contour are compatible. Between the 60 to 65  $L_{dn}$  contour, residential land uses, mobile homes, transient lodgings, and public facilities such as schools, hospitals and nursing homes are compatible only when "additional noise level reduction incorporated into the design and construction...(ibid. Table 2B, footnote A). Thus, under the State DOT guidelines, and using the most extreme noise condition (straight in-out operations), mitigative sound

attenuation features would have to be incorporated in building design for structures placed in the Puhili Point area (lying within the 60  $L_{dn}$  contour).

#### Short-Term Construction Noise

Audible construction noises may be unavoidable during the project construction period. Depending on the type of construction activity, distances at which outdoor construction activities would be audible range from 500 to 2,000 feet. It should be noted that the nearest residences or noise sensitive public facilities are located several miles away from the project site.

#### Long-Term Vehicular Traffic Noise

At full build-out, internal traffic noise could become a source of noise within the resort. Accepted measures to reduce the impact of vehicular noise include the development of wide landscaped buffer zones (including the placement of golf course fairways, earthen berms, and architectural screening), ample setbacks and low vehicular speed limits.

#### 4.1.10.3 Mitigative Measures

Short-Term Construction Noise. As stated above, no noise sensitive land uses are located nearby. Nevertheless, every effort will be made to mitigate construction noise impacts. A number of options exist to reduce or mitigate construction noise. Such measures include the use of muffled construction equipment and the early phasing of landscaped buffers/berms construction.

Aircraft Noise. The preliminary noise contour study cited above indicates a possible noise impact (between 60 - 65  $L_{dn}$ ) to a portion of the Kohana-iki Resort under extreme straight in-out flight operations, using the more conservative State DOT noise compatibility guidelines. The applicant intends to work closely with the State DOT in the design and construction of the structures located in areas exposed to greater than 60  $L_{dn}$ --should the pending and more detailed noise studies identify such areas on the site. These procedures can most appropriately be addressed at the Zoning and Special Management Area permit approval stages of the development process.

#### **4.1.11 Natural Hazards**

##### 4.1.11.1 Existing Conditions

Volcanic Activity. A report prepared for the U.S. Geological Survey has identified "zones of overall relative risk" associated with volcanic activity on the island of Hawaii. These zones take into account both direct elements of volcanic activity (such as lava flow inundation, rock fragments, and gases) and indirect hazards (such as subsidence, surface rupture, earthquake shaking and tsunamis). The classification system includes six zones, "A" through "F", with risk increasing from "A" to "F". The subject property is located in the "DE" zone indicating a relative degree of risk from volcanic action between D and E (Mullineaux & Peterson, 1974).

Seismicity. The entire Island of Hawaii is susceptible to earthquakes originating in fault zones under and adjacent to it. Two fault zones have been identified within the Kona region: the Kealakekua and the Kaholo faults, both located in South Kona and well away from the subject property. The island of Hawaii is classified as a Zone 3 area for the purpose of structural design. This classification system is based on a scale of 0 to 4, with 4 being the zone of highest seismic occurrence and danger. The Hawaii County Building Code requires that all new structures be designed to resist forces that might be expected in Zone 3 areas.

Lava Flow Inundation. The project area is susceptible to potential lava flow from Hualalai, one of the five volcanoes comprising the Island of Hawaii and one of the three which has been active in historic times. The last active period of eruption occurred circa 1800 when lavas produced from the northwest volcanic rift zone of Hualalai at about the 1,600 foot elevation (makai of the existing Mamalahoa Highway) reached the coastline at Keahole Point, approximately two miles north of the project area.

Flood Hazard. The Hawaiian Islands have been subjected to at least 50 possible tsunami occurrences within historic times. The greatest tsunami wave run-up heights ever recorded in the Kona region resulted from the Japanese tsunami of 1896 which caused extensive damage throughout the Hawaiian Islands. The Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency (May 3, 1982) have identified coastal high hazard areas in terms of areas susceptible to flooding from tsunami and high wave run-up. As shown in Figure 13, the coastal high hazard area (Zone V-15) generally follows the coastline. The 100-year flood zone boundary (Zone A-4) lies inland of the V-15 zone and varies between 200 to 1,000 feet inland of the shoreline. By far the majority of the site lies within the "C Zone", or areas of minimal flooding. Base flood elevations range from 7 to 9 feet above mean sea level. The property has not been designated as potentially susceptible to flood hazard other than by tsunami inundation as discussed above.

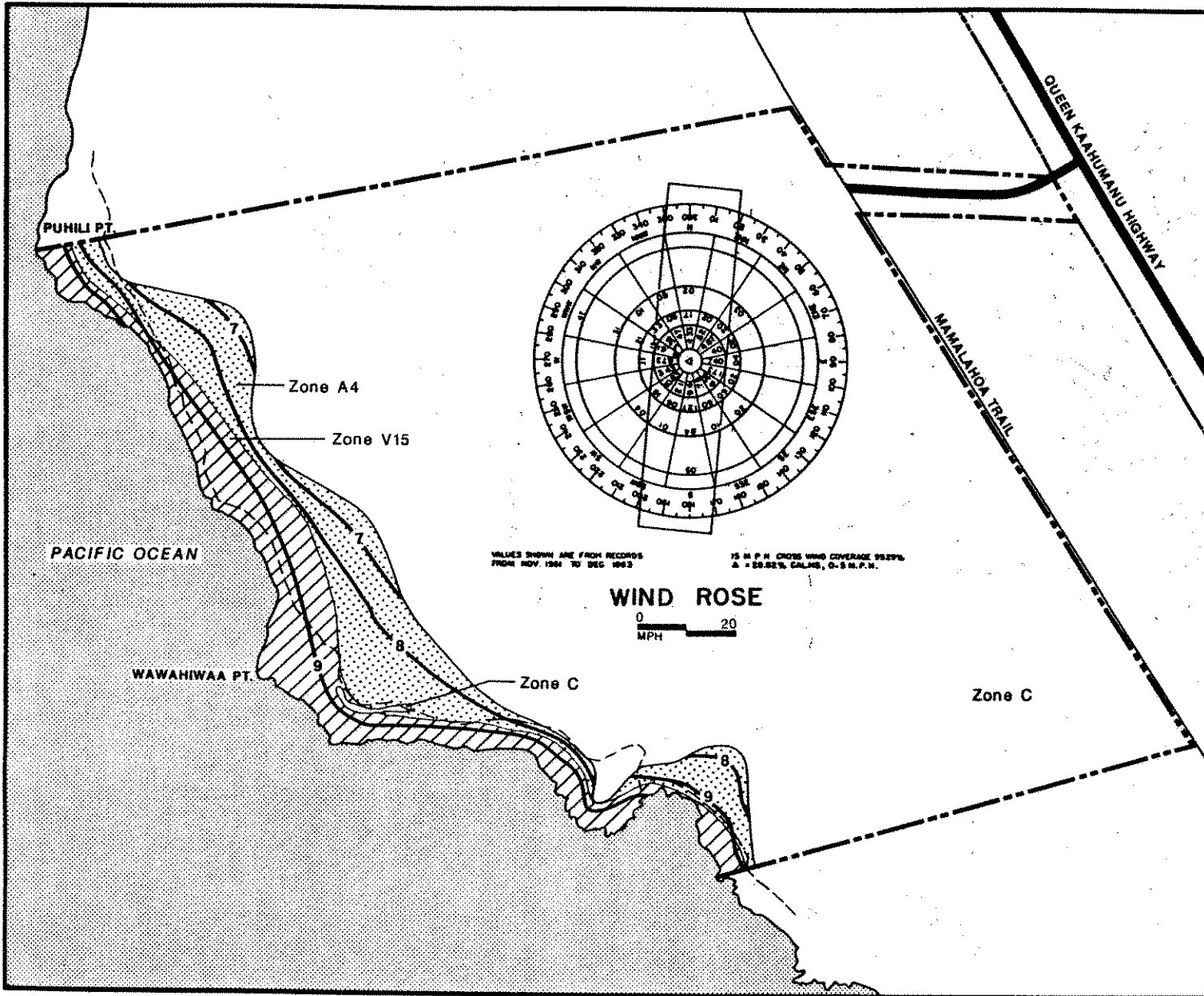
#### 4.1.11.2 Probable Impacts

Structures at the Kohana-iki Resort will be built in accordance with all governmental standards to be resistant to flooding and seismic shock. All habitable floors within the 100-year floodplain will be elevated to or above the base flood elevation and no fill will be placed in the coastal high hazard area for structural support.

#### 4.1.12 Aesthetics






##### 4.1.12.1 Existing Conditions

Much of the project area is visible by motorists on the Queen Kaahumanu Highway, except directly above the property; this is because the roadway is slightly depressed directly mauka of the property and because of the sloping nature of the terrain. The Keahole Airport and the NELH facility at Keahole Point are evident to the north of the property, imparting an urban tone to the natural lava landscape. Extensive views of the property are evident from the



**Environmental Constraints:  
Winds & Flood Hazards**

**LEGEND**

-  Zone A4
-  Zone V15
-  Zone C
-  Base Flood Elevation Line (in Feet NGVD)
-  Coastal Beach Trail

**REFERENCES**

- Flood Insurance Rate Map:  
Panel 1551680683B, May 3, 1982
- Wind Rose:  
Airports Division, State Department of Transportation

**KOHANA-IKI**

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
ENGINEERING CENTER • 7th FLOOR • 724 KONGI STREET • SUITE 2000  
HONOLULU, HAWAII 96813 • TELEPHONE 534-8500



0 600' Figure: 13

coastal jeep trail. Current vistas looking mauka are of pahoehoe lava lightly colored by patches of fountain grass with dark mounds of a'a lava distributed randomly.

Located approximately midway between the northern and southern borders of the site (and visible from almost anywhere on the site), is a relatively large clump of mangrove trees. The anchialine ponds found scattered about the site are not easily visible from the ground because they are situated in depressions within the lava. The views along the coast are of the emerald blue off-lying waters with black fingers of lava anchoring stretches of white coral and sand beaches. The morning glory, naupaka and beach heliotrope provide a green belt and transition zone between the coastal and mauka environments.

#### 4.1.12.2 Probable Impacts

The present landscape of the property will be irretrievably altered from its present natural condition to one of an urban state characterized by low-lying buildings, landscaped open space, internal roadways, marina harbor and related facilities, and an 18-hole golf course. Major buildings will be designed to minimize impacts to existing mauka-makai view corridors.

#### **4.1.13 Flora**

A botanical survey of the Kohana-iki site was conducted in May 1986 by Char & Associates, botanical and environmental consultants (Appendix C). Major objectives of the survey were to: inventory existing flora, describe major vegetation types, search for rare, threatened or endangered plant species, and identify areas of potential environmental problems or concerns.

#### 4.1.13.1 Existing Conditions

A total of 73 vascular plant species were identified on the Kohana-iki site, 42 (57.5%) are introduced or exotic species, 27 (37%) are native, and 4 (5.5%) are of Polynesian origin. Among the native species, 18 are indigenous and 9 are endemic (restricted to the Hawaiian Islands). One small plant, about a foot tall, tentatively identified as *Reynoldsia* species, was found growing within the walls of a stone structure located under the kiawe thicket. *Reynoldsia sandwicensis* or 'ohe (the Kona species formerly *Reynoldsia huehuensis*) is a candidate endangered or threatened species (U. S. Fish and Wildlife Service 1980).

The study recognized four vegetation types: Strand, Pond, Kiawe Thicket and Scrub vegetation. These types are briefly described below.

#### 1. Strand Vegetation.

Along the coastal portion of the project area is a well-developed strand vegetation. The vegetation occurs on sandy to coral rubble substrates. These sandy/coral beach areas form a narrow to wide belt along the coast. The project site is characterized by its desert-like appearance with sparse, dry grasses and herbs providing the only color to the dark lava landscape. The more common species present within this zone include beach morning glory (*Ipomoea brasiliensis*), naupaka-kahakai (*Scaevola taccada*), hinahina

(*Heliotropium anomalum* var. *argenteum*), Bermuda grass (*Cynodon dactylon*), alena (*Boerhavia diffusa*), pa'u-o-Hi'iaka (*Jacquemontia Sandwicensis*) Christmas berry (*Schinus terebinthifolius*), and tree heliotrope (*Messerschmidia argentea*). The strand vegetation supports a number of native species. Some, such as the pohuehue and naupaka-kahakai, are used in landscaping.

2. Pond Vegetation

A number of anchialine ponds are found along the coastal portion of the project area (see Chapter 4.1.14 for discussion of ponds). The ponds are in various stages of aging. The younger ponds are largely lava pools with some vegetation around the edges, usually 'aki'aki (*Sporobolus virginicus*) and 'akulikuli (*Sesuvium portulacastrum*). The older or shallower ponds are filled with organic material from leaves and other plant parts. These more or less filled ponds support a dense growth of pickleweed (*Batis maritima*) and makai sedge (*Scirpus paludosus*).

A large forest of mangrove (*Rhizophora mangle*) occupies one of the ponds. This plant is considered a pest by the State Department of Agriculture (1981), as it blocks coastal and harbor waterways and fills fishponds.

3. Kiawe Thicket

Kiawe (*Prosopis pallida*) trees, 15 to +25 feet tall, form a closed to semi-open canopy on the pahoehoe lava immediately behind the sandy beach area in the southern area of the project site. Located between the beach strand and the inland scrub vegetation types, the kiawe forest shares species from both these vegetation types. Small shrubs of 'ilima (*Sida fallax*) and hairy abutilon (*Abutilon grandifolium*) are common. The *Reynoldsia* species discussed above was tentatively identified within this vegetation type.

4. Scrub vegetation

The scrub vegetation covers roughly 80 to 85 percent of the project area. It is comprised of a mixture of grasses and shrub species with scattered trees of kiawe. Ground cover varies from 40 to 60 percent on pahoehoe flows, and only 5 to 10 percent on the a'a flows.

Fountain grass (*Pennisetum setaceum*) is the most abundant species in this vegetation type. Other common grasses are pili grass (*Heteropogon contortus*) and Natal redtop (*Rhynchelytrum repens*). 'Ilima and 'uhaloa (*Waltheria indica* var. *americana*) are the most commonly encountered shrubs. Ferns and a few annual species may be found in the cracks and crevices of the pahoehoe lava where it is damper and shadier. The mauka areas consist of Pahoehoe lava with several pockets of A'a lava jutting through. This lava-covered area is sparsely vegetated with vigorous and invasive introduced species such as fountain grass (*Acacia Farnesiana*), klu and kiawe, and native plants such as sword fern (*Nephrolepis multiflora*), luhaloa and caper or pua-pilo (*Capparis Sandwichiana* var. *Zoharyi*).

#### 4.1.13.2 Probable Impacts

The Kohana-iki resort development will require site grading and grubbing, and construction of various improvements such as roadways, buildings, and a golf course. These activities will cause major changes to the vegetation types which presently exist at the project site. Vegetation cover and density will increase and changes in species composition will be introduced through landscaping and natural processes.

#### 4.1.13.3 Mitigative Measures

The proposed resort development will result in the loss of a number of native plants. However, these plants are found in similar habitats throughout the West Hawaii region, thus, the probable impact on island-wide populations will not be significant.

The botanical survey conducted for this EIS tentatively identified one small plant, Reynoldsia (a candidate endangered or threatened species) in an area near the coast. This area is not planned for development and, should the existence of the plant be verified, appropriate action will be taken to insure its continued survival.

The vegetation surrounding the anchialine pools will be maintained, and, where appropriate, enhanced in accordance with the Pond Management Plan (Chapter 4.1.14). Wherever possible, the development will incorporate as much of the existing vegetation into its landscape design as possible. Native plants with ornamental potential on the project area will be propagated and used in landscaping.

#### 4.1.14 Terrestrial Fauna

A terrestrial faunal survey of the Kohana-iki site was conducted in May 1986 by Char & Associates, botanical and environmental consultants (Appendix D). Major objectives of the survey were to: describe vertebrate communities present in the study area, identify sighting locations that are listed under the Endangered Species Act, and to identify and discuss areas of potential environmental problems or concerns.

##### 4.1.14.1 Existing Conditions

Birds. The Kohana-iki site is approximately 2.5 kilometers north of the 'Aimakapa Pond. Information on birdlife at the 'Aimakapa Pond is extensive and includes waterbird censuses which have been conducted annually since the 1950's, and twice a year since 1968. Thus, it can be assumed that much of the birdlife identified at the 'Aimakapa Pond area is also present, at least on occasion, at the Kohana-iki site.

Thirteen bird species were identified during the bird survey of the site. The most common species present were the House Finch (*Carpodacus mexicanus*) which were found in the mangrove, kiawe thicket and strand habitats. The second most prevalent species was the Japanese White-eye (*Zosterops japonicus*), most common in the kiawe scrub or in the strand vegetation. A single Great

Frigatebird, 'Iwa (*Fregata minor palmerstoni*) was seen flying along the coastline near Puhili Point. An immature Black-crowned Night Heron, 'Auku'u (*Nycticorax nycticorax hoactli*) was seen in the large pond about one-half kilometer up the coast from the mangrove trees. Two Pacific Golden-plover Kolea (*Pluvialis fulva*) were found along the shoreline. During the winter months, plover are probably much commoner. Other species identified included: The Grey Francolin, (*Francolinus pondicerianus*); Rock Dove, (*Columba livia*); Zebra Dove (*Geopelia striata*); Common Barn-owl (*Tyto alba*); Melodious Laughing-thrush (*Garrulax canorus*); Nutmeg Mannikin (*Lonchura punctulata*); Yellow-billed Cardinal (*Paroaria capitata*); and the Northern Cardinal (*Cardinalis cardinalis*).

Mammals. The mongoose (*Herpestes auropunctatus*) was the only mammal seen during the survey. Mammalian skeletal remains were abundant in the study area. The majority of the bones were not recent. Three species were represented: Feral Pig (*Sus scrofa*); Feral Goat (*Capra hircus*); and, Donkey (*Equus asinus*). The three species are probably no longer found in the area. There was no sign of the endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*).

#### 4.1.14.2 Probable Impacts

The proposed resort development will alter the existing faunal habitats. The landscaping of large areas presently consisting of pahoehoe lava will increase and diversify existing habitats. The greatest potential impact to avifaunal habitats could be that associated with coastal development adjacent to the anchialine ponds, suspected as providing a feeding habitat for both native wetland bird species and migratory shorebirds and wildfowl. A related potential impact could be felt by the nearby Kaloko and 'Aimakapa Fishponds.

#### 4.1.14.3 Mitigating Measures

The applicant is aware of the importance of the anchialine pond resource, both to the marine and avifaunal ecosystems. Preliminary pond "Buffer Zones" have been established around each of the major pond groupings (see discussion in Chapter 4.2.15) which will prohibit development near the ponds and will prevent undue disturbances by casual passers-by. Related potential impacts to the neighboring Kaloko and 'Aimakapa Fishponds will be mitigated in a similar fashion by reducing casual access to the adjacent parcels by the use of landscaped screening and, where appropriate, fences.

#### **4.1.15 Anchialine Ponds**

The coastline at Kohana-iki contains a series of anchialine ponds which constitutes one of the larger concentrations of relatively undisturbed ponds on the island of Hawaii. Thus, an integral part of the planning process for the proposed Kohana-iki Resort development is the avoidance or mitigation of any adverse impacts to these ponds.

These ponds (i.e., shoreline pools without surface connection to the sea, having waters of measurable salinity and showing tidal rhythms) are commonly located in recent lava flows which have depressions deep enough to reach the water table and are made up of brackish water. The faunal community is crustacean-



mollusk dominated and several species of shrimp (known only to Hawaiian anchialine ponds have been discovered. Aquatic vegetation is primarily made up of benthic algae. Aquatic vascular plants are also in existence, such as *Ruppia maritima* which requires bottom sediments in which to root. Salinities in these ponds range from 9-13 ppt. Bottom types vary from rock to sediment covered, and surrounding vegetation includes trees, grasses and vines (Maciolek and Brock, 1974; Traverse Group, Inc., 1985).

An impact analysis of the proposed Kohana-iki Resort on the anchialine pond resource was conducted between April and June, 1986 by O. I. Consultants, Inc. (Appendix E). Substantive findings and conclusions of this report are summarized below.

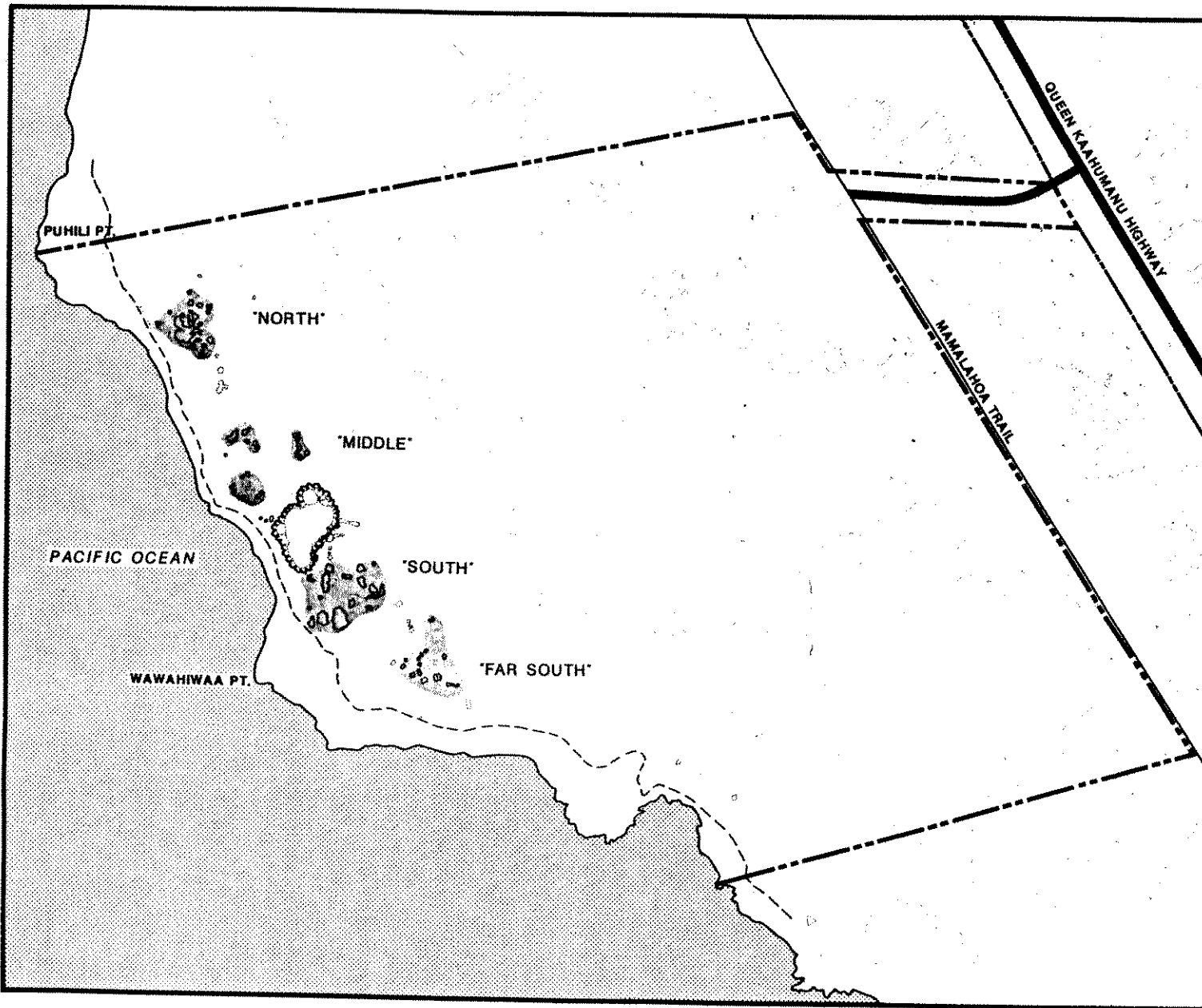
#### 4.1.15.1 Existing Conditions

A survey conducted by Maciolek and Brock between 1972 and 1973 (Maciolek and Brock (1974)) identified 29 ponds in three different sub-areas at Kohana-iki (North, Middle and South); two additional ponds were found just to the south. A more recent survey (O.I. Consultants, Inc. 1985) of the Kona coast ponds located 43 ponds in the Kohana-iki area covered in the 1972 survey; an additional 13 ponds were found in the area to the south not examined in 1972 (Far South) (Figure 14). Ponds indicated by solid line have been surveyed while those outlined by dotted lines have not. A recent (May, 1986) brief examination of the Kohana-iki site on the ground and by helicopter noted the presence of scattered depressions, mostly to the south of the mangrove thicket, which contain water only at extremely high tides. Two large ponds located at the southern edge of the site, heavily overgrown by terrestrial vegetation on their borders, were noted from the air; one pond was briefly examined from the ground.

The size, depth, surface area, water temperature and salinity of the ponds examined in 1985 are presented in Table 1, Appendix E; the occurrence and relative abundance of terrestrial vegetation surrounding each pond are presented in Table 2, Appendix E; the occurrence and relative abundance of aquatic flora and fauna in each pond are presented in Table 3, Appendix E. Figure 1, Appendix E is keyed to the numerical pond identification system used in the foregoing tables. As stated above, ponds outlined in a solid line have been surveyed while those indicated by dotted line have not. From a hydrographic standpoint, the ponds in the four main areas are similar, although small differences in salinity and temperature were noted. Mean salinities increased from 12.7 ppt. in the north ponds to 13.7 ppt. in the middle ponds and 15.1 ppt. in the south ponds; salinity in the far south ponds decreases to 11.9 ppt. The patterns of salinity reflect both short-term variability due to tidal phase, and large-scale sub-surface processes of groundwater-seawater interactions.





#### 4.1.15.2 Probable Impacts

The only direct impacts due to construction will be associated with the proposed marina. The marina is presently planned to be located in an area where two large, senescent anchialine ponds have recently been discovered. Preliminary marina design plans show these ponds to be located within the marina proper, thus construction of the marina would result in the destruction of these two ponds. Some flexibility in marina design may result in one of these ponds being included in a shoreline buffer zone.



**Anichaline Ponds**

**LEGEND**

-  Anichaline Ponds
-  Coastal Beach Trail
-  Mangrove
-  Preliminary Pond Area Buffer Zones

**REFERENCES**

- Ziemann, 1986
- MacIolek & Brock, 1974

**KOHANA-IKI**

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA  
ENGINEERING CENTER • P.O. BOX 1000 • 700 SOUTH KIMBEE DRIVE • KONA, HAWAII 96751 • TELEPHONE: (808) 852-1111



Other potential impacts to the pond resource include the potential for development related surface runoff to inundate the pond areas, the effect of increased dissolved nutrient levels in the groundwater (resulting from the use of treated effluent to irrigate golf course fairways and the application of fertilizers and herbicides to landscaped areas), and the impact of direct physical intrusion into the pond areas.

#### 4.1.15.3 Mitigating Measures

Preliminary site plans for the Kohana-iki Resort have been prepared (Figure 3) with the goal of minimizing impacts to the anchialine pond resource. Except for the construction of the marina (the impacts of which will be fully discussed in a subsequent federal supplemental EIS prepared pursuant to a U. S. Army Corps of Engineers Permit), no structures or construction activities are planned which would result in the filling or grading of any of the ponds in the area. Buffer zones will be established around each of the major pond areas to insure no grading or construction activities in adjacent areas will result in material entering the ponds. Landscaping of the pond areas will be minimized to retain the natural setting of the ponds as much as possible; any landscaping done adjacent to the ponds will utilize indigenous plants which will not impact the pond environment.

A Management Plan for the anchialine ponds will be developed in consultation with the Army Corps of Engineers and the Fish and Wildlife Service. Such a plan has been approved for ponds at Waikoloa, and proposed for ponds at Kaupulehu and Kukio. The objectives of such a plan are to:

- 1) Maintain the environmental integrity of the existing ponds;
- 2) Protect and manage this resource to provide educational and interpretive opportunities to the public;
- 3) Control and monitor construction activities so that secondary impacts may be identified and mitigated to avoid any detrimental impacts to the ponds; and,
- 4) Provide for a pond manager to implement the management plan and conduct scientific monitoring programs.

The management plan will detail the areas of ponds to be preserved, the dimensions of buffer zones surrounding the pond areas, allowable activities within the pond areas, if any, and establish a pond management program.

#### 4.1.16 Historic and Archaeologic Resources

##### 4.1.16.1 Existing Conditions

There have been several archaeological investigations of the Kohana-iki site. The earliest recorded field work was conducted in 1930 by John E. Reinecke, who located coastal sites of the West Hawaii region for the B. P. Bishop Museum (BPBM). The most intensive archaeological work conducted to date within the project area was done in late 1975 by Ross H. Cordy during coastal survey and

testing conducted as part of his dissertation research. The most recent prior archaeological investigations at Kohana-iki was a preliminary field inspection conducted by Paul H. Rosendahl, Inc. (PHRI) in September 1985.

A full archaeological reconnaissance survey of the Kohana-iki property was subsequently completed in conjunction with this EIS by Paul H. Rosendahl, Ph.D., Inc. Consulting Archaeologist in May 1986. This report is summarized below and is appended in its entirety to this report as Appendix B.

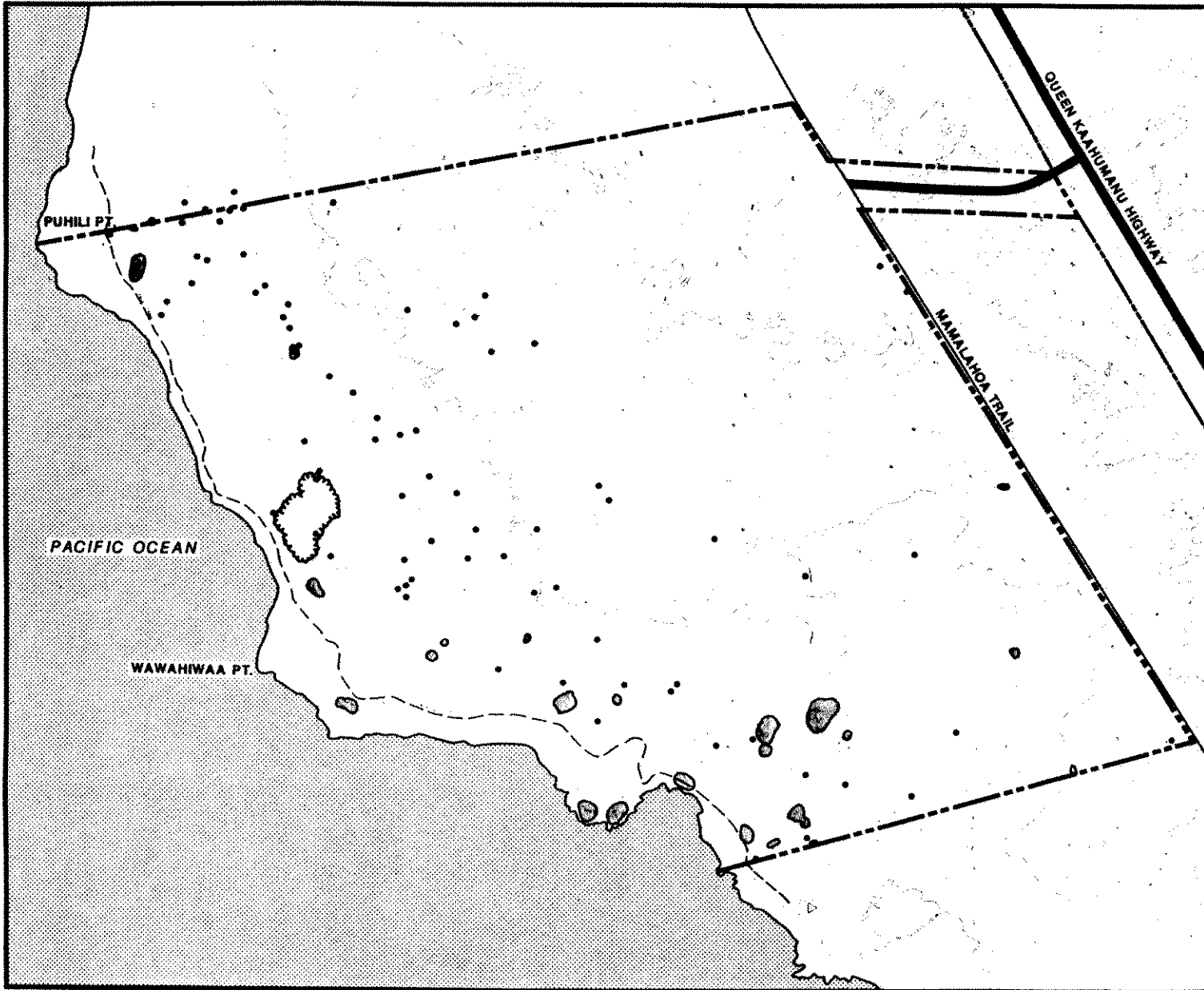
A total of 105 archaeological sites have now been identified within the Kohana-iki development area (Figure 15). Enough information has been gathered to assume that these 105 sites represent all the sites on the property. Six of these sites were recorded in 1971 and submitted for placement on the Hawaii Register of Historic Places (HRHP) in 1972. Four of the HRHP sites and an additional seven sites were recorded at the BHPM by Ross H. Cordy (1975). One site was recorded during the preliminary reconnaissance survey conducted in 1985 and 91 sites were located during the full-scale reconnaissance. Nearly half (49.5%) of all sites recorded are complexes which contain two to 14 associated features. Five of these complexes include more than 10 features and the majority (77%) are comprised of less than five features.

Nineteen formal types were identified among the 262 features located within the project area (Table 2, Appendix B). Thirty-eight features representing six formal types were previously recorded. The remaining 224 features were recorded during full-scale reconnaissance, including 29 new features located at previously recorded sites.

Tentative functional interpretations are suggested at this time for 76 of the 105 recorded sites. Habitation sites represent over half of the identified sites (48), and include 17 habitation complexes, 13 habitation/ceremonial and/or burial complexes, and 18 temporary habitation sites. Other functional types include two road/trail sites, 16 boundary markers (same boundary), and two animal pens, three recreation sites (petroglyph and pools), two shrines, and three aquaculture sites.

Newly identified and previously identified sites are described individually and in numerical order starting on Page 16 of Appendix B. A numerically keyed map is included as Figure 5, Appendix B. Information included in each description includes the overall site size, dimensions of features, general environmental zone and elevation of the site, distance to adjacent site(s), portable remains observed, and tentative functional category, if determinable. Tables 2 and 3, Appendix B, summarize the identified sites and their component features in terms of formal type, tentative functional interpretation, preliminary evaluation of significance, and recommended further action. Table 3, Appendix B lists newly identified sites, while Table 4, Appendix B lists previously identified sites.

The significance of archaeological remains can be defined in terms of potential scientific research, interpretive, and/or cultural values. Research value refers to the potential of archaeological resources for producing information useful in the understanding of cultural history, past lifestyles, and cultural processes at the local, regional, and interregional levels of organization. Interpretive value



**Archaeological Sites**

**LEGEND**

- ● Archaeological Sites
- - - Coastal Beach Trail
- ☁ Mangrove

**REFERENCES**

Rosendahl, 1988

**KOHANA-IKI**

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA  
ARCHITECTURAL CENTER • 710 TOWER • 713 BOWEN STREET SUITE 1000  
 HONOLULU, HAWAII 96813 • TELEPHONE (808) 521-6222



0 600' Figure: 15

refers to the potential of archaeological resources for public education and recreation. Cultural value, within the framework of significance evaluation used here, refers to the potential of archaeological resources for preservation and promotion of cultural and ethnic identity and values.

The findings, evaluations, and recommendations of the archaeological reconnaissance have been reviewed with Ms. Virginia Goldstein--staff planner and historic sites specialist in the Hawaii County Planning Department. Ms. Goldstein has concurred with the conclusions and recommendations of the archaeological reconnaissance. Dr. Ross H. Cordy, staff archaeologist with the Historic Sites Office, State Department of Land and Natural Resources has been consulted throughout the preparation of the archaeological reconnaissance and has unofficially praised the archaeological consultant for producing a "high quality report."

At the present time six sites have been recommended for preservation. No further work is recommended at this time for another 51 sites. This number is inflated by the 25 small and relatively insignificant cairns that were located during the survey. Further intensive survey work, including: detailed recording; recording with surface collection; and, recording with surface collection and/or test excavation, must be conducted before complete site specific recommendations regarding significance can be evaluated.

#### 4.1.16.2 Probable Impacts

Most of the sites identified in the archaeological reconnaissance survey are located in the coastal areas of the site, within 1,200 to 1,500 feet of the coastline. Since development will be concentrated in portions of this area, many of the sites could be impacted. As discussed above, only preliminary significance evaluations have been made at this stage in the planning process. More detailed field work is necessary to determine the disposition of individual sites. The applicant intends to follow through with the archaeological consultant's recommendations concerning future field work and will continue to coordinate all archaeological work closely with both the Hawaii County Planning Department and the Historic Sites Office, DLNR.

#### 4.1.16.3 Mitigation Measures

All sites recommended for preservation will be preserved in accordance with the archaeological consultant's recommendations. Sites with significant interpretive and cultural value will be incorporated into an archaeological resources management plan which will be formulated with the assistance of the State Historic Sites Office and the Hawaii County Planning Department.

### **4.1.17 Recreational Amenities**

#### 4.1.17.1 Existing Conditions

Currently there are only three significant beaches in the Keahole Point to Keauhou Resort urbanized corridor: Kahaluu Beach Park, Disappearing Sands Beach Park and the beach fronting the Honokohau Fishpond. The first two are heavily used. The beach at Honokohau is difficult to access, requiring a

lengthy walk from the Honokohau Small Boat Harbor. The recreational amenities presently afforded by the subject property are limited to the coastal areas. These areas of the property are frequented by local fishermen and beachcombers and persons transiting the area (via the unimproved coastal trail) to access the popular bathing and surfing area known as Pine Trees Beach, located close to the center of the subject property (Figure 15).

#### 4.1.17.2 Probable Impacts

Development of the proposed resort will have a significant impact on the recreational resources of the North Kona region. As noted above, the Kona community has limited access to local beaches. The public access currently planned for the Kohana-iki Resort will provide the greater Kona community with a fourth recreational beach. Increased public access to the shoreline will inevitably impact the coastal and nearshore marine environments.

## 4.2 SOCIO-ECONOMIC ENVIRONMENT

History. The Kona District of the Big Island has played a significant role in the history of the Hawaiian Islands. The Island is believed to have been the first landfall of the Polynesian explorers - almost 1,000 years ago. The Kona region was probably the most populated area on the island of Hawaii at the time Captain Cook, the English explorer, was slain on the shores of Kealahou Bay in 1779, near what is now the town of Captain Cook. The town of Kailua-Kona was made the capital of King Kamehameha the Great's newly consolidated kingdom in 1812. He died there in 1819. In the same year, Liholiho, Kamehameha's heir, abolished the traditional "kapu" system from his throne in Kailua.

The following year, 1820, the first missionaries arrived, an event which hastened the transformation of the native social and economic structure from a subsistence-based and highly stratified society to a market-based "westernized" society. Western concepts of land ownership were introduced, alienating the native population from their traditional relationship with the land. Imported crops such as oranges, grapes and coffee were established. Horses and cattle were imported and the first large scale ranching operations were begun.

In addition to the land-based industries of diversified agriculture and ranching, the waters lying off the Kona Coast have long provided both food and livelihood for Kona residents. Safe harbors available in numerous coastal coves provided shelter from the predominant trade winds and resulted in a large whaling trade during the early decades of the 19th century.

The historic economic base of the region has been ranching, fishing and diversified agriculture. The past decade has seen a transition in the socio-economic character of the region from an agrarian lifestyle to a resort and residentially-oriented community.

### 4.2.1 Population

The 1980 Census reported a resident population of 13,748 persons in the North Kona District, of which almost half (44%) resided in the town of Kailua-Kona. Resident population in the North Kona area almost tripled (285%) between 1970 and 1980, increasing at an 11% annual compound rate. These annual rates of growth become significant when compared with the population growth of the county as a whole (3.7%) and the entire State (2.3%) during the same period. It was estimated that the population of the North Kona District was 16,266 as of January, 1983 (DPED 1984). Population projections prepared for the market study indicate a 1990 resident population of 25,000 persons, increasing to 32,500 in 1995 (Table 4 below).



Table 4: POPULATION GROWTH: North Kona

	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>
Resident Population	4,832	8,440	13,748	18,000	25,000	32,500
Average Annual Change (%)	0.86	14.93	12.58	6.19	7.78	6.0

Source: Hallstrom Appraisal Group, Inc. 1985

The near tripling of the North Kona population between 1970 and 1980 was accompanied by ethnic shifts within the major population groups. Both North and South Kona witnessed a decline in the proportion of orientals and a rise in the proportion of caucasians (the major ethnic group). Increased transiency and mobility is also noted. While more than half the population of the rest of the island had lived in the same house five years earlier, the figure for North Kona was less than 40 percent.

#### 4.2.2 Economy

As previously noted, agriculture, specifically diversified agriculture, has provided the historical economic base of the region. The importance of diversified agriculture to the district is, however, being rapidly surpassed by the growth of the visitor industry and associated service-related jobs. "In 1950, 52 percent of the employed persons in Kona listed farm laborer, farm manager, or farmer as their occupation... By 1980, only 8.2 percent of the labor force held agriculturally-related jobs" (Draft Kona Regional Plan, 1983). Today tourism is the primary economic activity of the North Kona district, supplanting agriculture as the number one revenue-generating activity. In 1970 there were approximately 1,752 visitor accommodation units in the West Hawaii region representing 50 percent of total Big Island visitor units. By 1985 West Hawaii supported a total of 6,123 visitor units representing 83 percent of Big Island visitor units. The majority of these units are hotel rooms (3,999 rooms). Just over 98 percent (2,124 units) of all the Big Island's condominium inventory is located within the West Hawaii area, principally in and around the town of Kailua-Kona (2,046 units) (Hawaii Visitors Bureau, 1986).

Other service industries such as retailing, real estate, and financial services have benefited from the increased income introduced into the local economy by the expanding visitor industry. Property values in general have increased significantly over the past decade, a result of the increased demands 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.

#### 4.2.3 Employment

In 1980, Census records indicated that there were 10,115 persons 16 years of age and over residing in the North Kona district (Table 5). Of these, 7,292 (72%)

were in the civilian labor force, approximately 379 (about 5.2%) were unemployed. This compares with an unemployment rate of almost 7% for the County as a whole during the same period. The Kona labor force is characterized by its high component of service employment and low levels of manufacturing jobs, as compared with the county as a whole.

**Table 5: SELECTED LABOR FORCE CHARACTERISTICS:  
North Kona (1980)**

<u>Labor Force Status</u>	<u>North Kona (Persons)</u>		<u>Hawaii County (Persons)</u>	
16 years and over	10,115		67,205	
Civilian labor force	7,292		41,006	
Unemployed	379		2,856	
Total employed	6,913		38,150	
<u>Occupation</u>		<u>(%)</u>		<u>(%)</u>
Managerial and Professional	1,462	21%	7,648	20%
Technical, sales and administrative	1,984	28%	9,956	26%
Service occupations	1,486	21%	6,283	16%
Farming, forestry and fisheries	491	7%	3,927	10%
Precision, production, craft and repair	839	12%	4,848	13%
Operators, fabricators and laborers	687	10%	5,488	14%

Source: 1980 Census

#### 4.2.4 Housing

Housing in the Kona area has undergone a dramatic growth cycle following the expansion of the tourist industry (Table 6). The stock of year-round housing units nearly tripled between 1970 and 1980 (249%). The major growth was in owner-occupied housing (297%) with a smaller increase in renter-occupied housing (161%) (1980 Census).

**Table 6: SELECTED HOUSING CHARACTERISTICS:  
North Kona (1980)**

Characteristic	1980		1970-80 Change
	Units	%	
Year round housing units	6,894		249%
Owner-occupied	2,536	37.8%	297%
Renter-occupied	2,066	30.0%	161%
Vacant	2,292	33.2%	321%

Source: 1980 Census

The 1980 Census reported a 33% vacancy rate for North Kona. After subtracting an estimated 2,000 resort condominiums from the stock of residential housing, however, a vacancy rate of approximately 9% is obtained "which is in keeping with the residential vacancy rate of the County as a whole" (Draft Kona Regional Plan, 1983).

In 1980, approximately 39% of the households in Kona were renting their homes. This compares to 39% County-wide and 52% Statewide during the same period.

#### 4.2.5 Probable Impacts

##### Employment

The proposed Kohana-iki Resort development will create a significant amount of short- and long-term, employment growth in the Kona region. Employment growth can be estimated by determining the number of direct jobs created by the proposed development and adding to this the number of indirect and induced jobs created as a result of this growth.

Direct construction employment. Direct construction employment is that which would be supported directly by the construction of the various facilities. This would include those physically involved in actual construction activities as well as the professional, managerial, and related support jobs that may not occur at the site.

Direct demand for construction employees is estimated based on similar experiences at comparable resort developments elsewhere in the state. Assuming full-time equivalent (FTE) person-years per constructed unit to be as follows: Hotel construction, 1.00; Condominium/apartment construction, 1.05; single family homes, 2.00, direct construction employment may be estimated at approximately 2,000 FTE person-years for total project build-out

Indirect and induced construction employment. Direct employment of construction period workers will stimulate additional purchases of goods and services on the island and elsewhere in the State, resulting in indirect and

induced employment. The State Department of Planning and Economic Development estimates that 1.4 additional FTE jobs are created for every FTE position in the construction industry. Using the base employment of 2,000 FTE person-years, this would amount to an additional indirect/induced effect of 2,800 additional FTE person years for a total direct, indirect and induced contribution of 4,800 FTE person-years.

Direct operational employment. Direct long-term operational employment can be estimated by applying employment multipliers against the appropriate unit counts of the various employment generating land uses. Each of the employment-generating land uses is first identified (Table 7). Employment multipliers are then applied to each of the land uses to arrive at the total number of direct, FTE jobs which will be created. Multipliers of 1.2 and 0.2 FTE positions per hotel and resort condominium unit, respectively were applied to the number of units to arrive at an estimate of direct employment attributable to these land uses. An employment multiplier of 0.2 was assigned to each of the permanent residential and support housing units provided in the development. These multipliers have been derived by others from empirical market research and are used here only to estimate the relative magnitude of employment impacts (Peat Marwick, 1985; Anderson, et al., 1975).

The 18-hole golf course and clubhouse is expected to provide a total of 55 FTE positions. Of this, 15 FTE positions are expected to be provided by the commercial activities located at the clubhouse. Other commercial activities located at the resort commercial area between the two hotels and in the marina area are expected to generate an additional 400 direct FTE positions. A total of 1,525 direct FTE positions will be created by the development, of this, 55% are involved in hotel operations, 26% in commercial activities, 10% in resort condominium operations, 5% in permanent and support housing maintenance, and the remaining 4% in operating the golf course/club house

Table 7: OPERATIONAL EMPLOYMENT

Land Use	Unit	Multiplier	Direct Emp.	Indirect/ Induced Emp.	Total
Hotel	700 rooms	1.2/room	840	168	1,008
Resort Cond.	800 units	0.2/unit	160	32	192
Homesites	200 dwgs	0.2/unit	40	8	48
Supt. Hsg.	150 units	0.2/unit	30	6	36
Resort Com'l.	100K s.f.	1/500 s.f.	400	80	480
Golf Course	18-holes	N.A.	40	8	48
Clubhouse			15	3	18
TOTAL			1,525	305	1,830

Indirect and induced components of operational employment. In order to capture the indirect and induced components of regional employment growth, a regional multiplier of 0.2 was applied to the number of direct jobs (Peat Marwick, 1985; Anderson, etal, 1975). The resultant value is then added to the direct job totals to arrive at overall employment growth. A total of 305 indirect/induced jobs are estimated. Total employment growth is estimated at approximately 1,830 FTE positions at full project build-out.

#### Population.

As with the employment growth discussed above, significant increases in local resident population are likely to occur as a result of developing the proposed project. Total increase in resident population can be estimated by applying the average labor force participation rate for the Kona area (53%) to the total number of operational jobs estimated above (1,830). A total regional resident population growth of 3,452 persons is estimated to occur as a result of project development.

In addition to increases to resident population, the development can be expected to increase de facto population levels. Assuming an average of 1.9 persons per unit for the hotel, 2.7 persons per unit for the visitor-occupied resort condominiums, 2.6 persons for the multi-family support housing, and 2.6 persons per permanent single family dwelling (Peat Marwick, 1985), and also assuming an average occupancy rate of 75% for the resort hotel, 50% for the resort condominiums, and 95% for the permanent and support housing, approximately 2,941 visitors and permanent residents (997 visitors in the Hotel, 1,080 visitors in the resort condominium units, 370 residents in support housing, 495 residents in permanent single family housing) would be accommodated by the project on the average day. Adding to this a portion of the 1,525 direct jobs estimated previously (say 50 percent of the resort work force present on-site on the average day), the average daily census of the project site would be approximately 3,703 persons. Note that there may be some double counting with respect to support housing and employees: no assumptions were made as to what proportion of the support housing would be utilized by the employees. Furthermore, this figure is an average daily census and does not reflect the seasonal variation which inevitable occurs in the Hawaii visitor industry.

#### Economy.

A public economic benefit analysis was prepared for the Kohana-iki Resort in June 1986 by The Hallstrom Appraisal Group, Inc. and is included in this report as Appendix I. Substantive findings and conclusions are discussed below.

The economic benefit study analyzed the fiscal impact of the proposed Kohana-iki Resort on integral public services such as fire and police protection, water service, access and other minor concerns (see discussion of impacts to these public services in relevant sections of this report). The study then estimated the increased direct tax payments to the County and State arising from the subject development in the form of Real Property Tax roll increases and additional excise tax revenues. Indirect economic benefits, including enhanced regional employment opportunities, subsequent income and other tax revenue increases, and other community benefits are also addressed. A 15-year cash flow model

was developed to depict the levels of public tax income generated by real property taxes, excise taxes, and State income taxes.

Only two areas of significant public expenditures were found to be associated with the proposed resort development: expenditures related to police and fire protection. Costs for municipal police protection were estimated at \$52,000 per year during the first phase of development, increasing to a stabilized level of \$105,000 annually upon the completion of the second phase of development (after the second hotel is open for occupancy). No appreciable public expenditures for fire protection services were forecasted during the first phase of development. However, prior to the completion of the second phase, the County would incur start-up costs at that time of approximately \$210,000 which would be ascribed to the resort, and a proportion subject share of \$252,000 in annual operating expenses.

After consideration of the above expenses, the proposed Kohana-iki Resort (stabilized basis), will contribute some \$10,818,415 per year into State and County coffers in direct net tax benefits upon project completion. This amount can be divided between \$5,719,425 to the County of Hawaii and \$5,098,990 to the State of Hawaii. This does not include the over \$4 million annually in other tax revenues generated through economic multipliers in the community, or other island-wide economic benefits resulting from increased employment levels.

#### Housing.

The proposed development will have a significant impact on the demand for housing in the Kona area. A number of methodologies exist to predict the extent of employment-induced housing impacts. Essentially, all methodologies attempt to identify both those employees drawn from off-island locations and those employees drawn from on-island locations which form new households in response to their new employment. Each of these methodologies utilizes different assumptions concerning two basic components of housing demand: 1) the make-up of the pertinent labor force potentially seeking housing (i.e., % available labor, % currently housed in the area, % turnover from within/without the region, and % off-island in-migrants); and, 2) projections of household size by job classification.

For purposes of more informed decision making, a preliminary housing impact analysis has been prepared utilizing some of the more commonly used assumptions on labor force composition and household size. This is not to be construed as a definitive statement on employment-induced housing demand, for this can only be determined much later in the development process and then only in conjunction with input from the County.

Direct employment-induced housing demand is estimated by dividing the total number of FTE positions derived above (1,525) by an average household size of 1.45 persons per household (managerial employees projected at 1.0 employees/household, other employees projected at 1.5 employees/household: 10% managerial jobs, 90% other). This figure (1,052) is then adjusted to reflect that segment of the labor force which will require additional housing, here estimated at 25% based on studies of other resort developments in the West Hawaii area (Peat Marwick, 1984, 1985). Demand for approximately 263 additional housing

units will be created. It should be noted that this estimate does not account for the short term housing demand impacts generated by the construction crews building the project.

This figure should be contrasted with the proviso in the General Plan regarding the Intermediate Resort Designation: "Employee housing shall be provided at a maximum ratio of one employee unit to every two hotel units built. The required ratio shall be determined by an analysis of housing needs of each district or relative area" (General Plan, 1971 as amended) Using the General Plan guideline, a maximum of 350 "employee units" would need to be provided. As previously stated, close cooperation between the developer and the County will be maintained to insure that the employee housing needs are met. As stated in the Master Plan section, a total of 150 dwelling units will be provided for employee housing on the site near the marina development.

## 4.3 PUBLIC FACILITIES, INFRASTRUCTURE AND SERVICES

### 4.3.1 Transportation Facilities

#### 4.3.1.1 Existing Conditions

Roadways. Two major roadways service the North Kona area: the Queen Kaahumanu Highway and the Mamalahoa Highway (also referred to as the Hawaii Belt Road). The Queen Kaahumanu Highway is a two-lane, class I State Highway, designed for a 70-mile per hour vehicle speed. It is a limited access highway within a 300-foot right-of-way. Dedicated in 1975, the highway extends 38 miles to connect the towns of Kawaihae and Kailua-Kona and provides a vital transportation link between the growing coastal resort areas of South Kohala, the Keahole Airport and Kailua-Kona (Figure 10).

Mamalahoa Highway, formerly the main road between Kailua-Kona and Kamuela (prior to the development of the Queen Kaahumanu Highway) still provides a major transportation link between Hilo and Kailua-Kona (via Kamuela when used in conjunction with the Saddle Road). The highway extends around most of the Big Island.

Keahole Airport. Located approximately two miles north of the property, the Keahole Airport facility consists of a modern terminal complex and a single runway 150 feet wide and 6,500 feet long. Planes generally approach and depart the runway in a southerly direction. The Airport experienced 93,879 aircraft operations in 1985, up approximately 11 percent from the previous year. The major users of the facility are Air Taxis (35%) followed by General Aviation (23%), Military (21%) and Air Carriers (20%) (Hawaii State Department of Transportation, 1986).

In 1984, the airport handled over 1.42 million passengers, a 16% increase over the previous year. There are presently three daily flights to California provided in stretch DC-8 jet aircraft. In addition to the scheduled mainland flights, numerous interisland flights are provided on a daily basis (Table 1B, Appendix J).

Honokohau Small Boat Harbor. The Honokohau Small Boat Harbor is the major pleasure-craft and commercial and charter fishing anchorage in West Hawaii. The harbor is located approximately one mile south of the property. Currently the man-made harbor can accommodate a total of 165 boats. All available slips are filled with a waiting list of "over 60 seriously interested" parties. The long-range master plan for the facility calls for a total of 455 slips to be developed on the 65.5 acre harbor site (25.1 acres of water area and 40.4 acres of land area). Short-term improvement plans for the harbor will be ancillary commercial and light industrial development (Hallstrom Appraisal Group, 1985).

Kawaihae Deepwater Port. Located approximately 27 miles north of the property is the Kawaihae Deepwater Port, one of two deepwater ports servicing the island. Developed in 1959, the harbor has a 40-foot deep entrance channel and a 35-foot-deep harbor basin with an area of 53.8 acres. The harbor provides the only port facilities for deep draft vessels on the west side of the Island.



Primary cargo handled includes building materials, consumer goods, large equipment, and machinery, as well as the provisions and supplies needed to operate the resort facilities in South Kohala and Kona.

4.3.1.2 Probable Impacts

Queen Kaahumanu Highway

Trip Generation. The proposed development will generate vehicular traffic both internally and onto the adjacent Queen Kaahumanu Highway. An estimate of the magnitude of trips generated by the proposed development was made to determine the potential impact on the adjacent highway. Traffic generation figures derived below represent traffic being generated from a fully-developed project, as proposed herein. For the purposes of this section, a "trip" is defined as a "one-way journey that proceeds from an origin to a destination by a single type of vehicular transportation."

Each land use activity within the development has its own, unique trip generation characteristics (Table 8). Utilizing trip generation indices developed in recent traffic analyses of similar developments in the region (Belt, Collins & Associates, 1985; Traverse Group, Inc., 1985), and those found in national aggregate studies (Institute of Transportation Engineers, Traffic Generation, 1983.), the project can be expected to generate a total of 8,640 external vehicle trips per day with the hotel facilities responsible for approximately 31% of the volume. Visitors staying in the resort condominiums are expected to account for approximately 28% of overall external vehicular trips. Permanent residents of the project, including those living in the single- and multi-family residential areas account for another 30% of the total. Patrons of the commercial areas are expected to be another major component of overall traffic generation, amounting to approximately 6% of the total volume.

Off-site patrons of the golf course and clubhouse commercial areas (restaurant, coffee and pro shops) are estimated to generate a total of 180 trips per day - 2% of the total. This level of trip generation is based on an annual daily average, and does not reflect seasonal variations in traffic generation. In addition, this figure does not include internal trips such as hotel guests driving from the hotel to the golf clubhouse.

Table 8: TRAFFIC GENERATION

Land Use	Units	Trips/Day	Occupancy	Total Trips
Hotel	700 rooms	5.5/room	70%	2,695
Resort Cond.	800 units	6.0/unit	50%	2,400
Homesites	200 dwgs.	6.0/dwg.	95%	1,140
Support Hsg.	150 units	10.0/unit	95%	1,425
Resort Com'l.	100 K s.f.	5.0/K s.f.	100%	500
Clubhouse				180
Other recreational				200
<b>TOTAL</b>				<b>8,640</b>

Peak Hour Traffic. Estimates of peak-hour traffic and directionality have been made using information provided by traffic analyses cited previously. For the purposes of this study, it is assumed that the morning peak-hour will represent approximately 7.5% of total daily trips. Evening peak hour represents approximately 10.5% of the total daily trips. Directionality is estimated at 45% in and 55% out of the project during the evening peak hour. Based on a total daily traffic generation figure of 8,640 vehicle-trips, peak flows into the resort are estimated at 408 vehicles per hour with peak flows out of the resort estimated at 498 vehicles per hour. Studies prepared for the NELH/HOST Park projects estimate that 11% of its traffic will be distributed north of the project with the balance distributed south towards Kailua-Kona (Traverse Group, 1985).

Currently the Queen Kaahumanu Highway is operating well under capacity, estimated at 1,800 to 2,500 vehicles per hour per lane. Historic and existing highway traffic volumes along the Queen Kaahumanu Highway fronting the Kohana-iki site are presented in Table 9 below.

**Table 9: HIGHWAY TRAFFIC COUNTS**  
**Queen Kaahumanu Highway**  
**(1976-1984)**

		<u>Southbound</u>	<u>Northbound</u>	<u>Total</u>
<u>24 hour</u>	1976	1594	1581	3175
	1978	2304	2233	4537
	1980	2107	2113	4220
	1982	2707	2549	5256
	1984	3484	3607	7091
<u>1984 Peak hours</u>				
	6:15 AM - 7:15 PM	146	337	483
	10:00 AM - 11:00 AM	225	332	557
	3:30 AM - 4:30 PM	365	229	594

Source: State of Hawaii, Department of Transportation, Highways Division. Count Station 8-P (A&B, South of Keahole Airport Road)

Current traffic volumes on the highway close to the subject property indicate peak flows of 594 VPH during the afternoon peak hour. Traffic volumes in the Keahole area are expected to increase considerably during the coming years. Proposed projects in the area, including the adjacent 'O'oma II Resort and the HOST Park will generate significant increases in traffic volumes. The Kohana-iki resort is estimated to generate approximately 500 VPH onto the highway during the evening peak hour at full project build-out. Given adequate

intersection improvements (Chapter 4.1.5) this volume of traffic should not appreciably impact the current level of service now experienced by motorists moving along the Queen Kaahumanu Highway in the vicinity of the project site. However, the applicant is cognizant of the proposed increases in traffic generation from surrounding developments, and will work with adjacent landowners and the State Highways Division to manage the roadway in the most responsible manner.

#### 4.3.2 Water Supply

##### 4.3.2.1 Existing Conditions

The island of Hawaii has an orographic rainfall pattern typical of the larger islands in the Hawaiian chain. Moisture-laden trade winds are cooled as they rise up the mountain slopes, losing part of their moisture as rain. The prevalence of trade winds throughout much of the year accounts for the high annual rainfall of 75 to over 300 inches on the windward or northeast side of the island. It is estimated that of the 14,100 mgd of rainfall island-wide, 44 percent is lost to evapotranspiration and 35 percent to runoff. The remaining 31 percent (4,300 mgd) finds its way into the underlying basal lens as groundwater recharge.

The Kona area receives minimal trade wind rainfall due to the sheltering effect from the land masses of Mauna Loa, Mauna Kea and Hualalai. Convective-type showers, forming as a result of the difference between land and sea temperatures, occur along the western slopes of Mauna Loa and Hualalai and provide the area with considerable rainfall. Total annual rainfall estimated for the Kona hydrographic area is 1,160 mgd. Of this total, 71 percent is lost via evapotranspiration, 10 percent via runoff and the remaining 19 percent (345 mgd) becomes groundwater recharge (R. M. Towill, December 1980). Most of the rainfall occurs between the 1,200 to 3,500 foot elevations of Hualalai and Mauna Loa with zones of decreasing annual rainfall at lower elevations near the coast and at the higher elevations located above the rain-bearing tradewind regime.

Water resources in the Kona area are essentially limited to groundwater. Although dike-impounded groundwater is theorized to exist deep within the volcanic rift zones of Hualalai and Mauna Loa. The salinity of the groundwater, or the degree of seawater intrusion, varies with the distance to the coast and the basal water recharge capacity of the local rainfall. "The observed distribution range of seawater intrusion and mixing as indicated by the brackish qualities of several wells in the Kona region, is .75 and 3.4 miles inland. However, this range cannot be considered absolute in that the locations of existing wells along the coast is sporadic, and the chloride content of such well-waters is highly variable. The degree of salt water intrusion is greatest along the southwest flank of Hualalai near Kailua Village and least along the southwest slopes of Hualalai and Mauna Loa just makai of the high rainfall belt between Kahaluu and Keel" (Draft Kona Regional Plan, 1982).

The Hawaii County Department of Water Supply maintains the North Kona Water System, servicing the area between Keahole Airport to the north and Kealakekua to the south. The system is supplied by four wells and a shaft

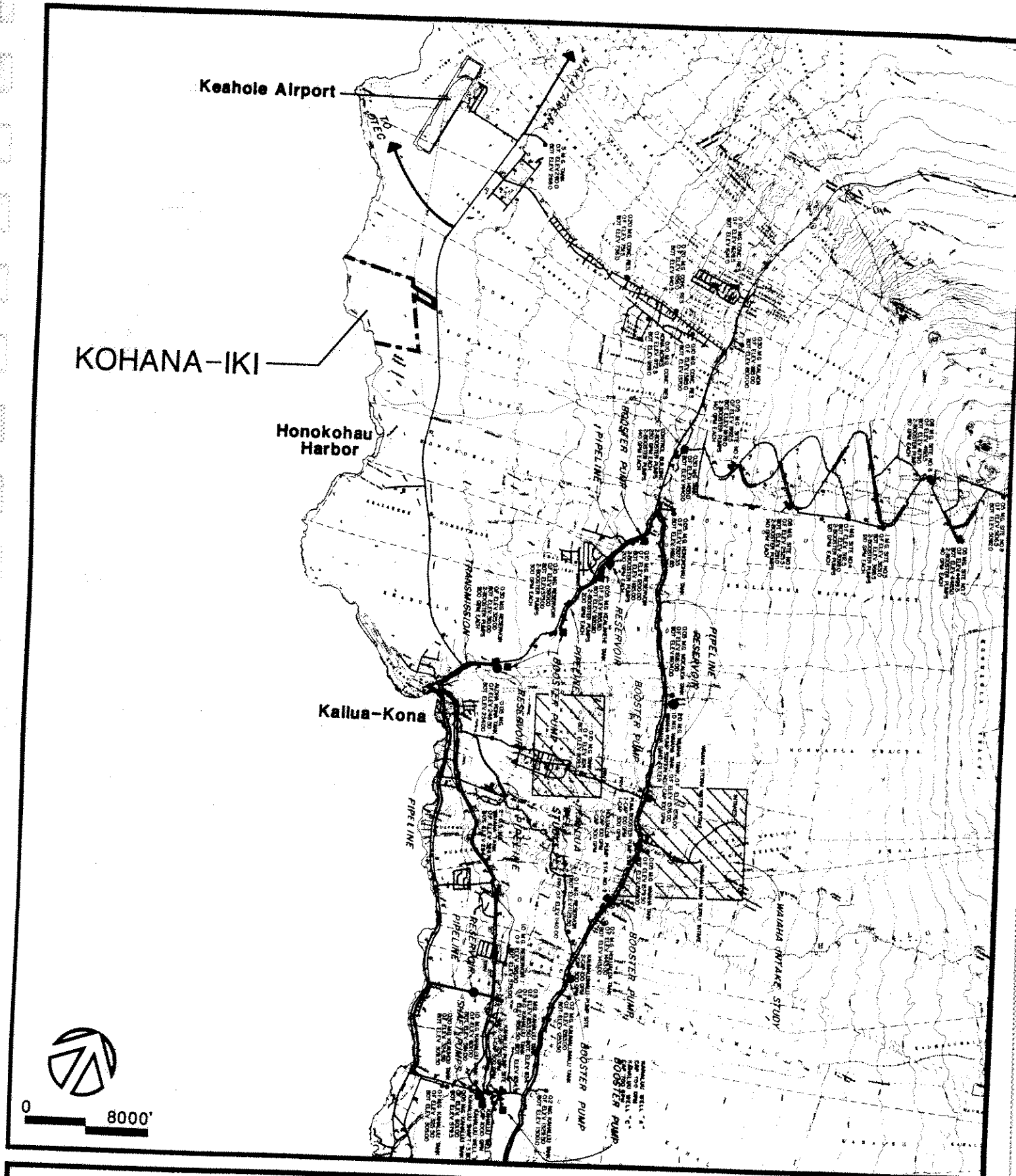
located at Kahaluu, situated between Kailua and Keauhou Bay at the 600-foot level, one to one and one-half miles inland from the coast (Figure 16). The Keahole Airport area is fed from the Kahaluu reservoirs through 8-, 12-, and 16-inch gravity mains running along the Kuakini and Queen Kaahumanu Highways. A 16 inch main terminates at the Honokohau Small Boat Harbor access road intersection with the Queen Kaahumanu Highway (approximately 12,000 feet from the proposed Kohana-iki Access road) and a 12 inch main continues from this point along the Highway past the subject property terminating just north of the Keahole Airport access road.

The groundwater resources in the Kona area have been estimated to total 100 mgd by the Hawaii Water Resources Plan. The existing Kahaluu system capacity is estimated at 8.4 mgd (cumulative safe capacity based on the breakdown of one pump). Maximum daily consumption in 1980 was estimated at 4.7 mgd. "Recent pumpage trends indicate that the maximum safe capacity of [8.4 mgd] may be reached as early as 1985" (Draft Kona Regional Plan, 1982). Thus, the major water problem confronting Kona appears to be one of source development and transmission, rather than one of source availability.

In 1981, because of limits to existing supply sources in the North Kona area, the DWS imposed a moratorium which limited all existing Tax Map parcels to a single one-and-five-eighths-inch metered line, regardless of parcel size. This moratorium is still in effect.

#### 4.3.2.2 Probable Impacts

An assessment of projected water demand, water development alternatives and probable impacts has been conducted by M & E Pacific, Inc. and is included in Chapter IV, Appendix F). Substantive findings and conclusions are presented below.



Existing & Proposed Water System: North Kona

**KOHANA-IKI**

Kona Beach Development Venture

Figure: 16

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
 GROSVENOR CENTER • PRI TOWER • 733 BISHOP STREET SUITE 2500  
 HONOLULU, HAWAII 96813 TELEPHONE: (808) 545-2035

Projected water demand. Based on accepted per capita water usage factors, projected water demand for the Kohana-iki Resort is as follows (Table 10):

**Table 10: PROJECTED WATER DEMAND**

	<u>Units</u>	<u>Gal/Day/Unit</u>	<u>Subtotal</u> (gpd)
<b>Initial Development Phase</b>			
400-Room Hotel	400 rooms	600/room	240,000
Clubhouse	4 acres	3000	12,000
Staff	645 persons	13 gpcd	8,385
Irrigation	112 acres	4,000 gpad	<u>448,000</u>
			708,385
			= 0.7 MGD
<b>Ultimate Development Phase</b>			
Hotels, Resort Units, Support			
Housing	1,850 units	600/unit	1,110,000
Clubhouse, Commercial	10 acres	3000	30,000
Staff	1829 persons	13	23,777
Irrigation	189 acres	4,000 gpad	<u>756,000</u>
			1,919,777
			= 2 MGD

Based on: irrigation of 30% of developed areas  
irrigation of 60% of golf course  
 Source: M & E Pacific, Inc. 1986

Reclamation of treated sewage effluent could provide an estimated 0.255 MGD subsequent to the initial phase and 0.46 MGD at the ultimate phase of development. Water system infrastructure, however, should be designed to meet water needs exclusive of sewage reclamation to insure water needs can always be met.

Water Development Alternatives. Four potential water development alternatives have been examined, including:

1. Unilateral municipal expansion;
2. Buy into existing water agreement;
3. Develop a new water agreement; or
4. Develop and maintain a new private water source.

Unilateral municipal source development is unlikely and cannot be presumed for the projected development. Buying into an existing water agreement could be advantageous because of the lack of uncertainties regarding cost. Development of a new water agreement is the most probable alternative for the proposed development. The County would be responsible for easement acquisition as well

as well design and development; funding would be provided by developers. Joint funding by developers with adjacent properties would be advantageous. A privately developed water system (Alternative No. 4) would be liable for all operation and maintenance expenses and would also lack the County's right of eminent domain, thus easement acquisitions could prove more difficult.

Since water limitations in the region are a problem of development and transmission rather than source availability, negative impacts on the physical environment from a properly designed and operated water system should be negligible.

Development of a new water source and distribution system will be subject to all applicable terms and conditions of the state's drinking water regulation, Chapter 20, Title 11, Administrative Rules.

### **4.3.3 Wastewater Treatment and Disposal**

#### **4.3.3.1 Existing Conditions**

Two methods of liquid waste disposal are utilized in the Kona area: private cesspool and municipal and private treatment plants. The primary method of domestic sewage treatment and disposal continues to involve the use of private cesspools. This disposal method is becoming increasingly problematic due to the permeability of the underlying lava substrate and the propensity of the wastes to seep rapidly through the strata causing contamination of the underlying groundwater. In addition to private cesspools, two sewage treatment systems are currently operated in the Kona area: the Keauhou Resort system and the Kailua-Kona municipal system. The Kamehameha Investment Company constructed the Keauhou Sewerage System in the early 1970's in conjunction with the resort developments at the Keahou Bay area. The collection system consists of 17,700-feet of sewer lines and three sewage pump stations. Sewage flows from the resort related developments are channeled to the Heeia STP facility for treatment and subsequent use as irrigation water for the resort golf course. The collection system is maintained by the resort developers while the Heeia STP is operated by the County.

The Kailua Municipal Sewerage System is one of five municipal sewage systems operated by the County of Hawaii. Built in the mid 1960's, the collection system involves 14,000 feet of sewer lines, six sewage pump stations and one treatment plant located in the Kailua Village Industrial Area. The system is presently operating near capacity (.50 to .65 mgd). The STP utilizes a "Rapid Bloc" treatment process which produces both secondary treated effluent for irrigation use at a nearby County park, and dried sewage sludge used by local farmers for fertilizer (Draft Kona Regional Plan, 1982).

Plans are currently underway to construct a second, much larger sewage treatment plant on State-owned land adjacent to the southern boundary of the Honokohau Small Boat Harbor. The facility, estimated to cost \$26 million, may include an ocean outfall as the primary method of waste disposal. The new system will incorporate the existing collection system of the Kailua-Kona Sewerage System and would expand service to areas between Kailua town and

the Keahole Airport (ibid.). (The existing Keahole Airport system consists of an extended aeration, prefabricated treatment plant [Traverse Group, Inc., 1985].)

#### 4.3.3.2 Probable Impacts

An evaluation of collection, treatment, and disposal of wastewater generated within the Kohana-iki Resort, and probable impacts and mitigating measures was conducted by M & E Pacific, Inc. and is included in Chapter V, Appendix F. Substantive findings and conclusions are presented below.

Table 11 summarized the estimated wastewater flows expected to be generated by each of the major resort activity centers.

**Table 11: ESTIMATED WASTEWATER FLOWS**

<u>Land Use</u>	<u>Acreage</u>	<u>Wastewater Flow (gpd)</u>
300-Room Resort Hotel	25	55,040
400-Room Luxury Hotel	30	74,636
Resort Condominium:		
Site P	23	57,948
Site GC	23	53,635
Marina Village:		
Resort Condo. Site M	24	75,968
Commercial	1	9,753
Resort Commercial Village	9	16,315
Clubhouse/Recreation Center	8	25,600
Support Housing	10	43,075
Resort Residences:		
Site I	40	24,960
Site II	18	11,232
Site III	<u>13</u>	<u>5,408</u>
Total	224	453,570

Source: M & E Pacific, Inc., 1986

The engineering study examined five alternative treatment systems for the proposed resort development. The alternatives included:

1. Onsite Treatment Facilities. Individual self-contained activated sludge units with aerobic digestion ranging in capacity from 17,000 to 86,000 gpd would be installed at each of the development parcels.
2. Two Treatment Facilities. Wastewater would be collected at two separate facilities located at opposite ends of the resort.
3. Single Centralized Treatment Facility. A centralized treatment facility with a capacity of 0.46 MGD to treat the entire development would be



feasible if funds were available and the entire planned resort development were scheduled for construction at one time.

4. Interim/Ultimate Treatment Phasing. Another alternative action for wastewater management is a two phase scheme. Initially, the onsite treatment option or multiple facility option would be employed. Upon completion of the entire development, wastewater would be rerouted to a single 0.46 MGD treatment facility and the interim units would be abandoned.
5. Connect to proposed Honokohau Wastewater Treatment Facility. Connection to the proposed facility would require construction of an onsite pump station, and sewer force main along Queen Kaahumanu Hwy. to transport the wastewater. Implementation of this alternative would be dependent upon actual development of the proposed treatment facility and the proposed Kohana-iki development. Construction of the treatment facility prior to or concurrently with development of Kohana-iki would be necessary for implementation of this alternative.

The study examined three alternatives for effluent disposal.

1. Golf Course Pond Storage and Irrigation. Due to the close proximity of golf course fairways to all resort areas, use of golf course ponds for effluent storage would be convenient. Ponds would provide additional treatment due to disinfection by ultraviolet radiation from the sun. Expected nitrogen removal by bermuda grass would be 40 pounds per acre per month.
2. Subsurface Injection/Groundwater Recharge. This alternative involves the subsurface disposal of effluent by septic tank, leaching fields and/or injection wells. The cost of installing a leaching field system would be expensive due to the excavation of the lava rock.
3. Ocean Outfall. Ocean outfalls are an effective but expensive effluent disposal method. The long, deep outfall that would most assuredly be required would be prohibitively expensive and could affect the cold water intakes of the NELH and HOST Park facilities.

Regardless of the treatment system and disposal alternative selected, it is imperative that effluent entering the ground water have acceptable nutrient levels to avoid upset of the anchialine pond ecosystem and the nearshore marine environment.

All wastewater pumping stations and treatment facilities would be located as far from the anchialine ponds as practical. Pumping and treatment facilities would also be located above the 15 foot elevation to reduce the potential for groundwater contact.

#### 4.3.3.3 Mitigative Measures

Nutrient concentrations would be decreased below secondary standards with the addition of water hyacinths or other wetland plants to the effluent holding ponds. The principal nitrogen removal mechanism is bacterial nitrification/denitrification rather than plant uptake. Harvesting of the hyacinths is recommended every five weeks since the removed nutrients are converted to cellular mass in the form of hyacinth growth.

Maintenance of aerobic conditions within the storage ponds would be an effective odor control measure. Aerobic conditions would be achieved by minimizing the pond depth and biochemical oxygen demand loading.

Human contact with aerosols from effluent irrigation would be minimized by buffer zones or planting trees and shrubs around the irrigated areas; use of low trajectory sprinklers or downward spray nozzles; and avoiding irrigation during windy periods. Irrigation of golf course fairways at night would reduce the chance of human contact by aerosols--a concern expressed by the State Department of Health. Night irrigation would also aid infiltration of effluent into the ground, preventing accumulation of salts on grass blades due to rapid evaporation during daylight conditions.

#### **4.3.4 Solid Waste Disposal**

##### 4.3.4.1 Existing Conditions

Municipal solid waste generated on the island is generally disposed of at one of several sanitary landfills located throughout the County. There is no residential municipal pick-up service. The County operates 25 solid waste transfer stations at 20 different locations around the Island. Refuse collected at these stations is transferred to one of two active landfill sites; Hilo or Kailua-Kona (Kealakehe) (See Figure 6, Appendix F: "Solid Waste Facilities"). Refuse collected by private contractors cannot be deposited at the refuse transfer stations; instead it must be trucked to one of the two public landfills. Hazardous wastes and sludge are not handled at any of the County's landfills.

The Kailua-Kona landfill at Kealakehe is scheduled to be closed in the near future in conjunction with the development of a new 300-acre public sanitary landfill at Puuanahulu. The new facility will service both Kailua-Kona and Waimea and will be located between the two towns on the Mamalahoa Highway. The Kailua landfill would be converted to a transfer station after closure.

##### 4.3.4.2 Probable Impacts

Solid waste generation quantities for the proposed resort were projected by M & E Pacific, Inc. and are included as Chapter VII, Appendix F. Applying the solid waste generation rates for the North and South Kona Solid Waste District in the county management plan of 7.41 pounds per capita per day (lbs/cd) for 1990 and 9.96 lbs/cd for 2000 would result in 5.19 tons/day (t/d) and 13.03 t/d of solid waste projected for the initial and ultimate phases of development respectively. Projected solid waste generation for the entire district are 726 tons/week (t/wk)

in 1990 and 1,282 t/wk in the year 2000. The projected rates of solid waste generated by the project would equal approximately 5 percent and 16.9 percent of projected quantities for the entire solid waste district.

The projected solid wastes to be generated by the proposed project make up a very small fraction of the total projected solid waste quantities. The proposed project should not require the construction of a new landfill or significantly shorten landfill life.

#### **4.3.5 Police Protection**

##### 4.3.5.1 Existing Conditions

Police protection for the region is provided by the Hawaii County Police Department operating from its regional headquarters in Captain Cook. The area served by the Captain Cook station extends from the Manuka State Park in South Kona to Anaehoomalu Bay in North Kona. Presently a small sub-station is maintained in Kailua-Kona. Planning is underway to move the Captain Cook headquarters to a new 10-acre facility at Kealakehe, North Kona, located approximately mid-way between the project site and Kailua-Kona. As of July 1, 1986, the Kona District Police force will consist of 81 personnel including 71 officers and 10 administrative and clerical positions (Personal Communication, Captain Henry Silva, June 1986).

##### 4.3.5.2 Probable Impacts

A Public Economic Benefit Study prepared for this report by the Hallstrom Appraisal Group, Inc. (Appendix I), analyzed the impact of the resort development on certain State and County-provided services such as police protection. The report concludes that one full-time patrolman position (consisting of five individual patrolmen working in three daily shifts throughout the week) would be more than sufficient to meet the initial stage of development and that an additional one half position will be required upon the completion of the second hotel facility. This would equate to \$52,500 annually, increasing to a stabilized level of \$105,000 per year expenditures by the County for Police protection for the subject. This is an insignificant amount when compared to the potential public financial benefit which the project will provide in the way of increased property tax base, and excise and income taxes. See Chapter 4.2.2 for a full discussion of the Public Economic Benefit Study.

#### **4.3.6 Fire Protection**

##### 4.3.6.1 Existing Conditions

The Hawaii County Fire Department provides fire protection services to Big Island residents. Fire stations are located in the Kona area at Captain Cook, Kailua-Kona and Kawaihae. The Kailua-Kona Station is located on Palani Road above the Queen Kaahumanu intersection approximately 7 miles away from the Kohana-iki site (maximum 8 minute response time) and is presently staffed by 16 fire fighters. Equipment includes five vehicles operated by three shifts of ten men each (Traverse Group, Inc., 1985). A State Airports Division

emergency fire squad is located at the Keahole Airport, but equipment and personnel are restricted to airport emergencies.

#### 4.3.6.2 Probable Impacts

The public benefit cost study referred to above also analyzed the fiscal impacts of publicly provided fire protection services. As with police services, the fire protection facilities in the North Kona region are already taxed to the limit according to Deputy Fire Chief Don Coloma. The existing Kailua station is insufficient to meet the projected demand resulting from increased development throughout the region encompassing the subject property. Because of the existing need for service enhancement (some of the residential subdivisions in the neighborhood of the Kohana-iki mauka of Queen Kaahumanu Highway have difficulty being accessed by a fully loaded tanker truck due to steep grades in the area), a new station house will inevitably need to be constructed to meet the needs of the developing areas north of Kealahou, including the subject property. Also, as stressed by the deputy chief, fire insurance premiums for improvements increase dramatically the further the structure is away from a fire station, especially if outside a five mile radius. The economic impact study suggests one alternative means of funding the construction of a new station, similar to the cooperative agreement recently worked out between the County and a cooperative of South Kohala resort developers where a fire station was privately funded and constructed on donated land and equipped and operated with County funds.

#### **4.3.7 Health Care**

##### 4.3.7.1 Existing Conditions

The State Department of Health administers the Kona Hospital located in Kealahou. Built in 1975, the 83-bed skilled nursing facility provides both acute and intermediate care to Kona residents. The Hospital is reaching capacity and it is expected that funding requests will be forthcoming to expand the number of available beds. A new \$40 million hospital was opened in Hilo in 1985.

Emergency Ambulance. Emergency Ambulance Service is provided by the State Department of Health. Advanced life support ambulance units are located at the Lucy-Henriques Medical Center in Waimea (2 holding beds, X-ray), the Kailua-Kona Fire Station and at the Captain Cook Fire Station. The Kona Hospital houses a basic life support ambulance unit.

##### 4.3.7.2 Probable Impacts

The increase in de facto population attributable to the development of the proposed resort and associated activities will impact the existing level of health care experienced by Kona residents. Using a standard of 4 hospital beds per 1,000 residents, the project would necessitate the provision of approximately 17 additional hospital beds when the project is fully completed and operational.

### 4.3.8 Power and Communications

#### 4.3.8.1 Existing Conditions

##### Power.

Electrical Power. In 1982, the island of Hawaii consumed 618 million KWh of electricity. Only fifty-five percent of this energy was produced by petroleum-fired generators operated by the Hawaii Electric Light Company (HELCO), a subsidiary of Hawaiian Electric Company and the only franchised public utility. Thirty-eight percent of the island's total electrical consumption was generated by the sugar companies through the burning of bagasse. Four percent of the total energy demand was produced by hydroelectric power plants and three percent was produced by a geothermal well located in Puna. At the end of 1983, HELCO had an installed capacity of 116,500 KW and had sold 466 million KWh. Average monthly residential use in 1983 amounted to 480 KWh with an average monthly bill of \$59.68 - the lowest rate of the four counties. (DPED, 1984). The electric utility operates six electrical generating stations; four located in the Hilo area, one at Waimea and one near the subject property at Keahole. The island's transmission system consists of 69 KV and 34.5 KV lines. A 69 KV overhead transmission line runs along the Queen Kaahumanu Highway between Waimea and Kailua-Kona (mauka of the subject property) and connects to the major generating facilities in Hilo. Present electrical generation capacity is 123 mw, with 100 mw peak demand. In the Kona area, substations are located near the Keahole Airport, at Kealakehe and at the Kona Industrial Park (Wilson Okamoto & Associates, 1981).

Recent technological advancements have increased the viability of harnessing wind energy. A series of wind-energy generators currently under construction in North Kohala are expected to produce 3.3 MW of intermittent electricity (Phillips, Brandt, Reddick & Associates, 1984).

Solar. This Keahole Point area has one of the highest year-round solar radiation levels in the U.S., with cloud free days occurring approximately 95% of the year (Traverse Group, Inc., 1985). Average daily radiation on a horizontal surface is 2,019 BTU per square foot (ibid.).

Liquefied Synthetic Gas. Limited LSG service is provided by the Gas Company (GASCO), a subsidiary of Pacific Resources, Inc. Although Hawaii County is the State's second largest consumer of LNG, it consumes only six percent of total State consumption. Average monthly residential use in 1983 was 18.4 therms with an average monthly bill of \$29.43 (DPED, 1984).

##### Communications

Telephone. Local telephone service is provided by the Hawaiian Telephone Company, a subsidiary of General Telephone & Electronics. The closest existing facilities are located approximately 100 feet upland of the Queen Kaahumanu Highway. Available telephone trunk capacity out of Kailua-Kona would be sufficient for the needs of the Kohana-iki Resort

Postal Service. A total of 33 Post Offices and Stations are located around the Island. The nearest Federal Post Office to the project area is located in Kailua-Kona.

Cable Television. The island is serviced by three Cable TV companies. Sun Cablevision is licensed to provide cable television service in the Kona-Kohala region. There are presently no cable lines immediate to the project area. The closest cabled areas are Kailua-Kona to the south and the Pacific Palisades subdivision five miles to the north.

Commercial Television and Radio. As of June 30, 1984, residents of the Big Island were served by 4 AM and 3 FM commercial radio stations and a total of 4 commercial TV stations.

Newspapers. Big Island residents receive the two Honolulu daily newspapers in addition to the daily Hawaii Tribune Herald and West Hawaii Today.

#### 4.3.8.2 Probable Impacts

An assessment of both power and telecommunications demands for the Kohana-iki Resort was prepared by M & E Pacific, Inc. and is included as Chapter VI, Appendix F. The initial electrical requirement for the resort would be 7.5 mva for the 400-unit hotel development. An estimated requirement of 35 mva would be expected for ultimate development totaling 1,850 units. A substation consisting of transformer and switching gear would be required to handle the ultimate demand, plans of which would be developed by HELCO. The substation would be located mauka of Queen Kaahumanu Highway and two 12.47 Kv distribution lines would run under the highway to the site.

A substation would also be required for telephone service for the ultimate development. An underground cable under the Queen Kaahumanu Highway would carry the system to an onsite substation.

The projected onsite population of the initial development phase would be insufficient to require expansion of cable television service to the Kohana-iki site. Should cable television service be desired, the developer would be required to fund any initial capital costs.

There should be little direct impact to existing utility customers in the area since electrical and telephone capacity is available.

#### 4.3.9 Schools and Libraries

##### 4.3.8.1 Existing Conditions

##### Schools

The North Kona District is serviced by three public schools and two private schools. The major public high school for the region, Konawaena High, is located in Captain Cook, south of Kailua-Kona (1986 projected enrollment: 1,467 students). The project is also located within the attendance areas of Kealakehe

Elementary and Intermediate school. The most recent addition to the public school system was the construction of Kahakai Elementary School in 1982 (1986 projected enrollment: 514 students). Kealakehe Elementary, Kealakehe Intermediate, and Konawaena High Schools are at capacity. The budgeting of additional classrooms will be required to accommodate growth at the subject schools.

Libraries. The North Kona region is currently served by three public libraries. Plans are currently underway to build a permanent Kailua-Kona Library once a site has been located.

4.3.8.2 Probable Impact

The State Department of Education has prepared the following student enrollment projections for the Kohana-iki Resort (Table 12):

**Table 12: STUDENT ENROLLMENT PROJECTIONS**

<u>SCHOOL</u>	<u>GRADES</u>	<u>APPROXIMATE INCREASE IN ENROLLMENT</u>
Kealakehe Elementary	K-5	25-45
Kealakehe Intermediate	6-8	10-20
Konawaena High	9-12	10-20

Source: State Department of Education 1986

A total of between 45 and 85 children may require public school educations at full project build-out. These figures may still be overstated as most families residing on the Resort (with the exception of the employee/support housing geared to the young singles or two-person households) will be able to afford the choice of sending their children to private schools.

CHAPTER V

K

O

H

A

N

A

I

K

I



## CHAPTER V

### ALTERNATIVES TO THE PROPOSED ACTION

#### 5.1 INTRODUCTION

Chapter 200 of Title 11, Environmental Impact Statement Rules, requires a discussion of "any known alternatives...which could feasibly attain the objectives of the action." The rules further specify that the alternatives be explored and evaluated in light of enhancement to environmental quality or the avoidance or reduction of adverse environmental effects.

Three alternative actions that could reduce or eliminate environmental risks or costs were considered: (1) "no action" (no amendment to the existing land use classifications at either the State or County level); (2) "major resort" development; and (3) "retreat resort" development.

#### 5.2 NO ACTION ALTERNATIVE

The no action alternative would preserve the existing situation at Kohana-iki. The undeveloped coastal property, now characterized by a relatively barren landscape, would remain largely underutilized, except by recreationists.

*Advantages:* No further expenditure of resources by the developer or any public agency would be required. Areas that are considered environmentally sensitive, such as the anchialine ponds and archaeological sites would remain undisturbed since environmental impacts of the type discussed in Chapter IV would not materialize. However, changes in the environment still could occur from other causes, such as natural cycles, indirect impacts from land uses on surrounding parcels, and the existing low-intensity use of the land.

*Disadvantages:* The absence of land development would also preclude economic benefits that might accrue from the project, such as additional employment, increased tax revenues, and increased economic activity in the region overall. Opportunities to implement State and County economic objectives and policies would be lost. Similarly, privately funded environmental programs designed to take positive actions toward resource management for public benefit and enjoyment would not be available.

#### 5.3 MAJOR RESORT

The Hawaii County General Plan has defined and established standards for specific types of resort developments. A "major resort" area is described as "a self-contained resort destination area which provides basic and support facilities for the needs of the entire development. Such facilities shall include sewer, water, roads, employee housing and recreational facilities, etc." A general breakdown of land uses is provided as follows:

Maximum hotel and condominium-hotel units: 3,000 rooms

Resort acreage: 90 acres minimum

Active/passive recreation areas: 50 acres minimum

Accessory use within hotel or resort zoned area shall be based on 50 square feet of floor area per hotel room.

A maximum of 640 acres for residential use when other zoned lands are not available in close proximity for support use.

*Advantages:* Strictly in terms of land-use intensity, this alternative represents the highest use of the property. If this level of development is warranted by market demand, it could contribute significantly to the economic vitality of the region. Through economies of scale, fiscal revenues are expected to rise faster than outlays to fund public services and utilities.

*Disadvantages:* With a total of 470.13 acres, Kohana-iki does not contain sufficient land area to develop a high-quality resort area at the major-resort scale. While a room count exceeding the 1,500 rooms allowed by the intermediate resort category can be accommodated physically on the site, the development would be congested and contrary to the unrestricted, open feeling that is characteristic of the Kona Coast. A major resort development would also put Kohana-iki in a less competitive position compared to existing major resort areas that incorporate larger acreages.

### 5.3 RETREAT RESORT AREA

The Hawaii County General Plan characterizes retreat resort as "generally an area which provides the user with rest, quiet, and isolation for an environmental experience. It shall have sewer, water, roads, employee housing, and recreational facilities, etc." Standards for land use include:

Maximum hotel and condominium-hotel units: 100 rooms

Resort acreage: 15 acres minimum

Provide active and passive recreation area commensurate with the scale of development

Accessory uses within hotel or resort zoned area shall be based on 50 square feet of floor per hotel room.

The Kona Coast has an example of a premier retreat resort in the form of the Kona Village, whose secluded site is set well back of the main highway. The individual thatched-roof bungalows are clustered in a village setting. Contrary to expectations of a luxury resort, man-made amenities are few, thus reinforcing the sense of isolation.

If a retreat resort is developed at Kohana-iki, similar guest accommodations would have to be provided together with a substantial amount of recreational

facilities. A commercial center, such as the one currently proposed, would not be compatible with a retreat resort.

*Advantages:* Because of its extremely low density, this alternative would provide greater flexibility to minimize adverse impacts on existing archaeological and environmental features.

*Disadvantages:* The high capital cost of developing infrastructure to serve the development, combined with a low projected rate of return would call into question the economic feasibility of this alternative action.

## 5.6 ANALYSIS AND CONCLUSION

The EIS rules concerning "rigorous exploration and objective evaluation" of feasible alternatives apply both to public and private actions. However, feasibility is evaluated differently in the two cases. The benefits of public actions are measured by their contribution to the public good, which is determined through an inherently political process. On the other hand, the feasibility of a private action, is ultimately determined by expected future returns, including a return on investment, compensation for risk, and a margin of profit. The importance of a development project's economic feasibility, measured in these market terms, is underscored by the weight this factor is given in certain public decisions, such as those made by the State Land Use Commission, which requires data regarding the petitioner's financial condition. Therefore, although the EIS rules state that alternatives be evaluated, "even though more costly", the consequences on a private action's bottom line set a minimum standard for establishing the feasibility of the alternative.

The "no action" alternative would not materially degrade the environment beyond that which would otherwise occur in the absence of the project. However, this alternative has an opportunity cost since economic benefits, as well as any positive resource management programs that might be established in conjunction with the resort, are not realized.

While the "major resort" alternative would seek to provide benefits that are not available in the "no action" alternative, it is uncertain whether this type of resort would meet the development objective of providing a high-quality resort environment. Without the qualitative merits of a superior resort development, the economic feasibility aspect would be diminished.

In many respects, the "retreat resort" alternative combines the benefits of the two previous alternatives: minimal environmental disruption supplemented by resource management programs (that would be integrated with the resort's offerings of guest amenities), and an infusion of capital into the regional economy. However, the cost-revenue balance of this type of resort development would not meet the feasibility requirement of the development program.

None of the three alternatives considered compares more favorably than the proposed action in establishing an economically feasible resort that meets the developer's standards of quality and also fulfills public policies and objectives.

CHAPTER VI

K

O

H

A

N

A

I

K

I

## CHAPTER VI

### IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction and operation of the Kohana-iki resort community will involve the irretrievable loss of certain environmental and fiscal resources. The cost of using these resources, however, should be evaluated in light of recurring benefits to the residents of the region and the County, and the alternative of taking no action.

The proposed resort development will urbanize approximately 470 acres at Kohana-iki. Construction of buildings and other man-made amenities will further narrow the range of future uses for this site, although not significantly. The site is undeveloped; however, lack of on-site productive resources limit its appropriateness for certain uses, such as agriculture.

Resort hotels and condominiums, residences, the commercial area, and the golf course will remove most of the existing vegetation. Although the ground level environment will be altered, the visual "resource" attached to the site, namely its coastal and open space vistas, will be preserved to the extent possible by the golf course and other undeveloped areas, which amount to approximately 261 acres or slightly less than half of the parcel.

"No build" areas have been designated around the anchialine ponds and historic sites that are deemed to possess significant cultural value. Some historic sites may be destroyed by construction; however, prior to such action, pertinent information will be extracted or other work performed in accordance with the recommendations of the historic preservation assessment which is being coordinated with the State Historic Preservation Office.

Construction and operation of the resort community will require the expenditure of labor, materials, and energy, most of which are non-renewable and irretrievable. Water for domestic use will require the commitment of a resource that is not readily accessible at present; water for irrigation use will be obtained from recycled and treated wastewater.

The proposed action will not require a substantial new commitment of publicly supported services and facilities.

K

O

H

A

N

A

I

K

I

CHAPTER VII

## CHAPTER VII

### RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Analyses of various on-site environmental features have found the Kohana-iki property to be well endowed with physical attributes that are desirable both as amenities in a resort community and for their own sake. These include pristine near-shore waters, the anchialine pond ecosystem, and sites of cultural significance. The studies have also indicated that the proposed development is compatible with the existing natural environment. Specific recommendations to mitigate adverse impacts are being implemented in the planning phase and would be followed through in the design, construction, and operations phases of the project.

Improved public access to the shoreline, open space corridors, and archaeological and ecological preserves that seek to enhance public education and enjoyment are contained in the project's conceptual plan. These proposals represent long-term community gains. And, as evidenced by the findings of this report, the proposed action is not anticipated to pose a significant risk to the health and safety of residents or visitors of the development or vicinity.

As the property develops, its productivity in terms of generating property tax revenues will increase. Employment opportunities generated on the site will have benefits that ripple through the regional economy. Income from property, personal, and excise taxes are expected to more than offset expenses associated with expanded public services to meet the requirements of the resort and indirect population growth. Chapter V previously has noted that the property is unsuitable for certain alternative land uses in which productivity is measured by the value of its cultivated or extracted products.

CHAPTER VIII

K

O

H

A

N

A

I

K

I



## CHAPTER VIII

### OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES

Chapter III contains a detailed discussion of the relationship between government plans and policies and the proposed action. The conceptual development plan for the Kohana-iki resort community is consistent with all relevant public objectives, except for portions of the Hawaii County General Plan and State Land Use District boundary that are the subject of amendment petitions pending before the Hawaii County Planning Department and the State Land Use Commission, respectively. Land use intensities and unit counts fall within the allowable limits of the approvals being sought, i.e., within the "intermediate resort" range.

West Hawaii, particularly the North Kona-South Kohala area, has been the focus of efforts to expand the Big Island visitor industry. The Kohana-iki development represents an opportunity to promote economic growth by establishing a viable, high-quality destination resort area.

The site is appropriately located between the Keahole Airport, the main entry/exit port, and Kailua-Kona, the regional urban center. The site is not serviced directly by public utilities; however, major distribution lines are accessible from the property, with the developer providing for connections and/or infrastructure expansion to increase capacity. Discussions have been initiated with the agencies responsible for various utilities and services to determine project requirements and mutually acceptable arrangements for their provision.

Analysis of projected direct, indirect, and induced public revenues compared with anticipated public expenses indicate a favorable benefit-cost ratio. State and County revenues are expected to reach \$10.8 (stabilized, 1986 dollars) at project completion.

Environmental benefits and costs have not been quantified. However, anticipated adverse environmental impacts related to the project are not significant and measures to mitigate the undesirable consequences of development have been proposed: anchialine pond management plan, historic preservation program (data recovery, salvaging, and preservation), marine baseline assessment for future monitoring efforts, and improved shoreline access and public parking.

CHAPTER IX

K

O

H

A

N

A

I

K

I

## CHAPTER IX

### CONSULTED PARTIES AND PARTICIPANTS IN THE DEIS PREPARATION PROCESS

#### 9.1 CONSULTED PARTIES

The Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kohana-iki Resort project was published in the OEQC Bulletin on March 8, 1986. The thirty-day review period, announced in the OEQC Bulletin, ended on April 7, 1986. In addition, a more detailed EISPN, including maps of the project, was mailed directly to the agencies, organizations, and individuals listed below. The list contains parties believed to have an interest in the project or who requested consulted party status.

- " \* " indicates agencies or individuals who sent a written response to the EISPN.
- " # " indicates agencies or individuals who did not respond in writing, but whose comments were solicited by telephone or in personal interviews.
- " + " indicates agencies or individuals who telephoned to express an interest in reviewing the DEIS.

#### Federal Agencies

- \* Department of Agriculture, Soil Conservation Service
- \* Department of the Army, Engineering Division
- \* Department of Housing and Urban Development
- Department of Interior
- # Fish and Wildlife Service
- + National Parks Service
- \* Department of Transportation, Federal Aviation Administration
- Environmental Protection Agency, Region IX-San Francisco

#### State Agencies

- \* Department of Agriculture
- \* Department of Education
- Department of Health
- Department of Land and Natural Resources
- # Division of State Parks and Historic Sites
- \* Department of Planning and Economic Development
- + High Technology Development Corporation
- \* Department of Transportation

#### Hawaii County

- Office of the Mayor
- + Mr. Russell S. Kokubun, County Council
- \* Department of Parks and Recreation
- # Department of Public Works

County Agencies (continued)

- \* Department of Research and Development
- \* Department of Water Supply
- \* Fire Department
- # Office of Housing and Community Development
- Planning Department
- \* Police Department

Public Utilities

- \* Hawaii Electric Light Company, Inc.
- # Hawaiian Telephone Company

Community Organizations and Other Groups/Individuals

- \* Mr. Bill Graham
- + West Hawaii Today, Mr. Reed Flickenger
- + Wilson Okamoto & Associates, Mr. Gary Okamoto

**9.2 PARTICIPANTS IN THE DEIS PREPARATION PROCESS**

The DEIS was prepared for Kona Beach Development Venture by Helber, Hastert, Van Horn & Kimura, Planners. The following list identifies individuals and organizations who were involved in the preparation of the DEIS and their respective contributions.

Helber, Hastert, Van Horn & Kimura, Planners

Mark H. Hastert, AICP	Principal-in-charge and Project Manager
Thomas A. Fee, AICP	Project Planner and Principal Author
Toshiko Matsushita	Graphic Artist

Subconsultants

The Hallstrom Appraisal Group, Inc.	Market Study
	Highest and Best Use Analysis
	Fiscal Impact Analysis
Paul H. Rosendahl, Ph.D., Inc.	Archaeological Reconnaissance Survey
Char and Associates	Botanical Survey
	Terrestrial Faunal Survey
OI Consultants	Near-shore Marine Environment and
	Anchialine Pond Impact Analysis
M & E Pacific, Inc.	Preliminary Civil Engineering
Edward K. Noda & Associates	Oceanographic Environment and
	Conceptual Feasibility for
	Kohana-iki Marina
Gordon Bricken and Associates	Aircraft Noise Exposure Analysis
Steven Dollar	Marine Assessment

CHAPTER X

K

O

H

A

N

A

I

K

I

## CHAPTER X

### COMMENTS AND RESPONSES RECEIVED DURING PREPARATION OF THE DEIS

Fifteen letters were received in response to the Environmental Impact Statement Preparation Notice (EISPN); the individuals and agencies are listed below.

The following pages contain a copy of the EISPN and the cover letter requesting review of the proposed development with respect to issues that should be addressed in the DEIS. Those comments received and our follow-up responses are also reproduced.

#### Federal Agencies

Department of Agriculture, Soil Conservation Service  
Department of the Army, Engineering Division  
Department of Housing and Urban Development  
Department of Transportation, Federal Aviation Administration

#### State Agencies

Department of Agriculture  
Department of Education  
Department of Planning and Economic Development  
Department of Transportation

#### County Agencies

Department of Parks and Recreation  
Department of Water Supply  
Fire Department  
Police Department

#### Public Utilities

Hawaii Electric Light Company, Inc.

#### Individuals

Mr. Bill Graham

ENVIRONMENTAL IMPACT STATEMENT  
NOTICE OF PREPARATION

KOHANA'IKI RESORT COMMUNITY  
NORTH KONA, HAWAII

←DATA Kohamail.lst→  
←SET today's date=?Type today's date and press Return:→  
←today's date:→

←contact name→  
←position→  
←agency/organization→  
←street address→  
←city→, ←state→, ←zip→

Environmental Impact Statement Preparation Notice:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear ←greeting→:

The official preparation notice (EISPN) for the Kohanaiki Resort was published in the OEQC Bulletin dated March 8, 1986 (copy enclosed). No comments were received from your agency during the 30-day official review period mandated by Chapter 343, Hawaii Revised Statutes.

Because your agency has been identified as one which may be interested in participating in the preparation of the EIS as a consulted party, we have also enclosed a copy of the complete EISPN to assist you in evaluating potential project-related impacts.

We would greatly appreciate your assistance in this process by either responding with written comments to the enclosed EISPN or by identifying an individual within your organization whom we may contact to discuss the project in greater detail. Thank you for your cooperation.

Sincerely,

Thomas A. Fee  
Project Planner

Encl.

I. IDENTIFICATION OF APPLICANT

A. Applicant  
Kona Beach Development Venture  
562 California Avenue  
Wahiawa, HI 96786

B. Consultant for EIS  
Helber, Hastert, Van Horn & Kimura, Planners  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, HI 96813

II. IDENTIFICATION OF APPROVING AGENCY (ACCEPTING AUTHORITY)

Planning Department  
County of Hawaii  
25 Aupuni Street  
Hilo, HI 96720

III. AGENCIES CONSULTED IN PREPARING ASSESSMENT

A. County Agencies

1. Hawaii County Planning Department
2. Hawaii County Office of Housing and Community Development

IV. PROJECT DESCRIPTION

A. Location and Ownership

The project site, comprising 470 acres, is located on the west coast of the island of Hawaii, in the district of North Kona, ahupua'a of Kohanaiki, TMK: 7-3-09:03 and 16. The entire area is being requested for a General Plan Amendment, from Conservation and Open land use to Open, Intermediate Resort, Medium Density Urban and Low Density Urban.

HELBER  
HASTERT  
VAN HORN  
& KIMURA  
Planners

**HM&K**

Grosvenor  
Center

PRI  
Tower

733  
Bishop  
Street

Suite  
2590

Honolulu  
Hawaii

96813

Telephone  
(808)

545-2065

Telex  
634466

HM&K LW

Principals  
Larry E.  
HELBER

ASLA  
Mark H.  
HASTERT

A.I.C.P.

Richard H.  
VAN HORN

A.I.C.P., A.I.A.

Glenn T.  
KIMURA

Associates  
Nancy L.  
NISHIKAWA

A.I.C.P.  
Thomas A.  
FEE

A.I.C.P.

## EIS PREP NOTICE

The project site is located adjacent to a parcel of open, unimproved land to the north (which is adjacent to the proposed HOST Park), the historic Mamalahoa Trail to the east, and the proposed Kaloko-Honokohau National Historical Park to the south. The site is approximately 2 miles south of the Keahole Airport and 5 miles north of the center of Kailua-Kona.

The site is owned by Kona Beach Development Venture.

### B. Conceptual Plan

#### 1. Land Use

The master plan for the entire project site consists of the following land uses:

- a) Resort Hotel (62 acres)--Two hotel sites located several hundred feet inland from the shoreline. Total of approximately 700 units.
- b) Resort Condominiums (50 acres)--Approximately 500 units in two groupings at approximately 10 units/acre.
- c) Commercial (3 acres)--A 3-acre Resort Commercial Village located between the two hotel sites.
- d) Marina Village (33 acres)--Includes a man-made, 10-acre, 150-slip marina basin and 23 acres of mixed-use (3 acres commercial and 20 acres resort condominium containing approximately 300 units) located at the southern edge of the property.
- e) Recreation (178 acres)--A 170-acre, 18-hole golf course and 8-acre Clubhouse Recreation Center, located inland from the beach, providing for indoor activities with spas, weight rooms and racket courts, and outdoor activities with tennis courts and swimming pool. A golf pro shop is included.
- f) Residential (73 acres)--Approximately 200 single-family house lots, integrated within the golf course, with an average density of 3 lots/acre.
- g) Support Housing (10 acres)--Approximately 150 units of on-site resort staff housing, adjacent to the Marina Village.
- h) Other (61 acres)--The balance of the project area will be used for roads, parking, a sewage treatment plant and utility easements.

## EIS PREP NOTICE

### 2. Public Facilities

- a) Water--It is estimated that the fully-developed project will require approximately 0.925 MGD of potable water, supplied via the municipal system.
- b) Wastewater--All wastewater will be treated and disposed of on-site via a private STP, the effluent from which will be used to irrigate the golf course and other landscaped areas.
- c) Electrical--Power is to be acquired from HELCO via the island-wide power grid.
- d) Drainage--A drainage system will be designed and constructed in accordance with County standards.
- e) Transportation and Public Access--Access to the proposed development will be via a road constructed within a narrow parcel at the northern, mauka corner of the property, which connects with Queen Kaahumanu Highway. All interior roadways will be built to County standards.

### C. Phasing

Project development will be phased from the northern end of the property to the southern end, along with infrastructure improvements, including site access and installation of water, sewer and electrical systems.

## V. DESCRIPTION OF AFFECTED ENVIRONMENT

### A. Topography

The project site consists primarily of lava formations gently sloping from the shoreline to an elevation of about 70ft. at the northern-mauka boundary, with no streams or drainage channels identified.

### B. Flora/Fauna

The site is characterized by desert-like, sparse, dry grasses and herbs, with somewhat more diverse vegetation found along the shoreline, where some kiawe trees and a large mangrove cluster occur. Two species of endemic birds are known to exist in the Kona region: the endangered Hawaiian Stilt and the Hawaiian Owl. Other common indigenous and introduced birds have been observed there as well. Introduced mammals (mongoose, mouse, rat, feral cats and goats) are believed to inhabit the site and the endangered Hawaiian hoary bat may feed along the shore area.



## EIS PREP. NOTICE

### C. Anchialine Ponds

A number of anchialine ponds exist within the coastal fringe of the site. About two-thirds of all the ponds are less than 10sq. meters in size and several are over 100sq. meters and are located in the southern portion of the site. Several early-1970's surveys categorized a number of the southern ponds as having high natural value. The ponds contain crustaceans/mollusks, several rare species of shrimp and aquatic vegetation.

### D. Historic/Archaeological Resources

A recent preliminary archaeological reconnaissance survey located a number of previously-identified pre-historic/historic sites as well as one newly-identified site. Most occur in the shoreline area and southern portion of the project area. The sites were evaluated as varying from low to high significance from the standpoint of research, interpretive and cultural value, with a possible heiau and/or shrine (not positively identified) located just south of Wawahiwa Point.

### E. Marine Environment

The nearshore waters off the subject property are in a pristine condition, with no stream discharges, industrial or domestic waste entering (and such discharges are prohibited by the State Dept. of Health). A 1968 study of beaches along part of the coast of North Kona identified the beach at Wawahiwa Pt. as the best beach and swimming area within the area surveyed, offering potential for resort recreational development with minor improvements.

## VI. SUMMARY OF MAJOR IMPACTS AND MITIGATION MEASURES

### A. Coastal Resources

1. Shoreline--Construction of permanent structures will be in conformance with the State/County shoreline setback regulations, which will avoid possible tsunami inundation and provide unobstructed along-shore vistas and access.

2. Water Quality--To minimize siltation of coastal waters, site drainage will be collected on-site and allowed to percolate slowly into the water table. Treated wastewater effluent will be used for irrigation. No nutrient enrichment or bacterial contamination of the coastal waters should occur from subsurface seepage of the effluent due to nutrient uptake by plants and the distance inland at which irrigation would occur. The possible effects of increased runoff and/or sediment, pesticides, etc. will require further study, as part of the EIS.

## EIS PREP. NOTICE

3. Public Access--The currently restricted access to beaches at the site will be enhanced with the development of the proposed project, with a new road yielding access from Queen Kaahumanu Hwy., public parking and beach access rights-of-way being provided.

B. Anchialine Ponds--The flora and fauna of the ponds will inevitably experience some disturbance due to increased human activity in the area. Drainage of foreign substances into the ponds may affect the endemic shrimp negatively. However, it has also been noted that many such ponds have been altered by human activities (such as introduction of fish species which prey on the ponds' endemic life, and rubbish-dumping into them) despite the lack of development immediately around them. It is felt that the ponds can be incorporated into and managed along with the proposed development in an attempt to preserve their unique qualities. The ponds will be further surveyed and studied within the context of the EIS.

C. Flora/Fauna--To date, no endangered flora or fauna have been found to inhabit the site. Although the endangered Hawaiian Stilt and Owl may feed in the area, they are not thought to nest on the site. Terrestrial flora/fauna characteristics on the site will change significantly due to landscaping and irrigation, but both native and introduced species will continue to exist on the site. Disturbance of beach-area vegetation will be minimized and water areas associated with the golf course may add additional habitat areas.

D. Archaeological Sites--Additional archaeological surveys are planned as part of the EIS to be prepared. Sites deemed significant will be incorporated into the project design where possible, or otherwise preserved.

E. Population and Employment--Employment opportunities will result from the construction activities, hotel services, vacation rentals and retail facilities operations. The proposed support housing would provide for employees and an estimated 200 single-family residential units are planned. Directly and indirectly, the proposed development is estimated to lead to an overall growth in regional employment of up to some 1800 positions. Total regional resident population growth of approximately 3450 persons is estimated as a result of project development. The proposed development will also yield increases in State and County tax revenues via income and property taxes.

**EIS PREP. NOTICE**

**VII. DETERMINATION OF SIGNIFICANCE**

The proposed project has the potential to cause significant impacts. Therefore, an Environmental Impact Statement will be required. The reasons supporting this determination, which are based on the significance criteria in Section 1:31 of the Environmental Quality Commission EIS Regulations, are as follows:

1. The proposed action may involve an irrevocable commitment of resources;
2. The proposed action may involve substantial secondary impacts such as population changes or effects on public facilities;
3. The proposed action is individually limited but cumulatively may have effect upon the environment or involve a commitment for larger actions;
4. The proposed action may affect a rare, threatened or endangered species of animal or plant or habitat;
5. The proposed action may affect coastal water quality.

**VIII. AGENCIES TO BE CONSULTED IN THE PREPARATION OF THE EIS**

**A. Federal Agencies**

1. U.S. Department of Agriculture,  
Soil Conservation Service
2. U.S. Department of Interior,  
Fish & Wildlife Service
3. U.S. Army Corps of Engineers

**B. State Agencies**

1. Department of Planning & Economic Development
2. Department of Health
3. Department of Transportation
4. Department of Education
5. Department of Land & Natural Resources

**C. County Agencies**

1. Mayor's Office
2. Department of Planning
3. Department of Public Works
4. Department of Water Supply
5. Department of Parks & Recreation
6. Office of Housing & Community Development

**EIS PREP. NOTICE**

**D. Public Utilities**

1. Hawaii Electric Light Company
2. Hawaiian Telephone Company

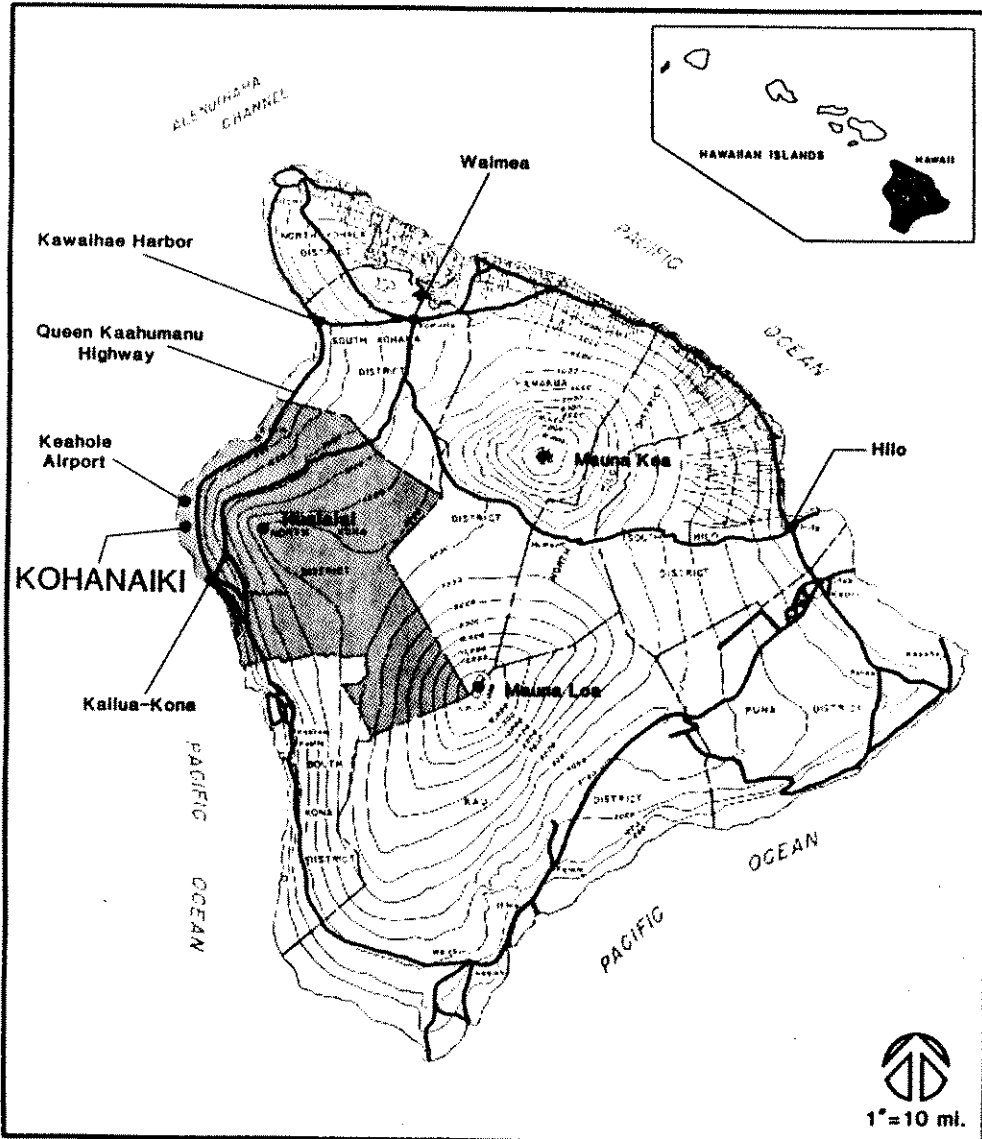
**E. Community Organizations**

**IX. DESCRIPTION OF THE ASSESSMENT PROCESS**

The proposed project is subject to the EIS requirements, pursuant to Chapter 343, Hawaii Revised Statutes, because a County General Plan Amendment is being requested by a private applicant (sec. 343-5(a)(6), HRS). The applicant has submitted an environmental assessment to enable the County to determine the significance of the proposed action. This environmental assessment document, entitled Kohalaiki Resort Community General Planning and Environmental Considerations (Helber, Hastert, Van Horn & Kimura, Planners, January 1986), should be consulted for more detailed information on the project and associated impacts.

Since the County has determined that the proposed action has potential significant impacts, this notice to prepare an environmental impact statement is being filed with the Office of Environmental Quality Control (OEQC). The OEQC then publishes this EIS Preparation Notice in the OEQC Bulletin.

The public has 30 days to respond to the notice. The response should indicate the types of issues that the EIS should address and whether one wishes to be notified when the Draft EIS is available. The response should be sent to the EIS consultant with a copy to the County agency.



Project Location Map  
**KOHANAIKI**  
 Kona Beach Development Venture

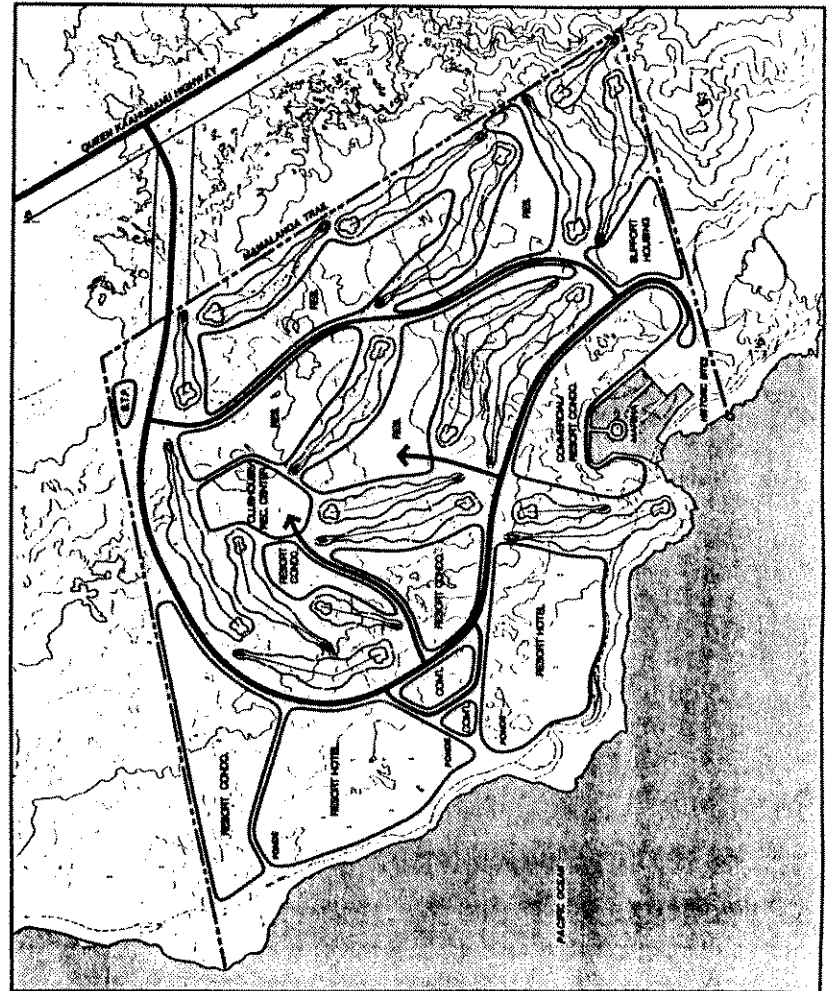
**HELBER, HASTERT, VAN HORN & KIMURA** PLANNERS  
 2800 KALANIANA'OHU DRIVE SUITE 1000 HONOLULU HAWAII 96815 • TELEPHONE 808 942-9700

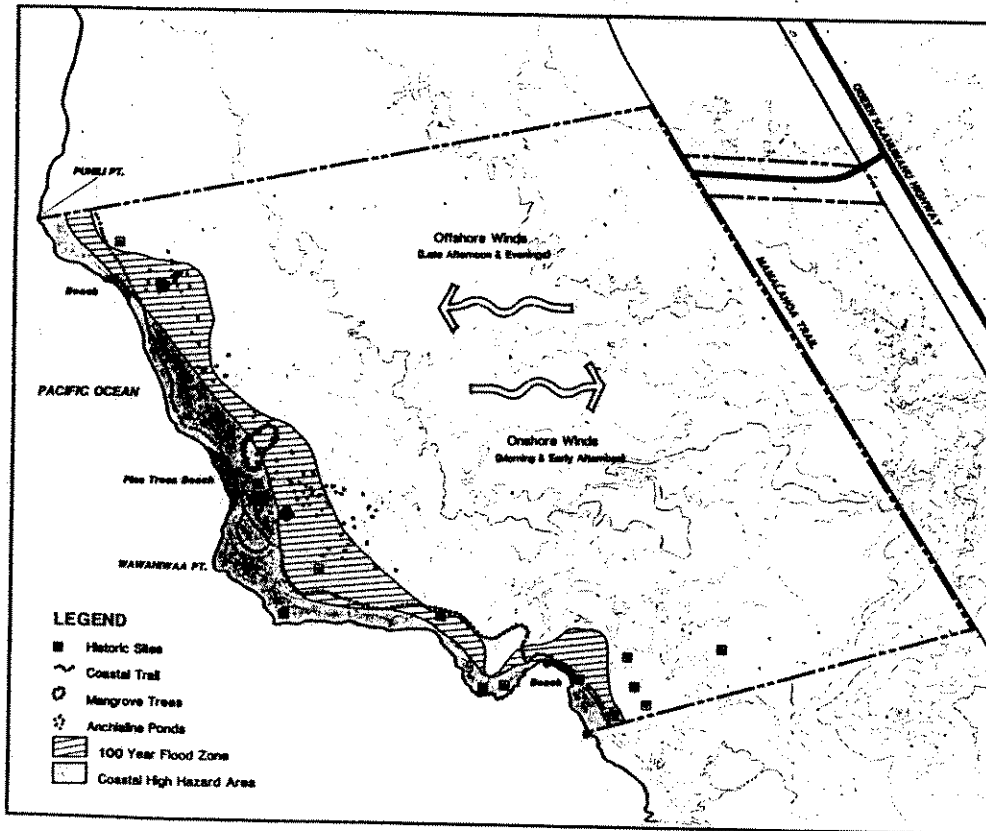
Preliminary Land Use Plan

**KOHANAIKI**

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA  
 2800 KALANIANA'OHU DRIVE SUITE 1000 HONOLULU HAWAII 96815





**Constraints**

**REFERENCES**

Historic Sites:  
 State of Hawaii Historic  
 Preservation Office; Cordy, 1978

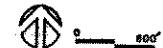
Archaline Ponds:  
 Maciolek and Brock, 1974

Flood Zones:  
 Flood Insurance Rate Map

**KOHANAIKI**

Kona Beach Development Venture

HEIDER, NASTERT, VAN HORN & KIMURA



UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

SOIL  
CONSERVATION  
SERVICE

P. O. BOX 50004  
HONOLULU, HAWAII  
96850

April 30, 1986

Mr. Thomas A. Fee, Project Planner  
HBMV&K Planners  
733 Bishop Street, Suite 2590  
Honolulu, HI 96813

Dear Mr. Fee:

Subject: Kohanaiki Resort Community, North Kona, Hawaii

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

To discuss the project, you may contact our district conservationist Mr. Gary Kam, by telephone: (808) 322-2484, or at the following address:

Kealakekua Field Office  
P.O. Box 636  
Kealakekua, HI 96750

Thank you for the opportunity to review the document.

Sincerely,

  
HERBERT J. LYFORD  
Acting State Conservationist

14 May 1986

Mr. Herbert J. Lyford  
Acting State Conservationist  
Soil Conservation Service  
U.S. Department of Agriculture  
P.O. Box 50004  
Honolulu, Hawaii 96850

Draft Environmental Impact Statement:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Mr. Lyford:

Thank you for your letter of 30 April 1986 in which you note that your agency has no comments to make on the EISPN prepared for the proposed Kohanaiki Resort.

I spoke with Mr. Gary Kam of your Kealakekua Field Office today and will continue to keep him informed of the project throughout the EIS preparation process.

Sincerely,  
  
Thomas A. Fee  
Project Planner

RECEIVED  
MAY 5 1986  
HELDER, HASTERT, VAN HORN  
& KIMURA PLANNERS

HERBERT  
HASTERT  
VAN HORN  
KIMURA  
Planners  
HBMV&K  
Growers  
Center  
733  
Bishop  
Street  
Suite  
2590  
Honolulu  
Hawaii  
96813  
Telephone  
(808)  
546-2063  
Telex  
334400  
HBMV&K  
LAW  
FAX  
546-2063  
HERBERT  
HASTERT  
VAN HORN  
KIMURA  
Planners  
Richard H.  
VAN HORN  
AICP, AIA  
George L.  
KIMURA  
AICP  
HERBERT  
HASTERT  
VAN HORN  
KIMURA  
Planners  
Thomas A.  
FEE  
AICP

X  
CO



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

REPLY TO  
ATTENTION OF

April 18, 1986

**RECEIVED**  
APR 24 1986  
HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

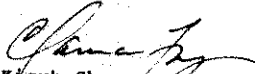
Mr. Thomas Fee  
Helber, Hastert, Van Horn  
and Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Dear Mr. Fee:

Thank you for the opportunity to review and comment on the EIS Preparation Notice for Kohanaiki Resort Community, North Kona, Hawaii. The following comments are offered:

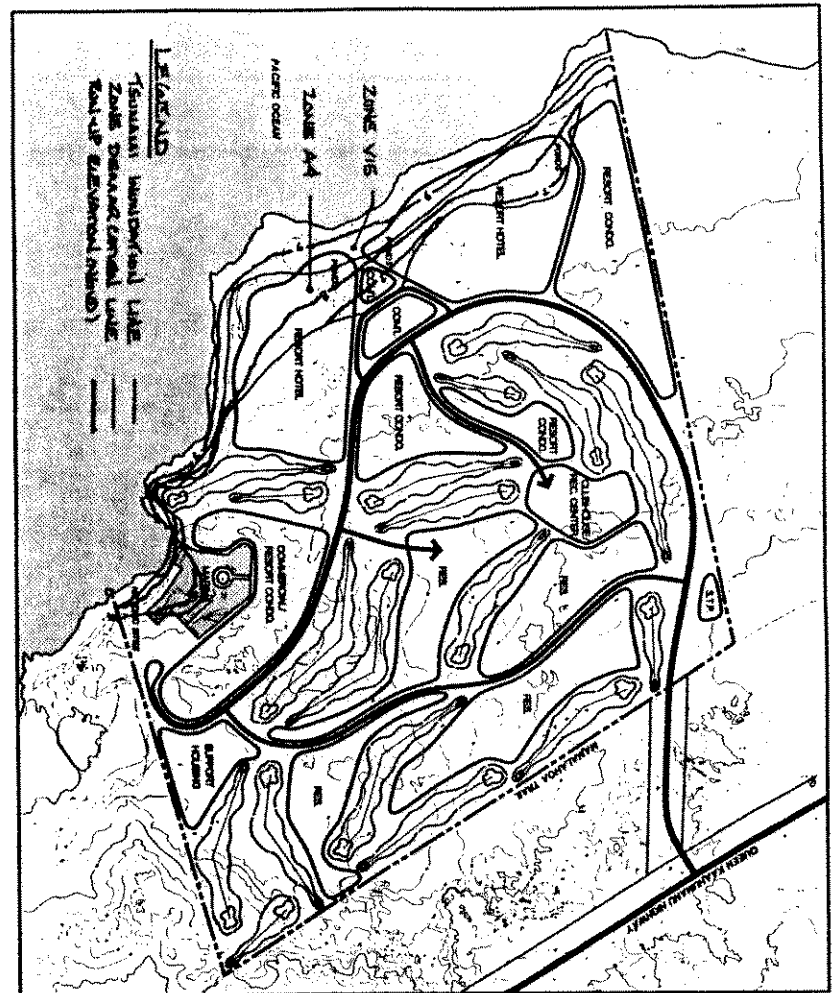
- a. A Department of the Army permit is required to construct the marina and for any fill in anchialine ponds.
- b. Parcel described as TMK 7-03-09:3 is affected by tsunami inundation along the shoreline, and may require certain building restrictions. Suggest close coordination with County of Hawaii. Enclosure 1 indicates the tsunami information by the Federal Insurance Agency FIRM map.

Sincerely,

  
Kisuk Cheung  
Chief, Engineering Division

Enclosure

REINSURED FROM FIRM MAP & ISSUED UNDER MAP 5, 1982





**KOHANAIKI**

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA

Preliminary Land Use Plan

25 April 1986

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

**Draft Environmental Impact Statement:  
Kohanaiki Resort Community,  
North Kona, Hawaii  
TMK 7-3-09: 3 & 16**


Dear Mr. Cheung:

Thank you for your letter of 18 April 1986 providing comments on the EISPN for the Kohanaiki Resort.

Earlier this week we met with Mike Lee of your office and briefed him on the status of the Kohanaiki project. He informed us of the Corps' concerns which are reflected in your comments. We will continue to keep him informed throughout the EIS preparation process.

Sincerely,

HELDER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner



U.S. Department of Housing and Urban Development  
Honolulu Area Office, Region IX  
300 Ala Moana Blvd., Room 3318  
Honolulu, Hawaii 96850

86-126

April 22, 1986

Mr. Thomas A. Fee  
Helber, Hastert, Van Horn  
and Kimura Planners  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, HI 96813

RECEIVED  
APR 22 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Dear Mr. Fee:

SUBJECT: Environmental Impact Statement Preparation Notice  
Kohanaiki Resort Community, North Kona, Hawaii

This responds to your request for HUD comments on the subject project that is oriented to the housing, commercial and recreational needs of a resort community on 470 acres along the Kona coast.

We are pleased to note that provisions were made for some support housing for 150 units to accommodate employees servicing the development. However, it was noted that the project may generate approximately 1,800 jobs upon completion of the project. It may be helpful to discuss the total housing needs of the 1,800 positions that will be created. The discussion could address the location and cost of the housing units in relation to the current housing market for the area.

If HUD assistance is proposed, you may contact Frank Johnson at 546-5570.

Sincerely,

*Calvin Lew*  
Calvin Lew  
Director  
Community Planning and  
Development Division, 9.2C

cc:  
Hawaii County Planning Dept.

25 April 1986

Mr. Calvin Lew, Director  
Community Planning and Development Division, 9.2C  
U.S. Department of Housing and Urban Development  
Honolulu Area Office, Region IX  
300 Ala Moana Boulevard, Room 3318  
Honolulu, Hawaii 96850

Draft Environmental Impact Statement:  
Kohanaiki Resort Community,  
North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Lew:

Thank you for your letter of 22 April 1986 providing comments on the EISPN for the Kohanaiki Resort. The DEIS will address the total housing impact of the proposed resort community.

We recognize the difficulty of forecasting housing impacts generated by resort development--due in large part to the relatively longer time periods in which these projects are built. In any event, we will continue to coordinate our planning efforts with the Hawaii County Department of Housing and Community Development to assure that their concerns are represented in the DEIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

*Thomas A. Fee*  
Thomas A. Fee  
Project Planner

X-11



13 May 1986

Mr. Gary Barbano  
Recreation Planner  
National Park Service  
Box 50165  
300 Ala Moana Boulevard  
Honolulu, Hawaii 96850

Environmental Impact Statement  
Preparation Notice (EISPN):  
Kohalaiki Resort Community,  
North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Mr. Barbano:

As discussed this morning, I am forwarding a copy of the EISPN prepared for the proposed Kohalaiki Resort for your review and comment. The official preparation notice was published in the OEQC Bulletin dated March 8, 1986 (copy enclosed). No comments were received from your agency during the 30-day official review period mandated by Chapter 343, Hawaii Revised Statutes.

Please don't hesitate to call me if we can provide additional information. Your prompt attention to this review will be appreciated.

Sincerely,



Thomas A. Fee  
Project Planner

Encl.



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

AIRPORTS DISTRICT OFFICE  
BOX 50244  
HONOLULU, HI 96850-0001  
Telephone: (808) 546-7129

March 18, 1986

Helber, Hastert, Van Horn  
and Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Gentlemen:

This is in regard to the proposed EIS for the Kohanaiki Resort  
Community, North Kona, Hawaii. We are concerned with the development  
of residential areas beneath or near aircraft approach and departure  
patterns; therefore, we would suggest the EIS be coordinated with the  
upcoming Airport Master Plan and Noise Compatibility Studies.

Sincerely,

David J. Welhouse  
Planning Engineer

Henry A. Sumida  
Airports District Office Manager

**RECEIVED**

MAR 20 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS



50 Years of Air Traffic Control Excellence  
A Standard for the World

4 April 1986

David J. Welhouse, Planning Engineer  
Airports District Office  
Federal Aviation Administration  
U. S. Dept. of Transportation  
Box 50244  
Honolulu, Hawaii 96850-7129

Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Mr. Welhouse:

Thank you for your letter of 18 March 1986 and for spending the time with  
me on the phone this afternoon. We do appreciate your concern about  
urban encroachment on the Keahole Airport facility. Regrettably, we will  
have to proceed with the EIS preparation without the benefit of the results  
from the Airport Master Plan and Noise Compatibility Studies (referred to  
in your letter of 18 March 1986) as the contracts for these studies are  
tentatively scheduled to be awarded later this month and will take  
approximately one year to complete.

Be assured that we will use the best available information on flight tracks,  
noise contours and aircraft type and will incorporate noise mitigation  
features in all appropriate areas should they be deemed necessary. We  
would welcome any comments or suggestions you may have regarding the  
project, including the names of persons you feel we should contact. We  
would also appreciate any preliminary information you receive from the  
Master Plan and Noise Compatibility Studies.

Enclosed please find the complete EISPN for the Kohanaiki Resort project.  
The second to last page of the report contains the preliminary land use plan  
I referred to on the phone. We will be sending you a copy of the Draft EIS  
when it is finalized--probably in late May. Thank you for your interest in  
this project. Please let us know if we can be of further assistance.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Thomas A. Fee  
Project Planner

cc: Mr. Henry A. Sumida, Manager, Airports District Office

Encl.

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
733 BISHOP STREET, SUITE 2590  
HONOLULU, HAWAII 96813  
TELEPHONE: (808) 546-7129  
FAX: (808) 546-7129  
DAVID J. WELHOUSE  
PLANNING ENGINEER  
HENRY A. SUMIDA  
AIRPORTS DISTRICT OFFICE MANAGER  
THOMAS A. FEE  
PROJECT PLANNER

X-13

GEORGE R. ARIYOSHI  
GOVERNOR



State of Hawaii  
DEPARTMENT OF AGRICULTURE  
1428 So. King Street  
Honolulu, Hawaii 96814-2512  
April 17, 1986

JACK K. SUWA  
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON  
DEPUTY TO THE CHAIRPERSON

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

Mr. Thomas A. Fee  
April 17, 1986  
Page -2-

The EIS should describe the soils found on the project area. This description consists of the Soil Conservation Service Soil Survey, Land Study Bureau overall productivity ratings and the Agricultural Lands of Importance to the State of Hawaii (ALISH) system.

Thank you for the opportunity to comment.

Sincerely,

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

Mr. Thomas A. Fee, Project Planner  
Helber, Hastert, Van Horn & Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

RECEIVED

APR 22 1986

HELBER, HASTERT VAN HORN  
& KIMURA

Dear Mr. Fee:

Subject: Environmental Impact Statement Preparation  
Notica (EISPN) for Kohanaiki Resort  
Community, North Kona, Hawaii  
TMK: 7-3-09: 03 & 16

Attachment

cc: OEQC

This is in response to your letter of April 8, 1986, requesting our comments on the subject EISPN.

According to the EISPN, the applicant seeks to construct an integrated resort with residential housing.

The proposed project is the subject of a State land use district boundary amendment petition (State Land Use Commission Docket No. A86-599; see attached comments of April 3, 1986).

Our analysis of the information provided in the EISPN indicates no direct adverse impacts upon the agricultural resources of the area should the proposed project be developed. The proposed project will require .925 million gallons per day (MGD) of potable water to be supplied via the municipal system (EISPN, page 3). An on-site private sewage treatment plant (STP) will provide treated wastewater for irrigation of the golf course and other landscaped areas. The EIS should include the expected irrigation water requirements. If the irrigation requirements are greater than the wastewater supplied by the STP, then the source(s) to meet the remaining water needs must be identified.

X-14

Mr. Kent M. Keith  
April 3, 1986  
Page -2-

April 3, 1986

VIIIs which indicates severe limitations due to stoniness. Other references to the Land Study Bureau's Detailed Land Classification for the island of Hawaii and the Agricultural Lands of Importance to the State of Hawaii (ALISH) system are correct.

Thank you for the opportunity to comment.

MEMORANDUM

To: Mr. Kent M. Keith, Director  
Department of Planning and Economic Development

Subject: Petition for an Amendment to the State Land  
Use District Boundaries  
A86-599 (Kona Beach Development Venture)  
Resort Community  
Conservation to Urban  
TMK: 7-3-09: 3, 16  
Kohanaiki, North Kona, Hawaii  
Acres: 470.13

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

According to the Petition, the applicant seeks to construct an integrated resort with approximately 1,850 transient and permanent housing units.

Our analysis of the information provided in the Petition indicates no direct adverse impacts upon the agricultural resources of the area should the proposed project be developed. However, the Petition states that the proposed project will require .925 million gallons per day (MGD) of potable water (Petition, page 41). This figure appears to exclude irrigation water. The Petition indicates that Hawaii County's North Kona System may be at its source and transmission capacity (8.4 MGD) (Petition, page 16). If this is the case, then alternative sources and/or transmission facilities to meet the projects needs should be identified.

The references to the Soil Conservation Service Soil Survey for the island of Hawaii are correct but incomplete. The southeast corner of the subject property is composed of Punaluu extremely rocky peat (rPYD) with 6 to 20 percent slopes which is used for pasture. The crop capability rating for rPYD soil is

*Jack K. Suwa*

JACK K. SUWA  
Chairman, Board of Agriculture

cc: Hawaii County Planning Department

23 April 1986

Mr. Jack K. Suwa  
Chairman, Board of Agriculture  
Department of Agriculture  
P. O. Box 22159  
Honolulu, Hawaii 96822-0159

**Draft Environmental Impact Statement:  
Kohanaiki Resort Community  
North Kona, Hawaii  
TMK 7-3-09:03 & 16**

Dear Mr. Suwa:

Thank you for your letter of 17 April 1986 providing comments on the EISPN for the Kohanaiki Resort. Our comments to your letter are as follows:

**1. Water requirements.**

Our estimate of the potable water requirement for the fully developed project, 0.925 MGD, was based upon a planning standard of 500 gallons per day per housing unit (1,850 units x 500 GD). Engineering studies now underway will refine this estimate as well as determine the waste water and irrigation water requirements for the entire resort. The results of these studies will be presented in the DEIS and should provide more detailed information on: 1) the sources of, and overall demand for, potable and irrigation water; and, 2) the type of waste water treatment system to be utilized and associated volumes of waste water to be disposed of.

As a point of clarification, at this time no potable water commitments have been secured from the Hawaii County Board of Water Supply. As noted in the Environmental Assessment prepared for the Kohanaiki Resort (Helber, Haster Van Horn & Kimura, Planners, General Planning and Environmental Considerations: Kohanaiki Resort Community, January 1986), the Kona area is graced with vast groundwater resources. The primary water problem facing the Kona community today is related not to water scarcity but rather to source development and the distribution of the groundwater resource. Our engineering consultants are now in the process of assessing the water situation and will be meeting with County officials to discuss mutually beneficial means for the provision of potable water to the site. The results of their investigation will be presented in the DEIS.

**2. Soils.**

Your comments concerning the need to present a full description of the soil conditions within the project are noted and will be incorporated into the DEIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Thomas A. Fee  
Project Planner

Encl.

X-16

Vertical strip of text on the left margin, mostly illegible due to heavy noise and scanning artifacts. Some legible fragments include: "HAWAII COUNTY BOARD OF WATER SUPPLY", "EISPN", "GENERAL PLANNING AND ENVIRONMENTAL CONSIDERATIONS: KOHANAIKI RESORT COMMUNITY", "JANUARY 1986", "KONA AREA", "GROUNDWATER RESOURCES", "WATER SCARCITY", "SOURCE DEVELOPMENT", "DISTRIBUTION OF THE GROUNDWATER RESOURCE", "ENGINEERING CONSULTANTS", "MEETING WITH COUNTY OFFICIALS", "MUTUALLY BENEFICIAL MEANS", "PROVISION OF POTABLE WATER", "RESULTS OF THEIR INVESTIGATION", "PRESENTED IN THE DEIS".

GEORGE H. ARIYOSHI  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF EDUCATION  
P. O. BOX 2360  
HONOLULU, HAWAII 96804

FRANCIS M. HATANAKA  
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

April 24, 1986

RECEIVED

MAY 1 1986

WELDER, MASTERT, VAN HORN  
& KIMURA PLANNERS

Mr. Thomas A. Fee  
Project Planner  
HHVH&K  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Dear Mr. Fee:

SUBJECT: Environmental Impact Statement Preparation Notice: Kohanaiki  
Resort Community, North Kona, Hawaii, TMK: 7-3-09:03 & 16

The proposed Kohanaiki Resort Community in North Kona, Hawaii, is  
expected to generate the following student enrollment:

SCHOOL	GRADE	APPROXIMATE ENROLLMENT
Kealakehe Elem./Int.	K-8	50 - 80
Konawaena High	9-12	15 - 35

The projections are based upon the proposed 1150 single family and  
condominium units.

Both Kealakehe and Konawaena schools are overcrowded and may require  
additional portables for the short term. On the longer range, we may need  
to budget for classroom buildings on both campuses.

Should you have any questions, please contact Mr. Richard Inouye at  
737-4743.

Sincerely,

Francis M. Hatanaka  
Superintendent

FMH:jl

cc V. Honda, OBS  
K. Mizuba, Hawaii Dist.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

14 May 1986

Mr. Francis M. Hatanaka  
Superintendent  
State Department of Education  
P.O. Box 2360  
Honolulu, HI 96804

Draft Environmental Impact Statement:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Mr. Hatanaka:

Thank you for your letter of 24 April 1986 providing comments on the  
EISPN for the Kohanaiki Resort. Your letter provided projections of the  
approximate public school enrollment generated by the proposed resort  
development.

After discussing your comments with Mr. Ed Matsushige of your  
Department, I would like to provide some additional clarification on the  
types of housing to be provided at the Kohanaiki project as they relate to  
the potential demand for public school services.

Using the per unit multipliers obtained from Mr. Mastushige over the phone  
this morning, the following table can be generated using the projected unit  
counts provided in the EISPN:

Housing Type	Units	Approx. Enrollment				Total
		Per Unit		Total		
		K-8	9-12	K-8	9-12	
Support Housing	150	0.25	0.1	38	15	53
Residential	200	0.1	0.05	20	10	30
Resort Condominium	800	0.03	0.01	24	8	32
	<u>1150</u>			<u>82</u>	<u>33</u>	<u>115</u>

The estimated total of 115 new student enrollments corresponds to the high  
range indicated in your letter.

We would like to point out that using Mr. Matsushige's methodology, the  
majority of students are projected to be generated by the 150 support  
housing units. These units are planned to accommodate young and, for the  
most part, single employees of the resort. The units will consist principally  
of studio and one-bedroom, possibly rental apartments. Since this on-site  
support housing is not designed to provide family housing, the potential  
student enrollment projected for this housing type (68 students) is  
overstated.

WALTER  
VAN HORN  
& KIMURA  
PLANNERS  
Groves  
Center  
PRI  
Tower  
733  
Bishop  
Street  
Suite  
2590  
Honolulu  
Hawaii  
96813  
Tel: 737-  
4743  
Fax: 737-  
4743  
Richard H.  
VAN HORN  
ALCP, AIA  
Chris T.  
KIMURA  
ALCP  
Henry L.  
MIZUKAWA  
ALCP  
Thomas A.  
FEE  
ALCP

X-17

Mr. Francis M. Hatanaka  
Page 2

We realize of course that this level of detailed information was not provided in the EISPN and hence not available for your analysis. Please be assured that we will incorporate your concerns into the Draft EIS and will provide a full discussion of potential project-related impacts to the public schools serving the project area.

Sincerely,



Thomas A. Fee  
Project Planner

GEORGE R. ABIYOSHI  
GOVERNOR



FRANCIS M. HATANAKA  
SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

May 28, 1986

Mr. Thomas A. Fee

-2-

May 28, 1986

Kealakehe Elementary, Kealakehe Intermediate, and Konawaena High Schools are at capacity. The budgeting of additional classrooms will be required to accommodate growth at the subject schools.

We would appreciate your keeping us updated on your development schedule.

Should you have any questions, please contact Mr. Richard Inouye at 737-4743.

Sincerely,

Francis M. Hatanaka  
Superintendent

Mr. Thomas A. Fee, Project Planner  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

RECEIVED  
JUN 3 1986

HEIDER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Dear Mr. Fee:

SUBJECT: Kohalaiki Resort Community  
North Kona, Hawaii  
TMK: 7-3-09: 03 & 16

This memo is in response to your letter of May 14, 1986, which necessitated changes to our student enrollment projections of April 24, 1986. Our revised projections are as follows:

SCHOOL	GRADES	APPROXIMATE ENROLLMENT
Kealakehe Elementary	K-5	25 - 45
Kealakehe Intermediate	6-8	10 - 20
Konawaena High	9-12	10 - 20

The projections shown above reflect the following changes:

1. Student generation factors for the 150 support housing units were adjusted downward to studio and one-bedroom level.
2. The projections reflect the opening of a separate intermediate school at Kealakehe this fall in accordance with Hawaii District plans.

FMH:j1

cc OBS  
K. Mizuba, Hawaii Dist.

X-19





DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING 250 SOUTH KING ST. HONOLULU, HAWAII  
MAILING ADDRESS: P.O. BOX 2359 HONOLULU, HAWAII 96804 • TELE: 403250 HIERED

GEORGE R. ARIYOSHI  
GOVERNOR  
KENT M. KEITH  
DIRECTOR  
MURRAY E. POWELL  
DEPUTY DIRECTOR  
LINDA KAPURIAI ROSEHILL  
DEPUTY DIRECTOR

DIVISIONS  
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION  
ENERGY DIVISION  
330 Merchant St., Room 1010 Honolulu, Hawaii 96811  
FOREIGN TRADE ZONE DIVISION  
PORT HONOLULU MARINA DIST. 1  
LAND USE DIVISION  
PLANNING DIVISION  
RESEARCH AND ECONOMIC ANALYSIS DIVISION  
OFFICES  
ADMINISTRATIVE SERVICES OFFICE  
INFORMATION OFFICE

Ref. No. P-3817

April 3, 1986

Helber, Hastert, Van Horn and Kimura, Planners  
Page 2  
April 3, 1986

Helber, Hastert, Van Horn and Kimura, Planners  
Grosvenor Center, PRI Towers  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

RECEIVED  
APR 3 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Dear Sir:

Subject: EIS Preparation Notice, Kohanaiki Resort Community, North Kona, Hawaii

We have reviewed the subject preparation notice and offer the following comments for your consideration and action.

- 1) The General Planning and Environmental Considerations document for the Kohanaiki Resort Community states that the quality of the off-lying waters will not be greatly affected by the development of the proposed project. The draft EIS should address possible methods to be used in developing the 150 boat marina as well as impacts on the surrounding Class AA waters. The draft EIS should also discuss the need for boating facilities in the region and the number of slips in the proposed marina which may be available for public use.
- 2) The proposed development site contains a number of anchialine ponds which could be "significantly altered by the changes in the quality and quantity of water which permeates the site unless care is taken to isolate the ponds from the effects of siltation and runoff." The draft EIS should thoroughly discuss the impacts and mitigative measures to preserve these anchialine ponds.
- 3) The Draft Kona Regional Plan states that the Kona Water system is overcommitted and that given the cost of developing new water sources and integrating them with the water distribution system, it appears that the availability of additional water commitments will be limited for the foreseeable future. The draft EIS should discuss the availability of water for the proposed development as well as the impacts on water commitments for the "significant increase in resident population" and the "significant demand for housing in Kona" likely to occur as a result of developing the proposed project.

- 4) The Hawaii Ocean Science and Technology Park (HOST Park) and the Keahole Airport are in close proximity to the proposed development. The draft EIS should discuss the impacts of a resort development in close relationship to industrial uses and airport facilities.
- 5) The draft EIS should include a discussion of the need for the proposed development relative to future tourism growth, need for hotel/resort condominium units in relation to the existing and proposed supply of units in the Kona region, and the segment of the market that the proposed development will serve.
- 6) There is a cursory discussion on the relationship of the proposed project to the Hawaii State Plan and Functional Plans. This discussion should be expanded in the EIS to address how the proposed development will meet the appropriate objectives, policies and priority guidelines of the Hawaii State Plan, and the policies and implementing actions of the applicable Functional Plans.
- 7) In addition, the draft EIS should list the permits required for the proposed development and a timeframe for development.

With regard to Hawaii's Coastal Zone Management Program, we have the following comments to offer.

Recreational Resources

In comparing the site map entitled "Constraints" with the "Preliminary Land Use Plan" map, the proposed marina appears in the vicinity of an existing beach. The impact of the marina development upon this beach should be discussed further. The project also proposes the development of many ocean uses including boating, waterskiing, windsurfing, and snorkeling. Existing water uses include fishing, surfing and diving. The potential for user conflicts and possible mitigation measures should be discussed. The impact of the project on the State park system should also be discussed.

Historic Resources

The area is rich in historic resources including heiaus, fishponds, and a large collection of settlement remains. The draft EIS should describe those which will be preserved and the provision of public access to these as may be appropriate. The historic Kaloko Fishpond is located on the adjacent property. Possible impacts upon the fishpond should be described, including those impacts which might accrue from the adjacent marina and boating activity and off-site seepage of irrigation water.

X-20

Coastal Ecosystems

The short-term and long-term effects of the proposed marina should be discussed with a description of potential impacts upon endangered marine species such as the humpback whales and sea turtles. The description of impacts upon coastal water quality should include a discussion of runoff and seepage of irrigation water, and possible sedimentation effects due to imported soil cover used for landscaped areas. In view of the number and significance of anchialine ponds in the project area, the effects of development and mitigative measures to avoid, minimize disruption, and protect these ponds should be fully described.

Coastal Hazards

The draft EIS should discuss the effects the marina development may have in increasing the inland extent of the coastal high hazard area, and describe additional mitigative measures as may be necessary.

Thank you for the opportunity to offer comments.

Very truly yours,



Kent M. Keith

cc: Office of Environmental Quality Control  
Kona Beach Development Venture

14 April 1986

Mr. Kent M. Keith, Director  
Department of Planning and Economic Development  
250 South King Street  
Honolulu, Hawaii 96804

Draft Environmental Impact Statement for the  
Proposed Kohanaiki Resort Community  
North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Mr. Keith:

Thank you for your letter of 3 April 1986 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the subject development. We appreciate your in-depth review of the EISPN and the comments and information you have provided. Our comments to your general concerns are as follows:

1. HARBOR RELATED IMPACTS

It is the intent of the applicant, Kona Beach Development Venture, to develop the Kohanaiki Resort in several phases. The first phase will entail the construction of the golf course, hotels, commercial area, and support housing--as indicated in the EISPN. Construction of resort condominiums and single family dwellings will be initiated during this phase and developed to meet market demands. The proposed uses and probable environmental impacts of these developments will be analyzed in the subject draft EIS.

Due to the probable impacts on the shoreline and surrounding areas, the construction of the harbor/marina (and the residential/retail activities associated with it) will require much more detailed studies and a Federal EIS/U.S. Army Corps of Engineers Permit. Planning for the harbor/marina is still at a very conceptual level with preliminary studies now being conducted to determine market and engineering feasibility. The findings of these preliminary investigations will be reported in the subject draft EIS. However, detailed environmental impact analyses of the proposed harbor development, such as many of those identified in your letter, will be reported in a subsequent supplemental EIS filed in conjunction with the Corps of Engineers Permit mentioned above. (See attached letter from the Director, Hawaii County Planning Department to the Chairman, Environmental Quality Commission regarding the Planning Department's position relative to the filing of a subsequent supplemental EIS for the harbor development.)

HELBER  
HASTERT  
VAN HORN  
& KIMURA  
Planners  
**HHV&K**  
Greene  
Center  
P.O.  
Box  
733  
Blanchard  
Street  
Suite  
2500  
Honolulu  
Hawaii  
96813  
Telephone  
(808)  
545-2055  
Telex  
834408  
HHV&K LW  
LARRY E.  
HELBER  
A.S.L.A.  
Mark H.  
HASTERT  
A.L.C.P.  
Richard H.  
VAN HORN  
A.L.C.P. A.L.A.  
Glenn T.  
KIMURA  
A.L.C.P.  
Henry I.  
NISHIKAWA  
A.L.C.P.  
Thomas A.  
FEE  
A.L.C.P.

X-21

Mr. Kent Keith  
14 April 1986  
Page 2



**PLANNING DEPARTMENT**

25 AUPUNI STREET • HILO, HAWAII 96720  
(808) 961-8288

COUNTY OF  
HAWAII

DANTE E. CARPENTER  
Mayor

ALBERT LONG LYMAN  
Director

LILIMA A. PIIANAI  
Deputy Director

**RECEIVED**  
MAR 26 1986  
HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

March 24, 1986

2. ENVIRONMENTAL/SOCIOECONOMIC CONSIDERATIONS

As discussed above, detailed studies are now under way to assess the environmental and socioeconomic impacts of the proposed Kohanaiki Resort. These studies cover the areas of concern identified in your letter, such as water quality (nearshore and anchialine ponds), historic sites, relationships to surrounding land uses, and impacts on recreational resources, coastal ecosystems, coastal hazards, and regional public infrastructural systems and services. Findings from these studies will be incorporated into the draft EIS and will be used to identify the appropriate mitigative strategies needed to assure the protection of the environmentally sensitive elements while providing the type of quality resort the applicant desires to achieve.

3. CONFORMANCE WITH PUBLIC PLANS AND POLICIES

The draft EIS will contain a thorough discussion on the relationship of the proposed project to the Hawaii State Plan and Functional Plans.

We appreciate your interest in the proposed Kohanaiki Resort development and look forward to your comments on the draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Thomas A. Fee  
Project Planner

Encl.

Mr. James Morrow, Chairman  
Environmental Council  
465 South King Street  
Kekuanaoa Building, Room 115  
Honolulu, HI 96813

Dear Mr. Morrow:

Supplemental EIS

With the advise of the staff of the Office of Environmental Quality Control (OEQC), we would like to confirm our understanding of utilizing the Supplemental EIS process.

Specifically, we recently filed a notice of preparation of an EIS which was triggered by the submittal of a General Plan Amendment petition (Kona Beach Development Venture). The applicant proposes the development of a resort/residential community in North Kona. At this first step in the planning process, the plans are still in the conceptual stage. Among other components of the resort, the applicant proposes the construction of a marina.

While it is possible to acknowledge that there will be impacts to the environment, the detailed plans have yet to be prepared, including the specific location of the marina, has not yet been determined. Moreover, these plans will not be prepared until the proposal has reached later stages of the permit process. Thus, the applicant will not be able to describe the potential impacts to the environment in adequate detail in this EIS.

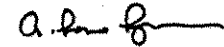
We raised the concerns with staff at OEQC and were advised that when the applicant has prepared more detailed plans for the marina and has filed for the appropriate permit, that a Supplemental EIS may be submitted for the marina.

X-22

Mr. James Morrow  
Page 2  
March 24, 1986

Should this not be the case, please so advise us as soon as possible, as the applicant is now preparing a draft EIS.

Sincerely,



ALBERT LONO LYMAN  
Planning Director

VKG/ALL:lv

xc: OEQC  
Mark Hastert

X-23

3 April 1986

Ms. Kay Yamada  
High Technology Development Corporation  
220 So. King Street, Suite 252  
Honolulu, Hawaii 96813

Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Ms. Yamada:

This letter acknowledges your telephone request to become a consulted party in the preparation of the Kohanaiki Resort EIS.

Pursuant to your request, we are transmitting a copy of the complete EIS Prep Notice prepared for the Kohanaiki project. You will also receive a copy of the Draft EIS when it becomes available. In the meantime, we welcome your comments on the proposed development.

Thank you for your interest in this project. Please let us know if we can be of further assistance.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS



Thomas A. Fee  
Project Planner

Encl.

HELBER  
HASTERT  
VAN HORN  
& KIMURA  
Planners  
**HEM&K**  
General  
Office  
P.O.  
Box  
730  
Bishop  
Street  
Suite  
2500  
Honolulu  
Hawaii  
96813  
Telephone  
(808)  
545-2028  
Telex  
634488  
HEM&K  
LARRY E.  
HELBER  
ALIA  
MARK H.  
HASTERT  
ALIA  
RICHARD H.  
VAN HORN  
ALICP, ALIA  
GLENN  
KIMURA  
HARRY T.  
MORIKAWA  
ALICP  
THOMAS A.  
FEE  
ALICP

GEORGE B. ARIYOSHI  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
888 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813

May 6, 1986

WAYNE J. YAMASAKI  
DIRECTOR

DEPUTY DIRECTORS  
JONATHAN K. SHIMADA, PH.D.  
WALTER T.M. HO  
CHERYL D. SOON  
ADAM D. VINCENT

IN REPLY REFER TO  
STP 8.1320

Mr. Thomas Fee  
Page 2

STP 8.1320

Our contact person is Mr. Dan Tanaka (Phone: 548-6526) should you wish to discuss this matter in greater detail. Thank you for this opportunity to provide comments.

Very truly yours,

Wayne J. Yamasaki  
Director of Transportation

**RECEIVED**

MAY 14 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Mr. Thomas A. Fee, Project Planner  
Helber, Hastert, Van Horn and Kimura  
Grosvenor Center  
PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Dear Mr. Fee:

EIS Preparation Notice  
Kohaniki Resort Community  
North Kona, Hawaii TMK: 7-3-09: 03 and 16

We have reviewed the subject EIS Preparation Notice and offer the following comments.

A traffic impact analysis report should be prepared to determine the development's impact on Queen Kaahumanu Highway and possible mitigation measures that may be required. Also, please verify that the proposed access to the highway is at an authorized location. The access along with intersection details and all plans for work within the State highway right-of-way must be submitted to the Highways Division for review and approval. Further, we have determined that full channelization for turning movements at the intersection will be required.

It should be acknowledged that all intersection improvement costs will be borne by the developer.

Under Section VI, we noted that there was no discussion on aircraft noise exposure and impacts at the project site. Due to its close proximity to the Keahole Airport, a detailed noise analysis and assessment should be done.

X-24

4 June 1986

Mr. Dan Tanaka  
State Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813

Draft Environmental Impact Statement:  
Kohalaiki Resort Community,  
North Kona, Hawaii  
TMK: 7-3-09: 3 & 16

Dear Mr. Tanaka:

Thank you for your letter of 6 May 1986 providing comments on the EISP  
for the Kohalaiki Resort. Our comments are as follows:

1. Vehicular Traffic

- o A traffic impact analysis will be prepared for the proposed project to determine the development's probable impact on the Queen Kaahumanu Highway.
- o The State of Hawaii Right of Way Map (Kailua-Kawaihae Road, Section II, Sheet No. 3) indicates an approved access fronting the proposed resort development.
- o Your comments concerning the channelization for turning movements at the main intersection of the resort and the Queen Kaahumanu Highway are noted. The applicant intends to work closely with DOT Highways Division in the design and construction of these improvements. Detailed plans will be submitted to the Highways Division for review and approval at a later date.

2. Airport

- o Your concerns about the potential aircraft noise exposure and related impacts are noted. An aircraft noise analysis and assessment will be included in the DEIS. We have contacted Mr. Herb Kido (Airports Division) and will keep him informed of our progress.

Thank you for your comments and please do not hesitate to contact us should you have any additional concerns.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

HELBER  
HASTERT  
VAN HORN  
& KIMURA  
Planners

**HHHK**

Governor  
Center

Pfizer  
Tower

733  
Bishop  
Street

Suite  
2590

Honolulu  
Hawaii  
96813

Telephone  
(808)  
545-2065

Telex  
834488  
HHHK LW

Principal

Larry E.  
HELBER

A.S.L.A.

Mark H.  
HASTERT

A.L.C.P.

Richard H.  
VAN HORN

A.L.C.P., A.I.A.

Cherry T.  
KIMURA

Associate

Nancy L.  
NISHIKAWA

A.L.C.P.

Thomas A.  
FEE

A.L.C.P.

RUSSELL S. KOKUBUN  
Councilman



COUNTY COUNCIL

County of Hawaii  
Hawaii County Building  
25 Aupuni Street  
Hilo, Hawaii 96720

**RECEIVED**  
APR 4 1986  
HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

April 2, 1986

Helber, Hastert, Van Horn and Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, HI 96813

The Environmental Impact statement preparation notice for the Kohanaiki Resort Community, North Kona, Hawaii, was recently published in the Office of Environmental Quality Control Bulletin. I would like to request that I be included as a consulted party in the preparation of this EIS.

Thank you.

Russell S. Kokubun  
Councilman

CRB:se

4 April 1986

Mr. Russel S. Kokubun  
Councilman  
City Council, County of Hawaii  
Hawaii County Building  
25 Aupuni Street  
Hilo, Hawaii 96720

Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Councilman Kokubun:

We received your 2 April 1986 letter requesting to be a consulted party in the preparation of the Kohanaiki Resort EIS.

For your information, we are forwarding a copy of the complete EIS Prep Notice prepared for the resort project. You will also receive a copy of the Draft EIS when it becomes available. In the meantime, we welcome your comments and concerns on the proposed development.

Thank you for your interest in this project. Please let us know if we can be of further assistance.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Thomas A. Fee  
Project Planner

Encl.

RECEIVED  
APR 4 1986  
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS  
Grosvenor Center  
PRI Tower  
733 Bishop Street  
Honolulu, HI 96813  
Tel: 808-534-6000  
Fax: 808-534-6000  
Name: Russell S. Kokubun  
Address: 25 Aupuni Street  
Hilo, HI 96720  
Phone: 808-935-2100  
City: Hilo  
State: HI  
Zip: 96720  
Name: Thomas A. Fee  
Address: 25 Aupuni Street  
Hilo, HI 96720  
Phone: 808-935-2100  
City: Hilo  
State: HI  
Zip: 96720

X-26

Dante K. Carpenter  
Mayor

Eugene N. Tiwanak  
Managing Director



Patricia G. Engelhard  
Director

Ronald Okamura  
Deputy Director

DEPARTMENT OF PARKS & RECREATION  
COUNTY OF HAWAII

**RECEIVED**  
APR 18 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

April 16, 1986

Mr. Thomas A. Fee, Project Planner  
Helber, Hastert, Van Horn & Kimura  
Grosvenor Center  
733 Bishop Street, Suite 2590  
Honolulu, HI 96813

Dear Mr. Fee:

Thank you for your letter asking for our comments on the EIS Preparation Notice for Kohanaiki Resort. We do not receive the OEQC bulletin and were not, therefore, aware of the need to respond.

We note with approval that self-contained resort/residential developments have, as a general rule, provided adequate recreational facilities for their permanent residents and visitors. Our concern, of course, is that our present recreational facilities in North Kona are inadequate. Although we have plans for improving them, those plans would probably take eight to ten years for development.

Shoreline access is a problem which is foremost in our minds for all new developments. We need to insure that island residents are able to have rights-of-way to beach areas.

Anchialine ponds, archaeological sites, and public access should be further explored and expanded upon in the EIS report.

Thank you for the opportunity to review your document.

Sincerely,

Patricia Engelhard  
Director

PE:ai

21 April 1986

Ms. Patricia G. Engelhard  
Director  
Department of Parks and Recreation  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

Environmental Impact Statement Preparation Notice:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Ms. Engelhard:

Thank you for your letter of 16 April 1986 reviewing the Environmental Impact Statement Preparation Notice for the Kohanaiki Resort project.

We will be contacting you shortly to discuss your concerns about public recreational facilities and shoreline access in the North Kona area.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

*Thomas A. Fee*  
Thomas A. Fee  
Project Planner

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS  
MHSK  
Grosvenor Center  
PN  
Tower  
733 Bishop Street  
Hilo, HI 96720  
Telephone (808) 545-2000  
Telex 444400  
FAX 444400  
LARRY E. HELBER  
AICP  
MARK H. HASTERT  
AICP  
RICHARD H. VAN HORN  
AICP, AIA  
RONALD T. OKAMURA  
AICP  
NANCY L. NISHIKAWA  
AICP  
THOMAS A. FEE  
AICP

X-27





DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

25 AUPUNI STREET • HILO HAWAII 96720

April 16, 1986

Mr. Thomas A. Fee  
Project Planner  
Helber, Hastert, Van Horn & Kimura  
2222 Kalakaua Avenue, Suite 1507  
Honolulu, HI 96815

KONA BEACH DEVELOPMENT VENTURE, L.P.  
STATE LAND USE BOUNDARY AMENDMENT (A86-599)  
CONSERVATION TO URBAN  
TAX MAP KEY 7-3-09:3 AND 16

Based on the prevailing water situation in the area, water is not available for the proposed development. Additional source and transmission facilities are required to be constructed.

H. William Sewake  
Manager

QA

RECEIVED  
APR 21 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

... Water brings progress...

21 April 1986

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

Environmental Impact Statement:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Sewake:

Thank you for your letter of 16 April 1986 in reference to the State Land Use Boundary Amendment Petition for the proposed Kohanaiki Resort Community.

As you may be aware, we have initiated an application to amend the Hawaii County General Plan. As part of the application process, it is necessary for us to prepare an EIS for the project. The Accepting Agency for this EIS is the Hawaii County Planning Department. When formally accepted by the Planning Department, the EIS is also intended to satisfy the requirements of the State Land Use Commission in subsequent State Land Use Boundary Amendment proceedings. Therefore, your concerns regarding lack of potable water in the area will be addressed as part of the EIS review process.

We and/or our engineering consultants will be contacting your agency shortly to gain more information on the prevailing water situation in the North Kona area and to discuss alternative means for the provision of potable water to the proposed development. This information will then be incorporated into the draft EIS which we are now in the process of preparing.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Thomas A. Fee  
Project Planner

H-H-H-K

Richard H. Van Horn  
AICP, AIA  
Doris T. Kimura  
Nancy L. Nishikawa  
AICP  
Thomas A. Fee  
AICP

X-28

DANTE K. CARPENTER  
MAYOR

**HAWAII COUNTY FIRE DEPARTMENT**

466 KINOOLE STREET, HAWAII 96720  
PHONE: 936-2978



FRANCIS E. SMITH  
FIRE CHIEF

DON COLOMA  
DEPUTY FIRE CHIEF

April 14, 1986

Mr. Thomas A. Fee, Project Planner  
Helber, Hastert, Van Horn & Kimura, Planners  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Dear Mr. Fee:

Subject: Environmental Impact Statement Preparation Notice:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK: 7-3-09:03 & 16

No objections to proposed development provided all water requirements and fire or building codes are met.

Because of excessive fire response times from the Kailua Fire Station to the project site, I recommend that sprinkler fire systems be installed in both commercial and residential structures.

Very truly yours,

*Francis E. Smith*  
FRANCIS E. SMITH  
FIRE CHIEF

FES/mo

**RECEIVED**

APR 15 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

16 April 1986

Mr. Francis E. Smith  
Fire Chief  
Hawaii County Fire Department  
466 Kinoole Street  
Hilo, Hawaii 96720

Environmental Impact Statement Preparation Notice:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Smith:

Thank you for your letter of 14 April 1986 reviewing the Environmental Impact Statement Preparation Notice for the Kohanaiki Resort project.

Your comments regarding the excessive response times from the Kailua Fire Station to the project site and your recommendations regarding the installation of sprinkler fire systems in both commercial and residential structures have been noted and will be addressed in the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

*Thomas A. Fee*  
Thomas A. Fee  
Project Planner

X-29



POLICE DEPARTMENT

COUNTY OF HAWAII  
349 KAPIOLANI STREET  
HILO, HAWAII 96720

OUR REFERENCE

YOUR REFERENCE

April 23, 1986



GUY A. PAUL  
CHIEF OF POLICE  
WAYNE G. CARVALHO  
DEPUTY CHIEF



OUR REFERENCE

YOUR REFERENCE

March 18, 1986

POLICE DEPARTMENT

COUNTY OF HAWAII  
349 KAPIOLANI STREET  
HILO, HAWAII 96720



GUY A. PAUL  
CHIEF OF POLICE

WAYNE G. CARVALHO  
DEPUTY CHIEF

RECEIVED

APR 24 1986

HELDNER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Mr. Thomas A. Fee, Project Planner  
Helber, Hastert, Van Horn & Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, HI 96813

Re: Environmental Impact Statement Preparation Notice  
Kohalaiki Resort Community, North Kona, Hawaii  
Tax Map Key 7-3-09:03 & 16

This is to acknowledge your letter of April 8, 1986, regarding the  
above subject. Captain Henry Silva of the Kona district may be  
contacted at 32J-3147 to discuss our concerns in greater detail.

We are also enclosing our comments of March 18, 1986, to the  
Planning Director.

Thank you for allowing us to provide input on this project.

GUY A. PAUL  
CHIEF OF POLICE

*Wayne G. Carvalho*  
WAYNE G. CARVALHO  
DEPUTY CHIEF OF POLICE

Enc.  
WGC:gs

cc: Captain Silva

TO : ALBERT L. LYMAN, PLANNING DIRECTOR  
FROM : GUY A. PAUL, CHIEF OF POLICE  
SUBJECT: STATE LAND USE BOUNDARY AMENDMENT (A86-599)  
KONA BEACH DEVELOPMENT VENTURE, L.P.  
TMK: 7-3-09:3 AND 16

This application has been reviewed and from the police  
standpoint, we foresee no adverse effect from the  
requested land use.

We trust that you will consider whether the projected  
volume of traffic from this development would warrant  
channelization of the Queen Kaahumanu Highway at its  
intersection with the access road.

*Guy A. Paul*  
GUY A. PAUL  
CHIEF OF POLICE

GAP/sf

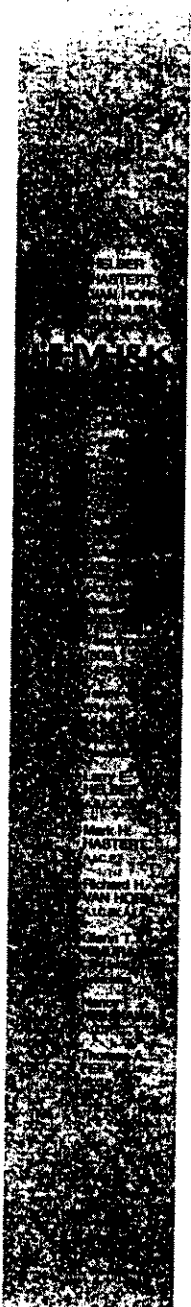
cc: Kona Police ✓

*Edm*

FILE

X-30

X-31



25 April 1986

Mr. Wayne G. Carvalho  
Deputy Chief of Police  
Police Department  
County of Hawaii  
349 Kapiolani Street  
Hilo, Hawaii 96720

**Draft Environmental Impact Statement:  
Kohalaiki Resort Community,  
North Kona, Hawaii  
TMK 7-3-09: 3 & 16**

Dear Mr. Carvalho:

Thank you for your letter of 23 April 1986 providing comments on the EISPN for the Kohalaiki Resort.

At your suggestion, we will be contacting Captain Henry Silva of the Kona District to discuss the project in greater detail.

Sincerely,

HELBERT, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

CUST  
H-W/G



June 16, 1986

Helber, Hastert, Van Horn & Kimura, Planners  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Attention: Mr. Thomas A. Fee

Gentlemen:

Subject: Environmental Impact Statement Preparation Notice:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK: 7-3-09:03 & 16

We have reviewed the above project and have the following comments regarding the electrical requirements:

It appears that if this development should occur in its entirety, a substantial load will be added to the HELCO system; however, we do not have any electrical facilities within the area except for a 69KV transmission line along Queen Kaahumanu Highway. A transmission line extension, substation and 12.47KV distribution system will be required to service the area. Since design and equipment delivery take longer than a year, the developer should submit firm plans to HELCO as soon as possible.

If there are any questions on this, please call Melvin Yamaki at 969-0323.

Very truly yours,

*Clyde H. Nagata*  
Clyde H. Nagata  
Sr. Electrical Engineer  
Planning Division

CHN:MSY:ts

cc: Dennis H. Tanigawa

RECEIVED

JUN 18 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

30 June 1986

Mr. Clyde H. Nagata  
Sr. Electrical Engineer  
Planning Division  
Hawaii Electric Light Company, Inc.  
P.O. Box 1027  
Hilo, Hawaii 96721-1027

Draft Environmental Impact Statement:  
Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Nagata:

Thank you for your letter of 16 June 1986 reviewing the Environmental Impact Statement Preparation Notice for the Kohanaiki Resort project.

Your comments regarding electrical transmission and distribution will be incorporated into the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Thomas A. Fee  
Project Planner

X-32

Helber, Hasterdt, Van Horn and Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, suite 2590  
Honolulu, HI 96813

March 30, 1986

Dear Sirs:

I write with regard to the proposed Kohanaiki Resort in the district of North Kona. The County of Hawaii has issued an EIS prep notice, and I would like to be a consulted party in the EIS preparation.

My residence is in North Kohala, my phone is 887-5957.

Thank you,

*Bill Graham*

Bill Graham  
P.O. Box 155  
Hawi, HI 96719

**RECEIVED**  
APR 1 1986  
HELBER, HASTERDT, VAN HORN  
& KIMURA PLANNERS

1 April 1986

Mr. Bill Graham  
P.O. Box 155  
Hawi, Hawaii 96719

Kohanaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

Dear Mr. Graham:

We received your letter requesting to be a consulted party in the preparation of the Kohanaiki Resort EIS.

For your information, we are forwarding a copy of the complete EIS Prep Notice prepared for the Kohanaiki project. You will also receive a copy of the Draft EIS when it becomes available. In the meantime, we welcome your comments on the proposed development.

Thank you for your interest in this project. Please let us know if we can be of further assistance.

Sincerely,

HELBER, HASTERDT, VAN HORN & KIMURA, PLANNERS

*Thomas A. Fee*

Thomas A. Fee  
Project Planner

Encl.

HELBER, HASTERDT, VAN HORN & KIMURA, PLANNERS  
P.O. Box 155  
HAWAII, HI 96719  
Tel: 808-833-1111  
Fax: 808-833-1112  
Telex: 808-833-1111  
E-mail: helber@hawaii.net  
www.helber.com

31 March 1986

Mr. Reed Flickenger  
West Hawaii Today  
P.O. Box 789  
Kailua Kona, Hawaii 96745

Kohalaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16

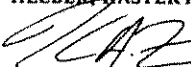
Dear Mr. Flickenger:

Per your telephone request on 28 March, we are forwarding a copy of the EIS Prep Notice prepared for the Kohalaiki project.

We will also be forwarding copies of the Draft and Final EIS to your attention as they become available. Thank you for your interest in this project.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

31 March 1986

Mr. Gary Okamoto  
Wilson Okamoto & Associates  
1150 So. King Street, Suite 800  
Honolulu, Hawaii 96814

Kohalaiki Resort Community, North Kona, Hawaii  
TMK 7-3-09:03 & 16


Dear Mr. Okamoto:

Per your telephone request, we are forwarding a copy of the EIS Prep Notice prepared for the Kohalaiki project.

Thank you for your interest in this project. Please let us know if we can be of further assistance.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

X-34

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS  
HEM&K  
Grossman  
Center  
P.O.  
Towers  
23  
Street  
Suite  
2500  
Honolulu  
96813  
Telephone  
(808)  
545-2055  
Telex  
534408  
HEM&K  
LARRY E.  
HELBER  
A.I.C.P.  
Mark H.  
HASTERT  
A.I.C.P.  
Richard H.  
VAN HORN  
A.I.C.P., A.L.A.  
GARY T.  
KIMURA  
A.I.C.P.  
THOMAS A.  
FEE  
A.I.C.P.

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS  
HEM&K  
Grossman  
Center  
P.O.  
Towers  
23  
Street  
Suite  
2500  
Honolulu  
96813  
Telephone  
(808)  
545-2055  
Telex  
534408  
HEM&K  
LARRY E.  
HELBER  
A.I.C.P.  
Mark H.  
HASTERT  
A.I.C.P.  
Richard H.  
VAN HORN  
A.I.C.P., A.L.A.  
GARY T.  
KIMURA  
A.I.C.P.  
THOMAS A.  
FEE  
A.I.C.P.

CHAPTER XI

K

O

H

A

N

A

I

K

I



## CHAPTER XI

### REFERENCES

- Adams, W.M., F.L. Peterson, S.P. Mathur, L.K. Leplay, C. Warren, and R.D. Huber. A Hydrogeophysical Survey from Kawaihae to Kailua-Kona. Technical Report Number 32, Water Resources Research Center, University of Hawaii. 1969.
- Anderson, Robert N., Gary R. Vieth, Benjamin J. Seidenstein, and Blaine Bradshaw. Kauai Socioeconomic Profile. University of Hawaii, Center for Non-Metropolitan Planning and Development. Honolulu. May 1975.
- Belt, Collins and Associates. Kaupulehu Resort, Draft Environmental Impact Statement. Prepared for Kaupulehu Developments. Honolulu. 1986
- \_\_\_\_\_. Revised Master Plan for Mauna Lani Resort, South Kohala, Hawaii. Draft Environmental Impact Statement. Prepared for Mauna Lani Resort, Inc. Honolulu. May 1985.
- \_\_\_\_\_. Environmental Assessment for the Proposed Hapuna Beach Resort, South Kohala, Hawaii. Honolulu. July 1984.
- \_\_\_\_\_. Mahukona Resort Environmental Impact Statement. Prepared for Mahukona Properties, Inc. Honolulu. September 1981.
- \_\_\_\_\_. Environmental Impact Assessment for Kona Industrial Subdivision Expansion and Commercial Development. Honolulu. December 1979.
- Blumenstock, D.I. Climates of the States, Hawaii. Environmental Science Services Administration. U.S. Department of Commerce. Washington D. C. 1961.
- Bretschneider, Charles L. and Gerritsen, Frans. Ocean Engineering Environment and Hydraulic Characteristics of a Proposed Small Craft Harbor for Kohanaiki, Hawaii. June 1970.
- Char and Associates. Botanical and Terrestrial Faunal Survey. June 1986.
- Chow, Warren. Kona Police Station. Personal Communication. June 25, 1985.
- Clark, Stephan D. An Archaeological Reconnaissance of the Natural Energy Laboratory of Hawaii Property, Ke-ahole Point, North Kona. Ms. 110784, Department of Anthropology, Bernice P. Bishop Museum. Honolulu. 1984.
- Cordy, Ross. State of Hawaii, Department of Land and Natural Resources, Division of State Parks and Historic Sites. Personal Communications, June 28, 1985.
- County of Hawaii Department of Public Works. Solid Waste Management Plan for the County of Hawaii. Hilo. August 1981.
- County of Hawaii. Annual Report. Hilo. 1983.

- County of Hawaii Department of Planning. Hawaii County General Plan (Preliminary Draft; Text Exclusive of Land Use Pattern Allocation and Facilities Maps). May 1986.
- \_\_\_\_\_. Draft Kona Regional Plan Final Recommended Changes. Hilo. May 1984.
- \_\_\_\_\_. Draft Kona Regional Plan Revisions. Hilo. November 1983.
- \_\_\_\_\_. Kona Regional Plan (Draft). Hilo. July 1982.
- \_\_\_\_\_. Kona Village Design Plan. Hilo. 1977.
- \_\_\_\_\_. General Plan County of Hawaii. Hilo. September 1971.
- County of Hawaii Department of Water Supply. 1981-1982 Annual Report. Hilo. 1982.
- County of Hawaii Department of Water Supply. Water Master Plan: Island of Hawaii. Hilo. December 1980.
- Edward K. Noda & Associates. Oceanographic Environment and Conceptual Feasibility Evaluation for Kohanaiki. May 1986.
- Glasstone, Samuel. Energy Desk Book. U.S. Department of Energy Technical Information Center. Tennessee. June 1982.
- Gordon Bricken and Associates. Aircraft Noise Exposure Analysis. June 1986.
- The Hallstrom Appraisal Group. Public Economic Benefit Analysis. June 1986.
- \_\_\_\_\_. Marina Market Study. May 1986.
- \_\_\_\_\_. Market Study and Highest and Best Use Analysis. July 1985.
- Harris, Kerr, Forster & Company. Report on Study of Potential market Demand and Statement of Estimated Operating Results of a Prototype Hotel: Kohanaiki Resort Development, Kailua-Kona, Hawaii. October 1970.
- Helber, Hastert, Van Horn and Kimura, Planners. Hawaii Ocean Science & Technology Park: Marketing and Feasibility Studies. Prepared for the State of Hawaii High Technology Development Corporation. Honolulu. January 1985.
- Highway Research Board. Highway Capacity Manual: Special Report 87 of the Highway Research Board. Washington D.C. 1965.
- Hydrophysics Corporation. Report on Phase I Study to Locate Low Level Water Development Sites At Kohanaiki, Hawaii. 1970.
- Institute of Traffic Engineers. Traffic Generation. 3rd Edition. Washington D.C. 1983.

- Jourdane, Elaine. Archaeological Reconnaissance Survey of NELH Proposed Facilities Areas at Keahole Point, North Kona. Ms. 061378, Department of Anthropology, Bernice P. Bishop Museum. Honolulu. 1978.
- Kay, E.A., L.S. Lau, E.D. Stroup, S.J. Dollar, D.P. Follows and R.H.F. Young. 1977 Hydrologic and Ecologic Inventories of the Coastal Waters of West Hawaii. Technical Report Number 105, Water Resources Research Center, University of Hawaii. 1977.
- M & E Pacific, Inc. Preliminary Engineering Utilities Report. June 1986.
- \_\_\_\_\_. Revised Environmental Impact Statement for the Ke-Ahole Agricultural Park. Prepared for the State of Hawaii, Department of Agriculture. Honolulu. 1977.
- Macdonald, G.A., and A.T. Abbott. Volcanoes in the Sea. University Press of Hawaii. Honolulu. 1977.
- Maciolek, John A. and Richard E. Brock. Aquatic Survey of the Kona Coast Ponds, Hawaii Island. Sea Grant Advisory Report, UNIHI-SEAGRANT- AR-74-04. April 1974.
- Marine Advisors, Inc. A Shoreline Inspection from Kaloko Fishpond Two Miles Northward for Beach Use Potential, Kona, Hawaii. Prepared for Huehue Ranch. December 1968.
- McGrath, Mr. Assistant Administrator, Hawaii County-State Hospital. Personal Communication. April 17, 1985.
- Mogi, Hitoshi. Kohanaiki Resort Project, Kohanaiki, North Kona, Hawaii. Honolulu. 1970.
- Mullineaux, Donal R. and Donald W Peterson. Volcanic Hazards on the Island of Hawaii. Prepared for the United States Geological Survey, Open-file report 74-239. 1974.
- OI Consultants, Inc. Near-Shore Marine Environment and Anchialine Pond Resource Impact Analysis. June 1986.
- Okahara/Shigeoka and Associates. Municipal Solid Waste Generation and Transportation Cost Study for the County of Hawaii. May 1984.
- Okamoto, Wallace. Facilities Branch, State of Hawaii Department of Education. Personal Communication. April 18, 1985.
- Paul H. Rosendahl, Ph.D., Inc. Full Archaeological Reconnaissance Survey. May 1986.
- Peat, Marwick, Mitchell & Co. Honolulu International Airport and Environs Master Plan. June 1981.

- Phillips, Brandt, Reddick & Associates (Hawaii) Inc. Kukio Beach Resort Final Environmental Impact Statement. Honolulu. May 1986.
- Pukui, Mary Kawena, and Samuel H. Elbert. Hawaiian Dictionary. University of Hawaii Press. 1977.
- Pukui, Mary Kawena, etal. Place Names of Hawaii. University of Hawaii Press. 1984.
- R. M. Towill Corporation. Environmental Impact Statement for the Natural Energy Laboratory of Hawaii at Ke-Ahole Point, Hawaii. Prepared for the Research Corporation of the University of Hawaii. Honolulu. December 1976.
- Rosendahl, Paul H. and Patrick V. Kirch. 1975 Archaeological Reconnaissance Survey of the Natural Energy Laboratory of Hawaii at Keahole Point, South Kona, Rep. 111775. Department of Anthropology, Bernice P. Bishop Museum. Honolulu. 1975.
- Sato, H.H., W. Ikeda, R. Paeth, R. Smythe and M. Takehiro, Jr. Soil Survey of the Island of Hawaii, State of Hawaii. U.S. Government Printing Office, Washington D.C. 1973.
- Silva, Captain Henry. Kona Police Station. Personal Communication. June 30, 1986.
- State of Hawaii Department of Health. Water Quality Management Plan for the County of Hawaii. Honolulu. December 1980.
- State of Hawaii Department of Labor and Industrial Relations. Labor Force Data Book. Honolulu. Updated 1984.
- State of Hawaii Department of Land and Natural Resources. Title 13, Chapter 2, Administrative Rules. Honolulu. 1981.
- State of Hawaii Department of Planning and Economic Development. Hawaii State Plan (Section 226 HRS as amended). Honolulu. n.d.
- State of Hawaii Department of Planning and Economic Development. State of Hawaii Data Book 1985. Honolulu. 1985.
- State of Hawaii Department of Planning and Economic Development. Economic Development on the Island of Hawaii: Issues and Options. Honolulu. August 1984.
- State of Hawaii Department of Transportation, Airports Division. Aircraft Operations, Keahole Airport. FY 1985. n.d.
- Stearns, H.T. and G.A. MacDonald. Geology and Groundwater Resources of the Island of Hawaii. Bulletin 9, Hawaii Division of Hydrology. Territory of Hawaii. 1946.

- Tune, Jerry. "Overview of Changes at Kohala." Honolulu Star Bulletin. Honolulu. March 10, 1985.
- U.S. Department of Commerce, Bureau of the Census. 1980 Census of Population and Housing: General Social and Economic Characteristics - Hawaii (Selected Areas). U.S. Government Printing Office. Washington D.C. June 1983.
- U.S. Department of the Interior, National Parks Service. Proposed Kaloko Honokohau National Cultural Park/Hawaii. Draft Environmental Impact Statement. March 1975.
- \_\_\_\_\_. The Spirit of Kaloko-Honokohau. The Honokohau Advisory Committee, National Parks Service. May 1974.
- U.S. Department of Transportation, Federal Aviation Administration. Federal Aviation Regulations: Part 150, Airport Noise Compatibility Planning. Washington D.C. January 1981.
- \_\_\_\_\_. Noise Control and Compatibility Planning for Airports. Advisory Circular AC 150/5020-1. Washington D.C. August 1983.
- University of Hawaii, Department of Geography. Atlas of Hawaii. University of Hawaii Press. Honolulu. 1984.
- Wilson Okamoto & Associates. Final Environmental Impact Statement Kaloko Light Industrial Subdivision, Kaloko, North Kona, Hawaii. Prepared for Takemasa International, Inc. Honolulu. July 1981.

CHAPTER XII

K

O

H

A

N

A

I

K

I

## CHAPTER XII

### **CONSULTED PARTIES AND THOSE WHO PARTICIPATED IN THE PREPARATION OF THE FEIS**

#### **12.1 CONSULTED PARTIES**

The agencies, organizations, and individuals listed below were sent copies of the DEIS with a request for their comments on the project. Those believed to have an interest in the project or who requested consulted party status were mailed a copy of the report. Written comments from these agencies and responses to these comments are reproduced on the following pages.

"\*" indicated agencies or individuals who sent a written response to the DEIS.

"^" indicated agencies or individuals who sent substantive written comments requiring written response.

#### Federal Agencies

- U.S. Army-DAFE (Facilities Eng.-USASCH)
- \*^ Federal Aviation Administration
- \*^ National Park Service
- \* U.S. Department of the Navy
- \* U.S. Soil Conservation Service
- \*^ U.S. Army Corps of Engineers
- U.S. Coast Guard
- \*^ U.S. Fish and Wildlife Service
- U.S. Geological Survey

#### State Agencies

- High Technology Development Corp.
- \*^ Office of Environmental Quality Control
- Department of Agriculture
- \*^ Department of Accounting and General Services
- \* Department of Defense
- Department of Education
- \*^ Department of Health
- \*^ Department of Land and Natural Resources
- DLNR State Historic Preservation Officer
- \*^ Department of Planning and Economic Development (DPED)
- DPED Library
- Department of Social Services and Housing
- \*^ Hawaii Housing Authority
- \*^ Department of Transportation
- State Archives
- State Energy Office
- \* State Land Use Commission

University of Hawaii

- \*^ Environmental Center
- Marine Programs
- \*^ Water Resources Research Center

County of Hawaii

- \*^ Planning Department
- \*^ Department of Parks and Recreation
- \*^ Department of Public Works
- Department of Research and Development
- \*^ Department of Water Supply
- University of Hawaii - Hilo Campus Library
- Honorable Russell S. Kokubun-County Council

Non-governmental agencies

Hawaii Electric & Light Co., Inc.  
American Lung Association  
Office of Hawaiian Affairs

Newspapers

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

Libraries

U.H. Hamilton Library, Hawn. Collection  
Legislative Reference Bureau  
State Main Library

Regionals

Kaimuki Regional Library  
Kaneohe Regional Library  
Pearl City Regional Library  
Hilo Regional Library  
Wailuku Regional Library  
Lihue Regional Library

Hawaii

Holualoa Library  
Kailua-Kona Library  
Thelma Parker Memorial Library  
Waimea Area Library





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

REPLY TO  
ATTENTION OF:

July 30, 1986

RECEIVED  
AUG 12 1988

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Mr. Albert Lono Lyman  
Director, County of Hawaii  
Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

Dear Mr. Lyman:

Thank you for the opportunity to review and comment on the EIS for Kohana-iki Resort Community. The following comments are offered:

- a. As stated on page I-7, a Department of the Army permit application is needed.
- b. The flood hazards have been addressed on page IV-17 of the report.

Sincerely,

*Kisuk Cheung*  
Kisuk Cheung  
Chief, Engineering Division

15 August 1986

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

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Cheung:

Thank you for your comments of July 30, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

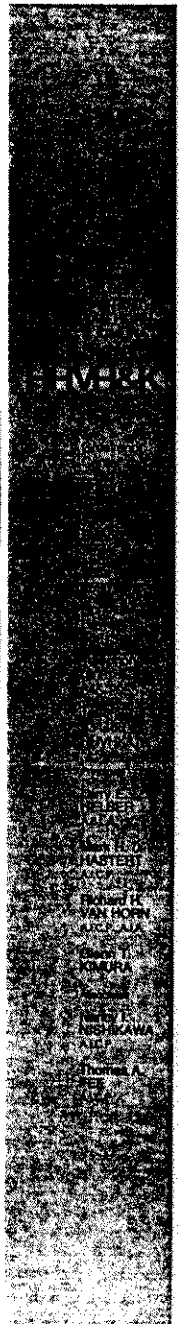
Your comments have been incorporated into the EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

*Thomas A. Fee*  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department



Federal Aviation  
Administration

AIRPORTS DISTRICT OFFICE  
BOX 50244  
HONOLULU, HI 96850-0001  
Telephone: (808)546-7129

July 16, 1986

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

Dear Mr. Lyman:

We have reviewed the Draft Environmental Impact Statement for the Kohana-iki Resort Community dated July 1986. Our only comment concerns the Preliminary Aircraft Noise Contour Study conducted by Gordon Bricken & Associates. We cannot accurately determine the impact due to aircraft noise and request the backup data be submitted for our review.

We also note that the State DOT is currently conducting a noise compatibility study and noise contours will be generated shortly which will depict the current and forecast noise exposure for the surrounding land.

Sincerely,

David J. Welhouse  
Airport Engineer/Planner

Henry A. Sumida  
Airports District Office Manager

6 August 1986

Mr. David J. Welhouse, Airport Engineer/Planner  
Mr. Harry A. Sumida, Airports District Office Manager  
U.S. Department of Transportation  
Federal Aviation Administration  
Airports District Office  
Box 50244  
Honolulu, Hawaii 96850-7129

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Welhouse:

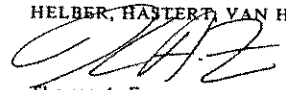
Thank you for your comments of July 16, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

Pursuant to your request for backup data used in the preparation of the Aircraft Noise Contour Study presented in the subject EIS, we are forwarding a copy of the letter sent to Mr. Owen Miyamoto, Airports Administrator, Airports Division, Hawaii State Department of Transportation.

We hope that the comments provided herein address the concerns raised in your letter.

Sincerely,

HELBER, HARTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosure

cc: Hawaii County Planning Department

4 August 1986

Mr. Owen Miyamoto  
Airports Administrator  
Airports Division  
State Department of Transportation  
Honolulu International Airport  
Honolulu, Hawaii 96819

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Miyamoto:


Thank you for your comments of July 15, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

Pursuant to your request, we have asked our accoustical consultant, Gordon Bricken & Associates, to respond to your questions regarding the technical considerations underlying the noise methodology and model assumptions used in preparing the L<sub>dn</sub> contours included in the Draft EIS. Please refer to the attached letter. In the Bricken response, reference is made to airport Runways 1 and 19. These are typical runway number assignments related to the airport noise model and should be used interchangeably with the Keahole Airport Runways 17 and 35 (i.e., Runway 1 = Runway 35; Runway 19 = Runway 17).

We hope that the comments provided herein address the concerns raised in your letter.

Sincerely,

HELBER, HASTERT, VAN HORN &amp; KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosure

cc: Hawaii County Planning Department



**GORDON BRICKEN & ASSOCIATES**  
CONSULTING ACOUSTICAL and ENERGY ENGINEERS

July 29, 1986

RECEIVED

AUG 1 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

MR. THOMAS FEE  
HHVH&K -- PLANNERS  
Grosvenor Center, PRI Tower  
733 Bishop Street, Ste. 2590  
Honolulu, Hawaii, 96813

SUBJECT: RESPONSE ON REQUEST FOR INPUT DATA,  
KEAHOLE NOISE CONTOURS

Dear Mr. Fee:

The majority of the data on the contours is listed on the maps. However, we are happy to repeat it. Keep in mind, all Operations Data is based on material supplied by The Planning Center's office in 1983, which was obtained from the Airport.

The operational assignments are listed in Table 1 (following page). A runway diagram is attached as Exhibit 1. Runways 19L and 19R are treated as one, 1R and 1L are also treated as one.

The model used is a simplified version of the INM program I wrote some years ago to work in an IBM-PC. The noise data, the climb curves, and the thrust conditions are from the INM model. The data is listed in Tables 2, 3, 4, and 5.

TABLE 1

OPERATIONAL DATA

TOTAL OPERATIONS: 74,296 (non-military)

RUNWAY UTILIZATION:

Runway 19: 80% Departures: 20% Landings  
 Runway 1 : 20% Departures: 80% Landings

DATA USE:

CASE	DEPARTURE	LANDING
1. a. Jet Commercial	19B = 100%: 1B = 100%	1B = 100%: 19B = 100%
b. Non-Commercial and Air Taxi	19B = 100%: 1B = 100%	1B = 100%: 19B = 100%
2. a. Jet Commercial	19A = 100%: 1B = 100%	1A = 100%: 19A = 100%
b. Non-commercial and Air Taxi	19B = 100%: 1B = 100%	1B = 100%: 19B = 100%

AIRCRAFT TYPE:

	OPERATIONS	PERCENTAGE
2 Eng. Turbo Fan	20,510	27.6
2 Engine TP (Air Taxi)	31,473	42.4
General Aviation: (1)		
1E	12,718	17.1
2E	9,564	12.9
TOTAL	74,286	100.0

(1) General Aviation split 57% 1E: 43% 2E.

DAY/NIGHT:

100% Day: zero % night all aircraft

TABLE 2

CLIMB CURVES

LANDING

All aircraft 3° glide slope: Touchdown at 100' from end of runway.

TAKE-OFF

	DISTANCE	ALTITUDE (2)
2 Eng. Turbo Fan	zero	zero
	4,255	zero
	4,935	100
	14,459	1,500
	99,000	10,883
2 Engine T.P.	zero	zero
	1,600	zero
	2,033	100
	8,093	1,500
	99,000	19,317
2 Engine General Aviation and 1 Engine General Aviation	zero	zero
	2,600	zero
	3,132	100
	10,578	1,500
	99,000	12,553

(1) Assume stage length -- zero to 500 miles.

(2) Straight-line segments.

TABLE 3

## NOISE CURVES -- DEPARTURE

SLANT RANGES	2 ENGINE TURBO FAN		TURBO PROP 2 ENGINE		GENERAL AVIATION (2) 2 ENGINE
	A/G (1)	G/G	A/G	G/G	A/G AND G/G
100	125	124	109	108	110
125	123	122	107	106	109
158	121	120	105	104	108
199	120	118	104	102	107
251	118	116	103	100	106
316	117	114	101	99	105
398	115	113	100	97	104
501	114	111	99	96	103
630	112	108	97	93	101
794	110	105	96	92	100
1,000	108	102	94	89	98
1,250	105	98	92	86	96
1,580	103	95	90	83	95
1,990	102	94	89	81	93
2,510	99	90	87	78	91
3,160	96	87	85	76	89
3,980	95	85	83	74	87
5,010	92	82	82	72	85
6,300	90	80	79	69	83
7,940	88	78	78	68	81
10,000	86	76	76	66	79

(1) A/G = Air-to-Ground  
G/G = Ground-to-Ground

(2) Subtract 3 for single engine

TABLE 4

## NOISE CURVES -- LANDING

SLANT RANGES	2ETF	TURBO PROP 2 ENGINE	GENERAL AVIATION 2 ENGINE
100	118	98	(1)
125	116	97	
158	115	95	
199	113	94	
251	111	92	
316	110	91	
398	107	89	
501	105	87	
630	103	85	
794	100	83	
1,000	97	81	
1,250	94	79	
1,580	91	77	
1,990	88	75	
2,510	85	73	
3,160	82	71	
3,980	78	68	
5,010	75	66	
6,300	73	64	
7,940	70	62	
10,000	68	59	

(1) Same as 2 Engine Turbo Fan (2ETF).

TABLE 5

THRUST ADJUSTMENTS

LANDING	DISTANCE	ADJUSTMENT
<u>LANDING:</u>		
2 Engine Turbo Fan	zero	zero
	9,000	8.0
	10,000	zero
2 Engine Turbo Prop and General Aviation	zero	zero
	10,000	zero
<u>DEPARTURE:</u>		
2 Engine Turbo Fan	zero	7.5
	2,600	zero
	9,093	- 1.6
2 Engine Turbo Prop and General Aviation	zero	zero
	10,000	zero

The program works just like the INM. The  $L_{dn}$  value is computed to the equation:

$$L_{dn} = \overline{SEL} + 10 \log W - 49.4$$

$$\text{Where } W = N_D + 10 N_N$$

$N_D$  = Number of operations in a day

$N_N$  = Number of operations in a night

The basic operational module is the number of aircraft operating in a path for the time of day. This number accounts for path percents, runway utilization percents, aircraft percents, and total operations. The program also computes the slant range based on a ground point x feet from reference along path and y feet to side from path and altitude. This slant range is used to look up noise data for the aircraft. The program runs through all combinations for the ground point and sums the output for a total noise level. Points are programmed. The major difference with INM is that the program accepts fewer aircraft types (i.e. library storage is limited) and paths, so as to be able to work within the storage constraints of an IBM-PC without hard disk and to run programs quickly. Keep in mind, we said, that this is not an INM run and will be limited. However, we are confident that the data is expressed correctly.

We hope this information will clarify any questions, and if we may be of further service, please do not hesitate to contact us.

Prepared by:

*Gordon Bricken*  
Gordon Bricken  
President

/mmb

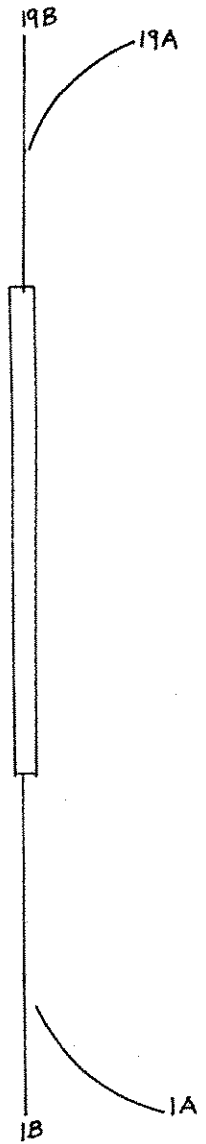


EXHIBIT 1



United States Department of the Interior

NATIONAL PARK SERVICE  
 PACIFIC AREA OFFICE  
 300 Ala Moana Blvd., Box 50165  
 Room 6305  
 Honolulu, Hawaii 96850

IN REPLY REFER TO:

L7617(PAAR)

August 7, 1986

Mr. Albert Lono Lyman, Director  
 County of Hawaii Planning Department  
 25 Aupuni Street  
 Hilo, Hawaii 96720

**RECEIVED**  
 AUG 8 1986  
 HELBER, HASTERT, VAN HORN  
 & KIMURA PLANNERS

Dear Mr. Lyman:

We appreciate the opportunity to comment on the draft environmental impact statement for the proposed Kohana-iki Resort Community, North Kona. Our comments are in two categories: effects of the proposal upon Kaloko-Honokohau National Historical Park and the adequacy of the environmental impact statement.

The proposal's effects on the national historical park, both direct and indirect, will be major and are of serious concern to the National Park Service. First, it should be made clear that a portion of the proposal lies within the Congressionally authorized boundary of Kaloko-Honokohau National Historical Park. For your information, we are enclosing a copy of Public Law 95-625 which established the park and a copy of the official boundary map cited therein.

The strip of coastal land extending up to Wawahiwa Point was included in the park to preserve the natural and scenic qualities of the entire Honokohau Bay shoreline and to protect the important Hawaiian archeological sites and features found there. The proposal calls for blasting through the lava rock here to create what appears to be a more than 100-foot wide channel entrance for the marina development. This action would destroy a major archeological site (Figure 15, page IV-27) and alter the natural and scenic qualities of this portion of Honokohau Bay.

Another major effect would be the siting of the proposed boat launching ramp and 150 units of support housing on lands immediately adjacent to the national historical park. The proposal makes no attempt to buffer the area next to the park with open space. Moreover, the proposal ignores recommendations made by one of the consultants to use a fence, a wide (at least 200 feet) undeveloped buffer zone, and plant nearby screening to protect Kaloko Pond from unwanted pedestrian traffic (see page D-8).

The proposal's plan to utilize treated sewage effluent to irrigate the golf course has the potential for adversely affecting Kaloko Pond since the existing drainage pattern (Figure 2, page F-4) of surface and subsurface flow is in the direction of the pond. It is unclear how the proposal's modified drainage would intercept and dispose of this flow.

Kaloko Pond provides important habitat for waterbirds -- including the Hawaiian stilt, Hawaiian coot, and the Hawaiian duck, all officially listed as endangered species and protected under Federal law -- and is a site of unparalleled importance to Hawaiian culture. The presence of the pond was a principle reason for the establishment of the national historical park.

The following comments are related to the adequacy of the environmental impact statement.

- In light of the above comments, we disagree with the statement made on page III-8 that the proposal conforms to the Hawaii State Plan in that it "respects the social and natural environment in which it is placed."
- The fourth paragraph on page IV-6 incorrectly describes the boundary of Kaloko-Honokohau National Historical Park by not including the coastal strip up to Wawahiwa Point (refer to enclosed map for correct boundary description).
- The second sentence of the second full paragraph on page IV-26 is incorrect. The archeological survey carried out in conjunction with the project was not an intensive survey of the entire project area. It was a reconnaissance survey where only 40 percent of the area was intensely surveyed (see page B-8) and the remaining 60 percent surveyed in "sweeps with 90-150 feet between team members" (see page B-9). Until an intensive survey of the entire area has been completed, it cannot be assumed that the 105 recorded sites "represent all the sites on the property."

In sum, we believe that the proposal makes no attempt to mitigate the effects its implementation would have on Kaloko-Honokohau National Historical Park, its nearest neighbor. The National Park Service cannot support the proposal in its present form.

Sincerely yours,

/s/ BRYAN HARRY

Bryan Harry  
Director, Pacific Area

Enclosures

cc: (w/encs)  
Mr. Thomas A. Fee

15 August 1986

Mr. Bryan Harry, Director, Pacific Area  
Pacific Area Office  
National Park Service  
U. S. Department of the Interior  
Box 50165  
Honolulu, Hawaii 96850

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Harry:

Thank you for your comments of August 7, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community. Our responses appear below in the order presented in your letter.

**Comment:** The proposal's effects on the national historic park, both direct and indirect, will be major and are of serious concern to the National Park Service.

**Response:** As noted on page IV-6 of the EIS, the National Park Service is in the process of negotiating for the purchase of approximately 615 acres of privately owned lands which are situated adjacent to the southern makai boundary of the Kohana-iki site. Negotiations with the private landowners have been underway for some time although no binding agreements have been made and the private land owners are in no way obligated to negotiate with the NPS. The major obstacle thwarting acquisition appears to concern the market value of the private landholdings. Congress had originally allocated approximately \$25 million for acquisition (1978) but this was found to be far less than the market value of the land.

The point being made here is twofold: 1) although negotiations are on-going, a national historic park does not currently exist at the Kaloko-Honokohau site; and, 2) there is no reasonable certainty that it will ever exist at the Kaloko-Honokohau site in light of rising land values in the West Hawaii area and the worsening state of the federal budget deficits and related scarcity of funds for park acquisition or of comparably valued surplus federal property for a land exchange.

Notwithstanding the above, the applicant recognizes the historic and cultural significance of the Kaloko-Honokohau area and is supportive of efforts by the NPS to acquire the area for a national park. The applicant feels that the resort and the park can become compatible land uses providing a spirit of mutual cooperation between interested parties prevails. Mitigation measures proposed in the EIS and discussed in this letter will



Mr. Bryan Harry  
15 August 1986  
Page 2

minimize direct and indirect impacts of the proposed Kohana-iki Resort on the proposed park area.

**Comment:** A portion of the proposal lies within the Congressionally authorized boundary of Kaloko-Honokohau National Historic Park.

**Response:** Our understanding, through discussions with Mr. Gary Barbano of your staff, and a review of the DEIS prepared for the proposed Kaloko-Honokohau National Cultural Park (1974), is whether an area lies within a congressionally authorized park boundary has no bearing on the ultimate disposition of the parcel--unless and until the parcel is acquired by the National Park Service. (See for example the discussion of the impacts of the proposed park within the aforementioned DEIS on adjacent landowners where the statement is made "There would be no economic loss to owners of surrounding lands". 2 Page 69). The applicant is not aware of any inquiries by the NPS to acquire this coastal area. Thus, the fact that a coastal strip (approximately 200 feet wide with the inland boundary of the strip labeled "State Conservation Zone Boundary" - see enclosed map) running from the southern makai corner of the Kohana-iki site to Wawahiwa Point lies "within the congressionally authorized boundary of the Kaloko-Honokohau National Historic Park" is moot so long as no purchase is consummated.

Furthermore, we believe the inland representation of this boundary is in error. In the description of the park boundaries found in the Park DEIS, it is noted that the inland boundary of the coastal strip extending into the Kohana-iki site runs along "the State's coastal ownership line and follows this line to Wawahiwa Point" (Page 1). Our understanding is that the State's ownership line is represented by "the high wash of the waves", the limu line, or the vegetation line and can only be determined in conjunction with a State certified shoreline survey. Thus to conclude that this line runs considerably inland (200 feet) is at least premature and probably in error. Notwithstanding this conclusion, no development has been proposed within the coastal setback area with the exception of the marina entrance.

**Comment:** The proposal calls for blasting through the lava rock...to create what appears to be a more than 100-foot wide channel entrance for the marina development. This action would destroy a major archaeological site (Figure 15, page IV-27) and alter the natural and scenic qualities of this portion of Honokohau Bay.

**Response:** The environmental impacts associated with the construction of the marina will be fully disclosed in the forthcoming application process necessary to secure a Corps Permit. Although preliminary engineering, market feasibility and environmental impact analyses were discussed in the DEIS, it was noted that these were meant to be general in scope and not meant to substitute for the more detailed studies to be prepared in conjunction with the Corps Permit application. The exact location and dimensions of the marina basin as well as the width and location of the entrance channel are all subject to modification during the forthcoming detailed engineering analysis phase. It is therefore premature to discuss the impacts of the marina development on site-specific features such as the two

Mr. Bryan Harry  
15 August 1986  
Page 3

anchialine ponds and the major archaeological site you have referenced. Any action which might directly impact these resources would require County, State and federal approvals.

It should be noted that Honokohau Bay is a very active boating area already and is used frequently by boats entering and leaving the State Small Boat Harbor at Honokohau as well as by the many skin and scuba diving charter boats which dive on the reefs within Honokohau Bay.

It should also be noted that the "congressionally authorized boundary" of the proposed national park extends along a coastal strip in the southern direction, much as it does to the north. Moreover, the entrance to the Honokohau Small Boat Harbor already penetrates this strip, much like the entrance being proposed for the Kohana-iki marina. Since this condition already exists to the south, we do not feel that a similar situation to the north would create any different impacts to the park than that which presently exists with the small boat harbor.

**Comment:** Another major effect would be the siting of the proposed boat launching ramp and 150 units of support housing on lands immediately adjacent to the national historic park. The proposal makes no attempt to buffer the area next to the park with open space. Moreover, the proposal ignores recommendations made by one of the consultants to use a fence, a wide (at least 200 feet) undeveloped buffer zone, and plant nearby screening to protect Kaloko Pond from unwanted pedestrian traffic.

**Response:** The DEIS recognized the potential impact of the development on avifaunal ecosystems, both in around the anchialine pond areas and on the neighboring Kaloko and Aimakapa Ponds. On page IV-22 it is stated that "Related potential impacts to the neighboring Kaloko and Aimakapa Ponds will be mitigated ... by reducing casual access to the adjacent parcels by the use of landscaped screening and, where appropriate, fences."

Notwithstanding the above, it should be noted that a fundamental objective in parkland acquisition should be that sufficient lands are acquired to provide an adequate buffering from adjacent development. It is assumed that the NPS took this into account when it established the boundaries of the proposed park site as shown on your map. On page 8 of the Kaloko-Honokohau DEIS the statement is made "For adequate control of on-site resources, sufficient acreage will be acquired by the NPS to provide protective zones within the Park." Again, the NPS has made no attempt to contact the Kohana-iki landowner for the purposes of acquiring additional buffer areas.

**Comment:** The proposal's plan to utilize treated sewage effluent to irrigate the golf course has the potential for adversely affecting Kaloko Pond since the existing drainage pattern (Figure 2, page F-4) of surface and subsurface flow is in the direction of the pond. It is unclear how the proposal's modified drainage would intercept and dispose of this flow.

Mr. Bryan Harry  
15 August 1986  
Page 4

**Response:** It is not anticipated that the golf course would be irrigated during times of heavy rainfall, and thus, the vast majority of the treated effluent will be absorbed into the root systems, with any excess seeping into the substrata. The planning standard used for golf course irrigation was 4,000 gallons per acre per day. This approximates to approximately 0.15 inches of water per day over the irrigated areas. The average daily evaporation rate at the Kohana-iki site is approximately 0.2 inches per day--leaving no excess for surface runoff or subsurface seepage.

Nevertheless, a major consideration in the design of the drainage plan was the potential impact of the development on the Kaloko Pond. At the present time it is estimated that a design peak flow of 2,800 cubic feet per second (CFS) are predicted to drain into the pond in the design-year storm. The proposed drainage plan, in part, provides for a retention pond (Page F-5) located within the golf course which will collect project-related storm runoff and allow it to infiltrate into the ground. The retention pond "should be sized to contain the 681,000 cubic feet expected from the 10-year, 6-hour rainfall. The runoff could be stored in a pond with a surface area of 2.61 acres and an average depth of 6 feet" (Appendix F-5). The construction of the retention pond is predicted to reduce the potential peak flow into the Kaloko Pond by approximately 100 CFS.

**Comment:** We disagree with the statement made on page III-8 that the proposal conforms to the Hawaii State Plan in that it "respects the social and natural environment in which it is placed."

**Response:** The discussion in the DEIS following the above quote is reprinted here. "The Kohana-iki Resort has been planned as a Hawaiian resort that respects the social and natural environment in which it is placed. To the extent possible, visitors to the resort will be exposed to Hawaiian culture and tradition through interpretive exhibits and displays. All significant sites of cultural importance will be preserved and, where appropriate, interpreted for the public and resort guests" (Page III-8).

**Comment:** The fourth paragraph on page IV-6 incorrectly describes the boundary of Kaloko-Honokohau National Historic Park by not including the coastal strip up to Wawahiwaa Point.

**Response:** Your correction is noted and will be incorporated into the revised EIS.

**Comment:** The second sentence of the second full paragraph on page IV-26 is incorrect. The archaeological survey carried out in conjunction with the project was not an intensive survey of the entire project area... Until an intensive survey of the entire area has been completed, it cannot be assumed that the 105 recorded sites "represent all the sites on the property."

**Response:** A full archaeological reconnaissance survey has been conducted of the project area. It is the assessment of both the State Historic Sites Office and the Hawaii County Planning Department that the survey located all historic sites. Should any additional sites be discovered during the

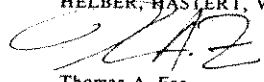
Mr. Bryan Harry  
15 August 1986  
Page 5

construction phase, construction activities will cease and the State Historic Preservation Officer will be notified of the find immediately. No further work will be conducted until appropriate mitigation measures are identified.

We hope that the comments provided herein address the concerns raised in your letter.

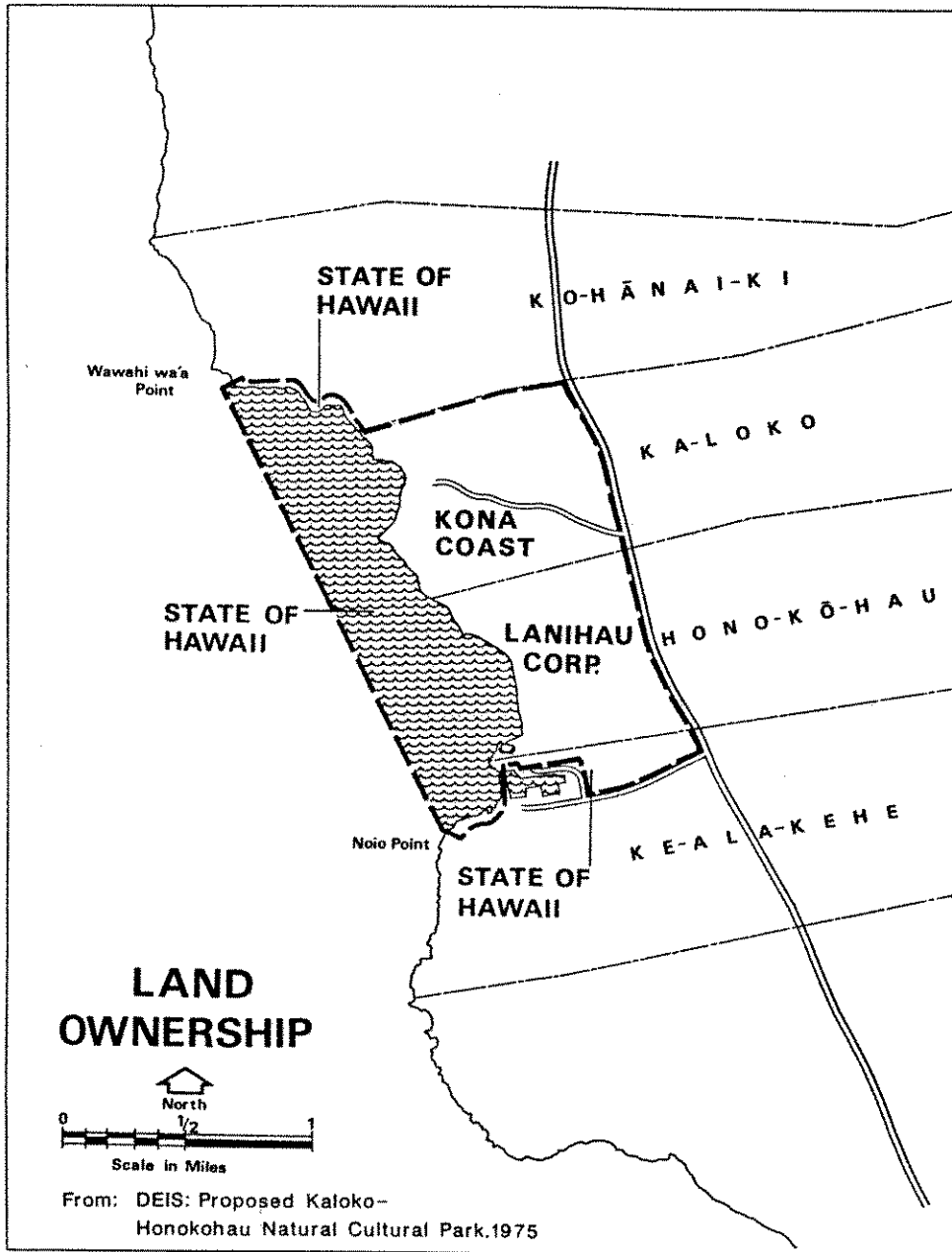
Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department

XII-13



DEPARTMENT OF THE NAVY  
 COMMANDER  
 NAVAL BASE PEARL HARBOR  
 RC4 110  
 PEARL HARBOR, HAWAII 96860-5020

IN REPLY REFER TO

5090  
 Ser 002B/5537

14 JUL 1986

Mr. Albert Lono Lyman, Director  
 County of Hawaii Planning Department  
 25 Aupuni Street  
 Hilo, Hawaii 96720

Dear Mr. Lyman:

ENVIRONMENTAL IMPACT STATEMENT  
 KOHANA-IKI RESORT COMMUNITY

The EIS for the Kohana-iki Resort Community has been reviewed and we have no comments to offer. Since we have no further use for the EIS, the EIS is being returned to the Office of Environmental Quality Control, by copy of this letter.

Thank you for the opportunity to review the EIS.

Sincerely,

HENRY J. RINNERT  
 Captain, SEC, U. S. Navy  
 Process Engineer  
 By Delegation of the Commander

Enclosure

Copy to:  
 Mr. Thomas A. Fee  
 Helber, Hastert, Van Horn & Kimura  
 Grosvenor Center, PRI Tower  
 733 Bishop Street, Suite 2590  
 Honolulu, Hawaii 96813

Office of Environmental Quality Control

**RECEIVED**

JUL 15 1986

HELBER, HASTERT, VAN HORN  
 & KIMURA PLANNERS

UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

SOIL  
CONSERVATION  
SERVICE

P. O. BOX 50004  
HONOLULU, HAWAII  
96850

August 6, 1986



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
300 ALA MOANA BOULEVARD  
P.O. BOX 50167  
HONOLULU, HAWAII 96850

IN REPLY REFER TO:

AUG 1 1986

RECEIVED

AUG 4 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Mr. Albert Lono Lyman  
Director, Planning Department  
County of Hawaii  
25 Aupuni Street  
Hilo, HI 96720

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

Re: Draft Environmental Impact Statement (DEIS) for the  
Kohanaiki Resort Development

Dear Mr. Lyman:

Dear Mr. Lyman:

Subject: Draft EIS for Kohana-Iki Resort Community, North Kona, Hawaii

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

On April 22, 1986, representatives of the Service met with Mr. Mark Hastert and Mr. Thomas Fee of Helber, Hastert, Van Horn & Kimura to discuss the protection of marine and anchialine habitats at Kohanaiki. Generally, the Service is concerned with the potential loss of anchialine ponds and pond biota, degradation of coastal and pond water quality, loss of native waterbird and migratory waterfowl habitat, and serious reduction of nearshore fishery resources due to unrestricted public access.

Thank you for the opportunity to review the document.

Sincerely,

We have completed our review of the DEIS, and find that many of our concerns have not been alleviated. We offer the following additional comments for your consideration.

*Wm H Duncan*  
RICHARD N. DUNCAN  
State Conservationist

General Comments

cc:  
✓ Mr. Thomas A. Fee  
Helber, Hastert, Van Horn & Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, HI 96813

We believe that the DEIS lacks sufficient information about the probable environmental impacts of the proposed resort. The specific issues presented below should be resolved and fully discussed in the Final EIS to provide a balanced analysis as a basis for deciding upon future land and water uses at Kohanaiki.

The growing number of natural history observations being gathered on anchialine ponds of West Hawaii in recent years is limited to species lists and basic physicochemical data. This data does not enhance our knowledge of pond ecosystem structure and function. Without this understanding, we cannot determine the ecological effects of the massive alterations to drainage patterns, groundwater quality and discharge, and riparian vegetation that accompany resort development around pond complexes.

RECEIVED

AUG 7 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS



Save Energy and You Serve America!

XII-14

The implementation of a pond management plan at Waikoloa is, of itself, no guarantee that the ponds will remain pristine in perpetuity. We anticipate, however, that it will provide detailed insights into the more subtle impacts of these activities on the integrity of the pond ecosystems over the course of several years. Therefore, the decision to allow construction of the Kohanaiki Resort must be tempered with the understanding that this DEIS does not present the necessary information upon which an adequate impact assessment can be made.

Without this information, the Service is at a disadvantage for evaluating the long-term impacts of this and other development projects. Because of this, we must make a more conservative estimate of effect. Acquiring the necessary data is feasible at acceptable costs with existing scientific methods; however, it cannot be obtained prior to the decision date for the proposed action. In August 1985, the Service requested that six species of anchialine animals be listed as Category 2 endangered species (species which are likely candidates for Federal protection as endangered species, but for which insufficient biological information exists to warrant further action). In June 1986, we submitted an internal research proposal to conduct status surveys of these and three newly discovered anchialine pond species. The cost of the survey was estimated to be \$130,000 over a two year period. The proposal is currently under review, therefore, it is premature to estimate when it might be conducted.

#### Specific Comments

1. Page I-3; 1.4.3. The summary of impacts on the nearshore marine environment should also identify (a), the probable insidious reduction of nearshore fishery resources which will accompany enhanced and unrestricted public access to the shoreline; and (b), the direct and secondary impacts of beach construction, fills, revetments, groins or other shoreline modifications which will ultimately be proposed as an integral part of the planned resort.

2. Page I-3; 1.4.6. If it is the intent of the developer to protect anchialine ponds from destruction (as stated in numerous sections of the DEIS), then we suggest that this be stated clearly in the Introduction and Summary. The statement that "Other potential impacts to the pond resource include ... direct physical intrusion into the pond areas" does not imply such a level of protection.

3. Page I-4; 1.5. This section should note that the implementation of an anchialine pond management plan is, by itself, no guarantee that the ponds will be protected from degradation. The efficacy of the pond management methods being employed at the Hyatt Regency Waikoloa cannot be determined for several years; therefore, the Service cannot consider a management plan alone as sufficient mitigation for the loss or degradation of anchialine ponds.

4. Page IV-12; 4.1.9.1. The section on threatened and endangered species should also list the hawksbill turtle (*Eretmochelys imbricata*). This species is known infrequently from waters along the Kona coast of Hawaii. It should also be included wherever the two other endangered marine animals are referenced in the EIS. Specific information regarding its biology should be obtained from the National Marine Fisheries Service, Western Pacific Program Office in Honolulu.

5. Page IV-12; 4.2.9.2. The probable destruction of one and possibly two large anchialine ponds as a consequence of marina construction should be identified and discussed in this section.

6. Page IV-13; 4.2.9.2. The Service believes that the discussion of resort-related impacts to the nearshore environment is seriously inadequate. Presently, there is only one white sand beach within the project area (Pine Trees). We anticipate that the developer will propose additional beach construction and/or improvements requiring Federal permit once State and County approvals for resort construction have been granted. These actions, undoubtedly considered integral to resort success, should be evaluated in the EIS for the resort. We also suggest that the depletion of nearshore fishery resources by increased public access be more fully evaluated in the EIS. The Service recommends that a long-term, quantitative study of this process by independent, qualified fisheries scientists be required as partial mitigation.

7. Page IV-22; 4.1.14.2. What is meant by the statement that, "a related potential impact could be felt by the nearby Kaloko and 'Aimakapa Fishponds?" 'Aimakapa Pond is considered to be the premier waterbird and waterfowl habitat on the island of Hawaii. It is identified as essential habitat for the endangered Hawaiian stilt, coot and kolob by the Fish and Wildlife Service in the Hawaiian Waterbirds Recovery Plan (September 1985 revision).

8. Page IV-22; 4.1.15. The Service is concerned that the biological survey of the Kohanaiki Ponds was not intensive enough to adequately describe the anchialine biota of the area or to assess the impacts of this project upon it (reference is made to Appendix E.) In fact, it appears that no comprehensive

biological surveys of the ponds were conducted specifically for the proposed action at Kohanaiki. The analysis of impacts in the DEIS is based entirely upon a previous survey (OI Consultants 1985). The principal purpose of the OI Consultants 1985 survey was to identify the number of ponds containing exotic species and to estimate the number of ponds which remain in a relatively natural state. This study did not involve sampling of the ponds at night, nor did it involve intensive sampling of the Kohanaiki Ponds. It is known that many anchialine crustacea will enter ponds from hypogean waters at night, even in ponds that have exotic, predatory fishes. It is therefore possible that the Kohanaiki ponds contain a greater diversity of organisms than reported in the 1985 report. The Service recommends that comprehensive research be conducted into the anchialine pond habitats and biota at Kohanaiki, and that the results of these surveys be evaluated in the Final EIS.

9. Page IV-23; 4.1.15.2. This section itemizes a few of the probable effects of resort development on the ponds, but fails to relate these effects to biological consequences (i.e. will these factors ultimately degrade or destroy the unique anchialine biota at Kohanaiki, and what is the cumulative impact of this loss in light of other/future Kona coast developments?) We recommend that this section be expanded to include an analysis of these impacts upon anchialine biota. The following potential impacts should also be evaluated in the EIS: potential changes in groundwater salinity and discharge due to mauka water well development and marina construction; riparian landscaping and grading; increased public access. Again, what is being implied by the statement that other impacts include "...direct physical intrusion into the pond areas?"


10. Page IV-25; 4.1.15.3. The Final EIS must fully disclose all significant environmental impacts and mitigation measures associated with the proposed project. We therefore recommend in the strongest terms that all details of the proposed anchialine pond management plan, pond buffer areas, grading and drainage plans be finalized in consultation with this office and the U.S. Army Engineer District, Honolulu, prior to publication of the Final EIS. A complete text of the plans and management proposals for the ponds should be included as an essential part of the Final EIS.

We encourage the developer to avoid the destruction of anchialine ponds. In accordance with the Service's National Mitigation Policy (46 FR 7644-7663), we have classified the Kohanaiki anchialine ponds as Resource Category 1; they are of high habitat value to their indigenous aquatic biota and are scarce on both a national and ecoregion basis. As stated in the DEIS, the Kohanaiki ponds provide feeding and loafing habitat for native waterbirds, migratory shorebirds and waterfowl.

It is current Service policy that any loss or degradation of these important national resources is unacceptable. We cannot be anything but concerned about the accelerating loss and degradation of West Hawaii anchialine ponds; therefore, it is our goal to insure that no loss of natural anchialine pond habitats occurs. If necessary, we will recommend denial of any County, State or Federal permit that allows the destructive alteration of these ponds.

We appreciate this opportunity of comment.

Sincerely,

  
Ernest Kosaka  
Project Leader  
Environmental Services

cc: RD, FWS, Portland, OR (ARD-HR/ARD-SE)  
EPA, San Francisco  
PODCO-O, Ft. Shafter  
NMFS-WPPO, Honolulu  
DAR, Honolulu  
DOFAW, Honolulu  
DLNR, Honolulu  
✓ HHVH&K, Honolulu

15 August 1986

Mr. Ernest Kosaka  
Project Leader, Environmental Services  
Fish and Wildlife Service  
U.S. Department of the Interior  
P.O. Box 50167  
Honolulu, Hawaii 96850

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Kosaka:

Thank you for your comments of August 1, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community. Our responses are as follows:

**General Comment:** Concern is expressed over what is meant by the statement "...direct physical intrusion into the pond areas" (DEIS Page 1-3; 1.4.6).

**Response:** This concern, raised in comments (2) and (9), needs to be clarified. The statement was made in reference to intrusion into pond areas-dry land areas adjacent the physical bodies of water typically referred to as "ponds." No physical intrusion into the individual ponds is being proposed. The exact nature of intrusions into the areas adjacent to the ponds would include limited physical improvements such as footpaths, interpretive exhibits, landscaping, trash receptacles, and other low intensity land uses. The types of permissible uses will be determined in consultation with the Fish and Wildlife Service as well as other agencies within the context of an anchialine pond management plan (discussed in greater detail below).

**Comments (1), (4) and (6):** The summary of impacts on the nearshore marine environment should also identify (a), the probable insidious reduction of nearshore fishery resources...; and (b), the direct and secondary impacts of beach construction which will ultimately be proposed as an integral part of the planned resort.

**Response:** We have asked our nearshore marine environment consultant, Dr. Steven Dollar, to respond to these particular comments. His response is attached in the following letter (Attachment A).

**Comments (2), (3), (5), (7) - (9):** We have asked our anchialine pond consultant, Dr. David Zeimann, to respond to your comments concerning the anchialine pond resource. His response is attached in the following letter (Attachment B).

Mr. Ernest Kosaka  
15 August 1986  
Page 2

**Comment (10):** The FEIS should include a final and detailed pond management plan prepared in consultation with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service.


**Response:** The applicant has stated that: (1) The anchialine ponds are an important asset to the proposed resort project; and, (2) No structures or construction activities are planned which would result in the filling or grading of any of the ponds in the area (with the possible exception of the two small ponds located in the vicinity of the proposed marina basin. The disposition of these two ponds will be determined pending the completion of the detailed engineering and environmental analyses prepared pursuant to an Army Corps permit application for marina construction.) The applicant recognizes the importance of preparing a pond management plan to provide for ongoing management of the pond areas in perpetuity.

Notwithstanding the above, the formulation of a detailed and approved pond management plan for inclusion in the Final EIS is premature at this stage in the development process. The applicant does not feel it desirable or appropriate to merely copy a management plan prepared for a different project in a different location (for inclusion in the Final EIS). Kohana-iki is a unique place and as such will require a unique plan. Included instead and attached as Attachment C to this letter, is a short report outlining guidelines for the preparation of the Kohana-iki anchialine pond management plan. These guidelines provide a framework, or starting point for the management plan by identifying objectives, responsibilities and consulted parties in the plan formulation process. As requested by the State Department of Planning and Economic Development (DPED), we have expanded the list of consulted parties to include not only the Corps of Engineers and your agency, but also DPED, State Department of Land and Natural Resources, and the Hawaii County Planning Department. Over the coming months, input from these agencies will be sought with the objective of submitting a comprehensive management plan as part of the Special Management Area Permit process administered by the Hawaii County Planning Department.

We hope that the comments provided herein address the concerns raised in your letter.

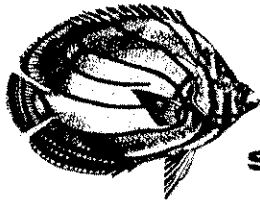
Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosures

cc: Hawaii County Planning Department



**STEVEN DOLLAR**

Marine Research Consultant

1720-A Paula Dr.  
Honolulu, HI 96816  
August 9, 1986

**RECEIVED**  
AUG 11 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Construction of the proposed development may actually reduce the intensity of shoreline fishing. Most of the fishermen are local residents that choose the Kohana-iki site as a location for recreational fishing because of the natural, undeveloped nature of the coastline. Should the development proceed, this aspect of the area would obviously be eliminated. Increased fishing pressure from tourists staying at the hotel or condominiums can also be projected as minor.

Inspection of the reef fish populations offshore of the Kohana-iki site revealed that there may be some alteration to community structure owing to the activities of aquarium fish collectors. This industry has been active in West Hawaii for many years, and the close proximity of the Pine Trees site to Honokohau Harbor has made the Kohana-iki site a prime collecting area. It is possible that a noted paucity of small butterfly fishes (Family Chaetodontidae) is a result of the selective harvesting techniques of aquarium fish collectors. However, this activity is conducted solely by boat, rather than by shoreline access, and would probably not be affected whatsoever by development.

The implementation of a long-term survey, as suggested by the Fish and Wildlife Service, designed to identify changes in fish population structure may be useful in quantifying the processes described above. If such a program is required, care should be taken to employ methods that can accurately differentiate between natural and man-induced changes in community parameters. For instance, inspection of the nearshore marine environments off Kohana-iki revealed considerable damage to coral communities in all exposed areas resulting from a severe winter storm in February, 1986. Such massive alteration of habitat could very likely influence fish community structure to a much greater extent than any degree of change in fishing pressure.

Comments 1 and 6 also refer to direct and secondary impacts to the nearshore marine environment from beach construction, fills, revetments, groins or other shoreline modifications which will ultimately be proposed as an integral part of the planned resort. Because such construction activities have not yet been planned, it is not possible to address specific potential impacts. In general, however, the lack of beaches suitable for swimming and wading is a characteristic of much of the coast of West Hawaii. It appears that the exposed nature of the shoreline at Kohana-iki constitutes an area where beach modification may not be practical. Presently, almost all of the land-sea interface is composed of rugged basaltic

Mr. Thomas Fee  
Helber, Hastert, Van Horn & Kimura  
733 Bishop St.  
Suite 2590  
Honolulu, HI 96813

Dear Mr. Fee:

This letter is in response to your request that I address the comments of the United States Department of the Interior, Fish and Wildlife Service regarding the Draft Environmental Impact Statement (DEIS) for the Kohana-iki Resort Development. These comments are presented in a letter from Mr. Ernest Kosaka to Mr. Albert Lono Lyman, Director of the County of Hawaii Planning Department, dated August 1, 1986. Because I have recently visited the site, I feel justified to address the specific comments relating to the nearshore marine environment.

Specific comments 1 and 6 refer to the potential for reduction in nearshore fishery resources owing to the development. At the present time, the Kohana-iki site cannot be considered a remote, or pristine area in terms of nearshore fishing. Entry to the area via the access road for the Natural Energy Laboratory of Hawaii (NELH) and shoreline road is possible for any type of automobile (i.e. it does not require 4-wheel drive). As a result, recreational shoreline fishing is presently possible for anyone wishing to engage in such activity, and on any weekend recreational fishing is a very common occurrence. Conversations with numerous fisherman at the site, using hook and line, and bow and arrow techniques, revealed that catches are small, both in number and size of fish, and consist of common nearshore reef fishes. Spearfishing also occurs, but is limited by the ruggedness of the shoreline, causing entry and exit to be difficult. None of the fishes caught can be considered rare or unique species, or species that represent any type of significant commercial resource.

XII-18



structures (either sea-cliffs or boulder beaches). If this material is excavated for the purpose of constructing safe swimming beaches, it appears that exposure to wave stress may cause rapid removal of imported sand.

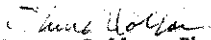
However, if such an activity is deemed feasible, it is not likely that construction activities would cause serious, or even noticeable, effects to the marine environment. A time-series survey conducted during beach construction at a site north of Kohana-iki (Makaiwa Bay at Mauna Lani Resort) revealed that initial beach excavation and grading, accomplished by heavy equipment, resulted in temporary turbid plumes of suspended sediment near the beach site. These plumes dissipated in less than 24 hours, and surveys of the reef biota indicated that the increased sediment loading had no adverse effects on community structure. Hawaiian coral reef communities are "pre-adapted" to a moderate degree of sediment stress, and the temporary increase resulting from beach construction was not sufficient to overload the normal physiological responses of the biota. Because the nearshore region at Kohana-iki is a much harsher environment than Makaiwa Bay, owing to direct exposure of wave stress, community structure is significantly impoverished at the former site compared to the latter. Thus, it could be expected that adverse effects to the marine communities off Kohana-iki arising from shoreline construction would be insignificant. Likewise, cleaning of the one pre-existing white sand beach at the development site does not appear to be a process that could potentially alter the nearshore environment.

If, however, such shoreline modification activities are planned in the future for Kohana-iki, it is recommended that a time-series survey program be instituted to monitor potential effects to the marine environment.

Comment 4 refers to the inclusion of the hawksbill turtle (*Eretmochelys imbricata*) to references of threatened or endangered species. Mr. George Balasz, Zoologist with the National Marine Fisheries Service, Western Pacific Program Office in Honolulu, who is an authority on the ecology and population dynamics of Hawaiian sea turtles states that the Kohana-iki site has not been reported as a nesting site for the hawksbill turtle. In addition, no sightings of this species have been reported recently in the area.

Thank you for the opportunity to respond to the comments of the Fish and Wildlife Service. If you have any questions, do not hesitate to call.

Sincerely,

  
Steven Dollar, Ph.D.

OI CONSULTANTS, INC.

August 12, 1986

Mr. Thomas Fee  
Helbert, Hastert, Van Horn & Kimura  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

RECEIVED  
AUG 13 1986  
HELBERT, HASTER, VAN HORN  
& KIMURA PLANNERS

Subject: FWS Comments on Kohanaiki DEIS

Dear Mr. Fee:

I have had a chance to review the comments from the Fish and Wildlife Service dated August 1, 1986. My responses to those comments will address only those relating to anchialine ponds; other consultants will address other issues.

Response to Specific Comments

2. I would support the FWS suggestion that the intent of the developer regarding pond protection be stated in the summary section. In regard to the second paragraph of Section 1.4.6, it should be made clear that while runoff and direct physical intrusion are potential impacts, the development plan includes drainage, wastewater disposal and site plans which minimize the potential of such impacts.
3. While a management plan is not a guarantee that pond conditions will not be degraded, it is a commitment to make the best practical effort to ensure degradation is minimized. Even no development is not a guarantee of no pond degradation, as our survey of 1985 showed. It should also be noted that the above-mentioned drainage, waste and site plans also form part of the mitigative measures.
4. I will contact the Fisheries Service to obtain whatever information they may have regarding the hawksbill turtle.
5. (Note: this section should be numbered 4.1.9.2). Section 4.1.9 deals specifically with "Nearshore Marine Environment". The discussion of the potential loss of two anchialine ponds during marina construction is properly addressed in Section 4.1.15 "Anchialine Ponds".
7. It should be made clear here that the statement of "related potential impacts", taken from the terrestrial faunal survey (DEIS Appendix D) was meant in that report to apply only to Kaloko pond, not 'Aimakapa, and that the statement was referring to the potential impact of increased access. It should also be pointed out that mitigative measures to

Mr. Thomas Fee  
August 12, 1986  
Page Two

offset such potential impacts were also proposed in that report.

8. It is true that no anchialine pond survey of the Kohanaiki area was done specifically for the DEIS. The reason for this is that the existing data for that area, generated by the referenced 1985 OI Consultants report, were of sufficient scope and detail to adequately describe the existing anchialine pond resource, and to assess potential impacts to the resource. The principal purpose of the 1985 survey was not, as the FWS states, to "identify the number of ponds containing exotic species and to estimate the number of ponds which remain in a relative natural state". The actual objective was to re-examine the ponds originally described by Maciolek and Brock (1974), to compare the pond conditions at present with those which existed in 1972, and to re-evaluate or confirm the pond valuations arrived at by Maciolek and Brock.

I am not sure what the FWS means by "intensive sampling" of the ponds, but our survey of the area consisted of aerial photography of the whole area, preparation of working pond maps from these photos, and ground survey of all ponds identified from the air and ponds not recognized as such in the photos. The map of anchialine ponds presented in the DEIS is as complete and accurate as mapping from aerial photographs allows, and of the same quality as that presented in the EIS for Waikoloa. Because we realized that the Kohanaiki area was one of the prime pond resource areas, special attention was paid to locating and surveying ponds there.

The scope of the pond surveys was established in consultation with the Army Corps of Engineers. It should be noted that the underlying reason for the study being funded was to supply information of sufficient detail and scope to allow the Corps to assess the impacts of the then proposed loss of ponds at Waikoloa in the context of the whole anchialine pond resource of the Kona coast. Thus the "intensity" of the survey was sufficient for that assessment of impacts. One should also realize that the development at Kohanaiki does not entail the filling of a large portion of the ponds on the site, as did the Waikoloa project. Without information as to the scope of the "comprehensive research" the Service recommends, I can only maintain that the data

XII-20

Mr. Thomas Fee  
August 12, 1986  
Page Three

presented in the DEIS are adequate to assess the impacts of the proposed development on the anchialine pond resource.

9. In response, see also #2. Note that as the Service reads it, "This section itemizes a few of the probable effects of resort development on the ponds." The section as written in the DEIS implies, at least to the Service, that runoff, changes in ground-water quality, and direct impacts are probable, not just remotely possible. It should be stressed, again, that these impacts are seen as remotely possible, not probable, and that the site plan, drainage plan, and wastewater plan all have been developed to further reduce the likelihood of any such impact.

The potential impacts of changes in groundwater salinity cannot be addressed at this time, since the water supply plan has not been developed, and the relationship between water removed far upland and changes in salinity at the shoreline is tenuous at best. The impacts of landscaping and grading, and public access on the ponds can be addressed in the pond management plan, which will establish allowable uses and activities and buffer zones.

I believe the above responses adequately address the Service comments. Should you have any questions or require further input, please contact me at our offices.

Sincerely,



David A. Ziemann, Ph.D

#### GUIDELINES FOR KOHANA-IKI ANCHIALINE POND MANAGEMENT PLAN

- o **Intent**  
This document has been prepared as part of the Kohana-iki Resort Community Final Environmental Impact Statement (EIS). The intent of this document is to set forth a general framework within which a detailed anchialine pond management plan can be prepared. A major purpose is to express the desire of Kona Beach Development, L.P., the developers of the Kohana-iki Resort Community, to preserve the unique anchialine pond resource in perpetuity. As stated in the Draft EIS, no direct intrusion into the ponds is planned\* and the policing and maintenance of the pond resource will be the responsibility of the developers.
  - o **Management Plan Objectives**
    - a. Maintain the environmental integrity of the existing ponds;
    - b. Protect and manage the resource to provide educational and interpretive opportunities to the public;
    - c. Control and monitor construction activities so that secondary impacts may be identified and mitigation proposed to avoid any detrimental impacts to the ponds; and,
    - d. Provide for a pond manager to implement the management plan and conduct scientific monitoring programs.
  - o **Pond Areas**  
The ponds are generally located in four distinct sub-areas along the coastal area of the Kohana-iki site. From north to south these sub-areas are identified as: North, Middle, South, and Far South. Each of the sub-areas has different characteristics in terms of pond diversity, vitality and uniqueness.
  - o **Allowable Uses**  
Some pond areas offer excellent opportunities for interpretive exhibits, especially in instances where remnants of prehistoric aquaculture may have been practiced. Other areas may lend themselves to different levels of activity, ranging from extremely limited to very active.  
  
The Pond Management Plan will have precisely defined preservation and buffer areas similar to those proposed for the Waikoloa Ponds. Allowable uses, construction and design restrictions within these areas will also be clearly detailed.
  - o **Pond Management**  
Each of the pond areas will be managed by the master developer its designated agent. The basic responsibilities of the pond managers will be to promote the objectives stated above.
  - o **Pond Management Plan Formulation**  
The Management Plan will be prepared pursuant to securing the Special Management Area Permit from the County of Hawaii. The plan will be prepared in consultation with the following agencies: U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, State Department of Planning and Economic Development, State Department of Land and Natural Resources, and the Hawaii County Planning Department.
- \* Two recently located ponds lie in the vicinity of the proposed marina basin. Because of the preliminary nature of the planning for the marina development (as noted in the Draft EIS), it is impossible to predict with certainty the ultimate disposition of these two ponds. Although every effort in the design of the basin will be made to preserve them, it is possible that one or both of them will be destroyed. The disposition of these two ponds will be thoroughly discussed together with a detailed discussion of the environmental, economic and social impacts of the proposed marina development, in a subsequent application for a U.S. Army Corps permit to construct the marina basin.

GEORGE H. ARIYOSHI  
GOVERNOR



STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
465 SOUTH KING STREET, ROOM 104  
HONOLULU, HAWAII 96813

LETITIA N. UYEHARA  
DIRECTOR  
TELEPHONE NO.  
548-8915

August 5, 1986

Mr. Albert Lono Lyman, Director  
Planning Department  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

RECEIVED  
AUG 10 1986  
HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Dear Mr. Lyman:

Subject: Draft EIS for Kohana-iki Resort Community,  
Kohana-iki, North Kona, Hawaii

We have reviewed the draft EIS for this project and offer the following comments.

1. In other projects along the Kona Coast, anchialine ponds have been destroyed in order to proceed with the development. Anchialine ponds are of limited quantity and are unique to Hawaii. Because of increased development, the number of ponds have been reduced significantly. We urge that all anchialine ponds be preserved and the proposed marina be relocated. The 401 certification pursuant to the Clean Water Act should be obtained.
2. Several archaeological sites may be significant and should be preserved and protected. The archaeological survey report identifies petroglyphs, possible heiau and burial complexes, and other structures which suggest a high level of habitation by ancient Hawaiians in the area.

Thank you for providing us the opportunity to review this EIS.

Sincerely,

Letitia N. Uyehara  
Director

cc: Tom Fee--Helber, Hastert,  
Van Horn & Kimura

15 August 1986

Ms. Letita N. Uyehara, Director  
Office of Environmental Quality Control  
465 South King Street, Room 104  
Honolulu, Hawaii 96819

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Ms. Uyehara:

Thank you for your comments of August 5, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

Comment (1): We urge that all anchialine ponds be preserved and the proposed marina be relocated. The 401 certification pursuant to the Clean Water Act should be obtained.

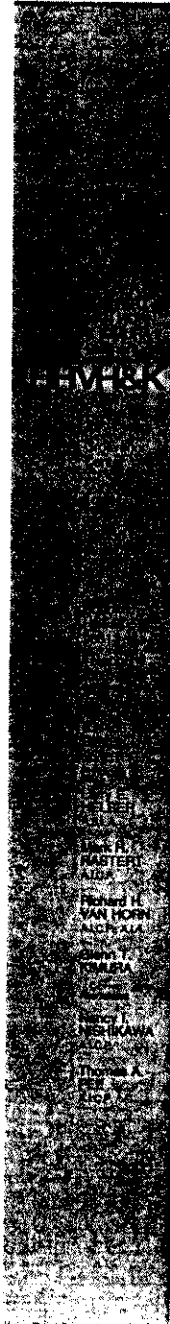
Response: The applicant intends to preserve all anchialine ponds at the Kohana-iki site with the possible exception of two small ponds located south of Wawahiwa Point in the vicinity of the proposed marina basin. Detailed engineering studies regarding the dimensions and precise location of the marina basin will be conducted pursuant to applying for an Army Corps permit to construct the marina basin and channel entrance. Although it is the applicant's desire to preserve the two small ponds, without the information provided by detailed engineering studies, unilateral statements to that effect would be premature.

The 401 certification pursuant to the Clean Water Act will be obtained from the State Department of Health in conjunction with securing the Army Corps permit

Comment (2): Several archaeological sites may be significant and should be preserved and protected.

Response: The project archaeologist has initially recommended six sites for preservation. As the site planning work and the detailed archaeological investigations progress, there will inevitably be opportunities to preserve additional sites.

XII-22

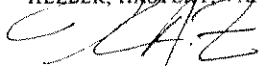


Ms. Letita N. Uyehara  
15 August 1986  
Page 2

We hope that the comments provided herein address the concerns raised in your letter.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department

RECEIVED  
AUG 2 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

(P)1833.6

AUG 7 1986

Mr. Albert Lono Lyman  
Director  
Planning Department  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

Dear Mr. Lyman:

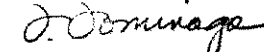
Subject: Kohana-iki Resort Community  
Environmental Impact Statement (EIS)

We have reviewed the subject project's EIS and have the following comments to offer:

1. The need for both the High Technology Development Corporation and the Natural Energy Laboratory of Hawaii to have high quality ocean water is recognized by the subject document. However, we wish to further underscore the need to protect the quality of this important resource.
2. The Table 11: Estimated Wastewater Flows on page IV-46 should be checked.

Thank you for the opportunity to comment on this EIS.

Very truly yours,



TEUANE TOMINAGA  
State Public Works Engineer

RY: jas  
cc ✓ Mr. Thomas A. Fee  
Mr. William Bass

15 August 1986

Mr. Teuane Tominaga  
State Public Works Engineer  
State Department of Accounting and General Services  
1151 Punchbowl Street  
Honolulu, Hawaii 96813

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Tominaga:

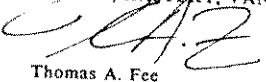
Thank you for your comments of August 7, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

Your comments relative to the need to protect the quality of the ocean water off the subject property are noted. The maintenance of the high quality of the waters lying off the Kohana-iki coast are vital to the success of the proposed resort and therefore of paramount importance to the applicant.

Table II, Estimated Wastewater Flows, has been corrected in the FEIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department

RECEIVED  
JUL 23 1986

STATE OF HAWAII  
DEPARTMENT OF DEFENSE  
OFFICE OF THE QUARTERS CENTRAL  
3940 DAWSON ROAD, HONOLULU, HAWAII 96814-25

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

JUL 22 1986

HIENG

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

Dear Mr. Lyman:

Kohana-iki Resort Community, North Kohala, Hawaii

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

We have completed our review and have no comments to offer at this time.

Yours truly,

RECEIVED  
JUL 23 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

signed

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

cc: Mr. Thomas A. Fee, Helber, Hastert, Van Horn & Kimura

XII-24

Mr. Tominaga  
Mr. Lyman  
Mr. Fee  
Mr. Helber  
Mr. Hastert  
Mr. Van Horn  
Mr. Kimura  
Mr. Matsuda  
Mr. [unclear]  
Mr. [unclear]  
Mr. [unclear]



RECEIVED  
AUG 1 1986

LESLIE S. MATSUBARA  
DIRECTOR OF HEALTH

STATE OF HAWAII HELBER, HASTERT, VAN HORN  
DEPARTMENT OF HEALTH & KIMURA PLANNERS  
P. O. BOX 3378  
HONOLULU, HAWAII 96801

In reply, please refer to:  
EPHSD

Mr. Albert Lono Lyman  
July 29, 1986  
Page 2

July 29, 1986

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni St.  
Hilo, Hawaii 96720

Dear Mr. Lyman:

Subject: Request for Comments on Environmental Impact Statement (EIS) for  
Kohana-iki Resort Community, N. Kona, Hawaii

Thank you for allowing us to review and comment on the subject EIS. We provide  
the following comments for your consideration.

Wastewater Disposal

We recommend that the developers look into the feasibility of connecting into the  
municipal wastewater treatment plant which will be located south of the Honokohau  
Harbor. The proposed project is located in the planning area for the municipal facility.

Drinking Water

Due to the size and scope of this project and its location, water availability is a  
critical issue which is not adequately addressed in the Draft Environmental Impact  
Statement. The projected water demand for the project is almost 1 MGD. The Hawaii  
Department of Water Supply has stated that water is not available for this project. New  
source and transmission facilities will be required. Recently, there have been several  
other large resort projects proposed for the North Kona area. These projects will be also  
competing for the available undeveloped water resources in this region. The possible  
sources and transmission facilities to meet the Kohana-iki Resort's needs should be  
identified and discussed in the Environmental Impact Statement.

Apparently, a new source or sources will be required to support this project. Please  
be advised that the sources and distribution system will be subject to all applicable terms  
and conditions of the State's drinking water regulations, Chapter 20, Title 11,  
Administrative Rules.

Section 11-20-29 of Chapter 20 requires all new sources of potable water serving  
public water systems to be approved by the Director of Health prior to their use to serve  
potable water. Such approval is based primarily upon the satisfactory submission of an  
engineering report which adequately addresses all concerns as set down in Section 11-20-  
29. The engineering report must be prepared by a registered professional engineer and  
bear his or her seal upon submittal.

Section 11-20-30 requires that new or substantially modified distribution systems for  
public water systems be approved by the Director of Health. Such approval depends upon  
the submission of plans and specifications for the project prior to construction and the  
demonstration that the new or modified portions of the system are capable of delivering  
potable water in compliance to all maximum contaminant levels as set down in Chapter 20  
once the distribution system or modification is completed. For water systems under the  
jurisdiction of Hawaii County Department of Water Supply, approval authority has been  
given to the Department of Water Supply.

The necessary permits and approvals list on page 1-7 should include Department of  
Health review and approval requirements for new sources and the drinking water  
distribution system.

Should you have any questions regarding Chapter 20, Title 11, Administrative Rules,  
please contact the Drinking Water Program at 548-2235.

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

Sincerely yours,

JAMES K. IKEDA  
Deputy Director for  
Environmental Health

cc: ✓ Mr. Thomas A. Fee,  
Helber, Hastert, Van Horn & Kimura  
DHO, Hawaii

XII-25

15 August 1986

Mr. James K. Ikeda  
Deputy Director for  
Environmental Health  
State Department of Health  
P.O. Box 3378  
Honolulu, Hawaii 96801

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Ikeda:

Thank you for your comments of July 30, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community. We have prepared our response to your comments in consultation with our engineering consultants, M & E Pacific, Inc.

**Comment:** We recommend that the developers look into the feasibility of connecting into the municipal wastewater treatment plant which will be located south of the Honokohau Harbor. The proposed project is located in the planning area for the municipal facility.

**Response:** Transmission of wastewater to the proposed wastewater treatment plant to be located south of Honokohau Boat Harbor would be an alternative to wastewater treatment at the Kohana-iki site. Preliminary cost estimates indicate the alternative would be comparable to onsite treatment costs. It should be noted that Plate No. 7 of the Draft Kona Regional Plan indicates that the Kohana-iki Resort does not lie within the same sewerage district as the proposed Honokohau municipal treatment plant. Clarification of this point will be made with the County Public Works Director in the near future. In the meantime, connection to the proposed treatment facility has been incorporated into the revised EIS as an alternative wastewater treatment method.

**Comment:** The possible sources and transmission facilities to meet the Kohana-iki Resort's needs should be identified and discussed in the EIS.

**Response:** As stated in the EIS, Chapter 4.3.2.2, page IV-42, water availability and description of source and transmission facilities are discussed in detail in Appendix F.

**Comment:** Apparently, a new source or sources will be required to support this project. Please be advised that the sources and distribution system will be subject to all applicable terms and conditions of the State's drinking water regulations, Chapter 20, Title 11, Administrative Rules.

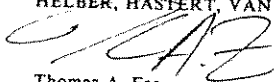
Mr. James K. Ikeda  
15 August 1986  
Page 2

**Response:** The revised EIS now recognizes compliance with the State's drinking water regulations, Chapter 20, Administrative Rules for new source development and distribution system. The necessary permits and approvals list will be revised to include Department of Health review and approval.

We trust our responses have addressed your concerns.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department





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

SUSUMU ONO, CHAIRMAN  
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU  
DEPUTY TO THE CHAIRMAN

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

August 14, 1986

Mr. Albert Lono Lyman, Director  
Planning Department  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

**RECEIVED**  
AUG 14 1986  
HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Dear Mr. Lyman:

SUBJECT: Comments, Draft EIS -- Kohanaiki Resort  
Kohanaiki, North Kona, Hawaii  
TMK: 7-3-09: 3, 14

There has been a delay in processing our departmental comments. We understand that the Final EIS is going to print tomorrow and that the preparers need any departmental comments that they can get for the EIS. We are presently enclosing our historic and recreation concerns to be included in the Final EIS.

Additional comments will follow at a later date.

Sincerely yours,

*Susumu Ono*  
SUSUMU ONO  
Chairman

cc: Mr. Thomas Fee, Helber, Hastert, Van Horn & Kimura.



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

SUSUMU ONO, CHAIRMAN  
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU  
DEPUTY TO THE CHAIRMAN

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

August 5, 1986

MEMORANDUM

TO: Roger Evans, OCEA  
FROM: Ralston H. Nagata, State Parks Administrator  
SUBJECT: Comments, Draft EIS -- Kohanaiki Resort  
Kohanaiki, North Kona, Hawaii  
TMK: 7-3-09: 3, 14

HISTORIC SITES SECTION CONCERNS:

We reviewed this project for a State Land Use Commission (LUC) petition in April 1986 and recommended that the LUC defer action on the petition until all significant sites were identified. Our reasoning was that the LUC and our office must know the significant sites present, in order to consider impacts and to evaluate mitigation plans to handle these impacts. We believe that the same is true for this EIS -- significant sites must be clearly identified before impact assessments and mitigation plans can be evaluated. This is vital because this EIS will be a supportive document for major zoning decisions at the County and State levels which involve extensive land alteration.

We believe the applicant has made great strides toward the goal of identifying significant sites since April. A complete archaeological survey took place (Donham 1986), and we believe it found all historic sites in the project area -- 105 sites. The survey report is very good and has compiled solid inventory information on each site. With information from prior studies, we believe enough information has now been gathered to evaluate the significance of all the sites and to identify the significant sites.

Unfortunately, the EIS does not clearly offer significance assessments or clearly identify all significant sites. The archaeological report has good information on this topic (pp. 95-100, Tables 3-4). We agree in concept with what the report says, but we are unable to clearly understand specific site significance assessments. Thus, we have not endorsed the preliminary assessments; rather we have asked for clarification. Once clarification occurs, then we believe significance assessments can be finalized with our office for the state historic sites inventory and for land use decision purposes.

August 5, 1986

Importantly, however, the EIS text seems to interpret the report as saying that more information needs to be gathered before significance can be assessed. If this is the applicant's position, then in our view, this would require a supplement to the EIS and a deferment of land use actions until this information is gathered and significance is assessed. But again, we believe significance can be determined now to enable land use decisions.

The mitigation plan also needs clarification. We have not endorsed the mitigation plan. The EIS seems to say that the mitigation plan is to (1) do intensive survey work to establish site significance, and (2) then sites to be preserved will be identified and an archaeological resources management plan will be prepared evidently to conduct further excavation in some sites (IV-28). We believe this plan is too general and is premature for a land use decision. Until the significant sites are identified, we believe a mitigation plan cannot be properly prepared, much less evaluated.

However, if site significance can be established now, we believe that an acceptable mitigation plan can be developed. This plan must clearly identify which sites are to be preserved (and why) and which sites are to undergo archaeological data recovery (realizing some might be avoided in design phases, p. III-5). Right now it is not clear which sites will be preserved. The EIS mentions that 6 sites are being considered for preservation, but it does not say which sites these are (IV-28). Archaeological data recovery should clearly be in two steps -- (1) an intensive survey like step and (2) as needed, further work, probably mostly excavation to recover significant information remaining in a few sites. Also, sensitive reinterment or archiving of any burial remains must also be part of this data recovery. The EIS does not clearly include step 2 and the burial matter.

In sum, it is our opinion that while the Draft EIS certainly has the intent to handle significant historic sites properly, it does not adequately identify the significant historic sites or present a clear mitigation plan that will adequately handle impacts to those sites. Thus, we cannot agree yet that the project will have no significant impact on historic sites ("no adverse effect" in our terms). However, we do believe that acceptable significance assessments and a mitigation plan can be easily prepared with existing information. We recommend that the applicant work in consultation with our office and the County Planning Department to prepare a brief historic

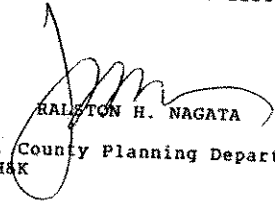
August 5, 1986

preservation supplement to, or revision of, the EIS which clearly identifies the significant sites and which clearly presents a mitigation plan -- with the significance assessments and plan approved by both our offices. This should take no more than 1-2 days, and it will resolve our concerns and will aid decisions to be made by the County's Planning Department and the land use boards (LUC and County).

#### RECREATION CONCERNS:

The subject land adjoins the proposed Kaloko-Honokohau National Historical Park. We note the National Park Service has requested the opportunity to review this Draft EIS. The high density commercial/marina development adjoining the proposed park may have a significant environmental impact.

There are no other known public park interests, but we are concerned about lateral public shoreline access along the entire length of the shoreline within the subject parcel. Figure 3 indicates a beach trail will be retained or developed along much of the shoreline but there is no indication how shoreline access will be provided in the marina area to the southern property boundary. Public use of the beach trail and public parking and access to the trail also needs to be addressed.

  
 RALESTON H. NAGATA

cc: Albert L. Lyman, County Planning Department  
 Thomas Fee, HHVH&K

15 August 1986

Mr. Susumu Ono, Chairman  
Board of Land and Natural Resources  
P.O. Box 621  
Honolulu, Hawaii 96809

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Ono:

Thank you for your comments of August 14, 1986, relative to the Draft EIS for the proposed Kohana-iki Resort Community. We have responded to your comments in the order they have been presented.

Historic Sites Section Concerns

Comments:

A complete archaeological survey took place (Donham 1986), and we believe that it found all historic sites in the project area -- 105 sites.

The DEIS does not adequately identify the significant historic sites or present a clear mitigation plan that will adequately handle impacts to those sites.

**Response:** We have asked the archaeological consultant, Paul H Rosendahl, Ph.D, to respond to your comments relative to the clarification of the significance assessments and mitigation plans for the Kohana-iki site. His comments will be incorporated into the comments section of the revised EIS and are attached to this letter in the form of a table and supporting text.

Recreation Concerns

Comments:

The high density commercial/marina development adjoining the proposed park may have a significant environmental impact.

We are concerned about lateral public access along the shoreline within the subject parcel. Public use of the beach trail and public parking and access to the trail also needs to be addressed.

**Response:** The EIS discusses actions to mitigate adverse impacts to the adjacent Kaloko-Honokohau property including drainage systems, site planning and landscaped screening. The comments of the National Park Service and our responses to them present a detailed discussion of the

Mr. Susumu Ono  
15 August 1986  
Page 2

possible impacts the the proposed National Historic Park at Kaloko. These comments have been incorporated into the comments section of the revised EIS.


It should be noted here that there already exists a growing marina operation within fifty feet of the proposed park boundary at the State Honokohau Small Boat Harbor.

As noted in our comments to the Hawaii County Planning Department which requested clarification of the proposed public access system, no attempt will be made to impede lateral pedestrian access along the coastal areas. The intent of the public access system is to maintain the present coastal access to lateral pedestrian ways with two mauka-makai points of entry: one at the Pine Trees Beach area and one near the proposed marina. Vehicular use of the existing coastal trail along the shoreline fronting the resort will be prohibited. Public parking facilities along with adequate comfort stations and appurtenant facilities will be constructed just mauka of the Pine Trees Beach area as part of the first phase of construction.

We trust our responses have addressed your concerns.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosure

cc: Hawaii County Planning Department

216-081486

**SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS  
AND RECOMMENDED GENERAL TREATMENTS FOR ARCHAEOLOGICAL SITES  
KOHANA-IKI RESORT DEVELOPMENT PROJECT AREA**

General significance assessments and recommended general treatments for all archaeological sites identified within the Kohana-Iki Resort Development project area are summarized in the attached Table 1. Eighty-four of the 105 archaeological sites identified within the project area have been determined to be significant solely for their information content. Sufficient data was collected from 50 of these 84 sites during the reconnaissance survey. These sites therefore no longer contain endangered information and a recommendation of no further data collection work being necessary has been made. The 50 sites included in this category are the following:

T-103, T-104, T-106, T-110, T-112 thru 115, T-119, T-121, T-123 thru 125, T-127, T-129, T-131, T-136 thru 139, T-141, T-146, T-150 thru 154, T-163 thru 172, T-174, T-179 thru 182, T-184 thru 186, T-188, T-189, T-193, D14-2, and 1902.

The remaining 34 sites determined to be significant solely for their information content still contain significant information (Significance Category A), and additional data collection has been recommended for these sites (Recommended Treatment FDC).

Eleven sites have been determined to be significant for their information content and may also have cultural significance as burial sites, pending the findings of further investigation. Data collection is recommended at this time; if burials are found to occur at any site, recommended treatment of these sites will be to preserve and protect the specific burial features. If this is not feasible, excavation for the disinterment of skeletal remains will have to be conducted, with additional studies focused on the skeletal remains. Reburial of skeletal remains according to appropriate State Health Department regulations and procedures is recommended, after completion of proper scientific study.

Five sites have been determined to be significant for information content, as a site type example, and for their cultural value. Recommended treatment for two of these sites (D14-4, D14-8) is to conduct data collection at all features, and either develop the principal features of the complexes as interpretive locales, or minimally preserve the principal features as is and protect them from adverse effects of development. Recommended treatment of two shrine sites (T-130, 134) is to conduct further data collection and preserve and protect them, with optional interpretive development. Recommended treatment of the Mamalahoa Trail (T-102) is to conduct further data collection, construct all trail breaches associated with development access across poorly preserved portions of the trail, and develop well preserved sections that provide good examples of causeway construction and design.

Five sites have been determined to be significant both for their information content and as good examples of specific site types. Recommended treatment of these sites is to conduct further data collection and to develop the sites as interpretive locales.

305 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 or 966-8038

216-081486

Table 1.

**SIMPLIFIED SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS  
AND RECOMMENDED GENERAL TREATMENTS  
KOHANA-IKI RESORT DEVELOPMENT PROJECT AREA**

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
T-101	+	-	-	-	+	-	-	-
T-105	+	-	-	-	+	-	-	-
T-107	+	-	-	-	+	-	-	-
T-108	+	-	-	-	+	-	-	-
T-109	+	-	-	-	+	-	-	-
T-111	+	-	-	-	+	-	-	-
T-116	+	-	-	-	+	-	-	-
T-118	+	-	-	-	+	-	-	-
T-120	+	-	-	-	+	-	-	-
T-122	+	-	-	-	+	-	-	-
T-133	+	-	-	-	+	-	-	-
T-142	+	-	-	-	+	-	-	-
T-143	+	-	-	-	+	-	-	-
T-144	+	-	-	-	+	-	-	-
T-145	+	-	-	-	+	-	-	-
T-147	+	-	-	-	+	-	-	-
T-148	+	-	-	-	+	-	-	-
T-149	+	-	-	-	+	-	-	-

**General Significance Categories:**

- A=Important for information content, further data collection necessary (PHRI=research value);
- X=Important for information content, no further data collection necessary (PHRI=research value, SHPO=not significant);
- B=Excellent example of site type at local, region, island, State, or National level (PHRI=interpretive value);
- C=Culturally significant (PHRI=cultural value).

**Recommended General Treatments:**

- FDC=Further data collection necessary (intensive survey and testing, and possibly subsequent data recovery/mitigation excavations);
- NFW=No further work of any kind necessary, sufficient data collected, archaeological clearance recommended, no preservation potential (possible inclusion into landscaping suggested for consideration);
- PID=Preservation, with some level of interpretive development recommended (including appropriate related data recovery work);
- PAI=Preservation "as is," with no further work (and possible inclusion into landscaping), or minimal further data collection necessary.

XII-30

Table 1. (Cont.).

SIMPLIFIED SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS  
AND RECOMMENDED GENERAL TREATMENTS  
KOHANA-IKI RESORT DEVELOPMENT PROJECT AREA

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
T-155	+	-	-	-	+	-	-	-
T-156	+	-	-	-	+	-	-	-
T-158	+	-	-	-	+	-	-	-
T-159	+	-	-	-	+	-	-	-
T-160	+	-	-	-	+	-	-	-
T-161	+	-	-	-	+	-	-	-
T-162	+	-	-	-	+	-	-	-
T-173	+	-	-	-	+	-	-	-
T-177	+	-	-	-	+	-	-	-
T-187	+	-	-	-	+	-	-	-
T-190	+	-	-	-	+	-	-	-
T-192	+	-	-	-	+	-	-	-
D14-3	+	-	-	-	+	-	-	-
D14-6	+	-	-	-	+	-	-	-
D14-7	+	-	-	-	+	-	-	-
D14-10	+	-	-	-	+	-	-	-
Subtotal: 34	34	0	0	0	34	0	0	0
T-126	+	-	-	*	+	-	-	*
T-128	+	-	-	*	+	-	-	*
T-132	+	-	-	*	+	-	-	*
T-140	+	-	-	*	+	-	-	*
T-175	+	-	-	*	+	-	-	*
T-183	+	-	-	*	+	-	-	*
T-191	+	-	-	*	+	-	-	*
D14-5	+	-	-	*	+	-	-	*
D14-9	+	-	-	*	+	-	-	*
D14-11	+	-	-	*	+	-	-	*
D14-12	+	-	-	*	+	-	-	*
Subtotal: 11	11	0	0	11	11	0	0	11

\*Provisional assessment, definite assessment pending further data collection (i.e., testing features for presence/absence of skeletal remains)

Table 1. (Cont.).

SIMPLIFIED SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS  
AND RECOMMENDED GENERAL TREATMENTS  
KOHANA-IKI RESORT DEVELOPMENT PROJECT AREA

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
T-102	+	-	+	+	+	-	+	-
T-130	+	-	+	+	+	-	-	+
T-134	+	-	+	+	+	-	-	+
D14-4	+	-	+	+	+	-	+	-
D14-8	+	-	+	+	+	-	+	-
Subtotal: 5	5	0	5	5	5	0	3	2
T-117	+	-	+	-	+	-	+	-
T-135	+	-	+	-	+	-	+	-
T-157	+	-	+	-	+	-	+	-
T-176	+	-	+	-	+	-	+	-
1908	+	-	+	-	+	-	+	-
Subtotal: 5	5	0	5	0	5	0	5	0
All others	-	+	-	-	-	+	-	-
Subtotal: 50	0	50	0	0	0	50	0	0
Totals: 105	55	50	10	16	55	50	8	13



DEPARTMENT OF PLANNING  
AND ECONOMIC DEVELOPMENT

KAMAHAHAU BUILDING 250 SOUTH KING ST. HONOLULU, HAWAII  
MAILING ADDRESS: P.O. BOX 2358 HONOLULU, HAWAII 96804 • TELE: 400250 HIRPO

GEORGE R. ARIMOSHI  
GOVERNOR  
KENT M. KEITH  
DIRECTOR  
MURRAY E. TOWELL  
DEPUTY DIRECTOR  
Roger A. Ulveling  
DEPUTY DIRECTOR

DIVISIONS  
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION  
ENERGY DIVISION  
135 Merchant St. Room 103 Honolulu, Hawaii 96813  
FOREIGN TRADE ZONE DIVISION  
1401 Kalia Road Honolulu 96813  
LAND USE DIVISION  
PLANNING DIVISION  
RESEARCH AND ECONOMIC ANALYSIS DIVISION  
OFFICES  
ADMINISTRATIVE SERVICES OFFICE  
INFORMATION OFFICE

Ref. No. P-4792

August 6, 1986

The Honorable Albert Lono Lyman  
Planning Director  
Planning Department  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

RECEIVED

AUG 8 1986

HELBER, HANSLERT, VAN HORN  
& KIMURA PLANNERS

Dear Mr. Lyman:

Subject: DEIS for Kohana-iki Resort Community, North Kona, Hawaii

We have reviewed the subject draft environmental impact statement (DEIS) and offer the following comments for your consideration and action.

1. According to the DEIS (page II-9), the project will be phased to meet market demands and to coincide with infrastructure improvements. It is estimated that one of two planned hotels, support housing, the golf course, and a portion of the clubhouse/recreation complex will be constructed within two years of receipt of government approvals. However, the proposed project's centralized sewage treatment facility will not be constructed until the next development phase. The EIS should identify the Phase IA sewage disposal system and its impacts on the environment including the nearshore marine waters. The EIS should also contain a specific timeframe for the development to include the number of units, extent of infrastructure, and associated costs.
2. The project's preliminary site plan shows a public access path will link a commercial complex to the shoreline area at "Pine Trees" Beach. The EIS should identify the existing and potential demand for specific recreational uses such as fishing, surfing, and diving, and describe the planning criteria and development phasing for public access facilities. It would be helpful to indicate in the EIS the number and location of accessways, public parking facilities, comfort stations and appurtenant facilities.
3. The dredging and supporting infrastructure concerning the marina should be further discussed. Offshore as well as onshore impacts associated with blasting and dredging activities as well as long-term drainage may affect nearshore and offshore waters.
4. The proposed management plan concerning the anchialine ponds should be discussed in more detail.
5. The Draft Kona Regional Plan states that the Kona Water system is overcommitted and that the given cost of developing new water sources and integrating them with the water distribution system, it appears that the availability of additional water commitments will be limited for the foreseeable future. The EIS should discuss the availability of water for the proposed development as well as the impacts on water commitments for the "significant increase in resident population" and the "significant demand for housing in Kona" likely to occur as a result of developing the proposed project.
6. The Hawaii Ocean Science and Technology Park (HOST Park) and the Keahole Airport are in close proximity to the proposed development. The EIS should discuss the impacts of a resort development in close relationship to industrial uses and airport facilities.
7. The EIS should include a discussion of the need for the proposed development relative to future tourism growth, need for hotel/resort condominium units in relation to the existing and proposed supply of units in the Kona region, and the segment of the market that the proposed development will serve.
8. The EIS should discuss the relationship of the proposed Kohana-iki Resort to an adjacent resort proposed at Ooma by Kahala Capital Corporation. (Land Use Commission Docket No. A86-602)
9. The information provided in the document lacks sufficient detail to determine its adequacy in addressing the resource areas covered under Chapter 205A (HRS). This information may be forthcoming at subsequent stages of the project; however, we believe it is important that these potential impacts be addressed early at the conceptual stage of a project.
10. The previously prepared EIS preparation notice indicated a beach at the location of the proposed marina. This beach is not indicated on the maps in the DEIS, nor is it described. The EIS should describe the shoreline area fronting the proposed marina and discuss its recreational value.
11. The DEIS describes the presence of a large number (53) of anchialine ponds, which are known to support unique ecosystems of rare species. To mitigate potential impacts, the DEIS states on page IV-25, "A Management Plan for the anchialine ponds will be developed in consultation with the Army Corps of Engineers and the Fish and Wildlife Service." We would like to recommend that the management plan also be developed in consultation with the Department of Planning and Economic Development, the Department of Land and Natural Resources and the County of Hawaii Planning Department.

The Honorable Albert Lono Lyman  
Page 2  
August 6, 1986

The Honorable Albert Lono Lyman  
Page 3  
August 6, 1986

12. The development of the proposed marina may have significant impacts including destruction of coral reef, increased siltation and sedimentation in adjacent areas, and the loss of an anchialine pond. The potential impacts due to the marina will be presented in a supplemental EIS, however, the EIS should indicate the importance of the marina to the viability of the project.
13. Relative to the listing of permits and approvals on page I-7, please be advised that if a U.S. Army Corps of Engineers permit is required for the project, a CZM consistency determination from our department will also be required in accordance with Federal CZM regulations, 15 CFR Part 930.

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

Very truly yours,

*Murray E. Towell*  
Kent M. Keith

cc: ✓ Mr. Thomas A. Fee  
Helber, Hastert, Van Horn & Kimura  
Office of Environmental Quality Control

15 August 1986

The Honorable Kent M. Keith  
Director  
State Department of Planning and Economic Development  
P. O. Box 2359  
Honolulu, Hawaii 96804

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Keith:

Thank you for your comments of August 6, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community. Our comments are as follows:

**Comment (1):** The EIS should identify the Phase 1A sewage disposal system and its impacts on the environment including the nearshore marine waters. The EIS should also contain a specific timeframe for the development to include the number of units, extent of infrastructure, and associated costs.

**Response:** As noted in the EIS (Page IV-46 & 47), the report examined five alternative treatment systems. At the present time the most feasible systems from an environmental and economic perspective, appears to be a single centralized treatment facility (as discussed in Chapter 2.6 of the DEIS). The construction of this plant could be designed to be expandable to accommodate the phased growth of the proposed resort. The treated effluent will be utilized to irrigate the golf course. No adverse environmental impacts on the environment, including the nearshore marine waters are expected to occur, providing that effluent levels entering the ground water have acceptable nutrient levels. Acceptable nutrient levels can be obtained with proper management using the mitigative measures presented in Chapter 4.3.3.3.

As noted in the EIS, the first phase (Phase 1A) is planned to be constructed within two years of receiving final government approvals. The subsequent phases could follow within two to three year increments, depending on market demands. The following table presents information on the number of units and related infrastructure and approximate costs by development phase.

PHASING AND ESTIMATED ORDER OF  
 MAGNITUDE INFRASTRUCTURE COSTS

Phase	Land Use	Units	Subtotal	Infrastructure Costs (\$ millions)
1A	Hotel	400		
	Support Housing	50	450	
	Golf Course			
	Infrastructure			\$21
1B	Hotel	300		
	Resort Condos	470		
	Support Housing	50	820	
	Commercial Village			
	Recreation Complex			
	Infrastructure			\$5
1C	Mixed Use Com'l			
	Facilities	330		
	Support Housing	50	380	
	Marina Basin			
	Infrastructure			\$3
2	Fairway Homesites	200	200	
	Infrastructure			\$1
TOTAL			1,850	\$30

**Comment (2):** The EIS should identify the existing and potential demand for specific recreational uses such as fishing, surfing, and diving, and describe the planning criteria and development phasing for public access facilities. It would be helpful to indicate in the EIS the number and location of accessways, public parking facilities, comfort stations and appurtenant facilities.

**Response:** The coastal areas of the Kohana-iki site provide a popular recreational spot for residents of the North Kona area. Entry to the area via the NELH access road and shoreline road is possible for many types of automobiles, and on any weekend numerous persons can be found either fishing, surfing or diving offshore. The applicant is proposing to improve direct access to the "Pine Trees" Beach area which should facilitate access to this area to a broader cross section of the North Kona population and thereby increase recreational use of the area by local residents (Chapter 4.1.17.2). The beach access will be constructed during the initial development phase (Phase 1A) and will include paved public parking facilities and related comfort stations and appurtenant facilities. Another coastal access point will be provided at the boat launching ramp area at the southern end of the site (refer to response to Hawaii County Department of Parks and Recreation's comments concerning coastal access).

**Comment (3):** The dredging and supporting infrastructure concerning the marina should be further discussed.

**Response:** As discussed in our first response to your comments to the EISPN (Page X-22) and later in numerous places throughout the DEIS (i.e., Chapters 1.4.3, 1.7, and 4.1.9), the marina design and related environmental impacts and mitigative measures related to the marina development discussed in this EIS are intended to be of a general nature and are not meant to substitute for more detailed studies prepared in conjunction with a subsequent supplemental EIS prepared pursuant to obtaining an Army Corps permit for marina construction.

**Comment (4):** The proposed management plan concerning the anchialine ponds should be discussed in more detail.

**Response:** The formulation of an approved detailed pond management plan for inclusion in the Final EIS is premature at this stage in the development process. The applicant does not feel it desirable or appropriate to merely copy a management plan prepared for a different project in a different location (for inclusion in the Final EIS). Kohana-iki is a unique place and as such will require a unique plan. Included instead and attached to this letter, is a short report outlining guidelines for the preparation of the Kohana-iki anchialine pond management plan. These guidelines provide a framework, or starting point for the management plan by identifying objectives, responsibilities and consulted parties in the plan formulation process. At your request, we have expanded the list of consulted parties to include not only the Corps of Engineers and the Fish & Wildlife Service, but also your agency, State Department of Land and Natural Resources, and the Hawaii County Planning Department. Over the coming months, input from these agencies will be sought with the objective of submitting a comprehensive management plan as part of the Special Management Area Permit process administered by the Hawaii County Planning Department.

**Comment (5)** The EIS should discuss the availability of water for the proposed development as well as the impacts on water commitments for "significant increase in resident population" and the "significant demand for housing in Kona" likely to occur as a result of developing the proposed project.

**Response:** Discussions with the Hawaii County Department of Water Supply indicate that adequate water supply can be made available to the project if the developer contributes to the cost of source and transmission facilities. The applicant is also expected to share in the cost of the secondary impacts of resort development on water commitments through offsetting tax revenues and by participating in employee housing programs coordinated through the Hawaii County Office of Housing and Community Development.

**Comment (6):** The EIS should discuss the impacts of a resort development in close relationship to industrial and airport facilities.



**Response:** The proposed Kohana-iki Resort is separated from both the HOST Park and the Keahole Airport by the O'oma II parcel (Chapter 4.1.4). The only potentially significant impact between the HOST Park and the resort will be vehicular traffic generated onto the Queen Kaahumanu Highway by the respective developments. As noted in Chapter 4.3.1.2, "...the applicant is cognizant of the proposed increases in traffic generation from surrounding developments, and will work with adjacent landowners and the State Highways Division to manage the roadway in the most responsible manner." The significant impacts of the resort in close relationship to the Airport are discussed in detail in Chapters 4.1.4, and 4.1.10.

**Comment (7):** The EIS should include a discussion of the need for the proposed development relative to future tourism growth, need for hotel/resort condominium units in relation to the existing and proposed supply of units in the Kona region, and the segment of the market that the proposed development will serve.

**Response:** A detailed market study and highest and best use analysis was conducted in order to determine the need for the proposed development relative to future tourism growth, need for hotel/resort condominium units in relation to the existing and proposed supply of units in the Kona region, and the segment of the market that the proposed development would serve. This report was attached to the EIS as Appendix A and summarized in Chapter 2.3 of the EIS.

**Comment (8):** The EIS should discuss the relationship of the proposed Kohana-iki Resort to an adjacent resort proposed at O'oma.

**Response:** The proposed O'oma II Resort has recently submitted a Draft EIS to the Hawaii County Planning Department pursuant to a General Plan amendment request to reclassify the property to an intermediate resort designation. Whether or not the O'oma II Resort will ultimately receive approval for development depends upon whether it secures all the required development approvals from the respective State and county agencies. Predicting the outcome of the O'oma II development process is difficult at this time. If both the Kohana-iki and the O'oma II Resorts were to receive development approvals within a relatively short period of time of each other, significant cost savings may be available in the form of shared infrastructural systems such as wastewater treatment and disposal, electrical substations and water source development and transmission. However, it should be noted here that the Kohana-iki Resort Community has been planned as an independent resort and is no way dependent on the development of the adjacent O'oma parcel.

**Comment (9):** The information provided in the document lacks sufficient detail to determine its adequacy in addressing the resource areas covered under Chapter 205A HRS.

**Response:** The provisions of Chapter 205A HRS establish State policies for any action affecting the coastal zone. Section 205A-Part I provides the

objectives, policies, and guidelines to which the counties must adhere in their administration of the coastal zone (Special Management Area or SMA). The relationship of the proposed Kohana-iki Resort to the areas of statutory concern is discussed below.

**Recreational Resources.** The development is not expected to reduce the size of any beach or any other area suitable for public recreation. Coastal access will be improved with the provision of paved roadways and public parking.

**Historic Resources.** The master plan provides for appropriate mitigative actions for all significant historical and archaeological resources including further data recovery and preservation.

**Scenic and Open Space Resources.** Extensive landscaping and the open space corridors of the golf fairways together with the undeveloped pond preserve and coastal setback areas will provide a dramatic visual character to the resort development. The resort will be set back from the coast to prevent any degradation of existing views along the coast.

**Coastal Ecosystems.** The proposed development should not adversely affect water quality, existing and potential fisheries and fishing grounds, or wildlife habitats. Monitoring of water quality and marine life would insure the integrity of these resources.

**Economic Uses.** The mix of uses proposed in the master plan is intended to produce a suitable match between land uses and locational characteristics so that developments requiring proximity to the coast are given priority siting.

**Coastal Hazards.** No habitable development is proposed for areas susceptible to flooding hazard from tsunami and high wave run-up.

**Comment (10):** The EIS should describe the shoreline area fronting the proposed marina and discuss its recreation value.

**Response:** As noted in the response to Comment No. 2 above, the coastal areas provide a popular recreational resource for the North Kona community. The amount of recreational activity along the shoreline falls off rapidly however, south of the "Pine Trees" beach, as the coastal trail crosses first over sandy areas and then over extremely rocky areas, making it difficult for vehicles to pass. Thus, little recreational activity has been observed in the area fronting the proposed marina. The general area of the marina entrance (the actual location and orientation of the marina entrance have yet to be determined) marks the transition from a lava promontory to a sandy storm beach. In this area the coastal trail forms a distinct boundary between the coastal strand and the kiawe thicket inland. The narrow beach, comprised of white calcereous sand, could provide opportunities for sunbathing and beachcombing. However, most of the area at the water's edge is covered with rock, boulders and cobbles making swimming difficult. Most of the nearshore area out to about 200 feet is very shallow with numerous rocks sticking out above sea level.

The Honorable Kent M. Keith  
15 August 1986  
Page 6

Comment (11): We would like to recommend that the anchialine pond management plan also be developed in consultation with DPED, Department of Land and Natural Resources, and the County of Hawaii Planning Department.

Response: Your recommendation has been incorporated into the EIS. Please refer to our response to your comment No. (4).

Comment (12): The EIS should indicate the importance of the marina to the viability of the project.

Response: The proposed marina development will be a major attraction and activity center for the Kohana-iki Resort as well as filling a need in the West Hawaii region (See Hallstrom Marina Market Study, Appendix G and summarized on Page II-3 of the EIS). It would be an amenity that no other West Hawaii resort now offers and therefore would contribute to the sense of uniqueness the applicant is trying to create. It is not, however, fundamental to the viability of the resort development. Discussions with hotel and resort condominium operators and developers indicate that they do not view the marina development as essential to the success of the resort.


Comment (13): If a U.S. Army Corps of Engineers permit is required for the project, a CZM consistency determination from our department will also be required in accordance with Federal CZM regulations, 15 CFR Part 930.

Response: Your comment has been incorporated into the EIS.

We hope that the comments provided herein address the concerns raised in your letter.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosures

cc: Hawaii County Planning Department

#### GUIDELINES FOR KOHANA-IKI ANCHIALINE POND MANAGEMENT PLAN

- o Intent  
This document has been prepared as part of the Kohana-iki Resort Community Final Environmental Impact Statement (EIS). The intent of this document is to set forth a general framework within which a detailed anchialine pond management plan can be prepared. A major purpose is to express the desire of Kona Beach Development, L.P., the developers of the Kohana-iki Resort Community, to preserve the unique anchialine pond resource in perpetuity. As stated in the Draft EIS, no direct intrusion into the ponds is planned\* and the policing and maintenance of the pond resource will be the responsibility of the developers.
- o Management Plan Objectives
  - a. Maintain the environmental integrity of the existing ponds;
  - b. Protect and manage the resource to provide educational and interpretive opportunities to the public;
  - c. Control and monitor construction activities so that secondary impacts may be identified and mitigation proposed to avoid any detrimental impacts to the ponds; and,
  - d. Provide for a pond manager to implement the management plan and conduct scientific monitoring programs.
- o Pond Areas  
The ponds are generally located in four distinct sub-areas along the coastal area of the Kohana-iki site. From north to south these sub-areas are identified as: North, Middle, South, and Far South. Each of the sub-areas has different characteristics in terms of pond diversity, vitality and uniqueness.
- o Allowable Uses  
Some pond areas offer excellent opportunities for interpretive exhibits, especially in instances where remnants of prehistoric aquaculture may have been practiced. Other areas may lend themselves to different levels of activity, ranging from extremely limited to very active.  
  
The Pond Management Plan will have precisely defined preservation and buffer areas similar to those proposed for the Waikoloa Ponds. Allowable uses, construction and design restrictions within these areas will also be clearly detailed.
- o Pond Management  
Each of the pond areas will be managed by the master developer its designated agent. The basic responsibilities of the pond managers will be to promote the objectives stated above.
- o Pond Management Plan Formulation  
The Management Plan will be prepared pursuant to securing the Special Management Area Permit from the County of Hawaii. The plan will be prepared in consultation with the following agencies: U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, State Department of Planning and Economic Development, State Department of Land and Natural Resources, and the Hawaii County Planning Department.

\* Two recently located ponds lie in the vicinity of the proposed marina basin. Because of the preliminary nature of the planning for the marina development (as noted in the Draft EIS), it is impossible to predict with certainty the ultimate disposition of these two ponds. Although every effort in the design of the basin will be made to preserve them, it is possible that one or both of them will be destroyed. The disposition of these two ponds will be thoroughly discussed together with a detailed discussion of the environmental, economic and social impacts of the proposed marina development, in a subsequent application for a U.S. Army Corps permit to construct the marina basin.

RECEIVED

AUG 13 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

86:PLNG/5203

August 11, 1986

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

Dear Mr. Lyman:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for Kohana-Iki Resort Community, Kona, Hawaii.

Recognizing the need for the development to include employee housing, the Developers have incorporated provisions for such in the master plan. The Hawaii Housing Authority (HHA) would like to further recommend that a representative portion of the residential units be affordable to low (income) to gap-group employees.

We request to be kept apprised of the progress of the development. The HHA supports the continued cooperative efforts between the developers and the County of Hawaii Housing Agency to work towards providing and meeting employee housing needs.

For any further questions, please contact Colette Sakoda of my staff at 848-3226.

Sincerely,

RUSSELL N. FUKUMOTO  
Executive Director

cc: Mr. Thomas A. Fee  
Helber, Hastert, Van Horn & Kimura

15 August 1986

Mr. Russell N. Fukumoto  
Executive Director  
Hawaii Housing Authority  
1002 North School Street  
Honolulu, Hawaii 96817

Environmental Impact Statement (EIS):  
Kohana-Iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Fukumoto:

Thank you for your comments of August 11, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-Iki Resort Community.

The comment concerning your recommendation that a representative portion of the residential units be affordable to low (income) and gap-group employees is noted and is consistent with the development concept for the provision of on-site employee support housing.

We thank you for your support and intend to keep you apprised of the progress of the development.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department

GEORGE R. ARIYOSHI  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
AIRPORTS DIVISION  
HONOLULU INTERNATIONAL AIRPORT • HONOLULU, HAWAII 96819

July 15, 1986

WAYNE J. YAMASAKI  
DIRECTOR

DEPUTY DIRECTORS  
JONATHAN K. SHIMADA, Ph.D.  
WALTER T.M. HO  
CHERYL D. SOON  
ADAM D. VINCENT

IN REPLY REFER TO:

AIR-EP  
86.2370

Mr. Albert Lono Lyman  
Director  
Planning Department  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

RECEIVED

JUL 23 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Dear Mr. Lyman:

Subject: Environmental Impact Statement (EIS) for the  
Kohanaiki Resort Community  
Kohanaiki, North Kona, Hawaii

We have reviewed the subject EIS and are particularly interested in the discussions and exhibits on aircraft noise impacts upon the project site. Based on information available to us at this time, it appears that aircraft noise exposure on the proposed resort site may be of greater significance than purported in the EIS document. Therefore, we would like to request that information on the noise methodology and/or model utilized and the input data base (aircraft type/mix, tracks, thrust settings, etc.) used to generate the noise contours in the EIS exhibits be provided to us. With this information, we feel that an assessment on the accuracy and validity of the noise contours for Keahole Airport as depicted in the EIS document can be ascertained.

Your attention on this matter is appreciated.

Very truly yours,

*Owen Miyamoto*  
OWEN MIYAMOTO  
Airports Administrator

cc: ✓ Mr. Thomas A. Fee (Helber, Hastert, Van Horn & Kimura)  
OEQC  
AIR-H

4 August 1986

Mr. Owen Miyamoto  
Airports Administrator  
Airports Division  
State Department of Transportation  
Honolulu International Airport  
Honolulu, Hawaii 96819

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Miyamoto:

Thank you for your comments of July 15, 1986 to Mr. Albert Lono Lyman Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

Pursuant to your request, we have asked our acoustical consultant, Gordon Bricken & Associates, to respond to your questions regarding the technical considerations underlying the noise methodology and model assumptions used in preparing the L<sub>dn</sub> contours included in the Draft EIS. Please refer to the attached letter. In the Bricken response, reference is made to airport Runways 1 and 19. These are typical runway number assignments related to the airport noise model and should be used interchangeably with the Keahole Airport Runways 17 and 35 (i.e., Runway 1 = Runway 35; Runway 19 = Runway 17).

We hope that the comments provided herein address the concerns raised in your letter.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

*Thomas A. Fee*

Thomas A. Fee  
Project Planner

Enclosure

cc: Hawaii County Planning Department

XH-38



**GORDON BRICKEN & ASSOCIATES**  
CONSULTING ACOUSTICAL and ENERGY ENGINEERS

July 29, 1986

RECEIVED  
AUG 1 1986

HELDER, HASTURI, VAN HORN  
& KIMURA PLANNERS

MR. THOMAS FEE  
HHVH&K -- PLANNERS  
Grosvenor Center, PRI Tower  
733 Bishop Street, Ste. 2590  
Honolulu, Hawaii, 96813

SUBJECT: RESPONSE ON REQUEST FOR INPUT DATA,  
KEAHOLE NOISE CONTOURS

Dear Mr. Fee:

The majority of the data on the contours is listed on the maps. However, we are happy to repeat it. Keep in mind, all Operations Data is based on material supplied by The Planning Center's office in 1983, which was obtained from the Airport.

The operational assignments are listed in Table 1 (following page). A runway diagram is attached as Exhibit 1. Runways 19L and 19R are treated as one, 1R and 1L are also treated as one.

The model used is a simplified version of the INM program I wrote some years ago to work in an IBM-PC. The noise data, the climb curves, and the thrust conditions are from the INM model. The data is listed in Tables 2, 3, 4, and 5.

TABLE 2

CLIMB CURVES

LANDING

All aircraft 3° glide slope: Touchdown at 100' from end of runway.

TAKE-OFF

	<u>DISTANCE</u>	<u>ALTITUDE</u> (2)
2 Eng. Turbo Fan	zero	zero
	4,255	zero
	4,935	100
	14,459	1,500
2 Engine T.P.	99,000	10,883
	zero	zero
	1,600	zero
	2,033	100
2 Engine General Aviation and 1 Engine General Aviation	8,093	1,500
	99,000	19,317
	zero	zero
	2,600	zero
2 Engine General Aviation	3,132	100
	10,578	1,500
	99,000	12,553

(1) Assume stage length -- zero to 500 miles.

(2) Straight-line segments.

TABLE 1  
OPERATIONAL DATA

<u>TOTAL OPERATIONS:</u> 74,296 (non-military)		
<u>RUNWAY UTILIZATION:</u>		
Runway 19:	80% Departures:	20% Landings
Runway 1 :	20% Departures:	80% Landings
<u>DATA USE:</u>		
<u>CASE</u>	<u>DEPARTURE</u>	<u>LANDING</u>
1. a. Jet Commercial	19B = 100%: 1B = 100%	1B = 100%: 19B = 10
b. Non-Commercial and Air Taxi	19B = 100%: 1B = 100%	1B = 100%: 19B = 10
2. a. Jet Commercial	19A = 100%: 1B = 100%	1A = 100%: 19A = 10
b. Non-commercial and Air Taxi	19B = 100%: 1B = 100%	1B = 100%: 19B = 10
<u>AIRCRAFT TYPE:</u>		
	<u>OPERATIONS</u>	<u>PERCENTAGE</u>
2 Eng. Turbo Fan	20,510	27.6
2 Engine TP (Air Taxi)	31,473	42.4
General Aviation: (1)		
1E	12,718	17.1
2E	9,564	12.9
TOTAL	74,286	100.0

(1) General Aviation split 57% 1E: 43% 2E.

DAY/NIGHT:

100% Day: zero % night all aircraft

TABLE 3  
NOISE CURVES -- DEPARTURE

<u>SLANT RANGES</u>	<u>2 ENGINE TURBO FAN</u>		<u>TURBO PROP 2 ENGINE</u>		<u>GENERAL AVIATION (2) 2 ENGINE A/G AND G/G</u>
	<u>A/G (1)</u>	<u>G/G</u>	<u>A/G</u>	<u>G/G</u>	
100	125	124	109	108	110
125	123	122	107	106	109
158	121	120	105	104	108
199	120	118	104	102	107
251	118	116	103	100	106
316	117	114	101	99	105
398	115	113	100	97	104
501	114	111	99	96	103
630	112	108	97	93	101
794	110	105	96	92	100
1,000	108	102	94	89	98
1,250	105	98	92	86	96
1,580	103	95	90	83	95
1,990	102	94	89	81	93
2,510	99	90	87	78	91
3,160	96	87	85	76	89
3,980	95	85	83	74	87
5,010	92	82	82	72	85
6,300	90	80	79	69	83
7,940	88	78	78	68	81
10,000	86	76	76	66	79

(1) A/G = Air-to-Ground  
G/G = Ground-to-Ground

(2) Subtract 3 for single engine

TABLE 4

NOISE CURVES -- LANDING

<u>SLANT RANGES</u>	<u>2ETF</u>	<u>TURBO PROP 2 ENGINE</u>	<u>GENERAL AVIATION 2 ENGINE</u>
100	118	98	(1)
125	116	97	
158	115	95	
199	113	94	
251	111	92	
316	110	91	
398	107	89	
501	105	87	
630	103	85	
794	100	83	
1,000	97	81	
1,250	94	79	
1,580	91	77	
1,990	88	75	
2,510	85	73	
3,160	82	71	
3,980	78	68	
5,010	75	66	
6,300	73	64	
7,940	70	62	
10,000	68	59	

TABLE 5

THRUST ADJUSTMENTS

<u>LANDING</u>	<u>DISTANCE</u>	<u>ADJUSTMENT</u>
<u>LANDING:</u>		
2 Engine Turbo Fan	zero	zero
	9,000	8.0
	10,000	zero
2 Engine Turbo Prop and General Aviation	zero	zero
	10,000	zero
<u>DEPARTURE:</u>		
2 Engine Turbo Fan	zero	7.5
	2,600	zero
	9,093	- 1.6
2 Engine Turbo Prop and General Aviation	zero	zero
	10,000	zero

(1) Same as 2 Engine Turbo Fan (2ETF).

The program works just like the INM. The  $L_{dn}$  value is computed to the equation:

$$L_{dn} = \overline{SEL} + 10 \log W - 49.4$$

$$\text{Where } W = N_D + 10 N_N$$

$N_D$  = Number of operations in a day

$N_N$  = Number of operations in a night

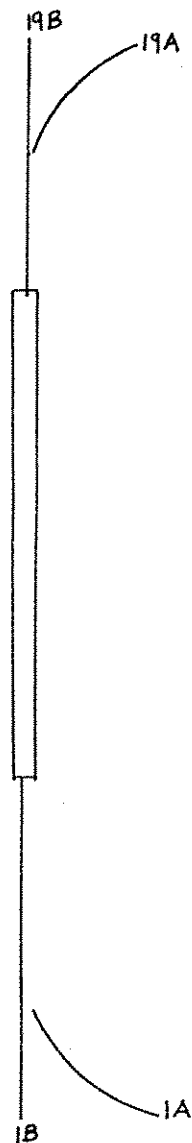
The basic operational module is the number of aircraft operating in a path for the time of day. This number accounts for path percents, runway utilization percents, aircraft percents, and total operations. The program also computes the slant range based on a ground point x feet from reference along path and y feet to side from path and altitude. This slant range is used to look up noise data for the aircraft. The program runs through all combinations for the ground point and sums the output for a total noise level. Points are programmed. The major difference with INM is that the program accepts fewer aircraft types (i.e. library storage is limited) and paths, so as to be able to work within the storage constraints of an IBM-PC without hard disk and to run programs quickly. Keep in mind, we said, that this is not an INM run and will be limited. However, we are confident that the data is expressed correctly.

We hope this information will clarify any questions, and if we may be of further service, please do not hesitate to contact us.

Prepared by:

*Gordon Bricken*  
Gordon Bricken  
President

/mmb







STATE OF HAWAII  
DEPARTMENT OF PLANNING  
AND ECONOMIC DEVELOPMENT

LAND USE COMMISSION

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

GEORGE R. ARIYOSHI  
Governor

TEOFILO PHIL TACBIAN  
Chairman

FREDERICK P. WHITTENORE  
Vice Chairman

COMMISSION MEMBERS:

Richard B. F. Choy  
Lawrence F. Chan  
Everett L. Cusack  
Winona E. Rubin  
Toru Suzuki  
Robert S. Tamaye  
William W. L. Tuen  
ESTHER UEDA  
Executive Officer

July 16, 1986

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

Dear Mr. Lyman:

Subject: Draft Environmental Impact Statement for  
the Kohanaiki Resort Community, Kohanaiki,  
North, Hawaii

Thank you for the opportunity to comment on the subject  
EIS. We have no comments to offer at this time.

Sincerely,

ESTHER UEDA  
Executive Officer

EU:to

cc: Thomas Fee

RECEIVED

JUL 18 1986

HELDER, HASTERT, VAN HORN  
& KIMURA PLANNERS



University of Hawaii at Manoa

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

August 5, 1986

RECEIVED

AUG 11 1986

HELDER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni St.  
Hilo, Hawaii 96720

Dear Mr. Lyman:

Re: Kohana-iki Resort Community, Draft Environmental Impact Statement,  
Kohana-iki, North Kona, Hawaii

The Kohana-iki Resort is a large scale, 2000 unit, resort development to be constructed on the north Kona coast of the Big Island. We have reviewed this document with the assistance of Bion Griffin, Anthropology; Richard Brock, Hawaii Institute of Marine Biology; Yu-Si Fok, Civil Engineering; Doak Cox, emeritus Geophysicist and Scott Derrickson; Environmental Center. The issues examined by our reviewers included sections on natural hazards, the future marina, the impact of the development on the adjacent marine environment and particularly the anchialine pond system, the availability of water resources to service the development, and the provisions for disposal of waste water.

Natural Hazard

Seismicity (p.IV-17): In the Uniform Building Code seismic risk classification, the highest risk zone is Zone 4, not 3 as stated in the EIS, although Zone 4 is restricted to a part of California.

Flood Hazard (p.IV-17): The highest historic tsunami runups on the Kona Coast were those of the Japanese tsunami of 1896, not the Chilean tsunami of 1960. Records of both tsunamis were taken into account in estimating the 100-year tsunami hazard indicated in Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps.

Marine Environment

We understand (p.I-5) that a Supplemental EIS will be prepared when the necessary permit is requested from the Corps of Engineers. At that time, further marine studies should be undertaken to establish the current baseline data on the marine ecosystem that will be affected by the marina development.

Anchialine Ponds

The Kona Coast contains numerous anchialine ponds, of which the Kohana-iki area constitutes one of the larger concentrations of relatively undisturbed ponds of high salinity. High salinity ponds (eg. above 12 ) are relatively uncommon along the Kona Coast. Many of the rarer hypogaeal,

XII-43

cryptic shrimp species are found in higher salinity ponds (above about 13 ) and are most frequently seen at night. Night sampling coinciding with high tides should be undertaken in all ponds that do not have exotic fish so that a complete accounting of aquatic resources is insured.

The developer proposes little destruction of pond resources on the site and has outlined different mitigation measures to limit negative impacts. Considerable changes to the surrounding terrain and area drainage patterns are proposed, thus mitigative measures and management plans seek to develop around but "preserve" the ponds. The initial impacts to the anchialine pond systems may be modest but in the long term we may find the impact from development (eg. chronic elevation of nutrients over considerable time) could result in permanent changes to the pond biota. If all the pond systems along the Kona Coast are so developed, the future of the pond resources along the Kona Coast is jeopardized. The potential cumulative impact of the many adjacent developments along the Kona Coast on the anchialine pond resources should be given discussion in this EIS. Since no long term observations exist that could substantiate whether significant impacts will or will not occur caution is advised in developing projects near anchialine pond resources.

#### Water Sources

The statement (p.IV-45) that " water limitations in the region are a problem of development and transmission rather than source availability " is not supported by a listing of available sources. The Department of Water Supply, County of Hawaii has stated that "based on the prevailing water situation in the area, water is not available for the proposed project". This seems to indicate that the developer will either need to privately develop a new water source or enter into a joint water agreement with the County of Hawaii for development of a new water source.

#### Wastewater

The effluent disposal alternative of golf course pond storage and irrigation needs further elaboration in the Final EIS. Although this method is used in other areas, questions have recently been raised regarding potential health problems associated with golf course effluent ponds.

We appreciate the opportunity to comment on this DEIS.

Yours truly,

*Jacquelin N Miller*  
Jacquelin Miller  
Acting Associate Director

cc: Patrick Takahashi  
OEQC  
Thomas A. Fee  
Bion Griffin  
Richard Brock  
Yu-Si Fok  
Doak Cox  
Scott Derrickson

15 August 1986

Ms. Jacquelin N. Miller  
Acting Associate Director  
Environmental Center  
University of Hawaii  
Crawford 317  
2550 Campus Road  
Honolulu, Hawaii 96822

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Ms. Miller:

Thank you for your comments of July 30, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

**Comment:** In the Uniform Building Code seismic risk classification, the highest risk zone is Zone 4, not three as stated in the EIS, although Zone 4 is restricted to a part of California.

**Response:** Your comment has been incorporated into the revised EIS.

**Comment:** The highest historic tsunami runups on the Kona coast were those of the Japanese tsunami of 1896, not the Chilean tsunami of 1960.

**Response:** Your comment has been incorporated into the revised EIS.

**Comment:** We understand (p.I-5) that a supplemental EIS will be prepared when the necessary permit is requested from the Corps of Engineers. At that time, further marine studies should be undertaken to establish the current baseline data on the marine ecosystem that will be affected by the marina development.

**Response:** As you note, further marine studies will be undertaken to establish the baseline data on the marine ecosystem that will be affected by the marina development.

**Comment:** The potential cumulative impacts of the many adjacent developments along the Kona Coast on the anchialine pond resources should be given discussion in this EIS.

**Response:** The concept that all the anchialine ponds along the Kona Coast are somehow directly connected, in a manner such as a common body of water, and that all these ponds can be considered a single resource (and therefore subject to cumulative impacts) is not supported by scientific evidence at this time. Furthermore, the applicant has stated that none of the Kohana-iki ponds will be destroyed (with the possible exception of one

Ms. Jacquelin N. Miller  
15 August 1986  
Page 2

or two ponds located in the vicinity of the proposed marina) and that a pond management plan will be prepared to manage the ponds in perpetuity.

**Comment:** The statement (p.IV-45) that "water limitations in the region are a problem of source development and transmission rather than source availability is not supported by a listing of available sources.. The Department of Water Supply (DWS) has stated that "based on the prevailing water situation in the area, water is not available for the proposed project." This seems to indicate that the developer will either need to privately develop a new water source or enter into a joint water agreement with the County of Hawaii for development of a new water source.

**Response:** The groundwater resources of the Kona area have been estimated to total 100 million gallons per day (MGD) (Hawaii Water Resources Plan, 1979:54). The capacity of the North Kona water system is estimated to reach 14.4 MGD by 1990 (EIS, Page F-11). Therefore, additional developments in the Kona area will have to assist in new water source and transmission systems in order to acquire adequate sources of water supply. The favored water supply source at this time is to either purchase shares in an existing water source agreement or participate in a new water source agreement (both alternatives under the auspices of the DWS).

The letter from the DWS referred to in your comments was written in reference to the EIS preparation notice. A subsequent DWS response to the Draft EIS (reprinted in this Chapter) concurs with our assessment that "Additional source and transmission facilities need to be constructed."

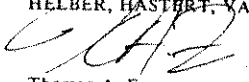
**Comment:** The effluent disposal alternative of golf course pond storage and irrigation needs further elaboration in the Final EIS. Although this method is used in other areas, questions have recently been raised regarding potential health problems associated with golf course effluent ponds.

**Response:** Your attention is directed to Chapter 4.3.3.3 and Page F-16 which contain discussions of measures to mitigate health problems associated with golf course use of wastewater effluent.

We trust our responses have addressed your concerns.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department



## University of Hawaii at Manoa

Water Resources Research Center  
Holmes Hall 283 • 2540 Dole Street  
Honolulu, Hawaii 96822

6 August 1986

RECEIVED

AUG 8 1986

Mr. Albert Lono Lyman, Director  
County of Hawaii Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Dear Mr. Lyman:

**Subject:** Draft Environmental Impact Statement, Kohana-Iki Resort Community, North Kona, Hawaii, July 1986

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

1. The specific locations of the anchialine ponds shown in Fig. 14 should also be clearly designated in the development plan (Fig. 3) so that their relative locations can be seen.
2. The full text of the Anchialine Ponds Management Plan is not available for review.
3. Water supply alternatives are presented (p. IV-44) but no specific source has been identified; therefore, its environmental impact cannot be reviewed.

Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

  
Edwin T. Murabayashi  
EIS Coordinator

ETM:jm

cc: T. A. Fee  
Helber, Hastert, VanHorn & Kimura

15 August 1986

Mr. Edwin T. Murabayashi  
EIS Coordinator  
Water Resources Research Center  
University of Hawaii  
Holmes Hall 283  
2540 Dole Street  
Honolulu, Hawaii 96822

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Murabayashi:

Thank you for your comments of August 6, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

We have enclosed a copy of the Preliminary Site Plan (Figure 3) with the pond information highlighted. It should be noted that the site plan is preliminary and was prepared only to show the relative massings and densities required to develop the project.

Your comment that the full text of the Anchialine Pond Management Plan is not available for review is noted. We have attached a brief report entitled "Guidelines for the Kohana-iki Anchialine Pond Management Plan" which we feel establishes the framework for a comprehensive management plan. The actual plan will be formulated over the coming months and submitted pursuant to the Special Management Permit process administered by the County of Hawaii.


Your comment about water supply alternatives is noted. As stated in the EIS, the applicant is considering a number of alternatives (Chapter 4.3.2). The most promising at this point in time is the development of a new water agreement with the County wherein the County would be responsible for easement acquisitions as well as design and development; funding would be provided by a pool of developers. Because the Kohana-iki development would only be one of many participants in the water source agreement, it would be incumbent on the county--the actual water system developer--to provide a comprehensive impact analysis, should they deem it necessary.

Mr Edwin T. Murabayashi  
15 August 1986  
Page 2

We hope our responses have adequately addressed your comments.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosure

cc: Hawaii County Planning Department





COUNTY OF  
HAWAII

**PLANNING DEPARTMENT**

25 AUPUNI STREET • HILO, HAWAII 96720  
(808) 961-8288

DANTE K. CARPENTER  
Mayor

ALBERT LONO LYMAN  
Director

ILIMA A. PHANAIA  
Deputy Director

August 7, 1986

Helber, Hastert, Van Horn and Kimura  
Grosvenor Center, PRI Tower  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii

Attention: Tom Fee

Gentlemen:

**RECEIVED**  
AUG 14 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Kohanaiki Draft EIS - Comments

We have reviewed the subject draft EIS and submit the following comments. Our comments are submitted with the understanding that a supplemental EIS will be prepared when detailed plans for the marina are developed and the impacts from this portion of the proposed development can be adequately assessed and described.

Land Use Policies: In the section discussing the General Plan Land Use Pattern Allocation Guide (LUPAG) map designations, we suggest that the document consistently use the term "designations" rather than "zones" in order to avoid any confusion with actual zoning designations. The statement regarding the General Plan designation for the Hawaii Ocean Science and Technology (HOST) Park is not correct.

Archaeological impacts: Although the draft EIS and archaeological reconnaissance report adequately describes the sites on the property, the survey methodology and an outline of recommendations for additional work, these documents do not describe the sites in relation to the sites in the adjacent Kaloko-Honokohau National Historic Landmark. The draft EIS also does not discuss the current status of and the possible indirect impacts to the proposed National Historic Park at Kaloko-Honokohau.

Helbert, Hastert, Van Horn and Kimura  
August 7, 1986  
Page 2

While the National Parks Service has commented that the recommended boundary for the proposed National Historic Park includes the coastal strip of Kohanaiki to Wawahiwa Point, we are not aware that these lands have been part of the official appraisals and proposals to purchase and/or exchange lands or easements by the National Park Service. A clarification on this inclusion within the park boundaries should be discussed in the final EIS.

The EIS should note that the County will further review the archaeological impacts if the property is eventually rezoned, and that the site preservation requirements will be determined in conjunction with the Shoreline Management Area permit.

Recreational impacts: Although Sec. 4.1.17.2 notes that public access is currently planned for the Kohanaiki Resort, a public access system is not described in this section nor in the section relating to the overall master plan. Is it, for example, the intent to keep the coastal access to pedestrian ways with mauka-makai points of entry or is it the intent to maintain the existing un-improved jeep trails or allow for some vehicular lateral access?

Support Housing: It should be noted that there has not yet been a determination made regarding the extent of the support housing that will be required in conjunction with the development of the resort. The County's resort housing requirement in the General Plan should be included. The reference to consultation with "County Housing officials" should be changed to "County". The analysis of housing requirements should also include consideration of the indirect population impacts and the resulting housing requirements.

Anchialine pond impacts: The anchialine pond management plan will be addressed in conjunction with the Shoreline Management Area permit process and should also include the Planning Department as a consulting party. In this regard, the Army Corps of Engineers may be involved only if ponds are filled or new ponds are created. We would also note that the mangrove stand also impacts upon the anchialine ponds. Will the management plan also address the possibility of removing this stand to prevent its taking over the anchialine ponds in the vicinity?

Marina construction impacts: In addition to a Federal EIS, a supplemental EIS under Chapter 343, H.R.S. (State) will also be required.

XII-48

Helber, Hastert, Van Horn and Kimura  
August 7, 1986  
Page 3

Roadways and probable impacts: The impact of the resort visitors, residents and employees on traffic needs further analysis beyond the probable impact on the Queen Kaahumanu Highway.

Wastewater treatment and disposal: Gross order of magnitude cost estimates should be provided for the alternative wastewater treatment and disposal systems for the proposed resort.

Water resources: Section 4.3.2 concludes that water limitations are a problem of development and transmission rather than source availability, hence negative impacts on the environment from properly designed and operated systems should be negligible. Since no potential source or sources have been identified, we do not feel that the draft adequately addresses the issue of the present lack of a water source and system for the proposed development, the anticipated demand, potential sources to meet that demand, and gross order of magnitude costs for systems development.

Should you have any questions or wish to meet with us to discuss these comments, please do not hesitate to contact us.

Sincerely,

  
for ALBERT LONO LYMAN  
Planning Director

ALL/VKG:aeb

15 August 1986

Mr. Albert Lono Lyman, Director  
Hawaii County Planning Department  
25 Aupuni Street  
Hilo, Hawaii 96720

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Lyman:

Thank you for your comments of August 7, 1986, relative to the Draft EIS for the proposed Kohana-iki Resort Community. We have responded to your comments in the order they have been presented.

Comment: Land Use Policies. In the section discussing the General Plan Land Use Pattern Allocation Guide (LUPAG) map designations, we suggest that the document consistently use the term "designations" rather than "zones" in order to avoid any confusion with actual zoning designations. The statement regarding the General Plan designation for the Hawaii Ocean Science and Technology (HOST) Park is not correct.

Response: Your recommendation regarding the use of the word "designation" in reference to LUPAG Map land uses is noted and the appropriate revisions have been made to the EIS. We have also corrected the statement made on page III-24 of the DEIS to clarify that the "Industrial" LUPAG designation of the property was not derived through the county zoning ordinance.

Comment: Archaeological Impacts.

- a. The DEIS and the archaeological reconnaissance report do not adequately describe the relationship between the archaeological sites at Kohana-iki and those of the adjacent Kaloko-Honokohau.
- b. The DEIS also does not discuss the current status of the possible indirect impacts to the proposed National Historic Park at Kaloko-Honokohau.
- c. A clarification of the proposed National Park boundary with respect to the Kohana-iki site should be discussed in the FEIS.
- d. The EIS should note that the County will further review the archaeological impacts if the property is eventually rezoned, and that the site preservation requirements will be determined in conjunction with the Shoreline Management Area permit.

**Response:**

- a. The principal purpose of the full archaeological reconnaissance study prepared for the Kohana-iki site was to identify and locate sites or features of archaeological and historic significance. The report did not specifically address the interrelationship of the Kaloko and Honokohau archaeological sites with those of Kohana-iki.

The Kaloko and Honokohau ahupua'as are located directly south of the Kohana-iki ahupua'a and have been identified for purchase as a national park by the National Park Service. At least two major fishponds at Kaloko-Honokohau have provided the focal point for a large prehistoric settlement, much like Anaeho'omalu and Kalahuipua'a further north along the West Hawaii coastline. Associated with the large prehistoric settlement at Kaloko-Honokohau, are 3 major heiau, a large cemetery and a holua slide. Archaeological evidence as well as traditional evidence indicate the Kaloko-Honokohau area was a very important political and ceremonial center.

The Kaloko-Honokohau area is also characterized by its soils which were able to support prehistoric agriculture. These soils extend over into the southern portion of the Kohana-iki site, and thus it is expected that some limited farming took place there as well. In addition to this possible interrelationship, a number of large prehistoric habitation complexes occur in the coastal portion of Kohana-iki, which appear to be related to the adjacent Kaloko-Honokohau settlement or at least the fishponds. An examination of these remains indicates that Kohana-iki may represent a transition zone of settlement pattern from alii class at Kaloko-Honokohau to a commoner class on the periphery.

- b. The comments of the National Park Service and our responses to them present a detailed discussion of the possible impacts to the National Historic Park at Kaloko. These comments have been incorporated into the comment section of the revised EIS.
- c. Refer to response (b) above.
- d. Your comment is noted. The EIS notes that the County will further review the archaeological impacts if the property is eventually rezoned, and that the site preservation requirements will be determined in conjunction with the Shoreline Management Area permit.

**Comment: Recreational Impacts.** A public access system is not adequately described in the DEIS.

**Response:** The intent of the public access system is to maintain the present coastal access to lateral pedestrian ways with two mauka-makai points of entry: one at the Pine Trees beach area; and one at the proposed marina. Vehicular use of the existing jeep trail along the shoreline will be prohibited.

**Comment: Support Housing.** It should be noted that there has not yet been a determination made regarding the extent of the support housing that will be required in conjunction with the development of the resort. The County's resort housing requirement in the General Plan should be included. The reference to consultation with "County Housing officials" should be changed to "County." The analysis of housing requirements should also include consideration of the indirect population impacts and the resulting housing requirements.

**Response:** As you point out, there has not yet been a determination made regarding the extent of the support housing that will be required in conjunction with the development of the resort. Regarding the County's resort housing requirement found in the General Plan, your attention is directed towards Chapter 4.2.5, Page IV-37 where reference is made to the housing requirements of the General Plan.

Your comment to change "County housing officials" to "County" is noted and corrected in the revised EIS. Regarding indirect population and housing demands, they will inevitably be generated as a result of resort development. These demands are caused by workers whose employment is indirectly supported by the resort development and by new workers filling positions vacated by others who would take jobs at the resort. The indirect employee housing demands are extremely hard to predict, partly due to the difficulty in understanding how many times job turnover occurs down the line as a result of an initial job change and how much housing is needed for each subsequent change. Because of this, a continuing dialogue must ensue with State and County agencies to insure that these very real housing needs are met.

**Comment: Anchialine Pond Impacts.** The anchialine pond management plan will be addressed in conjunction with the Shoreline Management Area permit process and should also include the Planning Department as a consulted party. In this regard, the Army Corps of Engineers may be involved only if ponds are filled or new ponds are created. We would also note that the mangrove stand also impacts upon the anchialine ponds. Will the management plan also address the possibility of removing this stand to prevent its taking over the anchialine ponds in the vicinity?

**Response:** We concur with your assessment that the anchialine pond management plan can best be addressed in conjunction with the SMA permit process and that your agency should be involved in plan formulation. We have prepared a brief outline entitled "Guidelines for Kohana-iki Anchialine Pond Management Plan" for your review. This document will provide a guide to future plan formulation.

**Comment: Marina Construction.** In addition to a Federal EIS, a supplemental EIS under Chapter 343, H.R.S. (State) will also be required.

**Response:** Your comment is noted and incorporated into the EIS.



Mr. Albert Lono Lyman  
15 August 1986  
Page 4

**Comment: Roadways and Probable Impacts.** The impact of the resort visitors, residents and employees on traffic needs further analysis beyond the probable impact on the Queen Kaahumanu Highway.

**Response:** Regional traffic impacts are difficult to predict in the absence of large amounts of data on projected regional, economic, employment and housing forecasts and detailed information on the nature and timing of regional development proposals. Notwithstanding this, it is possible to discuss at a general level the anticipated regional impacts of vehicular traffic generated by the Kohana-iki Resort.

Increased vehicular traffic can be expected to increase island-wide as a result of the resort development as is the case with any significant new development. Because the resort is located near the regional airport (approximately two miles distant) and because this will be the major port of entry and departure for the majority of the resort guests, a major segment of the vehicular traffic (i.e., visitor trips to and from the Keahole Airport), will only impact a small portion of the Queen Kaahumanu Highway including traffic in and out of the Airport. This is not the case with many other resorts in South Kohala and North Kona as these resorts are located much further away from the airport and hence cause a greater impact.

As noted in the EIS, Kohana-iki is a planned, integrated resort. All amenities will be located on-site making it unnecessary for any of the resort guests and residents to travel off the site. Many guests will of course wish to travel to the numerous scenic, cultural, recreational and commercial attractions the Big Island has to offer. Kailua-Kona, a major commercial center, will be a principal attraction to many of the guests and residents and will therefore experience increased traffic. The costs associated with this increase in traffic will at least partially offset the increase in sales and associated tax payments of Kailua-Kona merchants. The volume of trips to any particular location other than perhaps to Kailua-Kona, is not expected to be significant.

The 1,525 employees (the majority of which will be employed at either the two hotels or in one of the commercial shops) of the resort are expected to reside, for the most part, either onsite in one of the 150 support housing units (no commute-to-work trips) or south of the resort in the greater Kailua-Kona area. Some will inevitably commute from as far away as Hamakua and Hawi to the north and as far south as Captain Cook. With the majority of employees expected to commute from the Kailua-Kona area, it can be expected that this area will receive the greatest impact. To a certain extent, Kailua-Kona residents commuting to and from work at the resort will offset residents from rural areas and other districts commuting to work in Kailua-Kona. Also, because of the nature of hotel employment (1,008 employees) where work shifts work around the clock, peak hour traffic flows generated by the resort will be somewhat attenuated as will impacts to critical intersections in Kailua-Kona such as the Queen Kaahumanu/Palani Road Intersection.

In summary, the impact of the resort visitors, residents and employees on traffic can be expected to extend beyond the impacts on the adjacent Queen

Mr. Albert Lono Lyman  
15 August 1986  
Page 5

Kaahumanu Highway. Next to the resort itself and the immediate segments of the Queen Kaahumanu Highway adjacent to the resort, the greatest potential impacts of resort related traffic would appear to be in and around the Kailua-Kona area. This will be at least partially offset by increases in retail sales by the local merchants. Resort employees will also add to the Kailua-Kona traffic but because of the nature of the employment, these impacts are not expected to be significant.

**Comment: Wastewater Treatment and Disposal.** Gross order of magnitude cost estimates should be provided for the alternative wastewater treatment and disposal systems for the proposed resort.

**Response:** At the present time, the favored wastewater treatment system is a centralized plant and transmission system which can be built in two phases to correspond with the development phasing of the resort. The gross order of magnitude cost for this system is estimated at \$8.32 million.

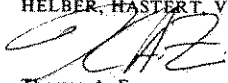
**Comment: Water Resources.** We do not feel the DEIS adequately addresses the issue of the present lack of a water source and system for the proposed development, the anticipated demand, potential sources to meet that demand, and gross order of magnitude costs for systems development.

**Response:** The EIS examined four potential water development alternatives (Chapter 4.3.3, Page IV-44). As noted in the EIS, the most probable alternative is the development of a new water agreement wherein the County would be responsible for easement acquisition as well as the design, source development and operation; funding would be provided by a pool of developers. Another variant of this alternative would be to purchase shares in an existing water source agreement. Because these types of agreements pass control of source development over to the County, it is impossible to identify the actual source of water at this time. The anticipated demand for water has been recently reexamined by our engineers in light of new information from the Department of Water Supply and further refinement of the landscaping plan. Table 10, Projected Water Demand, has been adjusted to reflect the current built-out water demand of 2.7 MGD. The gross order of magnitude cost to provide this amount of water to the resort is estimated at \$12.65 million.

We trust our responses have addressed your concerns.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosure

XII-51

Dante K. Carpenter  
Mayor

Eugene N. Tiwanak  
Managing Director



DEPARTMENT OF PARKS & RECREATION  
COUNTY OF HAWAII

Patricia G. Engelhard  
Director

Ronald Okamura  
Deputy Director

July 18, 1986

Mr. A. Lono Lyman, Planning Director  
County of Hawaii  
25 Aupuni Street  
Hilo, HI 96720

Subject: Kohana-iki Resort Community, North Kona, Hawaii  
Draft Environmental Impact Statement

Dear Mr. Lyman:

The draft EIS has been reviewed and we are pleased to note that an anchialine pond management plan and a historic preservation program are being developed. It is also noted that public shoreline access is being improved, as well as access to the "Pine Trees" beach area.

Our only comment concerns the preliminary site plan (figure 3) which shows termination of the beach trail at the marina. Perhaps, this is an oversight and we would recommend that the beach trail be extended south of the marina to the boundary of the adjoining property.

We would appreciate being able to provide additional input as detailed development plans are finalized.

Thank you.

Sincerely,

*Patricia Engelhard*  
Patricia Engelhard  
Director

PE:GM:ai

J cc: Mr. Thomas A. Fee

RECEIVED

JUL 19 1986

HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

XII-52

7 August 1986

Ms. Patricia Engelhard, Director  
Department of Parks & Recreation  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 97720

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Ms. Engelhard:

Thank you for your comments of July 18, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community.

The southerly extension of the coastal beach trail which you refer to was inadvertently omitted from the Preliminary Site Plan (Figure 3). Preliminary plans for the proposed marina basin indicate that the trail in this area will not be impacted by harbor construction except by necessity at the entrance channel. It is the applicant's intent that pedestrian beachgoers will have continued access to the existing coastal trail system. A promenade around the perimeter of the marina basin will allow for continued north-south pedestrian movements along the coast.

We hope that the comments provided herein address the concerns raised in your letter. We will keep you informed as more detailed development plans are finalized.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

*Thomas A. Fee*  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department

DEPARTMENT OF PUBLIC WORKS  
COUNTY OF HAWAII  
HILO, HAWAII

Planning Department  
Page 2  
July 30, 1986

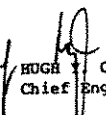
*Memorandum*

DATE July 30, 1986

TO : Planning Department  
FROM : Chief Engineer  
SUBJECT: KOHANA-IKI RESORT COMMUNITY  
Draft EIS  
Kohana-Iki, North Kona, Hawaii

**RECEIVED**  
AUG 4 1986  
HELBER, HASTERT, VAN HORN  
& KIMURA PLANNERS

Page F-20 - Second paragraph concludes that the solid waste generated won't adversely impact the county's landfill. We see it differently. A single source which represents 16.9 percent of the volume is a significant single generator of solid waste.

  
HUGH F. ONO  
Chief Engineer

DEM:BOH:aa

cc: Helber, Hastert, Van Horn & Kimura  
Engineering & Surveys  
W&SW

We have reviewed the draft EIS and our comments are as follows:

ENGINEERING AND SURVEYS DIVISION

The roadway shall be kept in private ownership.

The public pedestrian access shall be clearly marked and privately maintained.

To facilitate the review of the building locations, the V-15 and A-4 zones should be superimposed on the development's site plan.

Flood ordinance requirement for the Coastal High Hazard Area states that "Fill is prohibited for structural support in a Coastal High Hazard Area."

Buildings shall be made to conform to all requirements of the Code pertaining to building construction.

A grading permit is required for this development.

Roadways are usually at the perimeter of a golf course. In this case, the course and roadways are interwoven. Assure that crossings have adequate sight distance.

WASTEWATER AND SOLID WASTE DIVISION

Page F-19 - First sentence is in error. The County of Hawaii operates only two landfills and not three.

XII-53

XII-54

15 August 1986

Mr. Hugh Y. Ono, Chief Engineer  
Department of Public Works  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

Environmental Impact Statement (EIS):  
Kohana-Iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Ono:

Thank you for your comments of July 30, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community. We have prepared our response to your comments in consultation with our engineering consultants, M & E Pacific, Inc.

All of your comments are acknowledged and those requiring specific responses are discussed below.

**Comment:** To facilitate review of the building locations, the V-15 and A-4 zones should be superimposed on the development's site plan.

**Response:** We have attached an amended site plan with the V-15 and A-4 zones superimposed. It is important to note that the principal purpose of the preliminary site plan is to portray the relative massings and densities of the proposed resort in relation to the land. Building design and location have not yet been finalized.

**Comment:** Page F-19 - First sentence is in error. The County of Hawaii operates only two landfills and not three.

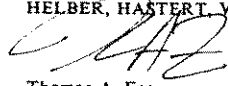
**Response:** The revised EIS has been corrected to state that the County of Hawaii operates two landfills instead of three. The conversion of the Waimea landfill into a transfer station was overlooked when the report was written. Although the waste generated by the proposed resort is estimated to represent approximately 16.9 percent of the county landfill capacity, this will not be sufficient to require the construction of a new landfill or significantly shorten landfill life.

Mr. Hugh Y. Ono  
15 August 1986  
Page 2

We trust our responses have addressed your concerns.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

Enclosure

cc: Hawaii County Planning Department

COF



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

25 AUPUNI STREET • HILO, HAWAII 96720

JUL 16, 1986

RECEIVED

JUL 19 1986

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

TO: Planning Department  
 FROM: H. William Sewake, Manager  
 SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT  
 KOHANA-IKI RESORT COMMUNITY  
 TAX MAP KEY 7-3-09:31 AND 16  
 FILE NO. BA-7-004-0034

As stated in the document, existing water system facilities will not be able to support the proposed development. Additional source and transmission facilities need to be constructed.

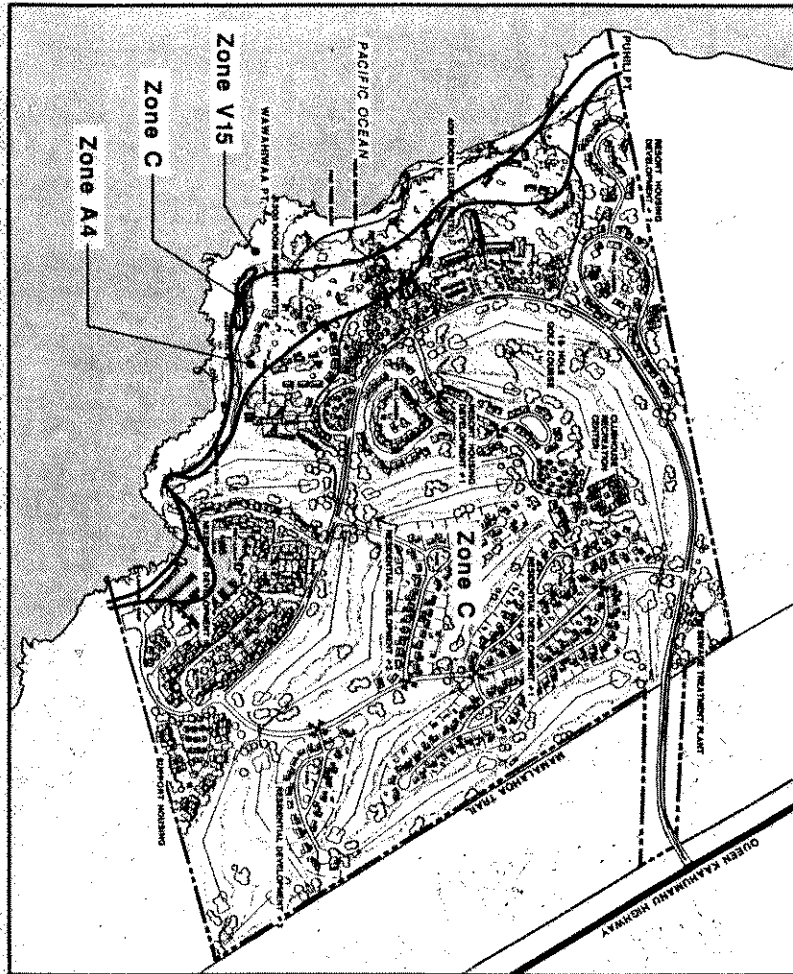
For your information, the Department uses a maximum water demand rate of 500 gallons per day per residential or hotel unit. This demand rate may be higher for other areas like West Hawaii.

The different water development alternatives described in the document should be further discussed among the parties involved in order that a mutually acceptable alternative is finally pursued.

*H. William Sewake*  
 H. William Sewake  
 Manager

JA

cc - Mr. Thomas A. Fee



XII-55

Preliminary Site Plan

**KOHANA-IKI**

Kona Beach Development Ventures

HELBER, HASTERT, VAN HORN & KIMURA  
 PLANNERS

500 Feet Figure: 3

REFERENCE  
 Site Plan Prepared by  
 Helber, Hastert, Van Horn & Kimura,  
 Architects, Ltd.

... Water brings progress...

15 August 1986

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

Environmental Impact Statement (EIS):  
Kohana-iki Resort Community, North Kona, Hawaii  
TMK 7-3-09: 3 & 16

Dear Mr. Sewake:

Thank you for your comments of July 16, 1986 to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, relative to the Draft EIS for the proposed Kohana-iki Resort Community. We have prepared our response to your comments in consultation with our engineering consultants, M & E Pacific, Inc.

**Comment (1):** As stated in the EIS, existing water system facilities will not be able to support the proposed development. Additional source and transmission facilities need to be constructed.

**Response:** As you are aware, the applicant is examining a number of water source alternatives (Chapter 4.3.2). At the present time it appears that a water source development agreement with the County may be the best "mutually acceptable" alternative. Our engineers will keep your office informed of our progress throughout the development process.

**Comment (2):** The Department uses a water rate demand of 600 gallons per day per residential or hotel unit. This demand rate may be higher for drier areas like West Hawaii.

**Response:** The revised EIS will reflect the 600 gallons per day residential or hotel unit water demand used by your department. The previous water demand calculation was based on inflation of the 400 gallons per day unit rate stated in the 1985 Water System Standards to 500 gallons per day per unit.

**Comment (3):** The different water system development alternatives described in the document should be further discussed among the parties involved in order that a mutually acceptable alternative is finally pursued.


**Response:** See response to Comment (1) above.

Mr H. William Sewake  
15 August 1986  
Page 2

We hope that we have adequately addressed the concerns raised in your letter.

Sincerely,

HELBER, EASTERT, VAN HORN & KIMURA, PLANNERS

  
Thomas A. Fee  
Project Planner

cc: Hawaii County Planning Department

XII-56

APPENDICES

K

O

H

A

N

A

I

K

I

## APPENDICES

- A. Market Study and Highest and Best Use Analysis. Prepared by The Hallstrom Appraisal Group, Inc. James E. Hallstrom Jr., Project Manager. July 1985.
- B. Full Archaeological Reconnaissance Survey. Prepared by Paul H. Rosendahl, Ph.D., Inc. Theresa K. Donham, Supervisory Archaeologist. May 1986.
- C. Botanical Survey. Prepared by Char and Associates. Winona P. Char, Principal Investigator. June 1986.
- D. Terrestrial Faunal Survey. Prepared by Char and Associates. Maile S. Kjargaard, Principal Investigator. June 1986.
- E. Near-Shore Marine Environment and Anchialine Pond Resource Impact Analysis. Prepared by OI Consultants, Inc. Dr. David Ziemann, Project Manager. June 1986.
- F. Preliminary Engineering Utilities Report. Prepared by M & E Pacific, Inc. James Kumagai, Ph.D, Project Manager. June 1986.
- G. Marina Market Study. Prepared by The Hallstrom Appraisal Group, Inc. James E. Hallstrom Jr., Project Manager. May 1986.
- H. Oceanographic Environment and Conceptual Feasibility Evaluation for Kohana-iki Marina. Prepared by Edward K. Noda & Associates. Elaine Tamaye, Project Manager. May 1986.
- I. Public Economic Benefit Study for the Proposed Kohana-iki Resort. Prepared by The Hallstrom Appraisal Group, Inc. James E. Hallstrom Jr., Project Manager. June 1986.
- J. Aircraft Noise Exposure Analysis. Prepared by Gordon Bricken and Associates. Gordon Bricken, Project Manager. June 1986.



**A. MARKET STUDY AND HIGHEST AND BEST USE ANALYSIS**

The  
Hallstrom  
Appraisal  
Group.  
Inc.

July 15, 1985

Mr. Christian Wolffer, President  
Trans-Atlantic Consultants Inc.  
1414 Avenue of the Americas  
New York, New York 10019

**Market Study and Highest and Best Use Analysis  
of 470.13-Acre Kohanaiki Oceanfront Holdings**

Dear Mr. Wolffer:

At your request, we have completed a comprehensive market study and highest and best use analysis detailing the existing and forecasted real estate marketplace trends on the Island of Hawaii, and within the State, as they impact the developability of the above-described property, which is located in the North Kona District, approximately six miles north of Kailua-Kona. Comprising 470.13 acres adjacent to Puhili Point, the site is identified on State of Hawaii Tax Maps as portions of Third Division, Tax Map Key 7-3-09, Parcels 3 and 16.

The purpose of our Market Study is to identify the economic market sectors in which potential subject land uses would compete; address historic, existing and forecasted supply, demand and absorption trends for the probable use types; and set forth demand conclusions based on our analysis of the available data. The Highest and Best Use Analysis discusses the adaptability of the subject property for the market-defined uses in regard to infrastructure available, government and public planning concerns and restrictions, and ability to be competitive within the identified competing markets. Potential development scenarios and market absorption forecasts are also presented.

It is acknowledged that we have undertaken timely, similar studies for other properties in the vicinity of the subject. Based on these other analyses, it is apparent the most efficient and probable use of the subject lies in integrated resort development. For this reason, we have focused on the statewide master-planned resort market to a greater degree than in previous studies, with only summations of other market sector use-types contained herein.

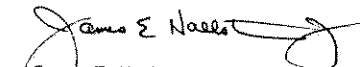
It is our understanding that portions, or all, of this document may be included within land use change petitions prepared by yourself or others. The opinions expressed in this report are subject to the stated assumptions and limiting conditions. All investigation and analyses have been performed in accordance with the standards and guidelines of the American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers.

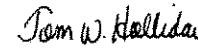
Mr. Christian Wolffer  
July 15, 1985  
Page 2

We appreciate the opportunity to have worked with you on this most interesting assignment.

Respectfully submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

  
James E. Hallstrom, Jr., MAI, SRPA

  
Tom W. Holliday

/gc

A-1

Market Study and  
Highest and Best Use Analysis  
for the  
470.13-Acre Oceanfront Holdings  
Located at  
Kohanaiki, North Kona, Hawaii

Prepared for  
Mr. Christian Wolffer  
Trans-Atlantic Consultants Inc.  
New York, New York

May 1985

TABLE OF CONTENTS

	Page
INTRODUCTION	1
SUMMARY OF CONCLUSIONS	3
DEFINITIONS OF TERMS	7
LIMITING CONDITIONS AND ASSUMPTIONS	8
MARKET STUDY	11
Identification of Economic Market Sectors	11
General Economic Market Sector	12
South Kohala District	12
North Kona District	17
Primary Economic Market Sector	21
The Kailua-Kona to Kawaihae Coastal Corridor	21
Competitive Economic Market Sector	26
State of Hawaii Destination Resort Industry	26
Identification of Potential Subject Use Types	30
MARKET ANALYSIS OF POTENTIAL USE TYPES	31
Commercial	31
General Economic Market Sector Development	31
Primary Economic Market Sector	33
Summary	34
Industrial	35
General Economic Market Sector	35
Primary Economic Market Sector	35
The Kona Industrial Subdivision	36
The Kaloko Light Industrial Subdivision	39
Kaei Hana II	41
Gentry's Kona Marina	43
Other Potential Developments	46
Summary	46
Residential	47
Resort	52
The Tourism Industry	52
State of Hawaii	53
County of Hawaii	53
Island of Hawaii	55
Keauhou-Kona	61
Mauna Kea Beach	61
Mauna Lani	71
Waikoloa Beach	81
Island of Kauai	90
Princeville at Hanalei	99
	99

Table of Contents (Continued)	Page
Island of Maui	111
Kaanapali Beach	111
Kapalua	124
Wailea	133
Summary	143
Agriculture	164
General Economic Market Sector	164
Primary Economic Market Sector	164
Summary	165
<b>HIGHEST AND BEST USE ANALYSIS</b>	166
Property Description	168
Honokohau Small Boat Harbor	170
Land Use Classifications	173
Adaptability of Subject's Physical Characteristics for Resort Use	175
Locational Characteristics	177
Summary	184
Logistics and Availability of Off-Site Infrastructure	185
Water Supply	185
Waste Water Disposal	185
Access	186
Community Reaction	187
Ecosystem Maintenance	187
Historical Preservation	187
Beach Access	187
Summary	188
<b>CORRELATION</b>	190
Land Use	190
Absorption	191
Timing	191
<b>ADDENDA</b>	
Exhibit I - Kaloko Light Industrial Subdivision Price List	
Exhibit II - Summary of Master Ground Lease	
Exhibit III - Graphs - State of Hawaii	
Exhibit IV - Graphs - County of Hawaii	
Qualifications of the Appraising Firm	
Qualifications of the Appraisers	

INDEX TO TABLES		
Table Number	Descriptive Title	Page
1	Summary of Major Island Resort Destinations	29
2	Summary of the Kona Industrial Subdivision	37
3	Summary of the Kaei Hana II Industrial Subdivision	42
4	Space Lease Rent Levels	45
5	Keauhou-Kona Hotels Features Schedule	63
6	Summary of Condominium Marketing	65
7	Summary of Condominium Marketing	104
8	Summary of Hotel Facilities	114
9	Summary of Condominium Marketing (Kaanapali Beach Resort)	116
10	Summary of Condominium Marketing (Kapalua Resort)	127
11	Summary of Condominium Marketing (Wailea Resort)	137
12	Summary of Condominium Marketing (At Eight Destination Resorts)	151
13	Summary of Condominium Sales	152
14	Summary of Existing Unit Mix	155
15	Summary of Proposed Unit Mix	156

## INTRODUCTION

The following narrative abstract contains the research, analyses and conclusions of our Market Study and Highest and Best Use Analysis regarding the demand for various land-use development types at the 470.13-acre Kohanaiki oceanfront holding identified on Hawaii Tax Maps as Third Division, Tax Map Key 7-3-09, Parcels 3 and 16. Based on our experience in the area, destination resort development appears the most probable improvement concept, and is the focal point of our study. The study of other land-use types is summarized herein.

The primary purpose of our assignment is to quantify the demand (or lack thereof) for resort development on the subject site in light of historic and forecasted economic trends and the level of competing supply anticipated over the next 20 years. If improved as a destination resort, the subject community would be expected to include hotel(s), resort condominiums, resort commercial, recreational and other support facilities to such a degree as to attract tourists in sufficient numbers to justify construction capital costs.

Competitive supply, historic and projected demand, and market absorption trends for the various possible subject uses are the focal points of our Market Study. Physical characteristics of the site, availability of off-site infrastructure, and community acceptance are the primary concerns within our Highest and Best Use Analysis. We acknowledge the coordinated efforts of Helber, Hastert, Van Horn & Kimura in establishing potential selected highest and best use concerns for the subject concurrent with this assignment. For this reason, certain characteristics are only briefly covered in the Highest and Best Use portion of this report, as they have been presented elsewhere.

In the Market Study section of our assignment, we identify the major potential uses of the subject property; set forth parameters in regard to its effective General and Primary Economic Market Sectors; investigate the environs of the subject area; and, discuss the historic, current and projected status of the potential uses relative to supply and demand trends. Because of the obviousness

of resort as the most probable land use type, we have included only summaries of other uses within the General and Primary Economic Sectors; although, complete statistical and analytical data is contained within our files.

The Highest and Best Use Analysis summary details the probability of efficient realization for the identified potential uses (integrated resort) of the property for which a market demand has been projected. The adaptability of the subject parcel, the availability of public support, and the anticipated ease in resolution of various existing restrictions (or hindrances) for each use is addressed. Market absorption forecasts are also contained in this document.

The indicators from our research and analyses were then correlated, giving greatest weight to those identified uses which would likely return the highest present value to the subject property based on market demand and pricing levels, and the timeliness of such developability.

## SUMMARY OF CONCLUSIONS

Based upon our investigation and analysis of the identified General, Primary and Competitive Economic Market Sectors, our conclusions regarding market trends and forecasts can be summarized as follows:

1. The South Kohala and North Kona Districts are experiencing general market expansion as a result of the ongoing economic recovery and (specifically) the increase in numbers of visitors and tourism-oriented investment to the region. Long associated with high-quality resort development (owing to Mauna Kea Beach and Kona Village Resort operations), the North Kona-Kohala coastline corridor from Keahole Point to Kawaihae has undergone major inventory plant expansion since 1981 (with 894 hotel and 103 condominium units added), while other statewide vacation destinations were experiencing stagnate construction and market activity. In recent months, construction has commenced or firm plans have been announced for an additional 1,560 hotel rooms and 247 condominium units to be completed within the three existing resorts over the next three to five years. Owing to this activity, and the natural attributes of the area, the Primary Economic Market Sector is anticipated to become a significant focal point for resort development in the state throughout the century.
2. Although land use types and their relative investment levels remain somewhat diversified within the General Economic Market Sector (oriented toward tourism and agriculture in North Kona and ranching/residential in South Kohala) the substantial majority of private capital investment and developed land uses in the Primary Economic Market Sector has been resort oriented. Based on all known proposed development plans by private land owners and public planners, this trend is anticipated to accelerate over the next decade. The only private, significant non-resort use evident in the sector, and also undergoing large-scale expansion relative to existing supply, is Light Industrial; with three projects currently being constructed/finalized in close proximity to the subject property.
3. Commercial Uses -- Commercial activity is primarily situated in the major population centers of Waimea and greater Kailua-Kona. Four major projects (including the 72,000 square foot Keauhou Shopping Center) are under construction, or have been recently finished, in the Kailua-Kona to Keauhou corridor, with several others in the preliminary planning stages. These developments are anticipated to meet the demands of the West Hawaii region for the next three to seven years, particularly in light of the practice by many commercial businesses to locate in industrial-zoned developments. There are no major commercial projects in the Primary Economic Market Sector, with future plans proposing such development only within, and in conjunction with, the expanding destination resorts. Due to the lack of proximate residential development, and the availability of approved better-located sites, free-standing, non-resort commercial development is not forecasted for the region, and is not considered a probable use for the subject property.
4. Industrial Uses -- Within the North Kona and South Kohala Districts, industrial land uses are concentrated within the Primary Economic Market Sector, the majority within eight miles of the subject property. Currently, there are only 69 subdivided industrial lots in the sector; however, ongoing construction, and expansion plans scheduled, will add 275 lots more over the next eight to ten years. Despite the proliferation of commercial uses in industrial subdivisions (enhancing absorption potentials), this level of inventory increase will meet all foreseeable light industrial/service demands throughout (at least) the next decade.
5. Residential Uses -- Currently within the General Economic Market Sector, a substantial oversupply of vacant and improved residential properties exists. In the mauka Kalaoa-Kealakehe and Kailua-Kona communities, there is a potential estimated supply of developable, vacant lots equivalent to a minimum five years of strong, stable demand. Published Kona Board of Realtors listings provide sufficient supply for more than 2.5 years of improved homes at today's activity levels. Additional subdivisions are being planned for these areas which will add more than 3,600 residential lots to

the market in the next six to ten years, intensifying the oversupply condition despite projected population increases.

Due to the lack of historic access, and the prevailing climatic and soil conditions, the Primary Economic Market Sector has experienced minimal historic residential development, totaling only 321 homesites (existing or under construction) as of the report date. Success of these projects is heavily dependent upon strong locational/amenity attributes, with 84.11 percent of the lots in close proximity to the oceanfront, or within a resort complex. The high cost of infrastructure development, restrictions on shoreline use (the subject's primary desirable feature), and demonstrated limited demand, make free-standing (outside of a planned resort development) residential improvement improbable and, likely, economically unfeasible.

- 9-V
6. Resort Uses — The focal point of our study in light of research and analysis accumulations, resort development is anticipated to continue unabated in the Primary Economic Market Sector over the next decade, with potentials for increased expansion levels above current trends should the economy remain strong. Projects within the Kailua-Kona to Keauhou corridor (free-standing hotels, free-standing condominiums, and planned resort development) have fared poorly in recent years, with declining occupancy, market activity, and general demand indicators; although, numbers of visitors and some occupancy rates substantially improved in 1984 and early 1985. Conversely, indicators (including the degree of proposed visitor plant increase) from the existing Primary Economic Market Sector developments (Keahole Point to Kawaihae) are extremely positive. While new free-standing projects would be viewed as uncompetitive due to the lack of amenities available at existing planned resort destinations, we are of the opinion that sufficient demand does exist for additional resort-integrated hotel facilities at sites having prime locational attributes.

Based on current Competitive Economic Market Sector trends, it is our opinion that absorption for circa 50 developed condominium units per year could be anticipated for a quality and distinctive resort community (if

competitively priced) located on the subject site. Demand for residential homesites would be anticipated to be commensurate with locational attributes. A golf course, and extensive on-site amenity development is seen as integral to planned resort improvement on the subject.

The focal point of tourism capital investment in recent years, destination resorts are considered as having continued strong growth prospects over the long-term. Able to provide far-ranging opportunities for guests, these master-planned projects have shown increasing appeal among the growing markets of return, FIT, and middle- to upper-income travelers. A key aspect of a resort is the "critical mass," or cumulative attraction generated by the interworking land use types (hotel, condominium, commercial, recreational and open space). Currently, there are 12,405 resort units (hotel and condominium) within the major destination resorts, or approximately 20 percent of the State total. By the year 2000, it is estimated that there will be approximately 40,000 units within planned communities, or an increase to 37.56 of the State's lodging inventory at that time.

Demand for destination resort accommodations on a statewide level is projected to increase at approximately 10 to 15 percent compounded annually throughout the century.

7. Agricultural Uses — Due to poor soil conditions, high infrastructure development costs, availability of competing acreage in publicly-subsidized parks, and demonstrated limited demand, agricultural uses were not considered as probable for the subject properties following analysis.
8. Based on our Market Study, we are of the opinion that greatest market demand within the Primary Economic Market Sector, generally, and for the subject property, specifically, is for planned destination resort development of a quality comparable with existing Kohala Coast and statewide resort communities.

## DEFINITIONS OF TERMS

### Visitor Unit

The terms "Visitor Unit," "Lodging Unit," "Hotel Room," or similar phrases are considered as interchangeable, and may refer to either a room within a dedicated hotel operation, or a singular (or pool) of condominium unit(s) rented out on a transient basis. According to recent HVB surveys, approximately 32 percent of the State's available visitor lodging inventory is contained within condominium projects, and their relative desirability as viewed by Hawaii tourists has been statistically increasing. Within our completed study, the relative qualities and potentials of both lodging types are discussed at length.

### Destination Resort

A "Destination Resort," "Planned Resort" or similar terms refer to an identified tourism-oriented development, which has been master-planned by a single (unified group) land owner/developer. Typically buffered to enhance uniqueness, a destination resort will contain hotel, condominium, commercial, and (often) single-family improvements. Golf courses, tennis gardens, groomed beaches, and other recreational and scenic amenities are generally the focal point of the communities. In recent years, the majority of capital investment in the tourism industry has been within (or in close proximity to) destination resorts. A planned resort (i.e., Kaanapali, Turtle Bay, Waikoloa Beach, etc.) differs from a "resort area or district," such as Waikiki, Poipu, Kailua-Kona and others, where land ownership and development control is not centralized; often resulting in disparate construction, conflicting development philosophies, and minimal long-term regard.

## 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 our 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 our 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 American Institute of Real Estate Appraisers of the National Association of Realtors. 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 American Institute of Real Estate Appraisers or to the M.A.I., designation or to the Society of Real Estate Appraisers or the S.R.P.A., designation) 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.

## MARKET STUDY

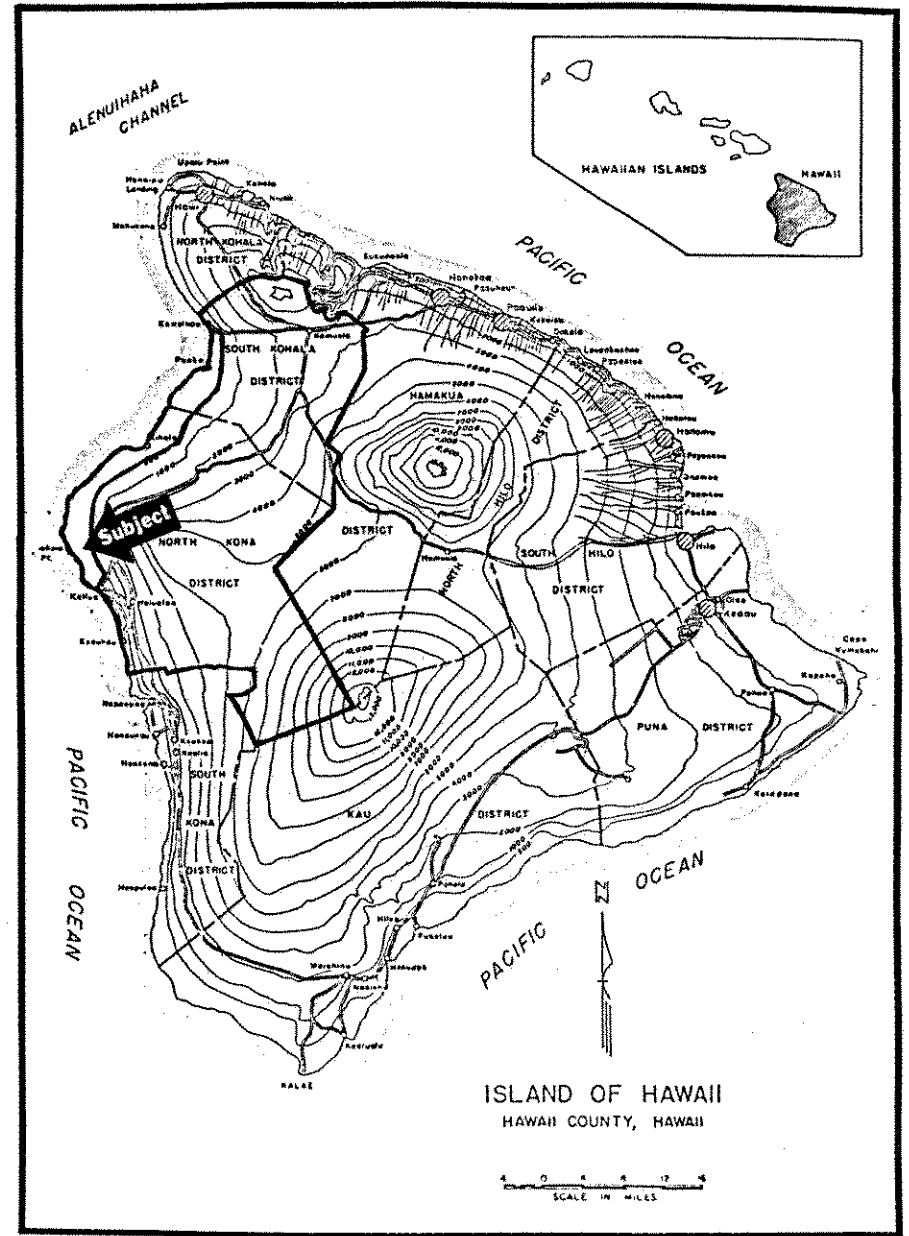
### Identification of Economic Market Sectors

The subject property is located on the leeward, or westerly, coast of the Island of Hawaii, between the community of Kailua-Kona and West Hawaii's Keahole Airport. 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 (outlined in "green") are considered as comprising the **General Economic Market Sector** of the subject properties. 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 land-use transition from agricultural to resort, residential and other development types.

The **Primary Economic Market Sector** of the subject properties is the coastal corridor stretching from Kailua-Kona to Kawaihae, a distance of approximately 33.5 miles. This lava strewn region of the Island, shown in "red" on the map, is arid, sparsely vegetated and has relatively uniform development potentials. Queen Kaahumanu Highway, and the properties fronting both sides thereon, is generally considered the mauka (or inland) boundary of the Primary Market corridor.

The **Competitive Economic Market Sector** of the Kohanaiki property is the statewide major Neighbor Island destination resort industry, comprised of eight identified master-planned communities in varying stages of development. This sector, and each comparable project, is discussed at length, establishing the criteria for facility and locational characteristics necessary for efficient and successful development of such projects. In this portion of the report, the concept of cumulative attraction, or "critical mass" is addressed--a necessary marketing attribute.



General Economic Market Sector

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 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. Current population estimates for the District range upward of 7,000.

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. John Young and Isaac Davis, Englishmen who became the first foreigners of major importance in the Islands, served the King at Kawaihae, permitting Captains Vancouver and Cleveland to land the first cattle and horses, respectively, in the area, thus, 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 were 11 sites in the area designated for protection and restoration by the County General Plan of 1971.

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 upslope 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, running 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, bought 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 1,500 acres currently cultivated in the Waimea area. This represents one-half of the potential for arable production farming in the region. In 1981 (the most recent final figures available), the Hawaii Agricultural Reporting Service estimated over 32,040,000 pounds of melons and vegetables worth \$8,827,000 were grown on the Big Island. Over 90 percent of these totals are from Waimea or South Kohala's 200-plus full-time farmers.

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, a luxurious 310-room hotel, condominium units, houselots, and other amenities, the 1,000-acre originally Rockefeller-financed resort began the now strongly-emerging movement to make South Kohala one of the Neighbor Islands' favorite resort playgrounds. As discussed later in the report, this UAL-owned development has recently announced plans for large-scale, long-term expansion, with a second golf course and another luxury class hotel proposed.

The Mauna Lani Resort, its golf course opened in 1980, and an exclusive 351-room resort hotel in spring 1983, is anticipated to move into a rival position with the Mauna Kea Resort. This potential 3,200-acre development also features a full line of resort amenities, including high-priced condominiums (the second

development of which has been recently publicly presented) in addition to one of the world's classic beachfront golf courses.

The third major resort development in the District is located in the expansive 31,000-acre Trans Continental's Waikoloa holding which stretches upslope from Anaehoomalu Bay to above the 2,600-foot elevation level. The 500-acre beachfront resort currently contains the 543-room Sheraton Royal Waikoloa Hotel, with plans recently unveiled for construction of a \$360 million 1,260-room Hyatt Regency in the project. In addition to the standard amenities, the resort is currently pre-selling units in its first condominium project. The residential/resort community of Waikoloa Village is located approximately eight miles inland from the beachfront development.

Low-density residential and a single multifamily project (Puako Beach Apartments) are scattered along other beachfront areas.

While other resort districts in the State experienced stagnation during the 1980 through early 1983 recession, with virtually no inventory expansion (hotel or condominium units) or other construction evident, South Kohala's visitor plant underwent large-scale expansion. Two luxury-class hotels (Mauna Lani Bay and the Sheraton Royal Waikoloa) and three condominium projects (Mauna Lani Terrace, 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 2,700 hotel rooms and 388 condominium units (completed or firmly proposed) within the coastal resort region. A minimum of 2,500 and 800 additional hotel and condominium units, respectively, are additionally projected for the area in the next decade.

Kawaihae, with a current resident population of approximately 800, is the second largest community in the district. The residentially-oriented village has limited commercial facilities, with the interisland 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 interisland airport at Waimea. The former is anticipated to increase in importance as the area develops, particularly if plans for manganese nodule processing on the Island are actualized. A commuter airstrip serving the Waikoloa and Mauna Lani Resorts has recently been opened along Queen Kaahumanu Highway near the vacation areas.

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 County 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 higher regions.

Central Urban Area: Waimea--Waimea is situated in the saddle between the Kohala Mountains to the north, and Mauna Kea to the south, approximately 40 minutes driving time from the subject. Despite the small size of the town and generally cool temperatures, the eastern portion is considerably damper and subject to greater winds 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 approximately 1,200 within the 652 acre census-defined village. An additional 600 to 800 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 northeastern 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.

The majority of community attributes are described in the preceding section describing the South Kohala district, of which Waimea is the most populous residential, commercial, and agricultural area. Among the amenities not specifically mentioned are the Kahilu Community Theater, one of the finest performing auditoriums in the State, and the Hawaii Preparatory Academy (HPA), Hawaii's most respected private school. Currently having an enrollment of 530, 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.

In general, the town residents reside 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 size 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 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 western flanks of Mauna Loa and Hualalai for nearly 80 miles. Relatively young geologically, the topography is characterized by lava soil gently sloping from the shoreline to the upper elevations of the inland mountains. Mauna Loa, partially within South Kona and seasonally snow-capped, is the second highest Pacific Island peak with a 13,677-foot volcanically-active 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 800 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 coastline appeals to tourists and retirees resulting in large-scale resort-type development; while the large majority of permanent residents prefer 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, are significant locales in Hawaiian history; central villages of the large native 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 (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 nineteenth century.

The 1980 census reported a total of 13,748 residents in North Kona, with current estimates ranging upward of 16,000. Kailua, one of the State's larger non-Oahu communities, recorded a 1980 population of 4,751; with Kealahou and Ho'aloa, 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 3.56 percent above 1960 levels. Governmental planners forecast a population for North Kona of 25,000 by 1990.

Tourism is the primary economic activity of 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 4,509 transient units available in North Kona, comprising 62.55 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 1984, 756,890 tourists stayed an average 4.64 days each, spending more than \$410,000,000. The visitor count is down from the record 910,000 visitors of 1978. For a variety of reasons, ranging from the effects of Hurricane Iwa on Kauai to lower airfares and general economic recovery, 1984 experienced large increases in numbers of visitors, growing by nearly three percent for the year. The Stanford Research Institute (in studies prepared for the State) estimates the visitor count on the Big Island will increase to between 1.6 and 2.5 million annually in the next 15 years. Figures such as these, and the recent addition of direct Mainland flights, encourage continued investment in all West Hawaii economic sectors. Average length of visitor stay is also expected to increase over present levels.

Many industries--real estate, commercial, service-oriented, and retail in particular--have benefitted 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 life style to a resort and residentially-oriented community designed to meet the increasingly urbanized employment needs in the tourism-spurred Kailua-Kona to Kealahou 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 subtropical and temperate crop production agricultural uses, although (for tax purposes) many bulk acreage holdings are still used for 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 a 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 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 (adjacent to the subject properties), and Keauhou Bay harbors.

The North Kona water system is primarily supplied by four wells at Kahaluu and Waiaha Stream, with the Kahaluu wells providing the bulk of the water. Current source output capacity is approximately eight to ten million gallons per day, somewhat below the anticipated levels, thereby contributing to the current water shortage being experienced, limiting development. 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 stores generally directed toward the visitor industry. In addition to tourism, the village is the commercial and residential hub for the agricultural and retiree communities in the surrounding areas.

The corridor between Kailua Village and Keauhou, stretching from the shoreline upslope to Mamalahoa Highway, is in a state of gradual transition, 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 Aili Drive and Kuakini Highway.

The 2,000-acre Keauhou resort area is currently experiencing its second phase of growth with planned residential and condominium development centered around the existing hotels, resort multifamily projects and the Keauhou Golf and Country Club. To date, 1,330 hotel rooms and 647 condominium units have been constructed in the project. Extensive non-tourist commercial development is only now occurring in Keauhou--an example of the gradual change taking place as businessmen and retailers move into the corridor from traditional Kealakekua and Captain Cook locales.

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 95-room hotel, 12 miles north of Kailua, is the only other master-planned resort area in the North Kona district. The isolated village has experienced historically high occupancy rates in recent years being operated as a polynesian-style low-key retreat destination. The Village is located approximately eight miles north of the subject property at Kahuwai Bay, and its owners have recently sold adjoining bulk acreage to developers who have expressed a desire to expand the resort area and develop condominium or other uses in the holding.

#### Primary Economic 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 primary economic market sector of the subject parcel. Properties within this 33.5-mile

strip, of which Queen Kaahumanu Highway is the general mauka (or inland) border, share similar climatic, soil, topographical, infrastructure and development potential characteristics. South of this currently underdeveloped corridor, the greater 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 bays in the area. The subject property has evidence of such use. 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 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 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 completion of 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.

Despite these influences, 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. 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 the Primary Economic Market Sector, resort-oriented development is primary. The map on the following page shows the location of the existing major projects relative to the subject property. Discussed within the General Economic Market Sector presentation, the four major resort-type holdings are summarized as follows:

Project Name	Kona Village	Waikoloa Beach Resort	Mauna Lani	Mauna Kea Beach
Size in Acres	62(1)	500	3,200	1,000
Year Opened	1966	1981	1982	1965
Hotel Rooms:				
Existing	95	543	351	310
Proposed(2)	--	1,260	--	300
Condominium Units:				
Existing	--	--	80	23
Proposed(2)	--	114	116	17

(1) Additional 318 acres nearby submitted for State Land Use change from conservation to Urban.

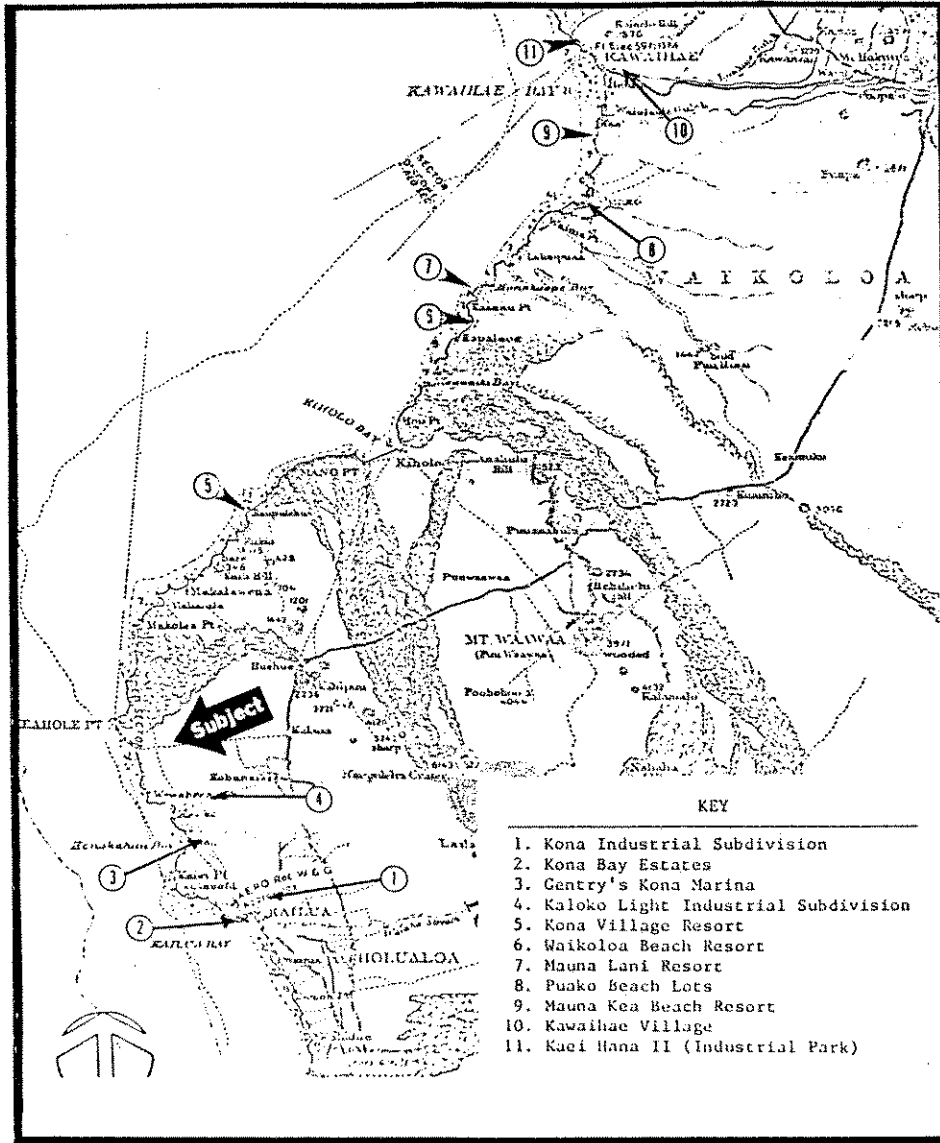
(2) With construction anticipated to commence within two years.

These developments will be addressed at length later in this report. 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 three of the four existing hotels being considered as among the most exclusive in the State. Room tariffs, dining costs and condominium unit prices are commensurately high.



PRIMARY ECONOMIC MARKET SECTOR  
DEVELOPMENT LOCATION MAP  
Kailua-Kona to Kawaihae Coastal Corridor

A-16



The secondary major land use in the corridor is industrial, with parks developed at either end of the area in Kailua-Kona and Kawaihae, and a third under construction fronting the mauka side of Queen Kaahumanu Highway one mile south of the subject. The Kaei Hana II Park, located in Kawaihae, is centered around spatial needs created by the interisland port, while the Kailua-Kona development (planning its fifth phase of construction) has evolved into a mixed-use industrial/commercial area with wide ranging tenant types. The Kaloko Light Industrial Subdivision, near the subject property, is also scheduled for general industrial uses. The West Hawaii Concrete and Allied Aggregates quarries and batching plants are also located on the mauka side of the Highway nearby the subject property.

The only quasi-commercial development in the corridor, outside of the resorts, is Gentry's Kona Marina, a recently completed construction adjacent to the Honokohau Harbor. The project contains tackle shops, a restaurant, storage, boat repair and other commercial and light industrial facilities oriented toward marine service. Additional commercial projects are being developed in urban Kailua-Kona, just south of the Primary Economic Market Sector.

With the exception of the small Puako community (population of 257 in 1980) situated between the Mauna Lani and Mauna Kea Beach Resorts, residential uses in the Kailua-Kona to Kawaihae corridor are limited to scattered second homes and retreats along the shoreline or in resort development. For the most part, the outlying shoreline improvements are not serviced by county utilities. In all, the full-time resident population of the corridor is approximately 300. This relatively low total is mainly due to the intense heat of the region throughout the year; with residents generally preferring the cooler upland areas. A 40-lot luxury-oriented development, "Kona Bay Estates" with parcel sizes ranging from 7,052 to 26,337 square feet, has recently been completed on 11.51 acres situated at the extreme southerly portion of the Primary Economic Market Sector.

Public land use in the corridor includes: the Keahole Airport, servicing West Hawaii, a 780-acre project zone approximately one mile north of the subject holdings; Honokohau Harbor, a 165-berth small boat harbor immediately two miles south; and, the Kailua-Kona community solid waste disposal station (dump), with

the Humane Society adjacent, mauka of the highway between the subject and Kailua-Kona. Additionally, the Natural Energy Laboratory is located on 10.25 acres at Keahole Point between the ocean and the airport.

The only agricultural land use in the primary economic market sector is Phase I of the 206-acre Keahole Agricultural Park across Queen Kaahumanu Highway from the Airport, currently containing 35 leasable lots. However, only seven of the parcels are currently in use; two planted in mango fruit (as yet unmaturing), one improved with shade houses, another recently planted with plumeria trees, and the remainder being developed. Aquaculture is also being attempted adjacent to the Natural Energy Laboratory on a quasi-experimental basis.

There are four 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 Hapuna State Beach Park (three miles south of Kawaihae), which is improved with cabins and picnic facilities. A public beach park is included in the Waikoloa Beach Resort development on Anaehoomalu Bay. The fourth public area, Wawaloli Beach Park, is adjacent to the subject property and is unimproved.

In summation, the Primary Economic Market Sector containing the subject property is generally underdeveloped. The significant majority of private capital invested in the area has been within the destination resorts along the coastline. While the expansion of urban Kailua-Kona will undoubtedly utilize some of the southerly portions of the defined corridor (for a variety of uses) all available indicators point to the continuing dominance of resort-oriented development. Climatic traits that are desirable among tourists; the increasing demand for quality Neighbor Island resort destinations created by the expanding visitor industry and the deterioration of Waikiki; and, the desires of governmental planners, are among the positive characteristics which contribute to this trend. The lack of a proximate resident population, the undesirability of the continually hot climate among residents, poor soil conditions, and availability of competing supply are factors which limit the potential of other large-scale uses over the short-term.

## Competitive Economic Market Sector

### State of Hawaii Destination Resort Industry

The most vibrant sector of the statewide tourism industry, and the focal point of visitor-oriented capital investment over the past decade, master-planned destination resorts communities--through the use of integrated improvement and marketing strategies--have proven to be the most desirable type of tourism inventory development. With the attractions available in destination resorts, it is generally conceded that the long-term success of the Hawaii visitor industry (outside of Waikiki) lies in their continued, efficient improvement; this holds particularly true in light of the disparate strip-construction undertaken by individual short-term, profit-oriented developers in many Island beachfront areas.

Resort development at Kohanaiki would be considered as an entry in the competitive market formed by the major Neighbor Island destination resorts within the State. Its long-term potential would be dependent upon its ability to offer, maintain, and attract based on the attributes of the site and amenities made available relative to other competing projects.

For this reason (and in consideration of the general health of the statewide tourism industry), we consider the destination resort industry as the Competitive Economic Market Sector for the subject holdings. In the section of our Market Study covering resort improvement, we present a comprehensive analysis of this market sector, and provide criteria which a subject resort development program could be judged against (undertaken elsewhere in this document) in estimating its potential marketability.

The continued urbanization of Honolulu/Waikiki, availability of oceanfront land at reasonable prices in outlying or Neighbor Island locales, and the modernization of interisland air travel, were major contributors to the development of master-planned resorts in the State of Hawaii during increasing demand periods in the 1960's and 1970's. Independent small-scale projects (single hotels and condominiums) were undertaken in various communities; however, success was limited due to the lack of sufficient visitor infrastructure facilities, retail/restaurant space, and developed recreational opportunities.

In order to provide a sustaining atmosphere that could compete with the opportunities then available in Waikiki (including shopping, dining, transportation and other services), outlying/outer-island resort developments had to provide effective wide-ranging diversions (beyond physically desirable locations) to consistently attract high volumes of visitors. In practice, the integration of mixed resort uses (achieved through master planning) proved synergistically beneficial to each component; and the resorts experienced qualified success. Efficient communities contained a variety of hotel, condominium, commercial and recreational sites.

The major dilemma facing bulk-acreage resort developers is the extent of investment required to achieve a state of synergy; or at what point are there sufficient improvements, amenities and facilities so as to create a marketable cumulative attraction, without the need to overbuild infrastructure. This "critical mass" level and mix is important to planning decisions as the failure or insufficiency of one or more components could significantly hamper overall success. In addition to man-made improvements, physical attributes (as scenic or recreational characteristics) strongly contribute to the critical mass of a resort development.

The optimum relationship in achieving maximum cumulative attraction (in regard to land use type and intensity) is not readily quantifiable, nor is the ease of reconciliation between developer desires and public land use plans. Therefore, we have investigated the Hawaii major island destination resort market in regard to existing and planned composition, and recreational and locational characteristics; establishing a market correlation of the facilities, or critical mass, necessary for efficient resort development. In order to remain competitive in the market, the subject would have to provide similar amenities and opportunities. We acknowledge that the subject owners are seeking land use approvals for an "intermediate" resort, while those analyzed are planned as "major" resort communities. However, the characteristics necessary for market success are similar for both types, and to date there has been minimal intermediate-class resort development undertaken.

Currently, there are eight Neighbor Island master-planned projects in the State which we consider as being or having the potential to be considered as a full-

amenitized destination resort. These major island projects (we have omitted Kalua Koi on Molokai) are summarized on Table I. We note that only those developments fulfilling the definition of an integration destination resort (contained earlier in this report) were analyzed. Vacation or destination "areas", such as Poipu and Coconut Beach, Kauai, and Banyan Drive in Hilo, which have diverse ownership and development objectives, were not considered comparable.

Historically, the development of integrated resort communities has been cyclical; with periods of intense demand and construction activity followed with terms of stagnate market conditions. Additionally, demand can be periodically regionalized (as experienced on the Kohala Coast during otherwise slow 1983-84), or widespread (as during the statewide demand of 1978-79).

Despite these anomalous trends, analyzed at-length during the course of this assignment, the demand for destination resort development has steadily grown over the past 15 years. Return visitors, FITs, and the middle- to upper-class travelers, all of which are growth sectors within the statewide tourism market, have consistently demonstrated an increasing attraction to the master-planned complexes. As statistically presented in the Demand section, the result has been that proportionately greater numbers of visitor/days being spent on Neighbor Islands, which have centralized resort areas typically dominated by a destination community.

Consequently, an aging Waikiki, lacking the recreational facilities and ambience available at planned resorts, is developing an image of catering to "budget minded" travelers. Proposals for a convention center or other significant capital improvement projects within the Waikiki Special Design District may increase the size of potential market available, but will not stem the flow of tourists to the physically more desirable and less dense resort projects.

Viewed over the long-term, the cyclical economics of resort development do not diminish the success of, and established and projected increasing demand for, resort lodging units and facilities with destination resorts. In estimating the demand for development at the Kohanaiki site (considered as competitive in this market), we have examined density, timing, absorption, and other indicators from the previously identified comparable master-planned projects. This analysis is presented in the section of our Market Study regarding resort development.

TABLE I

SUMMARY OF MAJOR ISLAND RESORT DESTINATIONS  
State of Hawaii

Island	Resort Name	Location	Approx. Area in Acres (1)	No. of Units (2)		Existing Projects				
				Existing	Total Proposed	Name of Hotels (H) Condominiums (C)	No. of Units	Comm. Center	No. of SFR Lots	No. of Golf holes
HAWAII	Keauhou-Kona	South - Leeward	2,000	2,175	7,098	Keauhou Beach (H)	317	Yes	1,210	27; 9 Proposed
						Kona Lagoon (H)	454			
						Kona Surf (H)	537			
						Keauhou Resort (C)	48			
						Keauhou Akani (C)	48			
Surf & Racquet Club (C)	193									
Keauhou Palena (C)	56									
Country Club Villas (C)	116									
Keauhou Punahale (C)	94									
Kanaloa @ Keauhou (C)	160									
Keauhou Kai (C)	18									
Keauhou Gardens (C)	112									
Mauna Kea Beach	Leeward	4,000	350	5,100	Mauna Kea Beach (H)	310	Proposed	2,000	18; 18 Proposed	
					Villas @ Mauna Kea (C)	40	long-term			
Mauna Lani	Leeward	3,200	431	6,285	Mauna Lani Bay (H)	351	Proposed	None Currently Proposed	18; 18 Proposed	
					Mauna Lani Terrace (C)	80				
					Mauna Lani Point (C)**	104				
Waikoloa Beach	Leeward	500	548	6,000	Sheraton Royal Waikoloa (H)	548	Proposed	None Currently Proposed	18; 18 Proposed	
					Waikoloa Shores (C)**	114				
KAUAI	Princeville	North	1,200	1,630	3,300	Sheraton Princeville (H)**	300	Yes	1,400	27; 9 Proposed
						Hanaiei Plantation (H)**	204			
						Alii Kai (C)	115			
						Cliffs @ Princeville (C)	202			
						Hale Mai (C)	40			
						Hanaiei Bay Resort (C)	134			
						Ka'eo Kai (C)	64			
						Hakai Club (C)	40			
						Mauna Kai (C)	26			
						Pali Ke Kua (C)	99			
						Paliuli Cottages (C)	8			
						Puu Poo (C)	56			
						Sandpiper Village (C)	74			
						Sealodge (C)	86			
						Princeville (C)	124			
						Puamoa (C)	97			
						Pukana La (C)	76			
						Kalapaki Villas (C)	264			
						Kamaha (C)	62			
						Hanaiei Bay Villas (C)	37			
Panolo (C)	26									
MAUI	Kaanapali	Leeward	1,169	5,020	9,200	Hyatt Regency Maui (H)	820	Yes	215	36
						Maui Surf (H)	556			
						Kaanapali Beach (H)	430			
						Sheraton Maui (H)	503			
						Royal Lahaina (H)	724			
						Maui Marriott (H)	720			
						The Whaler (C)	360			
						Maui El Dorado (C)	204			
						International Colony (C)	44			
						Hale Kaanapali (C)	228			
						Kaanapali Plantation (C)	62			
						Kaanapali Royal (C)	105			
						Kaanapali Alii (C)	264			
Kapalua	North - Leeward	750	724	3,700	Kapalua Bay (H)	196	Yes	Up To 65 Discussed	36	
					Ironwoods (C)	40				
					Golf Villas (C)	186				
					Bay Villas (C)	141				
					The Ridge (C)	141				
Wailea	South - Leeward	1,450	1,488	4,300	Inter-Continental (H)	540	Yes	700 to 1,000 Proposed	36	
					Stouffer's Wailea Beach (H)	350				
					Wailea Ekahi (C)	298				
					Wailea Ekolu (C)	148				
					Wailea Elua (C)	152				

(1) Figures may include large acreage non-designated or conservation/buffer areas. Portions may not be master planned for development at this time.  
(2) Hotel and Condominium units. Proposed figures represent rounded totals discussed by developer, and may not have existing governmental approvals.  
\*\* Under construction.

Source: The Hallstrom Appraisal Group Inc., July 1985.

Identification of Potential Subject Use Types

Based on our investigation of the subject property's General and Primary Economic Market Sectors, and the commensurate obvious limitations which exist, we are of the opinion that there are five potential use-types which an informed individual may consider in development of all or part of the subject holdings. The uses are:

- Commercial
- Industrial
- Residential
- Resort (Condominium/Hotel)
- Agricultural

Our experience has demonstrated that the most probable efficient use of the subject holdings is in integrated resort development, thus this is the focal point of our study. The other uses, with the exception of industrial (which is a major existing land use in the Primary Economic Market Sector) are presented only in summary form, with complete data and analysis contained in our files.

For all use-types except resort, emphasis was placed on trends within the General and Primary Markets (supply, demand, absorption, etc.); in discussion of resort potential, the trends within the competitive market are singularly addressed. This includes the four existing integrated resort communities currently being developed in West Hawaii.

A-19

## MARKET ANALYSIS OF POTENTIAL USE TYPES

### Commercial

#### General Economic Market Sector Development

The major communities in this market sector, previously identified, 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. However, the growth of Kailua-Kona in the past decade, and the projections for its continued urbanization, has stimulated business migration to the near-coastal area of the village fronting Palani Road, Alii Drive and Kuakini Highway.

The existing commercial (retail/service) developments in Waimea and Kealahou/Kainaliu have efficiently met the demand of the communities in past years, and are not considered as either comparable or competitive with potential commercial use of the subject properties.

The Kailua-Kona to Kealahou urban corridor is currently 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 is centered along Alii Drive, from Kuakini Highway to the Kona Hilton. Secondary facilities are located in the hotels within the Kealahou-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 (still undergoing final refurbishment) and the arcade at the Hotel King Kamehameha, the Alii Drive commercial improvements are one- and two-story low-rise structures containing from 6,000 to 25,000 square feet of leasable area. Although tenant turnover rates are relatively high (in comparison to typical retail market segments), fluctuating in accordance with the fortunes of the Island's tourism industry, there are currently few vacant spaces. With the exception of the King Kamehameha Square project (circa 12,000 gross square feet) currently under construction, and the Kealahou Shopping Village (72,000 square feet)—both attempting to solicit the resident and tourism consumers, are the only commercial projects planned for tourism service on a short-term basis.

The latter facility will be West Hawaii's largest shopping mall, and is anticipated to be the focal point of retailing activity in the region for many years. Although the anchor tenants (KTA Supermarket and Liberty House Department Store) have been signed, full absorption of space is projected by the developers to require a minimum of 18 months to two years, depending upon the continued expansion of tourism capital influx levels.

This project, along with the planned expansion of the Kona Coast Shopping Center (previously the area's largest) and the recent or proposed construction of the Sakamoto Electric complex, Territorial Centre and the W. F. Dillingham Medical/Professional Center, should provide a sufficient amount of supply to meet commercial demands in the greater Kailua-Kona urban area for five or more years. And, it is noted that several office/service commercial buildings, notably the Kailua Trade Center and Hualalai Center, both constructed in 1980-81, have large amounts of vacant space still available.

Preliminarily, a commercial complex is planned for the mauka area of the proposed Y.O. (TSA) bulk acreage development approximately four miles upslope

from the subject property, if governmental approval and market acceptance of the residential offerings is achieved.

Additionally, as discussed at length in the appropriate section of this report, a significant portion of the improvements in the Kona Industrial Subdivision are utilized by nonconforming commercial tenants. The availability of such less expensive space (particularly as the "rural-life style" area residents have shown no displeasure in frequenting the light industrial subdivision) has hampered the demand for standard-quality commercial space. As the lower rents in the subdivision permit lower overhead and price levels, this trend is anticipated to continue over the short-term. The next phase of the development (76 lots) is going to emphasize this "mixed-use" concept to an even greater degree, and thereby fill the major supply space need for resident-oriented commercial space in the community for five to seven years, at a minimum.

#### Primary Economic Market Sector

There are currently no major commercial developments within the subject properties' Primary Economic Market Sector.

Within the identified resorts, there are shopping arcades contained in the existing hotels, and all have expressed a desire to develop a commercial facility to serve the growing destination communities. However, all plans are preliminary at this time, and dependent upon the successful implementation of their hotel and condominium projects.

There is a single "Mom and Pop" store in Kawaihae, and one counter-service eating establishment. There is also a convenience/general store six miles inland at Waikoloa Village.

Major commercial-use additions in this market sector outside of the resorts, will only be within the industrial projects detailed in the following section.

#### Summary

Based on the apparent trends within the marketplace, it is our opinion there exists insufficient demand to make large scale commercial development of the subject property feasible. The continuing concentration of inventory, and demand by area businesses, for urban Kailua-Kona locations, and the availability of traditionally-acceptable alternative sites and improvements in existing and proposed industrial projects, will undoubtedly fill general market expansion needs for the remainder of the decade.

At best, selected portions of the bulk acreage subject property could be viewed as having long-term commercial potential, if large scale residential development occurs in the Kalaoa area upslope; however, the difficulty in obtaining subdivision and governmental approvals, and the cost of infrastructure construction (particularly water) would likely make such use projections specious.

Limited ancillary commercial requirements will exist within a resort development, were the subject so improved.

## Industrial

### General Economic Market Sector

There are no large acreage (more than 20 acres) industrial subdivisions or otherwise significant developments in the South Kohala and North Kona districts outside of the identified Primary Economic Market Sector.

In Waimea, individual lots are improved with industrial-type uses (often as grandfathered or nonconforming with the underlying zoning) along Mamalahoa and the Kawaihae-Waimea Highways. A majority of the developed uses are oriented towards the needs of community farmers and ranchers, and are often contained in older or lower-quality improvements.

Similarly, there are scattered industrial-type uses along Kuakini and Mamalahoa Highways in the southerly portions of the North Kona district near the towns of Honalo, Kainaliu and Kealahou. Again, farmers contribute to much of the consumption demands.

While in past years the agricultural communities of Waimea and the identified North Kona villages represented a meaningful degree of industrially-oriented land use demand, the expansion of the tourism and service industries in the last two decades has resulted in the shifting of primary consumer market areas into the Kailua-Kona urban region. Over the short-term, there are no large industrial developments planned outside of the Primary Economic Market Sector, although the recent opening of several agricultural subdivisions, in addition to those still in planning (notably Waikii Ranch), could stimulate a limited, but increasing demand in the Waimea area during the next decade.

### Primary Economic Market Sector

Within the Kailua-Kona to Kawaihae coastal corridor there are three existing or underconstruction large acreage industrial subdivisions. A fourth, industrial/commercial project, has also recently been completed adjacent to the Honokohau Harbor.

### The Kona Industrial Subdivision

Currently encompassing approximately 52 acres on the northerly edge of the Kailua-Kona community, at the southern end of the Primary Economic Market Sector, the Kona Industrial Subdivision began sales in January 1985 of Increment VI; part of a 103.9-acre expansion of the subdivision. This development is 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 1969 through 1981. The individual phases are summarized on Table 2. The fee landowners and master lessors are the Trustees of the Liliuokalani Trust (First Hawaiian Bank). The table is keyed to the facing map.

Accounting for the five lots remaining for lease in Increment V, the rate of original product absorption over the 15-year development period has been an average of 3.20 lots per year. The lots are leased ungraded, with the lessor providing only off-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 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 storefrontage for wholesaler/distributors and light industrial uses, the actual experience has been the proliferation of (potentially) nonconforming retail, restaurant and other commercially-oriented lessees. The result of this tenant influx (more concerned with lower rents relative to available commercial facilities than in appearances) was increasing demand, so 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 to this point. The problem of nonconforming

KONA INDUSTRIAL SUBDIVISION

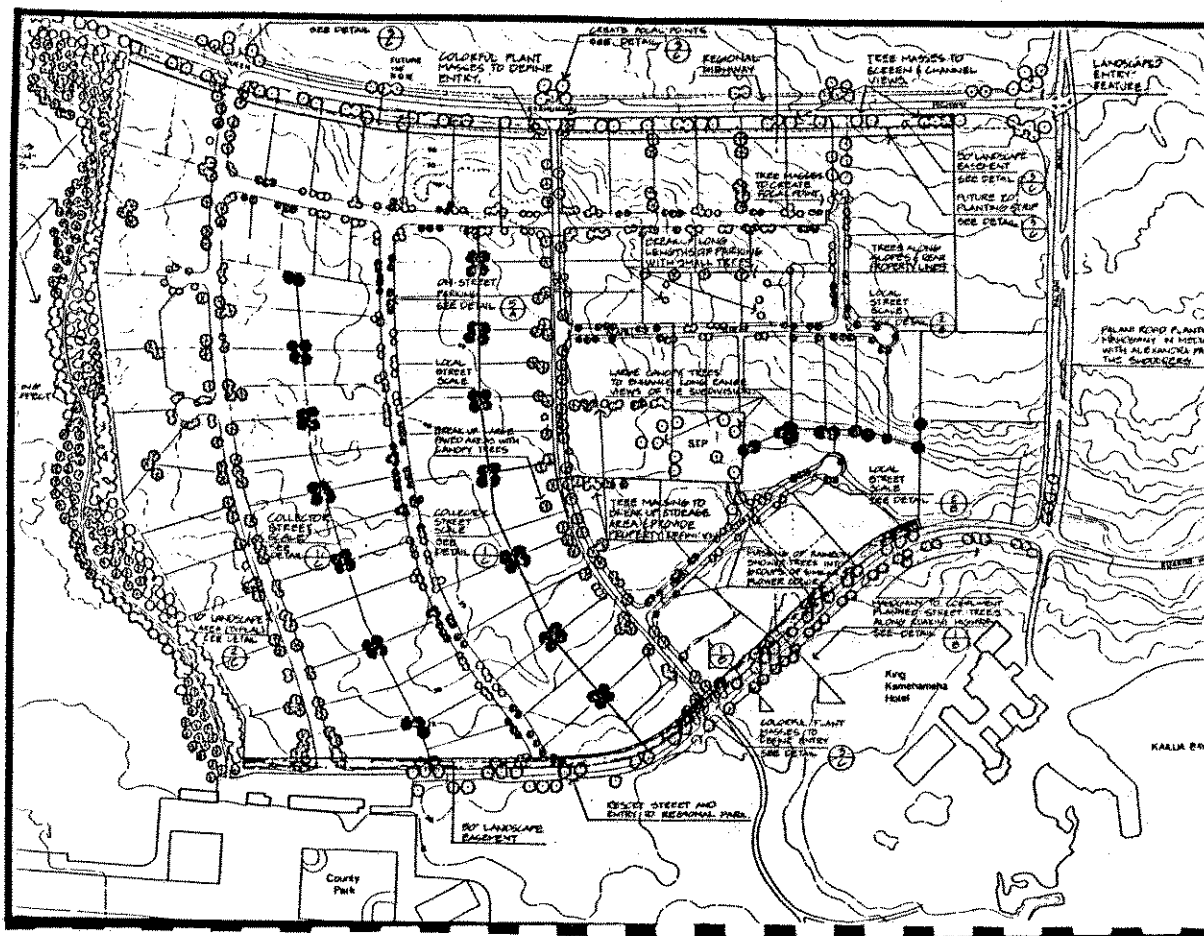




TABLE 2 SUMMARY OF THE KONA INDUSTRIAL SUBDIVISION  
Kohalaiki Market Study

Increment/ Phase	No. of Lots	Lease			Annual Per Acre Rental	Estimated Fee Simple Land Value (Per Sq. Ft.)
		Begin	End	Reopening		
<u>Existing:</u>						
I	18	11/1/69	10/30/1999	11/1/1979	\$ 1,500	N/A
II	11	7/1/73	6/30/2003	7/1/1983	6,000	N/A
III	7	7/1/77	6/30/2007	7/1/1987	8,100	\$3.10
IV	8	7/1/79	6/30/2009	7/1/1989	8,500	3.25
V	9	5/1/81	11/02/2011	5/1/1991	24,000	6.89
<u>Proposed:</u>						
VI/1	42	7/1/1985*	7/1/2015*	7/1/2005*	\$29,620*	\$8.50
VI/2	17*	N/A	N/A	N/A	N/A	N/A
VI/3	17*	N/A	N/A	N/A	N/A	N/A

\*Estimated.

SOURCE: Trustees of the Liliuokalani Trust, and The Hallstrom Appraisal Group, Inc., July 1985.

commercial uses becoming major tenants in industrially-zoned areas (thereby damaging legitimate commercial space developers), is rampant on all the outer islands.

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 have expressed of the opinion that the fee owners of the land 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. As shown on the table, 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 13.44 percent between the first rent renegotiations in 1977 and the considered land value for the proposed 1985 expansion.

The proposed 76-lot Increment VI expansion is anticipated as requiring three development phases spaced over an estimated eight-year absorption period (or an average of 9.5 new lease agreements per year). The minimum lot size will be one acre, with "strict architectural and tenant guidelines to be enforced." All off-site infrastructure will be underground.

According to Clifford Poulton, President of the Kuakini Corporation, the contracted developer of the expansion, the project has received rezoning and other necessary approvals and clearances. The engineering and expansion design is being completed by Belt, Collins and Associates.

The first increment of the expansion, will contain approximately 42 lots and require 50 percent of total phase development costs. The proposed lease agreement is as follows:

- \$110,000 Land Lease Agreement Premium.
- A 30-year lease term.
- Three ten-year fixed periods.

- First ten-year period rents fixed at an annual return of eight percent on \$8.50 per square foot of site area.
- Second ten-year period rents at a 35 percent increase, or using Cost of Living adjustment, whichever is greater.

However, we have received information that agreements offering only \$70,000 premiums are under consideration.

The developer intends the project to be a "high quality development, with a Mainland feel...a business park", thus continuing the existing tenant mix trends. Mr. Poulton has estimated that approximately half of the tenants will be Kona companies relocating to the project, and half will be otherwise new businesses to the area.

#### The Kaloko Light Industrial Subdivision

Construction has recently been completed of the first phase, containing 55 lots, planned for this approximately 250-acre development, which will have a total of 190 circa one-acre lots upon completion. The subdivision, located on the mauka side of Queen Kaahumanu Highway one mile south of the subject, is shown on the map on the following page.

The estimated \$16 million project is being developed by Pan Pacific Land Corporation, on a site owned by TSA International, a major landowner/developer in the immediate subject area. KG Construction was awarded the site improvement contract.

Offered on a fee simple ownership basis, the Phase I lots range in price from \$5.85 to \$7.73 per square foot; with the lower prices located in the mauka sections. A current price list is contained in Addenda Exhibit I. The lots will be individually finished graded.

Terms of sale require a 25 percent down payment with the outstanding balance financed through First Hawaiian Bank at 12.75 percent annual interest, or .5 percent over the prime rate, whichever is lower. A deposit of \$5,000 is to be

submitted with the purchase offer, an additional \$20,000 within ten days, with the remainder of the down payment due at closing. The first sales were scheduled to close in December 1984. First Hawaiian will also act as the escrow agent.

Water to the subdivision is supplied by the County. However, the developer, anticipating the time lapse prior to construction of improvements by all subdivision purchasers, has allocated a portion of his limited commitment to construction of a golf course nearby (if approved). Should accelerated absorption and improvement require the developer to service the industrial park commitments prior to the completion of planned water supply enhancement projects, supply problems could arise. Potential solutions should this occur, include limitations imposed on later lot sales, abandoning service to the golf course, or (most probably) developing of extensive storage facilities on the site.

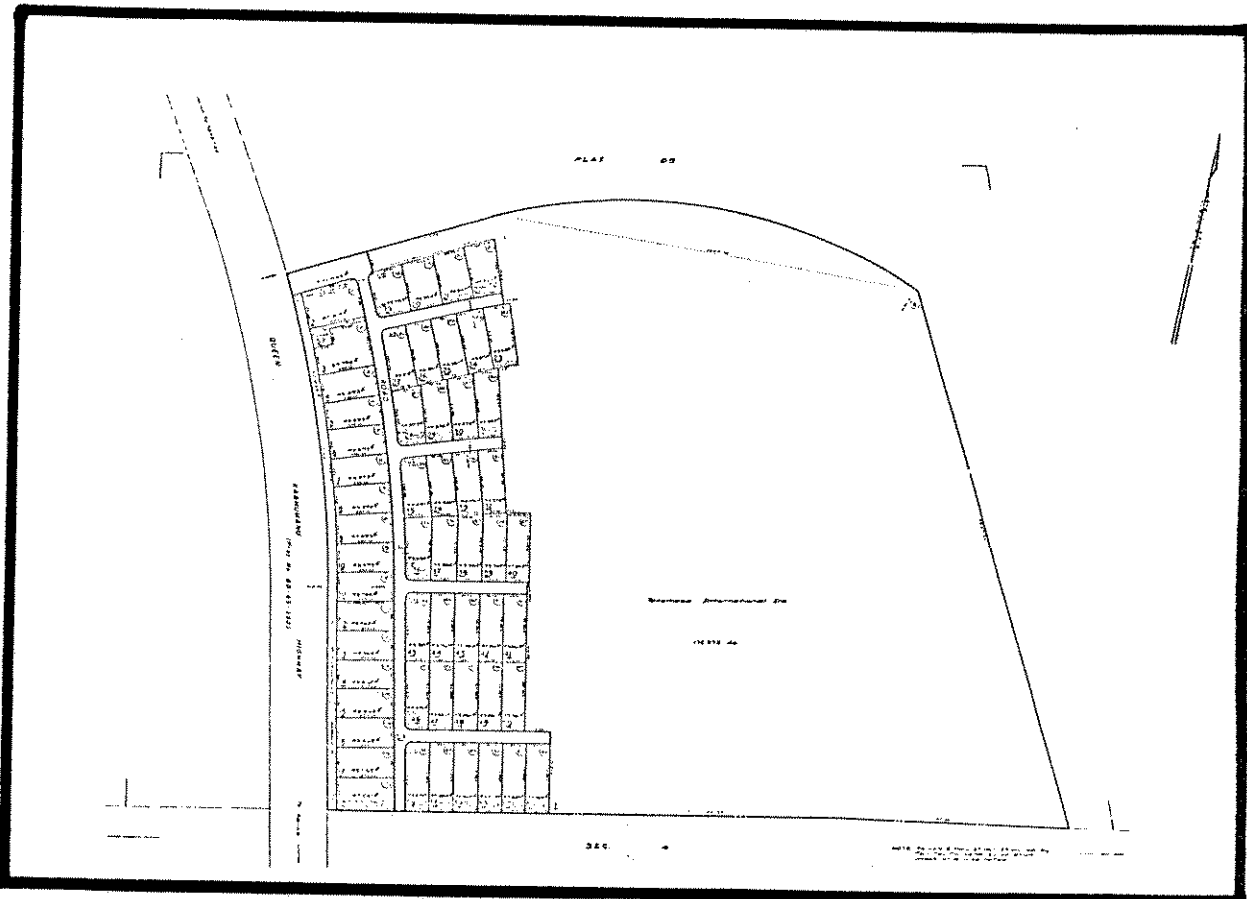
According to the lead broker for the project, Ken Uyeda, the lots have been privately promoted for the past three years, with a "long list of" national and local corporations expressing strong interest. Currently, 21 lots have been sold or purchase contracts submitted for approval. "Tentatively, all of the lots in Phase I should be sold within 90 days (of completion)," says Uyeda, or circa the date of this report.

Major users are anticipated to be importers, distributors, trucking concerns, warehouse and other light industrial-type businesses including "very well known local and Mainland corporations".

Uyeda estimates that 20 percent of the potential purchasers are businesses relocating from the Kona Industrial Subdivision; primarily due to dissatisfaction with the leasehold tenure. He stressed the importance and desirability of fee simple ownership, and said that many parties had held off locating in North Kona until such was available.

Proximity to the Honokohau Harbor and Keahole Airport are viewed as potentially major advantages. Due to the distance from urban Kailua-Kona, it is doubtful that commercial-type uses will represent as significant a portion in this development as within the Kona Industrial Subdivision.

KALOKO LIGHT INDUSTRIAL SUBDIVISION



A-26



Kaei Hana II

A development planned to eventually encompass a total of 33.60 acres, the Kaei Hana II Industrial Subdivision north of the Kawaihae Harbor has leased 22.60 acres 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 developments on ceded native lands. The site was formerly planned for development with a nuclear power plant by the Hawaii Electric and Light Company; a concept abandoned in the late 1960's. The acreage thereafter 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, currently an otherwise small and inconsequential 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 eight 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 has been 17 years, resulting in an average annual market demand of .47 lots per year. However, according to Bruce Taylor, Property Director for the State, the project (due to the extent of the previously planned use) was opened "ten to 15 years" ahead of schedule, and that effective development did not begin until 1978; resulting in a six-year period having six lease agreements signed, or an average demand of one lot per year.

A schedule of existing tenants is shown on Table 3, keyed to the facing map.

As shown, the most recently recorded lease was for 2.85 acres in May 1984.

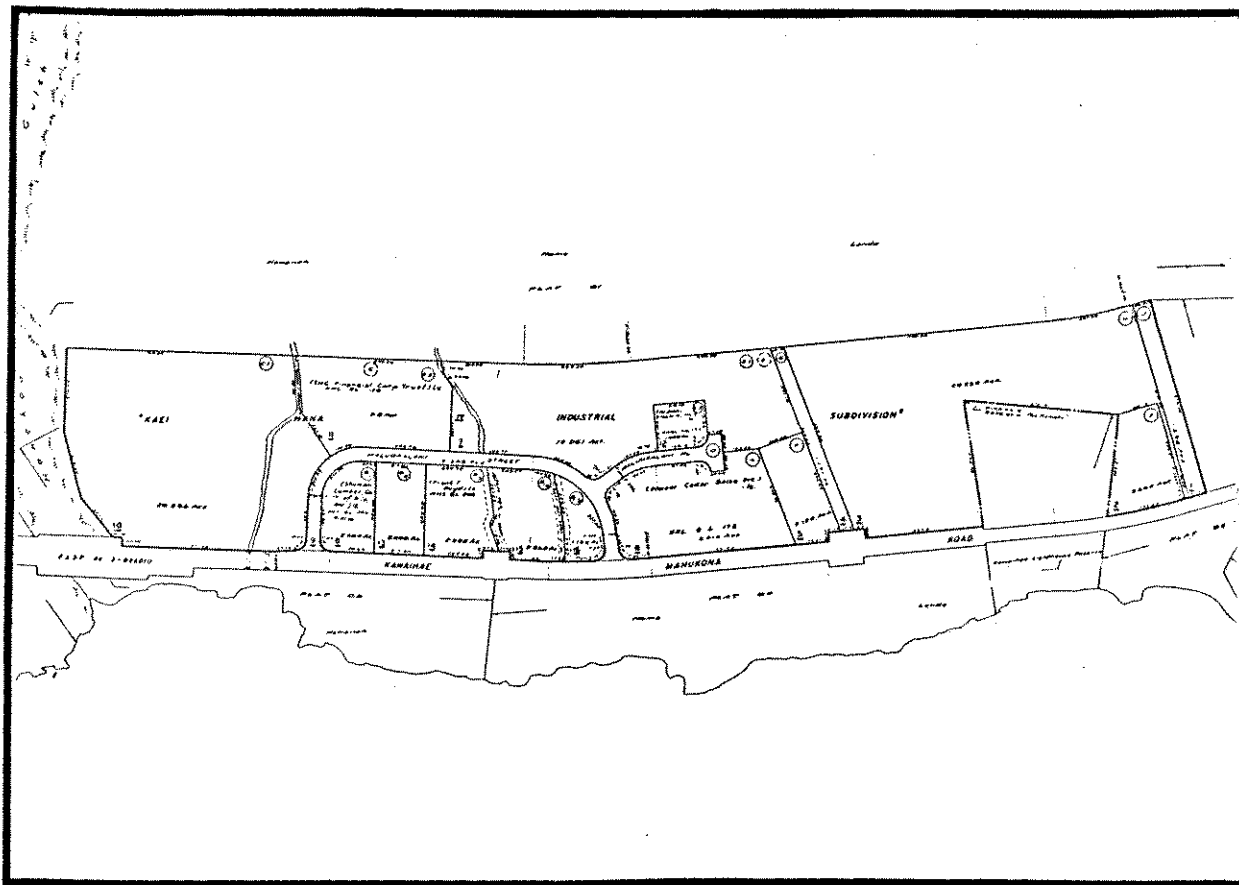
The most significant development yet planned for the subdivision is the multi-use industrial/commercial project proposed by Hans Wittemeyer, a successful center developer in the South Pacific. A post office, supermarket, multi-story office

TABLE 3 SUMMARY OF THE KAEI HANA II INDUSTRIAL SUBDIVISION  
Kohalaiki Market Study

Tax Map Key	Size (in Acres)	Lessee	Lease Terms/Comments
6-1-6-02	3.594	Vacant	
-03	20.339	Vacant	To be re-subdivided.
-04	1.171	Vacant	To be re-subdivided.
-05	2.120	Vacant	Request for lease by lessee of Parcel 6.
-06	6.513	Hans Wittemeyer, et al.	55 year lease from 5/1/72 to 4/30/2027. Reopenings in 2000 and 2012. Current rent is \$13,000/year plus ten percent override.
-07	12.961	Vacant	To be re-subdivided.
-08	2.000	Schumann Lumber Co.	30 year lease from 5/5/1978 to 5/4/2008. Reopenings in 1988 and 1998. Current rent is \$4,618.62/year.
-10	20.256	Vacant	To be re-subdivided.
-11	5.800	Pioneer Lumber Co.	65 year lease from 9/1/1968 to 8/31/2033. Reopenings in 1993 and 2013. Current rent is \$24,000/year.
-12	1.000	Arakaki Electric	55 year lease from 7/23/1971 to 7/22/2026. Reopenings in 1991 and 2011. Current rent is \$2,510/year.
-13	2.000	Kawaihae Millworks	30 year lease from 5/5/1978 to 5/4/2008. Reopenings in 1988 and 1998. Current rent is \$5,000/year.
-14	2.588	Boyd Enterprises, Inc.	Same as Parcel 13. Annual rent currently \$8,450.
-15	2.850	Kawaihae Development Co.	30 year lease from 5/7/1984 to 5/6/2014. Reopenings in 1994 and 2004. Current rent is \$8,000/year. \$6,800 lease upset paid.
-16	11.134	South Pacific Ship and Chandlery, Ltd.	Same as Parcel 13. Current rent is \$3,000/year.

SOURCE: The Hallstrom Appraisal Group, Inc., July 1985.

KAEI HANA II INDUSTRIAL SUBDIVISION



building, 15 storage/warehouse bays and ice house are preliminarily planned for the up to \$7 million complex. The State has approved conceptual plans (May 1984), and approximately \$500,000 in site work has been completed. A mid- to late-1986 completion date is anticipated. Despite the lack of competing facilities, and "strength of the concept", pre-leasing programs have been slow as potential tenants remain skeptical pending funding and start of construction.

Future expansion plans call for re-subdivision of the larger remaining parcels, according to Taylor, with (perhaps) some change to residential-type development along the highway frontage. On a long-term basis, the Department is optimistic about demand for the lots, citing the expansion of the Kawaihae area forecast for the next decade and the current lack of available services as integral contributing factors. A major problem to subdivision growth is water supply and storage, with only three additional water hookups available at this time. The County is planning enhancement of services to the area. Storage and transmission are the existing significant liabilities. There is the possibility water will be made available by mauka Ranch operators, who have a four and one-half inch line in the area.

#### Gentry's Kona Marina

A modernly designed industrial/commercial complex adjacent to Honokohau Harbor, Gentry's Kona Marina is intended to meet the demand for marine-oriented retail, warehouse and service space created by the small boat harbor.

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, which is summarized in Addenda Exhibit II). The project occupies a waterfront site at the southeasterly corner of the harbor.

An artist's rendering of the finished development is reproduced on the following page. Master ground lease terms call for:

Length of Term: 35 Years, five-year fixed rental periods.

Restricted Use: Marine or Marine-related activities.

Annual Rent: Phase I, 2 acres

\$25,000 per annum for the first five years

Phase II, 2.083 acres (if undertaken)

\$.272 per square foot, annually, throughout first five-year period, waived first year.

The remaining six, five-year periods rental will be at 100 percent of Fair Market Rental, as determined.

The complex, housed within a single improvement, contains 20 individual leasable spaces ranging in size from the 1,120-square-foot Fish House Storage Space to a 4,000-square-foot harbor-front restaurant. There are a total of six standard 1,152-square-foot bays, with three double bays. All warehouse bays have 520 square feet of mezzanine space.

The improved area is leased as "loft", or unfinished, space. Loading doors, ventilation and mezzanine improvements are provided. Common elements within the project are limited.

The market offered, or contracted, sublease agreement terms are displayed on Table 4.

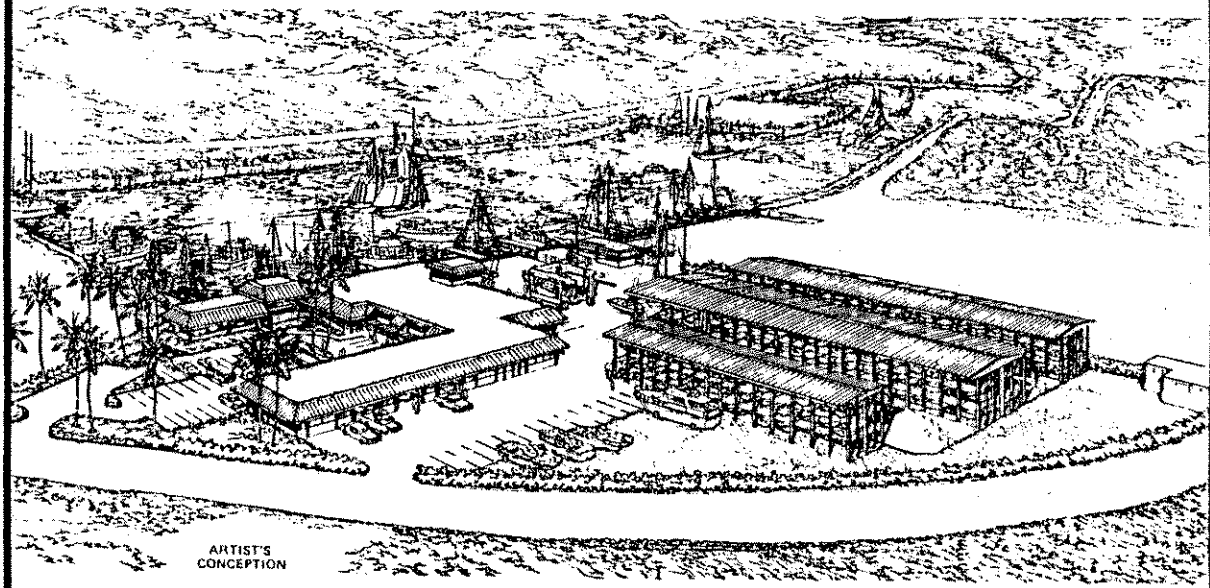
According to Charley Pang, lead project broker, the market acceptance of the project has been above expectations. He forecasts total absorption of the leasable area by fall of 1985. "Ninety percent" of the spaces are already under contract, with high levels of interest expressed by other potential tenants.

The developer is anticipated to commence construction of the second increment on the site, upon completion of Phase I; however, plans have not, as yet, been finalized. It is the intent of the State to permit leasehold development of up to



GENTRY'S

# KONA MARINA



ARTIST'S  
CONCEPTION

TABLE 4

**SPACE LEASE RENT LEVELS**  
**Gentry's Kona Marina**  
**Kohanaiki Market Study**

Space Type	Net Leasable Area (Sq.Ft.)	Monthly Rent
Warehouse:		
Floor Space	1,152 to 2,240	\$ .60 Per Square Foot
Mezzanine	520	\$ .20 Per Square Foot
Fish House Storage	1,120	\$1.00 Per Square Foot
Cold Storage	1,300	\$ .60 Per Square Foot
Fiberglass Shop	1,200	\$ .60 Per Square Foot
Restaurant ("atilla the hun")	4,000	\$ .85 Per Square Foot, first three years. Increase of 15 percent each year for years four and five. Negotiate next three, five-year periods.

SOURCE: The Hallstrom Appraisal Group, Inc., July 1985.

30 acres for maritime-oriented commercial, light industrial and storage uses in the harbor area. Development of a fuel dock and ancillary facility is the next project planned (on 10,000 square feet leased in November 1983). Lease rental income is perceived by the State as the primary contributor to recouping the capital investments and operating economics of the Honokohau facility; not, boat slip rentals.

#### Other Potential Developments

There are no other significant bulk acreage industrial subdivisions planned in the Primary Economic Market Sector in the foreseeable short-term. Neither are there lands so designated on the existing County of Hawaii General Plan.

In addition to the proposed incremental expansions described in the identified developments, growth is anticipated to occur within the Keahole Airport and Natural Energy Laboratory projects. However, use in both areas is controlled and somewhat specific; the Airport growth dependent upon tourism expansion, and the Natural Energy Laboratory on availability of subsidy research/entrepreneurial funds and grants.

#### Summary

The previously "limited" inventory of industrial-oriented development that has historically existed in the Primary Economic Market Sector, is currently undergoing expansion that will potentially place more than 275 lots on the market over the next eight to ten years. This effectively quadruples the number of lots (69) completed as of the beginning of 1985.

Despite the positive economic factors evident in the South Kohala and North Kona districts, particularly the significant growth in the tourism industry, it is doubtful that demand will increase sufficiently to create a need for additional industrially zoned lots beyond those planned during the next decade. Absorption of lots would have to occur at an average of over-25 units annually over the next ten years (a five-fold increase above combined historic trends) before a market sector "shortage" was created.



It is our opinion, that development of the subject into a bulk acreage industrial subdivision project is not sufficiently probable from an economic viewpoint to be considered as a potential Highest and Best Use alternative within our analysis. This is primarily due to the large increase in inventory currently proposed for the sector.

#### Residential

In analyzing residential real estate market trends within the identified Economic Market Sectors, population and housing demand forecasts, and historic locational-specific demand were necessary in addition to summation of individual projects in the areas.

Traditionally, residential development in the South Kohala and North Kona districts has been generally along Mamalahoa Highway, in the 600 to 3,500 foot elevation range. As discussed in previous sections, this is due to the climatic desirability of these "mauka" regions, which experience significantly cooler average temperatures, more stable relative humidity conditions, and more abundant rainfall. This latter trait permitted improvement based on catchment water supply prior to the construction of public and private systems. Elevations above the 3,500 foot level are, for the most part, considered less desirable due to extreme rainfall levels, overcast/foggy conditions prevalent, chill factor, and access difficulties.

The opinion is generally expressed by area residents, that the climate of the coastal (or lower elevation) regions, while excellent for tourism/vacation home development, is consistently too hot ("oppressive") and alternately too humid/arid for mass appeal except in closely proximate shoreline properties.

In South Kohala, approximately 6,200, or 88.57 percent, of the district's estimated 7,000 current residents live above the 800 foot elevation level. Many of these individuals have residential or agricultural lots in or near Waikoloa Village (estimated population 400, 900 to 1,100 foot elevation) and Waimea (2,000 estimated population, and 2,000 to 3,400 foot elevation).

Puako, population 257 in 1980, which has all development within 100 yards of the shoreline, and Kawaihae, population circa 200, which is a bedroom community servicing port and resort employee housing needs, are the only permanent residential coastal communities.

The impact of urbanization and tourism demand has resulted in some residential development in the Kailua-Kona to Keauhou corridor not on either the shoreline or above the 600 foot elevation level. The availability of infrastructure, services, employment opportunities, as well as the overall population increase, contributed to this development type.

Cursory demographic analysis of purchasers in mid-range (between shoreline and the 600 foot elevation) subdivisions reveals a significant ratio of investors/speculators, retirees, and "second-home" parties. Lower to middle income purchasers and renters are also prevalent.

However, with the exception of these approximately 1,300 lots, within eight subdivisions, the large majority of residential improvement in the North Kona district has been in the mauka communities of Kalaoa, Holualoa, Keauhou, Kainaliu and others, or within a tightly defined shoreline strand of the urban corridor.

It is our opinion, the continued expansion of the greater Kailua-Kona area over the next decade (as forecasted by government planners) will result in increasing residential development within the Kailua-Kona to Keauhou urban corridor at all elevational levels, stimulated by the attributes of the area. However, the mauka and beachfront locations will continue to be considered most desirable, with mid-elevation range development resulting from the lack of vacant mauka and shoreline developable acreage, and available infrastructure.

Outside the defined urban corridor, residential development in the South Kohala and North Kona districts is anticipated to be largely oriented towards the mauka regions, and secondarily, within the coastal resorts.

For brevity's sake, our in-depth statistical analysis of population and housing supply and demand trends has been omitted from this document, although, it is contained in our files. Our conclusions are summarized as follows.

The projected expansion of the resident population at rates approximating 9.60 percent annually on an average basis over the next ten years (1985 to 1995) will create the demand for circa 885 additional housing units per year in the General Economic Market Sector. Investor, vacation and second-home purchasers will also contribute to market activity.

Based on historical preferences, current economic/growth trends, and availability of infrastructure, it is highly probable that a significant majority of future residential inventory (sites and homes) will be added near the existing communities of Waimea, Kalaoa-Kealahou, and the Kailua-Kona to Keauhou corridor.

The former two of these areas are considered desirable due to the prevailing cooler climatic conditions (a major factor), and the rural equestrian/agricultural lifestyles available. An estimated 500 subdivided residential/agricultural homesites are proposed or under improvement in the greater Waimea area, and plans to develop a minimum of 1,800 lots (the majority in the Y.O./TSA project) in the Kalaoa area are currently being discussed with County planners, and are to receive approval for subdivision as County water becomes available.

In addition to the planned projects, an estimated 1,000 existing lots (fully-improved with off-site infrastructure and water approvals) that are within the 16 major identified subdivisions in Kalaoa-Kealahou are still unimproved. Based on historic demand trends in the area, for vacant and improved properties, there exists/is firmly planned a sufficient supply of developable lots for over 17 years (2,800 lots divided by 159 average transactions annually). These figures assume that all properties transacted are not returned to the market unimproved at a later time, that historic construction trends will continue, and that a high percentage of current owners (as yet not having improved the lots) would be desirous of selling their holdings.

There is currently a minimum of a 266-day supply of lots listed by area realtors.

Although the effects of the 1981-82 recession upon the "improved residential" market in the area have eased, with sales activity returning to 1979-80 levels during 1983 and 1984, demand is not forecasted to increase beyond 70 transactions per year over the short term (56 sales in 1983, average of 3.69 per month over last 51 months). Based on existing demand levels (approximately 60 transactions annually), there is currently a 2.7 year supply of homes listed for sale.

The expansion of the tourism industry along the Kohala Coast is anticipated to contribute to demand in the Kalaoa and Waikoloa "bedroom" communities; however, the existing and planned subdivisions should more than compensate for this increase.

In the Kailua-Kona to Keauhou corridor the oversupply condition is not as extreme but readily evident. It is estimated that a minimum of 600 to 800 existing lots are currently unimproved, or a market supply equivalent to 2.14 to 2.86 years based on historic/projected demand trends (under the assumptions listed above). Approved and under construction subdivisions will contribute an additional 800 lots over the next three to five years, effectively doubling the currently available inventory to upwards of five years of market supply.

Over the past 51 months, improved residences have transacted at the rate of 3.47 per month in the corridor. Allowing for the economic recovery and expansion over the past 20 months (50 sales in 1983), and continued anticipated growth, it is projected demand over the short term (three to five years) will be circa 60 homes annually. At this absorption rate, there is currently a 2.90-year supply of listings (173) with Kona realtors.

Within the Primary Economic Market Sector, the limited availability of subdivided homesites (321 total) both hampers the depth of analysis possible, and is indicative of the overall historic market demand to some degree. In past years, the lack of access to the sector (resolved with the completion of Queen Kaahumanu Highway), severely restricted residential (and general) development potential. The consistent high temperatures prevalent in the region, extremely poor soil

A-33

conditions, lack of infrastructure, and distance from facilities/services are the existing primary factors limiting market demand.

The majority of the homesites (270, or 84.11 percent) subdivided in the area are oceanfront, in close proximity to the shoreline, or within a quality resort development. The remaining subdivided residential properties are older, lower priced homes within a fully improved planned development having extremely small lot sizes.

It is apparent that successful residential development in the primary coastal corridor is dependent upon association with one or more strong locational amenities, specifically oceanfrontage. The strong success of Kona Bay Estates, which was effectively sold-out upon completion of infrastructure improvements (40 lots sold to "100 interested parties" approached over a three-year period), illustrates the continual demand for well-situated properties.

As a free-standing residential development, it is doubtful that a sufficient demand exists to justify the bulk acreage subdivision of the subject parcel into residential use; however, the near-shoreline areas would likely achieve market acceptance. This portion of the property is limited relative to overall size, and subject to severe restrictions for environmental and historical reasons. It is our opinion that the cost of infrastructure improvement coupled with locational-demand constraints, would make such subdivision of Kohanaiki unfeasible.

However, limited amounts of residential development might be included were the subject property improved as an integrated resort. Currently, seven of the State's 15 destination resorts contain single-family homesites, with four of the remainder planning subdivisions within the next three years. In all cases the lots are situated on interior resort parcels; with the demand for the properties being created by the availability of resort amenities. The degree of such improvements, and the potential market absorption parameters within the primary economic sector, are discussed within the Resort section of this report.

## Resort

Having surpassed agriculture as the primary industry of West Hawaii, tourism is anticipated by private and public analysts and planners to expand its economic dominance throughout the century. Via capital improvement investment, purchased local goods, and creation of employment, the visitor industry stimulates a wide-range of business sectors in the community, notably construction, real estate, trade, transportation and financial concerns.

For these and other reasons, the County of Hawaii has been amenable to well-planned destination resort development during recent years. However, the individual improvement of single, smaller holdings typically resulting in denser, incongruous, aesthetically lacking strip development (as has occurred in the Kailua-Kona to Keauhou urban corridor, in Kihei, Maui, and elsewhere) is discouraged.

Resort development, whether on a bulk or individual lot basis, is dependent upon the relative health of the County of Hawaii tourism industry. During periods of increasing visitor arrivals and expenditures, a demand is created for finished hotel and condominium units, related resort uses, and similarly developable sites. Conversely, declining tourism indicators results in diminishing, often stagnate, demand for resort-oriented real estate, and generally an overhanging supply of available units.

In the following sections, the trends within the State of Hawaii and County of Hawaii visitor industry are summarized. Thereafter is presented a comprehensive analysis of the statewide destination resort industry based on our analysis of the eight integrated major Neighbor Island resort communities previously identified. It is our opinion this is the Economic Market Sector in which a Kohanaiki resort development would compete, and is therefore of greater interest than merely the General or Primary Sector indicators would be.

### The Tourism Industry

Our conclusions regarding the State of Hawaii and County of Hawaii tourism industries based on our investigation of the physical and economic components of the market, and analysis of historic and current operating and income trends, can be summarized as follows:

#### State of Hawaii

1. The State of Hawaii visitor industry has recovered quickly and strongly from the 1980 through mid-1982 economic recession which plagued the dollar-influenced world. While other tropical destinations are only now beginning to achieve pre-recession levels, Hawaii posted record years in 1982, 1983, and 1984 in regard to number of tourist arrivals and visitor expenditures. In 1984 a total of 4,855,580 visitors spent an estimated \$4.582 billion in the State, while enjoying an average length of stay of 10.5 days, the highest figure in more than 20 years. Preliminary 1985 data indicates this could be the most successful year ever for the industry, particularly for Neighbor Islands, with Kauai and the Big Island returning to late 70's record levels.
2. The major contributors to this increase, beyond the general expansion of the Mainland economy, are the low air fares brought about by the deregulation of the airline industry, the publicized political and economic instability of competing vacation areas (notably Mexico and the Caribbean), and the pent-up demand for quality leisure time brought about by the stagnation and insecurity which were prevalent during the recession. The continued aggressive marketing of Hawaii is another factor in the recent resurgence of the tourism industry.
3. The visitor accommodation inventory (number of rooms available) has consistently exhibited continuing growth trends over the past decade despite the vagaries of the economy. At the last accounting, in February 1985, there were a total of 65,919 transient rental units available in Hawaii, with more than half (52.34 percent) located within Oahu's Waikiki Resort District. An emerging trend since 1977 has been the increasing percentage

of condominium units in the lodging inventory. This is primarily due to three causes: 1) the potential for faster and greater returns to the developer in condominiums as opposed to hotel construction; 2) the demand in the world market for Hawaii resort condominiums as an investment tool; and, 3) the increased return, and hence smaller negative cash flow, available to owners through vacation as opposed to fixed-lease rentals. Condominium rentals are achieving continually greater occupancy success, particularly among return visitors, due to their typically larger size, more relaxed atmosphere, competitive pricing, and kitchen facilities (which are generally unavailable in hotel rooms). Currently, circa 32 percent of all transient rental units available are located in condominium projects; 68 percent in hotels. The number of condominium rental units has more than tripled since 1977, hotel rooms have increased by 11.50 percent over the same period.

4. While average daily room rental receipts have continued to climb during the course of our study period, other relevant income categories (occupancy rates, food and beverage revenues) have been erratic over the past several years. Preliminary 1985 figures indicate a returning to the growth trends experienced throughout the 1970's.
5. The short-term prospects in the State of Hawaii visitor industry appear strong. Should the economy continue its present rate of expansion, and competition among air carriers remain high, industry growth for the remainder of the decade should continue at five or more percent annually. The opening of the Neighbor Islands to direct Mainland air service, and the continually increasing percentage of return travelers in proportion to all visitors, are factors anticipated to keep long-term growth prospects at an annualized rate of three to five percent per year until the end of the century. The economic and political emergence of the Pacific Basin as a factor in world-wide economic and United States affairs will also stimulate Hawaii tourism, particularly if expressed State goals of making the State the "crossroads of the Pacific" are realized.

Selected graphs depicting historic statistical trends for the years 1972 to 1984 (through June only), are contained in Addenda Exhibit III. The indicators

analyzed include: Average Length-of-Stay, Room Rental Rates, Occupancy Rates, and Food and Beverage department revenue levels.

County of Hawaii

1. Following three successive years of declining or stagnate economic indicators, the County of Hawaii tourism industry has experienced strong recovery through 1984. However, this current expansion of the visitor trade has yet to result in indicator levels approaching the record figures established during the late 1970's. The number of visitors to the Big Island in 1984 totaled 756,890, according to the Hawaii Visitors Bureau, a 6.25 percent increase from the 1983 figure of 712,380, (which represented a 5.0 percent growth from 1982 levels). Through March of this year, 205,530 tourists had visited the County, a slight drop relative to the similar period during the previous year. The record visitor count was 905,000 in 1978. It has been estimated that tourism contributes more than \$625 million annually to the County, and supplies more than 3,000 jobs, making it the largest Island business. Continuation of the trends apparent in recent years would result in near-record totals for arrivals and expenditures in 1985, with short-term prospects highly positive.
2. Among the primary factors stimulating the resurgence (other than those addressed in summation of statewide influences), were: the commencement of direct Mainland-to-Kona flights in early 1984, now running several times daily; the opening (and associated publicity) of the Mauna Lani Bay Hotel; the increasingly-recognized quality of the Kohala Coast resorts; the competitive pricing of many Kailua-Kona properties; and particularly, the continued deterioration of Waikiki encourages travelers to visit Neighbor Island destinations. A marketing campaign implemented in 1982 and 1983 targeted toward traditionally strong market segments is considered a secondary growth factor. The Hilo vacation area (located along Banyan Drive) has not experienced recovery to nearly the same degree as the Kona-Kohala region, and continues to be rated (according to Pannell Kerr Forster statistics) at or near the bottom of the ten statewide destination areas in regard to occupancy, room rates, and other economic data.

3. The number of units currently available on a transient basis in the County totaled 6,944 as of February 1985, a slight decrease from the previous year. (The cause for this loss in visitor rooms is due to the closing-for-conversion of the Sheraton Waiakea and Hilo Lagoon hotels.) Of the existing units, 4,336, or 62.44 percent are in the Kailua-Kona to Keauhou urban corridor; 16.83 percent, or 1,169 units, are located in Hilo; and, 1,439 rooms (20.72 percent) are located elsewhere, the majority (circa 1,250) within the Primary Economic Market Sector. The number of transient accommodation units in the County has not increased as rapidly over the past decade as experienced on other Hawaii Islands, expanding to current levels from the 5,265 units available in June 1974; equivalent only to a 31.89 percent increase. However, the opening of two large hotels (Sheraton Royal Waikoloa and Mauna Lani Bay) and the beginning of condominium development in the Kohala resorts since mid-1981, has placed West Hawaii in the forefront for projected expansion during the coming ten years, while other Neighbor Island resorts have remained relatively stagnate. A significant addition to the County total will come with the completion of the 1,260-room Hyatt Regency scheduled for late 1987.

The Kona lodging plant has long been composed, to a large degree, by condominium units placed in rental programs by absentee owners. The result has been an evolution of the areas tourism industry around this condominium concept (and commensurate benefits) much to the chagrin of hotel owners in the Kailua-Kona community.

4. The average daily room rate (received) in 1984 showed an increase of 13.23 percent on a County-wide basis, up to \$57.17 per night from 1983's \$50.49 figure. This annual increase, the largest during the 12-year study period, followed four years of minimal growth from 1980 through 1983. During 1972 through 1980, steady annual increases of 10 to 14 percent were recorded. Major contributing factors to the significant increase during 1984 included the pent-up needs for increases muted by hoteliers during recent slow periods, and the relatively high occupancy levels achieved by the upper-priced Kohala resorts, particularly the Sheraton Royal Waikoloa and the Mauna Lani Bay Hotel. An anticipated increasing demand for lodging,

created by the growth in visitor arrivals, the establishment of the Kohala Coast as an exclusive destination region, and the synergistic effects resulting from cumulative high-quality development, should result in continually increasing room rates over the short-term, at 12 to 20 percent annually. This figure would be anticipated to stabilize several years past the opening of the proposed Hyatt Regency at Waikoloa, which will likely influence the rate structures of many area operations.

5. Occupancy rates in the County have generally been the lowest of the State's four Districts over the study period. This is due to the creation of a large condominium inventory in Kona at a faster pace than visitor arrivals increased, and the continued decline of Hilo as a desired destination. Although occupancy was at the highest average level during 1984 since 1979, the annualized figure of 55.58 percent occupancy was still, well below statewide averages. However, 1984 totals represent a significant increase from the 1982 and 1983 figures when occupancy rates fell to all-time lows of 44.15 and 44.66 percent, respectively. From 1972 through 1979, occupancy rates ranged from 56.02 (1977) to 63.66 (1978) percent. This stable range was the result of inventory development roughly equivalent to the expansion of the tourism industry. In 1980, when arrival totals began to fall, many Kona projects (planned during positive economic times) were still being constructed; coming on-line as the recession deepened, further aggravating declining occupancy levels. Occupancy rates are anticipated to continue climbing over the next three years, a result of the growth trend in Big Island visitor arrivals, the continuing establishment of the Kohala coastal resorts as pre-eminent destinations, and the lack of existing plans to increase average quality, non-competitive inventory during this time. However, the effect an operating Waikoloa Hyatt Regency will have upon future trends is not clear. The majority of individuals expressing opinions feel that the hotel will contribute greatly to the region, helping to form the "critical mass" necessary to fully establish West Hawaii as a premier resort area; yet, the potential does exist, if the tourism market again declines later in the decade, that such a recognized operation could damage other hotels unable to compete. It is our opinion, that the Hyatt Regency will positively impact the existing projects.

6. As with other industry indicators, the ratio of food and beverage sales per occupied room was also experiencing significant growth during 1984, following several years of stagnate or declining revenue totals. Through 1984, the County average for food and beverage sales per occupied room were at \$26.44 and \$10.40, respectively, (or \$36.84 combined) per day, up 22.92 percent from 1983's combined total of \$29.97, which was .63 percent below 1982 figures. With the exception of 1978, when totals dropped 3.98 percent from the previous year, the period from 1972 through 1981 experienced increases in food and beverage sales every year. Again owing to the acceptance of the higher-priced resorts, and the current success of the visitor market, it is our opinion that these revenues will continue to climb over the next decade at growth rates of three to five percent annually, at or slightly above inflation levels.

In 1984, food and beverage revenues were equivalent to 64.44 percent of average daily room rate figures. In 1974, the ratio was 92.93 percent of room revenues. This downward ratio trend is evident in all sectors of the Hawaii tourism industry, a result of changing dietary habits, the prevalence of fast-food and non-hotel eating establishments, competition among hotel operators, and the increasing market share of condominium units (which contain kitchen facilities).

7. Despite the depressed indicators evident in 1982 and 1983, the current and long-term prospects for the tourism industry in the County of Hawaii look positive at this time; to a much more significant degree in West Hawaii (Kona-Kohala) than in Hilo. Through 1984 and the first quarter of 1985, the market has evidenced substantial recovery, and no lessening in demand is anticipated over the short-term. The major contributors to this resurgence (previously discussed) provide a strong foundation for attracting visitors, with the deterioration of Waikiki having the greatest potential long-term impact. The probability of achieving optimistic goals has been substantially enhanced with the emergence of the Kohala Coast as a high-quality, self-promoting destination area; with the recognized possibility that the region could undergo massive growth as experienced in West Maui and other Neighbor Island resort communities. In light of the existing and projected

trends, and other available studies, it is our opinion that the number of visitor arrivals and expenditures will increase at compounded rates of from three to five percent throughout the century.

Selected graphs depicting historic statistical trends for the years 1972 to 1984 (through June only), are contained in Addenda Exhibit IV. The indicators analyzed include: Available Rental Units, Room Rental Rates, Occupancy Rates, and Food and Beverage department revenue levels. While the subject is seeking less-intensive development than most of the projects analyzed, the characteristics necessary for success are similar, and a Kohanaiki resort community would have to maintain market levels of densities, facilities, amenities, and location in order to remain competitive.

The overall desirability of a destination resort, assuming it is constructed, managed, and marketed in a qualitatively competitive manner, is a function of two general characteristics: facilities and location. Both of these factors are comprised of a variety of sub-attributes and relative quality levels. While the subject is seeking less-intensive development than most of the projects analyzed, the characteristics necessary for success are similar, and a Kohanaiki resort community would have to maintain market levels of densities, facilities, amenities, and location in order to remain competitive.

In the following sections, we analyze the eight identified existing major Neighbor Island destination resort projects based on the format outlined below. A summation of the developments, and opinions regarding the apparent efficient and desirable levels of improvements necessary for successful market acceptance of a resort, are also presented. It is this general criteria which forms the basis for our conclusions about the potential for a resort development on the subject holdings.

The historic construction (supply) and absorption (demand) trends for each project are of primary importance in our analysis. The resort descriptions are presented in accordance with the order displayed on Table 1 (foregoing), beginning with the Island of Hawaii, then Kauai and Maui.

1. Introduction
2. Facilities
  - Hotels
  - Condominiums
  - Commercial
  - Single Family
  - Recreational
  - Proposed Expansion<sup>(1)</sup>
3. Location
  - Oceanfrontage
  - Climate
  - View Planes
  - Topography/Size
  - Archeological/Other Points of Interest
  - Transportation/Access
  - Environs
  - Other

<sup>(1)</sup> Expansion plans as proposed by the developer. All units may not be permitted under existing zoning.

Island of Hawaii

Keauhou-Kona

1. Introduction

Developed by the Kamehameha Investment Company on 2,000 acres fronting Keauhou, Maihi and Kahaluu bays, five miles south of Kailua-Kona, the Keauhou-Kona Resort currently contains 1,330 hotel rooms (in three facilities) and 845 condominium units spread among nine separate projects. Amenities include a golf course, archaeological sites, and shoreline parks. Additional development, including a \$10 million, 72,000 square foot shopping mall (West Hawaii's largest) and 135 single-family lots are scheduled for completion in 1985.

The master plan for the resort is shown on the following page.

The Big Island's first general-market planned destination (discounting the previously limited, exclusive Mauna Kea Beach resort project), Keauhou-Kona has, in many respects (notably hotel occupancies and overall recognition), failed to achieve the level of success experienced by other Neighbor Island resort developments. Generally, this is attributed to three factors: 1) the lack of quality white-sand beachfrontage; 2) extreme competition from nearby condominium rentals; and, 3) the existence of several non-resort, privately owned parcels in the complex which create a disparate appearance and hamper a unified atmosphere. Additionally, Aiihi Drive and Kamehameha III Road, heavily traveled thoroughfares and the only access to the southerly portions of the Kailua-Kona to Keauhou corridor, bisect the resort and further serve to diminish the overall ambience.

2. Facilities

Hotels -- There are currently three hotels in the resort with no existing expressed plans to construct additional operations. The Keauhou Beach (317 rooms) and Kona Lagoon (454) hotels are both standard-class operations located in the less desirable northerly portions of the resort near Kahaluu Bay. The Kona Surf (537)

is a well-designed deluxe-class property on a headland of Keauhou Bay. Table 5 summarizes the characteristics of each facility.

All three of the hotels have transacted on the open market at least once during the past 18 months and were publicly acknowledged by the sellers to be unprofitable at the time of sale. In general, the operations have historically experienced low occupancy levels; consistently under 60 percent for the Kona Surf, and 10 to 20 points lower for the other two properties. Actual room rates in recent years have been heavily discounted from advertised rack rates, with the result being that the bay and lagoon hotels achieve among the lowest rates in the State.

Currently, the Kona Surf and Keauhou Bay (as a result of refurbishment undertaken by short-time owners, Summit Hotels) are in good condition. The Kona Lagoon is in poor condition, with dated and aging furnishings, fixtures and grounds.

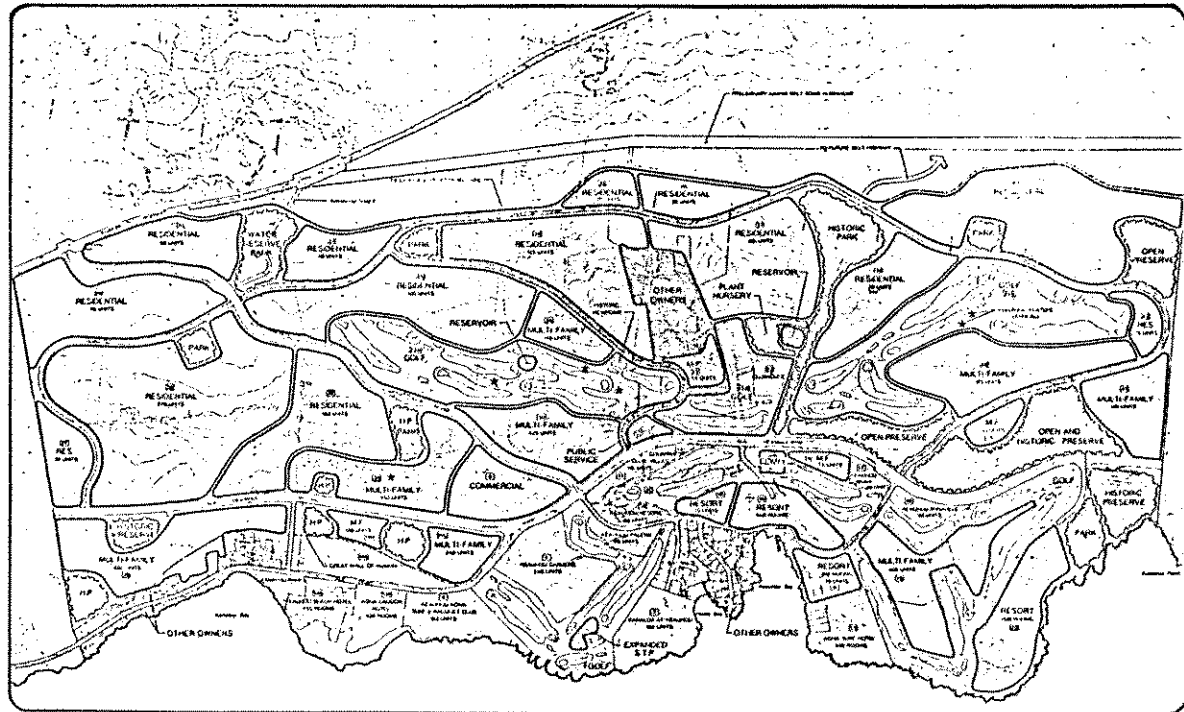
Competition from central Kailua-Kona hotels and similarly-priced area condominium rentals has significantly denuded the success of the Keauhou Bay and Kona Lagoon operations, which being well-removed from the resort's golf course and other quality improvements, offer minimal amenities beyond the identified competing properties. The opening of the Sheraton Royal Waikoloa and Mauna Lani Bay hotels along the Kohala Coast substantially diminished the market share available to the Kona Surf, which was originally intended as a similar-class facility.

Management at the three hotels have undertaken various new promotional techniques including: heavy marketing directed toward group travelers; aggressive targeting of Japanese tourists; extremely low "Kamaaina" rates for State residents; and in the case of the Kona Surf, an "Orchid Class" service. In this campaign, orchids are placed throughout the facility up to 20,000 per day according to General Manager Bob Herkes.

Condominiums -- Within the Keauhou-Kona Resort, condominium development has periodically fared more successful than its hotel developments, experiencing



KEAUHOU-KONA RESORT MASTER PLAN



LAND USE MASTER PLAN

KEAUHOU RESORT  
KEAUHOU-KONA, HAWAII

EXHIBIT 7



NOVEMBER 14, 1960  
Revised: June 8, 1961

PREPARED FOR **K** KAMEHAMEHA INVESTMENT CORPORATION  
PREPARED BY **CD** Belt, Collins & Associates

A-40



TABLE 5 KEAUHOU-KONA HOTELS FEATURES SCHEDULE  
Kohalaiki Market Study

Lodging Operation	Location	No. of Units	Restaurant	Separate Cocktail Lounge	Shopping	Meeting Rooms	Amenities
Keauhou Beach Hotel	Oceanfront	317	Yes	Yes	Arcade	Yes	Pool, Television, A/C, Parking and Tennis
Kona Lagoon	Oceanfront	454	Yes	Yes	Limited	Yes	Pool, Television, A/C, Parking and Tennis
Kona Surf	Oceanfront	537	Yes	Yes	Arcade	Yes	Pool, Television, A/C, Parking, Tennis and Golf

SOURCE: Hawaii Visitors Bureau, DISCOVER HAWAII and The Hallstrom Appraisal Group, Inc.

cyclical market activity trends similar to those within other resort areas in the State.

Since 1970, a total of 845 condominium units have been offered within the resort. Table 6 summarizes the nine projects (15 phases) and their original marketing absorption.

From late 1978 through mid-1979, market absorption of units on a pre-sale basis was extremely rapid, with seven consecutive offerings in the resort achieving sell-out within two months. Several projects, notably Kanaloa @ Keauhou (Fairway Villas) which sold out within one business day, required even less time.

However, outside of this peak period, absorption has been prolonged, with the most recently offered units as yet having failed to achieve total sell-out. In fact, the failure of the marketing program at Kanaloa @ Keauhou (Ocean and Bay Villas phases) was so acute, 80 units were sold in syndication to a group who will operate the units on a rental basis for a minimum of seven years before again releasing them on the market.

In general, over the past four years, activity has been stagnate with prices and numbers of sales falling.

Commercial -- Outside of limited facilities (restaurant and retail) in the three hotels, typically sundry shops and in-house dining rooms, the Keauhou-Kona Resort had not attempted to develop free-standing commercial space prior to 1984. In that year, construction began on a 72,000 square foot shopping center, which upon completion would be West Hawaii's largest. The primary cause for no commercial development in the resort was the ready availability of sufficient space in nearby Kailua-Kona village.

Unlike centers in all other resort projects except Princeville, the Keauhou-Kona facility is not solely oriented to serving the needs of its (and proximate) tourists. In fact, the prime tenants are retailers (supermarket, drug store, department store) vying to compete in the general community marketplace. This is in

**TABLE 6**      **SUMMARY OF CONDOMINIUM MARKETING**  
**Keauhou-Kona Resort**  
**Kohalaiki Market Study**  
**North Kona, Hawaii**

PROJECT NAME	NO. OF UNITS	DATE OF MARKETING	NO. OF SEMI-ANNUAL MARKETING PERIODS	AVG. NO. OF SALES PER PERIOD
Keauhou Resort	48	End 1969	8	6.00
Keauhou Akahi	48	End 1974	1	48.00
Keauhou Surf & Raquet Club I	50	Beg. 1975	2	25.00
Keauhou Palena	56	Beg. 1976	3	18.67
Keauhou Surf & Raquet Club II	26	End 1976	1	26.00
Country Club Villas I	67	End 1977	1	67.00
Country Club Villas II	49	Beg. 1978	1	49.00
Keauhou Punahale I	48	End 1978	1	38.00 (1)
Keauhou Surf & Raquet Club III	117	End 1978	1	117.00
Keauhou Punahale II	46	End 1978	1	36.00 (1)
Kanaloa @ Keauhou (Fairway Villas)	62	Beg. 1979	1	62.00
Keauhou Kai	18	End 1979	1	18.00
Keauhou Gardens I	112	Beg. 1980(1)	9	3.89
Kanaloa @ Keauhou (Ocean Villas)	46	Beg. 1980(2)	9	3.78
Kanaloa @ Keauhou (Bay Villas)	52	End 1981(3)	7	7.43
TOTALS	845			
Total Units Sold	736		47	15.66

- (1) Ten units per increment were retained by developer during initial marketing.  
(2) Project taken back by lender following poor pre-sale response. Currently being re-marketed, with 35 total sales to date.  
(3) 16 units sold on market, 18 included in syndication with units below, 12 are still available for original purchase.  
(4) All 52 units in project syndicated. To be operated on rental pool basis for a minimum of 7 years before re-sale.

Source: The Hallstrom Appraisal Group Inc.

keeping with the overall apparent trend of the resort away from just a visitor development to a resort/residential community.

With only circa 60 percent of the space currently leased, it is estimated the center will meet the tourist and resident commercial space requirements in the area for the next two to three years.

Single Family -- The first single-family residential lots in the Keauhou-Kona Resort have been offered on the market since late 1984. The response for the 135 lots in the Keauhou Estates subdivision has been mixed, with 43 reportedly spoken for to date. Set along the fairways of the second championship golf course being developed (in Phases) within the resort, the lots have excellent makai view planes although they are circa 1/2 mile upslope from the oceanfront. The asking prices, from \$95,000 to \$180,000, are among the most expensive along the Kona Coast.

Existing plans call for an additional 1,000+ single-family lots to be developed in the resort over the next 15 to 20 years.

Recreational -- With the completion of the nine mauka holes under construction along Kamehameha III road, the resort will contain 27 golf holes (1 1/2 courses). Future expansion plans call for an additional nine holes, thereby completing two full championship courses within the next two to five years.

Tennis courts are available to guests/owners at the Kona Surf Hotel and within several of the condominium projects (notably the Kanaloa @ Keauhou and Kona Surf and Racquet Club developments) although there are no facilities offered on a general basis for resort visitors. There are reported talks underway for the resort to purchase courts from one of the condominiums for general resort use.

There are several oceanfront parks within, or adjacent to, the resort along with a shoreline trails system. However (as discussed following), water recreational potentials are limited due to the lack of quality beachfront areas. Kahaluu Beach Park, a County facility at the northerly end of the resort, has poor quality of sand with extremely limited beach area, and is subject to gross overcrowding.

Proposed Expansion -- As discussed in the foregoing paragraphs, the Keauhou-Kona Resort is currently experiencing substantial expansion in what is generally considered Phase II of the overall development program. Beyond the single-family lots, commercial center, and golf course enhancement of this phase, there are no other concrete expansion plans. Developers are being sought for multifamily mauka sites, but interest has been minimal. There are no specific additional hotel facilities proposed at this time although sites have been designated for such use. It is likely that primary long-term efforts will have to develop the single-family residential parcels in the higher elevations of the community.

Under current plans, the resort will eventually contain:

Hotel Rooms:	3,311
Condominium Units:	3,787
Single-Family Lots:	1,210
Commercial Sites:	two, 7.64 and 1.50 acres

3. Location

Oceanfrontage -- The absence of quality beachfrontage within the Keauhou-Kona development is the most oft cited reason for the poor market acceptance of the project. This is further compounded by both the general lack of white-sand beaches in the North Kona District (which could help mitigate the problem), and the very exposed nature of the Keauhou region oceanfront, making access into the water (over the rocky shoreline) precipitous.

There are three bathing areas serving the development. Keauhou Bay is a relatively well-protected inlet which suffers from non-resort homeowners controlling the majority of the shoreline, and the (relative) noise and water pollution generated by its heavy use from local fishermen, canoe clubs and yachters. Maihi Bay has a pebble and coral beachfront, requires a hike for access and is susceptible to harsh wave and current action. However, it does offer excellent snorkeling potentials during calm periods.

Kahaluu Bay is a public beach with well-protected swimming and diving zones, consistently having superior conditions. The thin grey sand beach, however, is the only year-round strand in the area, and is consistently overcrowded tourists and local residents.

Climate -- Being in the lee of Hualalai and Mauna Loa, the resort typically enjoys excellent, windless climatic conditions. Yet, the Kona environment is the most tropical of any Hawaii resort area, frequently overcast in the afternoons and highly humid during the evenings and at night. Temperatures average 72.1 to 77.3 year-round, and precipitation is approximately 25 inches per year.

Mornings are generally clear and warm; the most favorable time of day. There is no defined rainy season for the coastal areas of Kona, although late winter and early spring are usually the wetter months. Only during infrequent "Kona wind" conditions, which periodically plague all of the State leeward resorts, is the air other than calm at Keauhou-Kona.

View Planes -- In addition to the ocean panoramas available from most areas in the resort (a result of the significant slope of Hualalai), there are superior mauka views upslope into the heavily wooded regions of the mountain. The lower bands of the mountain are increasingly being developed, thereby damaging some of the impact of the scene, yet in general, Keauhou-Kona has some of the finer mauka views among the studied resort developments.

The bays and inlets of the resort shoreline further allow for enhanced view potentials. The headlands of the bays give excellent coastal view planes towards Kailua-Kona (northerly) and southerly towards Mauna Loa. The Kona Surf has the best site, in regards to scenic panorama, of any oceanfront property in the resort.

Topography/Size -- As discussed above, the topography of the resort is relatively steep, and overall the most extreme of any resort development in the State (although Kapalua has some more severe areas). While this permits greater view potentials for mauka properties, it limits recreational potentials (strolling, playability of the golf course, etc.).

The 1,000 acres of the project are sufficient enough to allow development of a major community. For the most part, the project is situated on an A'a lava stratum, either barren or covered with feral haole koa and kiawe growth prior to development.

Archeological/Other Points of Interest -- The Kona Coast was the site of a major native population, hence, most desirable oceanfront sites have evidence of fishing villages or other communities. As the resort was developed prior to the full-bloom of the native Hawaiian awareness movement, some of the archeological sites were damaged or destroyed at the time of development. A holua (or lava rock slide) stretching through the southerly portions of the resort, which would be considered both mandatory to conserve and a desirable attribute under current development philosophies, had lengthy sections removed in the building of access roads and the original golf course. However, other sites, including a heeiau (temple) and housing area adjacent to Kahaluu Bay, were refurbished during the construction of the Keauhou Beach Hotel.

The other significant point of interest in the development is a marine blowhole situated along the sixth hole of the golf course. This is accessible via a shoreline trail.

Transportation/Access -- Approximately 13 miles from the Keahole Airport, which inaugurated direct Mainland flights in 1984, the resort is among the closest in the State to the airport which services it. A high-speed highway (enhanced with the completion of the Queen Kaahumanu extension in late 1984) provides ready access to the entrance of the development. Alii Drive, an oceanfront thoroughfare, provides further access directly into Kailua-Kona (the region's main community) approximately five miles north.

Public transportation is available though extremely limited. However, it is more substantial than that servicing resorts other than the subject. There is a shuttle bus which provides service from the Keauhou-Kona to a Kailua-Kona shopping mall.

Keahole Airport is one of the newest and most attractive Neighbor Island airports in the State, and appears capable of handling the necessary traffic loads anticipated over the next 10 to 15 years.

Environs -- The Island of Hawaii as a whole, and the leeward coast in particular, has excellent facilities conducive to tourist development and an unmatched variety of scenic and climatic potentials. As previously mentioned, West Hawaii has the highest concentration of historical sites in the State (an emerging desirable attribute among visitors), with developed cultural facilities at Puu'honua O'Honaunau (the City of Refuge), Puukoholo Heiau, Lapakahi State Park, Mookini Heiau, and many others. The first two are operated by the National Park Service, which is attempting to secure an additional cultural park in the area.

Within several hours drive is the Volcanoes National Park, which may consider the major point of interest in the State.

Additionally, the rich farmlands of the mauka regions are a source of interest and products (notably coffee and macadamia nuts) highly recognizable and desired by visitors. The offshore sportfishing grounds of Kona are world famous for Pacific blue marlin and ahi; Kailua-Kona being headquarters for many fishing tournaments each year.

The wide variety of climates on the Island permit excellent sightseeing potentials, including vast lava fields, stunning valleys, open cattle ranges, waterfalls, rain forests, wild flower fields, and seasonal snow-covered peaks.

The major drawback to the Kona Coast is the lack of accessible sandy beaches. However, as development in the region continues, many of the currently hard-to-reach bays in the North Kona and South Kohala regions should be opened for public use.

In general, the environs of the leeward Hawaii coast are excellent in regards to desirability among tourists.

Mauna Kea Beach

## 1. Introduction

Spearheaded by Laurence S. Rockefeller, the Olohana Corporation was established in 1964 to guide the resort development of nearly 4,000 acres surrounding Kaunaoa Bay. With the opening of the 310-room Mauna Kea Beach Hotel one year later, the project became the first planned resort development in West Hawaii, and among the forerunners in the State.

The resort is developed on a leasehold basis with the site owned in fee by Richard Smart (the Parker Ranch).

The existing Master Land Use Plan for the resort is shown on the following page.

Catering specifically to the upper-class (or "Carriage trade") traveler, the resort attained unparalleled acceptance, becoming the benchmark against which future luxury-oriented projects in the islands were compared. As amenities for the award-winning hotel operation, the complex also included a championship 18-hole golf course designed by Robert Trent Jones, Sr., a seven-court tennis garden, lush landscaping, and one of Hawaii's finest beaches.

The exclusive and isolated atmosphere desired by the then-operators resulted in minimal stimulus for development within the resort.

This attitude was changed considerably when UAL, Inc. (parent company of United Airlines, Westin Hotels, and Mauna Kea Properties) purchased approximately 3,500 acres from the Olohana Corporation in 1979. UAL, Inc. also purchased an additional 48,250 acres between the resort and Hapuna Beach Park in January 1979 for \$13,700,000, or \$284,056 per acre.

The larger transaction, according to the parties, allocated \$46,775,000 to the hotel, underlying site and operation.

The second parcel is designated for resort use by the State Land Use Commission, and is the proposed site for additional hotel development within the next three years.

It has become the expressed intent of UAL, Inc. through its Mauna Kea Properties subsidiary to promote and develop the resort into its fullest potential, capitalizing on its well-established luxury image. Many cite this commitment as a primary reason for the decision by United Airlines to begin direct Mainland service into the Keahole Airport when restrictions were lifted in 1983.

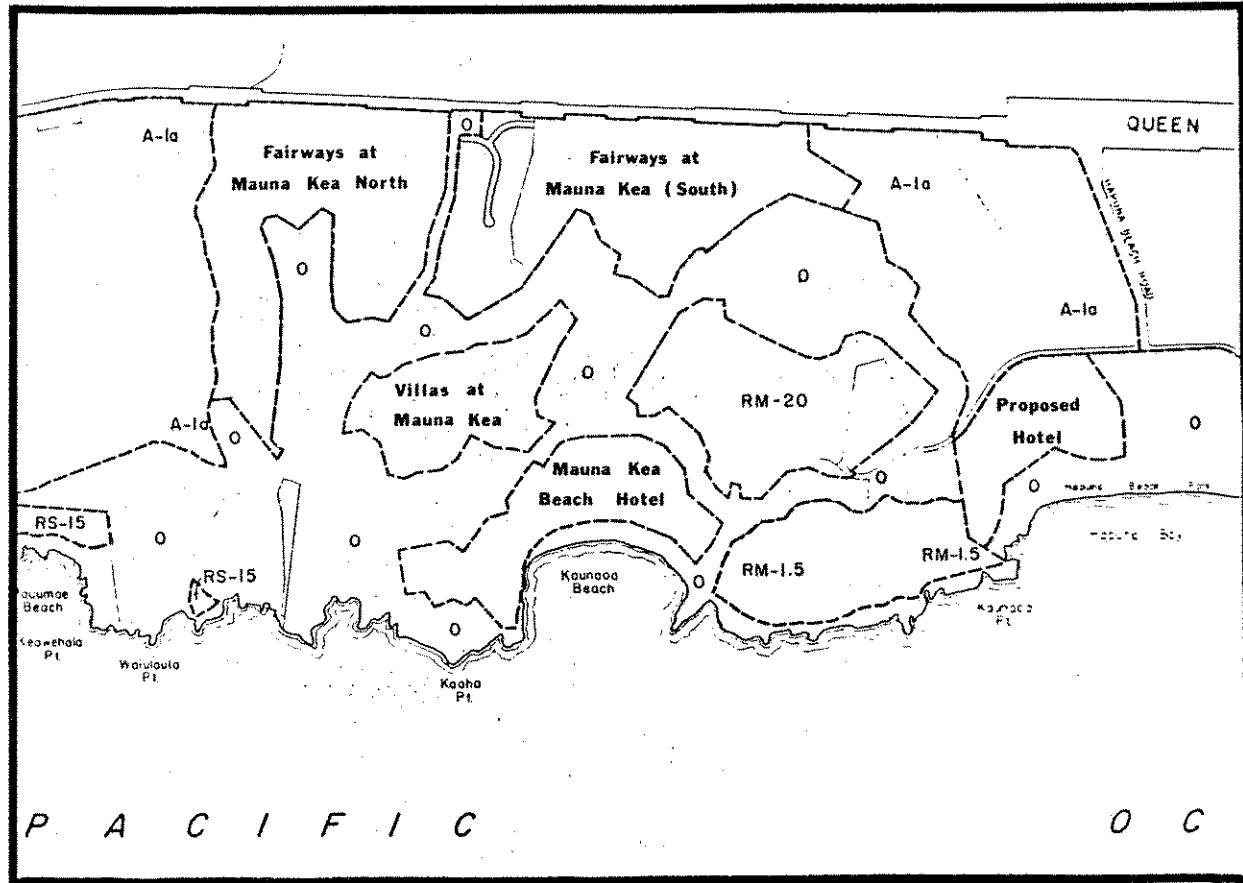
## 2. Facilities

Hotels — Although one year younger than the Kahala Hilton, the Mauna Kea Beach Hotel was Hawaii's first fully contained destination hotel. Considered among the premier hotels in the world since its opening in 1965, the complex boasts an excellent location, recreational amenities, award winning restaurants and relaxed elegance; which all subsequent luxury hotels in the State have attempted to emulate. Attracting a wide-ranging clientele fostered over two decades of operation, the facility has continually operated at high occupancy levels despite the highest average room rates in the State. The facility is currently the only hotel within the resort, although plans are progressing calling for a second similar quality project adjacent to Hapuna Beach in the resort's southerly area.

The existing 281.82-acre hotel site on the shoreline of Kaunaoa Bay was originally developed by Rockefeller Resorts along what was then a desolate coastline accessible via a winding road leading downslope from the 3,200 foot elevation— with the nearest major airport some 60 miles distant. Due in large part to the continued success of the hotel, a high-speed coastal highway was constructed accelerating other resort development. Westin Hotels, a subsidiary of UAL, took over management operations of the project in 1979.

Despite its age, the physical plant at Mauna Kea Beach remains one of the most elegant in Hawaii. While certain construction techniques have been outdated, the open-air style and landscaped interior atrium remain contemporary and the

MAUNA KEA BEACH RESORT MASTER PLAN



A-46

predecessor of all other luxury hotel designs in the State. The majority of the 310 guest rooms have excellent southerly ocean views or are located adjacent to the large grass park fronting the beach area. The rooms are exceptionally well appointed. Historically, the hotel has experienced annualized occupancy rates in the 90 percentile; one of the consistently most successful in the State.

Condominiums -- Currently, there is only one condominium project within the Mauna Kea Beach Resort, the Villas at Mauna Kea, a 40-unit development. There are no existing plans for additional condominium construction.

The 23 units of the first phase of the Villas at Mauna Kea were offered for sale beginning June 1, 1983, and achieved exceptional market acceptance. Within six months, all of the units were under contract.

The units, 22 two-bedroom and one, four-bedroom, ranged in price from \$750,000 to \$1,200,000, the highest average price level of any project ever offered in the State by a substantial margin. Gross unit sizes range from 3,962 to 5,336 square feet for the single-story, semi-detached residences.

No financing was offered by the developers with the large majority of purchases being cash; although, some buyers did arrange for private financing.

In addition to their large size, the units are well-appointed with a wide-range of luxuries and appliances including private pools/spas, ceiling fans, skylights, landscaped courtyards and trellises.

Phase II has met with more muted success, only nine of the 17 available units having been absorbed in the first 18 months of marketing. Sales prices are comparable with the first phase units. According to realtors with Mauna Kea Properties, the subdued acceptance (relative to Phase I) is due to: the seasonal fluctuations in demographics among visitors in the resort; the then-existing pent-up demand for units that was displayed in Phase I marketing; and, primarily, a reluctance to purchase until Federal Income Tax reforms are finalized. This latter factor is currently affecting demand for resort units statewide.

Commercial -- To date, there are no commercial facilities available at the resort beyond the restaurants (four) and retail (six shops housing circa 10,300 square feet of retail space) within the existing hotel. The developers, although acknowledging the long-term need for commercial space, do not consider it a priority. A restaurant and pro shop will be included in the clubhouse scheduled for construction along with the development of a second golf course.

Single Family -- The first development in the resort, other than the hotel and infrastructure, was the subdivision of 33 quarter-acre homesites along the 8th and 16th holes of the golf course, on an approximately 70-acre development site. The original sales prices for the "Mauna Kea Fairways" lots ranged from \$105,000 to \$250,000, and required 21 months to achieve full market absorption. This equates to a demand of 1.57 lots per month. It is noted, however, that sales terms required "payment in full" of the lots (offered on a leasehold basis) prior to construction of improvements, and set forth strict structural guidelines. These restrictions may have hampered acceptance, but enhanced the quality level of the complex. The lots are located in the mauka, or less desirable, area of the development along Queen Kaahumanu Highway with partial ocean views.

The first project undertaken by UAL, Inc. was The Fairways North, a 32-lot residential subdivision located on 68 acres adjacent to the 5th and 6th holes of the golf course. The homesites range in size from 23,033 to 62,787 square feet, and are offered on a leasehold basis at prices ranging from \$175,000 to \$500,000.

Sales of the lots began in Summer 1982 with only nine having been sold to date. Realtors cite the purchase restrictions (similar to those in the Mauna Kea Fairways purchase agreement) and availability of quality condominiums within the resort as the primary factors inhibiting absorption.

In conjunction with this sales program, the resort also began marketing memberships into The Club at Mauna Kea to homesite owners and condominium unit purchasers. The membership entitles participation in all recreational (golf, tennis, pool, etc.) and social benefits offered by the hotel, along with credit privileges.



Recreational -- The amenities available at the Mauna Kea Beach Resort compare favorably with other Hawaii destination resorts, although the existing hotel facility is lacking some of the more modern appurtenances such as a whirlpool and health spa.

Robert Trent Jones, Sr. designed the championship golf course to maximize the scenic ocean views available and minimize the need for extensive grading. Many of the techniques were copied by others (including his son), and used in building other Hawaii courses, notably at Mauna Lani, Waikoloa Beach and Makena resorts. Mauna Kea's third hole, across a wave-swept bay, is among the most famous in the world.

Seven tennis courts are available with seven others currently under construction. A sand volleyball court is also located on the hotel grounds.

Only Kapalua Bay Hotel can match Mauna Kea Beach's diversity in programmed guest activities. In addition to hotel and ground tours, classes in lei and quilt making are offered, as are nightly first-run movies (with free popcorn), group exercise sessions, and various gaming tournaments. Additionally, during school vacation periods, the resort provides a complimentary supervised children's program featuring picnics, hiking, games and crafts.

Due to its age, the grounds of the Mauna Kea Beach Resort are exceptionally mature and well-groomed. While not as verdant or ornate as those at the Hyatt Regency-Maui or Stouffer's Wailea Beach Resort, the gardens feature over 70 species of flora in an open relaxed setting fully encircling the hotel. The grounds and open-air atrium contain a "priceless" collection of Asian and Pacific art. A variety of tropical birds grace the atrium area.

Additionally, a well-maintained shoreline trail stretches from Kaunaoa Bay to Hapuna Beach Park, southerly adjacent to the resort, which gives excellent coastal view planes and access to oceanfront points of interest. Hapuna Beach Park, a State enclave, is one of the finest and best developed facilities in the State park system.

The hotel will also provide horseback riding, hunting, deep-sea fishing and even skiing (when available) opportunities for guests.

Proposed Expansion -- Recently, the resort developers have announced plans for large-scale expansion including a second golf course and 300-room hotel of comparable quality with the existing operation.

Portions of the golf course will be located on the mauka side of Queen Kaahumanu Highway and will be serviced by a lounge/rest area facility. This is the first example of a resort development utilizing mauka acreage. Preliminarily, construction on the course is scheduled to begin in late 1985 with completion within two years.

The hotel will be located on the acreage purchased apart from the primary resort acquisition transaction, overlooking the Hapuna Beach State Park. According to the developers, the hotel, although not directly beachfront, will be of the quality as to charge room rates circa \$175 nightly in current dollars. Preliminarily, construction on the hotel is planned to begin (if approved) by 1986-87.

An established market reputation, the regional expansion of tourism, an increasing demand among upper-class travelers, and the master plan of the developers are the primary reasons cited for the growth of the resort. With the addition of a second hotel, the developers viewed a second golf course as integral.

Long-term concepts also call for additional homesites (possibly with developer constructed custom homes) and quality condominium development. No time table has been established for these projects. The 28-unit planned residential development to be called The Bluffs at Mauna Kea, located between the shoreline and the 12th hole of the golf course, is the most advanced project plan.

It is the expressed intent of Mauna Kea Properties to develop the resort holdings on an in-house or closely-controlled basis, as practicable, over the short-term, thereby fully capitalizing on the established acceptance of the Mauna Kea name, and controlling development inventory and quality levels. No developable sites in the resort are being publicly marketed at this time.

Total long-range plans for the entire 4,000 acres call for:

Hotel Rooms:	1,100
Condominium Units:	4,000
Single Family Lots:	2,500
Commercial Sites:	one, 5.4 acres

### 3. Location

Oceanfrontage -- The wide, sandy beach of Kaunaona Bay, fronting the Mauna Kea Beach Hotel and the centerpiece of the resort, is the finest on the Big Island and one of the best within the State. Backed by a 60-yard wide coconut palm shaded private park, the beach frontage is easily among the most appealing at any resort analyzed. And, as the only access is through the secured resort or via a coastal trail, the area is essentially private for resort guests. The sheltered bay rarely has severe wave or current problems, and the snorkeling is good when the water is not subject to periodic cloudiness as is prevalent from February through summer. A complete line of ocean activities equipment, including scuba lessons and tours and catamaran sailings, is available to guests.

Outside of the approximately 3/4-mile crescent strand of the bay, the resort has mostly rocky shoreline which is relatively unprotected and does not lend itself to water recreation, but is extremely scenic. The proposed hotel in the resort will be on a bluff overlooking Hapuna Beach State Park, another excellent white sand beach.

Both Kaunaoa and Hapuna Bays have sandy bottoms, a substantial benefit, with coral formations found only along the forming headlands.

Climate -- The South Kohala coastline has long been considered as having extremely desirable climatic conditions for resort development. Average temperatures along the lava strewn region are among the highest in the State, averaging 73 to 80 degrees annually. The area also has some of the driest weather in Hawaii (it was considered a desert by the ancients) with less than 10 inches of

rainfall per year on the average. The precipitation is typically concentrated into a limited number of extreme downpours.

The major climatic drawback to the region is the strong afternoon winds which are relatively consistent throughout the year. However, unlike the other major resorts in the vicinity, Mauna Kea Beach is somewhat protected due to its location on the downward side of a coastal bluff, which serves to block most of the turbulence.

The combination of factors: sunny, hot, and arid with minimal winds, make the resort one of the best located in regard to climate of any major destination community in the State.

View Planes -- The scenic panoramas available from the resort are only average. While ocean views from the interior parcels are plentiful, the topography of the resort and further mauka lands, limits the inland views. The slopes of the nearby Kohala mountains are not as desirable a view amenity as other Hawaii mountains, as they are typically windswept and dry.

Many of the sites in the southerly portion of the resort and the higher plateau near the existing hotel do enjoy view planes south along the Kohala/Kona coastline, which is a superior panorama. But the existing development in the project, beyond portions of the hotel grounds, several of the lots and selected condominium units do not exploit this available scene.

Haleakala (on Maui) is not visible from the resort property, as it is from other area resorts.

Topography/Size -- At 4,000 acres, the holdings of UAL in the region are sufficient to permit adequate development as to allow cumulative attraction (or critical mass). Approximately 1,000 acres are in the resort proper, makai of Queen Kaahumanu Highway.

As previously mentioned, the topography of the site (abruptly sloping seaward from the highway) is one of the resort's main advantages by serving to block the

winds which plague the area. Next to Keauhou-Kona, the development has the most significant slope of any resort property in the State, permitting excellent ocean views from nearly all interior parcels. Because the slope is not gradual (as at Keauhou-Kona), but of a terraced variety, the golf course is not a constant sidehill lie.

The underlying geology is of older A'a and Pahoehoe lava flows, similar to that found throughout West Hawaii. The undeveloped portions of the resort (and the entirety of the property prior to development) is covered with pili grass in the mauka areas, and with haole koa and kiawe thickets in the near shoreline region.

Archeology/Other Points of Interest -- Unlike other West Hawaii properties, there are no significant points of archeological, environmental or other cultural significance that remain on the resort property, nor is the resort promoted based on its history (as are other destinations in the region). This may be due to the fact the property was developed prior to community concern for such sites, and any that may have been in existence were not saved. Nor are there any major anchialine ponds or fishponds as are found throughout leeward Hawaii.

While the lack of such sites would be considered as slightly detrimental to a new project, which use such points as marketing and thematic tools, the established nature of Mauna Kea Beach mitigates this concern.

Transportation/Access -- The major facility providing air service to the Kohala Coast area is Keahole Airport, approximately 26 miles south of the resort. Queen Kaahumanu Highway provides direct vehicular access to the property. This highway is probably the best outer-island roadway, a very high-speed thoroughfare. Prior to the highway's opening in the late 1970's, visitors flew either into General Lyman Field in Hilo (60 miles easterly) or into the small commuter terminal in Waimea (10 miles east). It is doubtful that many resort guests utilize either of these facilities at this time.

The resort is near a major intersection (a relative term) in the West Hawaii region, enhancing the touring potentials from the development.

Environs -- Mauna Kea Beach enjoys many of the same regional attributes expressed in the discussion of the Keahou-Kona project, although it is significantly more outlying and removed from the farming communities and parks of the South Kona district.

The "gold coast" of Kohala has long been considered a potentially prime resort destination development area by Hawaii governmental planners. As the sunniest and driest region in the State, the coastline offers dramatic views, deep clear water, and (due to the lava soil) little potential for other uses. The small bays of the coastline were favored by ancient Hawaiian royalty, who constructed fishponds, villages and trails which, although restricting some development, contribute to the mystique of the area today. The scarcity of the developable sites enhance the exclusivity of the various resort projects. For these reasons, the Kohala coast typifies the perfect Hawaiian setting for many American tourists, particularly those from the sunbelt.

There are three major drawbacks to the area: periodic severe wind-conditions; the perceived lack of beaches, which though existing, are difficult to access for the non-resident; and, as previously mentioned, the isolated nature of development and lack of a nearby urban center. This latter difficulty is being somewhat eliminated by the rapid expansion of vacation facilities in the region. While all other resort areas suffered stagnation to a near-total degree during the 1980-1982 recession and beyond, the Kohala coast was experiencing unparalleled growth. Two high-quality hotels were opened (Mauna Lani Bay and Sheraton Royal Waikoloa), three condominium projects were announced and well-received on the market, and several projects were proposed but failed to receive governmental permits. The room rates, condominium unit prices, and dining costs are among the highest for any region in the State, which bodes extremely well for future development in light of the success currently being experienced in this destination sector.

Mauna Lani

## 1. Introduction

Potentially comprising approximately 3,200 acres along the shoreline of Makaiwa Bay, the Mauna Lani Resort is the youngest destination community in the State; with golf course and hotel opening dates of 1982 and 1983, respectively.

Set on the most recent A'a lava flow (Mauna Loa, 1859) in the area, the concept for the project is generally accredited to the late Francis Pi Brown, a prominent Hawaii politician and partial owner of the site. Additional acreage was purchased from Signal Properties, Inc.; one of their select Parker Ranch properties. Approximately 775 vacant and feral acres are also leased from the State of Hawaii Department of Land and Natural Resources, at a current annual rental of circa \$17,000, which serves as a buffer zone between the resort and the nearby Puako oceanfront community.

The land development arm of the Tokyu Corporation (a Japanese-national conglomerate), also known as the Orchid Island Resorts Corporation, purchased the primary 3,201.48 acres of the raw resort site through two transactions recorded in April 1972 and January 1983.

The larger purchase, 3,036.983 acres from Signal Properties, Inc., was comprised almost entirely of mauka-lying land having little oceanfrontage. At the time of purchase, the two Tax Map parcels were designated for Conservation, Agriculture and Urban uses under the State Land Use statute. The County of Hawaii General Plan called for Extensive Agriculture, Open, Medium Density Residential, and Alternate Urban Expansion uses of the property. County zoning was unplanned at the time. The \$11,537,500 cash purchase price equated to \$3,800 per acre.

Key to the resort development was the acquisition of the 164.5 acres owned by Brown which encircled Makaiwa Bay and five historic fishponds, now forming the beach and major shoreline features for Mauna Lani. State Land Use classifications identified 56.0 acres (fishpond and shoreline areas) as within the Conservation district, 108.5 acres as Urban. The County of Hawaii General Plan

designated 74.5 acres as Conservation, and 90.0 acres for Alternate Urban Expansion. Following the first transaction of this property from Brown to Tokyu in April 1972, Tokyu placed the property into its Orchid Island Resort Corporation division allocating an indicated value of \$47,916 per acre.

According to the resort developers, planning was beyond the preliminary stages by the time of the land purchases, and required ten years in total. The State Land Use Commission petition for necessary designation changes was submitted in 1974-75, with final map amendments only recently passed by City Council.

Approximately 800 acres have received regulatory approval for development; the remaining resort acreage will be re-zoned by the County on a phased basis as need is demonstrated.

The map on the following page depicts the current master plan of the Mauna Lani Resort.

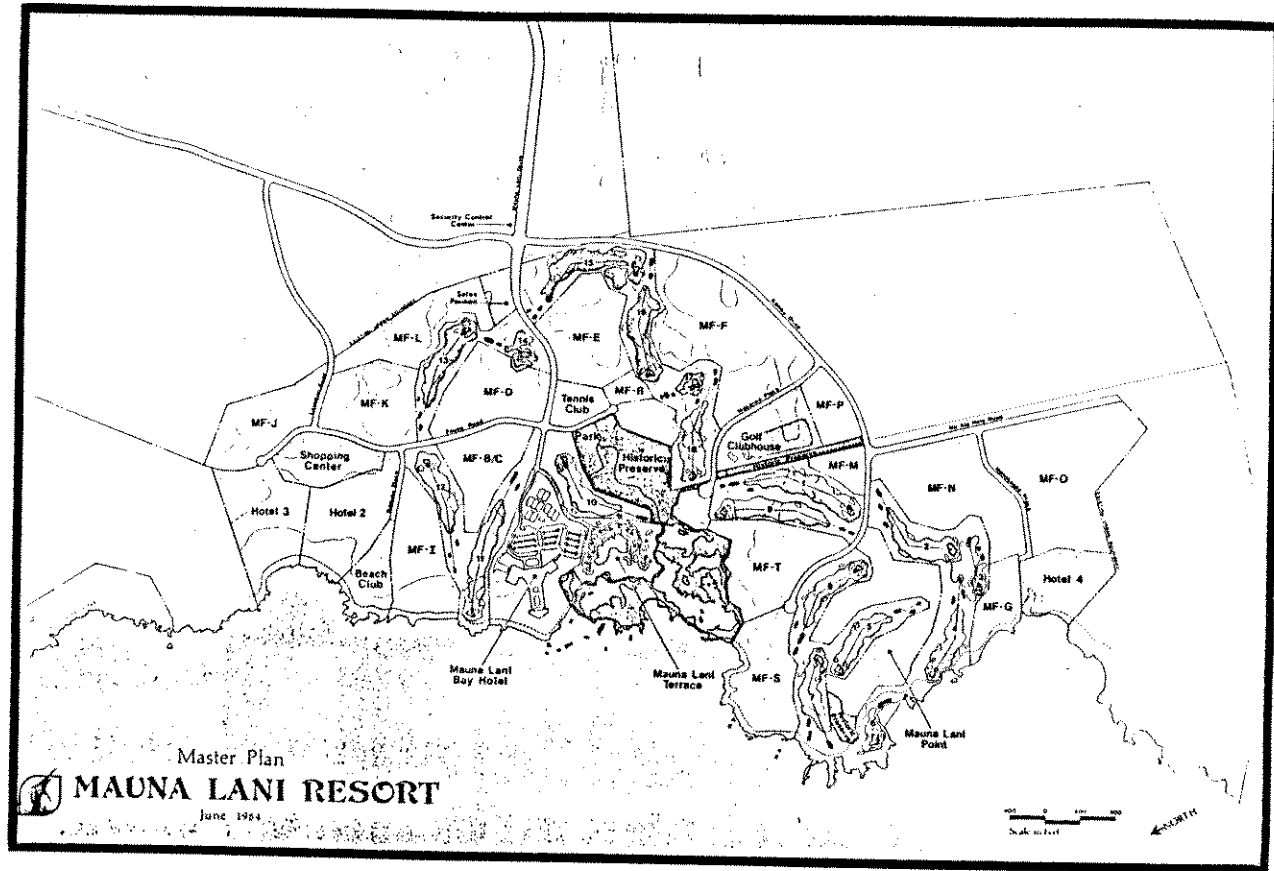
There are a total of 21 sites ranging in size from 5 to 40 acres available for development within the resort. While offers have been made on some parcels, the resort developers have been cautious thus far in giving serious consideration due to the apparent strength of the existing condominium unit market, the desire to maintain strict quality and density guidelines, and other unspecified reasons. Negotiations have been undertaken to retain Merrill Lynch as a marketing consultant, directing placement of selected multifamily parcels.

Specific unit and parcel prices have not been established by Tokyu, but prices circa \$1,000,000 per acre for shoreline properties, and \$500,000 per acre for inland sites have been discussed, according to the developer. The density of multifamily units allowable per acre will be from eight to 12.

## 2. Facilities

Hotels -- Advertised as the "new jewel of the Kohala Coast," the Mauna Lani Bay Hotel, currently the only hotel operation in the resort, offers an exceptional modern facility set on 29.090 acres of one of the Big Island's recent stark, black

MAUNA LANI RESORT MASTER PLAN



A-52



A'a lava flows. Stressing seclusion and exclusivity, the facility (which opened in February 1983) is marketed entirely towards the very upper-income Hawaii traveler, in direct competition with the Mauna Kea Beach Hotel four miles north. The hotel has been well-received particularly among Southern California, Japanese and corporate incentive group visitors, many of whom were regular guests at Mauna Kea Beach that become disenchanted when that operation was taken over by Westin in 1979. The emphasis on controlled well-planned development along the Kohala coastline, coupled with the year-round extremely hot arid climate, will provide increasing demand for the Mauna Lani Bay Hotel.

The 351 guest rooms at the Mauna Lani Bay Hotel, while of high-quality, are more conservatively appointed than other luxury hotels in the State. Over 80 percent of the rooms have ocean views, the remainder with scenic mauka panoramas of the Kohala mountains, Mauna Kea and Hualalai.

According to the hotel operators, the hotel was "in creation for more than ten years at a cost exceeding \$200,000 per room."

Condominiums -- Two projects, totaling 196 units have been announced within the Mauna Lani Resort, contained in two projects: Mauna Lani Terrace and Mauna Lani Point.

The first resort condominium project announced on the Kohala coastline, Mauna Lani Terrace achieved favorable market acceptance, "selling out" the 80 units over a sales period of approximately two years, according to head broker, Bob Rediske. Prior to completion, four of the units failed to clear escrow, and while offers have been received, are still listed as available for purchase.

Original asking prices ranged from \$365,000 for a one-bedroom, one and one-half bath unit to \$895,000 for three-bedroom, three and one-half bath residences.

In light of the stagnate (and often depreciating) market experienced in all other resort condominium sectors within the State, the successful marketing of these units (and those at Mauna Kea Beach Resort), despite the record average prices, was considered as a sign of definite market trend change.

There are seven units available on a resale basis, in addition to the three unsold "developer's" units. The successful resale of two units is also significant in an otherwise slow market statewide. The resales both were marketed in less than six months, and showed appreciation from original purchase prices of 18.39 and 12.50 percent, respectively.

The difficulty in marketing three of the four unsold original units is due to their relative high price (over \$750,000), according to representatives of Mauna Lani Realty; the potential buyers of such priced units preferring the more exclusive and expensive units offered at the Villas at Mauna Kea project, which are priced upward from this level.

The 116-unit proposed Mauna Lani Point condominium commenced pre-sale in January 1985, and completion of the first phase (55 units) of construction is anticipated by mid-1986. The project is designed by Media Five Ltd., Honolulu architects, and is to be located on a mauka parcel adjacent to the picturesque sixth hole of the Francis Brown golf course, but having unobstructed ocean views.

As of May 14, 1985, only seven of the units had been spoken for; significantly less than anticipated at the beginning of the pre-sale period. Again, uncertainty in income tax proposals was the oft cited primary factor. However, numerous potential purchasers expressed "strong" interest when the tax issue is favorably resolved. Acknowledging this, the developers have adopted a "longer-range" plan for the Phase II units.

Projections are for complete sell-out of Phase I by spring 1986.

Commercial -- Currently, the only commercial space within the resort is contained within the hotel (four restaurants/lounges and eight retail spaces housing approximately 8,350 square feet) and within the golf clubhouse (one restaurant and a pro shop). Additionally, there is a small pro shop adjacent to the existing hotel tennis garden.

The resort developers acknowledge and stress the need for an integrated resort commercial facility in the resort, particularly in light of its isolated location.

Within the next major expansion phase of the resort, scheduled to commence in the latter part of the decade, a 60,000 square foot center is planned. This will represent Phase I of the improvement of the 12.65-acre commercial site. The second hotel in the community, planned for the same period will also house a retail arcade.

A second clubhouse, serving the planned second golf course, will also contain a restaurant. The 10 court tennis garden currently under construction will have a juice/snack bar facility.

Single Family -- Single-family subdivision is planned for the resort on a long-term basis; however, there are no firm dates or sites established.

Recreational -- The recreational facilities within the resort, to a large degree, are associated with the existing hotel operation, and are commensurate in quality with the striking hotel improvement. The hotel's large free-form swimming pool, whirlpool and sundeck area is adjacent to the beachfront, and designed to offer the maximum individual privacy in a common open area. The complex is lacking in that it has no shuffleboard courts, health spa or gaming room.

The 6,813-yard Francis H. Pi Brown Championship Golf Course, considered by many publications as among the world's ten best, was allowed to mature for two years prior to opening of play, and is rapidly becoming the most famous in the State; a lush carpet of green set on an otherwise barren rock wasteland. Holes include shots across ocean inlets and anchialine ponds.

Ten varying-speed tennis courts, available exclusively for hotel guests, are designed to minimize wind and visibility interferences, and an additional 12, serving the resort at-large, are under construction. The hotel tennis pro, Craig Pautler, is renowned in the State, having previously been head of a variety of famous Caribbean and Hawaii resort clubs.

A second golf course is scheduled for construction within the next three years.

There are several large historic preserves in the resort and an extensive trail system which passes by the many historical sites on the property, connecting with the numerous fishponds near the shoreline. The quality of this development is among the finest of any resort in the State, rivaled only by the nearby Waikoloa Beach destination project.

The off-site recreational opportunities are extensive, but represent one of the hotel's most cited paradoxes. Although hunting, horseback riding, other golf courses and a myriad of popular activities exist in the Kohala district, the isolated nature of the Mauna Lani makes all trips beyond the limits of the resort a timely undertaking. Guests often note the lack of nearby restaurants, shopping, and night-life which is generally available at other luxury hotels.

The tastefully designed grounds of the resort, while featuring ancient fishponds, petroglyphs and other historical sites, are still several years from maturation resulting in a generally stark current appearance for the community. However, the atrium/interior of the hotel is extremely well landscaped (among the more striking in the State) and features ponds and streams stocked with a wide variety of Hawaiian reef fishes, including sharks.

Proposed Expansion -- The firmly proposed future development within the resort, beyond the underconstruction condominium and tennis garden projects, includes a second golf course, health club, commercial village and second hotel similar in quality to the existing operation.

The Tokyu Corporation has repeatedly asserted its projection that the entire planning and development of the Mauna Lani Resort holdings would require approximately 25 years, or roughly from purchase in 1972/73 until the end of the century. It is this long-term commitment to sustained, quality development (as evidenced in the major capital infrastructure expenditures) that has generated the rapid market acceptance of the hotel and condominium offerings to date.

The developable shoreline resort holdings, covering 800 acres, are planned to include upon completion:

Hotel Rooms:	3,000
Condominium Units:	3,285
Single-Family Lots:	undecided (limited, if any)
Commercial Sites:	Five Acres

### 3. Location

Oceanfrontage -- Makaiwa Bay, fronting Mauna Lani offers excellent swimming, diving and sailing potentials. While a rock reef protects a small, close offshore swimming area, the majority of the bay is subject to winter storm swells and strong currents. The water generally has a high degree of clarity, but due to the relative young age of the lava flow on which the hotel was built, a coral reef has not yet developed; although tropical fish can be seen in abundance.

The white-sand hotel beachfront was man-made by digging a shallow pit along the rocky shoreline and importing sand. The ability of the beach to survive in the high winds common throughout the area is questioned by some local residents. Despite its artificial qualities, the beach is wide and picturesque for hotel guests. Ocean activities equipment, including boat rental, is available.

The remainder of the resort shoreline is rugged A'a lava and not conducive for guest use, although the near shore anchialine and fishponds do have some recreational potential. Any additional oceanfront hotels will likely require a man-made beach area.

Climate -- The climatic conditions at the Mauna Lani Resort site are very similar to those experienced at the Mauna Kea Beach Resort (which see); however, as the project is situated on a flat lava flow, it is not protected from the strong afternoon gusting winds which plague the area.

The winds create difficulty for afternoon golfers, and resulted in the resort enclosing all beach chaise lounges with wind canopies.

View Planes -- The view potentials of the property are excellent, offering coastal panoramas southerly to Hualalai and Keahole Point, northerly to the Kohala

mountains, and across the channel to Haleakala on Maui. As previously mentioned, the mauka views of the Big Island's mountains (Mauna Kea and Mauna Loa) and central plain are among the finest non-ocean scenes available from any resort in the State, save Princeville on Kauai.

However, the relatively flat topography of the property limits the ocean views from interior parcels.

Topography/Size -- The Mauna Lani site was relatively flat and featureless prior to commencement of development. Although the rough underlying A'a lava is extremely malleable (using appropriate crushing and grading equipment), the property will always be insufficiently sloped to buffer the periodic gusting wind conditions or enable mauka parcels to enjoy ocean views. The stratum proved to be very conducive to golf course development, with rolling fairways and elevated greens and tees easily constructed, making the course one of the more scenic and playable in the State.

With 3,200 acres available for development (only 800 of which are currently master-planned), all makai of Queen Kaahumanu Highway, it would appear there is more than sufficient acreage to establish an effective full-amenitized resort community.

Archeological/Other Points of Interest -- The Mauna Lani property was the site for one of the most important and successful fishing villages in the islands. And the fishponds within the resort, which cover approximately 300 shoreline acres, were the largest constructed/adapted by the native Hawaiian population. Although large amounts of the ponds were destroyed in the lava flow which inundated the area (creating the "leaf" that forms the resort property), much of their historic and scenic values remain. When the site was owned by Francis Brown, hundreds of coconut palms were planted around the ponds, many of which he restored to their pre-flow condition.

It is said that King Kamehameha was fond of the ponds and they were reserved for the Alii. Today, preservations have been created in the resort with signs and pathways leading guests to the historic areas, including petroglyphs, home and



temple sites, rock walls and other significant points. Additionally, the Mamalahoa, or "kings highway," an ancient shoreline trail system transverses the property and is marked and preserved.

No other resort in Hawaii, with the exception of nearby Waikoloa Beach, enjoys such a critically important historical location and has done so much to preserve and exploit its potential as has Mauna Lani. This marketing angle has proven to be successful for the resort, providing an ancient contrast to the ultra-modern facilities which have been developed.

Transportation/Access -- The resort is also accessed from Queen Kaahumanu Highway, as is Mauna Kea Beach, and serviced by the Keahole Airport. The airport is approximately 21 miles south of the site.

A small airstrip has been constructed across the highway from the resort that is utilized for two flights daily by a commuter airline. It is not considered as a substantial benefit to Mauna Lani. The resort is the most isolated of those on the Kohala Coast, being some 29 miles from Kailua-Kona and 18 miles from Waimea Village.

Environs -- See Mauna Kea Beach Resort.

Waikoloa Beach

1. Introduction

A 500-acre complex along the shores of Anaehoomalu Bay (containing one of the Big Island's better white sand beaches) and Waialua inlet, the Waikoloa Beach Resort is the focal point of Transcontinental Development Company's 31,000 acre planned community.

The map on the following page depicts the approved resort subdivision plan.

Stretching some 12 miles inland from the shoreline, the entire project is conceptually designed to include up to 5,800 single-family residences, 5,200 multi-family units, and 3,000 hotel rooms. Currently, all development is contained within the resort, and near Waikoloa Village, located seven miles upslope from the destination area.

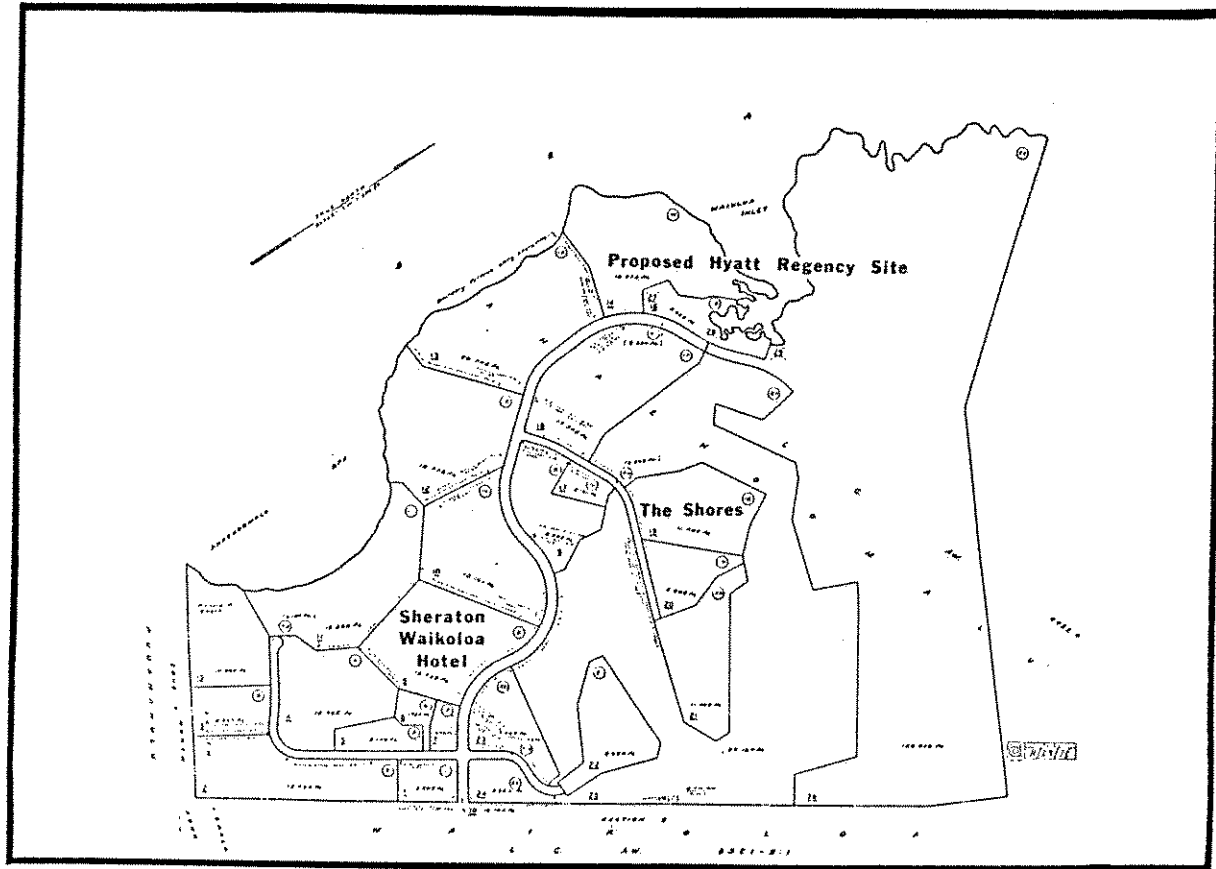
Transcontinental obtained the acreage from the Boise-Cascade Corp. in a purchase/exchange program during the mid-1970's. At the time of transaction, Boise-Cascade had invested approximately \$60 million in the development, including private gas, sewerage and water systems constructed since 1969. Seven water wells have been drilled; five fresh-water wells at the 1,200 foot elevation level (producing in excess of two million gallons daily), and two lower elevation brackish wells for irrigation purposes.

Although final land use classifications have only recently been obtained, necessary zoning clearance allowing development on the resort acreage was granted in 1978. The initial infrastructure for the resort (including roads, utilities and an 18-hole golf course) was completed in 1981, commensurate with the opening of the 543-room Sheraton Royal Waikoloa Hotel, currently the only major improvement in the complex beyond a golf clubhouse/pro-shop/restaurant and a small realty sales office.

However, the resort is in the process of major plant expansion which will make Waikoloa Beach the County's dominant tourist destination. The first condominium



WAIKOLOA BEACH RESORT SUBDIVISION PLAN



project in the complex, The Shores at Waikoloa (Phase 1), has been offered on a pre-sale basis since November 1983, and initially achieved strong market acceptance relative to most resort projects in neighbor island vacation areas. Additionally, plans have recently been announced detailing construction of the \$360 million Hyatt Regency Hotel within the resort; the largest private undertaking in the history of the State.

Existing amenities in the resort include: an 18-hole championship golf course designed by Robert Trent Jones, Jr., with plans for an additional 18 holes to be constructed in conjunction with the Hyatt project; one and one-half miles of sandy beachfrontage along Anaehoomalu Bay; and, extensive Hawaiian archaeological sites.

## 2. Facilities

Hotels -- The first hotel opened on the Kohala Coast after more than 15 years of dominance by the Mauna Kea Beach and Kona Village operations, and the only existing operation within the resort, the Sheraton Royal Waikoloa was conceptually designed to meet the needs of the middle- to upper-middle class group and independent travelers unwilling to meet the tariffs of the existing high-priced facilities. Sheraton management considered the complex one of the finest in its world-wide chain, and were hopeful of its positive impact upon the corporate image.

The Royal Waikoloa began operation in late 1981. At that time, the Big Island was experiencing a declining number of visitor arrivals, resulting in initial occupancy rates below projected levels. In order to stimulate use, the hotel offered substantial discounts to local residents and group travelers.

However, the fortunes of the operation have increased significantly during the past 13 months, due to the expansion of the Hawaii tourism industry generally, and the emergence of South Kohala as a widely recognized destination, specifically. The high-profile publicity campaign accompanying the opening of the nearby Mauna Lani Bay Hotel contributed to the recognition of the Royal Waikoloa. Despite the "poor relations" attitude of the other area hotels towards

the Sheraton, the facility and operation are considered of a luxury-class, competitive with most hotels in the State. In many respects this attitude is somewhat beneficial to the project as the high prices at the area's ultra-luxury hotels makes the Sheraton a "reasonable-priced" alternative offering comparable amenities and quality levels.

Additionally, the higher prevailing rates at the nearby operations, in conjunction with the expanding Hawaii County visitor market, permits the Royal Waikoloa to achieve higher daily room rates than were it in another destination region. The hotel is managed by Sheraton Hotels of the Pacific.

It is noted that the hotel improvement is somewhat set back from the beachfront due to the existence of the Anaehoomalu fishponds. This is not considered a negative characteristic, as it insures wide-angle ocean view planes and enhances the open and cultural atmosphere forwarded by the facility.

The 523 standard guest rooms and 20 lagoon cabana suites of the Sheraton Royal Waikoloa are relatively spacious and well-appointed. The furnishings and finish, though not of the class seen in the Mauna Lani Bay and Mauna Kea Beach hotels, is nonetheless tasteful and of high quality.

Condominiums -- The first condominium in the development is The Shores at Waikoloa Beach Resort, the third resort-oriented project announced along the Kohala Coast. The "Shores" has been relatively well received by the market since its pre-sale offering began in November 1983. As of May 1, 1985, a total of 37, or 56 percent, of the units within the first phase were under contract. Thirty-five of the units were spoken for in the first 12 months of marketing, but the uncertainty of future income tax revisions dampened response during the winter of 1984-85, although interest remained high.

Prices for the 66 apartments in the opening increment range from \$175,000 for a 1,155 gross square foot one-bedroom, one-bath unit, up to \$560,000 for three-bedroom, three and one-half bath units circa 2,400 gross square feet in size. According to head broker Bob Rediske, the most successful units thus far in the

sales program have been the two-bedroom units ranging in price from \$235,000 to over \$400,000.

Although the project has not been absorbed at as fast a rate as experienced during the first months of sale at the Villas at Mauna Kea and Mauna Lani Terrace, it is still achieving a greater level of activity than any other original sales program within the State for a resort-oriented condominium. The announcement of the Hyatt Regency is anticipated to further fuel sales during the coming 1985-86 winter season as tourist/purchasers are exposed to the hotel's master plan.

The significant majority of purchasers and interested parties are from Southern California, said Rediske, with professionals, real estate investors, and wealthy retirees constituting a substantial portion. He anticipates this trend to continue. Rediske was also the original lead broker during the pre-sale of Mauna Lani Terrace.

Commercial -- Currently, the only commercial facilities are within the Royal Waikoloa hotel, which houses four restaurants and lounges and nine retail shops containing approximately 7,300 square feet. The golf course clubhouse additionally contains a restaurant and pro shop.

Although long-range plans establish a seven-acre commercial center site within the resort, the actual construction of the project will likely be delayed, as the proposed Hyatt Regency hotel will contain circa 45,000 square feet of retail space and eight (or more) restaurants. This is anticipated to meet the demands of the resort community for the remainder of the decade.

Single Family -- There are no existing single-family lots within the resort, nor existing master plans calling for their construction. Long-range goals could propose up to 150 unless there is greater demand for land use as condominium sites. Because of the large acreage holdings of Waikoloa upslope from the resort, single-family lots in the beachfront resort area are not viewed as integral.

Recreational -- The resort offers a wide range of recreational facilities, equitable with any luxury-class development.

Within the existing hotel, a large free-form swimming pool, with adequate decking and support facilities, is located between the improvement and the fishponds. Restrooms, a poolside bar, and snack shop encircle portions of the pool area.

The Robert Trent Jones, Jr. 18-hole championship golf course at Waikoloa Beach, considered somewhat comparable with the famous courses nearby, is available for guest use. A second course is scheduled to commence construction by late 1985. The periodic strong winds of the region can inhibit play to some degree, a factor which could be reduced as the course and resort landscaping matures.

Currently, the hotel has six tennis courts, with additional planned as occupancy increases. The long range intent of the resort, in conjunction with the Hyatt Regency project, is to develop sports/health clubs, racquetball courts, tracks, and other facilities making Waikoloa a "sports mecca" and the most amenitized resort in the world.

As with the other hotels in the region, off-site recreational opportunities are numerous. However, despite the availability of other activities (including horseback riding, hunting, and golf and beaches elsewhere), the facility is somewhat isolated, being more than 15 miles from the nearest urban area. This is a common complaint among guests to the Kohala Coast resorts, a problem which will be alleviated over time as additional capital is invested.

Proposed Expansion -- The proposed Hyatt Regency promises to be the major tourism attraction along the Kohala Coast, and is anticipated to be a powerful stimulus to resort development in the region. The 1,260-room complex is being developed by Chris Hemmeter, the force behind the extremely successful Hyatt Regency facilities located at Kaanapali, Maui and Waikiki, Oahu.

Planned to contain "every conceivable" luxury and amenity, the hotel will feature: 14 bars and restaurants; a monorail system connecting the three lodging towers; intricate water features with gondolas transporting guests throughout the site; and, complete sports/health facilities, including weight rooms, saunas, racquetball and tennis courts, and fully-equipped gymnasiums. According to Clifton Jenkins,

Transcontinental Vice-President, the complex will be a "sports mecca . . . offering so many things to do that it would be unthinkable to go anywhere else."

Additionally, the hotel will contain more than 45,000 square feet of retail space, elaborate elevated gardens, four swimming pools, and an extensive man-made beach and bathing pond (if environmental approvals allow the excavation of the tidal pools fronting the site).

The project will utilize more than 1,500 construction workers, and will permanently employ an estimated 2,000 full-time hotel personnel; making it the largest employer in the County. The hotel will create demand for housing in the area (though mostly of a lower to middle income strata), and is forecasted to add ten percent to the Island's tax base.

Many prominent Big Island individuals, including then Mayor Herbert Matayoshi, have expressed the opinion the hotel will provide the "critical mass" necessary for the Kohala Coast to "explode" into the State's primary outer-island destination region by the end of the century. It is anticipated the hotel, if approvals are readily obtained as expected, will be completed by late 1987.

The effect of the facility on the resort is projected to be dramatic, hence, the negotiation war between the Mauna Lani and Waikoloa Beach resorts undertaken to attract the development. Jenkins said many other hotel developers/operators have expressed interest in Waikoloa sites since the announcement of the Hyatt project. "We've talked off and on to virtually every hotel chain", he has been quoted, "We've been told that the minute Hyatt signs, others will sign." Marriott, Stouffer's and Regent International are the most oft-mentioned interested parties.

Beyond the proposed Hyatt Regency and the Shores condominium projects, no other developments are definitively planned at this time. In addition to the interest expressed by other hotels in resort sites, numerous private developers have approached the resort owners regarding condominium and single-family projects. According to Bob Rediske, broker for Waikoloa Realty, while the resort is desirous of constructing additional condominium units, a commercial complex

and residential projects, they are awaiting the realization of the impact of the Hyatt announcement before concluding further plans.

Existing master plans in the resort call for a total of:

Hotel Rooms:	3,000
Condominium Units:	3,000
Single Family:	0 lots
Commercial:	one site of seven acres

3. Location

Oceanfrontage -- Anaehoomalu Bay, fronting the resort site, has long been a primary recreational location along the West Hawaii coastline. Offering one of the few large, year-round white-sand beaches on the leeward side of the island, the bay is popular among residents and tourists. The Parker Ranch has long had a beach park at Anaehoomalu (southerly adjacent to the existing hotel), and the County required the resort developers to provide public park facilities and beach access. The relatively sheltered bay provides good anchorage, excellent swimming and windsurfing, and other ocean activity opportunities. The winds, prevailing currents, and seasonal wave action, limit diving potentials; although coral reefs abound in the bay and water clarity is excellent at times. Ocean recreational equipments, including boats and windsurfers, are available for rental.

Waialua inlet, fronting the proposed Hyatt Regency site, is the only other major shoreline feature (although there are anchialine ponds scattered throughout the site) with most of the coast being rocky, with inland sand pockets. The Hyatt and any other shoreline development would require major beach development/enhancement. A trail system extends the length of the resort's oceanfrontage.

Climate -- Extremely similar to that at the nearby Mauna Lani Resort (which see) Waikoloa Beach also has problems with strong afternoon wind conditions.

View Planes -- Same as Mauna Lani (which see), only slightly less desirable mauka panoramas.

Topography/Size -- The topography and geology of the Waikoloa Beach Resort is also very similar to the Mauna Lani. Although it is set on a somewhat older lava flow (portions), there are greater amounts of vegetation (pili grass and kiawe) in the feral areas. The near shoreline areas of the two resorts are very comparable.

At 500 acres (within the designated makai resort area), Waikoloa Beach is the smallest of the identified projects analyzed. With the construction of a second golf course and the 60-acre Hyatt site, approximately 80 percent (or more) of the resort will be developed. It would appear that the 500 acres is only minimally sufficient in size for a major destination resort. In light of this, it is understandable that the developers are hesitant to commit portions of the limited acreage available to single-family lots, which generally offer a smaller return than does multifamily or hotel use.

Archeological/Other Points of Interest -- The resort is developed on a site that is steeped in Hawaiian archeological remains, including petroglyph fields, habitation and ceremonial building foundations, ancient trails (including Mamalahoa) and other artifacts in addition to the fishponds. The resort has capit lized on this theme, stressing the history of the location through design, finishings, marketing and signage. The remains of the community which once lived on the shores of the fishpond have been identified, cleaned, and in some cases rebuilt. Footpaths and descriptive signs enhance the historical orientation. For this reason, the landscaping at the existing hotel is somewhat subdued, with emphasis on shrubs and smaller plants enhancing the natural topography and lava outcrops. Bougainvillea and various other shrubs common to the region are most predominant. The majority of trees on the premises are palms surrounding the fishponds.

The preservation of the existing archeological sites is one of the focal points and major draws of the resort. The developed beachfront park, and the south side of the bay stretching towards Kapalaoa (a scenic inlet) are the resort's other major interest sites.

Transportation/Access -- This resort is also accessed from Queen Kaahumanu Highway, as are the Mauna Lani and Mauna Kea Beach projects. Keahole Airport,

19 miles south, is the major facility used by resort guests. Waikoloa Beach is 27 miles from Kailua-Kona and 20 miles from Waimea, the primary communities in the region.

Environs -- See Mauna Kea Beach Resort.

A-61

Island of Kauai

Princeville at Hanalei

I. Introduction

Currently, the only major master-planned destination resort community on Kauai (and likely the only one which will be developed during the foreseeable future), the Princeville at Hanalei project is situated on 1,000 acres of a coastal mesa overlooking Hanalei Bay. Long-term expansion calls for an additional 800 makai acres of resort/residential development. Currently, the program is in the land use change application process.

As with the Waikoloa development on the Big Island, the oceanfront Princeville Resort is the focal point of a much larger master-planned community. The Consolidated Oil & Gas Co. purchased the 11,000-acre Princeville Ranch holdings (established in 1853), with the intent of constructing a major agricultural, residential and resort area over the course of 35 to 50 years. Beginning in 1984, the corporation started selling shares in a holding company designed to further the community's development.

Princeville stretches from the interior central mountain range of Kauai makai (or northerly) to the Pacific Ocean, where it enjoys nearly five miles of shoreline. The site has widely contrasting land forms, including rolling grasslands, acres of forest and jungle, picturesque Kalihwai and Hanalei Valleys, and the plateau of the existing resort. The mauka (or inland) acreage is presently used for cattle grazing, with the valleys primarily planted in taro and other diversified crops.

A reproduced map of the existing Princeville Resort is shown on the following page.

Architectural controls within the resort are among the stiffest in the State, in order to preserve the excellent mauka panoramas and rural atmosphere. All single and multifamily structures are limited to 25 feet, with hotels a maximum of 40. All utilities are underground, adjacent to macadam roadways that are

otherwise unimproved (no sidewalks, gutters, etc.). Storm run-off is handled by contoured-grass gullies running parallel with the roadways. There are scattered storm drain culvert implacements throughout the complex to aid in sheet-flow run-off.

Originally, the makai areas of Princeville were intended to be used for, townhouse, second home and single-family oriented development. However, due to a variety of economic factors, improvement began along a multifamily concept resulting in its emergence as a destination resort community.

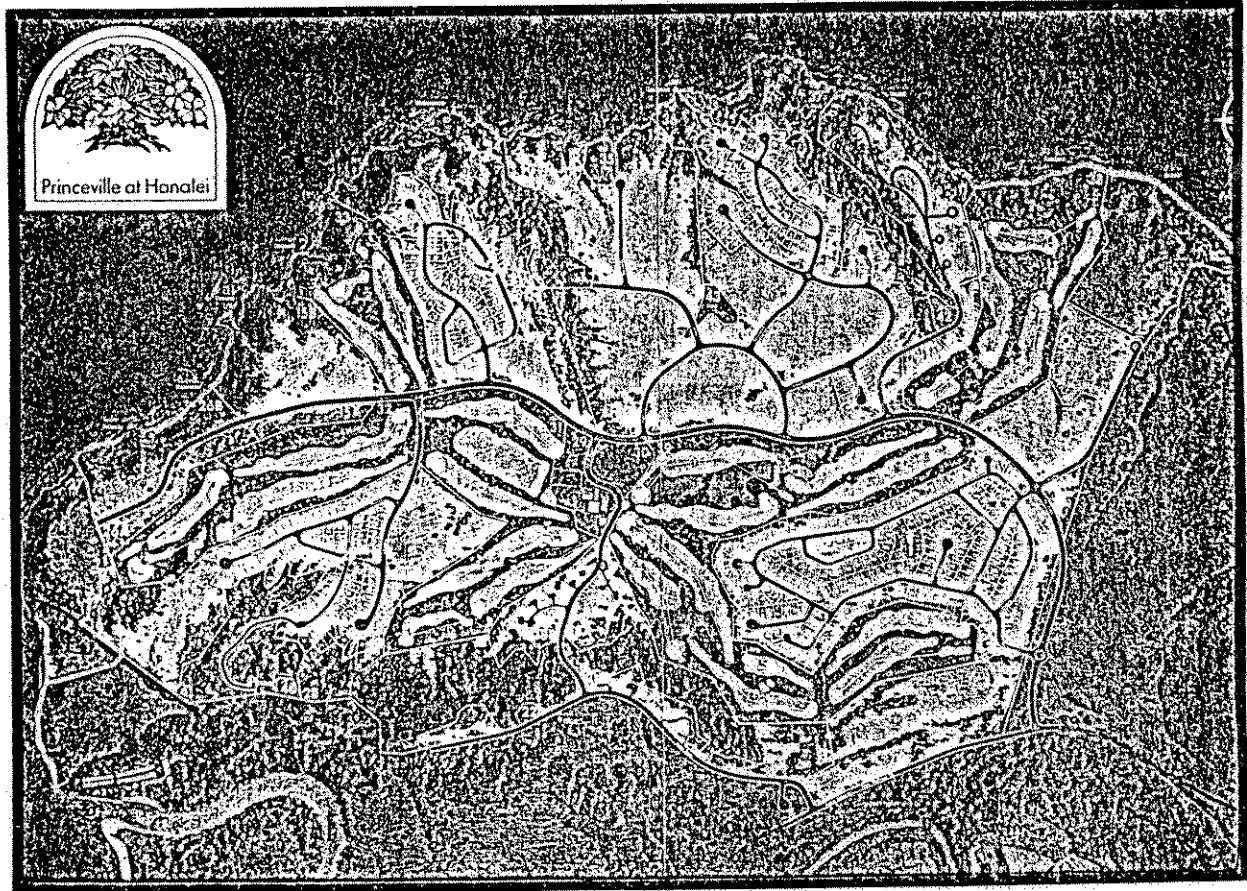
Because of the evolutions in its conceptual planning, Princeville has not been developed in what is generally considered a standard resort improvement format. Typically within a resort, hotel(s) are the first facilities built after the infrastructure is completed; establishing a profit center which helps in the overall marketing of the project. Thereafter, condominiums are constructed, then commercial and single-family developments. At Princeville, the order of improvement was almost reversed, with single family then condominium then commercial facilities. Although the resort has offered real estate on the market for nearly a decade, the first hotel within the community, the Sheraton Princeville (300 rooms), is not scheduled to open until later this year.

This hotel is the only one planned for development at this time, although the Hanalei Plantation Hotel (originally designed as a condominium) containing 204 rooms is currently under construction immediately adjacent to the resort, sharing the same isolated promontory. Both of these operations are intended to be of the luxury-class, "five-star" quality.

The impact of a name hotel operator such as Sheraton should prove beneficial to the resort, which currently suffers from an identity and recognition crisis among all but the most seasoned Hawaii visitors. This is greatly compounded by the common perception that the area is extremely wet, with minimal nearby visitor support facilities. Both of these insights are somewhat true, as is the fact that although the north shore of Kauai has some of the State's most beautiful beaches, there are few quality strands within the resort. Existing beaches are difficult to reach down the precipitous shoreline cliffs buttressing the resort mesa.

A-62

PRINCEVILLE RESOURCES MASTER PLAN.





The major attributes of the project are its lush surroundings and the spectacular views available from the site, which are considered some of the finest panoramas in the world. Many movies, including South Pacific, have used Princeville as a south seas setting.

Including the two hotels under construction, the Princeville Resort currently contains: 504 hotel units; 1,093 condominium units spread among 20 projects; a 16.68-acre, 52,000-square foot (gross leasable area) commercial center; 27 holes of championship golf, and expansive clubhouse facility with two restaurants; 17 tennis courts (spread throughout the complex); and 633 single-family homesites. A small commuter airstrip and riding stables are available in the mauka areas of the Princeville holdings. Additional development (beyond the preliminary planning stages) call for 1,500 more condominium units, up to 500 hotel rooms, and 750 single-family lots. Although there is a significant oversupply of finished units and lots in the resort, interest has been expressed by independent developers for available multifamily sites.

Relatively isolated, the closest town to Princeville is Hanalei, a small rural community with approximately 800 residents. Prior to the resort's construction, Hanalei was aguarian based; however, sites are now in demand among the wealthy of the world. Only in recent years has Hanalei experienced a tourism-oriented development push, and it has been extremely subdued. The prime attributes of the region are the numerous wide white-sand beaches, Hanalei Bay (one of the larger, more picturesque in the State), Hanalei Valley, and the rugged Na Pali coastline.

The prime transportation facility is the Lihue Airport, approximately 22 miles south of the resort.

2. Facilities

Hotels -- Currently under construction, the Sheraton Princeville will be the first hotel opened in the well-planned Princeville Resort community overlooking Hanalei Bay. The 336,162 square foot low-rise improvement will contain nine wings of guest rooms which cascade down the sea cliffs of the resort to the

shoreline. The project features spectacular views across the bay towards the Na Pali Coast; among the most beautiful panoramas available in the State.

Designed by Boone and Associates, the facility is being developed by Princeville Hotel Associates, a wholly owned subsidiary of Consolidated Oil and Gas, Inc., the resort entrepreneurs. Originally, Marriott was to operate the hotel, but withdrew. Sheraton Hotels of the Pacific is now holding the management contract. They anticipate the hotel will be among the most luxurious in its organization. However, while widespread recognition of the Sheraton name should enhance short-term occupancy rates, the chain is typically perceived as being of slightly-less-than-luxury quality. This may impact the effort of the hotel to achieve a stabilized higher rate structure over the long-term. The \$61 million project is located on 23.129 acres occupying the plateau, cliff face and coastal area of Princeville's easternmost point.

The 300 guest units of the Sheraton Princeville will be divided between standard rooms (294) and suites (6).

Also under construction, the Hanalei Plantation Hotel will contain 204 extremely spacious units housed in 12 detached three-story pods, each containing approximately 9,600 square feet of living and 2,200 square feet of lanai space. An additional 22,000 square feet of space will be housed in a separate lobby/restaurant/commercial improvement. The guest rooms will be among the largest in the State for a hotel operation.

The complex is situated on a 19.183-acre parcel overlooking the Hanalei River, Valley and Bay. The promontory site (steeply falling toward the river) provides excellent panoramas of Mount Waialeale and the Na Pali coastline. Many consider the view the finest available in the Islands.

Originally planned to be an exclusive condominium project, with average prices of circa \$900,000, the developer converted the plans to hotel use as a result of the stagnate demand for luxury condominiums during 1981-83, and the emerging desirability of Hawaii hotels as investment tools. As such, the project suffers from many traits which, while acceptable for a multifamily project, are not

typical for luxury hotel facilities. At this time, there is no contracted management/operator, although several reputable firms including The Radisson Corp., and OMNI/Dunfey have expressed interest. The entire facility will cost an estimated \$48,000,000 to complete (including land).

Condominiums -- Multifamily development within the Princeville Resort, the focal point of early capital investment, has been sporadic; following the same general cycles evident throughout the Hawaii destination resort industry. However, with the exception of the high-demand period of 1978-79, the market absorption of finished units has not been as intense as anticipated, or as successful relative to other statewide master-planned communities.

The primary reasons cited for slow absorption have been the perceived incimate weather at the site and the lack of a hotel operation (which would serve to attract a core of potential buyers and provide many needed facilities and amenities).

Since early 1973, a total of 1,093 condominium units have been offered within the resort. Table 7 summarizes the 20 projects/phases and their original marketing absorption. It is noted that several of the developments, notably the Cliffs at Princeville, have been the subject of large-block foreclosure action when sales reached unacceptably low levels for lenders. Additionally, in many of the projects, large numbers of units have been purchased (or taken as payment) by various development or construction companies involved with the individual projects.

For a myriad of reasons, particularly its lessened recognition relative to the other major Islands in the State, the condominium market on Kauai has not been as periodically successful as that on either Maui or the Big Island. However, since the implementation of a massive marketing program for the Island as a resort destination (undertaken following Hurricane Iwa), and the beginning of direct mainland flights in the summer of 1984, visitor arrivals and overall tourism demand has significantly increased. Should the economy remain strong, and the tax laws favorable, it is anticipated by Princeville developers that there will be an increasing demand for finished condominium projects in the resort over the next two years.

TABLE 7 SUMMARY OF CONDOMINIUM MARKETING  
Princeville Resort  
Kohalaiki Market Study  
North Kona, Hawaii

PROJECT NAME	NO. OF UNITS	DATE OF MARKETING	NO. OF SEMI-ANNUAL MARKETING PERIODS	AVG. NO. OF SALES PER PERIOD
Pali Ke Kua I	36	Beg. 1973	3	12.00
Princeville Sea Lodge I	50	Beg. 1974	2	25.00
Hanalei Bay Villas	37	Beg. 1974	3	12.33
Pali Ke Kua II	28	Beg. 1974	3	9.33
Princeville Sea Lodge II	36	Beg. 1976	3	12.00
Princeville Mauna Kai I	26	Beg. 1977	3	8.67
Alii Kai I	59	End 1975	7	8.43
Pali Ke Kua III	34	End 1975	3	11.33
Paliul	8	End 1976	2	4.00
Hanalei Bay Resort	134	Beg. 1978	1	105.00
Hale Moi	40	Beg. 1978	1	40.00
Kamahana I	30	Beg. 1978	1	30.00
Puamana	97	Beg. 1978	5	19.40
Ka Eo Kai I	20	Beg. 1978	1	105.00
Princeville Paniolo	26	Beg. 1979	2	13.00
Cliffs @ Princeville	202	Beg. 1979	7	11.71 (1)
Puu Poa	56	Beg. 1979	2	52.50
Alii Kai II	56	Beg. 1979	(2)	N/A
Sandpiper Village I	74	Beg. 1979	(3)	N/A
Ka Eo Kai II	44	Beg. 1981	(4)	N/A
TOTALS	1,093			
Total Units Sold	823		49	16.80

- (1) 82 units sold during original offering. Remaining 120 foreclosed upon, and many later sold via commissioner's deed.
- (2) Only 9 units sold during two-plus year offering. Remainder foreclosed upon.
- (3) 6 units sold in original marketing. Remainder dispersed among construction lenders.
- (4) 9 units sold on open market. Remainder controlled by developer holding company or construction lenders.

Source: The Hallstrom Appraisal Group Inc., May 1985.

Commercial -- The commercial facilities (restaurant and retail) within the resort are centered in two areas. Primarily, the 52,000 square foot gross leasable area Princeville Town Center serves the greater amount of needs, housing some 18 stores and two dining rooms. The golf course clubhouse at the center of the resort also contains two restaurant facilities in addition to a pro shop and lounge. Additionally, several of the condominium projects (The Cliffs and Bali Hai) contain restaurants.

The Princeville Town Center, like the shopping village under construction at Keauhou-Kona, is intended to serve both the resort guest and local resident market. In fact, to access the center which fronts Highway 56 (the region's main thoroughfare), one must exit the resort entirely. The anchor tenant of the development is a supermarket. Again, this illustrates the dilemma of Princeville's development program, caught between its original thrust as a second home/residential community, and its more recent concept as a full-amenitized destination resort.

Single Family -- To date, there have been 653 single-family lots developed within the resort. An additional 750 are planned for the first 1,000-acre phase. Demand for the lots has also been cyclical, however as some of the State's lowest priced resort real estate, they have generally been absorbed at a more brisk pace than that experienced at other major island destination communities.

Currently, several of the projects are still in original sales, with approximately 20 percent of the inventory still available.

The success of the SFR lot sales programs is not atypical in light of its relative low-cost, the attributes of the resort, including extensive golf and promontory frontage, lush surroundings, a strict architectural code ensuring mauka views, and a rural atmosphere.

Recreational -- The primary recreational attribute of the Princeville Resort is its 27-hole championship golf course, designed by Robert Trent Jones, Jr., which is considered by many publications to be one of the ten best in the world. Planned expansion calls for nine additional holes to be constructed, resulting in two complete 18-hole layouts.

Seventeen tennis courts are located within resort condominium projects, and not for general use. There is no resort-owned tennis garden as is found at many other destination resorts. The Sheraton Princeville will not have courts, a rather obvious oversight (according to many industry professionals) in view of the luxury level trying to be obtained.

There are stables and extensive riding trails available to resort guests in the mauka areas of the Princeville acreage. Other recreational opportunities are limited, a trait enhanced by the difficulty in reaching the oceanfront of the resort property; down semi-adequate trails along the face of the coastal cliffs.

In the area, however, there are many activity potentials, including expansive white-sand beaches, reknowned helicopter rides, boat trips along the Na Pali Coast, and many outdoor (hiking and sightseeing) points of interest.

Proposed Expansion -- At this time, expansion plans within the Princeville Resort are limited. Although the master developers are attempting to receive zoning approvals for an 800-acre addition (Phase II) to the existing resort. This will likely take several years. Within the resort, there have been plans expressed by independent developers for eight more condominium projects (or additional phases of existing ones), but most are in the holding stage until the impact of the hotel openings and tax laws can be more fully understood, and the current overhanging inventory is more fully absorbed.

The most-firmly planned improvement is the proposed nine-hole expansion to the golf course.

Within the 1,000-acre existing community, long-term plans call for total development as follows:

Hotel Rooms:	1,000
Condominium Units:	2,300
Commercial Sites:	two parcels, 16.68 acres total
Single Family:	1,400 lots

### 3. Location

Oceanfrontage -- As the Princeville Resort is located on a large mesa overlooking Hanalei Bay and the Pacific Ocean, with steep sea cliffs ranging from 60 to over 120 feet in height, the development does not enjoy the quality of direct oceanfrontage seen at other major island destination projects. There are several white-sand beach strands at the base of the plateau, but in general, they are difficult to reach; requiring precipitous hikes down oft-muddy trails. The underconstruction Sheraton Hotel site has the largest beachfront in the resort (though significantly smaller than that found at most major hotel properties). Due to the cascading hillside design of the hotel, guests will have relatively easy beach access. This beach varies in width from 15 to 40 feet, and is of a clean golden alluvial sand composition. Throughout the resort, the near tidal area is studded with loose volcanic stones and sand pockets. Off-shore areas contain well-developed coral reef formations, which make for excellent diving potentials and serve to protect the near shoreline and bathing areas from the seasonally (winter) heavy surf in the north shore region. Swimming and diving is particularly good in Hanalei Bay, except when heavy rainfall causes the silt level of the Hanalei River (which empties into the bay near the resort) to increase significantly.

Some of the State's finest white-sand beaches are in the region (such as at Hanalei Bay, mitigating the lack of quality frontage in the resort somewhat. There is no doubt this negative characteristic of Princeville hampers marketing efforts and the degree of return visitors.

Climate -- The extremely verdant countryside in the Princeville area results from the significant rainfall received. Average precipitation in the greater Hanalei area is circa 115 inches annually, with periodic extremes ranging from 47 to 240 inches per year. The resort is the only major destination resort other than Turtle Bay located on the northerly-windward (or rainy) side of an island; and Kauai is substantially wetter than Oahu. Rain, or the perceived threat thereof, is an anathema of resort operators due to the impact upon return visitors, and trepidation caused travel agents in booking clients into a potentially troublesome climate. Fortunately, most rainfall periods are from evening to morning, and in light of the high precipitation level, the relative humidity at the resort is not generally extreme or unpleasant.

The lush qualities of the location epitomizes Hawaii for many individuals. Upper-income travelers (who form the majority of Princeville visitors) have a greater capability to pursue other activities, and therefore the rain has proportionately less impact than on an operation appealing to lower income guests. As windward locations are not, in reality, as wet as perceived, the long-term effect is likely minimized as the market becomes aware of actual conditions over time. Furthermore, many travelers (particularly seasoned Hawaii visitors, residents, and many of the older age groups) consider the cool, breezy weather substantially more desirable than the hot, still-air climate of leeward locales.

The average temperature at Princeville ranges from 69 to 76 degrees.

View Planes -- The view panorama from most Princeville sites are perhaps the finest in the State; across Hanalei Bay towards the northern Wailaleale mountain range and the rugged Na Pali coast. It is extremely rare in that it offers both expansive seascapes and mountain scenes in a single view plane.

Although, the quality of ocean views from any of the properties on the edge of the plateau is only average (little shoreline, just open ocean), the superior mauka scenes are more than compensating. The lack of slope in the resort's topography, limiting ocean views from interior parcels, is overcome by the resort's strict architectural codes which protect the mauka scenes.

Topography/Size -- With more than 1,000 makai acres in Phase I, and an additional 800-plus acres due to come on line in the next decade, there is more than sufficient acreage for the resort to include the facilities necessary to establish critical mass. However, the lack of hotel operations has thus far damaged the thrust to achieve the desired levels of cumulative attraction.

As previously mentioned, the resort is relatively flat (although it has been sculpted to enhance the golf course contours and ease of rainfall run-off), situated on a seaside promontory which is well-covered with rich organic and volcanic soils. The flat character makes the golf course more playable.

The mesa cliffs pose a major topographical problem, limiting shoreline access, however they create expansive view potentials. The faces of the cliffs have been designated for conservation, and may not be improved.

Archeological/Other Points of Interest -- There are several significant archeological sites within the Princeville Resort. The Sheraton Hotel property encompasses: Fort Ross, an earthen battlement ring built by Russian traders in the early 1800's (of which minimal recognizable features remain); and, the Kanaoiaiki fishpond, now in-silted and overgrown, located behind the parcel's beachfront.

It is the intent of Sheraton to enhance both of these sites; the former with trails and signage, the latter (now basically an estuary) as a sanctuary/preserve with overlooking pavillions.

Other than these two, there has been no integrated attempt by the resort to capitalize on any native finds. Perhaps, as the site has been used in ranching purposes for more than a century, few significant sites remain. The major point of interest in the project is its excellent view, and if one is adventurous enough, the caves, ledges and enclosed beaches of the shoreline area at the base of the sea cliffs.

Transportation/Access -- The resort is approximately 40 minutes driving time from the Lihue Airport, which welcomes the large majority of Princeville visitors. Vehicular access is via Highway 56, the only thoroughfare in the vicinity. This can result in congested travel in the small towns along its length.

The Princeville airstrip is used by two small commuter carriers on a minimal schedule basis. At this time, there are no plans to expand the strip, or for other major airlines to route into this facility.

Environs -- The beauty of the region notwithstanding, Princeville does not enjoy the support facilities or points of interest that most resorts in the State do. While Hanalei has undergone (very) limited tourism-oriented expansion in the last five years, the community does not seem desirous of exploiting such a potential. In

fact, the majority of residents would likely speak out against the type of growth seen in near-resort towns such as Lahiana and Kailua-Kona.

North of Princeville are many spectacular beaches, with well-established hiking trails along the Na Pali coast. However, most tourism development is near Kapaa (12 miles south) or on the south-westerly side of the Island. Due to Kauai's size, the major points of interest, such as Waimea Canyon, Koloa-Poipu, and Barking Sands Beach (all are on the Island's south-westerly side), are relatively accessible, only an hours drive from Princeville. Most archeological remains are also found in this area.

This lack of activities and limited sightseeing potential is not necessarily viewed by travelers as a negative trait on Kauai, many of which visit the Island specifically to enjoy its rural character and "unspoiled" atmosphere. Yet, there can be no doubt that the minimal level of support facilities and perceived wet climate of Kauai hampers expansion in numbers of arriving visitors.

Island of Maui

Kaanapali Beach

1. Introduction

Considered the world's first full-amenitied destination resort, the Kaanapali Beach development program was first announced by Amfac in 1961. Since that time, it has grown into Hawaii's most significant master-planned vacation community, and its most successful; with all subsequent resort entrepreneurs seeking to emulate its marketability. The community is a prime example of an upscale destination resort development.

Although the area was acclaimed as the "playground of the ancient Alii," Kaanapali was a desolate stretch of sand backed by sugarcane fields until the then radical decision to undertake resort development was made public. Today, the community is the site of the most intensive tourism-oriented capital investment program other than Waikiki, and the most popular visitor destination outside of the Honolulu urban resort district.

Currently on the 1,169-acre property, there are six hotels (containing 3,761 rooms), 10 condominium projects/phases (housing 1,214 units), a 68,000-square foot (gross leasable area) shopping village, two championship golf courses, a commuter airstrip, and 75 single-family lots. In general, the average room rates within the resort are among the highest in the State (and country) save for several select luxury operations, with comparable finished condominium unit prices.

No other destination resort has more than three hotels, or (with the exception of Princeville) near the number of condominium units as found at Kaanapali. The success of the resort created a massive surge of growth in the West Maui coastal corridor (stretching seven north to Kapalua), with more than 5,000 condominium units developed in the area from 1972 through 1984.

A map of the resort is displayed on the following page.

More than 4,500 Maui residents are employed in the resort, making it the islands number one employer. And it is said Kaanapali contributes nearly 20 percent of the tax revenues (property and sales) generated on the island.

Following the first phase of construction, the resort did not achieve widespread recognition for over a decade, until Maui undertook a massive mainland advertising campaign in 1973 and 1974. Concurrently, a healthy economy and high-inflation created significant demand for condominium units, and the Kaanapali-mystique took hold. Over the next eight years, these units and the single-family lots in the community experience rapid appreciation, fueling the rampant development along the West Maui beachfront.

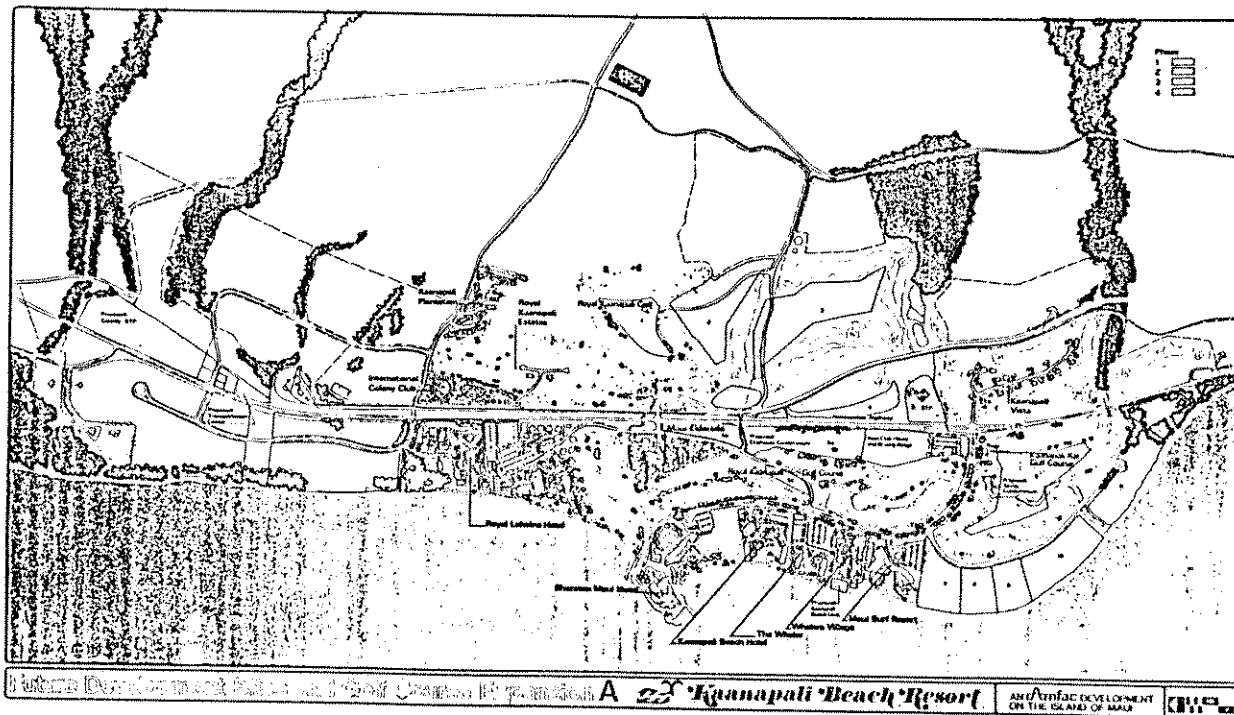
The impact on the region has been substantial, changing the area from a plantation to a high-powered resort district. Lahaina, a whaling port once considered the world's most decadent and the capitol of the Hawaiian republic before its move to Honolulu, is the economic and commercial center of West Maui. Four miles south of Kaanapali, it has more than doubled in size during the past decade, resulting in severe resident housing and transportation problems.

The excellence of the Kaanapali Beach development has enabled hotel and condominium/hotel operators to maintain high occupancy and rate levels on a year-round basis regardless of the seasonal economic effects experienced throughout the rest of the State. With major hoteliers such as Hyatt Regency, Sheraton and Marriott operating in the resort, a large reservation system is in place to assure a continuance of this trend.

Construction within the resort has been subdued during recent years, a lingering effect of the 1981-82 recession, and the current uneasiness over proposed tax law changes. However, Amfac has announced plans to close down the airstrip (occupying approximately 108 acres in the northerly makai area of the resort), and solicit developers for the liberated parcels.

In light of the quality of existing development; the well-entrenched support facilities in the area; and, the desirable attributes of the Kaanapali and West Maui beachfront; the continued dominance of Kaanapali appears likely during the

KAANAPALI BEACH RESORT MASTER PLAN



A-70

foreseeable term. Proposals to refurbish several of the hotels should further enhance the resort's standing, and push average room rates even higher.

2. Facilities

Hotels — The 3,753 hotel rooms within the six Kaanapali hotel projects represent the largest concentration of rooms outside of urban Honolulu. Additionally, the Hyatt Regency Maui (820 rooms), Royal Lahaina (724), Maui Marriott (720) and Maui Surf (556) are the four largest Neighbor Island hotel operations.

Table 8 summarizes the existing hotel operation within the resort.

The facilities are all above-average to excellent in quality. The prevailing ambiance is significantly more up-beat in the hotels relative to the understated elegance found in many of the leading resort operations in the State. Much of this results from the density of construction permitted (substantially more intense than allowed in other destination resorts), and the clientele drawn to the community (mostly active Californians).

Over the past five years, the hotels have averaged occupancy rates (on an annual basis) of 85 to 90 percent, by far the highest in the State. Room rates, which now average circa 104 per night, have shown a compounded yearly increase of 14 percent over the same period. The demand is such, that most operations in the resort experience little seasonal fluctuations, and therefore do not have variable rate structures.

The showcase hotel facility at Kaanapali is the Hyatt Regency-Maui, which opened in late 1980. Described as a "resort Disneyland," the Hemmeter designed project features extensive gardens, open air atriums, massive water features, a 1.5-acre swimming pool (with waterfalls, more than \$10 million of Pacific/Asian art, and over 50,000 square feet of restaurant and retail space. An eminent success since its opening, the hotel has provided a significant stimulus to the resort, and is the site of round-the-clock activity by both hotel guests and sightseers alike. Recently, the property and its sister operation the Hyatt Regency-Waikiki (1,228 rooms) were sold for \$298 million dollars, the largest real estate transaction in the history of the State.

TABLE 8

SUMMARY OF HOTEL FACILITIES  
Kohalaiki Market Study  
North Kona, Hawaii

Lodging Operation	Location	No. of Units	Restaurant	Separate Cocktail Lounge	Shopping	Meeting Rooms	Amenities
Hyatt Regency-Maui	Oceanfront	815	Five	Six	Arcade	Yes	Large Pool, Television, A/C, Parking, Tennis, Library and Health Spa
Kaanapali Beach	Oceanfront	430	Two	Three	Limited	Yes	Pool, Television, A/C and Parking
Maui Marriott Resort	Oceanfront	720	Four	Three	Arcade	Yes	Pool, Television, A/C, Parking, and Tennis
Maui Surf	Oceanfront	556	Four	Three	Limited	Yes	Two Pools, Television, A/C and Parking
Royal Lahaina	Oceanfront	737	Four	Four	Arcade	Yes	Seven Pools, Television, A/C, Parking, and Tennis
Sheraton Maui	Oceanfront	503	Three	Three	Limited	Yes	Two Pools, Television, A/C and Parking

SOURCE: Hawaii Visitors Bureau, DISCOVER HAWAII and The Hallstrom Appraisal Group, Inc.



All of the other hotels in the resort, with the exception of the Maui Marriott, have also been sold on the open market over the past decade, each obtaining relatively high prices based on accepted income multipliers.

Condominiums -- To date, a total of 1,214 units housed in 10 condominium projects/phases have been developed within the resort. In general, the units are above average in quality and have historically achieved selling prices among the highest in the State, although they are now priced somewhat below the ultra-luxury projects currently being developed in the Kohala Coast resorts on the Big Island.

The International Colony Club, Phases I and II, were the first projects constructed, the 42 units being offered for sale in 1964-65. On the mauka side of Honoapiilani Highway, which bisects the resort, the units met with average market acceptance. Currently, the projects are divided between waterfront (three: The Whaler, Kaanapali Alii, and Hale Kaanapali), central/golf course frontage (two: The Maui El Dorado and Kaanapali Royal), and mauka (two: The International Colony Club and Kaanapali Plantation).

Since 1976, only two projects have been constructed; the Kaanapali Royal which sold out shortly after its offering in late 1979, and the Kaanapali Alii (in sales since 1981) which has yet to be fully absorbed on an original sales basis. As a general barometer of demand for Hawaii resort condominium units, this activity level bespeaks of the subdued market over the past four years. It is noted that the Alii had excellent pre-sale activity, with up to 80 percent of the units spoken for six months into the original pre-sale offering; however, prior to completion of the buildings, interest rates sky-rocketed and the significant majority of potential purchasers either failed to close their contracts, or were unable to qualify for the higher mortgage payments.

Table 9 summarizes the projects and displays their original sales history.

While many developers have expressed interest in multifamily sites in the resort, there are currently no announced plans to offer additional condominium units within the next two years.

**TABLE 9** SUMMARY OF CONDOMINIUM MARKETING  
Kaanapali Beach Resort  
Kohalaiki Market Study  
North Kona, Hawaii

PROJECT NAME	NO. OF UNITS	DATE OF MARKETING	NO. OF SEMI-ANNUAL MARKETING PERIODS	AVG. NO. OF SALES PER PERIOD
International Colony Club I	22	Beg. 1964	2	11.00
International Colony Club II	22	Beg. 1965	3	7.33
Hale Kaanapali	174	Beg. 1965	6	29.00
Maui El Dorado I	44	Beg. 1969	1	44.00
Maui El Dorado II	162	End 1969	9	18.00
Kaanapali Plantation	61	Beg. 1970	6	10.17
The Whaler I	180	Beg. 1974	1	180.00
The Whaler II	180	End 1974	1	180.00
Kaanapali Royal	105	Beg. 1979	1	105.00
Kaanapali Alii	264	Beg. 1981	8	33.13 (1)
TOTALS	1,214			
Total Units Sold	1,055		38	15.66

(1) Only 105 units have been sold to date. Many others have been transferred to various entities of the parent developer corporation.

Source: The Hallstrom Appraisal Group Inc.

Kaanapali condominiums were forerunners in the rental pool concept, achieving high occupancy and rate levels despite slumping market demand for finished units.

Commercial -- The main commercial center at Kaanapali Beach is the Whaler's Village complex, built on a 8.513-acre oceanfront site. Containing 40 shops and restaurants and nearly 68,000 square feet of gross leasable area, the open air mall is one of the main attractions in the resort. Unique not only for its extremely desirable location, it is also a whaling museum, with numerous exhibits and historic collections spread among its boutiques and dining facilities. The complex also boasts West Maui's only movie theater.

Continually busy, it is this center which most resort developers attempt to emulate in other destination projects, as it serves not only the needs of resort guests, but also attracts other tourists and local residents as well. The quality of shops in the village are, on the whole, superior to that typically found in most hotel or resort properties, a positive point in that this is the facility to which many non-guests are first exposed.

Significant commercial space is also found in the Hyatt Regency, Maui Marriott, and Royal Lahaina hotels, making the resort (collectively) one of the major retailing regions in the State. Again, the hotel arcade space contains a generally higher quality of merchandise (particularly in the Hyatt Regency) than found in most Hawaii hotels. The remaining hotel's commercial space is limited to sundry and other assorted guest-oriented shops.

There are three free-standing restaurants within the resort, two of which have proven extremely popular with local residents as well as area tourists. The golf clubhouse also contains a restaurant and pro shop.

A 50,000 square foot complex (30,000 square foot retail, 20,000 office) has been proposed for a 3.14-acre site near the El Dorado condominium. To be developed by Harry Weinberg, it is currently in the land use approval process.

At one time, there were advanced plans for a second commercial center. "The Thousand Palms" was to contain 66,000 square feet of leasable area, however the

concept was shelved with the construction of large arcades in the Hyatt Regency and the Maui Marriott. Future expansion of the resort into the area currently used for the airstrip will likely include this second commercial center on a 10-12-acre site.

Single Family -- Long-term development plans call for more than 350-single family lots to be constructed within the resort, all on the mauka side of Honoapiilani Highway. To date, 75 have been offered on the open market, and an additional 120 are scheduled for sale during the next five years.

The first subdivision of 35 lots, Kaanapali Vista, set along the 5th, 6th, 14th and 15th holes of the Kaanapali Kai golf course, were extremely well received, selling out within eight months of being offered. Approximately, 40 percent of the lots have been improved with custom homes.

The 16 lots of Royal Kaanapali Estates did not fare as well, and took more than two years to be fully absorbed.

The first phase of Kaanapali Hillside, 24 of 145 planned lots, began focused marketing in mid-1984, with 14 sold to date.

Recreational -- The Royal Kaanapali and Kaanapali Kai golf courses are two of the most popular in the State, although not of the same dramatic quality as found in other resort developments. Both are championship length, and average over 90,000 rounds a year. They are the site of the LPGA Kemper Open. In 1977, a \$2 million clubhouse was opened to serve the links.

The courses offer excellent playability during calm weather conditions; however, the mauka portions of the courses, which are substantially on the sidehill, are subject to gusty afternoon winds.

Within the resort, there are more than 40 tennis courts; yet, they are all in individual condominium and hotel projects, and not operated by the resort. Plans call for a ten-court tennis garden and racquet club, developed by Amfac, in the next phase of Kaanapali development.

It is noted that each of the hotels also contain substantial recreation amenities, including health clubs/spas, expansive swimming pools, recreational programs for guests, and other activities.

The quality of the Kaanapali beachfrontage is the main recreational amenity of the resort. Excellent bathing and diving potentials abound, and many water activities (including cruises, jet skis, parasailing, windsurfing, and others) are offered. However, guests also complain that the abundance of such activities has crowded the shoreline swimming areas and created a "Waikikish," honky-tonk atmosphere.

Proposed Expansion -- Beyond the announcement of a desire to close the airstrip and begin the infrastructure development of Phase II, there are no substantial plans being offered for specific facilities development at this time. According to Amfac, the expansion will include a tennis garden and commercial facility, both of which they will likely construct; however, there are no immediate plans for hotel or multi-family development in the area.

Long-term plans call for total improvement of the resort as follows:

Hotel Rooms:	5,000
Condominium Units:	4,200
Commercial Sites:	three at 8.5, 3.14 and 10-12 acres
Single Family:	215 lots

### 3. Location

Oceanfrontage -- Kaanapali Beach is claimed by many as the best in Hawaii (an arguable assertion). It is of golden coral and alluvial sand, ranging in width from 40 to more than 120 feet. The main strand extends from in front of the Hyatt Regency, at the southerly edge of the resort, almost two miles to "Black Rock" (after which the resort is named; Kaanapali meaning "The Place of the Black Cliff") fronting the Sheraton Maui hotel. A second, less desirable beach (skinnier and with coral near offshore) extends from the northerly edge of the black rock past the Royal Lahiana Hotel to beyond the boundaries of the resort.

The near shore area of the main beachfront is generally free from coral growth, enhancing bathing potentials. However, it also leaves the beach relatively unprotected from the infrequent high wave action in the area (a minor concern). The beach is relatively steep in portions creating an undertow and on-shore current threat during high swells.

The secondary beach has significant off-shore coral development and scattered sand-pockets.

The diving potentials around Black Rock are superior, due to the coral reef formations and protection the monolith offers. Water clarity is typically good, with visibility in excess of 50 feet. A small inlet in the center of the rock has been made a marine reserve, thereby enhancing the quality of marine life available to view.

In recent years, the beach has experienced substantial periodic erosion, a cyclical process typical of most Hawaii beaches.

Climate -- Generally, the climate at Kaanapali is excellent, with annual temperatures ranging from 71.5 to 78 degrees, and rainfall circa 16 inches annually. The precipitation is heavily seasonal, making the early spring and late fall months slightly less desirable vacation periods.

As previously mentioned, winds can be gusty during the afternoon and evening periods, bringing in precipitation falling in the nearby mountains. The wind does keep the relative humidity level down, a factor plaguing the nearby town of Lahaina which is m in the lee of the West Maui range.

View Planes -- The ocean panoramas available from the Kaanapali Beach development are superior to those at most Hawaii resorts. The nearby islands of Lanai and Molokai provide excellent backdrops. Because of its location on the island, Kaanapali enjoys excellent sunsets year-round, which are only enhanced by the channel islands and the peaceful "Lahaina Roads" off-shore waters which they create.

Mauka views, upslope to the West Maui range are good, but not as spectacular as those at Princeville, Mauna Lani or Waikoloa or Keauhou-Kona. The mountainsides are for the most part covered in sugarcane, with the uncultivated areas typically dry and brown.

From a view plane standpoint, the resort takes advantage of its terrain. The flat central area of the makai portion is used for golf course development, with the sloping land further mauka improved with condominiums and residences offering good panoramas. The slope is of a desirable degree, ensuring view corridors without being excessively steep.

However, the height and density of the structures on the Kaanapali beachfront has created a concrete "wall" of mid-rise constructions, so that interior parcels have only ocean, and not beachfront or near-shore, views. This massive development is one of the resort's major negative characteristics.

Topography/Size -- As stated above, the resort has superior topographical features with a wide, flat coastal plane--for recreational, hotel and commercial development--backed by sloping acreage enhancing views from interior single and multifamily construction. The Black Rock is a major topographical feature of the shoreline, disrupting the otherwise flat coastal area. Having been cultivated with sugarcane for several decades, the resort has good organic soil conditions.

At 1,169 acres, the resort has sufficient acreage to permit upscale critical mass development, particularly in light of the densities and height of structures permitted. In most respects, Kaanapali is an excellent example of the concept of cumulative attraction and its potentials.

Archeological/Other Points of Interest -- In this area, the resort is lacking. Beyond the legends associated with the Black Rock, and the properties supposed historical kapu status (for ali'i only), there are no major archeological sites apparent in the resort.

The most significant points of interest are: the Kaanapali-Lahaina Sugarcane Train, a plantation-era steam locomotive (the only operating railroad in the

State), which provides transportation from the resort to Lahaina; and, the Black Rock, which offers excellent views and diving potentials.

Man-made constructions are the draw of the resort, and upon which its marketing approach is based.

Transportation/Access -- Although there is a small commuter airstrip within the resort, it is monopolized by a single carrier, and does not bring in a high percentage of the resort's guests. A larger strip (prop planes only) has been proposed for the Mahinahina-mauka area, about three miles north Kaanapali Beach, which would be utilized by the major carriers on a regular basis. It is estimated, that if approved, the flights to the strip would discharge circa 750,000 tourists per year, a substantial number being resort visitors.

Most travelers utilize the Kahului Airport, approximately 45 minutes driving time (under good conditions) from the resort. The airport is the second busiest in the State, with the most direct Mainland flights aside from Honolulu International. The facility is extremely inadequate for the degree of traffic it serves, and there is heated community debate regarding the desire and financial ability to construct a larger terminal and tarmac area. It is currently common that planes must wait for a "parking" space where they may unload passengers.

Honoapiilani Highway, the only vehicular route to West Maui, is also plagued by severe overcrowding, often resulting in bumper-to-bumper traffic from near the airport to past Kaanapali. All parties (residents, public officials, and developers) note the inadequacy of the highway for the level of traffic supported. However, there have been no solutions offered, beyond the construction of the Mahinahina airstrip, which many area residents find objectionable. A Lahaina bypass was recently finished for the highway; however, the traffic demand had increased during its planning and construction to the point where it also is overcrowded. As major portions of Honoapiilani Highway, from central Maui to Lahaina, are cut into solid rock cliff faces, the cost of expanding the two-laned thoroughfare would be extreme.

Environs -- The West Maui region has an extensive visitor plant, well-developed with restaurant, retail and activity facilities. In fact, a common complaint is that the development has continued to the point where the area is losing its rural atmosphere and qualities as a relaxed vacation area.

Lahaina is the focal point of the industry, and to some degree has maintained its quaint environment and numerous historical points of interest. However, the effect of tourism dollars has been such that retail spaces along Front Street (the major tourist avenue) no longer contain artisans as a decade ago. These quality retailers have been forced out by standard souvenir/curio/T-shirt shops which can afford significantly higher rent levels.

The beaches of West and South Maui are excellent, and among the most accessible and well-maintained in the State. Protected, for the most part by the channel islands, swimming and diving is superior all along the coastline. Much of the beach areas are county parks, preserving this attribute for future users.

Maui offers many scenic delights, including Haleakala National Park, the Hana Coast, and Iao Valley, all of which are admirable sightseeing adventures, and a contrast to the beach communities of West and South Maui. Additionally, the State's newest attraction has recently opened on the island "Waikapu Plantation," which contains the history and cultivated examples of the agricultural products of Hawaii. The park has experienced success beyond the levels projected by the developers, and is now one of Maui's most renowned attractions.

Other points of interest include La Perouse Bay, Tedeschi Vineyards (the only producing winery in the State) and the Seven Pools. However, the major draw of the island will always be its developed recreational plant, with seven excellent golf courses, countless tennis courts, exceptional dining facilities, and superior beaches and shoreline areas.

## Kapalua

### 1. Introduction

Offering an exclusive and secluded environment of 750 lush acres surrounded by more than 23,000 acres of cultivated pineapple fields, Kapalua Resort was opened in 1975, a project of the Maui Land and the Pineapple Company. The intent of the master-planned community was to provide a luxurious atmosphere removed from the increasingly congested Greater Lahaina-Kaanapali area. In most respects, the quality of design and improvements has achieved those aims. The resort acknowledges in its marketing programs that it is solely oriented towards the upper-income traveler and second home investor.

Due to the vast surrounding holdings of its parent company, the resort (though having intense development adjacent southerly) is assured of maintaining its exclusivity and degree of isolation relative to most West Maui properties.

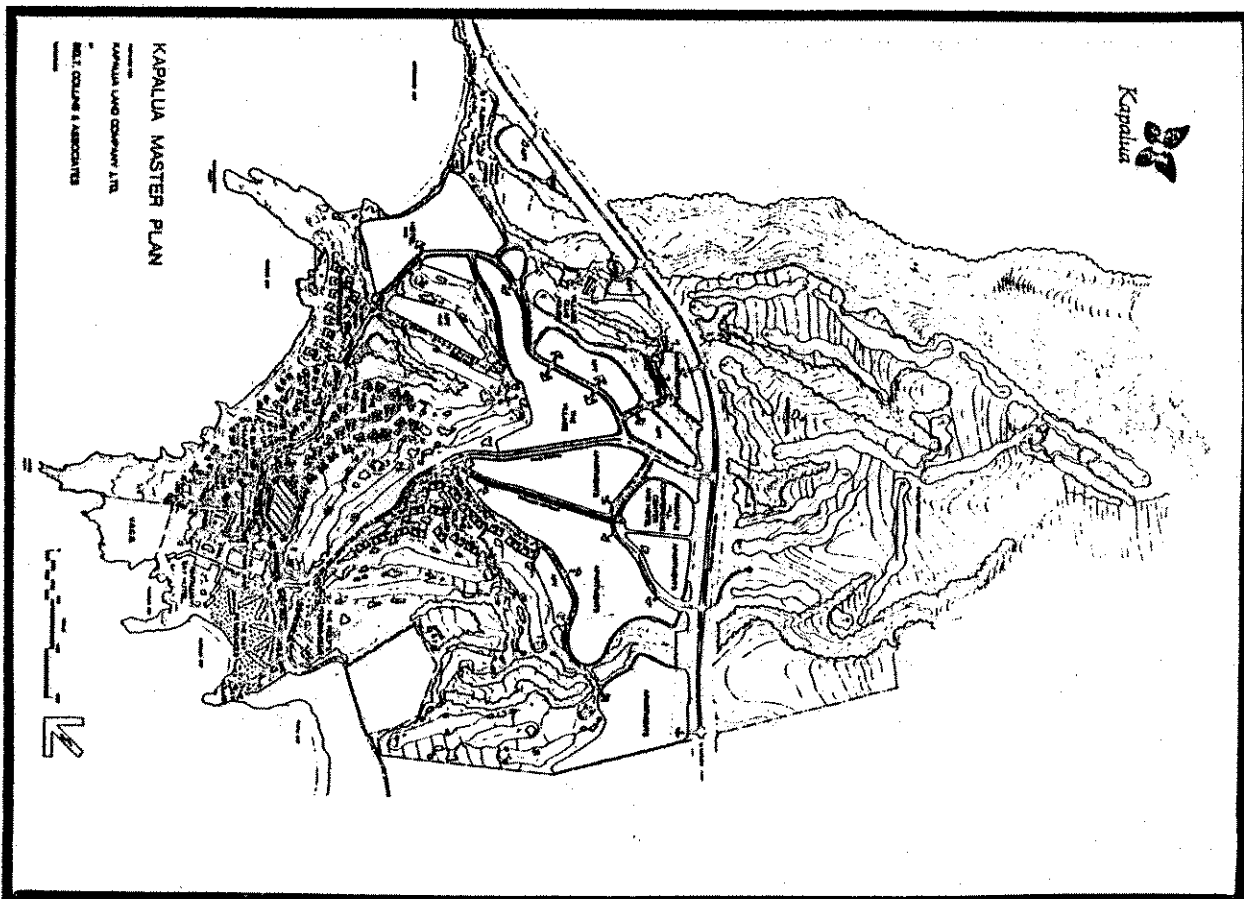
Located at the northerly-leeward extreme of West Maui, the project is susceptible to periodic strong winds, and a generally wetter climate than the Kaanapali Resort, which is approximately five miles south along Honoapiʻilani Highway. The property is developed on the slopes and rolling coastal plane of the West Maui mountain foothills, with the shoreline areas being rock outcroppings studded with picturesque bays.

To date, improvements have been limited to a single hotel containing 196 rooms, four condominium projects housing a total of 528 finished units, two exceptionally scenic 18-hole championship golf courses, a ten court tennis garden, and 22,000 square feet (gross leasable area) of commercial space in a center adjoining the hotel facility.

A map of the resort is displayed on the following page.

The resort has not undergone any expansion since 1978 when the last condominium project was completed. Recently, plans have been announced for a second luxury-class hotel having up to 600, all-suite, rooms. A 2.2-acre commercial site would

KAPALUA RESORT MASTER PLAN



also be developed simultaneously. Opening of the facility would be in three to five years from the current date. Condominium projects are on "hold" until the market "becomes active" according to its developers. The subsequent phase of construction would likely include a single-family subdivision and additional condominium units. In order to insure its ambience, the resort is not seeking to achieve the density levels of Kaanapali or other West Maui properties, and is an example of a low-key or conservative resort.

## 2. Facilities

Hotels -- The only existing hotel operation at Kapalua Resort is the Kapalua Bay Hotel, designed by the internationally renowned Killingsworth, Brady & Associates architectural group. The facility was recently sold to a group of investors for a reported \$26 million.

Despite several troublesome years following completion, the Kapalua Bay Hotel is steadily establishing a recognized, well-deserved reputation for attentive understated elegance. The low-rise plantation-design complex is situated on a 21.71-acre site overlooking Hawea and Kapalua Bays at the northern end of West Maui's famed resort coastline.

Due to lack of stable management and ongoing affiliation with an internationally recognized hotel chain, the original success of the project was limited following its opening in 1977. However, the tastefully designed and appointed development, has achieved an excellent standing among the upper-class FIT Maui visitors. The hotel's restaurants (and particularly the buffet luncheon) are famous among local residents and seasoned Maui visitors.

Maui Land and Pineapple, the developers of the resort, were also the entrepreneurs behind the Kapalua Bay Hotel. Maui Land and Pineapple is the current operator/manager of the facility, succeeding the relatively unsuccessful Rock Resorts and Regent International management groups. The vaulted open-air lobby design (Pioneered at Mauna Kea Beach) has since been emulated in other high-quality Hawaii hotels (notably the Mauna Lani Bay Hotel).

The smallest of the hotels situated in a major destination resort, Kapalua Bay contains only 196 guest rooms and suites, although the operators also control the rental of some 120 luxury condominium units contained elsewhere in the community.

The hotel stresses guest activities and participation. In fact, upon arrival, patrons are provided with daily activity cards outlining no less than eight to ten organized recreational and entertainment programs ranging from snorkeling, tennis and golf lessons to tournaments, sailing opportunities and garden and hotel facility tours.

The proposed 600-room hotel would seem large for a low-key resort project. However, it will be an "all-suite," ultra-luxury, cabana-type facility. Being spread over nearly 73 acres, density levels will remain low, thereby maintaining the general image of the resort.

Condominiums -- Kapalua's four projects and their original sales history are summarized on Table 10.

The Bay Villas, designed by Leitch, Kiyotoki & Bell, contain 141 spacious leasehold units overlooking Oneloa Bay. Pre-sale opened in the fall of 1975, and were completed within six months.

The Golf Villas (Richardson/Nagy/Martin architects) is a 186-unit complex set along the fairways of the Village course atop "Pineapple Hill," the highest point in the resort. The units enjoy excellent makai view planes southerly along the West Maui Coast, and across the channel to Molokai Island. All of the units were spoken for in a drawing on February 28, 1977.

Among the most prestigious multifamily developments in the State, the Ironwoods condominium project is essentially a common-wall residential community with little resemblance to the mid-rise constructions in the region. Set on an expansive site overlooking Oneloa Bay, the forty leasehold units (then the most expensive in Hawaii) were all sold at a private reception in May 1978.

TABLE 10

SUMMARY OF CONDOMINIUM MARKETING  
Kapalua Resort  
Kohalaiki Market Study  
North Kona, Hawaii

PROJECT NAME	NO. OF UNITS	DATE OF MARKETING	NO. OF SEMI-ANNUAL MARKETING PERIODS	AVG. NO. OF SALES PER PERIOD
The Bay Villas	141	End 1975	1	141.00
The Golf Villas	186	Beg. 1977	1	186.00
The Ironwoods	40	Beg. 1978	1	40.00
The Ridge	161	End 1978	1	161.00
TOTALS	528			
Total Units Sold	548		4	137.00

Source: The Hallstrom Appraisal Group Inc.

Located along two fairways of the Bay course, with views of the three major bays in Kapalua, the Ridge condominium contains 161 well-designed units. All of the units were contracted for during a lottery held July 8, 1978.

Commercial -- "The Shops" commercial village at Kapalua is situated on a three-acre site adjacent to the existing hotel. Like other developments in the resort, the atmosphere is a low-key, garden setting. There are a total of 21 bays in the complex (20 of which are currently occupied), which contains a total gross leasable area of 22,000 square feet. The resulting ratio of retail square footage per guest room in the resort is the highest of any destination community analyzed.

In general, the merchandise offered is of the highest quality (numerous designer shops, art galleries, wine and special foods, etc.) commensurate with the overall perception of the resort. The facility attracts outside visitors as well as Kapalua guests although it is not a commanding visible entity or promoted outside the resort to the degree that both the Kaanapali and Wailea retail centers are.

In example of the quality of development, the center has a covered below grade parking facility (under the shop level); the only such commercial improvement-type seen in our analysis. This was done, according to developers, to minimize the visual impact of the vehicles on non-resort visitors.

There are no other retail facilities in the development beyond golf and tennis pro shops, however, excellent dining facilities are available in both the Kapalua Bay Hotel and the golf clubhouse.

A 15,000 to 20,000 high-quality facility is proposed adjacent to the planned 600-room hotel, on a 2.2-acre site. It is intended to be of the same quality as the existing "shops" complex.

Single Family -- There are no single-family residential lots in the resort, and non-planned within the next three to five years. Existing long-term plans do not contain SFR sites, although resort developers indicate up to 65 lots may be developed if demand is evident.



Recreational -- The two golf courses within the resort are among the most scenic in the State, offering play over a wide variety of terrains and landscaping. The Bay course, 6,831 yards, was designed by Arnold Palmer in coordination with Francis Duane, and features several "over water" holes along the shoreline cliffs of the resort. The course was opened for play in 1975. The second set of links, the Village course, opened for play in 1979, also was designed by Palmer, and considered by many to be his best effort. The course offers a unique contrast between standard (though scenic) traditional layouts and nine holes among the ironwood and jungle woodlands of the resorts mountainous areas.

In its marketing programs, Kapalua has stressed its superior courses, and has invested heavily in their promotion; securing Hale Irwin as the resort traveling professional, and establishing the \$500,000-plus Kapalua Open. This tournament has no sponsor other than the resort, which has no hope of recouping prize money through spectator admissions (which is free).

The tennis garden has ten private courts (no more than two in tandem), designed on a terraced site. Opened in 1978, the clubhouse includes a pro shop and snack bar.

The resort is also establishing other recreational opportunities including riding stables, pineapple field tours, and nature excursions along the northerly slopes of the West Maui mountains.

Proposed Expansion -- Long-term development at the resort will result in the following totals:

Hotel Rooms:	1,500
Condominium Units:	2,200
Single Family:	0 lots*
Commercial:	three sites at 3.19, 2.2 and 8-10 acres

\*Official master plan, up to 65 currently being discussed.

3. Location

Oceanfrontage -- The resort enjoys shoreline along two excellent beaches, Kapalua Bay and D.T. Fleming Park, as well as strands in Oneloa Bay and other scattered areas. The focal beach of the resort is Kapalua Bay.

The Kapalua Bay beachfront, southerly adjacent to the hotel, is representative of the finest beaches on Maui, and experiences minimal wave action and currents, except during severe winter storms when strong currents prevail. However, as a popular public park, the beach area is subject to periodic congestion. The hotel provides oceanfront volleyball and croquet courts as well as clinics in sailing, snorkeling, scuba, and windsurfing. The clarity of water in the Bay is typically in excess of 100 feet visibility, and some fine diving grounds are within the resort. A complete line of ocean activities equipment is also made available at a charge.

D.T. Fleming Park (on the shores of Makaluapuna Bay) is also a superior white sand beach, although mainly of an alluvial type (as opposed to the coral variety of Kapalua Bay). There are no significant offshore coral reefs fronting the beach, however, excellent examples are situated along the headlands at either side of the bay. Because of this trait, and its northerly exposure, the beach is subject to extreme surf conditions during the winter (and periodically other) months. The area offers superior bathing potentials during the most of the year.

The remainder of the resort oceanfrontage is extremely rocky, with sea cliffs in some places in excess of 80 feet. The promontories created permit excellent views for several of the condominium projects and the hotel. However, the shoreline is basically inaccessible except via a stairway fronting the Bay Villas, and a precarious pathway near the Ironwoods condominium.

Climate -- Due to its more northerly location than Kaanapali Beach, the Kapalua Resort is subject to more frequent tradewind and stormy conditions, and slightly lower average temperatures than its southern neighbor. Yet, the climate is still generally good to superior, with many qualities (cool, low humidity, morning sun) that upper-income travelers typically find desirable.

In many respects (as evidenced at Princeville), the northerly climate is a trade-off of more sunny/arid characteristics for a desirable lush year-round green atmosphere. The hotel operators conceded that the perceived wetter Kapalua climate hampered the early market acceptance of the facility, a factor overcome with time as visitors realized the generally desirable and sunny attributes of the area.

View Planes -- Similar to those available from Kaanapali, the ocean views from the Kapalua resort are among the most desirable in the State, second (perhaps) only to those in the Princeville, Kauai development. In addition to the makai scenes of the oceanfront bays and beaches, Molokai and Lanai Islands form a backdrop across the "Lahaina Roads" channel.

The mauka panoramas from Kapalua are substantially better than at the Amfac development, with the expansive pineapple fields and lush upper slopes of the West Maui mountains visible from many interior parcels. The face of the Golf Villas does intrude on some mauka views.

Topography/Size -- The sloping topography of the resort is generally favorable, permitting ocean views from nearly all mauka locations, yet not resulting in overly many sidehill golf course holes. The shoreline bluffs (similar to Princeville) permit a variety of view planes and design types. In general, the terrain is (perhaps) slightly more sloping and undulating than desirable from a recreational standpoint.

The underlying geology is of volcanic ash, rock and organic soil, sufficient in depth to permit extensive landscaping and lush golf courses without need to import soil.

Even with the low-key development thrust of the community, the existing 750-acres zoned for resort acreage appears more than sufficient. With Maui Land and Pineapple having extensive holding surrounding Kapalua, additions could easily be undertaken. Of significant note, is that as a low-key luxury-oriented project, the critical mass level is different from that within an upscale resort such as

Kaanapali, which is dependent upon greater numbers of guests and having a different marketing philosophy.

Archeological/Other Points of Interest -- There are no significant archeological sites preserved within the development, and the only point of interest is a small wooden missionary church located adjacent to D.T. Fleming Beach Park.

Transportation/Access -- Being situated at the extreme end of Honoapiilani Highway, Kapalua has access traits extremely similar to the Kaanapali Beach community (which see); although, as it is at the proverbial end of the road, it has substantially less traffic congestion in the immediate vicinity.

Environs -- See Kaanapali Beach.

Wailea

## 1. Introduction

Maui's youngest full-amenitied resort complex, the 1,450-acre Wailea community has already established a well-founded reputation for quality, understated elegance on one of the State's finest beachfront holdings. The upscale though low density thrust of the resort developers stands in stark contrast to the intense improvement evident at Kaanapali, or the low-key construction at Kapalua.

Planned via a partnership between Alexander & Baldwin (one of the Hawaii's "Big Five" companies) and the Northwestern Mutual Life Insurance Co., Wailea's first hotel opened in 1976. Since that time one additional hotel and three phased condominium projects have been added to the development, which stretches some two miles along the desirable western shoreline of South Maui. In 1984, Alexander & Baldwin "bought out" the Northwestern Mutual interests in a purchase/exchange transaction valued at nearly \$18,000,000.

The Kihei-Makena corridor (of which Wailea dominates the central portion) is emerging as one of the fastest growing resort areas in the State. The region is known for typically longer visitor stays and a more relaxed atmosphere than found in Lahaina-Kaanapali. The increasing congestion of West Maui, and the addition of numerous restaurant and retail facilities in Kihei, is anticipated to further the demand for Wailea (and proximate) locations.

The existing development in the resort includes 950 hotels, 594 finished condominium units, 36-holes of championship golf, a 14-court tennis garden (featuring grass courts and a 1,500 seat stadium), a 70,000 square foot commercial village, and 257 single-family lots. The community is currently undergoing expansion, with the 136-unit Wailea Point condominium in the initial construction phase, and a third hotel in the advanced planning stage.

A map of the resort is displayed on the following page.

The primary draw of the resort is its excellent climate for tourism development, the most desirable in the State, with sunny, arid conditions the norm, and negligible wind. As the significant portions of the coastline south of the resort (beyond the underconstruction Seibu Makena resort enclave) are designated for preservation and public beach use, Wailea should not experience the vast overcrowding which currently plagues the West Maui area.

It is not the intent of the developers to establish a destination resort of the density envisioned at Kaanapali, Waikoloa Beach or Princeville, but to maintain a semi-rural atmosphere with upscale beachfront hotels backed by less intensive mauka condominium and single-family projects creating a desirable resort/residential destination.

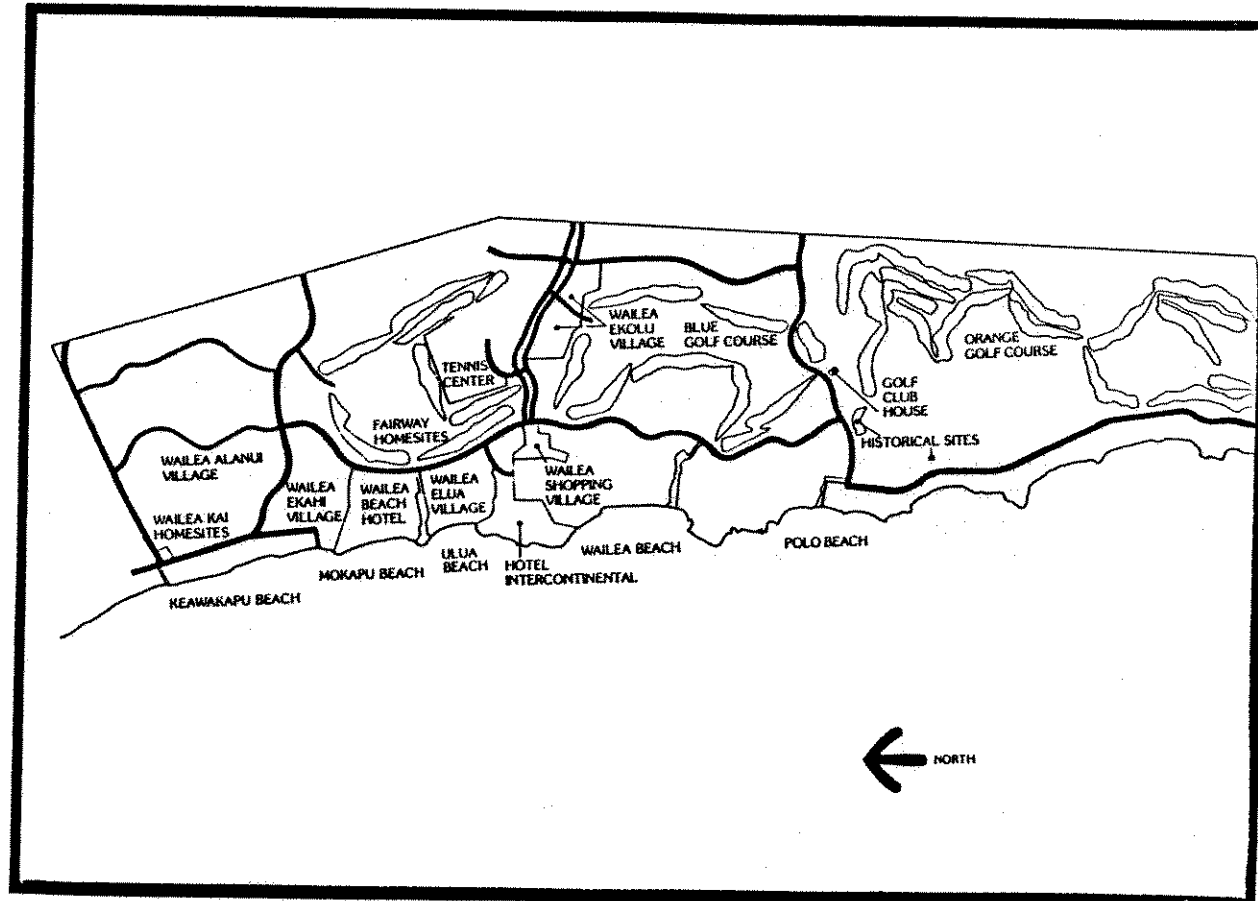
Prior to its use for resort acreage, the Wailea area was only marginally productive cattle grazing, covered with pili grass, haole koa and kiawe thickets, and no historical cultivated agricultural use.

In many ways, Wailea typifies the coming trend in the Hawaii destination resort industry, with expansive well-kept grounds surrounding mid-rise hotel and low-rise condominium facilities, interspersed with public beach parks and excellent recreational amenities.

## 2. Facilities

**Hotels** -- There are currently two hotels in the resort complex, the 350-room Stouffer's Wailea Beach Resort facility (one of Hawaii's finest), and the 600-room Hotel Intercontinental-Maui. The Stouffer's Wailea Beach Resort hotel is generally considered one of the State's more integrated facilities, having received widespread critical acclaim over the past several years. The low-key atmosphere offered by the hotel's airy improvements and lavish gardens corresponds well with the low-density thrust of the Wailea Resort master plan. The Kihei-Makena corridor, containing Wailea Resort, has traditionally appealed to tourists seeking longer stays and more relaxed vacations than prevalent in the West Maui (Lahaina-Kaanapali) region. Past hotel demographics support these perceptions.

WALEA RESORT MASTER PLAN



A-89

A-84

market characteristic enhances the long-term prospects of the Stouffer's Wailea Beach Resort.

Opened in 1978, the facility was originally operated by Westin Hotels. Stouffer's purchased the complex in November 1983 at a reported cost of \$33,000,000. The hotel and grounds are situated on a 15.578-acre site having extensive frontage along Mokapu Beach, one of five golden sand strands in the resort development.

The hotel contains 350 guest rooms, of which 266 (or 76 percent) have ocean view planes available.

The 600-room Hotel Intercontinental-Maui, opened in 1976, is situated on an 18-acre headland site overlooking Wailea Beach, one of the widest white-sand beaches in the State. Although it does not possess as spectacular of gardens as found at the Stouffer's facility, the landscaping is lush and well-integrated.

The unique design of the mid-rise lodging tower permits more than 90 percent of the rooms to have ocean views. The hotel has more than 20,000 square feet of commercial space, and its restaurants have been the recipients of numerous travel awards.

In recent years, the Intercontinental system has sold many of its holdings, and the Wailea property has repeatedly been rumored to be on the block. However, there have been no publicized transactions to date.

Condominiums -- A total of 594 units housed in three phased "townhouse" style projects have been developed in the resort to date. Compatible with the low-key, understated interior atmosphere of the resort, the spacious and airy units are housed in one and two story wood-frame pods set amidst lavishly landscaped grounds. The prices of the units at original sale were above average relative to most vacation units, but not as high-priced as those found at many Hawaii destination resorts.

The market reception of the projects was initially strong, with several phases being absorbed in less than one year of pre-sale. However, the demand

significantly dropped during the final construction period of the Wailea Elua II project, requiring a total marketing period of four years for the 66-unit project.

Table 11 summarizes the existing projects, and shows their original sales history.

Several condominiums were proposed for the resort (notably the L'abri project), only to be cancelled due to the stagnate real estate market. Currently, construction is underway on the 136-unit Wailea Point condominium, situated on a 26-acre site on a bluff overlooking Wailea Beach, across the bay from the Intercontinental facility. Asking prices for the units, which have been in pre-sale for two months, range from \$425,000 to \$1,000,000.

Many developers remain interested in Wailea sites, acknowledging the long-term desirability of the community.

Commercial -- The main commercial facility within the resort is the Wailea Shopping Village, a well-designed shopping plaza containing approximately 70,000 square feet of gross leasable area. Devoted almost entirely to retail and service space, the complex contains many designer/sportswear shops, and several sundry and souvenir outlets. The underlying site contains 10.528 acres.

The center has had a difficult time in maintaining full tenant occupancy. This is primarily due to two factors: the amount of retail space within the two existing hotels; and the fact the resort is currently the last major development on the areas thoroughfare, and does not enjoy the passing traffic such as found at Kaanapali. The opening of the Makena Prince Hotel and further improvement to the Seibu Makena Resort and Piilani Highway will enhance the consumer base the Village can draw from.

A second 40,000-square-foot commercial center has been proposed, but is being withheld until demand in the community returns to pre-1980 levels. A five-acre site is likely for the development.

TABLE II  
**SUMMARY OF CONDOMINIUM MARKETING**  
 Wailea Resort  
 Kohanaiki Market Study  
 North Kona, Hawaii

PROJECT NAME	NO. OF UNITS	DATE OF MARKETING	NO. OF SEMI-ANNUAL MARKETING PERIODS	AVG. NO. OF SALES PER PERIOD
Wailea Ekolu	148	End 1978	4	37.00
Wailea Ekahi I	100	Beg. 1975	2	50.00
Wailea Ekahi II	90	End 1975	1	90.00
Wailea Ekahi III	104	Beg. 1976	2	52.00
Wailea Elua I	54	Beg. 1976	3	18.00
Wailea Elua IB	32	Beg. 1977	3	10.67
Wailea Elua II	66	Beg. 1979	8	8.25
<b>TOTALS</b>	<b>594</b>			
Total Units Sold	594		23	25.39

Source: The Hallstrom Appraisal Group Inc.

Beyond the arcades in the two hotels, other commercial development in Wailea is restricted to a restaurant (the Wailea Steakhouse) located in what was the original golf clubhouse, a pro shop and restaurant/lounge in the new clubhouse, and a small pro shop and snack bar in the tennis garden.

Single Family -- With the exception of Princeville (which had mixed-marketing strategies), the Wailea Resort has offered the greatest number of, and most aggressively marketed, single-family lots of any destination resort analyzed. Many of the homes constructed on the fairway-fronting subdivisions are among the most expensive and striking in the Islands.

The Wailea Fairways were the first lots offered, with 97 parcels ranging in size from 10,600 to 23,636 square feet. Experiencing rapid absorption, more than 80 percent now have been improved. Due to the limited slope of the majority of the resort, the lots have only average view planes, as do the other lots thus far offered in the community.

The second subdivision was Wailea Kai Estates, a 101-lot project situated in the extreme northerly area of the resort, only minimally sharing in its general atmosphere. With no golf course or oceanfrontage, the 7,500 to 12,630 square foot parcels have achieved only average market acceptance.

The most recent offering is the Wailea Golf Estates I, situated along the 4th and 16th fairways of the Blue Course, has a total of 59 lots. Ranging in size from 10,500 to 21,000 square feet, the parcels are priced from \$155,000 (for interior lots) to \$375,000 (for fairway frontage). Since sales commenced in June 1982, 38 of the properties had been sold.

Recreational -- In many respects, the existing recreational facilities within the Wailea complex are representative of the finest at any resort in Hawaii. The two championship golf courses, the Orange and Blue, were both designed by Arthur Jack Snyder (considered the most progressive links architect in the world) and offer spectacular views and varying terrains nearly as diverse as those at Kapalua. Extremely playable for all levels of golfers, the two courses combine to average more than 100,000 rounds per year. The courses, as were those on the Big Island, were sculpted from the raw lava wasteland that underlies the resort property.

Play at Wailea is unhampered by the strong winds and rainy conditions which periodically afflict the West Maui resort courses.

The Wailea tennis garden is renowned as Hawaii's finest and most complete, with eleven Laykold and three grass courts, the latter being the only ones in the State. Also in the complex is a 1,500 seat stadium court (used for a variety of functions and performances), and five practice alleys with ball machines. Unlike many resort facilities, the courts are lighted for night play. Called "Wimbledon West" it is the site of Hawaii's only Grand Prix professional tournament.

The relatively level topography of the central resort permits walking and jogging trails, and there are several exercise areas. Perhaps the most striking recreational facilities are the resort-maintained public beach parks, with large parking lots, grassy and shaded areas, and clean restrooms and showers.

The resort will also arrange for off-site riding in the Ulupalakua Ranch, and scenic sailing and off-shore diving trips.

Proposed Expansion -- Wailea is currently undergoing its second major expansion phase, with the offering of a third single-family residential subdivision, the ongoing construction of a 136 unit luxury condominium project, and a third hotel in the advanced planning stages. As previously mentioned, other multifamily developers are bullish on the potential of the resort over the short term and would be anticipated to bid on available site if the Wailea Point condominium project achieves any significant market success level.

When fully developed, Alexander & Baldwin envisions a community composed as follows:

Hotel Rooms:	1,600
Condominium Units:	2,700
Single Family:	700 to 1,000 Lots
Commercial Sites:	two sites at 10.528 and five acres

### 3. Location

Oceanfrontage -- There are five major beaches within the resort, in addition to the nearby parks at Kamaole and Makena. Each beachfront is at the rear of a small bay or inlet, and all are of coral type. The remainder of the resort's shoreline is composed of rocky outcroppings separating the sandy strands.

In general, Wailea's beaches and the ready availability of others nearby provide the highest quality of overall oceanfront recreation potentials of all the resorts analyzed. Protected from the tradewinds by Haleakala (rising behind the resort), the beachfront conditions are excellent, with extreme water clarity, sandy bottom offshore, and minimal wave and current action. Occasional summer swells do strike the area, though the nearby islands of Kahoolawe and Molokini offer significant protection. Excellent snorkeling is available throughout the Kamaole-La Perouse shoreline, with one of the Island's best developed coral reef habitats separating Mokapu and Ulua beaches along the Stouffer hotel's southerly boundary. A complete line of ocean activities equipment is rented by both hotels.

Climate -- From a visitor standpoint, the climatic conditions at Wailea are the most desirable in the Islands. The region enjoys up to an estimated 350 sunny days each year, with average temperatures ranging from 72 to 80 degrees. Rainfall is almost non-existent, with annual average of less than eight inches, most of which is dropped in infrequent though intense cloudbursts.

View Planes -- The view potentials from the resort site are very good; comparable with the West Maui projects. In addition to Molokini and Kahoolawe Islands, Lanai Island and the West Maui mountains are visible across Maalaea Bay. Haleakala, the State's third highest mountain, forms the backdrop for the hotel, and is a good mauka view amenity.

Topography/Size -- Addressed previously, the topography of the Wailea site is relatively level, with a slight upward slope away from the shoreline, in the central and near-oceanfront areas of the resort. This serves to limit the availability of ocean panoramas from all but the best located units/lots, however, it does enhance the playability of the golf courses and pedestrian enjoyment.

In the mauka portions of the complex, the slope becomes more pronounced, offering future development in these areas substantial view amenities. The terrain does become steeper near the shoreline in the southerly region of the community (near Wailea Beach and the golf clubhouse).

The underlying strata is A'a and Pahoehoe lava from prehistoric eruptions of Haleakala. Prior to the resort's construction, the site was covered in pili grass and haole koa and kiawe thickets.

At 1,450 acres, the resort has sufficient size to permit the intensity of development proposed by Alexander & Baldwin.

Archeological/Other Points of Interest -- There are no significant archeological sites on the resort property, beyond isolated dwelling ruins, which have not been actively preserved or refurbished. Although the excellent beachfront areas within the complex were undoubtedly the location of seasonal ancient villages, the lack of consistent freshwater supplies limited long-term development. The resort has discussed the potential of establishing a cultural enclave, but it would not be an "authentic, restored" community.

The major points of interest in the complex, beyond the excellent beach facilities, bathing and diving potentials, are the extensive tide pools fronting the Hotel Intercontinental property, and the gardens located within the Stouffer's Wailea Beach Resort hotel grounds.

These lush gardens are described by visitor publications "as among the most beautiful in Hawaii, an example of modern landscape architecture at its very best," and are among the significantly striking amenities of the facility. Some 24 select imported species of flora are combined with a wide variety of general and native plants around two waterfalls, a stream, and pond feature leading from the hotel downslope to a beachfront lawn area.

Transportation/Access -- The resort is served solely by the Kahului Airport, whose troubles are discussed in detail within the analysis of the Kaanapali Beach Resort.

However, vehicular access to the community, approximately 12 miles southwest of the airport, is much superior. With the completion of the Piilani Highway extension, high-speed thoroughfares, by-passing coastal development, lead directly from the airport to the resort.

Environs -- See Kanapali Beach Resort. However, the Wailea complex is closer to the preserved shoreline areas from Makena to La Perouse Bay, which are planned as a major State conservation and park area.



Summary

1. Introduction

During the course of our analysis, we have identified eight projects meeting the market definition of a major Neighbor Island destination resort. Each of the communities is in varying stages of improvement, and there (as yet) is no project that has been fully "built-out," or completely developed according to existing master plans. There are three complexes on Maui, four on the Big Island, and one on Kauai.

In general, the destination resorts have achieved the highest quality levels of tourism plant construction in the State, and are the current and projected focal point for industry capital investment. The success of a project lies in the integration of many variables including: facilities available, desirableness of location, and the ability to market itself as a vacation destination community.

Hawaii resorts have developed reputations as the finest in the world, being a collection of mixed-use development types, as opposed to a mere hotel(s) with adjoining golf course as found in many vacation areas.

The term "destination" implies a significant level of guest opportunities; substantial enough to satiate the anticipated (perceived) vacation demands of a Hawaii visitor in total, at a single location. It is also necessary so resort developers can have sufficient income producing areas (site and finished unit sales/leases, commercial rents, golfing and other user fees, etc.) to justify the high infrastructure and other costs associated with major resort improvement.

Thus, in a destination resort, the demand/supply quotient is cyclically synergetic, or interdependent. In order to be economically successful, the resort must draw guests; to draw guests, the complex must offer a wide degree of facilities. Economic success depends the resort being able to capture a substantial portion of the guest's disposable outlays during his vacation. This optimum level of interplay is often referred to as "achieving critical mass."

There are two integral factors to understanding analysis of the destination resort industry, which we have not thus far addressed in detail.

First, although resorts originally catered solely to the upper-income Hawaii traveler, a continually increasing segment of the tourism market has begun utilizing these facilities. This is due to: the general enrichment (and higher disposable incomes) of major Hawaii markets, particularly California and Japan; and, the cost competitiveness and desirableness of a Hawaii destination resort vacation relative to many other world-wide locales. As discussed in the report section addressing demand, this trend is projected to continue.

Secondly, each resort project is individually designed based upon the market which the developer is attempting to capture; and the critical mass necessary to achieve this varies with the desired marketing segment targeted. The conservative, low-key projects (such as Kapalua and Mauna Kea Beach) which are programmed to appeal to upper-income, mature travelers seek less-intense facility improvement, while the more upscale, contemporary complexes (such as Kaanapali and Waikoloa Beach), marketed to a wider variety of guest-types, are dependent upon developing a wider range of services and opportunities. An example of a project actively pursuing the mid-ground of this spectrum with upscale hotel facilities and low-key condominium projects is Wailea.

As the market share of tourists attracted to destination resorts rapidly increases, the design of the projects is diversifying, providing a selection of facilities and price ranges. This must be viewed as a healthy trait within the industry, and certain to increase the market share of the resorts even more over time.

However, this does not mean that projects offering limited opportunities (lodging, commercial and recreational) in less desirable locations will be able to remain or establish competitive market levels.

Contrarily, the destination resort industry will become increasingly more competitive with successful projects having a wider range of favorable attributes. A complex which contained comparable facility and locational traits, and was able to charge less-expensive tariffs would be the optimum in resort development;

maintaining a competitive atmosphere yet having lower prices, thus being affordable to a greater market share of Hawaii tourists.

The following sections, formatted according to market analysis presentation, contains our summation of the existing major island destination resort industry in regards to the characteristics of facilities and locations offered. In order to achieve an efficient market share, a resort must possess competitive traits with these market parameters.

## 2. Facilities

Hotels -- Typically, the first facility opened to the public (except in some cases where the golf course is playable), a hotel provides a focal point for resort activity, as it contains all the operations (lodging, retail, restaurant, recreational) necessary for guest enjoyment. Additionally, it provides a ready made high-turnover market of satisfied patrons that are potential consumers of future resort development (particularly condominium units); and, a source of instant market recognition if a name-management concern (such as Hyatt, Hilton, Sheraton, etc.) is retained to operate/own the facility. This latter is an invaluable tool in establishing the "track record" of a resort project and achieving respectability among travel agents.

All the resorts analyzed opened a hotel as the first public facility in the complex, with the exception of Princeville, which has suffered significantly due to this and other factors.

Currently, four of the resorts (Kapalua, Mauna Kea Beach, Mauna Lani and Waikoloa Beach) have only one hotel operation, but all are anticipated to develop a second facility within the next two to four years. Wailea has two hotels, with a third in the planning stages; and Kaanapali has five operations, with more projected by the end of the decade. Princeville has no hotels at the present time, but two are scheduled for opening within the year. There are a total of 7,915 existing or underconstruction hotel rooms in the analyzed resorts.

The number of total hotel room master-planned in the resorts vary from 1,000 at Princeville, to 5,000 at Kaanapali Beach, with a median of 2,439 rooms. The total inventory proposed at this time is 19,511 rooms.

Again, it is noted, that the low-key resorts typically have smaller hotels, circa 350 rooms or less (i.e., Mauna Kea Beach, Mauna Lani, and Kapalua), while those projects targeting the upscale market (Kaanapali and Waikoloa Beach) have larger facilities.

Destination resort hotels are (for the most part) of a higher quality, have a more integrated atmosphere, are situated on a larger parcel, and more substantially landscaped than non-resort operations. Among the characteristics we have identified:

- a. Design -- A contemporary or classic style suited to its environment and compatible with neighboring development is desirable. Most of the resort hotels studied stress an open-air architecture (particularly in common areas) maximizing the advantages of the Hawaiian climate, and allowing generous use of flora throughout the interior. In all those viewed, the improvements are oriented inward towards grounds of the facility, or towards beachfront/view plane areas, minimizing the visual impact of adjacent land uses. This "self-contained" design approach enhances the seclusive and exclusive character of the hotel, and permits a fully individualized marketing posture and the charging of tariffs above that at nearby, otherwise designed, operations.
- b. Rooms -- Large lodging units are typical of Hawaii resort hotels. Furnishings and finishes are of a quality found in private residences, and not of the "durability" orientation of many Waikiki, or non-resort hotels. Most have designer furnishings featuring overstuffed, wicker or rattan pieces, oversized king or two double beds, a sofa, game table, refrigerator, bar and separate desks and dressers. All facilities analyzed have lanais, and all are centrally air-conditioned. Large bathroom and separate dressing areas are desirable, particularly as Hawaii vacationing typically requires frequent bathing and apparel

changes. Many of the projects studied have separate his and her vanities/dressing areas.

- b. Commercial Areas -- Expensive commercial areas (restaurant, retail and service) were found in all the hotels. For upper-class resort guests, many of which are older and less active, quality shopping and (especially) dining opportunities are viewed as recreational forms, and often considered the highlight of the day. The resort hotel operations all have a minimum of four (and as many as ten) restaurants and lounges; featuring at least one fine dining establishment, a general fare restaurant, and a poolside grill. On the Neighbor Islands, the restaurants in the resort hotels, for the most part, feature the finest food and atmosphere available to tourists and residents. The need for high quality dining at the hotels cannot be overstressed, not only from a marketing standpoint, but also as food and beverage expenditures by guests may constitute revenue ratios upwards of 40 to 50 percent of daily room costs. In many cases, guests may spend more of their waking hours in hotel restaurants than in their rooms, hence the need for emphasis on appearance and atmosphere. And, as nowhere in a hotel is employee-guest contact as extensive as during the dining periods, capable and hospitable waitpersons are strongly desired.

Retail opportunities are not as integral to project acceptance as are quality restaurants, but are necessary in order to create the integrated indulgent atmosphere required, as well as meet the needs of the guests. Minimally, a resort hotel complex should contain a sundries shop, resort apparel store, and at least one fine art or jewelry gallery. Retail space not only provides an amenity for the hotel, but lease rents also provide a major, high-profit operational income source. While the need for space can be mitigated by nearby shopping facilities, a minimum ratio of retail square footage per guest room of circa 15 to 25 square feet is recommended by most luxury hoteliers.

Banquet/meeting rooms, offering a minimum capacity of one seat per hotel room, are essential for this class of hotel, as a substantial

portion of guests (10 to 50 or more percent) would be anticipated to be corporate, incentive, or other group, travelers. Large ballrooms are not essential to a resort hotel operation but can be beneficial (although often a non-sustaining space), if the property desires to attract large groups.

- d. Grounds -- Lush, well-landscaped gardens are a hallmark of top-quality projects in Hawaii. Verdant grounds serve not only to camouflage hotel improvements and provide an aesthetic backdrop for common and restaurant/lounge areas, but also reinforce favorable guest perceptions of the islands and enhance the seclusiveness of the complex. Additionally, it provides light and acoustical buffers for lower floor, or less desirable, lodging units. Exceptional gardens, or site features, such as exist at the Hyatt Regency-Maui, Mauna Kea Beach, and Stouffer's Wailea Beach Resort hotels, serve as a major marketing tool by attracting non-guests to the hotel and displaying an appealing unique atmosphere. Fluid, uniform grounds, free of unnecessary roadways and other visual intrusions, more so than any other project feature (except, perhaps, a striking view) have the capability to overcome a lack elsewhere in the complex.

Condominiums -- A total of 4,490 finished condominium units have been offered in the identified resort projects to date, 3,806 (or 84.77) of which have been sold in the open market or placed through syndication.

Generally, resort condominium units are among the highest-priced in the State, with current "original" selling prices ranging from 285,000 to \$1,250,000. The reason for the higher-than-average prices are two-fold: being in a resort, the project is better located with more proximate amenities and more homogenous development types adjacent (relative to non-resort "strip" construction); and, destination resorts typically have higher standards (and restrictions) regarding improvement design and densities. The selling price disparity between comparable units within and outside a resort complex can be as much as \$200,000 (or more).

The term "luxury," in regard to Hawaii condominiums, has lost much of its credibility over the past decade, and is now a mere marketing catch-word for many overpriced units. However, projects within resorts are, on an overall basis, usually of a better quality of design, material, and craftsmanship. The most favored unit-types are one and two bedroom units, having a complete range of appliances and features.

In analyzing the marketing success of destination resort condominiums, a dilemma presents itself. As mentioned often in this report, demand is extremely cyclical, a function of general economic conditions. Periods of economic expansion, inflation and low-interest rates stimulate the market, while recession, stable price structures, and high interest rates hamper the desirability of a resort unit as an investment tool. Specific projects targeted towards specific market segments of pent-up demand (particularly ultra-luxury units appealing to the ultra-rich who are most economically independent of indicators) may fare extremely well during otherwise stagnate periods, as on the Kohala Coast in 1982-83. However, there is little a resort can do to increase activity during slow periods. The result is that construction and absorption of units is also staggered over time.

An additional concern in current and future condominium marketing is the impact of proposed Federal Income Tax guidelines, which could limit mortgage deductions on Second Home/Investor units. We make no assertions on the probability of tax code revisions, or their possible effect on the market, except to anticipate severe short-term readjustment problems. For this report, we assume historic conditions will continue.

Historic activity of resort condominium units must therefore be viewed in two perspectives, offering diverse demand indicators.

The first perspective is the velocity original unit sales only during the actual marketing period; pre-sale and following construction (if necessary). Each project is considered individually, even though several may be undergoing sale concurrently. As condominium developers are generally very sensitive to market demand trends, marketing/constructing units only when there is a demonstrated probability of rapid absorption, the ratio of unit sales per semi-annual marketing

period are rather high. Invariably, during the strong demand (or upward) portion of the cycle, units are quickly marketed, often in the course of days or months. However, in the stagnate or (downward) portion of the cycle, there remains an overhang of new units built by developers committed prior to the commencing of the slow period.

Analysis of destination resort industry condominium market based only on actual sales periods is shown on Table 12. Periodic demand ranges from a low of 8.00 units at Mauna Kea Beach, to a high of 137.00 units at Kapalua. Average market sales were 32.60 units per six month sale period on an individual resort basis. Among all resorts, on a weighted basis, each semiannual sales period averaged 22.61 unit transactions.

Yet, this figure is not fully representative, because the activity has not been maintained consistently over time; the sales being the product of periodic demand cycles. In this respect, it does not reflect the prolonged periods of in-activity and negligible demand that also form the reality of resort development; focusing only on sales (not construction) cycles. We have used minimum marketing periods of six months, as all sales programs (even those achieving "one day sell-out," require extensive setup, pre-contacts, and closing times. A successful one month or less sales period is the result of a well-developed program.

Similarly, the second perspective of resort condominium sales market activity, based on average original finished unit sales over time, is also flawed. In this analysis, demand is calculated based on the total number of units sold during the history of the individual resorts (the time lapse from the first condominium offering to the present).

Table 13 illustrates the annual demand for units in the identified resort communities over time.

This analysis is based on the assumption that developers are sensitive to the market, and will maximize the number of units constructed and offered over time if any measurable demand exists. The lack of offerings periodically is due to the stagnate market, which should also be reflected in making long-term demand

TABLE 12

**SUMMARY OF CONDOMINIUM MARKETING  
At Eight Destination Resorts  
Based on Marketing Periods Only  
Kohanaiki Market Study  
North Kona, Hawaii**

ISLAND	RESORT NAME	NO OF CONDO. UNITS OFFERED	NO OF CONDO. UNITS SOLD (1)	NO. OF SEMI- ANNUAL MARKETING PERIODS (2)	AVERAGE SEMI- ANNUAL SALES
HAWAII	Keauhou-Kona	845	736	47	15.66
	Mauna Kea Beach	40	32	4	8.00
	Mauna Lanii (3)	196	87	5	17.40
	Waikoloa Beach (3)	114	37	3	12.33
KAUAI	Princeville	1,093	823	49	16.80
MAUI	Kaanapali	1,214	1,055	38	27.76
	Kapalua	548	548	4	137.00
	Wailea	594	594	23	25.83
		4,644	3,912	173	
	Average Semi-Annual Sales Per Resort			32.60	
	Weighted Average Semi-Annual Sales Per Resort			22.61	

- (1) Open market sales only. Does not include foreclosure sales, developer-related transactions, or developer-held units.  
 (2) Cumulative number of six-month pre-sale to sell-out periods among all resort condominium offerings.  
 (3) Includes projects currently in pre-sale stages for initial phases.

Source: The Hallstrom Appraisal Group, Inc.

TABLE 13

**SUMMARY OF CONDOMINIUM SALES  
At Eight Destination Resorts  
Based on Overall Development Period  
Kohanaiki Market Study  
North Kona, Hawaii**

ISLAND	RESORT NAME	NO OF CONDO. UNITS OFFERED	NO OF CONDO. UNITS SOLD (1)	DATE OF FIRST OFFERING	AVERAGE SEMI- ANNUAL SALES
HAWAII	Keauhou-Kona	845	736	End 1969	23.00
	Mauna Kea Beach	40	32	End 1983	8.00
	Mauna Lanii (2)	196	87	End 1982	14.50
	Waikoloa Beach (2)	114	37	Beg. 1984	12.33
KAUAI	Princeville	1,093	823	Beg. 1973	32.92
MAUI	Kaanapali	1,214	1,055	Beg. 1964	24.53
	Kapalua	548	548	End 1975	27.40
	Wailea	594	594	End 1978	42.43
		4,644	3,912		
	Average Semi-Annual Sales Per Resort			23.14	
	Weighted Average Semi-Annual Sales Per Resort			26.61	

- (1) Open market sales only. Does not include foreclosure sales, developer-related transactions, or developer-held units.  
 (2) Includes projects currently in pre-sale stages for initial phases.

Source: The Hallstrom Appraisal Group, Inc.

calculations. In this respect, as often there are no new projects available (or only those having undesirable traits), the demand may be slightly misstated. However, we consider this analysis more appropriate than that employing the first perspective. According to this technique, the semiannual demand on a weighted basis for the eight resorts has been 26.61 units per period. The range of individual indicators is from 8.00 units per period at Mauna Kea Beach, to 42.43 units at Wailea.

Another characteristic of destination resort condominium development is the desirable unit mix between hotel rooms and condominium units within a project. These two facility types are the focal point of a resort community, as they provide the majority of capital return to the resort owners through ground leases, sales (units or land), or operation.

To a large degree, the mix between types is unique in each development, and the product of design and desired marketing target. The particular economic demands of the developer and the public land use agencies seem to be of more critical importance than any market generated statistic. Thus, one cannot quantify the optimum mix. However, we can present the development programs of the analyzed complexes.

It is noted that the effect of condominium unit versus hotel room development is being blurred over time, with the increasing usage of condominium units as lodging facilities; traditionally reserved for hotel rooms. In fact, many condominium projects are designed to be used as a hotel (extensive lobbies, registration desks, housekeeper areas, commercial space), and a primary unit sales tool is the promise of income which will be derived from their use as visitor accommodations. The result is that the major difference between hotel and condominium development is the underlying ownership and not actual usage. As this trend (condominium units as hotel rooms) is projected to strongly continue, the distinction between the two types will become less and less. That is why in our sections covering demand, the term "visitor unit" is commonly used because a successful resort is composed of both condominium units and hotel rooms.

Table 14 summarizes the existing hotel room/condominium unit ratios in the analyzed destination resort complexes. As can be seen, based on current conditions (existing and underconstruction projects only), the weighted market ratio is 1.70 hotel rooms per condominium units (7,915 existing hotel rooms - 4,576 condominium units).

However, as all of the resorts are still undergoing expansion and it was noted that hotel development is typically the first phase of improvement, the planned (fully improved) ratio is significantly different. The proposed units ratio is shown on Table 15, and is 0.77 hotel rooms per condominium units (19,511 total hotel rooms ÷ 25,472 total condominium units).

Commercial - Simply, every destination resort currently has, has proposed, or firmly acknowledges the need for a commercial village within the project. This is viewed not only as an additional revenue source (through ground or space lease rents), but essential to creating a total vacation community, as many individuals consider shopping and dining a major recreation. This need is reflected in a common complaint among the guests of the Kohala Coast resorts (Mauna Kea Beach, Mauna Lani, and Waikoloa Beach), which now lack such commercial facilities, that the diversity of shopping and dining facilities is insufficient. Without such a commercial complex, the isolation/exclusivity atmosphere desired by resorts is significantly diminished.

Among the resorts which have developed commercial villages, the range in gross leasable square feet ranges from 22,000 (at Kapalua) to 70,000 (Wailea), with an average of 52,500 square feet. The ratio of commercial square feet per existing hotel unit is 38.87. Long-term proposals call for ratios ranging from 15 to 55 square feet per unit, or an average of 24.

We concur with the resort developers that there is a need to contain a substantial commercial complex within a resort community if a project is to be considered as a competitive destination resort.

TABLE 14

**SUMMARY OF EXISTING UNIT MIX  
At Eight Destination Resorts  
Kohalaiki Market Study  
North Kona, Hawaii**

ISLAND	RESORT NAME	Number of Existing Units (1)		RATIO OF HOTEL TO CONDO. UNITS
		HOTEL	CONDO.	
HAWAII	Keauhou-Kona	1,308	845	1.55
	Mauna Kea Beach	310	40	7.75
	Mauna Lani	351	196	1.79
	Waikoloa Beach	543	114	4.76
KAUAI	Princeville	504	1,093	0.46
MAUI	Kaanapali	3,753	1,214	3.09
	Kapalua	196	548	0.36
	Wailea	950	594	1.60
TOTALS		7,915	4,644	

Average Hotel/Condo Unit Ratio: 1.07  
Weighted Overall Hotel/Condo Unit Ratio: 1.70

(1) Existing, under construction and in-sale units only.  
Table excludes the subject development.

Source: The Hallstrom Appraisal Group, Inc.

TABLE 15

**SUMMARY OF PROPOSED UNIT MIX  
At Eight Destination Resorts  
Kohalaiki Market Study  
North Kona, Hawaii**

ISLAND	RESORT NAME	Number of Proposed Units (1)		RATIO OF HOTEL TO CONDO. UNITS
		HOTEL	CONDO.	
HAWAII	Keauhou-Kona	3,311	3,787	0.87
	Mauna Kea Beach	1,100	4,000	0.28
	Mauna Lani	3,000	3,285	0.91
	Waikoloa Beach	3,000	3,000	1.00
KAUAI	Princeville	1,000	2,300	0.43
MAUI	Kaanapali	5,000	4,200	1.19
	Kapalua	1,500	2,200	0.68
	Wailea	1,600	2,700	0.59
TOTALS		19,511	25,472	

Average Hotel/Condo Unit Ratio: 0.30  
Weighted Overall Hotel/Condo Unit Ratio: 0.77

(1) Figure taken from existing master-plans for each resort.  
Land use approvals may not be secured for all proposed units.  
Adjacent parcels available for additional expansion at some resorts.  
Includes existing units.

Source: The Hallstrom Appraisal Group, Inc.

Hotel shopping arcades and dining facilities are the secondary focal point of commercial activity within a resort community. The amount of available space varies dramatically in each hotel, with the typically larger, upscale operations (Hyatt Regency Maui) having substantially more than the low-key, smaller hotels (Kapalua Bay). Many hotels have discovered that an attractive, large arcade can attract sales beyond those to hotel guests (traditionally the purpose of such commercial space), and also serves as a marketing tool for the hotel itself--as non-guests view the premises.

The tertiary commercial centers in a resort complex are the clubhouses for the golf courses and tennis gardens. At every resort, the golf clubhouse has a restaurant/lounge, or glorified snack bar, and a pro shop. Most tennis gardens are also so equipped, or plans exist to so modify them.

Single Family -- Of the eight resort analyzed, four had established single-family lot sales programs, and a fifth had recently begun offering such investments. The three other resorts (Kapalua, Mauna Lani and Waikoloa Beach) have discussed the option, but have yet to make allowances in their master plans. Based on market history and interviews with resort developers, single family improvement is typically not considered as an integral factor in destination resort economics, but the result of capitalizing on parcels having secondary favorable characteristics (such as view planes or golf course frontage).

The number of lots currently master-planned in the five identified resorts, which are to include them, ranges from 215 at Kaanapali to 2,500 at Mauna Kea Beach with an average of 955. A total of 4,775 lots are proposed.

It is our opinion that single-family residential lot development is not crucial to resort success, which is significantly more a product of the absorption of condominium units and hotel room demand. In fact, if sufficient demand exists, and public land use agencies were willing, most resort developers would likely forego lot development entirely due to the much greater return available in denser condominium and hotel improvement.

Recreational -- Recreational opportunities are a focal point of the competitive destination resort market. A factor enhanced by the surging popularity of physical fitness pursuits among the American public. The ability to offer a wide variety of facilities is a highly marketable trait, and serves to attract specific consumer groups. Although, many resorts offer substantial off-site opportunities (including helicopter rides, hunting, hikes, horseback riding, etc.), our concern is on-site facilities.

There are three basic area of recreational facilities: golfing, tennis, and others.

Access to an exceptional golf course is a prerequisite for a successful major destination resort, not only because of the need to maintain the appearance of a full-amenitized community, but also as a marketing tool attracting travelers who enjoy the game. Many of the resort courses in the State, particularly Kapalua, Princeville, Wailea, Mauna Kea and Mauna Lani, are considered among the finest in the world, and provide a substantial draw for the respective resort.

The impact of a striking course on operational levels is evidenced in campaigns such as the large expenditures incurred by the Kapalua Resort in establishing a professional tournament (despite the inability to recoup costs through spectator admission receipts), and the intensive and costly promotion mounted by Mauna Lani Resort in various golfing publications.

All of the identified projects have 36-holes (two courses) in existence, or advanced plans to have that many available within the next three to five years. A diversity of course-types is also desirable, though only significantly achieved at Kapalua. A selection of courses not only provides additional incentive for guests to remain within the resort; but, also enhances the luxury appearance (and marketability) of the destination, and creates additional golf course fronting developable parcels.

For similar reasons as with golf courses, the availability of tennis courts are essential for major resorts. Four of those analyzed have "tennis gardens" featuring numerous courts (six or more) of varying speeds, a teaching professional and a pro shop. While observation indicated the courts remain vacant a



significant proportion of the time (principally due to the extremes of the Hawaii climate and the age of most guests), their accessibility is required.

A tennis garden, while desirable, is not necessary for resort success if sufficient numbers of courts are readily available within the development at hotel and condominium projects. However, a luxurious facility with pro shop and snack bar is imminently desirable, and the higher quality resorts (Kapalua, Mauna Lani, Mauna Kea and Wailea) all have excellent tennis enclaves. Accessibility and availability are the keys in regard to tennis facilities.

Other on-site recreational opportunities range from archeological and scenic parks to ocean sailings, jet ski or windsurfing rentals, and parasailing. The proposed Hyatt Regency-Waikoloa will increase the facilities at that resort by constructing squash/raquetball courts, tracks, weight rooms/spas, and other improvements not typically found.

### 3. Location

In the following section, we describe the benefits of the individual locational attributes, summarizing our investigation. Additionally, we subjectively rank the projects, an analysis undertaken for the purpose in establishing the relative desirability of the subject location; presented later in this document. In ranking the resorts, overall quality of the attribute throughout the resort site, not the outstanding superiority of a single example, is the major concern.

Beachfrontage -- An expansive beachfront is the perceived epitome of a Hawaii destination resort location. To a large degree, ocean activities are a prime motivator behind all travelers to the State; however, the resort visitor is often more sedate, and prone to experiencing a wider range of activities than mere sun worshipping. Yet, the importance of a quality beachfront location as a recreational and view amenity, and marketing tool, cannot be understated. Of the eight major island resorts analyzed, all have high-quality direct natural or man-made beachfrontage, except Princeville and Keauhou-Kona, both of which acknowledge the marketing (and word-of-mouth) difficulties created by this lack. Ideally, a beach is of coral or alluvial sand, coral and rock free directly offshore,

with bordering reefs offering wave and current protection, and snorkeling potentials.

- Ranking:
1. Wailea
  2. Kaaanapali
  3. Mauna Kea Beach  
Kapalua
  5. Waikoloa Beach
  6. Mauna Lani
  7. Princeville
  8. Keauhou-Kona

Climate -- With the exception of Princeville all destination resorts analyzed have been developed on the leeward (or as at Kapalua, the northerly-leeward) shoreline. Because of the arid, and more wind-free conditions prevalent in these locations, it is considered climatically more desirable by tourists even though the surrounding plains and mountains may be uncharacteristically (for Hawaii) dry and void of the lush vegetation associated with the Islands. Rain, or the perceived threat thereof, is undesirable to hoteliers due to the negative impact on return guest figures and the trepidation travel agents have in booking clients into a potentially troublesome climate. Those associated with the hotel conceded that the northerly-leeward location of the Kapalua Bay Hotel, which is subject to periodic high winds and storms, had, during the first years of operation, a negative effect on occupancy levels.

However, the lush qualities of other locations epitomizes Hawaii for many individuals. As upper-class travelers have a greater capability to pursue other activities, the impact upon some destination resorts may be proportionately less than on an operation appealing to a lower income-class of visitor. As windward and northern locations are, in reality, not as rainy as perceived (typically rain is seasonal and periodic in the morning and evening only), the long-term impact of such a location would likely be minimal as the market is made aware of actual conditions over time. Furthermore, for many travelers, particularly seasoned Hawaii visitors and State residents, the cool, breezy weather is considered more desirable than the hot, still-air climate of leeward locales. Yet, the overall positive characteristics of a leeward location cannot be denied.

Transportation/Access -- The quality of airport serving the region and the ease of vehicular access (quality of thoroughfare and congestion) are the characteristics covered in this category. While these traits may not directly influence a decision on resort choice, they contribute to its overall desirableness, as traffic congestion and poor airport facilities hamper the vacation experience and reflect negatively on the region as a resort destination.

- Ranking:
1. Waikoloa Beach  
Mauna Lani  
Mauna Kea Beach
  4. Keauhou-Kona
  5. Wailea
  6. Princeville
  7. Kaanapali  
Kapalua

Environs -- This characteristic is somewhat more subjective than the others as individuals are attracted by differing qualities. We have given greatest weight to the overall availability of visitor support facilities and attractions on the respective islands, with primary emphasis on the historical and scenic traits. It is acknowledged that there is substantial debate on the desirability of Maui versus the Big Island; we have tended to favor the latter as it would appear to have a definite, greater potential over the long term to fulfill State goals. However, the overall relative difference between the Big Island projects and the Maui resorts is considered minimal.

- Ranking:
1. Keauhou-Kona
  2. Waikoloa Beach  
Mauna Lani  
Mauna Kea Beach
  5. Kaanapali  
Kapalua
  7. Wailea
  8. Princeville

## Agriculture

### General Economic Market Sector

As previously discussed, the districts of South Kohala and North Kona, have established agricultural traditions, which (though lessening in import relative to tourism) is experiencing real economic growth. Diversified products (macadamia nuts, avocados, citrus, coffee and other fruits), vegetable/truck crops and floral products are producing increasing quantities of goods, and utilizing increasing amounts of arable land. Only ranching has failed to keep pace with the general agricultural expansion.

However, existing agricultural is almost exclusively limited to elevations above the 800 foot level, where there are cooler conditions, greater amounts of soil and rainfall, and less salt air.

Due to the high cost of land (resulting from tourism demand) in the Kailua-Kona coastal corridor, the extremely poor geologic conditions in the low elevations of the South Kohala District, and the cost of water development/supply, no agricultural development is anticipated in the comparable regions of the General Economic Market Sector.

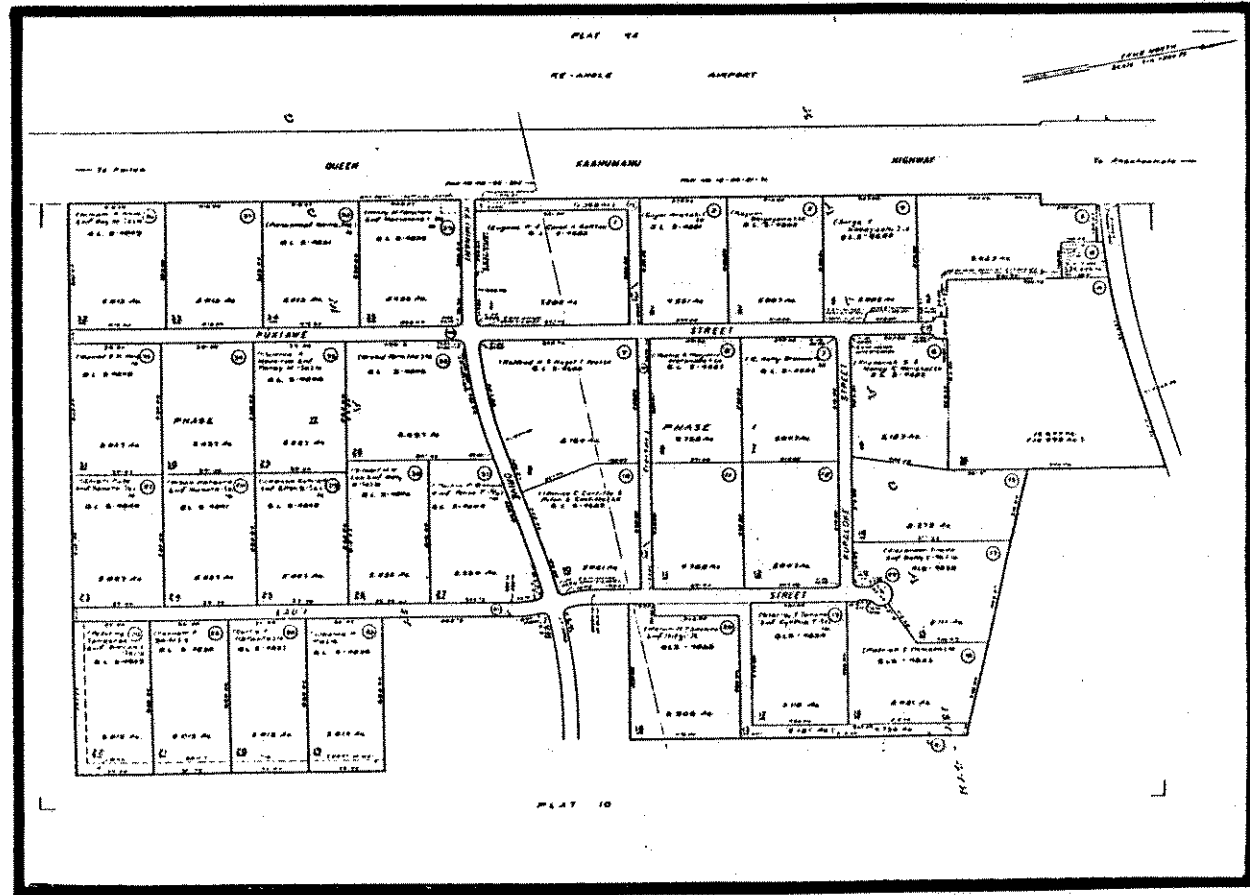
### Primary Economic Market Sector

A single agricultural subdivision, the State and County sponsored Keahole Agricultural Park, is located in this defined market sector.

The project, heavily dependent upon public funds for infrastructure (water) development, is located opposite the Keahole Airport, and was intended to be used for production of floral and specialized fruit crops which would benefit from close proximity to the air freight potentials available at the airport. A map of the subdivision is shown on the following page.

There are a total of 35 leasable lots in the park, ranging in size from 4.552 to 15.643 acres. Currently, 28 are leased, although only seven are improved (or in

KEAHOLE AGRICULTURAL PARK  
Kahanaiki Market Study



the process thereof). A common complaint among lessors (in addition to the extremely poor soil conditions--raw A'a lava), is the very low water pressure evident, hampering irrigation potential; particularly if more sites are improved.

Aquaculture development is being attempted within the Natural Energy Lab holding at Keahole Point. However, the project is considered as experimental (to a large degree) and heavily dependent upon funding grants and subsidized land costs.

There are no other agricultural developments proposed or commonly envisioned for the Primary Economic Market Sector in the foreseeable future.

#### Summary

It is our opinion, that due to the climatic and soil conditions evident on the subject property, the cost of developing infrastructure, and the competition for existing limited demand from the State subdivision, there is insufficient demand for agricultural use of the site to be considered as a viable land use option.

## HIGHEST AND BEST USE ANALYSIS

### Introduction

Based on our market analysis of the subject property's General, Primary and Competitive Economic Market Sectors, it is our conclusion that the principal land use for which widespread market acceptance can be readily projected, and which will efficiently utilize a significant portion of the subject site, is integrated intermediate-class resort development.

Master-planned resort development typically contains hotel and resort condominium projects, a commercial village and lesser numbers of single-family residential lots (when sufficient acreage is available). In order to be competitive, a resort complex must also contain a sandy beachfrontage (preferably white), golf course(s), tennis and other recreational facilities within a unified atmosphere. In the subject's primary effective market, successful resorts additionally have protected/refurbished archaeological and historic sites, and maintain high quality standards.

In this portion of our report, we assess the likelihood of actualizing a resort community on the Kohanaiki holdings. There are four constituent elements in assessing the probability of such manifestation, the interplay of which sets forth the potential time, and cost parameters involved with improvement of the property to its highest and best use.

Assuming a demonstrated market demand exists for such resort use (see the Market Study section), the elements are: physical desirability/adaptability of the property for resort use; logistical concerns and the availability of supportive off-site infrastructure (water, access, sewage, etc...); land use and other governmental constraints and restrictions; and, the impact of community reaction. Primary concerns in our analysis are the time necessary to achieve needed planning, land use approvals, and community support, and quantification of development intensity (recognizing competitive and other needs).

Our report is divided into four sections, commensurate with the highest and best use elements listed above. We note that in regard to several of the categories, notably zoning and certain infrastructure needs, we have relied heavily upon input from appropriate public agencies, and past experience of developers in the area. In many instances, time frames and probability ranges are the most accurate data available, with more specific conclusions dependent upon development of design/planning concepts which could be reviewed by the various concerned parties.

Because major portions of this analysis have been prepared and/or presented in conjunction with others, some sections are only noted or capsulized in this portion of this document.

#### Property Description

It is our understanding a detailed description of the subject property, both in its existing state and as proposed for development, has been prepared by Helber, Hastert, Van Horn & Kimura, and presented under separate cover. In the interest of brevity and non-repetition, we have therefore omitted such a description from this document.

There are, however, several planning concepts currently envisioned for the subject property which we consider worthy of note in this analysis, as they would contribute to its short-term marketing potential/acceptance and its prolong viability. Additionally, if developed as proposed, the subject would have unique characteristics setting it apart from other Hawaii resort projects.

While it has been discussed in other statewide locations, no existing resort in Hawaii has a boating marina within its community. We consider this a particularly appealing subject project attributes, not only as an advantageous marketing characteristic for both Hawaii residents and tourists/investors, but also as a thematic base for the upscale atmosphere which is sought by the proposed development.

As discussed elsewhere in this report, the North Kona region from Keauhou Bay to Keahole Point has an established world-wide reputation for sport fishing excellence, and has provided a recognized focal point for regional promotion efforts. Being in the full lee of Hualalai with the most prolific fishing area in the State ("The Grounds") directly offshore, and having complete support facilities available at nearby Honokohau Small Boat harbor, Kohanaiki is excellently located to maximize benefits which would accrue from inclusion of a marina in the proposed resort project.

Thus, a marina would enhance the standing of the planned subject community from a marketing standpoint by: establishing it as a unique item in its competitive market; providing a strong theme identified with the region; enabling the resort to attract State residents who are boating enthusiasts; and, by tapping the significant existing market demand for moorage facilities, which is not likely

to be met on a public basis during the foreseeable future. As a secondary benefit, a marina would be visually appealing and a strong amenity for the hotels and condominiums developed around it. It would further more increase the amount of shoreline on the site.

From a highest and best use standpoint, the marina is advantageous as it maximizes locational attributes of the subject property otherwise left unexploited; helps fulfill a community wide demand for additional harbor facilities (at little or no public cost); will likely enhance the subject's acceptance within the County (lessen opposition) by providing potential recreational benefits to the community-at-large and not just tourists; and, benefits boating and both supply related business in the region.

The second proposed development concept of importance is the planned design of the subject as an upscale, active community, geared towards the emerging lucrative middle age visitor market. This would place the subject resort in stark contrast to the existing West Hawaii resort (and throughout the State generally) which were developed with the older, established, "carriage trade" market sector as a focal point. The sedate project at Mauna Kea Beach, Mauna Lani, and Kona Village are prime examples of this philosophy. Through incorporation of numerous activity oriented amenities, the subject project will be exceptionally marketable to this target group, creating both an extreme short-term benefit (ready fulfillment of a currently unsatiated need) and long range acceptance factor as this age group matures and unable to fill its activity desires in other resort communities designed for the less active foregoing generation.

In addition to the standard resort recreational facilities (golf, tennis, and beachfront activities), other amenities proposed at this time are bicycling and running tracts, both-way easements, and playing fields converting otherwise idle open space into dynamic activity area. The lay of the site combined with its relatively wind-free and rainless conditions make the subject location an excellent choice for this type of development. Similarly, within the hotel and condominium to be constructed, physical activity amenities will be stressed, with spas, health clubs, racquet courts and gymnasium among the ideas currently advanced. Not only with such amenities provide a marketable "draw" but also give the operators

within the resort additional opportunity for positive guest interaction which is considered critical in establishing a return clientele base.

In summation, these two attributes of the proposed subject developments (marina and an upscale activity orientation) are considered as superior marketing characteristics, and exemplary of highest and best use developments of a site. It would be anticipated this trade would be synergistic, creating an extremely integrated atmosphere and an overall theme for the resort community.

#### Honokohau Small Boat Harbor

Upon completion of the first phase in 1969, the Honokohau Small Boat Harbor became the major pleasure craft, and commercial and charter fishing anchorage in West Hawaii. Subsequent expansion has resulted in a total of 165 boat stalls to date, with short-term re-configuration anticipated to add 37 more.

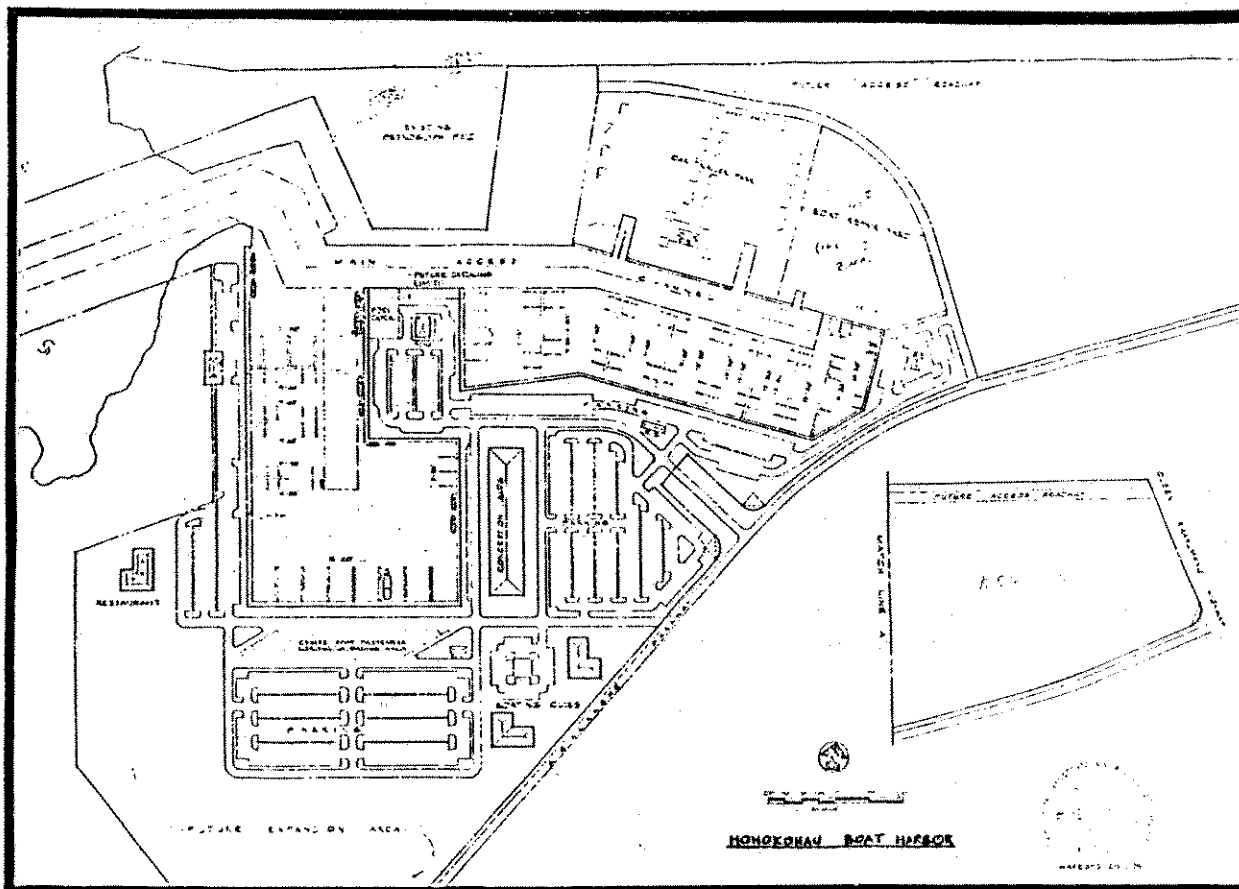
According to the master plan prepared by Daniel, Mann, Johnson and Mendenhall for the State of Hawaii Department of Transportation Harbors Division in December 1970, overall long-term planning calls for a total of 455 slips to be developed on the 63.5 acre harbor site (25.1 acres water area, 40.4 acres of land). It is assumed the reader has access to this extensive public document, which is still viewed as the basis for future expansion plans by the State.

The current master design map is displayed on the following page.

Fredrick Torres, Harbors Division Administrator, stated that the development has been slower than originally anticipated in the plan, which forecasted 308 completed slips by 1980. He said that currently, all available berths in the harbor are filled, with a waiting list of "over 60 seriously interested" parties. Turn-over among slip lessees is rare, with a waiting period of "many years".

Torres hypothesized an existing demand for circa 80 to 100 slips at the Honokohau Harbor. Recent studies have shown State demand increases by five to six percent annually, with major growth areas including West Hawaii, West Maui and Urban Honolulu.

HONOKOHAU SMALL BOAT HARBOR  
Master Plan



A-103

Lease rent rates are currently at \$1.50 (or less) per lineal foot for pleasure boats, with commercial and charter craft assessed at \$50 per month, or two percent of gross income; whichever is greater. The latter are also required to purchase special operational permits.

According to Torres, the rents are "dirt cheap", and do not support the amortized construction cost or operation expense of the facility. The main income producer is ground space lease rental for marine-related use of the harbor frontage.

Torres said the existing mix of slip tenants and interested parties is approximately as follows:

Group	Percentage	Number of Slips	
		Current Supply	Existing Unmet Demand
Charter Fishing	50-60%	83-99	30-50
Commercial Fishing	25-30%	41-50	10-20
Recreational Craft	10-20%	17-33	40-60*

Despite the substantial present demand for slips, the State does not have immediate plans to physically expand the harbor at this time, according to Torres, nor are funds anticipated to be made available for such development over the foreseeable future (ten to 15 years). This was confirmed in a series of public forums, held in North Kona in September 1984, sponsored by the Harbors Division and the Army Corps of Engineers. It was acknowledged that funds are extremely limited, and that priority projects by the agencies are improvement of the deep-water port at Kawaihae and a protective breakwater at the Honokohau Small Boat Harbor. Governmental funded expansion of the number of available small boat slips in West Hawaii is not projected "under current conditions, until the end of the century", according to quoted speakers.

Focal point of short-term improvement plans for Honokohau Harbor will be ancillary commercial and light industrial development; providing needed operational revenue for the State (lessors). Torres stressed the aggressive posture of the State in regard to stimulating this type of development, with recent leases

signed for a commercial/industrial facility (Gentry's Kona Marina) and a fuel dock.

In regard to the potential for harbor expansion by the private sector, State spokesmen viewed the concept as favorable (particularly in light of its inability to meet existing demand), but said it would be subject to extensive review. While the concept is new in the State, private marina development has been successful in several locations (notably Hawaii Kai, Oahu) and future projects (West Beach, Ewa Marina and others) are now finishing the planning and approval stage.

#### Summary

Based on the historic and highly-recognized excellent fishing and boating grounds along the Kona Coast, the high demand for such activity among residents and tourists, and the demonstrated market demand for prime, or specialty-located units and lots, it is our opinion that expansion of the Honokohau Small Boat Harbor is feasible and a very desirable marketable amenity. However, the probability for achieving the necessary logistical support for such a development would require further study.



**Land Use Classifications**

There are three levels of land use classifications governing the use/development of non-military lands in the State of Hawaii; they are: State Land Use, administered by the Hawaii State Land Use Commission; the County of Hawaii General Plan, and the County of Hawaii Zoning Code, both of which are administered by the County of Hawaii Planning Department and City Council. Proposed developments must achieve compatible classifications on all levels to receive necessary permits.

Additionally, the shoreline, and certain nearby areas are within a County of Hawaii Special Management Area (SMA) described as the Coastal Zone Management (CZM) program.

The need to change one or more designations, often a time-consuming and (therefore) costly process in Hawaii, can be a critical factor in ascertaining the probable Highest and Best Use(s) of the subject property. Conversely, a site with compatible existing land use classifications can anticipate priority development plan review, and thereby shorten or forego various hindrances to development which may arise.

Our findings and a substantial portion of our descriptive narrative are contained at-length within reports prepared jointly with the firm of Helber, Hastert, Van Horn & Kimura. The significant land use change timing ranges are summarized on the following table. Our opinions are represented at the upper end of the range; however, we have tempered them in accordance with the optimism expressed by the planners that applications could be expedited as the General Plan is currently under review. The low-end of the ranges reflect these opinions. Additionally, the planners may seek accelerated processing by submitting petitions simultaneously to the General Plan and SLU reviews. Typically, the General Plan applications precedes SLU submittals.

<u>Land Use Agency</u>	<u>Existing Classification</u>	<u>Action Required</u>	<u>Estimated Time Required for Action<sup>(1)</sup></u>
State Land Use Commission	Conservation	Change to Urban	9 to 36 Months
Hawaii General Plan	Open/ Conservation	Change to Resort	18 to 24 Months
Hawaii Zoning Code	Open	Change to Resort-Type Uses	6 to 18 Months following General Plan approval
Special Management Area (Coastal Zone Management)	Within SMA	Approval	Coincidental with zoning approval

<sup>(1)</sup> If all submittals are complete, and the action is viewed favorably by the respective agency.

Based on the existing land use constraints affecting the subject property and demonstrated market demand, it is our opinion that the use-type most probable and likely to receive the most-ready acceptance by County officials would be integrated intermediate-class resort development. SLU and General Plan amendments and a zoning change would be required for such development of the site. It is estimated that the entire land use approval process would require from 24 to 60 months following original submission of plans and documents. It is assumed that land use approvals will be expedited with due haste, and a General Plan amendment permitting subject resort development would be sought simultaneously with a State Land Use change. A variety of time frames are possible; the most probable are presented later in this report.

It is noted, that the conceptual development and actual design of a resort project can require upwards of two to five years before plans are of final submission quality. The failure to adequately prepare all necessary plans, studies, or otherwise required documents could result in a substantially longer approval time-frame. Based on experience of similar projects in the State, a minimum of six months planning would be required prior to commencement of land use changes and approvals. Following submission, planning and governmental action continues simultaneously.

A-106

**Adaptability of Subject's Physical Characteristics for Resort Use**

The desirability of an individual site for resort development is the result of both macro and micro characteristics, assuming necessary infrastructure is available (or can be constructed) and land use classifications permit.

Among the macro, or general, attributes are location within a recognized and/or expanding resort region, a sunny arid climate, proximate transportation facilities and access thoroughfares, generally calm water conditions, and availability of natural and scenic features. As the demand for resort-quality units is experiencing the most significant growth of any tourism sector, we have compared the subject with the major Neighbor Island destination resort projects previously identified; the competitive market. Using the criteria presented in that section of the report, we have analyzed the Kohanaiki site, ranking the property relative to the locational attributes of the developments. This section is of primary concern for our Highest and Best Use analysis as the subject would be required to compete with these master-planned complexes over the long-term, despite the fact it is proposed as a less intensive project (intermediate as opposed to major resort).

As discussed within the Market Study, the Kona-Kohala coastline contains all of the favorable locational characteristics; and the subject property is considered favorably situated in regard to these traits. Due to its proximity with the Keahole Airport (enhancing accessibility for potential guest and recognition for passers-by) and Kailua-Kona village (and all the tourism-oriented services and facilities therein), the subject enjoys additional environ benefits.

Favorable micro, or specific, site locational attributes for resort improvement typically include: an extensive white (or golden) sand beach; protected swimming and diving areas, with high degrees of water clarity; quality makai and shoreline view planes, ample slope to permit such views for interior parcels; and, sufficient acreage to allow development of necessary recreational amenities (golf course, tennis garden) and infrastructure.

Additionally, particularly for West Hawaii projects, significant archaeological and historic sites are desirable, unless they are intrusive or constrictive upon development.

The identified macro and micro site attributes provide not only entertainment/enjoyment to guests, but also serve as an effective marketing tool which can easily be expressed through brochures and presentations, and often provide focal points or themes for the development. The beach, view, protected swimming and similar site amenities furthermore act as the "resort" diversions for non-golf, or tennis enthusiasts, and are the type of features which enhance the likelihood of repeat visitors.

As final plans for resort improvement of Kohanaiki have not been prepared, and are (to some degree) dependent upon the findings of this analysis, the appropriateness/competitiveness of its proposed facilities is difficult to judge. Greatest concern is given to their placement in the resort, density and overall unit mix (hotel vs. condominium). Primarily, it is necessary the identified resort components are sufficient to reach the critical mass level required for the resort to be competitive on a statewide basis. In establishing the land use parameters presented later in this section, we have included all of those characteristics considered as integral for a competitive resort community.

Hotels should be oceanfront, or near-oceanfront, with unobscured view panoramas. Competitive densities would be circa 20 units per acre; with sites ranging from 10 to 20 acres in size, thereby having sufficient space for requisite grounds and amenities. Condominiums are typically near-oceanfront, or interior sites situated around frontage amenities such as the anchialine ponds and the golf course. Parcels having maximum makai views are more desirable, and densities of eight to twelve units per acre would be within the competitive range. A commercial village (three to ten acres, typical) and single-family residential lots (circa three per acre) are generally located in the less desirable interior portions of the resort community.

Locational characteristics, being of existing substance, are more disposed to comparative analysis. In the following section, we have provided our opinions on



where the subject would rank relative to the other eight major Neighbor Island destination resort projects previously discussed.

#### Locational Characteristics

In regard to the identified competitive locational attributes, the subject property is summarized in the following paragraphs.

Oceanfrontage -- As presented in descriptions of the subject property prepared by others, the subject has relatively extensive white-sand beachfrontages (between Puhili and Wawahiwa Point) for the North Kona District, and is one of the closest widely used major strands to urban Kailua-Kona. Called "Pine Trees" by local residents, the site is a favorite among area surfers, sun bathers and campers. Additional sand pockets are located in near-shoreline, and close-offshore areas. The beach is widest, and most desirable, near Wawahiwa Point and fronting the central portions of the property.

In the course of site development for resort use, some beach enhancement would be required, similar to that undertaken within the Mauna Lani Resort (though not as extensive), and as is currently being done in conjunction with the Sheraton Princeville Hotel project on Kauai. Sufficient, readily available sand would appear to exist on-site to complete an enhancement operation. An improved beach on the property (based on its current extent and attributes) would be one of the finest in leeward Hawaii.

Relative to existing West Hawaii resort developments, and other Neighbor Island destination areas, the subject enjoys good to excellent water recreation potentials, the major activities being swimming/bathing and snorkeling/diving.

The ocean area fronting the subject is exceptionally clear, with visibility underwater typically exceeding 100 feet. This clarity factor, coupled with the type of scattered coral formations and sand and rock sea floor which is found close offshore (through outside of the near tidal zone), create superior diving conditions. Additionally, being in the lee of Hualalai, the bay is protected from

the majority of disturbing tradewind action which plagues the Kohala resort projects.

Swimming potentials are poor to average fronting the southerly area of the site, due to tidal zone rock reefs and staggered shelves. From Puhili to Wawahiwa Point conditions are better, and bathing potentials range from average to good. Again, as at Mauna Lani and other resorts, shoreline swimming lagoons could be developed/enhanced using existing coastal formations. Offshore, swimming conditions are good due to the lack of unified reef formation. However, the lack of such a protective reef does permit occasional high surf to strike the central portion of the subject shoreline (hence its desirability as a surfing spot), although Keahole Point does provide some protection from the severe winter swells (from out of the northwest). Wawahiwa Point, the northerly headland of Honokohau Bay, provides substantial protection for the southerly portion of the Kohanaiki site, and despite the presence of tidal rock reefs, this area of the property may have the best bathing potentials. The subject is open to summer wave action (out of the south), which is typically not as extreme. Generally, surf conditions are "flat" in this area of the island (although a favorite local surfing spot is the aforementioned break near Puhili Point), and despite its "unprotected" quality, the subject shoreline is less susceptible to strong wave action than Keauhou-Kona, Kona Village, or the Mauna Kea Beach resorts.

The major bathing problem is two-fold: 1) the relatively steep slope of the undersea shelf fronting the site, dropping to more than 60 feet in depth within 100 yards of the shoreline; and, 2) the presence of tidal zone rock reefs along portions of the shoreline, which (due to wave action) can make entrance into the water difficult in some areas. The latter problem can be addressed through careful selection of beachfront improvement and limited excavation (if permitted), the former deficiency cannot be resolved.

Relative to other Hawaii destination resorts, an enhanced subject beachfrontage would be:

- a. superior to Keauhou-Kona, Princeville;
- b. comparable to Mauna Lani; and
- c. inferior to Waikoloa Beach, Mauna Kea Beach, Wailea, Kapalua and Kaanapali Beach.

View Potentials -- The subject property has good makai and shoreline views. Honokohau Bay provides an admirable view amenity for closely proximate scenes, while the leeward flanks of Hualalai and Mauna Loa serve as a southerly backdrop. Additionally, the boating activity in the bay (from Honokohau Harbor) enhances daily panoramas. Mauka views are mixed, with a stark contrast between the spectacular upper, forested slopes of Hualalai and the residential, agricultural and industrial development (though scattered) on the mountains lower slopes. Effective conceptual and structural planning, and screening using landscaping techniques, should mitigate the impact of these latter undesirable view characteristics.

The subject property would appear to have minimally sufficient slope to permit interior sites to have viable ocean view potentials, particularly if development is set back from the shoreline (as would likely be required), and structures are of the low-rise type.

In comparison with other statewide resorts on an overall basis, views from Kohanaiki can be ranked as follows:

- a. superior to Mauna Kea Beach;
- b. comparable to Waikoloa Beach, Mauna Lani, Wailea; and
- c. inferior to Princeville, Kapalua, Kaanapali and Keauhou-Kona.

Climate -- To some degree, nearly all coastal areas of the State have climatic conditions conducive to resort development, although sunny, arid areas are considered the most marketable. The majority of the resort communities in Hawaii have been developed on the leeward sides of the Islands, where it is

generally sunnier and warmer. The most favorable resort weather is found in the lee of the higher mountains on Maui and the Big Island.

The prevailing climate at Kohanaiki is superior compared to other State resort areas. The average temperature range is 73 to 79 degrees. Average annual rainfall for Hawaii resorts ranges from a low of less than ten inches on the Kohala Coast and at Wailea to a high of 115 inches within the Princeville complex. At the subject, rainfall is circa 12 inches per year. There is little wind in the Keahole Point area due to the presence of Hualalai as a buffer. In fact, the conditions result in a slight onshore breeze at times during the afternoons.

Relative to the analyzed Neighbor Island master-planned resorts, the prevailing climatic conditions at the subject site are:

- a. superior to Princeville, Kapalua, Mauna Lani, Waikoloa Beach, Kaanapali Beach, Keauhou-Kona;
- b. comparable to Wailea, Mauna Kea Beach; and
- c. inferior to none.

Topography/Size -- Based on discussion with land planners, and review of development within other resort areas, it is our opinion that the subject parcel is of sufficient size to permit development necessary for a competitive intermediate-sized resort. The list following displays the probable land use types and acreage allotments for such development of the subject, giving primary concern to achieving critical mass, competitive density levels, market unit mix, and zoning constraints.

It is stressed that the allocated land areas are only guidelines; actual space planning is concurrently being completed by Helber, Hastert, Van Horn and Kimura. This Market Study and Highest and Best Use report serves as a supporting document for their planning and presentation. The purpose of our referencing land areas is to confirm the reasonableness of the envisioned use potentials; the most critical element of our analysis being the potential number of units and approximate densities to conform/compete in the marketplace.

Size in Acres	Land Use	Comments
35	Hotel	Oceanfront areas; 700 rooms at 20 rooms/acre.
80	Condominium	Near-oceanfront and golf course frontage; 800 units at 10 units/acre.
170	Golf Course	18-hole championship course.
85	Open/Reserve	Shoreline, anchialine ponds and historic setbacks; circa 20 percent of total acreage.
10	Marina Basin	Oceanfront area, low lying area to provide the utility of boat slips and overall project amenity.
47	Roadways	Throughout development; 10 percent of total acreage.
5	Commercial Village	Retail/restaurant complex in interior of site; 20,000 to 35,000+ square foot leasable area.
<u>38</u>	Single-Family Residential and Support Housing	Mauka remainder acreage allowing for circa three lots/acre. Variable depending on land use efficiencies of above uses.
<b>470</b>	<b>Total</b>	

Note: Acreage figures assume tennis facilities developed in conjunction with individual hotel and condominium projects. If separate garden constructed (as is optimally desirable), approximately three to five acres would be deducted from single-family residential allotments.

From a topographical standpoint, the relatively minor slope (near flat) of the subject site, though inhibiting view planes from interior parcels somewhat, is highly favorable for recreational potentials.

Using the same rating system employed in our analysis of other Hawaii master-planned resort projects (where a fully level site is preferable to a fully sloping one) the subject can be ranked thusly:

- a. superior to Princeville, Keauhou-Kona, Mauna Kea Beach, Kapalua;
- b. comparable to Waikoloa Beach, Mauna Lani; and,
- c. inferior to Kaanapali Beach and Wailea.

Archaeological/Other Points of Interest — As the center of ancient Hawaiian civilization, the Big Island contains significantly more sites of historical interest than any other island. The leeward coast of Hawaii is particularly endowed with important archaeological artifacts and structure remains.

Due to the relative inaccessibility of the coastline (prior to the opening of Queen Kaahumanu Highway) and the historic negligible demand for development in the area (a factor which destroyed many sites on other Islands), the majority of important sites are relatively intact, and offer the most comprehensive insights available into the life style of the native culture. These historical attributes are considered an extremely positive trait, not only for historical perspective purposes, but also as a strong visitor attraction. The ability to entwine a sense of ancient history with the delights of a tropical vacation, places Hawaii in the forefront of tropical destinations, and contributes to the "foreign country" atmosphere of the State.

During the late 1960's and early 70's, the conflict between developers and historic activist groups created many confrontations regarding the importance and handling of identified sites. However, in recent years, both parties have come to realize the mutual benefits available through cooperation. Resort developers by providing funds and land to protect, refurbish and maintain designated sites have created amenities for the resort, and potential for themed improvement. Activist groups, recognizing the difficulty of restraining all potential development of historic sites, have cooperated (often by merely taking a passive stance) with well-intentioned developers, thereby permitting timely improvement.

Three of the four resort operations on the West Hawaii coastline (Keauhou-Kona, Mauna Lani and Waikoloa Beach) are situated on significant historic sites. This is due to the fact that the few choice areas along the lava strewn Kona-Kohala coastline also were appealing to the ancient Hawaiians. In all cases, through studious planning and research, the facilities have created a strong amenity out of the artifacts available. Over the long-term, as the region is fully developed (as projected), the benefits arising from archaeological concern and restoration will make the resorts more competitive with other Neighbor Island destinations.

In regard to this site characteristic, the subject property has many points of interest including several habitation sites and anchialine ponds, although it is not among the more favorable locations available.

Ranking of the subject in the statewide destination resort is as follows:

- a. superior to Kapalua, Kaanapali Beach, Wailea, Mauna Kea Beach, Princeville;
- b. comparable to Keauhou-Kona; and,
- c. inferior to Waikoloa Beach and Mauna Lani.

Transportation/Access — Kohanaiki has direct access to Queen Kaahumanu Highway, a high-speed, relatively congestion free thoroughfare, and is less than three miles from the well-designed Keahole Airport. The facility handles approximately 20 interisland flights daily, and has had direct Mainland service for more than a year. Due to these factors, the transportation and access characteristics of the site are extremely superior.

Relative to the other resort projects, the subject is:

- a. superior to Kapalua, Kaanapali Beach, Princeville, Wailea, Mauna Kea Beach, Waikoloa Beach, Mauna Lani, Keauhou-Kona;
- b. comparable to none; and,
- c. inferior to none.

Environs -- As discussed in the market study section of this report, it is our opinion that West Hawaii (and the Big Island in general) has the most favorable existing and potential environs for resort development due to the scenic, climatic, historic and agricultural attributes of the Island. The subject's central location on the leeward coast permits greater ease of access to other Island regions than enjoyed by the other resorts, and allows it to maintain a degree of isolation despite its relative proximity to urban Kailua-Kona.

In comparison with the identified projects, Kohanaiki is:

- a. superior to Kapalua, Kaanapali Beach, Wailea, Princeville, Waikoloa Beach, Mauna Lani, Mauna Kea Beach;
- b. comparable to Keauhou-Kona; and,
- c. inferior to none.

### Summary

Based on our analysis, the Kohanaiki holdings are a good to superior location for integrated destination resort development, having all the necessary site attributes for successful improvement. Relative to other existing complexes in the State, the subject has exceptional climatic, access and environs characteristics, and is above average in regard to points of interest and available views. The least favorable factor, quality of oceanfrontage, could be significantly enhanced through innovative design and construction of beach and swimming areas.

It is our opinion that the Kohanaiki site is readily adaptable for resort development, and among the more desirable properties still available in the State.

### Logistics and Availability of Off-Site Infrastructure

In this portion of our analysis, we researched the availability of utilities and other infrastructure which would be required in order to actualize an integrated resort development on the subject property. The primary areas of concern were water supply and transmission, waste water (sewage) handling, electricity, and access.

The focal point in discussion of these areas is the time frame necessary to provide subject development (either on a public or private basis) with the service, and the general cost parameters (where available) which may be encountered in improving the needed infrastructure.

We assume any industrial development of the subject would be serviced by the resort infrastructure, with any additional requirements available from the adjacent high-tech park.

As with our analysis of land use classifications, our findings and a substantial portion of our descriptive narrative are contained within reports submitted by Helber, Hastert, Van Horn & Kimura. Our mutual conclusions are summarized as follows:

#### Water Supply

Despite the existing North Kona water-service moratorium, public water service could be anticipated for subject development, with relatively high degree of probability within three to four years of the date of this report. Private systems could be developed in a shorter time frame, commensurate with site improvement, but would result in significantly higher service construction expenses and per unit costs to consumers.

#### Waste Water Disposal

Public sewage service is currently unavailable in the subject area; however, there are plans for an extensive treatment plant adjacent to Honokohau Harbor. Assuming transmission lines are in place, the plant would be available to service subject development in five to eight years from the current date.

A privately developed system as an alternative is a highly probable solution. To date, most Neighbor Island destination resorts have been developed using a private sewage treatment system. The impact of private construction is the cost, versus time before public-serviced availability. It is noted that many individual resort condominium projects in the State have constructed private sewage systems. Additionally, the treated discharge from a plant can be beneficially used for irrigation (particularly golf courses).

#### Access

Currently, vehicular access to the subject is available via two unimproved jeep trails: one leading from Queen Kaahumanu Highway makai to the northerly shoreline area of the site; the second is a coastal pathway extending from the Natural Energy Lab access roadway along the oceanfront. The latter terminates near the property's southerly boundary.

According to existing State of Hawaii Transportation Department, Highways Division Right-of-Way Maps covering Queen Kaahumanu Highway (Project Number BD-65-352, Sheet 3), an 80-foot wide easement from the limited-access highway is permitted onto subject Parcel 7-3-9-16 (which was acquired for this purpose). This would appear to be sufficient for resort development as conceived.

### Community Reaction

Community reaction to a proposed resort-type development of the subject property would be anticipated as being focused in three areas: maintenance of the fragile ecosystems of the near shoreline areas; preservation of significant historical sites; and, public access to beachfront areas. Additionally, there would likely be some general opposition from various vocal individuals and small groups who have long-standing anti-development commitments.

For the most part, opposition would be expressed and resolved within the governmental approval process; which requires public hearings. Based on our interviews with representatives of the respective land use control agencies, it is our opinion that there is less-than-average probability that subject resort development would not be permitted. The impact of negative public response would conceivably be to lengthen the time period before approval is granted.

However, if sensitive and detailed plans are submitted (a time-consuming preparation process), addressing the foreseen concerns, there is little reason approvals could not be achieved within the time frames projected by the regulatory agencies.

It is noted that a comprehensive Environmental Impact Statement may be required, a compilation that may take a minimum of four to six months.

The three significant community concerns, listed above, would be anticipated as being addressed as follows:

#### Ecosystem Maintenance

For the most part, this concern is already substantially mitigated by the conservation zone that has been established near the shoreline; forbidding major improvements in this defined area. The ability of the Waikoloa Beach and Mauna Lani resorts to achieve acceptance under more fragile site conditions is seen as an extremely positive factor in potential reaction to subject development. There is the potential that the developers may enlarge the defined area, beyond the

existing boundaries, to further placate concerned individuals, and expedite the approval process. It has been our experience that this concern (as that following) typically becomes problematic only when a lack of sensitivity is demonstrated by the developers.

#### Historical Preservation

This factor has the potential to create the most severe public reaction due to the significance attached to the subject property. However, as discussed in a previous section of this report, the ability of capital investment from resort use to preserve and refurbish archaeological sites is acknowledged by developers, planners and activists alike; by providing needed funding where none else exists. The concern of the activists is to insure the integrity and non-desecration of important sites, something that cannot be accomplished through mere isolation as has been the case of the near-past. All parties realize that the expanding use of the site by an increasing Kona population serves only to contribute to the demolition of the artifacts; for this reason, if the proper individuals are consulted and careful planning undertaken, this concern would be anticipated to be neutralized at worst, supportive of development, at best. Additionally, as discussed in the section regarding adaptability of the subject property for resort use, it is in the best interest of a developer from a thematic and attraction standpoint to enhance the historical sites and significance of the project.

#### Beach Access

Currently unrestricted, this concern would undoubtedly be the source of the most vehement opposition to subject development. The reason for this is three-fold: resort operations in the sector (notably Mauna Kea Beach and Kona Village Resorts) have severely restricted access to choice beaches in past years, despite government intents; planned expansion at Mauna Kea and Mauna Lani will further crowd available beaches and limit access; and, the current users of the subject shoreline would object to any change in the existing status quo. However, it can be reliably anticipated that many Kona residents would welcome development of the site if open beachfront access is insured; as the subject strand is one of the few white-sand beaches with close proximity to the urban Kailua-Kona area.



Development would also give easier access to the shoreline (currently a difficult four-wheel drive from the natural energy lab access road or Queen Kaahumanu Highway), and would be considered favorable by many local residents who now refrain from using the area due to the prevalent isolation and lack of facilities. The protests which would be forwarded by the current-users to maintain the property in its existing state, mainly for surfing and fishing use, would not likely be viewed as significant by County planners. If adequate design measures are undertaken, perhaps including a public beach park (as was developed within the Waikoloa Beach Resort), it is our opinion that the beach access issue can be readily resolved.

Summary

Although vocal opposition would undoubtedly arise upon proposal for development of the subject property, such is typical of all major coastal improvement in West Hawaii. Owing to the fact that the demand for resort properties is increasing in the area, we see no community reaction concerns which could not be adequately resolved during the development time frame projected, as long as sensitive and publicly open planning is undertaken.

A-113

**CORRELATION**

Based on our Market Study of the effective economic market sectors which demonstrates a primary demand for resort-type land uses, and our Highest and Best Use Analysis which illustrates the adaptability of the subject property for such use, it is our opinion that the highest and best use of the site is in integrated intermediate-size resort development.

Our conclusions can be summarized as follows:

**Land Use**

The table below displays the probable use intensities which would be anticipated for the proposed development on the subject property.

<u>Use</u>	<u>No. of Units</u>	<u>Acreage</u>	<u>Location</u>
Hotel	700 rooms	35	Oceanfront (20 rooms per acre)
Condominium	800 units	80	Near-shoreline and golf course frontage (10 units per acre)
Single Family and Support Housing	Variable	38	Mauka and golf course frontage (three lots per acre)
Commercial	20,000 to 35,000+ sq. ft. gross leasable area	5	Interior of resort, on main access (one complex)
Golf Course	18 holes	170	Interior of site
Open/Reserve	---	85	Shoreline, ponds, archeological sites, other
Marina Basin	---	10	Oceanfront area
Roadways	---	<u>47</u>	Throughout
	<b>Total acres</b>	<b>470</b>	

NOTE: Assumes tennis facilities will be developed within individual hotel and condominium projects. If separate garden constructed (as desirable), approximately three to five acres would be deducted from single-family residential allotments.

**Absorption**

Assuming two hotels are constructed on the property, and that the first along with the first condominium project are constructed by the developer (as is typical), or by an outside party secured during the planning/approval process, absorption of the resort improvements from the date of market offering is anticipated as follows:

Use	No. of Units	Absorption Period in Years	Comments
Hotel	700	6-8	Achievement of stabilized occupancy in two hotels at circa 75-80 percent. Construction of first operation to take 24 months from granting of approvals. Second hotel to be constructed after first has been operated for one year, or 36-months from approvals.
Condominium	800	14-16	Sales period based on 50 to 55-unit sales per year. Sales not anticipated to begin until completion of first hotel facility.
Commercial	20,000-35,000 Sq. Ft. Gross Leasable Area	3	Available for tenant occupancy one year following completion of the first hotel. (12 months construction period)
Single Family Residential	Variable	10-15	Based on seven to ten lot sales per year. Sales not anticipated to begin until after first 100 condominium units sold, or circa 48 months from approvals.

**Timing**

Our estimates and those provided by Helber, Hastert, Van Horn & Kimura, regarding the timeliness of achieving necessary governmental approvals and lapse before availability of public utilities are displayed following. Where ranges are indicated, the mid-point is shown. All time frames are beginning from date of this report, or from the submission of plans for orderly approval.

Item	Action Required	Anticipated Length in Months	Comments
<b>A. Development</b>			
Site Planning	None	36	Developer initiated. Six months minimum required prior to submission for first governmental approvals; considered computed by report date.
Financing	None	--	Commensurate with planning.
Construction	None	18-36	On-site infrastructure and off-site connection improvements; includes marina.
<b>B. Land Use Designations</b>			
State Land Use	Approval	9-36	For change from conservation to urban classification.
General Plan	Approval	18-24	For change from open/conservation to resort designations.
County Zoning	Approval	6-18	For change from "Open" to resort-type classifications.
SMA	Approval	6-18	Commensurate with zoning approvals.
<b>C. Infrastructure*</b>			
Water Supply	Development	36-48	Dependent upon County source development.
Waste Water	Development	60-96	Dependent upon State/County facility development.
Electricity	None	--	Readily available.
Access	None	--	Assumed to be readily available by commencement of land use change process.

\*Based on public supply. Private supply could be undertaken during "construction" time frame; however, it would be substantially more costly.

A-114

## ADDENDA

KALDRO LIGHT INDUSTRIAL SUBDIVISION - PHASE I  
SALES PRICES

Lot No.	Gross Acreage	Price/sq ft	Sales Price
1	59,514	7.73	460,000
2	59,796	7.11	425,000
3	43,593	7.43	324,000
4	43,593	7.32	319,000
5	43,593	7.62	332,000
6	43,593	7.59	331,000
7	43,593	7.43	324,000
8	43,593	7.62	332,000
9	43,593	7.34	320,000
10	43,730	7.45	326,000
11	43,562	7.51	327,000
12	43,562	7.51	327,000
13	43,562	7.60	331,000
14	43,562	7.64	333,000
15	43,562	7.62	332,000
16	43,562	7.35	320,000
17	49,601	6.31	313,000
18	43,563	6.52	284,000
19	43,560	6.40	279,000
20	43,564	6.70	292,000

Kaloke Light Industrial Subdivision - Phase I  
Sales Prices

Lot No.	Gross Acreage	Price/sq ft	Sales Price
21	43,566	6.84	298,000
22	43,588	6.45	282,000
23	43,596	6.10	266,000
24	43,561	5.99	261,000
25	43,561	6.31	275,000
26	43,572	6.08	265,000
27	43,599	6.40	279,000
28	43,576	5.92	258,000
29	43,573	6.17	269,000
30	43,583	6.01	262,000
31	43,575	6.52	284,000
32	44,195	6.31	279,000
33	43,632	6.12	267,000
34	44,691	6.44	288,000
35	43,558	6.31	275,000
36	43,562	6.40	279,000
37	43,562	6.43	280,000
38	43,559	6.29	274,000
39	43,562	6.29	274,000
40	43,561	6.50	283,000

Kaloke Light Industrial Subdivision - Phase I  
Sales Prices

Lot No.	Gross Acreage	Price/sq ft	Sales Price
41	43,563	6.24	272,000
42	43,563	6.27	273,000
43	43,563	5.85	255,000
44	43,755	6.47	285,000
45	43,575	6.04	263,000
46	43,561	6.22	271,000
47	43,561	6.22	271,000
48	43,561	6.40	279,000
49	43,561	6.15	263,000
50	43,564	6.63	289,000
51	43,564	6.01	262,000
52	43,564	6.36	277,000
53	43,564	6.36	277,000
54	43,564	6.13	267,000
55	43,574	6.17	269,000

A-116

EXHIBIT II

SUMMARY OF MASTER GROUND LEASE  
FOR 4.083 ACRES AT HONOKOHAU HARBOR

Project: Gentry's Kona Marina  
Land Area: 4.083 Acres

Lease Number H-82-4  
Dated: April 8, 1983  
Lessor State of Hawaii, Department of Transportation  
Lessee Gentry-Pacific, Ltd.  
Lease Type Commercial-Industrial  
Lease Description "...being a portion of Government Land of Kealakehe, also a portion of submerged land of Honokohau Boat Harbor situated at Kealakehe, North Kona.  
  
"Beginning at the N.W. corner of the Reapir Yard on the NW side of access road referred to "Hawaii Plane Coordinate Grid System Zone I.  
  
"Containing an area of 177,860 square feet, or 4.083 acres."  
  
Note: Said land does not have access to a public highway.

Lease Term 35 Years  
Use Marine or marine-related activities which shall include the following:  
  
Sales: 1. Marine hardware and supplies  
2. Marine paint and other finish materials  
  
Services: 1. The construction, operation and maintenance of a boat hull-out facility for boat repair and storage.  
2. Repair facility  
3. Marine workshop  
4. Rigging and swaying for vessels  
5. Administrative office  
6. Submerged land for berthing for service and repair and adjacent land area for work dock.  
  
Lessor intends to authorize by separate lease, restaurant operation.

Summary of Master Ground Lease  
For 4.083 Acres at Honokohau Harbor

EXHIBIT II  
Page 2

Additional Uses: Sales: 1. New sale and brokerage of boats  
2. Charts, maps, nautical publication  
3. Navigation instruments & supplies  
4. Marine electrical & electronic gear/radios  
5. Fishing tackle, lures, ice, fresh bait  
6. Engine supplies  
  
Services: 1. Sail making, canvas goods/repairs  
2. Repair/maintenance of electronic equipment and electrical  
3. Marine survey  
4. Construction, operation/maintenance of vessels and marine equipment facilities  
5. Scuba/skindiving services associated with repair and salvage  
6. Repair/maintenance instruments/navigation  
7. Marine upholstery/interior finishes  
8. Boat repair facilities  
9. Cold storage/ice house  
10. Vending machines  
11. Other approved in writing.

Annual Rents First Five Years \$25,000 per Annum for the initial development minimum two acres (Exhibit B) paid quarterly by January 1, 1984 (April, July, October)

Incremental development during the initial five years permitted upon approval with rental increased at the rate of 27.2 cents per square foot per annum waived for the first year.

The next six ensuing five-year periods 100 percent of fair market rental determined by appraiser appointed by lessor. Lessee may appoint a second appraiser. Thereafter a third appraiser arbitration.

Utilities, Availability:

A water supply, eight-inch waterline is available at the harbor, along the boundary of Kealakehe Parkway. No sewer available. The Lessee shall be responsible for providing utility services at the site.

A-117

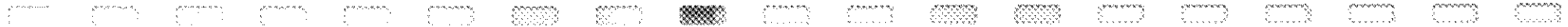
Lessor has awarded the contract for installation of overhead electric and telephone lines from Queen Kaahumanu Highway along Kealakehe Parkway, terminating at boat harbor. Lessee may request connection to the feeder line through utility company.

SUMMARY OF MASTER GROUND LEASE  
FOR 10,000 SQUARE FEET AT HONOKOHAU HARBOR

Project: Proposed Fuel Dock Facility  
Land Area: 10,000 Square Feet

Lease Number	H-83-2
Dated:	November 10, 1983, pending building permit
Lessor	State of Hawaii, Department of Transportation
Lessee	Jack T. Hall
Lease Term	35 Years
Annual Rent	\$4,000 per annum, or five percent of annual gross receipts, whichever is greater. Rents waived first year. Paid quarterly beginning January 1 (April, July, October).
Use	Sell, advertise for sale, contract for sale all types of fuel oil and lubricants normally used by small boats and service and goods normally conducted by fueling facility. Also allowed to sell soft drinks, liquor, fishing tackle and boat equipment.
Restricted Usage	No restaurant or take out foods, boat brokerage, construction, repair or overhaul.

A-118



# AVERAGE STAY ANALYSIS

State of Hawaii

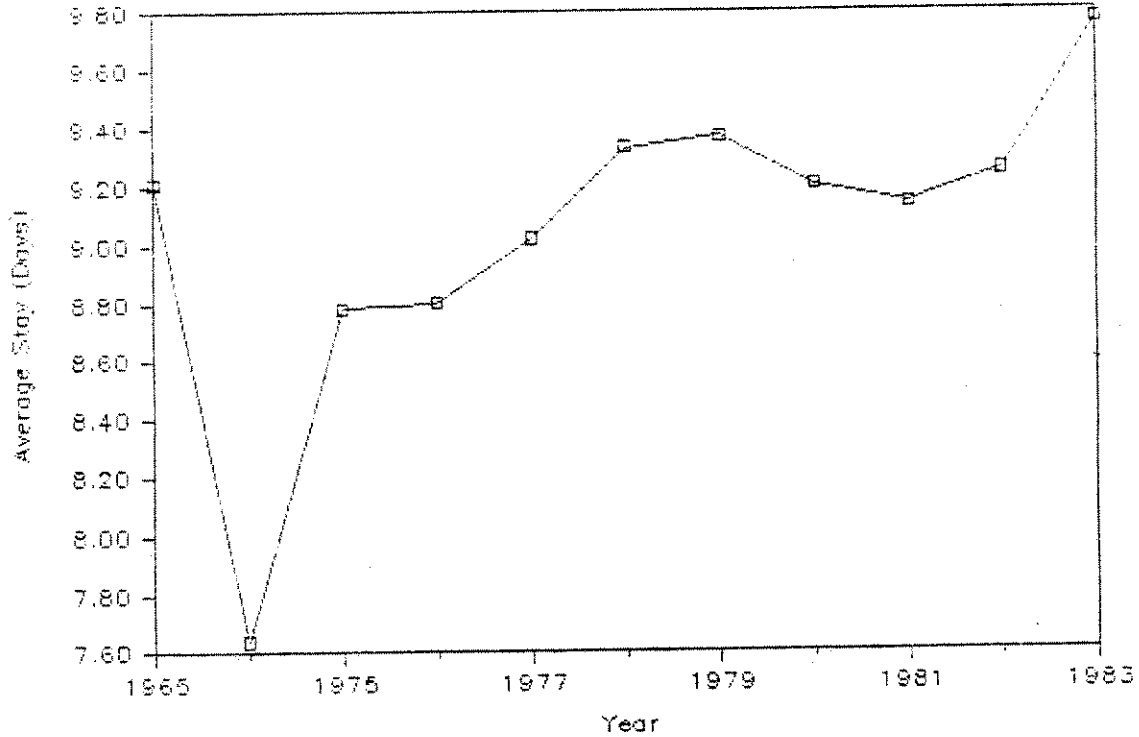


EXHIBIT III

# ROOM RATE ANALYSIS

State of Hawaii

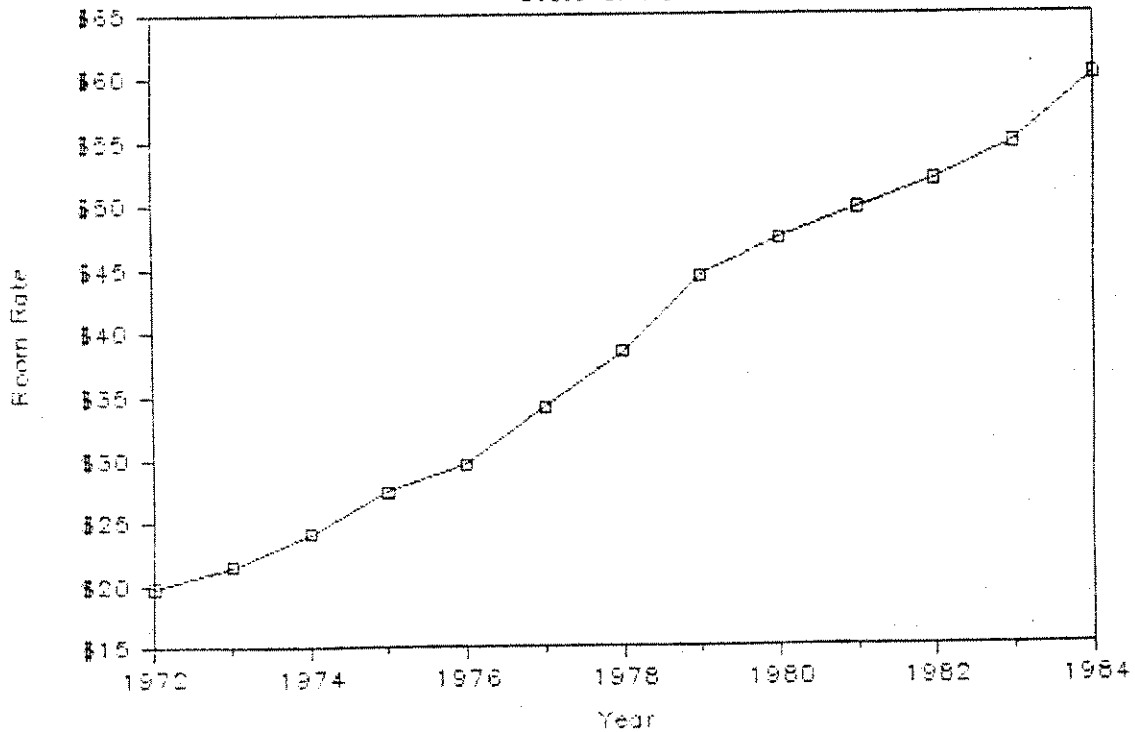


EXHIBIT III  
Page 2

# OCCUPANCY ANALYSIS

State of Hawaii

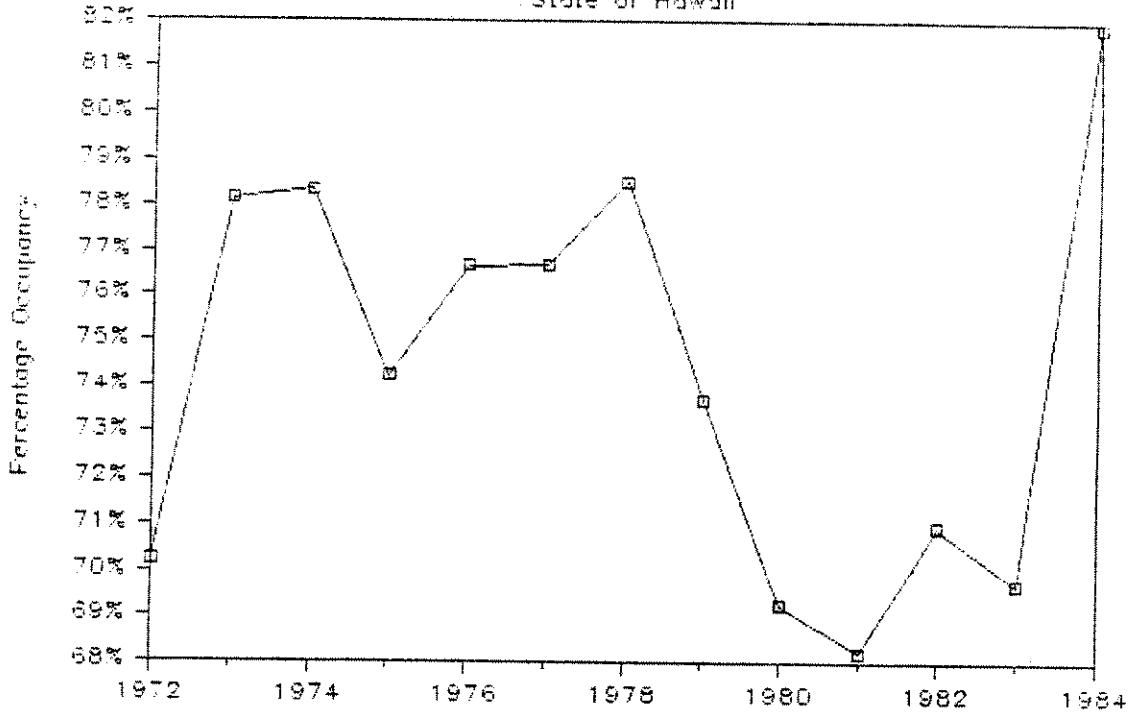


EXHIBIT III  
Page 3

# FOOD SALES ANALYSIS

State of Hawaii

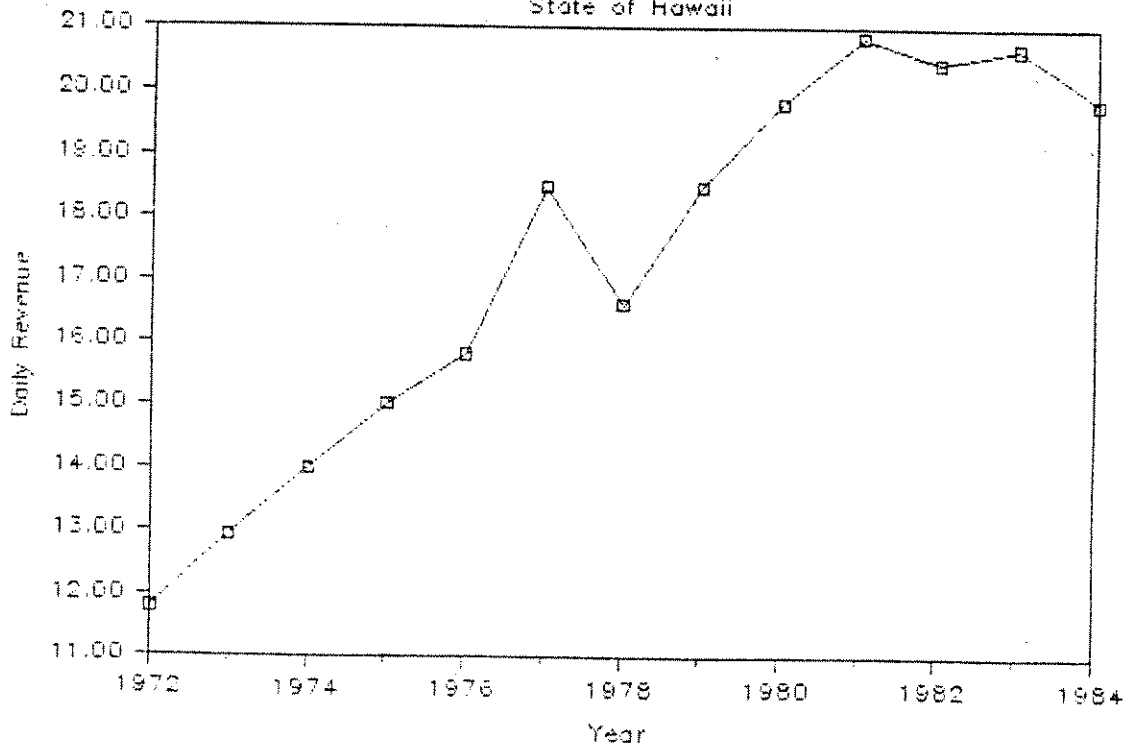


EXHIBIT III  
Page 4



# BEVERAGE REVENUE ANALYSIS

State of Hawaii

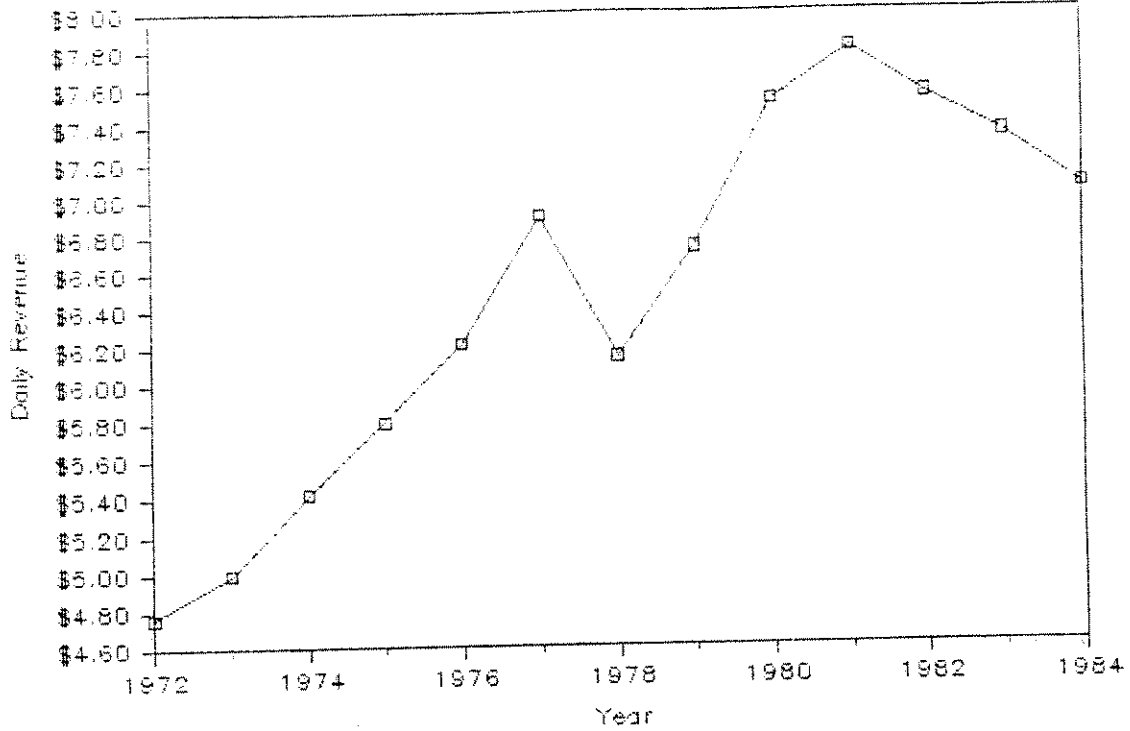


EXHIBIT III  
Page 5

# FOOD & BEVERAGE SALES

State of Hawaii

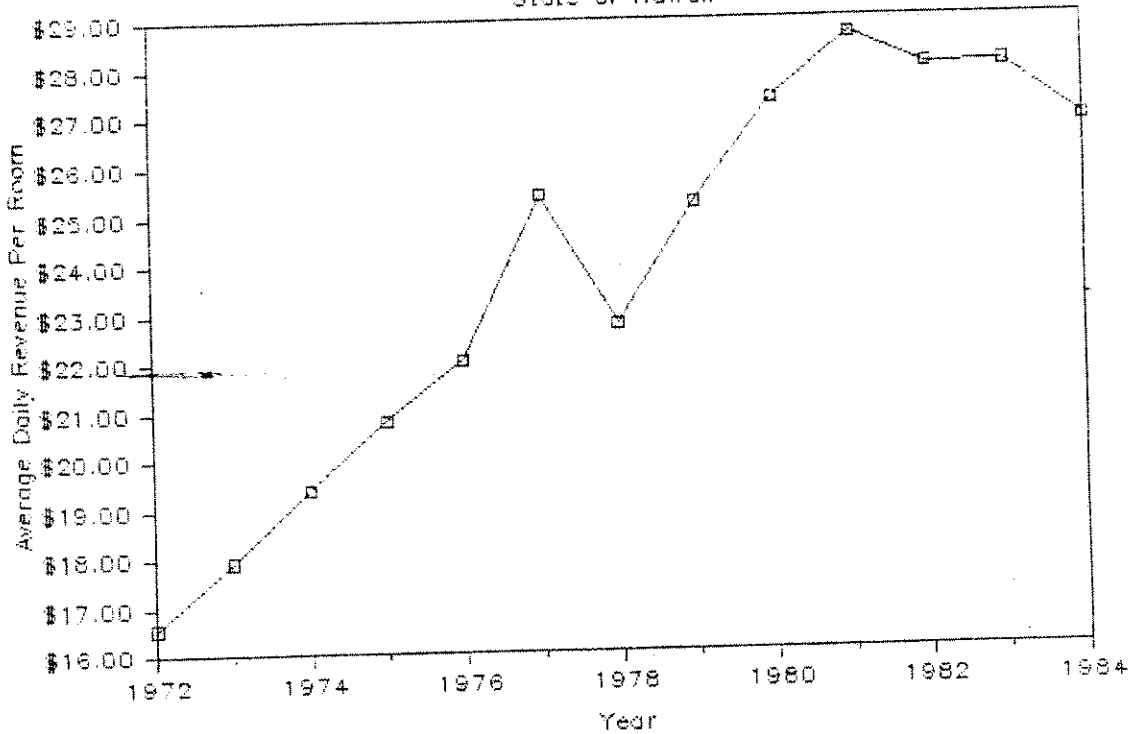


EXHIBIT III  
Page 6

### ROOM INVENTORY ANALYSIS

County of Hawaii

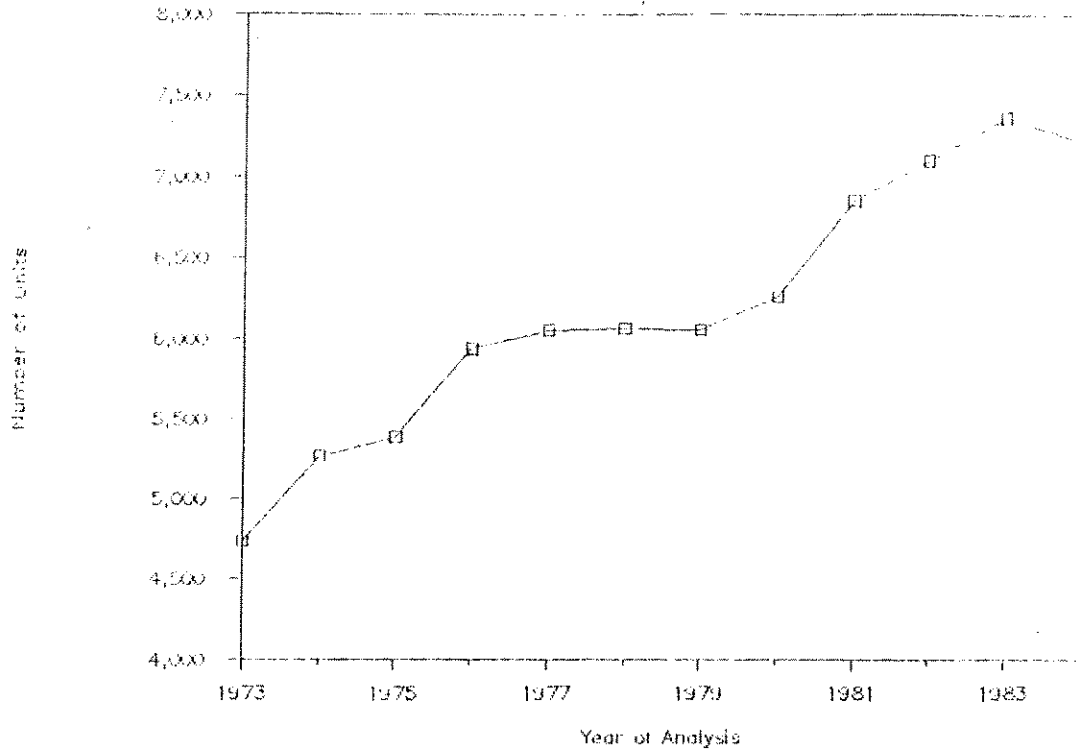


EXHIBIT IV

### ROOM RATE ANALYSIS

County of Hawaii

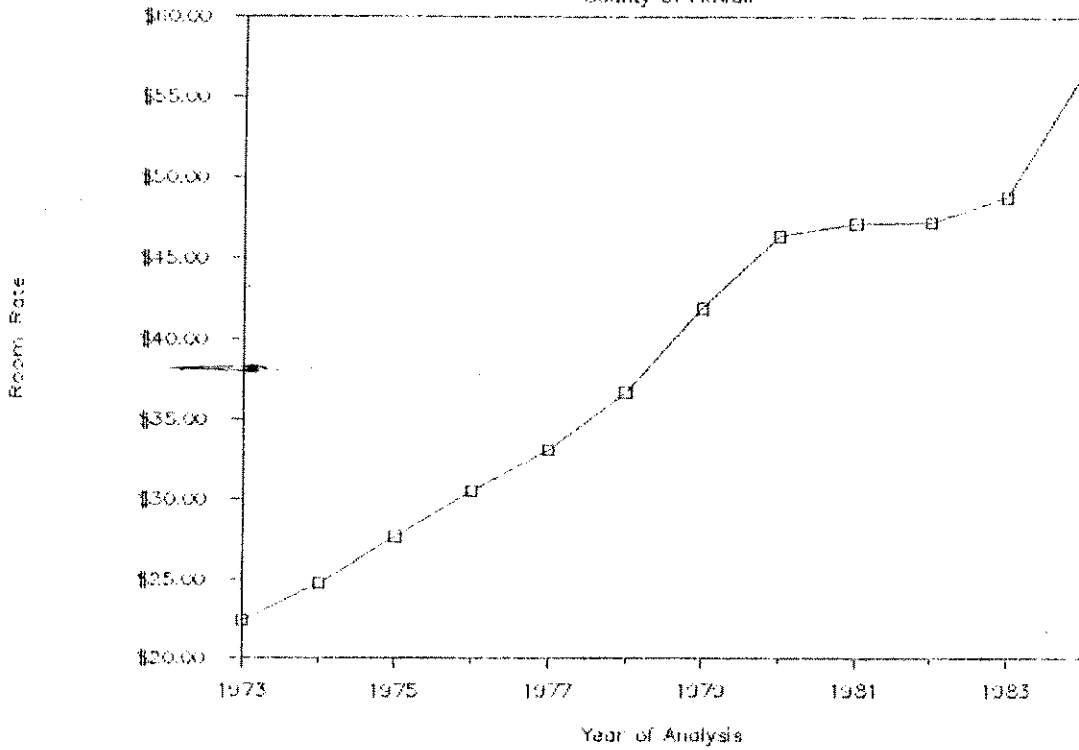


EXHIBIT IV  
Page 2

### OCCUPANCY ANALYSIS

County of Hawaii

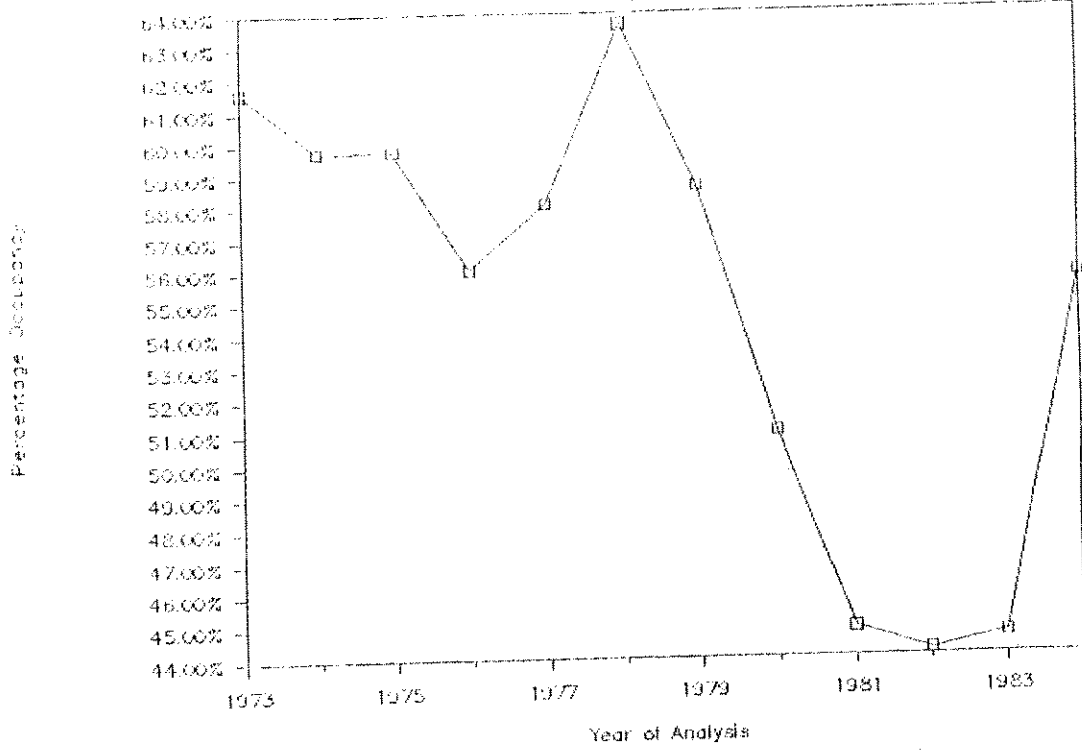


EXHIBIT IV  
Page 3

### FOOD SALES ANALYSIS

County of Hawaii

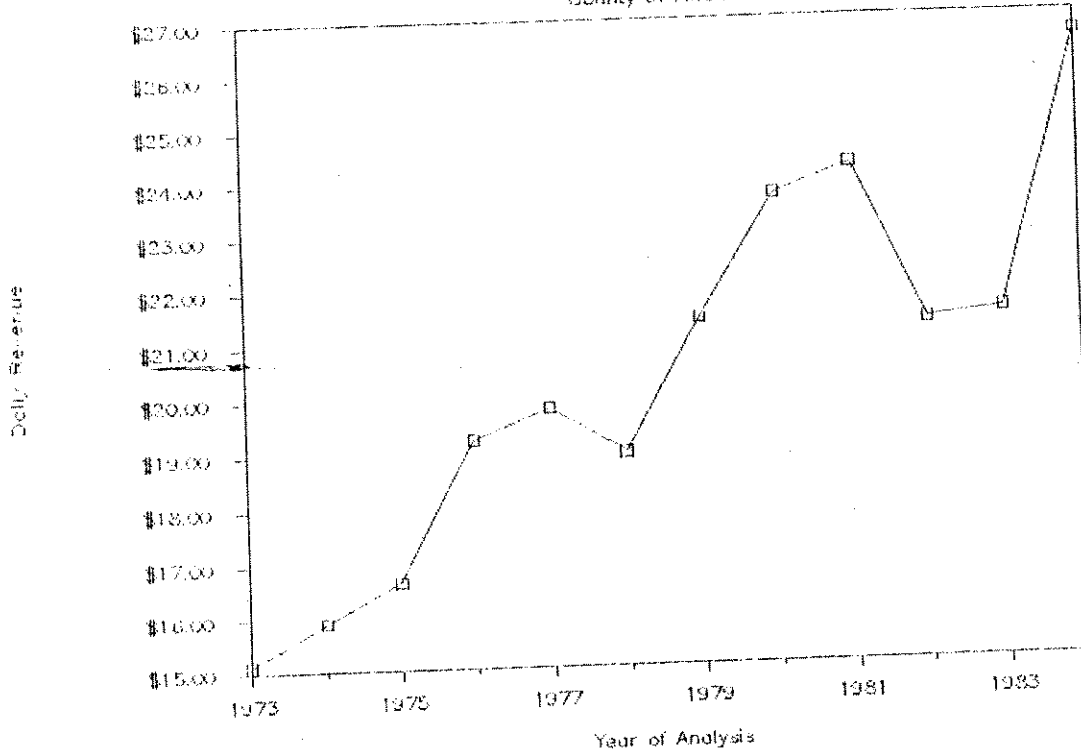
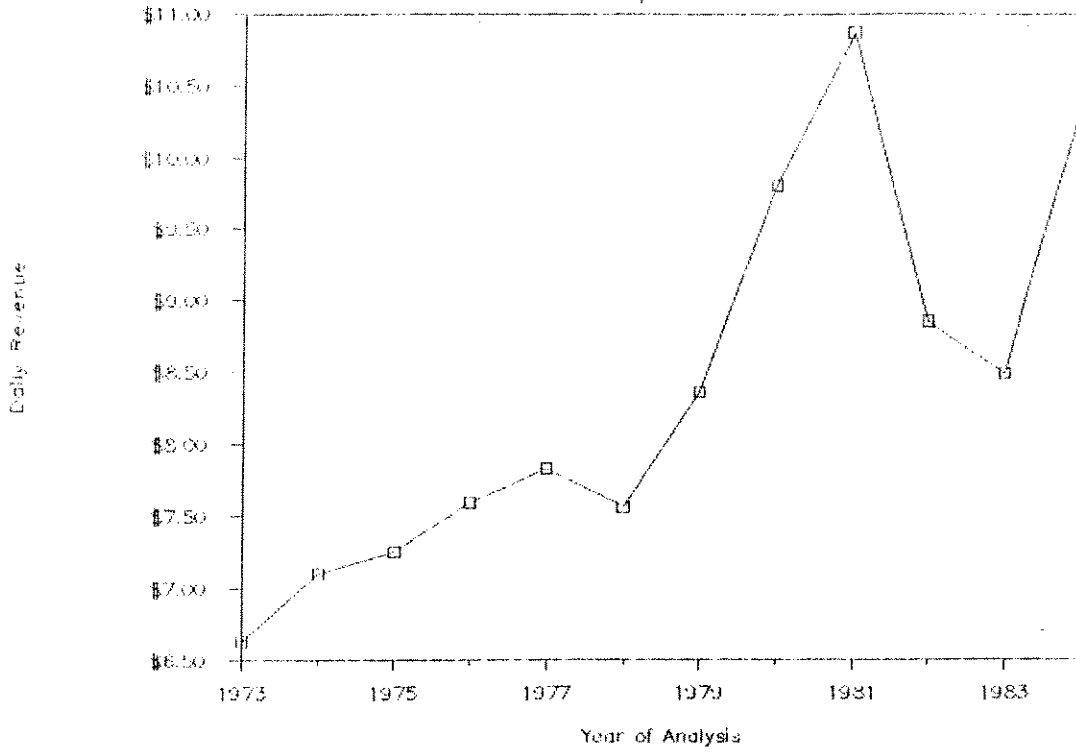


EXHIBIT IV  
Page 4

# BEVERAGE REVENUE ANALYSIS

County of Hawaii



**B. FULL ARCHAEOLOGICAL RECONNAISSANCE SURVEY**

PAUL H. ROSENDAHL, Ph.D., Inc.  
*Consulting Archaeologist*

Report 216-040286

PAUL H. ROSENDAHL, Ph.D., Inc.  
*Consulting Archaeologist*

Report 216-040286

**FULL ARCHAEOLOGICAL RECONNAISSANCE SURVEY  
KOHANA-IKI DEVELOPMENT PROJECT AREA**

**Land of Kohana-Iki  
North Kona, Island of Hawaii**

**FULL ARCHAEOLOGICAL RECONNAISSANCE SURVEY  
KOHANA-IKI DEVELOPMENT PROJECT AREA**

**Land of Kohana-Iki  
North Kona, Island of Hawaii  
(TKK:3-7-3-09:3,14)**

B-1

by

**Theresa K. Donham, M.A.  
Supervisory Archaeologist**

Prepared for

**Helber, Hasterf, Van Horn & Kimura  
2222 Kalakaua Avenue, Suite 1507  
Honolulu, Hawaii 96815**

May 1986

May 1986

SUMMARY

An archaeological reconnaissance survey of the Kohana-Iki Development project area was conducted by Paul H. Rosendahl, Ph.D., Inc., during the period March 7-22, 1986, under agreement with the planning firm of Helber, Hastert, Van Horn and Kimura. Fourteen previously recorded archaeological sites were relocated and 91 additional sites were newly identified within the 470 acres project area, which is located at the seaward end of the Land of Kohana-Iki, District of North Kona, Hawaii (TMK 3-7-7-09:3,14). Coastal and rocklands environmental zones are present within the surveyed area, in addition to a zone of approximately 80 anchialine ponds. All permanent habitation sites and the majority of all other sites identified were located within the coastal zone of the project area. Recommendations for further work at specific sites are based on evaluations of site significance for research, interpretive, and/or cultural values. Further work is recommended for 54 sites. This work includes detailed recording at 21 sites, recording and surface collection at seven sites, and recording with surface collection and/or test excavation at 26 sites.

CONTENTS

	Page
INTRODUCTION.....	1
Background.....	1
Scope of Work.....	1
Project Area Description.....	3
Previous Archaeological Work.....	7
Summary of Preliminary Historical Documentary Research.....	8
Field Methods and Procedures.....	10
FINDINGS.....	16
Site Descriptions - Newly Identified Sites.....	16
Site Descriptions - Previously Identified Sites.....	70
CONCLUSION.....	90
Discussion.....	90
Preliminary Evaluations and Recommendations.....	95
REFERENCES CITED.....	104
APPENDIX A. Preliminary Historical Documentary Research (By Carol L. Silva).....	120
Kekaha - Traditional Perspectives.....	120
Kekaha - Historical Briefs.....	121
Kohana-Iki - Mythological Traditions.....	122
Kohana-Iki - Historical Accounts.....	124
Kohana-Iki - Specific Land History of TMK:3-7-3-09:3.....	125
Cartography.....	127
References Cited.....	128

LIST OF ILLUSTRATIONS

Figure		Page
1	Project Location Map.....	2
2	Aerial View of Anchialine Ponds and Mangrove Thicket.....	6
3	Hydration Rind Dates From Kohana-Iki Sites.....	9
4	Map Showing High and Medium Intensity Reconnaissance Zones.....	12
5	Site Location Map.....	at end
6	Mamalaho Trail at Access Road Right-of-Way.....	19
7	Examples of Cairn Forms in Project Area.....	21
8	Site T-111, Plan View.....	24
9	Site T-115 and T-119, Plan Views.....	27
10	Site T-117 Petroglyph.....	29
11	Site T-122, Plan View.....	32
12	Site T-124, Plan View of Feature A.....	34
13	Site T-127, Feature A.....	37
14	Site T-129, Plan View.....	38
15	Site T-130, Feature B.....	40
16	Site T-134 and T-138, Plan Views.....	42
17	Site T-157, Elevation View.....	51
18	Site T-166, Plan View.....	54
19	Site T-173, Plan View.....	57
20	Site T-176, Plan View.....	60
21	Site T-184.....	65
22	Site T-190, View of Feature A.....	69
23	Site D14-2 and D14-4, Plan View.....	71
24	Site D14-3, Plan View.....	73
25	Site D14-3, <u>Papamu</u> Board Petroglyph.....	75
26	Site D14-12, Plan View.....	86
27	Site 1902, Plan View of Features.....	88
28	Site 1908, South Wall.....	89
29	Kohana-Iki Development Project Area Showing Anchialine Ponds and Large Cairns.....	91

LIST OF TABLES

Table		Page
1	Aerial Survey Sites and Assigned Temporary Site Numbers.....	11
2	Frequency of Recorded Features by Formal Type.....	17
3	Summary of Newly Identified Sites and Features Kohana-Iki Development Project Area.....	106
4	Summary of Previously Identified Sites and Features Kohana-Iki Development Project Area.....	116
5	Locational Data for Large Cairns in Alignment.....	92
6	Summary of Site-Specific Recommendations for Further Archaeological Work - Major Tasks.....	101

INTRODUCTIONBACKGROUND

An archaeological reconnaissance survey of the Kohana-Iki Development project area was conducted by Paul H. Rosendahl, Ph.D., Inc. (PHRI) under agreement with Helber, Hastert, Van Horn & Kimura. A full-scale reconnaissance was conducted, in compliance with the requirements of a Special Management Area permit application and Environmental Impact Statement, as requested by the Hawaii County Planning Department. The 470 acre area surveyed consists of two adjacent parcels at the seaward end of the Land of Kohana-Iki, North Kona, Island of Hawaii (Figure 1). Field investigations were conducted February 25 and March 7-22, 1986 by a crew of three to four persons, under the direction of Dr. Paul H. Rosendahl, Principal Investigator and Theresa K. Donham, Supervisory Archaeologist and Project Director.

Fourteen previously recorded archaeological sites were relocated and 91 additional sites were newly identified within the project area during reconnaissance. A descriptive account and preliminary assessment of these resources is presented in this report.

SCOPE OF WORK

The purpose of an archaeological reconnaissance survey is to identify and locate sites or features of archaeological or historical significance. A reconnaissance survey is simply a pedestrian, or walk-through, survey designed to determine the presence or absence of archaeological resources within a specified project area. Reconnaissance survey determines both the general nature and variety of archaeological resources and the general distribution and density of such remains. A reconnaissance survey permits a preliminary evaluation of archaeological resources and facilitates formulation of realistic recommendations for any additional work. Such further work could include intensive survey-- detailed recording of sites and features, with selected test excavations; and possibly subsequent mitigation--salvage research excavation, interpretive planning, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

The primary objective of the full reconnaissance survey of the Kohana-Iki Development project area was to identify and evaluate the entire range of archaeological resources present within the area. This objective required the location of as many sites as possible and the identification of potentially significant deposits and features within the various sites. Based on the findings of the earlier September 1985 preliminary survey (Rosendahl 1985) and subsequent discussion of those findings with Ms. Virginia Goldstein, staff planner and historic sites specialist in the Hawaii County Planning Department, the following specific tasks were determined to constitute an adequate scope of work for the full reconnaissance survey:



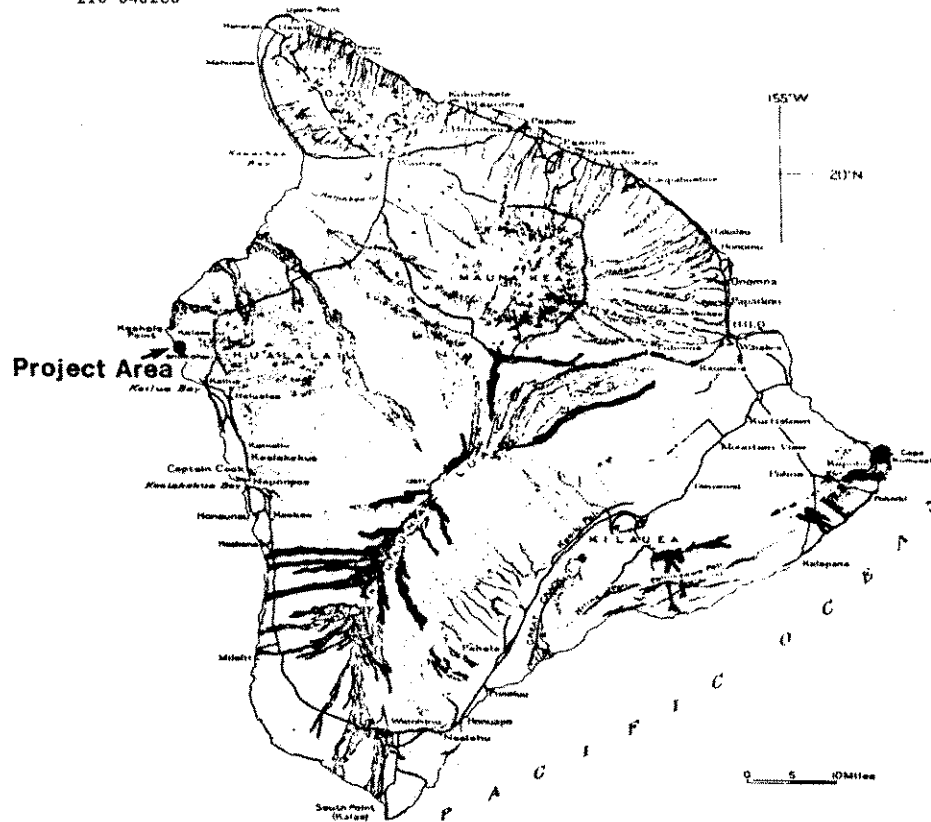


Figure 1. PROJECT LOCATION MAP

Full Archaeological Reconnaissance Survey  
Kohana-Iki Development Project Area  
Land of Kohana-Iki, North Kona  
Island of Hawaii (TMK:3-7-3-09:3,14)

PHRI Project 86-216

May 1986

(Map taken from Macdonald and Abbott 1970:288.)

1. Conduct a 100% coverage aerial reconnaissance (helicopter) of the entire 470 acre project area, with special emphasis upon (a) following out foot trails and plotting them on available maps and/or aerial photographs, (b) identifying sites observable from the air and locating them for subsequent pedestrian survey, and (c) identifying areas which appear to be devoid of sites;
2. Conduct high intensity ground reconnaissance of the immediate coastal zone (extending approximately 1000 ft inland) with 30 foot intervals between field personnel;
3. Conduct high intensity (30 ft interval) ground reconnaissance of a 150 ft wide corridor along the seaward side of Mamalahoa Trail;
4. Conduct high intensity (30 ft interval) ground reconnaissance of the area of smooth, open pahoehoe with abundant caves and shallow sinkholes in the southern portion of the project area;
5. Conduct medium intensity (90 ft interval) ground reconnaissance of the remaining portions of the project area;
6. Conduct preliminary historical documentary research, with an emphasis on readily available literature and documentary sources; and
7. Analyze data and prepare an appropriate report.

It was also agreed that the reconnaissance survey would be carried out in accordance with the standards for reconnaissance level survey recommended by the Society for Hawaiian Archaeology (SHA). These standards are currently being used by the Hawaii County Planning Department as guidelines for the review and evaluation of archaeological reconnaissance reports submitted in conjunction with various development permit applications.

#### PROJECT AREA DESCRIPTION

The major portion (98%) of the project area is a single land parcel (TMK:3-7-3-09:3) which comprises the entire coastal zone of the Land of Kohana-Iki, North Kona, Hawaii. This 362 acre parcel is bounded on the north by the Land of Ooma 2, on the east by the Mamalahoa Trail, on the south by the Land of Kaloko, and on the west by the Pacific Ocean. Three of the four sides of this parcel were clearly defined in the field; approximately 1.3 miles of shoreline forms the western boundary, 0.9 mi. of an old access road forms the northern boundary, and a 0.89 mi. long section of the Mamalahoa Trail forms the east boundary. The 0.59 mi. long southern boundary was marked by widely spaced surveyors cairns and could only be approximated using compass bearings.

The second parcel (TMK:3-7-3-09:14) is a 280 ft wide, 1360 ft long access corridor which connects the major parcel with Queen Kaahumanu Highway. This eight acre corridor was marked in the field by widely spaced surveyors stakes; it is oriented east to west at approximately 270 degrees Az.

The Land of Kohana-Iki is situated on the lower southwestern slope of Hualalai Volcano, in the west-central portion of the District of North Kona. The 1.3 mile long shoreline is the widest portion of the land division, which has an average width of 0.5 miles. The narrowest portion of the land division (0.2 mi) is at the eastern (inland) end, 4.5 miles from the coast. The Kohana-Iki Development project area includes c. 30% of the total area of the land division.

Elevation within the project area varies from sea level to 80 ft at the northeast corner of the project area. Over 50% of the land surface within the project area is below 25 ft AMSL (above mean sea level) and a very small percentage (less than 5%) is above 60 ft AMSL. The terrain is generally barren lava rocklands, with areas of smooth, open pahoehoe and rough aa. These rocklands were formed by post-Pleistocene lava flows of the prehistoric member of the Hualalai Volcanic Series (Stearns and Macdonald 1946:Plate 1).

Aa flow covers less than 10% of the project area land surface and is most concentrated in the east-central portion, where two major zones occur. The northern aa zone consists of a series of patches along the north and south sides of a pahoehoe flow. The westernmost patch in this series is 365 m from the coast. The southern aa zone is a broad (370 m), continuous flow which ends 550 m from the coast. Pahoehoe lava covers the remainder of the inland surface, as well as the immediate shorelines of Waihiwa and Puhili points. The lavas present in the project area are nearly all alkaline olivine basalt, with a few possible exceptions of gradational hawaiiite (Macdonald, Abbott, and Peterson 1983:364).

Soils in the project area include coral beach sand and Punaluu extremely rocky peat. Coral sand occurs along the shoreline in a narrow band which averages c. 120 m wide. Punaluu extremely rocky peat occurs in the basin-like southeast corner of the project area, where relatively unbroken and level pahoehoe has permitted the accumulation of a matted root peat (Sato et al. 1973:48). This organic matrix occurs primarily in low, level areas and in wide crevices, and occupies less than 40% of the surface area. This soil zone supports a relatively dense *kiawe*-fountain grass community that is nearly impenetrable in places.

Local climatic patterns are affected by the blockage of moisture-laden northeast trade winds by the mountains, which results in extremely dry conditions. Average annual rainfall ranges between 10 and 20 inches, with slightly lower averages along the coastal zone (Armstrong 1973:57). Mean temperatures range from 70 to 76 degrees F. (Hawaii Department of Land and Natural Resources 1970:81).

Two general environmental zones are distinguishable within the project area, the coastal and rockland zones. The coastal zone has an average width of 305 m (1000 ft) from the shoreline and a relatively low eleva-

tion, which rarely exceeds 15 ft AMSL. Characteristic vegetation along the beach includes a variable strand cover of tree heliotrope (*Messerschmidia argentea* [L.f.] Johnston), *naupaka-kahakai* (*Scaevola sericea* Vahl), and *popoehue* (*Ipomoea pes-caprae* [L.]), with occasional coconut palms (*Coccos nucifera* L.). The immediate coastal zone just inland of the beach has discontinuous dense stands of *kiawe* and *miio* (*Thespesia populnea* L.), as well as a large thicket of exotic mangrove (*Rhizophora mangle* L.). This mature thicket currently covers an area of c. 6000 sq m within the zone of anchialine ponds, and is apparently threatening the natural environment of the ponds (Maciolek and Brock 1974:16).

Vegetation covering the rockland zone within the project area includes various introduced grasses, primarily fountain grass (*Pennisetum setaceum* [Forak.] Chiov.), with scattered specimens and small stands of introduced trees and shrubs, including *kiawe* (*Protonia pallida* [Humb. and Bonpl. ex Willd.] HBK.), *koa-hale* (*Leucaena leucocephala* [Lam.] de Wit), Christmas-berry (*Schinus terebinthifolius* Raddi), and *lantana* (*Lantana camara* L.), and the native shrub, *'iiima* (*Sida fallax* Walp.).

The numerous shallow anchialine ponds present in the north and central portions of the immediate coastal zone are striking features of the local environmental setting. These ponds were mapped and studied by Maciolek and Brock (1974), who located 80 anchialine ponds within the project area and conducted detailed studies at 31 ponds. The ponds are concentrated primarily within a zone 1280 m long and 122 m wide, located between Puhili and Waihiwa Points (Figure 2). This area is below 10 ft AMSL, and all ponds extend to sea level or below. Salinity values of these pond waters ranged from 9 to 14 parts per thousand at the time of analysis, which is well above the standard definitions of potable water (1 to 4 parts per thousand; Maciolek and Brock 1974:7,36). The salinity of these ponds does, however, vary with the proportion of freshwater entering them and it is possible that certain ponds or springs may contain potable water during periods of increased rainfall.

Vegetation associated with the anchialine pond zone include those tree species found in the coastal zone (listed above), as well as vines and succulents such as *akulikuli* and *akulikuli-kai*. Plant species found in pond waters are primarily crustacean algae and vascular plants, principally *Ruppia maritima* (Maciolek and Brock 1974:10,15). Faunal communities present in pond waters are dominated by mollusk and crustacean species. Mollusks were observed in 24 of the 31 ponds examined by Maciolek and Brock; species present include *Assiminea* sp., *Melania* sp., *Theodoxus cariosa*, and Isopoda. Crustaceans were observed in 19 ponds and include six species of shrimp. The most common species are *Halocaridina rubra* (*opaeula*) and *Palaemon debilis*. Freshwater prawns (*Macrobrachium grandimanus*, *opae ohae*) were observed in two ponds (Maciolek and Brock 1974:15). No fish were observed in the Kohana-Iki ponds studied by Maciolek and Brock, however, small fish were observed in at least two ponds during reconnaissance survey. An additional faunal resource associated with the largest Kohana-Iki pond is waterfowl and shorebirds such as the Hawaiian stilt (*kukuluse'o*, *Himantopus himantopus knudseni*) and wandering tattler (Maciolek and Brock 1974:16).



Figure 2. AERIAL VIEW OF ANCHIALINE PONDS AND MANGROVE THICKET.  
View to north. (PHRI Neg.448-10)

After examination of 318 ponds in five land divisions along the west coast of Hawaii, Maciolek and Brock determined that the ponds at Kohana-Iki were "...of exceptional natural value based on physical structure, diversity, representative aquatic communities and new or unusual endemic species" (Maciolek and Brock 1974:16).

#### PREVIOUS ARCHAEOLOGICAL WORK

The earliest archaeological fieldwork recorded for Kohana-Iki and the project area was conducted in 1930 by John E. Reinecke, who located coastal sites in the Districts of North and South Kona for the Bernice P. Bishop Museum (BPBM). Reinecke recorded eight sites along the immediate coastal area of Kohana-Iki (Reinecke Ms.). Unfortunately, Reinecke's site descriptions and locational data were somewhat sketchy and not all of his original sites have been definitely relocated. Reinecke's sites were included in an inventory of Hawaii Island sites prepared in 1970 by the Bishop Museum for the Hawaii County Planning Department (Emory 1970). This inventory was based on existing records and did not involve actual field work.

Reinecke's Sites 58 through 62 were recorded and submitted for placement on the Hawaii Register of Historic Places (Sites 50-10-27-1902, 1905-1909\*) in 1971 and 1972, as part of the Statewide Inventory of Historic Places. These sites include residential habitation features and a possible heiau or shrine with associated burials (Site 1909) at Wawahiaa Point. The six sites placed on the Hawaii Register were evaluated by staff archaeologists and placed in the reserve category. All six were reviewed by the Historic Places Review Board in October 1972, and placed on the Hawaii Register of Historic Places in June 1973. They were all subsequently removed from the Register by the Hawaii State Attorney General on procedural/technical grounds; i.e., private landowners had not been notified that sites located on their lands were under consideration for placement on the State Register.

The most intensive archaeological work conducted to date within the project area was done in late 1975 by Ross H. Cordy during coastal survey and testing conducted as part of his dissertation research (Cordy 1981). Cordy surveyed a strip along the shoreline extending from 1/4 to 1/2 mile inland and selectively recorded and tested structures he interpreted to be permanent habitation sites. Cordy designated 12 sites with the Bishop Museum numbering system (Sites 50-Ha-D14-1 through -12<sup>†</sup>). Site D14-1 was determined to be located in the Kaloko Land Division rather than in Kohana-Iki during the preliminary reconnaissance survey (Rosendahl 1985: 7). This site is therefore not included in discussions of previously recorded sites within the project area.

\*Hawaii Register of Historic Places (HRHP) site designation system: all four-digit site numbers prefixed by 50-10-27- (50=State of Hawaii, 10=Island of Hawaii, 27-USGS 7.5' series quad map, "Keahole Point").

†B.P. Bishop Museum (BPBM) site designation system: all site numbers prefixed by 50-Ha-D14- (50=State of Hawaii, Ha=Island of Hawaii, D=District of North Kona, 14=Land of Kohana-Iki).

Cordy conducted surface collections and limited test excavations at eleven sites, including the NRHP Sites 1905, 1906 and 1907. Thirty hydration rind dates were determined from volcanic glass collected at ten sites; the date ranges span a period from AD 1432 to 1874 (Figure 3).

In a published version of his doctoral dissertation (1981), Cordy offers a number of hypotheses concerning land use and demographics in Kohana-Iki. On the basis of hydration rind dates determined from recovered volcanic glass, Cordy hypothesized that permanent settlement did not begin along the Kohana-Iki coast until after AD 1400 (1981:173). Prior to this time, the Land Division is thought to have been part of an extensive buffer zone between the politically autonomous districts of Kona and Kohala (Cordy 1981:176). Cordy offers population estimates for Kohana-Iki, based on the size and frequencies of dated coastal structures interpreted as sleeping houses. He suggests that there were 12 persons residing in the Land Division between 1400 and 1450; this number gradually increased to a peak of 66 persons by 1600, and was back to 12 persons by 1780 (Cordy 1981:170).

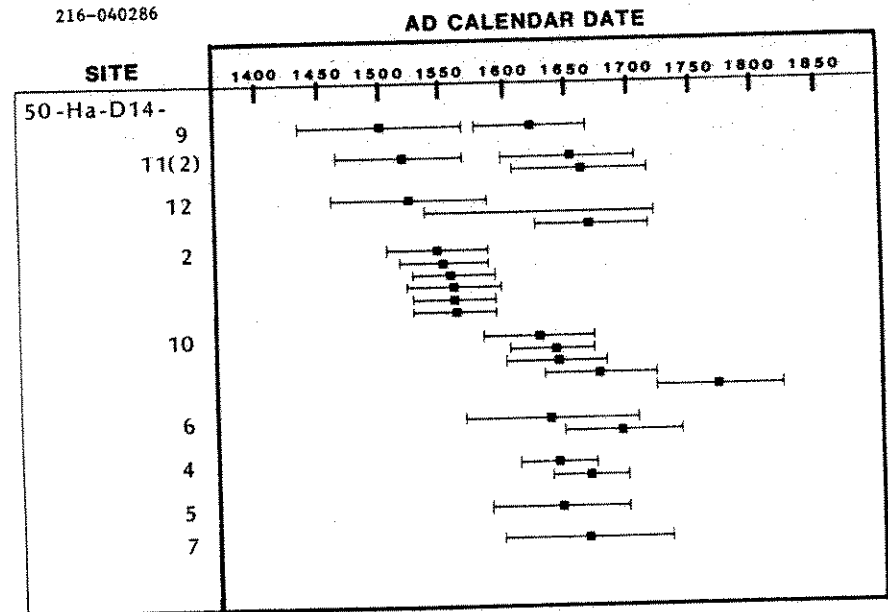
Cordy identifies two social rank levels within the prehistoric community of Kohana-Iki. These are differentiated on the presence or absence of men's houses within households (sites). Four men's houses were identified within the coastal area; these occur at Sites D14-4, 5, 9 and 11. The remaining six sites are interpreted as having sleeping houses only (Cordy 1981:166). Both social rank levels as defined by Cordy are assigned to the Commoner echelon, due to similarities in labor expenditure and general construction of sleeping houses and men's houses, and due to the the lack of site complexity (less than five structures per site). Cordy's hypotheses are further discussed below.

The most recent prior archaeological investigations at Kohana-Iki was a preliminary field inspection conducted by PHRI in September 1985 (Rosendahl 1985). This study focused on conducting background research on previous archaeological investigations, relocating previously recorded archaeological sites within the project area, and designing a scope of work for the subsequent full reconnaissance survey. In his report of investigations, Rosendahl (1985) offers alternative functional interpretations for a number of features previously identified by Cordy as sleeping houses.

#### SUMMARY OF PRELIMINARY HISTORICAL DOCUMENTARY RESEARCH

Preliminary historical documentary research was conducted by historical researcher Carol L. Silva for the Kohana-Iki project area (Appendix A). Silva's report is briefly summarized here.

The Land of Kohana-Iki is located at the southern edge of an ancient North Kona land section known as Kekaha, or Kekaha-Wai-Ole (the desolate land without water). The Kekaha land section is traditionally described as barren and desolate, but is also noted for its excellent inshore and offshore marine resources.



SOURCE: CORDY 1981:247

Figure 3  
HYDRATION RIND DATES FROM KOHANA-IKI SITES

Included in Silva's report are statements from native historian S. M. Kamakau describing the destruction in Kekaha undertaken by Kekaulike of Maui while fleeing Alapa'inui of Hawaii, and the setting apart of Kekaha lands for the priestly class, specifically the Kaushi and Nahulu lines of priesthood. Presence of the priestly class in Kohana-Iki is indicated in the source of the name for Pubili Point, which is said to be named after a priest.

Specific references to Kohana-Iki in myth and legend were not located during Silva's research; however, she does reference a mythological tale entitled "The Pool of Wawaloli" which may have involved one of the anchialine pools of Kohana-Iki. The tale involves a young woman who was traveling from the mountains to the coast and stopped at a pool for refreshment. There she met Wawaloli, who is eventually captured by the woman's father and exposed as a wicked wizard. A section of shoreline in Kohana-Iki bears the name of Wawaloli Beach.

Little information could be located by Silva regarding early historic descriptions or narratives that included references to Kohana-Iki. This dearth of information suggests that the area was not frequently traversed. The low frequency of footpaths and trails located during reconnaissance likewise suggests either avoidance of the area due to the harsh environment, or for reasons that were perhaps social or religious in nature.

Silva's examination of land transferal data indicate that no kuleana parcels were awarded in seaward Kohana-Iki. In 1863, the area seaward of the Mamalahoa Trail was granted to Kapena. Two years prior, Kamalo applied to lease the anchialine ponds at \$10.00 per year. No record of an official response to this request was located; however, it is evident that persons were utilizing some ponds for aquaculture during the historic period.

During the middle to late 1860s, disputes arose over ownership claims in Kohana-Iki. Testimony reviewed by Silva indicates that a woman named Kahalau perhaps operated a small craft landing along the coast. The specific location of this site was not determined, but it may have been located at the end of an old road which ran from the main road to the coast (tentatively identified as Site T-118). If this assumption is correct, the boat landing would have been at or near Site 50-Ha-D14-6 or 50-10-27-1902.

Cartographic information on Kohana-Iki is limited; two maps were located by Silva which indicated road and house locations. These are J.S. Emerson's map (Reg. No. 1449) which plots a house belonging to Kawaimaka. This house was situated along the coast, in the southern portion of the land division, in the vicinity of Site 50-Ha-D14-7. The location of this house correlates with the location of two structures sketched on a map of Grant 3068.

A USGS map dated 1924 was located which depicts a shoreline trail, two anchialine ponds, and the Mamalahoa Trail. The only house location plotted on this map is Kawaimaka's, which is shown to correspond with the location of Site 50-Ha-D14-7.

#### FIELD METHODS AND PROCEDURES

A total aerial reconnaissance of the project area was conducted February 25, 1986 by Theresa K. Donham and Alan T. Walker by helicopter piloted by Mr. Jim Cardin of Kona Helicopters. A series of overlapping east-west transects were flown at an average altitude of 30 ft, which enabled recognition of archaeological features in areas of sparse ground cover. Identified features were photographed from the air and flagged for subsequent recording during pedestrian reconnaissance. Site locations were plotted on an aerial photograph (R.M. Towill Corp., 1980, scale 1"=400'). A total of 15 sites with 33 features was located during aerial survey, and 10 previously recorded sites along the coast were identified. New sites identified from the air tend to cluster in the northwest and west central portions of the project area, where ground cover was particularly sparse and site densities relatively high. Aerial reconnaissance

was considerably less effective over the area of anchialine ponds or in the southern inland area, where dense kiawe and fountain grass obscured visibility. The only features identified from the air in these areas were substantial walls.

All aerial survey (AS) sites were revisited during pedestrian survey and reassigned temporary field numbers (Table 1), with the exception of AS-3, which was determined to be a non-cultural feature upon closer examination.

Table 1.

AERIAL SURVEY SITES AND ASSIGNED TEMPORARY SITES NUMBERS

Aerial Survey Site (AS-)	Temporary Site Number (T-)
1	176
2	192
3	Non-cultural
4	161
5	107
6	157, 158, 159
7	144
8	193
9a	115
9b	120
10	132
11	101
12	130
13	135

Pedestrian reconnaissance began March 7 and concluded March 22, 1986. The entire project area was covered using two intensity levels, as specified in the scope of work. High intensity areas included a 150 ft (45 m) wide corridor immediately west of the Mamalahoa Trail (6 acres); a 1000 ft (305 m) wide immediate coastal zone (145 acres); and a zone of open, smooth pahoehoe in the southern 1/3 of the project area (40 acres) (Figure 4). A total of 191 acres, or 40% of the project area, was covered during high intensity survey. This area was walked in parallel transects with team members no more than 30 ft (10 m) apart. The trail section was walked in transects parallel with the trail and the other high intensity sections were walked east-west, parallel with the southern boundary orientation of 75-255 degrees Az (azimuth).

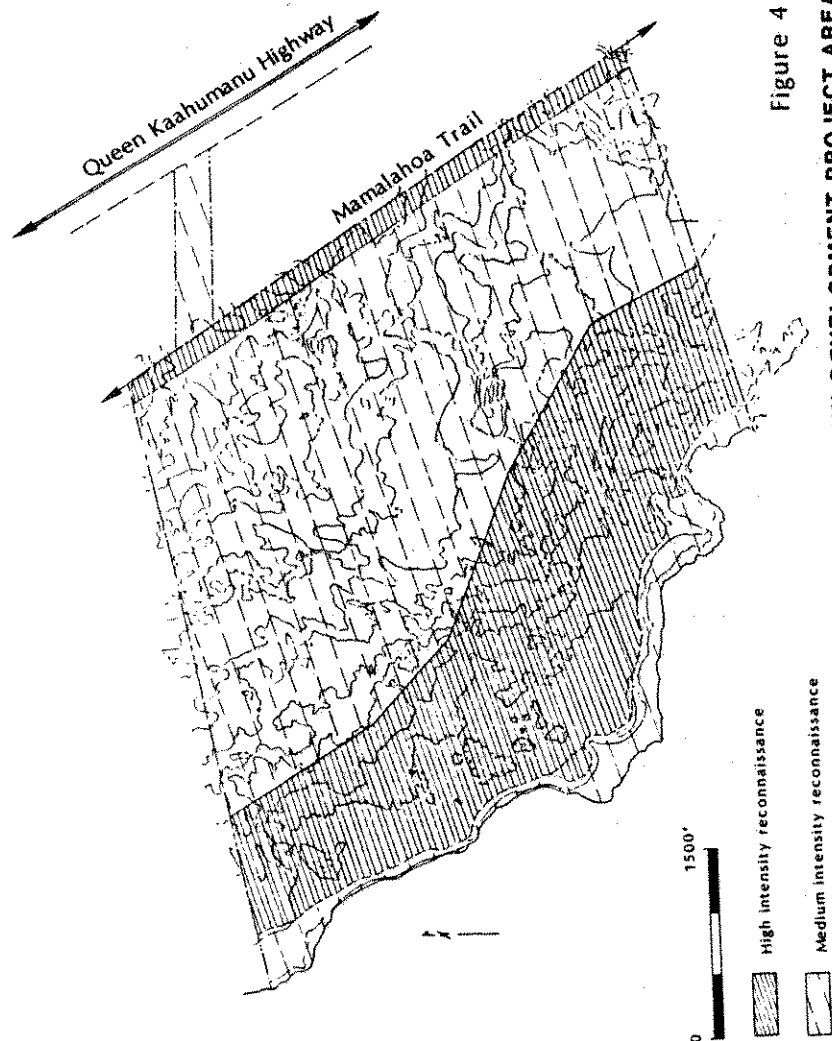


Figure 4

KOHALA-IKI DEVELOPMENT PROJECT AREA  
SHOWING HIGH AND MEDIUM INTENSITY RECONNAISSANCE ZONES

The inland perimeter of the high intensity survey coastal zone was determined to coincide with the large cairn alignment, which had been previously plotted during the aerial survey. With the exception of the three northernmost cairns, these features occur at a relatively uniform distance from the coast (mean distance 317 m [1041 ft]), and provided a well-defined distance gauge during survey. Seventy-one of the 91 newly identified sites were located in high intensity survey areas; the majority of these (67) occur in the immediate coastal zone.

Approximately 279 acres or 60% of the project area was surveyed in medium intensity sweeps with 90-150 ft between team members. Parallel transects were oriented 75-255 degrees Az and proceeded in a north to south pattern. The southernmost transect of each sweep was well marked with surveyor's ribbon and used to guide the subsequent sweeps.

Ten of the fifteen sites located during aerial reconnaissance were within the medium intensity survey zone. All of these sites were relocated during systematic pedestrian survey, indicating that the spacing between surveyors was adequate for the location of most kinds of sites.

Sites located during reconnaissance were plotted as accurately as possible on an aerial photograph scaled 1"=400' (R.M. Towill Corp., 1980, Map 7895-16). Whenever possible, taped distances and compass bearings were recorded from a newly located site to the nearest known site or feature. These data are presented in the site descriptions and represent actual field measurements, except where preceded by an approximation notation (c.).

A standard FHRI site survey form was completed for each site, with descriptive data and feature dimensions recorded on site at the time of location. Scaled plan maps were compiled for selected sites, depending upon site complexity, scope of anticipated work at the site, or necessity for illustrating site structure. In some cases, the need for further work at a site was mitigated by compiling scaled site maps at the time of site location. These cases are further discussed below. The principal features of each site, with the exception of some isolated cairns, were photographed in 35 mm black-and-white (FHRI Rolls No. 433-437, 448). Each site was marked with red and blue surveyor's tape and an aluminum tag denoting temporary site number, FHRI project number and date. Tags were placed in a conspicuous location on the principal features and locations were recorded on respective site forms. Site information was also written on a strip of yellow plastic surveyor's ribbon and wrapped around a cobble-sized stone which was placed in a protected but conspicuous area of the site. Newly located sites were numbered sequentially, beginning with T-102. Previously recorded sites designated with BPBM numbers or state numbers were not given temporary field numbers; likewise, Site T-101, recorded by FHRI during the preliminary reconnaissance, was not renumbered.

Artifacts were collected at three sites, and include three *Cypraea* sp. shell octopus lures recovered from Site T-129; a piece of twisted fibrous material, collected for identification from Site T-101; and a fragmentary metal spike for identification and dating, recovered from Site 50-Ha-D14-11.

Archaeological sites were designated when artificial features or modified natural features were encountered, or when subsistence remains or portable artifacts were encountered on the surface. Natural caves and overhangs with no evidence of modification or surface materials were not recorded as archaeological sites. Caves are differentiated from overhangs on the basis of dimensional proportions. Caves are natural shelters with greater depth than opening width; overhangs have a greater opening width than depth of habitable space.

Five wall variants were identified. Single walls are free-standing features that do not enclose a space and are not readily associated with other walls or features. These walls are either straight or slightly curved. Enclosing walls consists of four sides, or three constructed sides with a fourth side of natural bedrock that is used to complete an enclosure. C and L-shaped walls are free-standing, and of the shape indicated. A walled shelter is a straight or curved wall built so as to incorporate a rock face or natural sinkhole and to enclose a sheltered area. A number of walls were observed at the entrance of natural caves or overhangs; these features are not included in the walled shelter category, but are given as component features of the respective shelters.

Alignments are differentiated from walls on the basis of construction. A wall has a minimum of two courses of stone, while an alignment has a maximum of one course of stone.

Pavements, platforms and terraces are differentiated on the basis of height above ground surface. Pavements consist of a single course of fill material. Platforms are raised above ground on four sides and terraces are raised above the ground on one to three sides.

Filled depressions consist of rubble, pebble or cobble fill deposited in a sinkhole or crevice. The surfaces of filled depressions may be leveled, irregular, or slightly concave. Filled depressions are included in the rock mound category when they are built up, well above ground surface, and have unfaced sides which slope outward from top to bottom. Mounds also occur on level surfaces and are differentiated from cairns primarily on the absence of structure and relative size of the feature. The distinction between cairns and rock mounds utilizes projected original forms in some cases; dismantled cairns would otherwise be classified as mounds.

Sites were described as complexes if two or more features were located within a limited spatial area. Specific metric standards for the spatial area were not set, due to the extreme variability in site size and the constraints of local topography. Generally, features within 20 m were recorded as components of the same complex. This procedure resulted in a number of complexes that consist of two features, such as a cave and a cairn. The complex category is therefore functionally and formally heterogeneous, and site boundaries for some complexes are considered tentative until more intensive investigations and site mapping is completed.

Ten functional categories are used in describing the archaeological resources identified. These include three types of habitation sites, road/trail sites, boundary markers, animal pens, recreation sites, shrines and aquaculture sites.

Temporary habitation sites are indicated by feature forms such as cave shelters, walled shelters and C-shaped walls. Surface midden is light to medium in density and horizontal features include hearths and occasionally cupboards. These sites are generally single features or small two to three feature complexes. Temporary habitation/storage sites are extremely low ceiling caves that have been modified but exhibit no evidence of activities, other than the possible curation of materials.

Permanent or extended habitation sites are indicated by the presence of at least one terrace, platform or pavement to sufficient size to suggest the former presence of a residential structure. All permanent habitation sites identified in this study are complexes, with as many as 14 component features. The most common feature forms present on permanent habitation sites in addition to house platforms or terraces are enclosure walls, paved and/or filled depressions and crevices, modified caves or overhangs and various wall forms.

Habitation/ceremonial sites are those with platforms or terraces and additional features which suggest ceremonial activities. Such features include coral pavements, positioned upright waterworn boulders, large, unweathered pieces of branch coral, and potential burials. Features suggestive of burials include small, slightly mounded terraces or platforms, depressions or crevices filled with large stones and left unpaved or unlevelled, and rock mounds. Cave burials were not located within the project area.

Road/trail sites consist of either relatively wide (2.5-4.0 m) cart/horse roads or narrow footpaths. The latter are identified on the basis of weathered patterns on pahoehoe bedrock, clearing patterns on aa, and/or alignments of markers, such as weathered coral or cairns.

Boundary markers are identified as such only when a definite pattern or alignment of features is discernable. Features used as boundary markers within the project area include cairns and roads. The latter were used to demarcate private property claims.

Animal pens are large enclosures which contain no internal features and no evidence of extended occupation by humans within the enclosure. One animal pen, Site 50-Ba-27-1908, contains evidence of use during the historic/recent period; however, this use appears to represent post-abandonment re-use, rather than the primary use of the enclosure.

Recreation sites located within the project area include a petroglyph and small modified anchialine pools that apparently functioned as baths.

Aquaculture sites that occur within the project area occur exclusively in and/or around anchialine ponds and most often consist of complexes with walls and small terraces or platforms erected at the water's edge. Walls are built so as to channel water, deepen ponds, or section ponds.

FINDINGS

A total of 105 archaeological sites have been identified to date within the Kohana-Iki Development project area. Six of these sites were recorded in 1971 and submitted for placement on the Hawaii Register of Historic Places in 1972. Four of the HRHP sites and an additional seven sites were recorded at the BPEM by Ross H. Cordy (1975). One site was recorded during the preliminary reconnaissance survey conducted in 1985 and 91 sites were located during the full-scale reconnaissance. Nearly half (49.5%) of all sites recorded are complexes which contain two to 14 associated features. Five of these complexes include more than 10 features and the majority (77%) are comprised of less than five features.

Nineteen formal types were identified among the 262 features located within the project area (Table 2). Thirty-eight features representing six formal types were previously recorded. The remaining 224 features were recorded during full-scale reconnaissance, including 29 new features located at previously recorded sites.

Tentative functional interpretations are suggested at this time for 76 of the 105 recorded sites. Habitation sites represent over half of the identified sites (48), and include 17 habitation complexes, 13 habitation/ceremonial and/or burial complexes, and 18 temporary habitation sites. Other functional types include two road/trail sites, 16 boundary markers (same boundary), two animal pens, three recreation sites (petroglyph and pools), two shrines, and three aquaculture sites.

Newly identified and previously identified sites are described individually below, in numerical order. Information included in each description includes the overall site size, dimensions of features, general environmental zone and elevation of the site, distance to adjacent site(s), portable remains observed, and tentative functional category, if determinable. Tables 3 and 4 (at end) summarize the identified sites and their component features in terms of formal type, tentative functional interpretation, preliminary evaluation of significance, and recommended further action. Table 3 lists newly identified sites, while Table 4 lists previously identified sites. All site locations are indicated on Figure 5 (at end).

## SITE DESCRIPTIONS - NEWLY IDENTIFIED SITES

T-101 Complex

This complex consists of five features located in and around the rim of a broad, shallow pahoehoe sink. Two habitation shelters, a rubble filled depression and two cairns occur within an area of 284.5 sq meters. Elevation of the site is 12 ft AMSL; it is situated at the interface of the coastal and rocklands environmental zones.

Feature A is an overhang shelter 2.3 m deep that has a wide opening oriented toward the east (270 degrees Az). A narrow corridor leads from the main overhang room westward into a small (c. 15.0 sq m) cave that has

Table 2.

## FREQUENCY OF RECORDED FEATURES BY FORMAL TYPE

Formal Type	Number of Features Recorded by PHRI (1985-1986)	Number of Features Recorded by Cordy (1975) and/or HRHP (1971)	Total
Single wall	23	2	25
Enclosing wall	9	10	19
C-shape wall	4	-	4
L-shape wall	1	-	1
Walled shelter	6	-	6
Cave shelter	20	4	24
Overhang shelter	19	-	19
Paving	7	3	10
Platform	11	17	28
Terrace	9	2	11
Straight rock alignment	2	-	2
Circular rock alignment	6	-	6
Filled depression	21	-	21
Rock mound	4	-	4
Petroglyph	2	-	2
Trail	3	-	3
Cairn	74	-	74
Cleared pond	2	-	2
Spring/well	1	-	1
<b>Total</b>	<b>224</b>	<b>38</b>	<b>262</b>

a low ceiling (0.8 m) and sparse surface midden. A small, stone-lined sub-surface feature 0.4 m in diameter and at least 0.3 m deep is located near the entrance of the overhang. Shell midden, kukui, charred wood, coral and fibrous material are present.

Feature B is a cave shelter with a narrow (3.0 m wide) opening oriented toward the east (85 degrees Az). This opening faces Feature A, located 17.2 m to the east. Average ceiling height is 1.0 m. The cave opens into a tube that continues for c. 10.0 m around the rim of the sink. The tube is an average of 4.0 to 5.0 m wide and contains scattered shell midden with shallow (c. 3 cm) soil deposits in places.



Feature C is a filled depression 2.5 m long and 2.7 m wide that has been leveled and paved with small pahoehoe cobbles. A narrow path-like extension 1.0 m wide and 4.0 m long leads from the feature toward Feature A. This feature is approximately midway between the two shelters, in a low area of the sink.

Features D and E are cairns; Feature D is located in the sink, adjacent to Feature C. It is 1.6 m x 2.0 at the base and 0.75 m high. Feature E is situated at the rim of the sink and is visible for some distance. It is 1.7 m x 1.0 m at the base and 0.45 m high. This feature appears to be partially dismantled.

Portable remains are sparsely scattered on the site surface and concentrated in the two shelters. Shell species present include *CYPRAEA* spp., *Merita* spp., *Isognomon* sp., *B. crebristriatus*, and Thaididae; other portable remains include Echinoides, *kukui*, charred wood, coral, and twisted pieces of fiber (sennet?). There appears to be sufficient charcoal in Feature A to obtain a radiometric date sample. This site was located during the preliminary reconnaissance survey of Site D14-3, which is located approximately 36.0 m to the north. Site T-101 may therefore have functioned as a separate activity area within the former complex.

#### T-102 Mamalahoa Trail

This historic trail/road is immediately east of the eastern boundary of the project area, with the exception of a 350 ft wide section that is crossed by the proposed access road corridor. The trail/road is constructed of locally available lava rock; its surface varies from smooth, unpaved pahoehoe to crushed stone paving. Sides of the road are lined with flat to chunky boulders that are stacked and faced to varying heights, depending upon local terrain. Average width of the road is approximately 2.0 m; widths vary from 1.7 to 2.3 m along the project area boundary. The section of the trail that crosses the proposed access right-of-way is in particularly good preservation as compared to other sections along the boundary. This is especially true at the southern end of the right-of-way, where the trail crosses a rough as ravine and has faced bridge sections (Figure 6).

This Trail is described by Apple (1965) as a "Type B" trail and by Pukui, Elbert, and Mookini (1974:144) as a belt road. It is located on a map accompanying Land Grant 3068 to Kapena, dated 1863 (see Appendix A), and is referred to as the "Old Beach Road."

#### T-103 Cave Shelter

This temporary habitation site is one of three sites located in the northeastern quarter of the project area. It consists of an overhang 4.0 m wide that expands into a cave 9.0 m wide and c. 5.0 m deep, with additional crawlspace. Most of the floor space inside the cave is covered with large rockfall boulders, some of which may have fallen recently. The only indication of shelter use located was a very sparse scattering of charcoal fragments against a large boulder. The cave opens toward the north (350 degrees Az) and is c. 25.0 m west of the Mamalahoa Trail. Elevation is 60 ft AMSL.

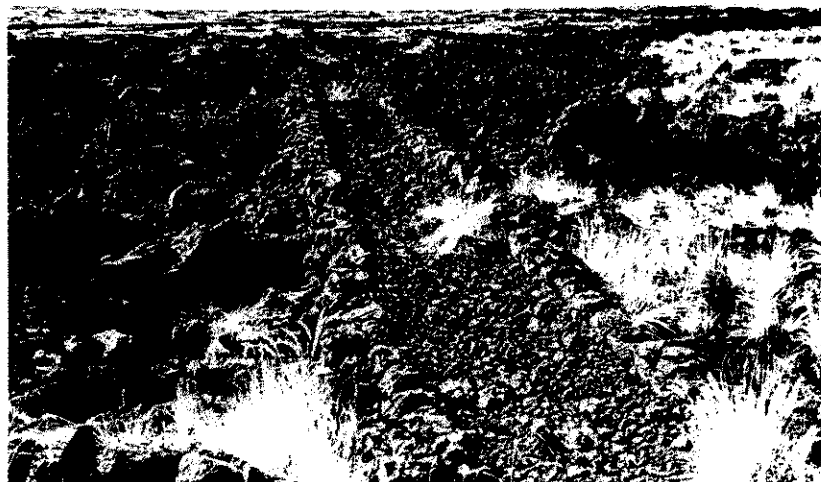


Figure 6. MAMALAHOA TRAIL AT ACCESS ROAD RIGHT-OF-WAY. View to south. (PHRI Neg.434-12)

T-104 Cairn

This single cairn is located 3.0 m west of the Mamalahoa Trail, along the southern slope of a rough aa embankment. The feature consists of a haphazard stack of less than 10 stones on a large aa boulder that is 0.6 m high. The actual structure is 0.6 m high and 0.75 m wide at the base (Figure 7a). This feature is probably historic, given its association with an historic road, and may represent a distance marker.

T-105 Complex

This site is situated at the interface of a rough aa flow and a grass-covered pahoehoe flat, 50-60 m west of the Mamalahoa Trail. The complex includes a C-shape wall, a footpath remnant and a small cairn.

Feature A is a small C-shape wall located 0.7 m southwest of Feature B, on an open pahoehoe ridge. The wall is constructed of stacked and leaned pahoehoe slabs; maximum height is 0.75 m at the closed end and ranges to 0.3 m at the two open ends. Width of the opening in the wall is 2.5 m. The highest point of the wall faces the footpath (Feature B) and is oriented toward the northwest (320 degrees Az). No portable remains were observed in or around this feature.

Feature B is the remnant of a footpath that apparently connected coastal and inland locales. It consists of a traffic-worn and partially filled path along aa and pahoehoe ridgelines. A section of the path approximately 0.5 km long could be followed; eastern and western ends of the section were obscured by ground cover.

Feature C is a small cairn constructed from four boulders and two cobbles, situated on a high bedrock shelf along the Feature B footpath. The cairn is 0.6 m wide at the base and 0.4 m high. It is located 52.0 m east (85 degrees Az) from Feature A.

Scaled plan and side views were compiled for Features A and C at the time of survey. No portable remains were observed within the area of the complex.

T-106 Complex

This temporary habitation complex consists of two natural shelters situated along the edge of a depressed pahoehoe blister, in open rocklands at 28 ft AMSL. The two shelters face one another and are approximately 15.0 m apart.

Feature A is a cave 3.8 m wide at the opening, which is oriented toward the northeast (60 degrees Az). It has an interior area of approximately 25.0 sq m and a maximum ceiling height of 1.0 m. A tube cave extends from the main overhang room northward for a distance of 10.0 m. The tube feature does not appear to have been occupied.



A. Site T-104  
S. View



B. Site T-110  
N. View



C. Site T-126(B)



D. Site T-136(B)  
N. View



E. Site T-136(C)  
N. View



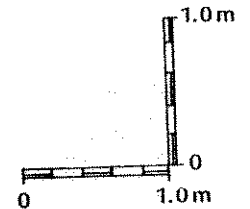
F. Site T-150  
W. View



G. Site T-163  
W. View



H. Site T-172  
S. View



B-15

Figure 7

ELEVATIONS OF CAIRN FORMS IN THE KOHANA-IKI PROJECT AREA

Feature B is a small overhang c. 2.5 m wide and 4.0 m deep with an average ceiling height of 0.56 m. The opening is oriented toward the west (300 degrees Az).

Portable remains are very sparse in these features and include Cypraea sp. and Echinoidea. There is no soil deposit on the site.

#### T-107 Complex

This complex consists of two caves, located in a large, deep sinkhole that has been partially filled with rough aa. The site is located c. 120 m east of Site T-106 in open rockland, at an elevation of 30 ft AMSL. The caves open at the bottom of the sinkhole, c. 4.0 m below ground surface.

Feature A is located at the west end of the sinkhole; it has a very high ceiling (4.0 m) at the opening and a main room area of c. 150 sq m. Tube caves extend out from this main room and may connect this feature with Feature B. Five concentrations of ash and midden were observed in this cave.

Feature B is located at the north rim and the sinkhole, c. 8.0 m from Feature A. It has a bedrock floor and a relatively sparse midden deposit.

Portable remains observed at this site include Cypraea spp., Conus sp., Trochus sp., Cellana spp., charred wood, and uncharred wood. This site appears to be a temporary habitation locale that was used a number of times; it has a higher number of hearth areas than any other cave shelter located in the project area.

#### T-108 Complex

This habitation/ceremonial site consists of two cave shelters located along the perimeter of a depressed pahoehoe blister in open rocklands, at an elevation of 35 ft AMSL. The site is located 73.0 m south and slightly east from Site T-107.

Feature A is a large tube cave c. 25.0 m deep and 6.0-8.0 m wide. Ceiling height is 1.9 m at the entrance and gradually decreases toward the back of the tube. There are two minor entrances to this feature along the axis of the tube, which is oriented roughly east-west along a shallow ravine. The major entrance is oriented toward the northeast (60 degrees Az). A large hearth area is located 2.0 m from the main entrance of the tube; subsistence remains are concentrated in this area. No midden was observed in the low-ceiling portion of the tube. Portable remains observed in Feature A include Cypraea spp., Trochus sp., Echinoidea, coral (including a coral abrader), and bird bone.

Feature B is an oval tube cave c. 5.0-6.0 m wide and 12.0 m long, situated at the western end of the site. The cave opening faces Feature A and is oriented toward the northeast. A small constructed platform is located in the center of this cave, on which is placed an upright boulder. No subsistence remains were observed in this cave, which appears to have functioned as a shrine.

#### T-109 Complex

This cave shelter and stone alignment is located along the perimeter of a broad, depressed pahoehoe blister in open rocklands at an elevation of 35 ft AMSL. The site is 85.0 m east from Site T-108, and appears to have functioned as a temporary habitation site.

Feature A is a cave shelter with two tube extensions. The main chamber of the cave is 266.0 sq m in area and has an average ceiling height of 1.7 m. The main entrance to the cave is accessed through a steep, narrow ravine that is filled with rockfall; the cave floor is c. 1.5 m below the ground surface adjacent to this ravine. Two purposely structured hearths occur in this cave, both contain concentrations of ash and shell midden. A small surface deposit of volcanic glass occurs near the entrance to the largest tube extension. This extension is c. 65.0 m long and has an average width of c. 4.0 m. It is oriented 150 degrees Az. from the main chamber and makes two to three turns along its axis. There are two skylights and a very small second entranceway along this tube. Surface midden in the tube is limited to a single Cypraea sp. shell.

Feature B is a roughly circular arrangement of pahoehoe slabs around the perimeter of a small cleared pahoehoe blister. This feature is 17.5 m southeast (139 degrees Az) from the main entrance of Feature A. The arrangement is 7.5 m long and 3.3 m wide. No portable remains were observed around the stones or inside this feature, which was probably a walled shelter.

#### T-110 Cairn

This single cairn is located in open pahoehoe terrain, over 200 m distance from the nearest located site. It is constructed of 10 to 15 pahoehoe slabs stacked and leaned on one another. The cairn is 0.8 m in diameter at the base and 0.7 m high (Figure 7b). It appears to be unaltered.

#### T-111 Complex

This relatively isolated temporary habitation site consists of a cave shelter, a walled overhang and a rubble mound, located along the side of a lava tube in open rocklands (Figure 8). Elevation of the site is 35 ft AMSL.

Feature A is a large cave shelter with an opening 7.0 m wide and 104.5 sq m of habitable space. An additional 30.0 to 40. sq m of crawlspace occurs in the cave, which has a second, small entrance at the back. The main entrance is oriented toward the northwest (340 degrees Az) and is 1.15 m high. Four hearths occur in the cave, three of which have been delineated with stones. There is a small constructed cupboard at the back of the cave, in the crawlspace. The cupboard is 1.0 x 0.5 m and 0.7 m deep; it had no contents at the time of survey. A soil and ash deposit covers the entire floorspace of the habitable portion of the cave. This deposit has been disturbed, apparently by relic hunters. Piles of disturbed soil are scattered about the cave, however, the base of the deposit was not disturbed.

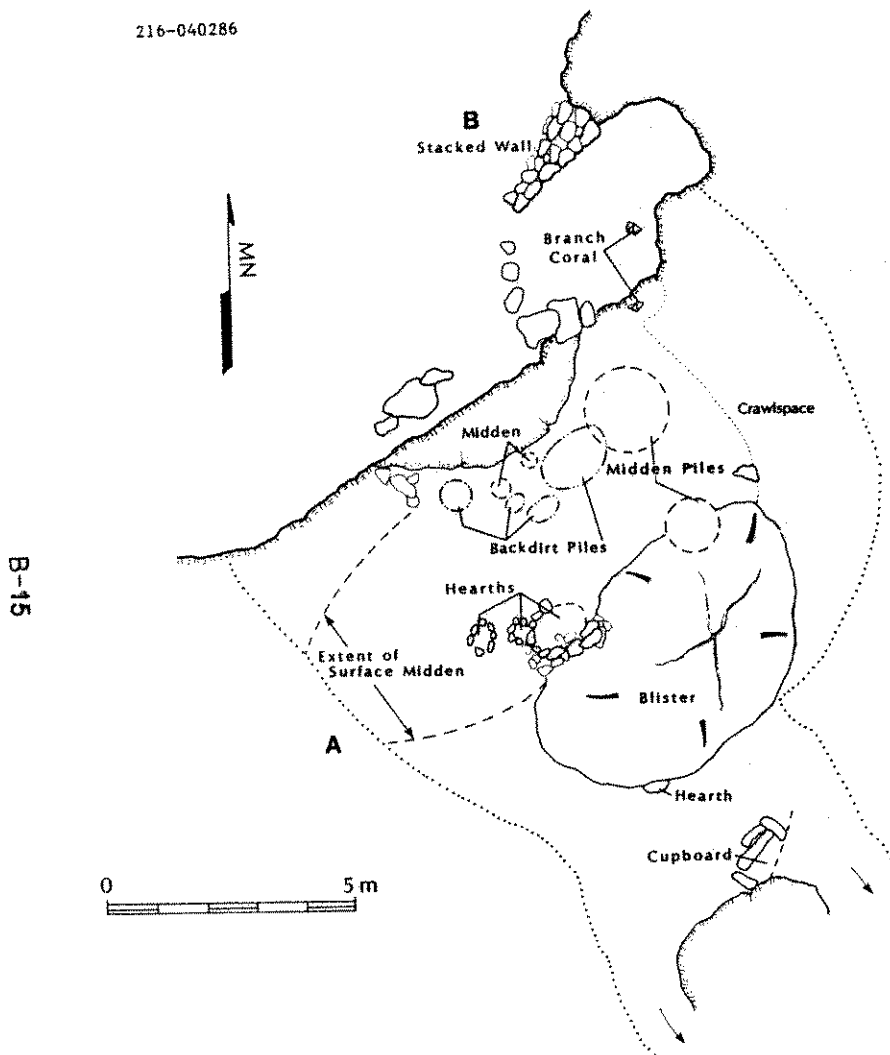


Figure 8  
SITE T-111  
FEATURES A AND B

Feature B is adjacent to the main entrance of Feature A and incorporates the same lava tube formation. It consists of a wall of stacked boulders 0.5 m high and 2.25 m long, built so as to enclose a shallow overhang. The east end of the wall abutts bedrock and the west end is 2.5 m north from the dripline of the overhang. Several pieces of branch coral occur within the walled overhang. There is no indication of surface midden within the feature, however, material is scattered just outside the stacked wall.

Feature C is a small pile of stone rubble, situated along the crest of the lava tube, c. 10.0 m northeast (65 degrees Az) from the entrance to Feature A. This feature appears to be a dismantled cairn.

Portable remains observed on the surface and inside Feature A include *Brachidontes* sp., *N. picea*, *N. polita*, *Cypraea* spp., *Theodoxus* sp., Conidae, Thaididae, Echinoidea, weathers coral, unweathers coral, fish bones, mammal bones, volcanic glass, and a coral abradar.

#### T-112 Complex

This temporary habitation site consists of two adjacent overhang shelters in the side of a lava tube, located in open rocklands at 35 ft AMSL. Feature A overhang is 4.4 m wide at the entrance and has a maximum depth of 8.0 m. The floor of the shelter is 0.5-0.7 m below the adjacent ground surface, and consists of rough bedrock. Ceiling height is 0.9 m at the entrance and averages 0.75 m. The only portable remains present in this small shelter are three pieces of waterworn coral, two of which were utilized as abradars.

Feature B is a section of the same lava tube that has been cut off from Feature A by rockfall. It has similar interior dimensions and the same ceiling height as Feature A. The only portable remains present in Feature B is a bamboo pole, apparently of recent deposition. Both shelter openings are oriented to the southeast (210 degrees Az).

#### T-113 Cairn

This single cairn is located on the crest of a lava tube, in open rocklands, at 27 ft AMSL. It is 98.5 m east (52 degrees Az) from Site T-142, which is a large cairn in the alignment around coastal ponds. The intact portion of this partially dismantled cairn is 1.8 m x 1.2 m at the base and 50 cm high. Construction appears to have been relatively haphazard with stones stacked and leaved against a central stacked core. No portable remains were observed in or around the cairn, and no functional interpretation is determinable.

#### T-114 Complex

This temporary habitation/storage site is located along a linear depression in broken pahoehoe at 25 ft AMSL. The nearest site is a cairn (T-110), located 189 m to the northwest. The two shelters are 15.0 m

apart and the openings face one another. There are two additional natural overhangs in this depression, however, they contain no cultural material or evidence of occupation.

Feature A is a low overhang shelter with an opening 6.0 m wide, oriented to the north (350 degrees Az). Ceiling height at the opening is 0.8 m and maximum ceiling height is 1.0 m, near the center of the 5.0 m deep shelter. All portable remains observed were within 2.0 m from the dripline; they include very limited quantities of *Cypraea* sp., *N. picea*, *Theodoxus* sp., Isognomonidae, and Echinoidea.

Feature B is a small cave which is accessed through a vertical opening c. 1.5 m wide and 1.0 m above the floor of the cave. Most of the interior space of this feature is crawlspace; c. 20.0 sq m are accessible. Portable remains observed include a number of bamboo poles, coconut husks, *kukui*, *Callana* sp., plastic debris and pieces of wire. It appears to have been recently used as a storage facility.

#### T-115 Walled Shelter

This isolated wall feature is constructed across a narrow ravine in broken pahoehoe, at an elevation of 20 ft AMSL. The nearest located site (T-114) is 220 m to the west. The wall is 3.6 m long and 0.6 m high along the exterior face. It is slightly bowed (center is 0.4 m out from the two ends) and positioned along a 0.4 m high bedrock shelf so as to enclose an area 10.0 m long at the head of the ravine. The enclosed area is surrounded on three sides by bedrock walls which rise 2.5 m above the ravine floor (Figure 9a). The three to four course stacked wall appears to be unaltered. No portable remains were observed in the vicinity, of this site, which is tentatively identified as a temporary habitation site.

#### T-116 Enclosure

This single feature consists of a large sinkhole that has been modified by construction of wall segments along the rim, so as to form an enclosure. It is in an isolated locale, 195 m distance from the nearest site (T-182), at an elevation of 20 ft AMSL. The area enclosed is roughly circular, with a major axis of 20.0 m and a minor axis of 18.5 m. Three walls have been constructed around c. 90% of the sinkhole; they vary in height from one to three courses. The northeastern portions of the wall are most substantial and rise to 0.8 m above exterior ground surface. Interior ground surface is 1.3 to 1.5 m below the top of the wall.

No surface midden was observed within the enclosure; however, the surface was obscured in some places by *kiawe* trees and bushes. All observable surface area was bedrock. A low, shallow overhang is located in the southwest quarter of the sink; it contained a single bamboo pole. Other portable remains observed were two pieces of branch coral, located at the base of the wall, above the sink. This site is tentatively interpreted as an animal pen, but further investigation may indicate use as a habitation site.

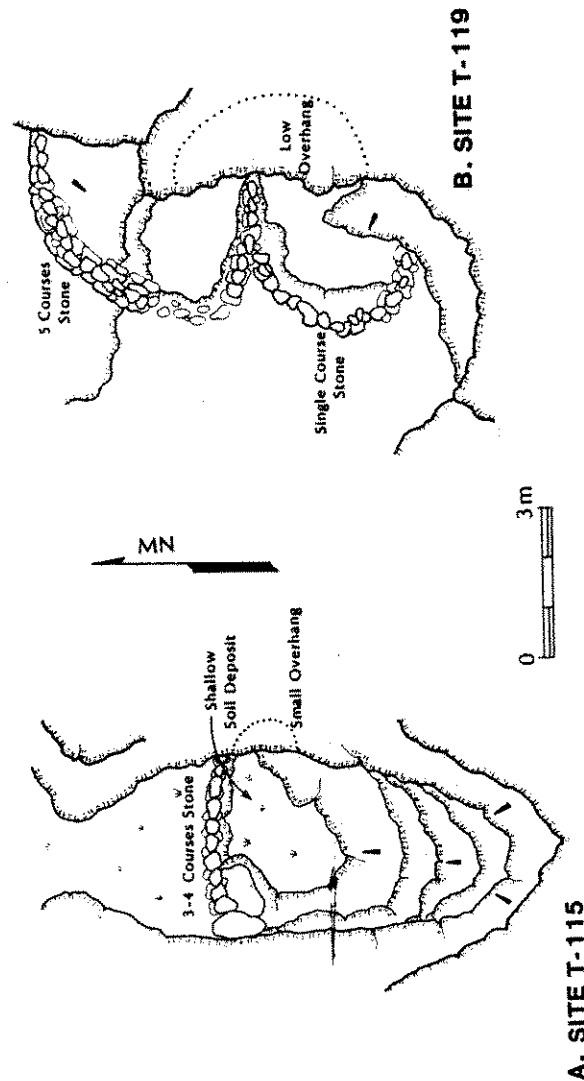


Figure 9  
SITES T-115 AND T-119

T-117 Petroglyph

This petroglyph is located along the crest of a major lava escarpment in the coastal zone, at an elevation of 15 ft AMSL. It is near the southern boundary of the Kohala-Iki Land Division and was previously recorded by Renger (1970) as site 50-Ha-D13-20, located within the Kaloko Land Division. The petroglyph consists of an irregular pattern of pecked holes within a space of 0.8 x 0.84 m. The size of the pecked depressions varies from 0.1 m to 0.04 m in diameter and from 0.03 to 0.01 m deep. There are 16 depressions, nine of which are patterned in three rows of three. This pattern is .4 m sq and may represent an original petroglyph that was subsequently altered (Figure 10).

Renger (1970:14) describes this petroglyph as a "papamu, or konane checkerboard". If this functional interpretation is correct, the petroglyph represents an extremely oversized specimen that has an unusually low number of depressions.

T-118 Cart Road/Trail

This site consists of a linear, roughly paved feature that has aligned or stacked stones along portions of the perimeters. It is located along the level crest and western slope of low pressure ridge in the coastal zone, at an elevation of 10 ft AMSL. The identifiable portion of the road is 65.0 m long and 4.0 m wide. Low areas and ravines along the feature have been filled with rubble; level portions along pahoehoe are not paved. A surface scatter of shell midden and historic artifacts occurs adjacent to and on the feature, within a 5.0 sq m area. The western end of the feature as identified is at the sand beach; the eastern end was not satisfactorily located due to extremely thick ground cover.

The location of this feature corresponds with that of an "old road" which forms the southern boundary of Land Grant 2030 to Kaiakoili, as illustrated in the 1889 Testimony of the Claim (Appendix). This road connected the "Main Road" (Mamalaha Trail) with the beach and was oriented east-west, with several curves.

Portable remains associated with this feature include Cypraea sp., Nerita spp., Conidae, coral, and salt-glazed stoneware jug sherds.

T-119 Complex

This walled shelter complex is located in a small ravine adjacent to a steep pahoehoe ridge in the coastal zone at 15 ft AMSL. It is situated equidistance (50.0 m) from three habitation complexes (D14-3,4 and 5).

Feature A is a set of attached semicircular walls that enclose two small areas (7.0 sq m each) against the face of the bedrock ridge (Figure 9b). The two sections were constructed as a single unit from pahoehoe slabs, stacked to eight courses. The walls are broad (0.85 m) at the base and narrow to a single row of stones (0.4 m wide) at the top.

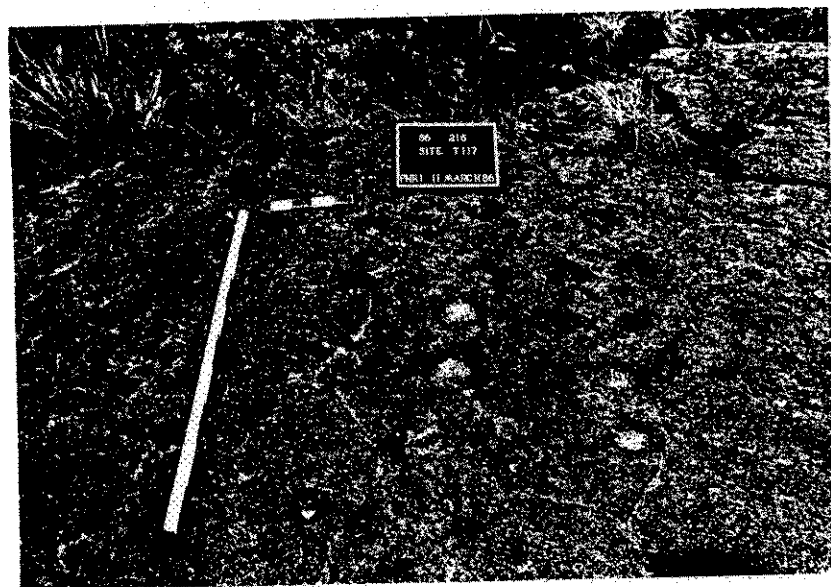


Figure 10. SITE T-117, PETROGLYPH. View to southeast. (PHRI Neg.433-28)

the exterior faces are vertical and interior sides slope from top to bottom. The walls follow a narrow, natural ditch 0.5 m deep that is along the interior sides. The top of the walls are an average of 0.9 m above the base of this ditch, and 0.65 m above the exterior ground surface. This feature apparently functioned as a temporary habitation site.

Feature B is a short (1.8 m), straight wall constructed across the opening of a small natural depression (3.2 sq m). The wall was built with pahoehoe slabs that were stacked and unfaced. Two to three courses are intact and maximum wall height is 0.4 m. This wall is 24.3 m northeast (34 degrees Az) from Feature A.

A single portable artifact was observed; it was located among rockfall boulders inside the southern compartment of Feature A. The item is an iron spike 0.36 m long with a rounded head and a broad, beveled tip; it appears to be machine forged, but is poorly preserved.

#### T-120 Complex

This site consists of 11 walls and a filled depression. It is located in and along the slopes of a long, deep ravine, between two pressure ridges. Major axis of the complex is c. 70.0 m and the minor axis is c. 35.0 m. The complex is situated in the coastal zone at an elevation of 15 ft AMSL. It is adjacent to Site D14-5, which is a complex of two platforms, and is probably part of that habitation complex.

Feature A is the southernmost and largest wall of the complex. It spans the ravine, enclosing all other features. The wall is constructed of pahoehoe slabs, stacked to an average height of 0.7 m. This feature is c. 10.0 m north of Feature B of site D14-5.

Feature B is slightly curving to L-shaped; it is constructed around the perimeter of a small natural opening at the bottom of a constricted section of the ravine.

Feature C is a free-standing wall located along the west-facing slope, c. 4.0 m from Feature B. It is slightly curved, 0.6 m high and c. 2.0 m long.

Feature D is a straight wall which abuts the face of the ravine and partially encloses a shallow overhang shelter. It is c. 1.5 m long and 0.5 m high. No portable remains were observed in the small, low-ceiling overhang.

Feature E is a slightly curved, 0.7 m high free-standing wall located along the crest of a narrow saddle. It is directly west of and above Feature D.

Feature F is a slightly curved, free-standing wall positioned on the west-facing slope of the narrow saddle, c. 4.0 m from Feature E.

Feature G is a U-shaped wall positioned around the perimeter of a natural opening at the bottom of a broad section of the ravine. It is c. 10.0 m northwest from Feature F.

Feature H is a semicircular wall which completely encloses a small, low ceiling overhang. It is c. 3.0 m long and 0.6 m high. No portable remains were observed in the overhang. This feature is c. 7.0 m north of Feature G.

Feature I is a semicircular wall which completely encloses a small natural opening at the base of the ravine slope. A low overhang occurs along a shelf above the wall, which is along the east face of the ravine, c. 5.0 m from Feature G.

Feature J is a straight wall constructed across a constriction near the head of the ravine, c. 4.0 m west of Feature H.

Feature K is a straight, free-standing wall located along the lower west facing slope, near the head of the ravine. It is c. 2.5 m long and 0.6 m high.

Feature L is a filled depression at the head of the ravine, c. 5.0 m northwest from Feature K. The filled area is the narrow, constricted portion of the ravine and is at a higher elevation than the wall features. An area c. 3.0 m long and 2.0 m wide was leveled with pahoehoe cobbles of relatively consistent size. The surface of this feature slopes slightly toward the southeast.

No portable remains were observed on the site surface or in any of the small enclosed overhangs. Ground surface visibility was, however, very poor over most of the site. Portions of some features, particularly the free-standing walls, have been knocked down. Most walls are in generally good condition.

#### T-121 Cairn

This single cairn is located 18.5 m northeast from Sites D14-5 and T-120. It is situated on the crest of a smooth pahoehoe pressure ridge, adjacent to a large crack. This feature is in the coastal zone, at an elevation of 12 ft AMSL. The cairn has been dismantled and stones are currently dispersed over an area 2.8 x 1.6 m; maximum height is currently 25 cm.

#### T-122 Complex

This temporary habitation/possible ceremonial site consists of a filled depression at the entrance of an overhang shelter and a cave shelter, located in adjacent ravines along the slope of a low pahoehoe rise. The site is in the coastal zone at an elevation of 10 ft AMSL, 85.0 m west from Sites D14-5 and T-120. The two features are 9.0 m apart and situated on opposite sides of a narrow saddle (Figure 11).

Feature A is a leveled, filled crevice at the front of an extremely shallow overhang that has a southwesterly exposure. The overhang is 2.2 m wide and 0.7 m deep; there is essentially no habitable space under the

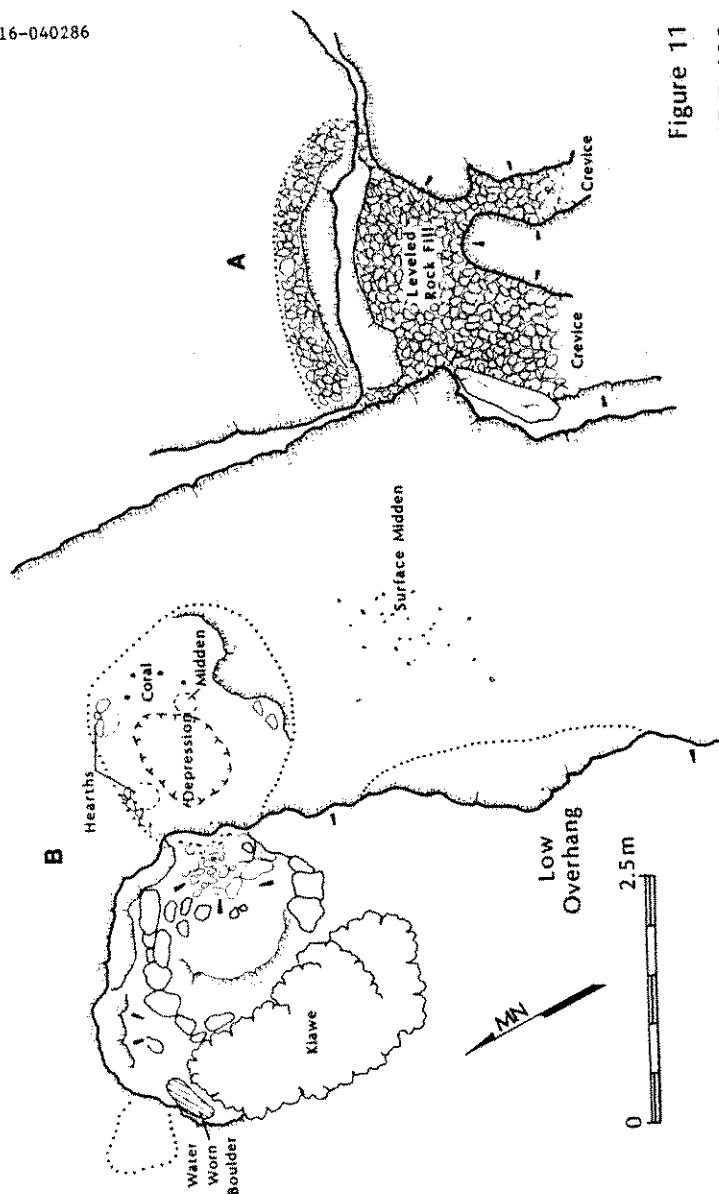


Figure 11

SITE T-122  
FEATURES A AND B

216-040286

dripline. The paved area is 2.25 m long and 1.75 m wide, and fills a crevice between outcropped bedrock. Relatively small, regularly-sized cobbles were used on the surface of the fill. Pieces of waterworn coral are incorporated into the pavement and scattered in the back of the overhang. No subsistence remains were observed on this feature, which may have functioned as a shrine or burial.

Feature B is a circular cave with a small (75 cm long) opening oriented toward the northwest (320 degrees Az). The cave is 2.5 m in diameter and has an average ceiling height of 70 cm. It contains a dense deposit of beach sand and midden which has been disturbed in places by recent utilization of the cave. The deposit is piled up to over 10 cm in places. Structural alteration is suggested at the cave entrance where rockfall appears to have been piled and arranged to allow access to the cave.

Portable remains observed in Feature B include *Cypraea* spp., *N. picea*, *B. crebristriatus*, *Callena* sp., Thaididae, Echinoidea, *kukui*, mammal bone, aluminum cooking ware, and a modern ironstone coffee cup. Surface midden was also observed along the saddle between the two features.

T-123 Cairn

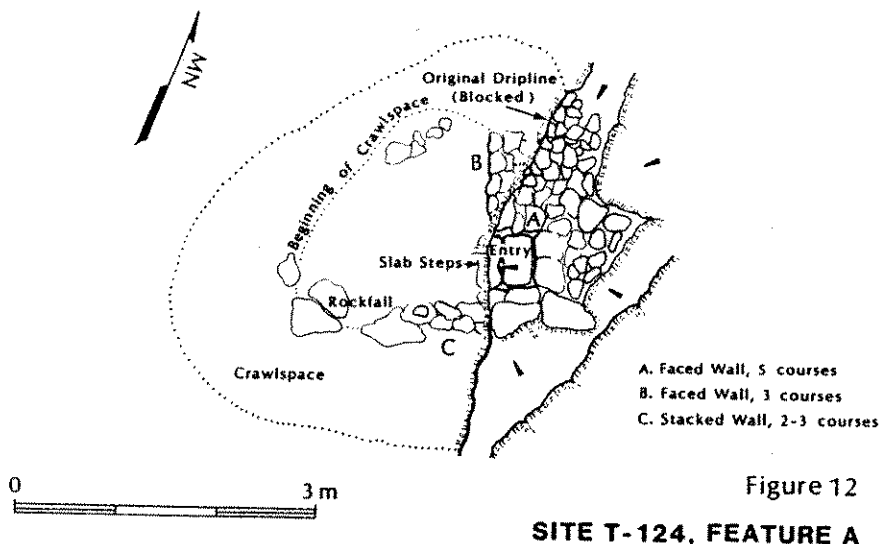
This single feature is located on the crest of a pahoehoe ridge in the coastal zone, at an elevation of 15 ft AMSL. It is 18.3 m southwest from Site T-124, discussed below. The cairn was constructed of stacked pahoehoe slabs, c. seven courses high. It is 0.8 m wide at the base and currently 0.3 m high. The feature has been knocked over, however, the stones are still arranged in their original positions.

T-124 Complex

This site consists of a walled cave and a single wall, located in a shallow ravine at the base of the east facing slope of a pressure ridge. It is located in the coastal zone at an elevation of 15 ft AMSL. The two features are 5.2 m apart; Feature A is the westernmost.

Feature A is a small, low-ceilinged cave that has been walled so as to decrease the size of the entranceway (Figure 12). The natural feature opening is 3.75 m long and is oriented toward the east (85 degrees Az). The artificial opening is 0.74 m wide and vertical, with a drop of 0.7 m to the floor of the cave. The artificial entrance was created by constructing two faced, vertical walls at the dripline and piling additional stones along the exterior faces. The vertical walls are constructed from regularly shaped pahoehoe blocks three courses high. The entranceway walls, which corner out from the dripline, are likewise faced and are five courses high. Ceiling height at the cave entrance is 0.65 m; maximum height is 0.76 m. Roughly two thirds of the 12.0 sq m cave is crawlspace with a ceiling height of 0.4 m or less. The cave is completely void of portable remains and has a sterile bedrock floor; it may have been used for storage.





Feature B is a low stacked pahoehoe boulder wall built across a constricted ravine, 5.2 m north of Feature A. The wall is two courses high (0.4 m) and one to two rows wide (0.6 to 1.0 m). No portable remains or surface deposit was observed in the vicinity of this wall, which is 1.8 m long. This feature possibly represents a temporarily occupied walled shelter.

#### T-125 Complex

This temporary habitation site consists of an overhang shelter, a low rubble mound and a circular arrangement of rocks, located within a 200 sq m area at the base of a shallow pahoehoe depression. The site is 30.0 m northeast from Site T-126; it is in the coastal zone, at an elevation of 13 ft AMSL.

Feature A is an overhang shelter with an opening 2.8 m wide; it is 1.6 m deep and has an average ceiling height of 0.9 m. The floor is very irregular bedrock and the shelter contains a single fragment of *CYPRAEA* sp. shell. Limited alterations appear to have been made in the shelter floor by filling cracks with small cobbles.

Feature B is a haphazard deposit of large pahoehoe boulders along the slope of a small blister and in the adjacent ravine. It is located c. 8.0 m north of Feature A and 5.0 m west of Feature C.

Feature C is a roughly circular arrangement of pahoehoe blocks, 0.64 m in diameter (interior of circle). The stones are single course and relatively large, with an average length of 0.4 m. A single goat bone and a waterworn pebble was observed near this feature.

#### T-126 Complex

This complex consists of a cave shelter, an overhang shelter, two filled and paved depressions and two cairns. It is located in a broad, shallow pahoehoe sinkhole in the coastal zone, at an elevation of 15 ft AMSL. Overall site area is approximately 600 sq m.

Feature A is a cave shelter located under the perimeter of a small pahoehoe blister (2.0 x 1.8 m) that has been cleared of rockfall. The floor of the cleared blister is 0.5 m below ground surface and is scattered with surface midden. The cave is a tube-like Feature 5.5 m long and 2.5 m wide, with an average ceiling height of 0.95 m. A low crawlspace area occurs under the perimeter of the remainder of the blister. Artifacts present in Feature A (listed below) indicate intensive historical use of this shelter.

Feature B is a shallow overhang shelter with a 4.0 m wide opening that is oriented to the south (180 degrees Az). This feature is on a natural shelf along the northern perimeter of the sinkhole, in an area of dense Christmas-berry. Shell midden is lightly scattered over the floor of this feature, with no concentrations. There are no indications of structural modifications to this shelter.

Feature C is a filled and leveled strip which spans a crack at the center of the shallow sinkhole. This feature is 4.0 m long and 1.2 m wide; it is constructed of large boulders and cobbles, with smaller stones on the surface. Depth of the filled area varies from c. 0.6 to 0.2 m. No portable remains were located on this path-like feature, however, surface midden is scattered in the immediate vicinity.

Feature D is a pavement of small cobbles in a shallow ravine, located c. 7.0 m east of Feature C. Width of the pavement varies from 0.6 to 1.9 m and it is 3.5 m long. The paving is narrow at the northern end, which is located under a small, low overhang (1.5 m wide, 0.6 m deep and 0.3 m high). No portable remains were observed on the pavement or in the low overhang.

Features E and F are small cairns that are located on the southern rim of the sinkhole. The smallest cairn, Feature E, is 0.44 m wide at the base and 0.25 m high. It is constructed of stacked pahoehoe slabs. Feature F is dismantled with only a single course remaining. Stones are scattered over an area 1.2 m in diameter. These cairns are 13.0 m apart and aligned northeasterly (25 degrees Az). Two additional small rubble piles were noted around the rim of the sinkhole, which may also represent dismantled cairns.

216-040286

36

216-040286

Portable remains are most concentrated in Feature A, however, surface midden is scattered in crevices and low areas across the site. Materials observed include *Cypraea* spp., *Callana* spp., Conidea, Echinoidea, wooden planks, aluminum cookware, iron cookware, enamelware dishes, screw-top glass jars, waterworn pebbles and waterworn boulders. A concentration of nine waterworn boulders occurs in Feature A; some of these stones appear to have been utilized as grinding surfaces. None of the boulders are positioned in a manner suggesting a abrane, however, possible disturbance by recent occupants is indicated. The site appears to have been used for temporary habitation. The function of Features C and D is indeterminate and they may represent burials.

#### T-127 Complex

This site consists of a walled tube cave and a cairn, located along the lower slope of a pahoehoe sinkhole in the coastal zone, at an elevation of 12 ft AMSL. This site is 49.0 m southeast from Site 1908, a large high walled enclosure.

Feature A is a natural tube cave which has been walled at the dripline to create an artificial opening 0.75 m high and 0.58 m wide (Figure 13). The wall is slightly semicircular and constructed as a single course of large boulders with smaller stones used to fill spaces. Interior space of the cave is quite small and the ceiling height averages 0.3 m; it appears to have been used as a storage facility. No portable remains were observed in the cave.

Feature B is a dismantled cairn located upslope, 6.0 m to the north-east (60 degrees Az) from Feature A. Original height is indeterminate and stones are currently scattered over an area 1.6 m in diameter. A single piece of weathered coral was located among the scattered stones.

#### T-128 Rubble Mound

This single feature is located in a pahoehoe crack 18.2 m north from Site 1908. It is in the coastal zone, at an elevation of 12 ft AMSL. The low (0.4 m) mound is crescent shaped and follows the configuration of the crack in which it is situated. Maximum length is 3.0 m and maximum width is 2.1 m, which is at the center. Pahoehoe slabs and chunky boulders were used in forming the mound by piling the stones haphazardly. No portable remains were observed on the mound; a waterworn pebble was located 6.0 m from the feature, in an adjacent crack. This feature may represent a burial.

#### T-129 Cave Shelter

This relatively isolated cave shelter is located at the base of a pahoehoe ridge, 110 m distance from the nearest site (T-128). It is at the coastal/rocklands interface, at an elevation of 20 ft AMSL. The cave is roughly oval in shape, with an interior area of c. 256 sq m (Figure 14).

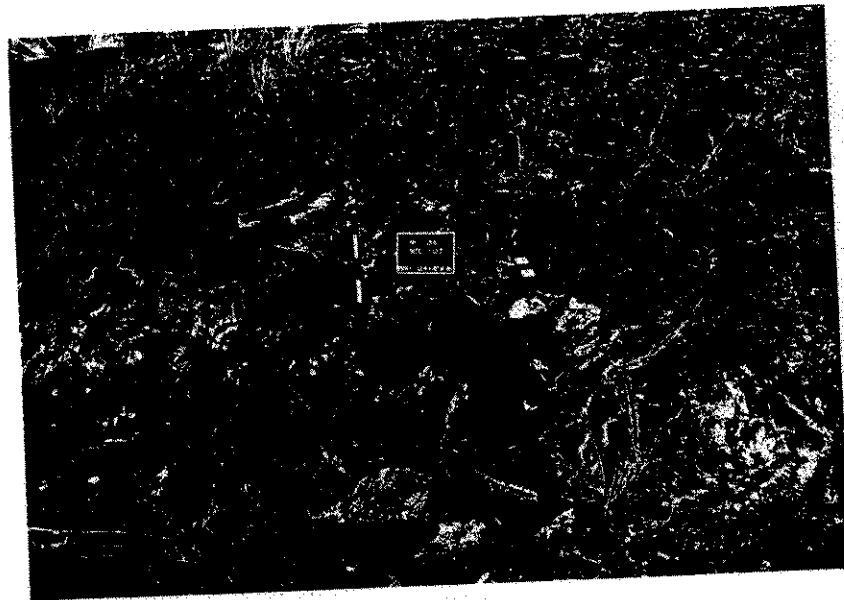


Figure 13. SITE T-127, FEATURE A. View to east. (PHRI Neg.435-14)

B-22

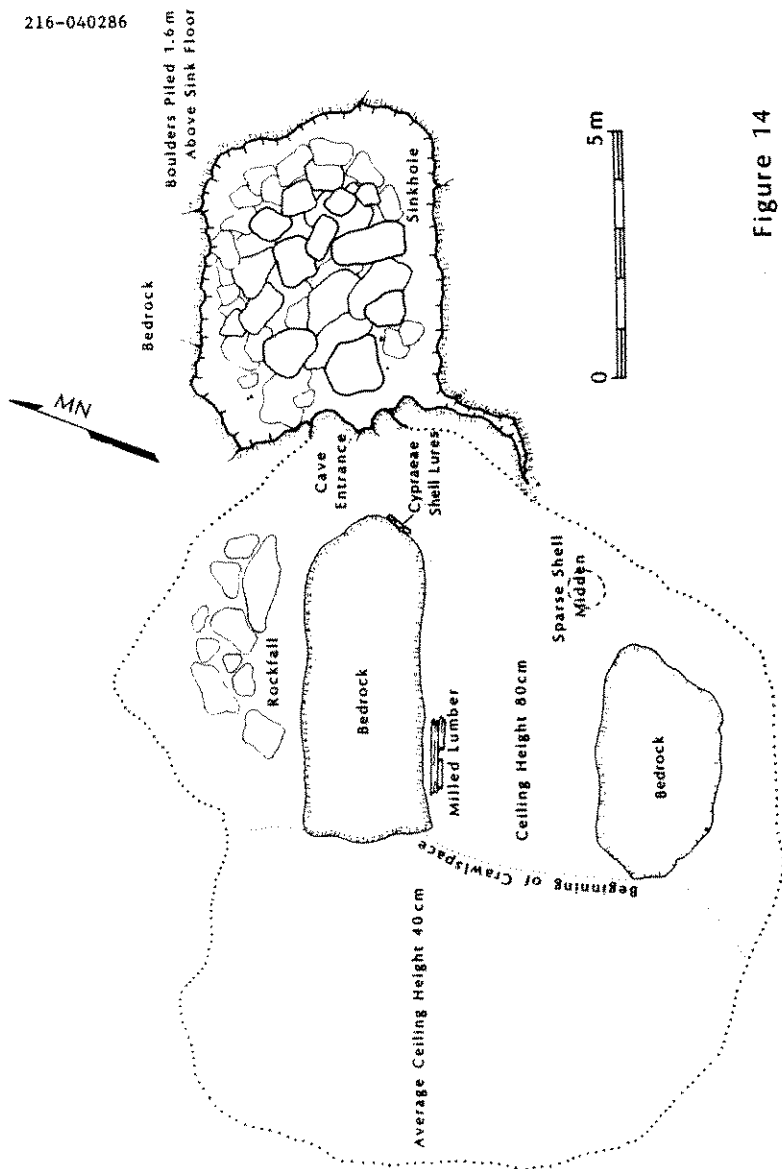


Figure 14  
SITE T-129

The opening is very small and low (1.0 m wide and 0.75 m high) and is oriented toward the east (70 degrees Az). Maximum ceiling height is at the entrance and over one half of the interior area is crawspace. A deep ravine is located immediately adjacent to the cave entrance; this ravine has been filled with large, chunky boulders that are piled to a height of 0.6 m. There is a small entranceway at the back of the cave that is difficult to access.

Portable remains observed inside the cave include three *Cypraea* sp. octopus lures, two planks of milled lumber with tongue-and-groove modifications and drilled holes, and seven Tellinidae fragments. The octopus lures were cached together near the cave entrance; these artifacts were collected. This site may have been used for either temporary habitation or storage.

#### T-130 Complex

This site consists of an overhang shelter and a coral pavement, located at the bottom of a relatively deep sinkhole in the coastal zone, at an elevation of 15 ft AMSL. The sinkhole is 8.4 m long and 4.0 m wide, with an average depth of 3.0 m.

Feature A is an overhang shelter located at the southern end of the sinkhole. It is c. 4.0 m wide and 3.0 m deep. No portable remains were observed; however, the shelter was densely overgrown and surface visibility was poor.

Feature B is a slightly terraced pavement located at the northern end of the sinkhole. It is square and measures 2.4 m on a side. Two edges of the pavement abutt walls of the sinkhole, and the northern side is built up in order to level the floor surface. Perimeters of the pavement are outlined with a single course of large boulders (Figure 15). The paving material consists of weathered coral, cobbles, and pebbles. Two large waterworn boulders are located in the center of the pavement. All surface shell observed was weathered and appeared to have been deposited with the coral surfacing. A number of waterworn boulders occur on the coral pavement, which appears to have had a ceremonial function.

#### T-131 Circular Stone Alignment

This single feature is located on smooth pahoehoe 73.5 m southwest from Site T-130, in the coastal zone at an elevation of 10 ft AMSL. It consists of a roughly defined ring of stones 2.2 x 1.9 m, most of which are a single course. A single portable artifact (aluminum beer can) was observed in the vicinity. This feature may represent a temporary shelter. There was no evidence that it was used as a recent hearth area.

#### T-132 Complex

This site consists of a terrace and three filled depressions, located in a 117.6 sq m area of crevices in a shallow pahoehoe depression. It is located at the coastal/rocklands interface at an elevation of 25 ft AMSL, 42.7 m southeast from Site T-133.



Figure 15. SITE T-130, FEATURE B. View to northeast. (PHRI Neg.435-18)

B-23

Feature A is a rock filled terrace constructed of large to medium pahoehoe boulders. It is rectangular in shape, 5.7 m long and 2.6 m wide. This feature is at the northernmost end of the complex; the eastern edge of the terrace is built up and extends over a relatively broad ravine. The terrace wall is not faced, and consisted of roughly piled slabs. A single piece of weathered coral was observed on the terrace, and shell midden is scattered on the surface immediately to the south.

Feature B is a roughly circular filled depression located 4.0 m south from Feature A. This feature is c. 2.0 m in diameter and constructed with pahoehoe slabs and cobbles. A concentration of waterworn pebbles and two waterworn boulders is located in the center of this feature. A small concentration of shell midden occurs immediately to the south.

Features C and D are filled depressions very similar in size and construction to Feature B. They are located in a line southwest (255 degrees Az) from Feature B, at c. 2.0 m and 6.0 m respectively. A circular hearth area, defined by aligned stones, is adjacent to Feature C to the south. Shell midden is concentrated within this hearth area.

Portable remains observed include *R. crebristriatus*, Thaididae, Conidae, Veneridae, Echinoidea, basalt flakes, and waterworn stones. Functional interpretation of the features present at this site must await further investigations.

#### T-133 Cairn

This single cairn is located on a pahoehoe ridge crest, at the coastal rocklands interface, at an elevation of 22 ft AMSL. It is partially dismantled, with stones scattered over an area 4.5 m in diameter. Current height is 0.5 m; original height and circumference is indeterminate. This feature is the southernmost of an alignment of large cairns which define the anchialine pond area along the coast. The nearest cairn in the alignment is Site T-142, located 90.2 m distance at 315 degrees Az.

#### T-134 Complex

This shrine site consists of two platforms constructed at the edge of an anchialine pool in the bottom of a small sinkhole. It is located in the coastal zone at an elevation of c. 8 ft AMSL. Site T-135 is located 30.5 m to the west. The sinkhole is oval shaped with a major axis of 9.8 m and a minor axis of 8.0 m; average depth is 1.8 m. Two small pools occur in the sinkhole; they are separated by a gravel and bedrock bar which apparently stays above water during high tide. Both features are at the edge of the northernmost pool (Figure 16a).

Feature A is a small semicircular platform 1.8 m long and 0.8 m wide constructed on a sloping shelf along the walls of the sinkhole. The surface of the platform is 0.45 m above water level (low tide), and is outlined with a faced wall four courses high. The platform surface is of small pebble fill. The platform is constructed so as to enshrine an upright boulder that is positioned on the bedrock 0.2 m above the feature. The upright is an egg shaped waterworn boulder 0.3 m long and 0.2 m wide.

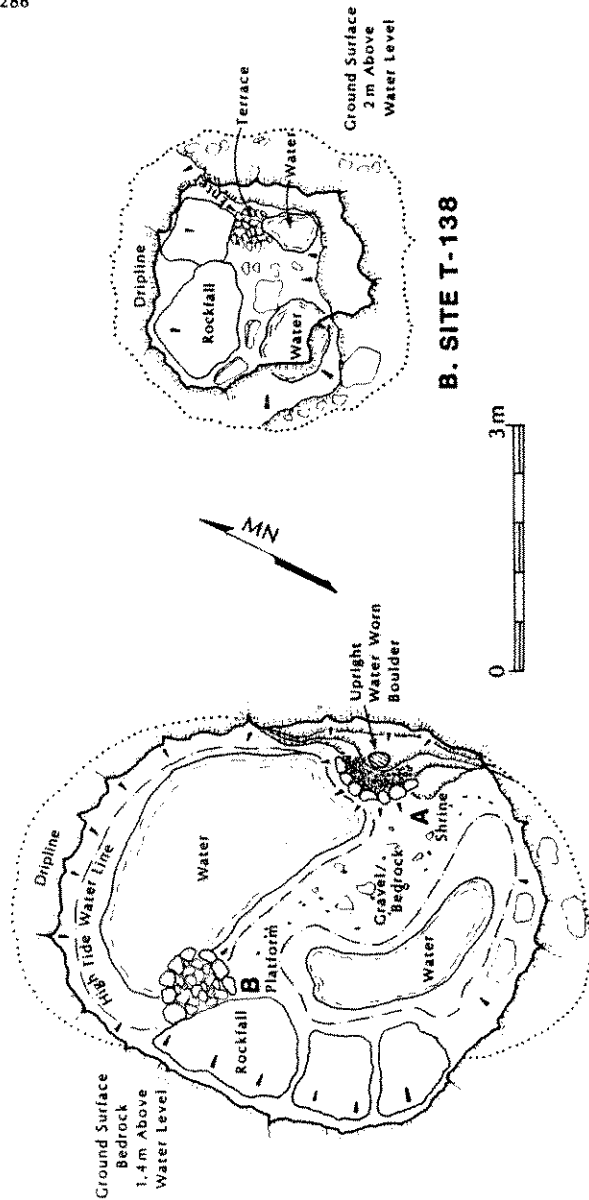


Figure 16  
SITES T-134 AND T-138  
MODIFIED SINKHOLE POOLS

A. SITE T-134

Feature B is a small platform located at the western perimeter of the same pool, 4.5 m west from Feature A. This structure is also semicircular, but is constructed of larger and irregularly shaped boulders and cobbles. The surface of the platform is 0.40 m above present water level and 0.15 to 0.2 m above water level during high tide. This platform is 1.9 m long and 1.65 m wide.

No subsistence remains were located in the sinkhole, however, a small modern dipnet was observed. Shell fragments of *Planaxidae* sp. and weathered coral fragments were observed on the ground surface above the sinkhole.

#### T-135 Complex

This aquaculture site consists of two extensively modified anchialine ponds and a spring channel. There are at least eight features in this complex, including six walls and two platforms. They are grouped into two clusters, each associated with a pond and spring stream. The site is located in a level area of the coastal zone, c. 25.0 m southwest from Site T-134. It is 170.5 m inland from Site D14-8, a possible *heiau* and burial complex.

Feature A is the longest wall of the complex and is oriented down the center of the largest, eastern pond. It is constructed from waterworn basalt boulders and pahoehoe slabs, stacked with double facing four to five courses high (0.75 m). The wall is 0.5 m wide and c. 9.0 m long. The northern end abutts the walls of the shallow sinkhole pond and the southern end has a gate-like opening and small dam, for passage and channeling of water. The wall bisects the ponded area, which is currently silted in and has no water above the vascular plants that completely cover the site.

Feature B is a facing wall that completely encloses a second pond, located c. 15.0 m to the west of Feature A. The wall is built into the banks of the pond and is c. 0.7 m high. The pond is c. 6.0 m in diameter and is presently difficult to access due to dense undergrowth.

Features C and D are small platforms erected along the course of the feeder stream to Feature B. This stream has been dammed in three places with small walls across natural constrictions. The platforms were constructed from rough rockfall that was probably removed from the stream; they are small (c. 1.0 m in diameter) and have irregular surfaces. Coral is scattered on the surface of Feature D.

The remaining features in this complex are small sections of facing or damming walls that occur around the perimeter of the large pond. Feature E is a free standing wall located at the perimeter of the spring; it apparently functioned to channel water toward the dam and gate of Feature A. Features F, G and H are small sections of facing placed along the perimeter of the large pond.

It is possible that there are additional features at this site; ground cover and tree growth severely restricted visibility at the time of survey.

216-040286

44

216-040286

T-136 Complex

This site consists of three cairns and a circular stone alignment, located along the crack of a low pahoehoe pressure ridge in the coastal zone, at an elevation of 10 ft AMSL. The features occur in an area 33.0 m long and roughly 4.0 m wide. The southernmost of the features, Feature A, is a dismantled cairn of which nothing is left but a dispersed pile of stones.

Feature B is a small cairn constructed from c. twelve stones. It consists of four large slabs leaned against one another with four smaller slabs stacked on top (Figure 7d). It is 0.5 x 0.8 m at the base and 0.6 m high. This cairn is 10.0 m southeast (155 degrees Az) from Feature A.

Feature C is a small cairn constructed from six pahoehoe cobbles and a long, narrow waterworn boulder. The cobbles are arranged so as to support the waterworn boulder in an upright position. It is 0.4 x 0.35 m at the base and 0.35 m high. This cairn is 23.0 m south (170 degrees Az) from Feature B (Figure 7e).

Feature D is a circular alignment of scattered stones located 4.0 m east of Feature B. The formation is 2.5 m in diameter and has a break in the alignment 1.2 m long. Stones are dispersed around this break. No portable remains were observed in the vicinity of these features, which may be of recent construction.

T-137 Complex

This site consists of five small cairns that are arranged along the crest of a low pahoehoe pressure ridge, adjacent to a large crack. The southernmost cairn in this complex is 24.5 m north from Site T-136, and it is likely that these sites are temporally related, given techniques of cairn construction.

Feature A is the southernmost cairn; it is 0.7 x 0.75 m at the base and 0.2 m high. This cairn is constructed from piled pahoehoe slabs and is partially dismantled.

Feature B is located 30.0 m northwest (320 degrees Az) from Feature A. It is constructed from piled and stacked pahoehoe slabs and measures a 0.44 x 1.2 m at the base; it is 0.4 m high.

Feature C is located 12.0 m northwest (330 degrees Az) from Feature B. It is the smallest cairn of the group and measures 0.4 x 0.35 m at the base, 0.37 m high. It consists of three blocky pieces of pahoehoe stacked on the bedrock.

Feature D is situated between Features A and B, 8.0 m southeast (165 degrees Az) from Feature B. It has been dismantled and stones are scattered in an area 1.1 x 0.8 m. The cairn remnants are 0.18 m high. This feature was apparently constructed from stacked slabs with core fill of smaller cobbles.

Feature E is located 55.0 m northeast (50 degrees Az) from Feature D. It is constructed from four pahoehoe slabs; three are leaned on end against one another and the fourth stone is laid on top. This cairn is 0.4 m in diameter at the base and 0.45 m high.

T-138 Cleared Pool

This site is a small, deep sinkhole with a cleared anchialine pool and a loosely constructed platform adjacent to the pool. The site is located in the coastal zone at an elevation of 10 ft AMSL. Site T-139 is 36.5 m to the south. The sinkhole is 6.0 m in diameter at the dripline, which is 2.0 m above pool water level. The steep sided sinkhole is accessed through a narrow pathway that appears to have been opened and cleared through rockfall. Large pieces of rockfall have been removed from the pool and placed along its perimeter; smaller pieces were apparently utilized to construct a small platform at the edge of the pool (Figure 16b).

The cleared pool is 1.1 m long and 0.7 m wide; beach sand has been placed in the bottom. A second pool, 1.5 m in diameter, does not appear to have been altered. The platform is adjacent to the smaller, deepened pool and is situated between large pieces of rockfall. It is an irregular shape, but averages c. 1.0 m in diameter. The platform surface is somewhat irregular and no pebble paving was observed.

Portable remains observed in the sink include coral, *Cypraea* sp., Echinidea and a small waterworn basalt pebble. The site probably functioned as a bath.

T-139 Overhang Shelter

This temporary habitation site is located along the side of a sinkhole in smooth pahoehoe, at an elevation of 8 ft AMSL, in the coastal zone. Cairn Complex T-137 is 18.0 m southwest from this shelter. The overhang opening is 8.0 m long and is oriented toward the northwest (320 degrees Az). Maximum depth of the sheltered area is at the center, where it is 1.8 m deep. Ceiling height is 1.25 m at the opening.

A stacked boulder wall is positioned directly under the dripline at the western end of the shelter. This wall appears to have been constructed from rockfall; it is 2.5 m long and 1.05 m high. The base of the wall consists of three very large boulders, on which three courses of smaller stones were stacked, unfaced.

No portable remains were observed in or around the shelter, however, a soil deposit of at least 0.1 m is present just outside the shelter dripline. The shelter floor is primarily exposed bedrock, with a low ditch-like feature along the back of the overhang which has collected c. 0.05 m of soil.

T-140 Rock Mound

This single rock mound is located 12.0 m west and downslope from the Cairn Complex T-137, and c. 25.0 m northwest from Feature C of Complex T-136. It is situated in a cracked pahoehoe depression, at an elevation of 8 ft AMSL. The mound has a major axis of 2.8 m at the base, oriented northeast (20 degrees Az). Minor axis is 2.3 m and maximum height is 0.75 m. The mound is constructed from variously sized pahoehoe slabs and boulders. Large slabs are positioned upright around the basal perimeter along the north face and are stacked two to three courses around the east face. The southern sides of the mound are not faced. Smaller cobbles and pebbles were used as mound fill and the surface was left somewhat irregular and mounded.

Portable remains scattered among mound fill stones include Cypraea sp., Conidae, coral, and waterworn basalt pebbles. Shell fragments of Cypraeidae and Thaididae are scattered sparsely on the ground adjacent to the mound, which may represent a burial site.

T-141 C-Shape Shelter

This single temporary habitation feature is located at the base of a broad sinkhole, adjacent to the rock face of the sink wall. It is located in the coastal zone, at an elevation of 15 ft AMSL. The site consists of a semicircular arrangement of c. ten large boulders a single course high, with a maximum width of 5.0 m. The C-shape opens toward the north (360 degrees Az), and the west and south walls are natural bedrock faces.

Portable remains observed inside the shelter include N. picea, Cypraea sp., Echinoidea, and coral. Material is sparsely scattered on the bedrock surface with no area of concentration.

T-142 Cairn

This large cairn is located 90.2 m northwest (315 degrees Az) from Cairn T-133, and is part of the alignment of large cairns around the anchialine ponds. This feature is constructed from pahoehoe slabs and a single large beach conglomerate boulder, which was placed in the east face, near the base of the cairn. The upper portions of the cairn have been disassembled and stones are scattered in an area 5.0 m in diameter. Original diameter was 2.3 m, as measured along the north-south axis. Maximum existing height is 0.98 m. The north wall is intact to six courses (0.8 m) and is faced. This wall appears to be straight, however, only a small portion was observable, due to dislocated rubble. Remnants of the east wall appear to be slightly curved and it is difficult to determine whether the cairn was rounded or squared. Other better preserved cairns in the alignment are rounded.

Portable remains observed on the cairn include fragments of a horned goat skull.

T-143 Cairn

This large cairn is located 71.5 m northwest (318 degrees Az) from Cairn T-142, at an elevation of 15 ft AMSL. This and other cairns in the alignment are situated at the interface between coastal and rocklands environmental zones. Like all other features in the alignment, this cairn has been partially dismantled and stones are scattered within a 5.2 x 5.7 m area. Actual cairn dimensions are 2.6 x 2.7 m. The cairn is constructed from stacked pahoehoe slabs and a single beach conglomerate. As with T-143, the actual shape could not be determined due to disturbed rubble. Maximum height of this feature is 0.85 m. No portable remains were observed on the cairn or in the immediate vicinity.

T-144 Complex

This habitation site consists of an overhang shelter with exterior walls, located in a shallow pahoehoe sink, 60.0 m northeast from Site T-138. It is situated in the coastal zone, at an elevation of 10 ft AMSL.

Feature A is a shallow overhang shelter which opens toward the northeast (30 degrees Az). Large pahoehoe boulders are stacked three to four courses high at the western end of the entrance, forming a freestanding wall 2.1 m long and 0.76 m high. The floor of the overhang is of irregular bedrock and additional stones have been stacked at the dripline so as to create a sectioned entrance. The remainder of the shelter is not sectioned.

Feature B is a wall of large, irregularly-shaped boulders, built along a bedrock shelf that defines the perimeter of the sink. This wall encloses a roughly circular yard space at the front of the shelter. It is 0.85 m high on a shelf that is 0.27 m high. The semicircular wall commences c. 2.0 m from the end of the overhang wall, leaving an opening for access to the shelter. It ends at the bedrock face of the sinkhole.

Portable remains observed in the shelter include Conidae and Kukuia, along with a few small waterworn basalt pebbles. A single piece of weathered coral was observed outside the shelter, where soil has accumulated to at least 0.06 m. A small partially buried circular arrangement of stones was located in the center of the enclosed yard area; this feature may represent a hearth.

T-145 Walled Pond

This single feature consists of a small wall of single course boulders, erected at the shallow low, southwest edge of an anchialine pond. The site is in a low sink along the coast, at an elevation of 5 ft AMSL. The pond is 4.5 m in diameter, with the deepest part at the eastern end. The base of the pond gradually slopes upward toward the southwest, where the wall is situated. The wall is 4.0 m long and is slightly curved, with an average height of 0.5 m. No portable remains were located in the immediate vicinity of this site, which probably functioned as a bath.

T-146 Cairn

This small cairn is located at the eastern edge of the mangrove thicket, at 7-8 ft AMSL. It is constructed from chunky pahoehoe boulders stacked to form a rough square, unfaced feature. Two courses of the north and west sides are intact to 0.65 m; the remainder of the cairn has been dismantled and stones are scattered over an area 2.3 x 1.9 m. No portable remains were observed in the immediate vicinity.

T-147 Cairn

This large cairn is part of the ponded zone demarcation; it is 130.0 m northwest (318 degrees Az) from cairn T-143. The spacing between Cairns T-143 and T-147 is the greatest along the alignment (average distance between cairns is 69.7 m). This cairn has been partially dismantled and stones are scattered within an area 6.0 m in diameter. The original structure was 2.7 m across both axes and current height is 0.83 m. Original shape is not determinable without removal of disturbed stones. No portable remains were observed in the immediate vicinity and all stones visible are pahoehoe slabs or boulders.

T-148 Cairn

This cairn is part of the alignment of large cairns; it is located 92.0 m northwest (315 degrees Az) from Cairn T-147, at an elevation of 15 ft AMSL. Disassembled stones are scattered over an area 6.0 m in diameter; original dimensions are 2.6 m on both axes. This cairn is currently 0.92 m high and was constructed from pahoehoe slabs with a single beach conglomerate boulder. Portable remains observed include a single large piece of weathered coral that was built into the cairn and several small pieces of weathered coral, scattered about stone rubble.

T-149 Cairn

This cairn is part of the alignment of large cairns; it is located 50.7 m northwest (311 degrees Az) from Cairn T-149. It is partially dismantled, with stones scattered over an area 5.6 m in diameter. Original dimensions are 2.6 x 2.45 m. Six courses of stacked pahoehoe slabs are intact along the east wall of this cairn, which appears to have been filled with smaller pahoehoe stones. A single boulder of beach conglomerate was observed among the disassembled rubble around this feature. No portable remains were observed.

T-150 Cairn

This small cairn consists of a simple stack of pahoehoe slabs 0.75 m high and 0.5 m at the base (Figure 7f). It is located midway between large Cairns T-148 and T-149, 39.8 m northwest (332 degrees Az) from T-149. This simple cairn may be a recent feature; no portable remains were observed in the immediate vicinity.

T-151 Cairn

This small, relatively isolated cairn is located 24.0 m east from the coastal jeep road, near the northwestern edge of the mangrove thicket. It is constructed from stacked pahoehoe slabs that are intact to four courses along the western wall. The cairn measures 0.6 x 0.8 m at the base and is currently 0.5 m high; it has been partially dismantled. No portable remains were located in the immediate vicinity.

T-152 Cairn

This small cairn is located along the northern perimeter of the mangrove trees, 116 m northeast from Cairn T-151. It consists of a simple stack of four pahoehoe slabs, 0.3 x 0.4 m at the base and 0.4 m high. No portable remains were observed in the immediate vicinity.

T-153 Cairn

This small cairn is located 12 m northeast (28 degrees Az) from Cairn T-152, in an area of broken pahoehoe, at an elevation of 8 ft AMSL. It is constructed from seven pahoehoe slabs and measures 0.6 x 0.56 m at the base and 0.5 m in height. No portable remains were observed in the immediate vicinity of this feature.

T-154 Complex

This site consists of a cave shelter, an alignment of large boulders around the cave entrance, and a small cairn. It is located in the coastal zone at an elevation of 8 ft AMSL.

Feature A is a cave shelter c. 8.0 m deep and 15.0 m wide that has a ceiling height of 0.47 m. The cave entrance is 1.48 m wide and is oriented toward the north (360 degrees Az). The floor of the cave is exposed bedrock and no internal modifications or portable remains were observed. This feature may have been used for storage.

Feature B is a crude alignment of large rockfall boulders that were apparently cleared from a crevice in front of the cave in order to provide access to the cave. The arrangement simply follows the configuration of the crevice and does not appear to have been structured; it is a single course of stones.

Feature C is a small cairn located on the rock overhang which forms the roof of the cave. It measures 0.9 x 0.7 m at the base and is 0.45 m high. The cairn is constructed from chunks of vesicular lava stacked three to four courses high in a somewhat amorphous conical form. No portable remains were observed in the immediate vicinity of this feature.



T-155 Cairn

This large cairn is part of the alignment of large cairns; it is located 67.0 m northwest (308 degrees Az) from Cairn T-149, at an elevation of 17 ft AMSL. This cairn has been partially dismantled and stones are scattered within an area 4.7 m in diameter. Original dimensions were apparently 1.6 m along each side. Existing height is 0.91 m. This cairn appears to have been squared in plan view and eight courses of stacked pahoehoe slabs are intact along the south wall.

T-156 Cairn

This large cairn is part of the alignment of large cairns; it is located 52.0 m northwest (311 degrees Az) from Cairn T-155. Disturbed rubble is scattered over an area 5.0 x 6.0 m around this cairn, which has original dimensions of 2.4 x 2.6 m. Existing height is 1.15 m. Portions of the north, east and west sides have up to ten courses of slabs intact. No portable remains were observed in the vicinity of this feature.

T-157 Complex

This site consists of a large cairn, a cave shelter and a small cairn, located on a prominent pahoehoe ridge at an elevation of 17 ft AMSL (Figure 17). (See also Figure 18.)

Feature A is a large cairn and is part of the alignment which demarcates the anchialine ponds. It is located 81.0 m northwest (311 degrees Az) from Cairn T-156. This cairn is in better preservation than other cairns in the alignment and has a clearly circular plan view. It has been cross-sectioned by looters rather than simply disassembled from the top down. Fourteen courses of flat pahoehoe slabs are intact along the western portion, which has a maximum height of 1.15 m. The internal fill appears to have been placed into the cairn after the exterior walls were completed; it consists of chunkier stones of a size similar to the exterior wall slabs.

Feature B is a cave shelter which is located in a lava tube directly beneath the Feature A cairn (Figure 17). This cave has three entrances, two of which are oriented toward the north. The western entrance is directly beneath Cairn T-157; it is 1.5 m wide and 0.75 m in height. Just inside this entrance is a stone outlined hearth which contains a concentration of subsistence remains. A single course stone alignment is located within the cave, at the western end. This feature is 2.0 m long and oriented east to west. A second hearth is also located in the cave, near the center, between the first and second entrances. The second entrance is 17.7 m northeast (76 degrees Az) from the first, and provides an easier access to the shelter, with a ceiling height of 0.95 m. The third entrance is another 32.8 m south (187 degrees Az) from the second. The third entrance is at the end of the tube cave.

Feature C is a small cairn located over the second, central entrance to Feature B. This feature is of different construction than Feature A; the stones used are chunkier and the cairn is less structured, with no

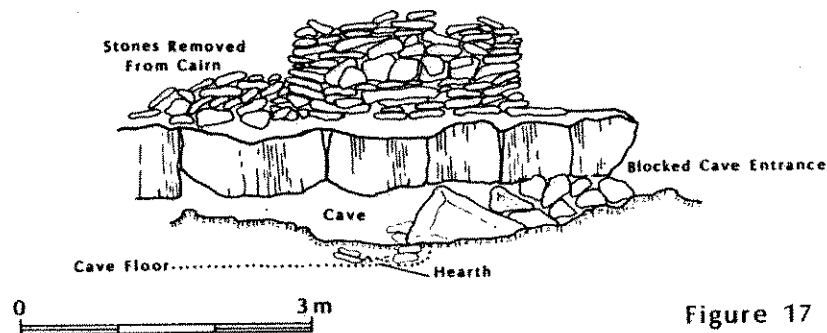


Figure 17

**SITE T-157**  
**ELEVATION - VIEW TO SE**

faced walls. Like other cairns, it has been dismantled, and stones are scattered over an area 3.2 x 2.9 m. Present height is 0.48 m.

Portable remains observed at this complex occur in highest density inside the cave shelter, however, materials also occur on the pahoehoe surface, around the cairns. Material observed in the cave include *Cypraea* sp., *Isognomonidae*, *Thaididae*, *Echinoidea*, *Cellana* sp., *Neritidae*, *kukui*, burned and unburned wood, mammal bone, volcanic glass and a hammerstone. Charcoal is present in sufficient quantities to obtain a sample for radiometric dating.

T-158 Cairn

This large cairn is part of the alignment of cairns around the anchialine ponds. It is located 41.0 m northwest (307 degrees Az) from Feature A of Site T-157. This feature is somewhat smaller than cairns to the south; its measurable axis is 1.75 m. Present height is 0.6 m. Stones from the dismantled portion of the cairn are scattered over an area 3.2 x 3.0 m. Construction is of stacked pahoehoe slabs; the presence or absence of faced sides could not be reliably determined. No portable remains were observed in the immediate vicinity.

T-159 Cairn

This large cairn is part of the alignment described above. It is located 26.8 m northwest (315 degrees Az) from Cairn T-158, which is the shortest distance between any of the aligned cairns. This feature is relatively well preserved; all sides are intact to a height of c. 1.0 m.

The form of this cairn is circular, with an average diameter of 2.3 m. Construction is of thin pahoehoe slabs stacked and faced around the exterior, and a core filling of chunkier boulders and cobbles. No portable remains were observed in the immediate vicinity.

#### T-160 Cairn

This large cairn is part of the alignment described above. It is located 68.2 m northwest (310 degrees Az) from Cairn T-159. This feature appears to have been circular in plan with a diameter of 2.2-2.4 m. Present height is 0.73 m. Stones from the dismantled portion of the cairn are scattered over an area 5.0 m in diameter. Construction was apparently similar to that described for Cairns T-157 and T-159. A single waterworn basalt boulder was observed on the top of the cairn, in a disturbed context.

#### T-161 Cairn

This large cairn is part of the alignment described above. It is located 59.8 m northwest (310 degrees Az) from Cairn T-160. This feature has been extremely disturbed, and if any intact portions remain, they are buried under rubble. The entire central portion of this feature has been removed nearly to bedrock, and stones are dispersed in a ring-like pattern 5.0 m in diameter. Maximum height of the piled rubble is 0.45 m. A few fragments of Cypraeidae and Thaididae shells are scattered on the bedrock around this feature.

#### T-162 Cairn

This large cairn is part of the alignment described above. It is located 92.8 m northwest (306 degrees Az) from Cairn T-161, and c. 10.0 m south of the northern boundary of the Kohana-Iki Land Division. Original dimensions of this feature were determinable on one axis only, which measures 2.45 m. Maximum height is presently 0.72 m and dismantled stones are scattered over an area 3.5 m in diameter. There are also two small adjacent piles of stones, which appear to have been constructed from stones removed from the large cairn. A few fragments of Cypraeidae shells were observed on the surface in the vicinity of the cairn.

#### T-163 Cairn

This small cairn consists of a simple stack of seven stones, located at the edge of a pahoehoe crack, 27.0 m southwest (222 degrees Az) from Cairn T-162. The stack is 0.42 wide at the base and 0.5 cm high (Figure 7g). No portable remains were observed in the vicinity.

#### T-164 Cairn

This small cairn is located between large Cairns T-161 and T-162, 39.3 m southeast (117 degrees Az) from cairn T-162. It is dismantled, with stones scattered in an area 1.6 x 1.2 m. Present maximum height is 0.46 m. The remnant of this cairn is roughly beehive shaped, however, this was probably not the original form. Portable remains in the vicinity include two small pieces of coral, located c. 7.0 m west of the cairn.

#### T-165 Cairn

This small cairn is located at the edge of a pahoehoe crack, 67.0 m southwest from large Cairn T-147. It is constructed of small pahoehoe boulders that were stacked on larger basal boulders. Original height is indeterminate; present height is 0.3 m. Stones are presently scattered over an area 1.46 x 1.8 m. No portable remains were observed in the vicinity of this feature.

#### T-166 Complex

This site consists of 13 features, eleven of which are cairns. It is located just west of T-157, on a relatively level pahoehoe plateau (Figure 18). Overall site area is 562.5 sq m.

Features A through K are cairns of similar construction and slightly variant sizes. They are scattered across the level portion of the site and around the rim of a shallow sinkhole (Features G-J). Most cairns are partially dismantled and dimensions given below are not of original structures.

Feature	Length	Width	Height
A	0.90 m	0.85 m	0.50 m
B	0.90	1.00	0.45
C	1.20	1.25	0.45
D	1.40	1.30	0.50
E	1.65	1.55	0.50
F	0.95	1.60	0.55
G	1.85	1.25	0.60
H	1.00	1.40	0.30
I	1.00	0.90	0.25
J	0.55	0.90	0.35
K	1.30	1.30	0.30

Feature L is a circular alignment of stones 2.40 m in diameter which outlines an area of surface coral and shell, most of which are weathered. This feature is near the center of the site.

Feature M is a C-shape shelter constructed from pahoehoe slabs, many of which are upright or leaned against smaller, chunkier stones. The shelter opens toward the southeast and has a maximum width of 3.0 m. The opening is 2.0 m wide, and the shelter is 1.5 m deep.

B-30

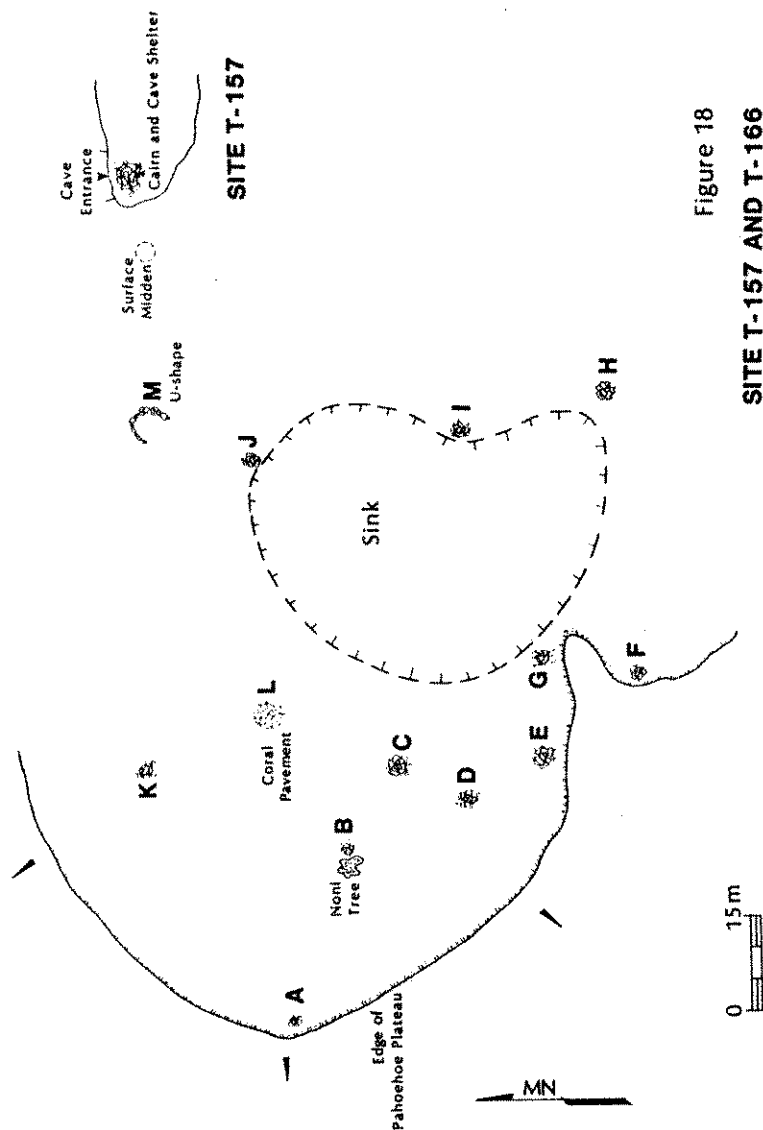


Figure 18

**SITE T-157 AND T-166  
FEATURES A-M  
CAIRN COMPLEX**

An area of surface midden 1.15 x 0.85 m is located to the east of Feature M, 4.0 m west from Site T-157. Shell species present includes Cypraeidae, Thaididae and Neritidae. The relatively continuous nature of this complex and Site T-157 indicates that they should be combined as one site when permanent numbers are assigned.

**T-167 Cairn**

This small cairn is located 20.0 m northeast (30 degrees Az) from Site T-162, a large cairn. It is situated on or just north of the northern boundary of the Kohana-Iki Land Division. The cairn is constructed of pahoehoe slabs, piled four courses high (0.43 m). It has been partially dismantled and stones are scattered over an area 1.45 x 0.95 m. No portable remains were recovered in the vicinity of this feature.

**T-168 Cairn**

This small cairn is located 47.0 m northwest (310 degrees Az) from Site T-162. It is situated on or just north of the northern boundary of the Kohana-Iki Land Division. The cairn is constructed of pahoehoe slabs, piled four courses high (0.35 m) and is roughly circular in plan view. The cairn measures 1.1 x 1.4 m at the base. No portable remains were observed in the vicinity of this feature.

**T-169 Cairn**

This small cairn is located 79.0 m northeast (65 degrees Az) from large Cairn T-161. It consists of a simple stack of six pahoehoe boulders or slabs, and measures 0.3 x 0.4 m at the base, 0.3 m in height. No portable remains were observed in the vicinity of this feature, which may be quite recent.

**T-170 Cairn**

This small cairn is located 80.0 m east from Site T-162, a large cairn. It is very near to the northern boundary of the Kohana-Iki Land Division. The cairn is constructed from pahoehoe slabs that are stacked four courses high (0.4 m). The actual cairn is 0.75 x 0.8 m at the base and is surrounded on all sides with rubble. Rubble is particularly dense to the southwest of the cairn, where it occurs in an area 2.3 x 2.0 m. Coral and a sparse scatter of Cypraeidae shell occurs in the same locus.

**T-171 Cairn**

This cairn is located 42.8 m northwest (333 degrees Az) from Cairn T-170. It is probably north of the Kohana-Iki land division boundary line. The cairn has been partially dismantled and the center has been removed. It was constructed from pahoehoe slabs stacked four to five courses high. The intact portion is 0.55 m high and the base measures 1.9 x 2.15 m. Two pieces of Cypraeidae shell were observed among the rubble stones.

T-172 Cairn

This small cairn is located 14.2 m north (340 degrees Az) of Site T-159, a large cairn. It is situated along a pahoehoe pressure ridge at an elevation of 15 ft AMSL. It consists of a large pahoehoe slab wedged upright in a crack with four smaller boulders piled around it as supports (Figure 7h). The feature is 0.5 m high and 0.6 x 0.35 m wide. No portable remains were observed in the vicinity of this feature.

T-173 Complex

This temporary habitation site consists of two cave shelters, a walled spring and a cairn, located in a narrow ravine in the coastal zone, at an elevation of 8 ft AMSL (Figure 19). It is located c. 85.0 m southeast (159 degrees Az) from Site T-162, a large cairn.

Feature A is a small, circular cave 4.0 m deep and 4.0 m wide with a maximum ceiling height of 1.08 m. The cave opens to the east (92 degrees Az) and has an entranceway 1.25 m wide x 0.9 m high. A portion of the cave floor appears to have been paved with small pebbles and the central area (1.4 x 1.4 m) is covered with beach sand. The sand deposit is at least 0.10 m deep and is darkened by organic midden, which is relatively dense in the cave. The sand has been churned up and the cave deposits are disturbed; however, there are still localized concentrations of subsistence debris within the cave. A small circular hearth is located adjacent to the sand floor, toward the back of the cave.

Feature B is an oval cave shelter 6.75 m wide and 3.75 m deep with a maximum ceiling height of c. 0.8 m. This shelter has not been as intensively utilized as Feature A and there is very little surface deposition. The cave opens toward the northeast (60 degrees Az), 7.5 m northwest from the entrance to Feature A.

Feature C is a linear wall erected around the perimeter of a small seepage spring of anchialine water. It is located at the head of the ravine, 8.75 m north (350 degrees Az) from the entrance to Feature B. The wall is 1.25 m long and is constructed from pahoehoe slabs that are loosely stacked to a maximum height of 0.65 m. It partially encloses a small (0.5 x 0.5 m) depression in bedrock at the base of the ravine wall. The water level in this depression was 0.02 m at the time of survey, however, a higher water level mark (stain) is present on the bedrock.

Portable remains observed at this site are concentrated in and immediately outside of Feature A. They include a large waterworn boulder, coral, mammal bone, quantities of fish bone, Cypraeidae, Neritidae, Patellidae, and Echinoidea.

T-174 Complex

This site consists of three small cairns situated along a cracked pahoehoe ridge which overlooks a large anchialine pond. It is located 24.0 m northwest from Site T-173.

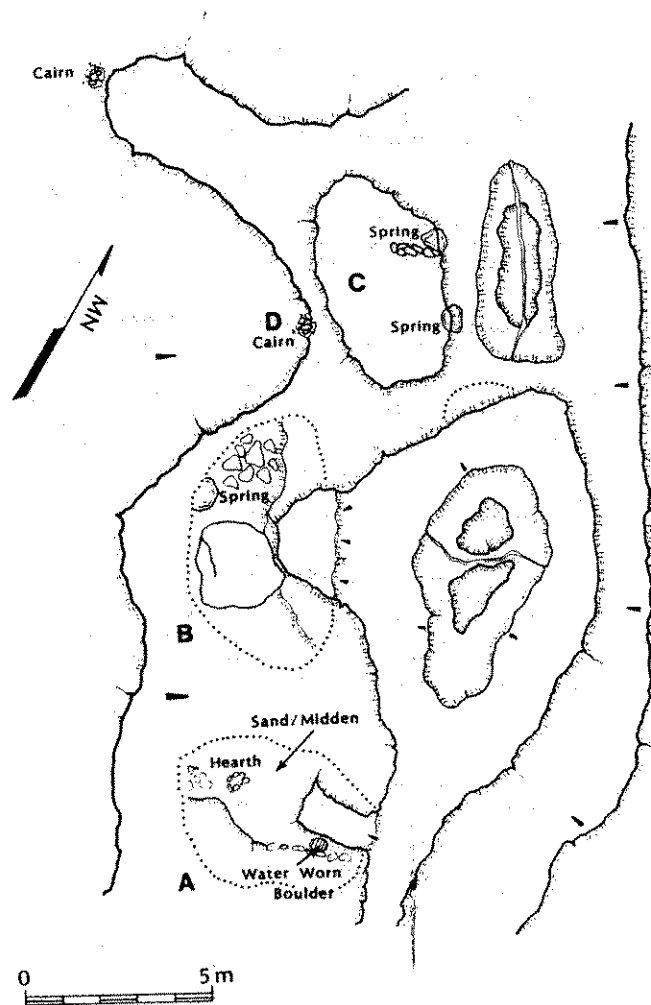


Figure 19  
SITE T-173  
FEATURES A, B, C AND D

Feature A is a simple stack of nine pahoehoe slabs 0.65 m high. Three additional slabs are leaned around the base of the stack, which is 0.5 m in diameter.

Feature B is 25.0 m east (88 degrees Az) from Feature A and is constructed from six pahoehoe slabs in a simple stack 0.35 m high, 0.3 m in diameter at the base.

Feature C is 25.0 m southwest (228 degrees Az) from Feature B and is constructed from four stacked slabs on a naturally upright bedrock boulder. This feature is similar in size to Feature B. No portable remains were observed in the vicinity of this or the other two simple cairns.

#### T-175 Complex

This site consists of two coral pavements, three rubble filled depressions and a cairn. It is located along the northern boundary of the Kohana-Iki Land Division, at an elevation of 12 ft AMSL. Site T-176 is 30.5 m west from this site. The five features are arranged in a linear pattern c. 20.0 m long that is oriented north-south.

Feature A is a small sinkhole 8.0 m in diameter that has been filled with pahoehoe rubble to within 1.0 m of the rim. The rubble deposit has an average depth of 0.5 m and contains three small cleared holes which extend to bedrock. In the center of the sink is a depression 0.6 m in diameter that is ringed with upright stone slabs. Exterior diameter of the ring of slabs is 1.6 m. The base of this depression is 0.7 m below the rubble fill level, and appears to have been deeper. It was possibly a well.

Feature B is a roughly rectangular (5.5 x 3.5 m) coral pavement that is partially surrounded with pahoehoe boulders. It is located c. 18.0 m south from Feature A. Immediately to the north is a circular area of rubble fill c. 4.0 m in diameter. This area represents a partially leveled crevice. The coral pavement is relatively thin and has been scattered in places. Several small waterworn pebbles and a large boulder grinding stone are located on the paved area.

Feature C is a small rectangular (1.5 x 1.2 m) coral pavement that is situated in a slight depression at the northern edge of the Feature A sinkhole. The southern side of this pavement is defined by a low terrace-like wall which serves to isolate the pavement from the rubble fill in the sinkhole. Waterworn pebbles are also present on this pavement.

Feature D is a small area of rubble fill, located 3.0 m west from Feature B. This 1.5 m square area of rubble was apparently deposited to level a depression. The surface is somewhat rough and there are no indications that it was paved with smaller pebbles or cobbles.

Feature E is a cairn that is located near the center of the site. This feature is in very poor preservation and stones are scattered in an area 6.0 m in diameter. The original structure was 1.25 m in diameter at the base. It is presently 0.35 m high. This cairn is situated very close to the Kohana-Iki boundary and may be part of the alignment of large cairns, despite its somewhat smaller size. It is 85.8 m northwest (285 degrees Az) from the nearest large cairn to the southeast, T-162.

An area of surface midden c. 1.5 m in diameter is located 2.0 m southeast from Feature E. This midden consists principally of Cypraeidae and Neritidae shell fragments. Other shell observed on paved areas was weathered and appeared to have been deposited with the coral. Functional interpretation of this complex is difficult without more detailed investigations of specific features. The site probably had a ceremonial function, but may also represent a habitation or burial locale.

#### T-176 Complex

This habitation complex consists of an extensively modified sinkhole, a rubble filled terrace, and a large cairn. It is located on the northern boundary of the Kohana-Iki Land Division, c. 55.0 m inland from the coastal jeep road. The sinkhole is 15.0 m long (E-W) and 11.25 m wide, with an average depth of 2.5 m. Features A-D are located inside the sinkhole; Feature E is around the perimeter of the sink rim and Features F and G are immediately to the south of the sinkhole.

Feature A is a well, constructed around an anchialine spring at the western end of the sinkhole. It consists of faced walls, 1.8 m high, that partially enclose a small (1.0 sq m) spring pool (Figure 20). The northern portion of this feature consists of two straight walls nine courses high that face an access path to the pool. The southern portion is a circular wall four courses high that encloses the pool. This latter wall is built under a low natural overhang. Present water level is 1.62 m below the top of the straight wall, and a high water mark occurs 0.65 m above present water level. Stones used in this structure are regularly sized, squared boulders; the construction technique appears to be historic.

Feature B is a cobble paving that occurs in the floor of the sinkhole. This feature covers an area 30.5 sq m and apparently leveled irregularities in the sink floor. Areas of exposed bedrock are left uncovered by the paving. A ramp extends off the north side of the paving and leads into Feature D, an overhang shelter.

Feature C is an overhang shelter situated at the eastern end of the sinkhole. It is 2.5 m deep and 3.75 m wide. A faced wall section is located at the northern end of this shelter, which serves to separate it from Feature D. A soil deposit is present in this shelter, as well as a number of late nineteenth/early twentieth century bottles.

EE-33

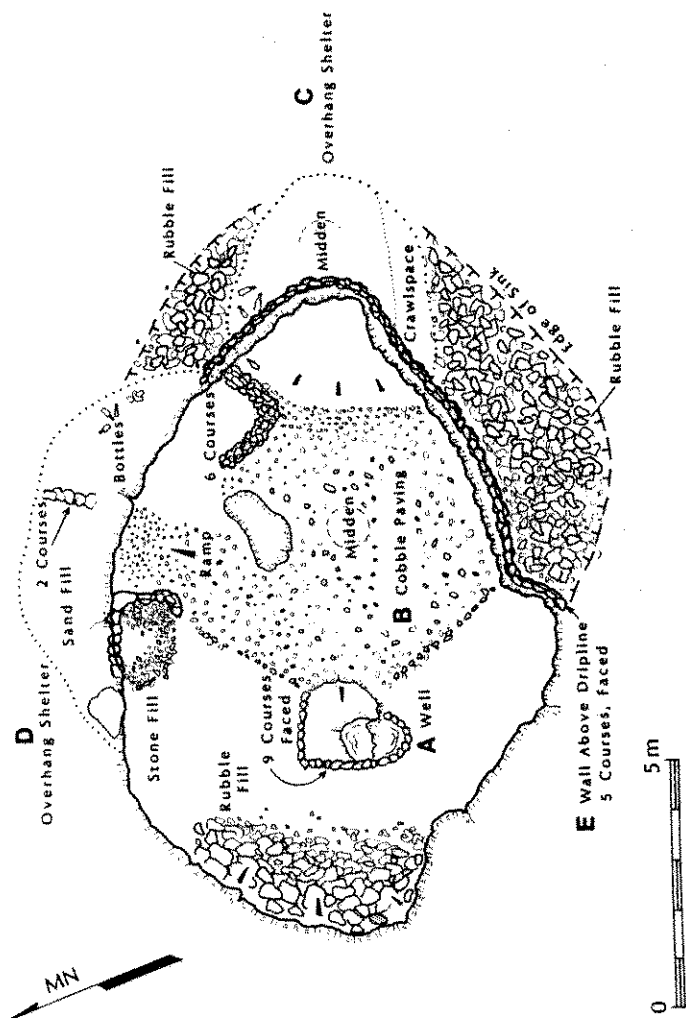


Figure 20  
SITE T-176  
FEATURES A-E

Feature D is an overhang shelter located along the northern edge of the sinkhole. It is 7.5 m wide and 1.75 m deep. The western 3.0 m of this shelter opening has been closed off with a faced wall, six courses high. The exterior side of this wall is built up with rubble fill; the interior side is faced to the dripline of the shelter. A short north-south wall four to six courses high extends out from the dripline at the eastern end of the former wall. The floor of Feature D has a beach sand deposit and historic bottles are scattered about. It is divided into two compartments by a low (two course) wall which extends 1.25 m from the back of the shelter.

Feature E is a wall that is constructed around the eastern dripline of the sinkhole. It is a stacked wall five courses high that is faced on the interior and built up on the exterior side with rubble. Rubble fill extends as much as 3.0 m away from the wall and serves to fill in the sloping terrain between the upper rim of the sink and the actual dripline.

Feature F is a large cairn located c. 7.0 m south of the modified sinkhole. It is constructed of stacked pahoehoe slabs with a core fill of smaller cobbles and coral. The cairn is partially dismantled and stones are scattered over an area 2.2 m in diameter. Original dimensions are 1.5 x 1.7 m at the base. The present structure is 0.75 m high, and the central fill has been removed to below this level. Coral, shell midden and historic bottles are scattered on the surface around the cairn. A recent aluminum can has been placed inside the feature. This cairn is the northernmost of the alignment which defines the anchialine pond area. It is 68.2 m southwest (225 degrees Az) from the cairn at Site T-175.

Feature G is a low, faced terrace located c. 10.0 m south from the modified sinkhole. The terrace is odd shaped, with overall dimensions of 3.0 x 3.0 m. A stone lined depression 2.0 x 1.0 m occurs in the center of the terrace. The western side of the terrace is paved with small pahoehoe cobbles, and is more level than the eastern portion. Artifacts scattered over this feature includes bottle glass, coral and sponge stamped white-ware.

#### T-177 Complex

This site consists of an overhang shelter and a filled depression along the south-facing slope of a major lava escarpment, near the southern boundary of the Kohans-Iki land division. Site T-117, a petroglyph, is located c. 10.0 m north from this site.

Feature A is an overhang shelter 6.7 m wide and 1.40 m deep which opens toward the southeast (160 degrees Az). The narrow shelter floor is very irregular and the eastern portion is a large crack which has been filled with boulders. A small concentration of midden 0.3 m in diameter is located in the deepest portion of the shelter. It includes *Merita picea*, *B. crebristriatus*, *Theodoxus* sp., *kukui*, and bird egg shell.

A lower chamber of the shelter is separated from the main chamber by a section of the floor, which forms the ceiling of the 1.6 m wide, 1.1 m deep room. This lower section has a ceiling height of 0.4 m. Portable remains present here include Neritidae, Mytilidae, coral, and a waterworn pebble.

Feature B is a filled and leveled depression located at the shelter opening. It extends 3.2 m out from the shelter dripline and is 3.6 m long. A few pieces of weathered coral and shell fragments are scattered over this leveled depression.

#### T-178

This site was found to be in the adjacent Kaloko land division and was previously recorded by Renger (1970). It is not included in this report.

#### T-179 Walled Shelter

This temporary habitation site consists of a small (4.0 x 2.9 m) natural sinkhole that has been cleared and enclosed with a low wall. It is located in the rocklands environmental zone, 128.0 m from the nearest site (T-183). The sinkhole is 0.9 m deep and has a flat, bedrock floor and nearly straight walls. The constructed wall follows the dripline of the sink, which overhangs only slightly. The wall is of loosely stacked pahoehoe chunks, no more than two courses high. There is no apparent break in the wall. No portable remains were observed in or around the sinkhole; however, the surface was obscured by fountain grass and kiawe at the time of survey.

#### T-180 Complex

This temporary habitation site consists of two walled shelters in a narrow, deep ravine along the west-facing slope of a major pahoehoe ridge. It is located in the rocklands, at an elevation of 30 ft AMSL, very close to the southern boundary of the Kohana-Iki Land Division.

Feature A is a crudely stacked wall which abutts bedrock to enclose the circular head of the ravine. The wall encloses an area 1.59 x 1.32 m against south-facing bedrock walls. The floor of the enclosed area is 0.9 m below the top of the wall, which is built on a naturally raised bedrock shelf. The wall is 1.45 m long and constructed from piled stones; smaller boulders and cobbles are at the bottom and larger, flatter stones are on top. The wall is unfaced and is 0.95 m high along the interior, 0.6 m high along the exterior side. Recent rock fall has partially filled the enclosed space of this shelter.

Feature B is a similarly constructed shelter, located at the opposite head of the ravine, c. 30.0 m southeast (150 degrees Az) from Feature A. The wall of Feature B encloses an area 1.24 x 1.32 m against north-facing bedrock walls. The constructed wall is 0.85 cm thick and 0.7 m high on

the interior side. It is of roughly stacked pahoehoe chunks six to seven courses high and is built along a low saddle across the ravine. This wall is substantial enough to serve as a bridge across the ravine. The floor of the enclosed area is 1.1 m below the top of the wall.

No portable remains or soil deposits were observed on the site, however, there are additional low areas of the ravine that may have been artificially filled. It is possible that the Kohana-Iki boundary line bisects this site and runs between Features A and B.

#### T-181 Rock Mound

This single isolated feature is located at the southeastern corner of the project area, 195.0 m from the nearest located site (T-180). The mound is situated in a somewhat low, level area of pahoehoe between two ridge formations, at an elevation of 35 ft AMSL. It is constructed of irregularly sized pahoehoe and sa boulders that were haphazardly piled in an oval-shaped mound. The mound is 1.03 m long, 0.75 m wide and has a maximum height of 0.35 m. It appears to have been unaltered since construction. No portable remains were observed in the vicinity of this feature, which is functionally indeterminate.

#### T-182 Rock Mound

This single isolated feature is located in a crevice at the bottom of a shallow sinkhole in the rocklands, 146.3 m from the nearest recorded site (T-179). It consists of a roughly triangular mounded rubble pile 4.0 m long and 2.98 m wide that follows the configuration of the crevice in which it is situated. This 0.4 m high mound was constructed from large chunky pahoehoe boulders that appear to have been thrown into the crevice. The surface of the pile is irregular. A small excavation hole occurs at the eastern end of the feature; it does not extend to bedrock. No portable remains were observed in the vicinity of this feature.

#### T-183 Complex

This site consists of five filled depressions, three terraces and a wall. It is located at the coastal/rocklands interface, 97.0 m northeast from Site D14-4. The nine features occur within an area of c. 800 sq m. They are subgrouped into two clusters, with Features A to F in the western cluster and G to I in the eastern cluster. All terraces are within the western cluster.

Feature A is a small, roughly square (1.4 x 1.5 m) terrace, located at the northern and highest end of the western cluster of features. This terrace is paved with small pieces of weathered lava. The northern side of the terrace is at ground level and the southern side is 0.44 m above the level of the adjacent terrace, Feature C.

Feature B is a low wall of stacked pahoehoe boulders three courses high (0.5 m) and 1.0 m long that is located along the western perimeter of Feature C. The northern end of the wall abutts the faced wall of the Feature A terrace, and it extends southward one half the width of Feature C. This wall may have connected with an east-west stone alignment which bisects Feature C.

Feature C is the largest of three terraces on the site. It is roughly rectangular (2.5 x 2.0 m), and is surfaced with the same material that was used on Feature A. The southern wall of this terrace is faced and is .34 m above the surface of Feature D. A waterworn boulder is located on this terrace, along with scattered coral and Cypraeidae shell fragments.

Feature D is located immediately south and downslope from Feature C. It has an amorphous shape that has an average width of 1.75 m and an average length of 2.0 m. The southern side of this terrace is near the rim of a crevice and is raised 0.2 m above ground surface. The terrace is paved with the same material used on the upslope features, and it is scattered with weathered coral. A waterworn cobble hammerstone also occurs on this terrace.

Features E and F are rubble filled depressions located 1.0 to 4.0 m south of the terraces. Feature E is a small sinkhole that is filled to within 0.88 m of the orifice. Feature F is a filled crevice 3.0 m long and 1.2 m wide. Stones used to fill these depressions are small boulders and cobbles. The surfaces have been somewhat leveled.

Features G, H and I are rubble filled depressions that comprise the eastern cluster of features. These features are aligned roughly east-west and are all amorphous in plan view. They fill a series of wide areas along a crevice and are constructed from large, chunky pahoehoe boulders. The surfaces of these features are irregular and no small paving material was used. Average size is c. 2.0 x 3.0 m.

The features of this complex may represent burials, since most are quite small for structure foundations. Additional work is needed at the site in order to determine specific feature functions.

#### T-184 Cave Shelter

This temporary habitation feature is located along the rim of a large pahoehoe sinkhole in the rocklands, at an elevation of 35 ft AMSL. The cave is roughly ovoid, with an interior space of 58.5 sq m. The entrance is 2.8 m wide and 0.76 m high; it opens toward the west (240 degrees Az; Figure 21). Maximum and average ceiling height inside the cave is 1.13 m. Approximately half of the interior area of the cave is crawlspace, with a ceiling height of 0.4 m or less. The floor of the cave is exposed bedrock and there are no hearth areas or alterations. Portable remains observed are limited to five pieces of shell, including Cypraeidae and Thaididae.

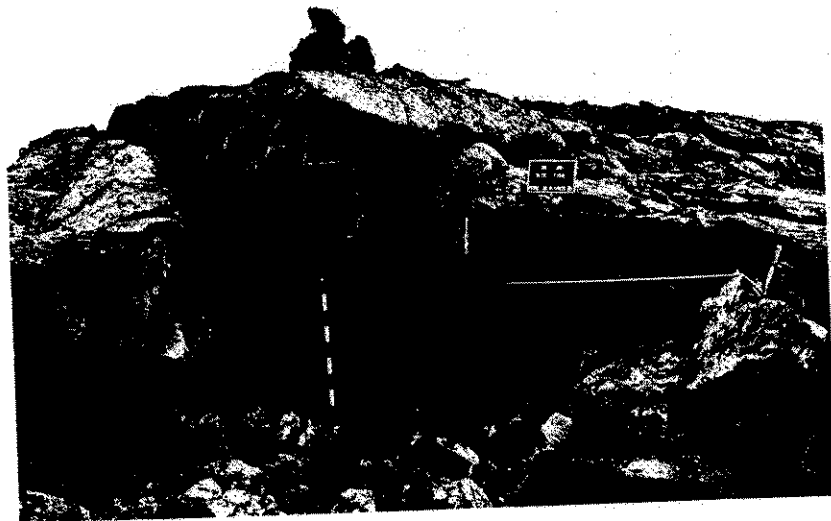


Figure 21. SITE T-184. View to northeast. (PHRI Neg.434-17)



T-185 Complex

This temporary habitation site consists of a walled shelter and cairn, located along the crest and at the base of a cracked pahoehoe ridge in open rocklands. The site is 42.7 m west from Site T-107, a large cave shelter, and is at an elevation of 12 ft AMSL.

Feature A is a partially dismantled cairn, situated on the crest of a cracked pahoehoe ridge. The present dimensions of the structure are 1.9 x 1.3 m at the base and 0.4 m high. A simple stack of stones 0.21 m high is adjacent to this cairn; it was probably constructed during the dismantling of the cairn.

Feature B is a walled shelter located c. 20.0 m northeast (38 degrees Az) from the cairn. It is located at the base of the eastern slope of the ridge, in a natural depression 2.0 x 2.5 m. A semicircular wall of stacked pahoehoe slabs and boulders 0.5 m high is constructed around the eastern perimeter of the depression. The wall abutts the bedrock ridge slope over the western portion of the depression, which is 0.4 m deep. The enclosed area has a relatively level bedrock floor. No portable remains were observed in this walled shelter or in the vicinity of the cairn.

T-186 Complex

This site consists of a C-shape wall and an L-shape wall, located within 10.0 m of one another at the base of an east-facing pahoehoe ridge. The site is 29.0 m east (73 degrees Az) from Site T-148, a large cairn, and is probably a temporary habitation site.

Feature A is a low rubble wall .2 to .5 m high that has a roughly defined L-shape. The long axis is 2.0 m and the short axis is 1.0 m; the open portion is oriented toward the west. The wall is constructed from loosely piled pahoehoe slabs and boulders, two courses high and one to four stones wide.

Feature B is located 8.5 m to the south of Feature A. It is a C-shaped rubble wall that opens toward the west (250 degrees Az) and abutts the gently sloping wall of the ridge. Two courses are intact of this loosely stacked wall, which is 3.0 m in diameter with an opening 1.0 m wide. No portable remains were located in the vicinity of these two walled shelters.

T-187 Complex

This temporary habitation site consists of two overhang shelters and a small platform that are located in a deep sinkhole, around the perimeter of an anchialine pool. The site is located in the coastal zone, 24.5 m west of Site T-160, a large cairn. The sinkhole is roughly circular (c. 5.0 m in diameter) and is 2.5 m deep with 0.2 to 0.4 m of water at the bottom. Water covers approximately 70% of the floor of the sink at low tide.

Feature A is an overhang shelter situated on a shelf 0.7 m above present water level, along the southwest rim of the sinkhole. The floor of the shelter is c. 3.0 m wide and 1.0 m deep; it is covered with a relatively dense deposit of subsistence remains at least 0.03 m deep.

Feature B is an overhang shelter situated on a shelf 0.4 m above water level, along the northern wall of the sinkhole. This shelter is somewhat smaller than Feature A and has a thinner deposit of portable remains.

Feature C is a crude platform-like feature constructed of chunky boulders at the edge of the water, in the floor of the sinkhole. Stones used in this feature appear to be rockfall; it has an irregular surface and is of haphazard construction. The amorphous platform is at the northern end of the pool and is roughly 1.0 m in diameter.

Portable remains observed at this site include Cypraeidae, Neritidae, Echinoidea, kukui, mammal bone and fish bone.

T-188 Complex

This site consists of two cairns. It is located near the edge of a natural depression which surrounds a large anchialine pond in the coastal zone. The site is 109.7 m east from the coastal jeep road. The cairns are located c. 10.0 m apart along a low pahoehoe rise.

Feature A is a simple stack of pahoehoe boulders six courses high. It is 0.5 x 0.55 m at the base and 0.55 m high. Feature B is of similar construction, with five courses of stacked stones. This feature is 0.4 x 0.3 m at the base and 0.45 m high.

One to two pieces of Cypraeidae and Veneridae shell were scattered around the cairns, and two waterworn boulders were observed 2.8 m west of Feature A.

T-189 Cleared Pool

This site is a small (2.0 x 2.5 m) sinkhole with a cleared anchialine pool at the bottom. It is located in the northern coastal zone, 80.0 m east from the shoreline, in the vicinity of several similar ponds and pools. The top of the sinkhole is 1.2 m above present water level (low tide) and the walls slope gently inward, providing access to the pool. Rockfall has been removed from the central portion of the pool and piled along its perimeter, significantly increasing the depth of the water. Water is 0.95 m deep in the center of the pool and 0.5 m along the edges of the pool. Beach sand has been deposited in the bottom of the pool. No portable artifacts were observed in or around this pool, which probably functioned as a bath.

T-190 Wall

This single feature is located at the edge of an anchialine pond in a shallow sinkhole, 25.0 m southwest from Site T-180. The wall is a roughly L-shaped construction, built from waterworn basalt boulders. It is 9.7 m long, 0.8 m wide and 0.6 to 0.7 m high. This core filled, double faced wall is four courses high and has inserted pieces of coral and beach conglomerate cobbles (Figure 22).

The north and south ends of the wall abutt sides of the 0.9 m deep sinkhole, which is 7.4 x 6.8 m at the orifice. The wall is at the present edge of the pond shoreline, with the open face toward the water and the long axis oriented southeast-northwest (153 degrees Az). Present water level (low tide) is 0.3 m in the pond. No portable artifacts were observed in the vicinity of the wall, however, ground visibility was near zero at the time of survey. This feature is apparently related to aquacultural activities conducted at the pond site.

T-191 Platform

This single, disturbed feature is located at the eastern edge of the coastal jeep road, on or very near the northern boundary of Kohana-Iki. It consists of the remnants of a stacked waterworn boulder platform 0.5 m high. Less than half of the original structure is present; the remainder was removed during road construction. The longest intact wall remnant present is the south wall, which is 4.7 m long. The existing feature is roughly crescent shaped; the original structure was probably rectangular or square. The feature has been partially covered with storm wash, which has also covered any use related deposits associated with the structure. The function of this feature is indeterminate, due to its extremely fragmentary condition.

T-192 Complex

This site consists of a sectioned cave shelter and two cairns. It is located midway between Sites T-170 and T-164 (cairns), near the northern boundary of Kohana-Iki. The site is at the mauka edge of the coastal zone, along the crest and lower sides of a lava tube.

Feature A is an extensively modified tube cave that had an original opening 6.0 m wide, oriented toward the southeast (130 degrees Az). Two walls, constructed from rough rockfall boulders, were erected at the entrance so as to create two separate entrances, 1.5 and 0.72 m wide. The entrances are separated by a constructed rubble pile which also separates the cave into two compartments. The southern compartment is roughly circular, 3.3 m in diameter, and is defined by semicircular walls on three sides. It has a ceiling height of 1.52 m and a relatively dense deposit of soil and subsistence debris. The exterior wall which modifies the entrance is 1.3 m high and constructed from loosely stacked rockfall, eight courses high. The interior wall appears to have been constructed from rockfall that was cleared from the cave floor; it is crudely stacked and blocks off a southern extension of the tube.



Figure 22. SITE T-190, FEATURE A. View to west. (PHRI Neg.434-35)

The northern compartment is less structured and has a lower ceiling height (0.98 m). It is 4.0 m deep and has an extension to the north that has not been blocked. Midden is concentrated at the entrance to this chamber, which was modified by a straight rubble wall, c. 0.8 m high.

A number of historic artifacts were observed in the southern chamber, but none were present in the northern chamber of the cave. Historic items include a wooden knife handle, enamelware dishes, a screw top jar, bamboo, tin, and clothing. Subsistence remains present in both chambers include Cypraeidae, Thaididae, Neritidae, Echinoidea, coral, gourd, and *kukui*. The northern chamber has been disturbed by relic hunters and open excavations are present.

#### T-193 Complex

This site consists of two cairns that are located on a pahoehoe ridge between two large sinkholes in open rocklands. These cairns are 4.0 m apart and may have been on two sides of a trail, or the old cart road which connected the coast with the Mamalahoa Trail. The road was not, however, discernable on the smooth pahoehoe. The cairns are in a nearly direct east-west line with Site T-105, a trail and cairn complex (0.7 km east) and Site T-113, a cairn (146.0 m west). A temporary shelter, Site T-111, is located 42.5 m north from the cairns.

Feature A is a roughly circular, beehive-shaped stack of pahoehoe slabs. It is 1.6 x 2.1 m at the base and 0.7 m high. Feature B is largely disassembled and is now 2.3 m in diameter and 0.3 m high. The original dimensions of both cairns are indeterminate. No portable remains were located in the vicinity of this site.

#### SITE DESCRIPTIONS - PREVIOUSLY IDENTIFIED SITES

##### 50-Ha-D14-2 Complex

This permanent habitation site consists of a pavement and a stone alignment that are located within a 176 sq m area adjacent to the Site D14-4 complex (Figure 23). It is situated on a level pahoehoe ridge in the coastal zone, at an elevation of 15 ft AMSL.

Feature A is a roughly rectangular pavement 6.0 x 4.0 m in diameter, with the major axis oriented southeast-northwest. The paving consists of broken pahoehoe chunks of medium to small size. The southern portion of the paving has been dispersed and stones are scattered in a 3.0 x 4.0 m area away from the original structure. Shell midden consisting principally of Cypraeidae is concentrated in a circular area at the southern end of the feature.

This feature was tested by Cordy (1980), who excavated a one m sq unit in the northwestern quarter of the pavement. Profiles recorded by Cordy indicate a maximum pavement thickness of 0.10 m and an average thickness of 0.08 m. Cordy recovered enough volcanic glass to determine six hydra-

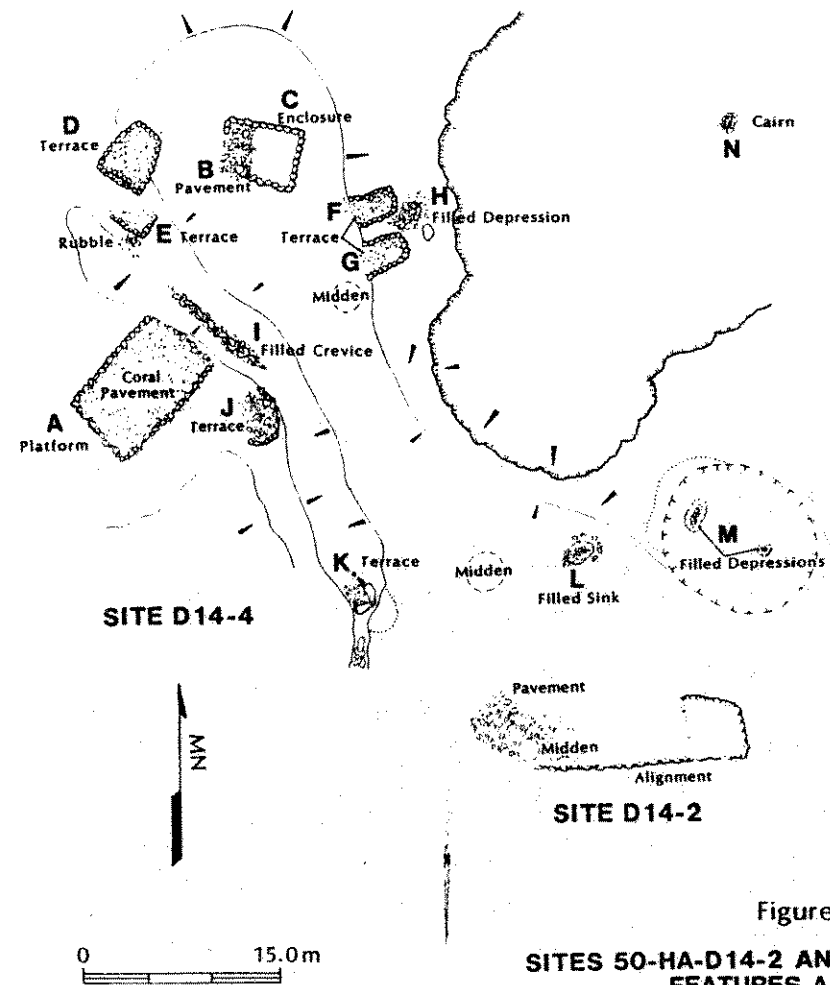


Figure 23  
SITES 50-HA-D14-2 AND 4  
FEATURES A - N

tion rind dates. These dates all range within a 90 year timespan of AD 1500-1590 (Cordy 1981:247). Cordy interpreted the feature as a sleeping house that was part of a commoner household (Cordy 1981: 161).

Feature B is an alignment of pahoehoe boulders 10.8 m long that extends eastward from the southwestern corner of the pavement. A squared, enclosed alignment (5.0 m sq) is at the eastern end of the straight alignment (Figure 23). None of the stones in this alignment are stacked over two courses high.

The close proximity of these features to the Site 50-Ha-D14-4 complex strongly suggests that they should be combined as a single site.

#### 50-Ha-D14-3 Complex

This permanent habitation site consists of twelve features, including two platforms, three enclosures, two cave shelters, two overhang shelters, two pavements, and a Papamu. It is located at the coastal/rocklands interface at 20 ft AMSL. The site covers an area of 15,000 sq m and incorporates three adjacent sinkholes as well as the pahoehoe ridges between the sinks (Figure 24).

Feature A is a platform 6.5 m wide and 13.0 m long. It is located at the southern end of the site, in the largest sinkhole. This feature is constructed from pahoehoe boulders and slabs that fill faced walls to a height of 0.5 to 0.4 m above ground surface. The northern side of the platform is faced with upright pahoehoe slabs and the southern side is faced with stacked slabs. The surface of the platform is somewhat irregular and no small paving material was used to level it.

This feature was tested by Cordy (1981), who excavated units in the southeastern corner and just outside the northwest corner. No hydration rind dates were obtained for this feature, which was designated D14-3-1 by Cordy, who interpreted it as a sleeping house (1981:161).

Feature B is an enclosure 7.5 x 8.0 m in diameter. It is located in the largest sinkhole, 17.0 m northeast from Feature A. The enclosure wall is a double faced, core filled structure, 0.5 m high and 0.6 m wide. The northern and eastern walls are relatively intact, however the west and south walls are knocked down. The interior of the enclosure is exposed bedrock. Cordy located an excavation/collection unit inside the enclosure, at the southwestern corner. No dates were determined from material collected. This feature was designated D14-3-2 by Cordy, who interpreted it as a sleeping house (1981:161).

Feature C is a platform erected in a crack along the crest of a pahoehoe ridge, 19.0 m northeast from Feature B. The platform is rectangular (7.0 x 5.0 m) and constructed from broken pahoehoe slabs and boulders. The north, narrow side of the platform is faced to 1.0 m above the surface of the crack, which has been partially filled with rubble. The south side is a single course high. Cypraeidae shell fragments, coral and basalt flakes are scattered among the platform stones. The feature was designated as D14-3-3 by Cordy, who interpreted it as a sleeping house. Cordy did not test this feature.

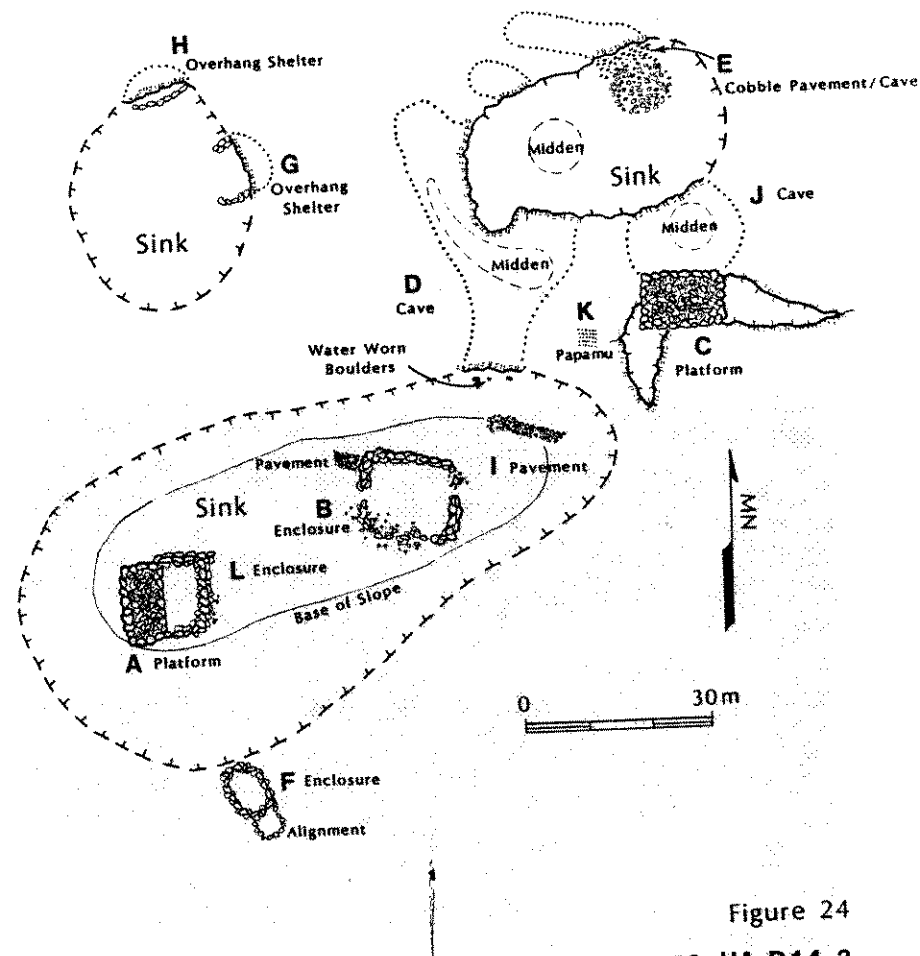


Figure 24  
SITE 50-HA-D14-3  
FEATURES A-L

Feature D is a large tube cave which extends under the main ridgeline on the site and connects two of the sinkholes. This feature has three entrances, one of which opens to the large sinkhole, 9.0 m northeast from Feature B. The cave has 130 sq m of interior space and a relatively dense deposit of midden. A wide range of shell species is present, along with Echinoidea, kukui, coral, waterworn basalt boulders, cobbles and pebbles, and milled lumber with wire nails. This feature was not recorded or tested by Cordy. It contains the densest concentration of artifacts and subsistence material found on the site.

Feature E is a narrow tube cave with cobble paving at the entrance, just outside the cave. It is located at the northern end of a small sinkhole, c. 10.0 m north from the two northern entrances to Feature D. The paving is 5.5 m sq and is as wide as the entrance to the tube cave, which is 10.0 m long and has an average width of 3.0 m. The paving is of regularly sized pahoehoe cobbles, and is relatively well preserved.

Feature F is a small oval enclosure located on the southern rim of the large sinkhole, c. 10.0 m southeast from Feature A. It is constructed from stacked pahoehoe slabs and totally encloses an area 3.5 x 2.0 m. A small semicircular alignment of cobble size stones extends from the south side of this enclosure. There are no portable remains around this feature.

Features G and H are small overhang shelters located along the north and east faces of the smallest sinkhole on the site. They are c. 25.0 m north from Feature B. Both overhangs are 4.5 m wide and 2.0 m deep, and have partially walled entrances. The entrance to Feature G is partially enclosed by two straight walls that extend out from the dripline at the edges of the opening. The entrance to Feature H is completely enclosed by a low semicircular wall which extends just 0.5 m beyond the dripline. These and the following features were not recorded or tested by Cordy.

Feature I is a linear pavement, located at the eastern end of the large sinkhole, 3.5 m south from the entrance to Feature D. The pavement appears to have filled a surface depression along the lower slope of the sink wall. It is 5.0 m long and 1.0 m wide. Shell midden is scattered among the pahoehoe cobbles used in this paving.

Feature J is a cave shelter that extends under the same ridge formation as Feature D and has an entrance 5.0 m east from the easternmost Feature D entrance. This cave is roughly circular, with an interior space of c. 25.0 sq m. It has a medium to dense scatter of midden, with a wide range of shell species represented.

Feature K is a papamu, or konane gameboard, that is pecked into the smooth pahoehoe along the major ridgeline on the site. It is located above and just east of the Feature D cave, 3.5 m west of Feature C. The petroglyph is 1.0 m sq and has c. 14 rows x 14 columns of pecked holes (Figure 25).

Feature L is a walled enclosure adjacent to the eastern side of Feature A. It has a maximum length of 6.75 m and a maximum width of 4.0 m; interior space is 4.5 x 2.5 m. The wall is constructed from stacked pahoehoe slabs and is unfaced with a maximum height of 0.4 m. It appears that

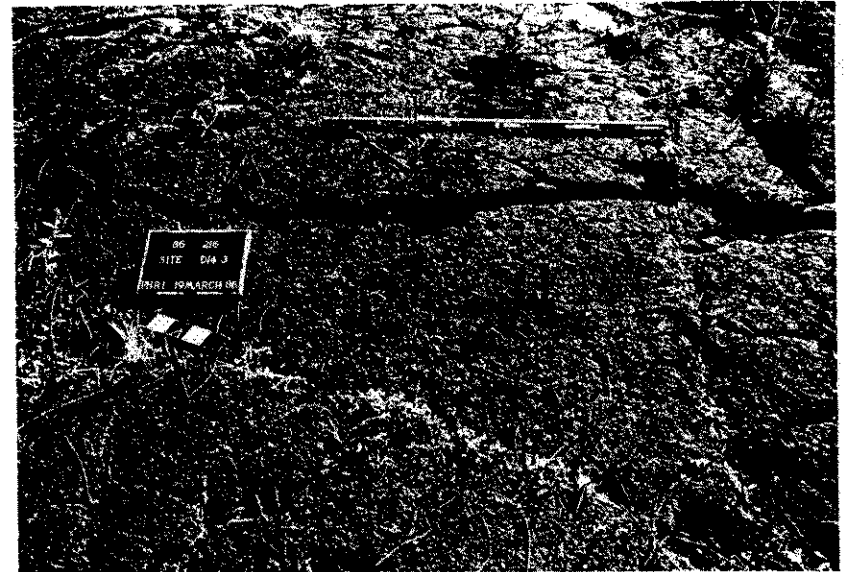


Figure 25. SITE D14-3, PAPAMU PETROGLYPH. View to northeast. (PHRI Neg.437-12)

Feature L may have been built prior to the Feature A platform, given the somewhat disoriented overlay of the structures, and differences in construction techniques.

Site D13-3 is the only site among ten tested by Cordy that could not be dated by either hydration dating or relative dating with artifacts (Cordy 1981:158). It appears that the site has both prehistoric and historic or recent components, and that the bulk of diagnostic material is concentrated in the cave shelters rather than around the enclosures and platforms.

#### 50-Ha-D14-4 Complex

This habitation/ceremonial site consists of 14 features, including a platform, six terraces, four filled depressions, a pavement, an enclosure and a cairn. It covers an area of 3600 sq m along two linear ridges and adjacent ravines, at the edge of an aa flow. The site is located in the coastal zone at an elevation of 15 ft AMSL.

Feature A is a large paved platform situated at the edge of a shallow ravine, at the western edge of the site (Figure 23). The platform is 10.0 m long and 6.0 m wide and is outlined on all sides with regularly sized chunky cobbles. The northwestern wall and western corner are faced to 1.3 m from ground surface. The faced portion of the wall is 13 courses of rough aa boulders and cobbles. The other corners of the platform vary in height from 0.15 to 0.05 m. The surface of the platform is leveled and paved with pebble sized pieces of weathered coral.

This feature was recorded by Cordy as D14-4-1 and was tested with two one m sq units. Cordy's profiles indicate a thin fill layer of 0.02 to 0.10 m overlying pahoehoe bedrock. No hydration dates were determined for this feature, which Cordy interpreted as a men's house (1981:161).

Feature B is a small pavement with an enclosure wall (Feature C) extending from the eastern side. The pavement is 4.5 m long x 2.5 m wide and consists of mixed boulder and cobble fill. The northern enclosure wall extends from the northwestern corner of the platform and is 6.0 m long; the southern wall extends from the southeastern platform wall and is 3.0 m long. The enclosed area adjacent to the platform is 3.0-3.5 x 4.0 m.

Features B and C were recorded as D14-4-4 by Cordy, who excavated a one m sq unit in the center of the pavement and one along the south, interior wall of the enclosure. A date of AD 1666±29 was determined from hydration rind analysis of volcanic glass recovered from the latter unit (Cordy 1981:247). Cordy interpreted the structure and enclosure as a sleeping house (1981:161).

Feature D is a roughly rectangular terraced pavement located along the slopes of the major ravine, 5.0 m west from Feature B. This feature is 5.0 m long and 4.0 m wide, and is terraced along the west and southwest facing walls. The southwest wall is 0.6 m high and has a narrow step-like

shelf at 0.3 m. This step is 0.5 m wide at its widest point. The western wall is faced to a height of 0.45 m above the surface of the slope. All other portions of the terrace are a single course of stone fill on bedrock.

Feature D was recorded by Cordy as D14-4-2, and was tested with two units, both near the center of the terrace. No dates were determined from this feature, which was interpreted as a sleeping house (Cordy 1981:161).

Feature E is a small rectangular terrace located downslope, 2.0 m southwest from Feature D. It is 3.0 m long and 2.0 m wide, with faced walls along the south and east sides. Rubble is piled against the southern side, which extends over the ravine. This feature was recorded as D14-4-3 by Cordy, who excavated a single unit near the north, shallow end of the terrace. A date of AD 1640±31 was determined from hydration rind analysis of volcanic glass recovered (Cordy 1981:247). The feature was interpreted as a special function sleeping house (1981:161).

Features F and G are linear terraces which extend over the eastern ravine on the site. They are located 8.0 m southeast from Feature C and 16.0 m northeast from Feature A. Both terraces are of very similar construction and dimensions (3.5 x 2 m). They are oriented parallel to one another, 1.5 m apart. The western, narrow sides of the terraces are flush with ground surface and all other walls are faced to a maximum height of c. 1.0 m. Immediately below these terraces is a rubble filled depression (Feature H) in the bottom of the ravine. These three features and the following were not recorded by Cordy during his study of this site.

Feature I is a linear deposit of rubble at the base of the ravine slope, directly below Feature A. This deposit is 9.0 m long and has an average width of 1.0 to 1.5 m. Depth of the deposit is indeterminate; it appears to fill a low area along the base of the ravine.

Feature J is a small oval terrace located 3.5 m southeast from Feature A. It has a major axis of 4.0 m and a minor axis of 2.5 m. The east and south sides of the feature are outlined with pahoehoe boulders and raised to c. 0.3 m above the sloping ground surface. The terrace is constructed from boulder and cobble sized stones.

Feature K is a small terrace situated in a narrow portion of the ravine, adjacent to a small overhang shelter (3.5 x 2.0 m). The terrace is 3.5 m long, 1.0 m wide and has a 0.3 m vertical face along the south wall. The face consists primarily of a single large boulder, with smaller stones used as fill. This feature is at the southern edge of the site, 11.0 m north from Site D14-2.

Feature L is a filled depression located along the major ridgeline on the site. It consists of a small (1.5 m in diameter) circular sinkhole that was filled with rubble to within 0.2 m of the rim. A semicircular alignment of stones occurs around the eastern perimeter of this small sinkhole. A concentration of surface shell midden occurs midway between this feature and Feature K. Shellfish species represented include Cypraeidae and Thaididae.

216-040286

78

216-040286

Feature M is a filled cavity at the bottom of a deep (4.0 m) sinkhole at the southeastern corner of the site. The sinkhole is 11.5 m in diameter and is situated 5.0 m southeast of the edge of an aa flow. The filled cavity is at the western end of the sinkhole and is oval-shaped (3.0 x 1.5 m). A second small filled cavity is located at the east end of the sinkhole; it is circular, 1.0 m in diameter.

Feature N is a cairn which defines the northeastern corner of the site. It is situated on broken pahoehoe mixed with aa, c. 25.0 m from the nearest feature. The cairn is 0.7 m high and 1.5 x 2.0 m at the base.

#### 50-Ha-D14-5 Complex

This site consists of a paved area, an enclosure, and a filled depression located on a low pahoehoe rise in a broad, shallow sinkhole. The site is adjacent to Site T-120 which is probably part of the same complex. It is located in the coastal zone at an elevation of 15 ft AMSL.

Feature A is a rectangular paved area (9.0 x 5.5 m) constructed from basalt cobbles and boulders with coral and pebble fill. A number of weathered shells are scattered on the surface of the pavement; these were probably deposited with the coral fill. This pavement was designated D14-5-1 by Cordy and two test units were excavated into the eastern portion. No hydration rind dates were determined from this feature, which was interpreted by Cordy as a sleeping house (1981:161).

Feature B is a square enclosure (6.0 m on a side) with a shallow interior pavement (0.25 m deep). The walls are constructed from pahoehoe slabs, loosely stacked, two to three courses high. Portions of the wall are somewhat jumbled and attain a width of 1.0 m. Weathered and unweathered branch coral is scattered on the interior paved area. This feature was designated D14-5-2 by Cordy, who excavated a test unit in the widest wall of the enclosure. A single hydration rind date of AD 1642±55 was determined from this feature (Cordy 1981:247).

Feature C is a filled depression that was constructed along the eastern side of Feature B. It is outlined on the east face with blocky boulders stacked two courses high. The surface of this filled area is 0.5 to 0.6 m lower than the surface inside the enclosure, due to its downslope position relative to the enclosure. Fill material includes basalt cobbles and a quantity of coral. This feature was not differentiated from Feature D14-5-2 by Cordy, who interpreted the composite as a men's house variant.

#### 50-Ha-D14-6 (50-10-27-1905) Complex

This permanent habitation site consists of a large enclosure with a central platform and an exterior stone alignment. It is located adjacent to the coastal jeep road, c. 43.0 m north from the southern boundary of Kohana-Iki. This complex is one of six sites (d) recorded by Reinecke (1930) as Site 59. He described the group as "A series of house platforms, all modern and in good condition..." (Reinecke Ms.).

Feature A is a walled enclosure 32.0 m long and 28.0 m wide with no intact gateway present. The double-faced, core-filled walls are constructed from waterworn and rough pahoehoe. Portions of the south wall are completely intact and are 0.85 m high. Average width of walls is 0.5 m. The eastern corners of the enclosure are erratic and follow configurations of the bedrock around a sharp ravine. These sections of the wall are not double faced and vary considerably in height, due to fluctuations in topography. A wall section at the southeastern corner is faced to 1.3 m below ground surface in order to maintain a somewhat level wall around the ravine. The southern half of the west wall has been eradicated by the coastal jeep road. Most of the area inside the enclosure is exposed bedrock; however, there is a zone of accumulated soil and midden in the southeastern quarter. Historic artifacts are also sparsely scattered inside and outside the enclosure walls.

Feature B is a rectangular platform 8.0 x 9.0 m, located slightly north from the center of the enclosure. The exterior sides are defined with blocky pahoehoe boulders, a single course high. The platform surface is varied and has a central strip 4.0 m wide where coral and 'ili'ili is concentrated. Cordy noted a series of postmolds along the edges of this central pavement (ms). The outer portions of the platform are paved with lesser amounts of coral and rubble, with sand fill.

Cordy excavated a test unit into the southeast corner of the platform, at the interface of two paving zones. He identified a thin (0.02 m) layer of small paving gravel, a 0.25 m thick zone of larger fill boulders, and a 0.10 m thick zone of soil overlying pahoehoe bedrock. Two hydration rind dates were determined from recovered volcanic glass; these are AD 1635±29 and 1692±45 (Cordy 1981:247).

Feature C is an alignment of large boulders situated along the edge of a bedrock shelf, 4.0 m north from the northeastern corner of the enclosure. The alignment is 2.5 m long and is free standing; it is oriented east-west.

Portable artifacts observed on the site surface include mold blown bottle bases, slip cast stoneware sherds, whiteware sherds (ironstone), hand thrown stoneware pan sherds, waterworn cobbles, coral, and shell. Artifacts recovered by Cordy during testing include nails, metal wire, buttons, glass, a ceramic bead, and two Echinoidea abraders (Cordy 1981:241). On the basis of recovered artifacts, absolute dates and construction style, Cordy hypothesized that the site has two construction/occupation stages. The platform was built as the first stage during the late prehistoric period, and the enclosure was added as the second stage, with continued use of the platform, during the historic period (Cordy 1981:154-155).

#### 50-Ha-D14-7 (50-10-27-1906) Complex

This site consists of two platforms, a U-shaped wall and a large enclosure. It is located along the coastal jeep road, 116 m north from Site D14-6. This site was recorded by Reinecke (Ms.) as one of the "modern" houses which comprised his Site 59.

Feature A is a square platform 5.5 m on a side that is situated on top of the eastern portion of Feature B. It is outlined with a single course of squarish boulders, and is filled with cobble to pebble size basalt and coral. A quantity of coral was used in fill and the surface has been leveled. Very dark soil is also in platform fill. The surface of this platform is 0.35 to 0.40 m above the surface of Feature B.

Feature B is a rectangular platform (c. 6.0 x 8.0 m) that has roughly one half of its surface area covered by Feature A. It is outlined with a single course of waterworn boulders and is filled with the same material found in Feature A. The surface of this feature is raised 0.25 m above ground surface. It should be noted that the northern wall of this feature, as shown on Cordy's field map, could not be definitively identified at the time of survey. The dimensions of this feature are therefore not substantiated.

Feature B was tested by Cordy with a single unit, placed at the north-western corner. A hydration rind date of AD 1662±67 was determined from recovered volcanic glass (Cordy 1981:247). Cordy also recovered glass, square nails, and metal fragments from platform fill (1981:242).

Feature C is a U-shaped wall located adjacent to Feature B. It is a substantial double-faced, core filled wall, constructed from large waterworn basalt boulders. The wall is in extremely poor preservation and the southern ends of the two long sides have been obliterated by the jeep road. The walls are currently 8.7 m long and 0.7 to 0.8 m wide. They are 3.0 m apart and connected at the northern end with a similarly constructed wall. The interior of this feature is paved with coral. Feature C walls are actually more substantial than the enclosure walls (Feature D) and probably represent what were formerly exterior walls. They are currently 0.3 to 0.7 m high.

Feature D is a large enclosure which surrounds Features A, B and C. These features are clustered at the northeastern corner of the enclosure. Additional features were not observed within the enclosure; however, much of the eastern and southern portions of the site have been radically disturbed by the current jeep road. The enclosure is 20.0 m wide and at least 34.0 m long. Walls are double-faced and core filled, and average in width from 0.7 to 0.65 m. The current maximum height of the walls is 1.0 m, which is apparently close to the actual original height. A single wall extends from the northern face of the enclosure and abutts a bedrock wall 9.0 m to the north. No features were observed within this smaller enclosed area; however, visibility was extremely limited.

Artifacts observed on the site surface include an iron tea kettle handle, a hand-blown bottle base with pontil scar and deep kick-up (c. 1830-40 manufacture), small metal fragments, some of which are copper, white-ware, and aluminum cookware. Cordy recovered glass and stoneware bottles, a poi pounder, square nails and glass sherds from surface proveniences at the site (Cordy 1981:241-242).

Two construction stages were identified by Cordy for D14-7; these include a stage one platform construction during the late prehistoric period and a stage two enclosure construction during the historic period (Cordy 1981:155-156).

#### 50-Ha-D14-8 (50-10-27-1909 Complex)

This ceremonial/burial site consists of a large terraced platform, eight smaller platforms and at least two small pavements. It is located on a coral beach, at Wawahia Point, 13.0 m west from the coastal jeep road. This site was recorded by Reinecke in 1930, who described a "Government survey stand on a platform, with a shelter at one end, badly damaged. Is it a fishing heiau, as appearances indicate?" (Reinecke Ms.). The site was recorded during the State survey of historic sites in 1972, and by Cordy, who interpreted it as a shrine and did not conduct excavations.

Feature A is the major platform of the complex; it is 18.0 m long and 6.3 to 7.0 m wide. The southwest (makai) face of the platform is 2.25 m high and appears to have been terraced. The upper tier has a vertical face four courses high (1.95 m). The lower tier is less distinct, but was apparently also vertically faced with a height of c. 1.0 m. The north-eastern (mauka) side of the platform is gradually sloping with the upper portions vertically faced. Fill from the smaller platforms has been added along this wall. The platform is paved with coral and the surface is scattered with large waterworn boulders which probably originated from the side walls. A rectangular stone-lined depression occurs at the western end of the platform (1.4 x 2.2 m; 0.9 m deep); it is currently filled with beach sand. A small extension occurs off the eastern end of the platform; it is lower (0.2 m) and narrower, but is constructed of similar materials and is also terraced along the makai side.

Features B-I are smaller platforms clustered at the foot of Feature A, along the northeastern (mauka) side. They occur within a 12.0 m sq area and are all outlined in waterworn boulders with boulder and coral fill. Occasional beach conglomerate boulders are located along the sides of some terraces. The surface of these features average 0.4 m above ground surface and 2.0 m below the main platform surface. Dimensions of the platforms are listed below.

Feature	Length	Width	Orientation
B	5.70 m	2.80 m	north-south
C	1.80	1.20	east-west
D	1.75	1.10	north-south
E	2.10	1.80	east-west
F	3.40	2.70	east-west
G	3.80	3.50	north-south
H	2.80	2.75	east-west
I	3.40	1.70	east-west

Two of these platforms were recorded on the State survey form and four were sketched by Cordy on the BPBM form.

Features J and K are two small paved areas located c. 3.0 m to the northwest of the platform cluster. These features are roughly oval in plan and outlined with boulders, some of which are set upright and



partially buried. The surfaces are not raised above ground surface, however, they are paved with coral and pebbles. They have a maximum length of 2.0 m and maximum width of 1.5 m. These features are probably graves.

#### 50-Ha-D14-9 Complex

This site consists of four platforms situated at the western side of four small anchialine ponds in the coastal zone. The coastal jeep road is c. 30.0 m to the west of the site.

Feature A is the westernmost platform. It is 4.7 m wide and 6.0 m long. The perimeter of the platform is defined with basalt boulders, stacked two to three courses high. Fill material consists of waterworn pebbles and cobbles, and coral. The western (makai) wall is stepped, with the lower tier 0.15 m high and the upper tier 0.10 m high. The eastern wall is vertical and is 0.65 m high. A boulder wall 0.75 m wide is constructed along the eastern edge of the platform; this wall is 0.35 m high.

Feature A was designated D14-9-2 by Cordy, who excavated a single test unit at the southeast corner of the platform. Fill in this area varied in thickness from 0.50 to 0.25 m overlying pahoehoe bedrock. A date of AD 1500±68 was determined from hydration rind analysis of volcanic glass (Cordy 1981:247). This is the earliest date determined from among the 30 dates obtained from Kohana-Iki sites. Cordy also recovered a pearl shell fishhook and an Echinoidea abrader from platform fill (1981:242).

Feature B is the largest and northernmost platform; it is 8.0 m from the northern corner of Feature A. This platform is 5.1 m wide and 7.8 m long. It has an internal division alignment which defines a 1.2 m long section of the platform at the north end. The perimeter of the platform is defined with waterworn basalt and beach conglomerate boulders stacked one to four courses high. Fill consists of basalt cobbles, coral and some rubble. This feature was designated D14-9-1 by Cordy, who excavated a single test unit at the west-central edge of the platform. Cordy located the remnants of a post in the test unit; no dates were determined and no artifacts were recovered. Cordy interpreted this feature as a sleeping house (1981:161).

Feature C is a small platform located 2.0 m south from Feature B and c. 1.0 m west from the shore of a small anchialine pond. This feature is 4.5 m long and 3.7 m wide, with an average height of 0.25 m. The perimeter of the platform is defined with waterworn basalt boulders and fill material consists of coral, soil, and basalt cobbles. Both weathered and unweathered coral is present. The feature is situated on bedrock, which is exposed in places within the perimeter.

Feature C was designated D14-9-3 by Cordy, who excavated a test unit at the eastern edge of the platform. Thickness of platform fill varied from 0.40 to 0.25 m in this area of the feature. A single hydration rind date was determined: AD 1621±46 (Cordy 1981:247). No other artifacts were recovered from this test unit. Cordy interpreted this feature as a men's house variant (1981:161), whereas Rosendahl interpreted it as a possible grave (1985:7).

Feature D is a small platform located 9.0 m south from Feature C. It is 3.8 m long and 1.6 m wide, with a variable height of 0.30 to 0.65 m. The south perimeter is defined with large upright slabs and the remaining side walls are of large waterworn boulders. Fill material in this platform is basalt cobbles and coral. This feature was not designated by Cordy, who labeled it as a rubble mound on his field map of the site.

Sparse shell midden (Neritidae and Cypraeidae) was observed scattered over the site surface, with no concentrations. Boulder rubble is scattered over the surface between Features A and B, and soil deposits were observed among fill matrices of Features A, B and C.

#### 50-Ha-D14-10 Complex

This habitation site consists of a platform, enclosure and wall remnant, located along the coastline, adjacent to the sand beach. It has been extensively altered by camper/pedestrian traffic and the surface is littered with recent rubbish.

Feature A is a platform 9.0 m long and 8.0 m wide, situated near the west-central end of the enclosed area. The perimeter is defined with large waterworn boulders and fill material is basalt cobbles. A small shanty was standing at the northern edge of the platform at the time of Cordy's investigation; this structure has subsequently fallen and the tin roof has covered most of the platform. Recently, campers have erected a stone wall along the western side of the fallen roof, creating a sleeping shelter beneath the roof. Stones for this wall were removed from the platform perimeter and enclosure walls.

Feature A was tested by Cordy, who excavated a test unit at the south-eastern corner of the platform. A series of five hydration rind dates were determined; these range from AD 1626±43 to AD 1772±50 (Cordy 1981:247). Seven artifacts, all historic, were recovered from the test unit as well (Cordy 1981:242).

Feature B is the enclosure constructed around Feature A. Walls of this feature are double-faced and core filled, with varying widths of 1.0 to 0.7 m. Most sections of the wall are either fallen or completely dismantled, particularly the southern (makai) wall, which was originally at the beach line. The enclosure is 31.0 m long on a north-south axis; the east-west axis is c. 32.0 m. The original shape of the enclosure was somewhat erratic and it incorporated natural pahoehoe ridges into the structure. Approximately half of the northern wall is natural bedrock rather than constructed.

Feature C is a single wall 9.0 m long and 1.2 m wide that is located at the eastern end of the enclosed area. The wall is double faced and core filled; it is constructed from large waterworn basalt boulders and is currently 0.8 m high. The western end of the wall abuts a bedrock face which has a vertical drop of 0.5 m. The eastern end comes to within 1.0 m of the eastern wall of the enclosure, creating a small enclosed space 8.0 m long and 6.0 m wide inside the northeast corner of the enclosure.

All artifacts and subsistence remains observed on the site surface are from recent on-site activities. At least three recent hearths have been constructed just maka of Feature A, inside the enclosure, and several large refuse piles are present. The recent sleeping shelter has severely affected habitation deposits associated with platform occupation.

Cordy suggests that this site represents two construction phases, including a late prehistoric platform and a historic enclosure phase, with continued habitation on the platform (Cordy 1981:154-155). With the exception of a single polished basalt fragment, all artifacts recovered by Cordy from surface fill were recent (1981:242).

#### 50-Ha-D14-11 (50-10-27-1907) Complex

This site consists of two enclosures and a platform. It is located along the coast, c. 30.0 m northwest from Site D14-10. Reinecke (1930) recorded this site as Site 60, and described it as "[w]alls on a point of lava; small platform that appears to be a recent, well-preserved grave" (Reinecke Ms.).

Feature A is a small rectangular platform (4.5 x 1.0 m) on exposed bedrock, constructed from waterworn basalt boulders stacked three to four courses high (0.8 m). The surface of the platform has been covered with storm deposits of weathered coral and shell; original fill material is therefore indeterminate.

Feature B is a core filled, double faced wall erected around three sides of Feature A. The walls abutt a bedrock face, which forms the northern wall of the enclosure around the platform. The wall is 0.9 to 0.5 m high and has an average width of 0.6 m. It is very close to the platform, with only 1.0 m between the inside of the wall and the outer edges of the platform. The space between these structures is filled with storm wash which covers a pavement of coral and pebbles.

Cordy excavated a test unit inside the southwest corner of the enclosure, which he designated as D14-11-1 (includes Feature A). No volcanic glass or other artifacts were recovered from this unit. Cordy determined that there was a pavement under the platform and suggested that it represents an initial stage in the construction sequence, with the platform and high wall as a second, historic stage (Cordy 1981:154). The paved area was interpreted by Cordy as a canoe house/men's house (1981:161). Reinecke (Ms.), the HRHP archaeologists (1972) and Rosendahl (1985) describe the later (?) construction stage as a burial platform.

Feature C is a long, narrow enclosure (14.5 x 5.0 m) located immediately south of Feature B. It is constructed from waterworn and rough boulders, with double-faced, core filled walls. Basaltstones along the west (maka) are extremely large and portions of the wall incorporate natural bedrock. The southern wall is also erratic and incorporates large, rough pieces of pahoehoe rockfall. The enclosure is situated on a bedrock ridge, which drops 3.0 m to the beach immediately west of the wall. The western wall apparently extended to the northern bedrock face

which forms the northern perimeter of Feature B. The east wall is very poorly preserved; it may have extended to or very near the south wall of Feature B. The interior of the enclosure is irregular bedrock, with sand and dark soil deposits in low areas. Some gravel fill is also present in low areas.

Three hydration rind dates were determined from volcanic glass recovered by Cordy from surface deposits in Feature C (designated D14-11-2). These are AD 1518±50, 1652±53 and 1661±52 (Cordy 1981:247). No other artifacts were recovered. Cordy interpreted this feature as a sleeping house (1981:161).

#### 50-Ha-D14-12 Complex

This habitation/possible burial site consists of a three-sided (U-shaped) wall, two filled depressions and a walled shelter (Figure 26). It is located 60.0 m south from the northern boundary of Kohana-Iki, c. 12.0 m west from the coastal jeep road.

Feature A is a squared, U-shaped wall constructed from pahoehoe boulders and waterworn basalt boulders, with cobble core-filling. The wall is 2.0 m wide and presently 0.3 m high. The side walls are 6.0 m apart, measured from exterior faces. Distance from the exterior of the closed end to the open end is likewise 6.0 m. The wall opens to the southwest. Several large pieces of tin roofing cover the enclosed area and recent glass sherds are scattered about. Surface midden is scattered around the perimeter of the wall and extends 8.0 m to the west. Material observed includes volcanic glass, Cellana sp., Cypraeidae, Meritidae, Conidae, coral, waterworn basalt and bottle glass.

Cordy excavated a one m sq test unit inside the east wall of Feature A and recovered several historic/recent artifacts (1981:242). Hydration rind dates were determined for three volcanic glass specimens; these are AD 1523±62, 1682±92 and 1668±45 (Cordy 1981:247). Cordy suggests that this feature was constructed in two stages. A paved living surface was first constructed and occupied (late prehistoric); the enclosing wall was later erected (historic), with continued occupation of the platform.

Feature B is a rubble filled depression located 7.0 m east from Feature A. It is roughly rectangular (3.5 x 2.5 m) and situated in a natural pahoehoe depression. The west wall is faced with waterworn basalt boulders and raised from ground surface c. 0.25 m. Sparse surface midden is scattered over the surface in the vicinity of this feature, including Cypraeidae, Thaididae, bottle glass, and a coral abrader. Two small rubble mounds are located within 4.0 m east of Feature B. These are 0.2 and 0.3 m high, with basal dimensions of 0.5 x 0.25 m and 1.0 x 1.0 m.

Feature C is a walled shelter located 16.0 m northeast from Feature B. The wall is C-shaped, with the open end facing a pahoehoe depression (west). It is constructed from loosely stacked pahoehoe rubble, three to four courses high. The wall is 1.0 m wide, with up to eight rows of

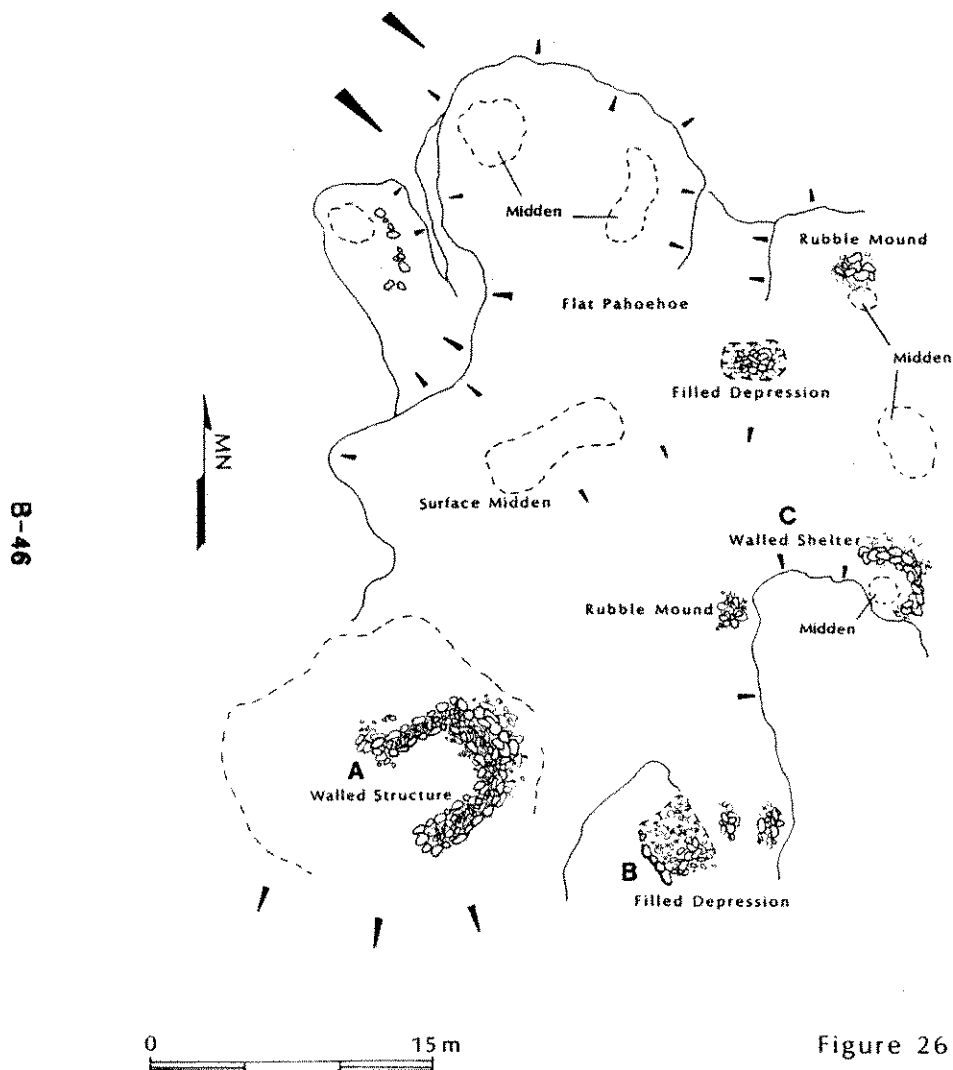


Figure 26

**SITE 50-HA-D14-12  
FEATURES A, B AND C**

stone. The enclosed space is 2.5 sq m, and the maximum length of the wall is 4.0 m. A small concentration of coral and Cypraeidae shell occurs 3.5 m to the north.

Feature D is a rubble filled depression located 11.0 m northwest from Feature C. It is oval in shape (3.5 x 2.0 m) and consists of rough pahoehoe slabs and boulders. There are no portable artifacts nearby.

Four additional areas of concentrated surface midden were observed in the northern portion of the site between Features A and D. Material present in these areas is the same as that noted above.

50-10-27-1902

This site consists of two very poorly preserved sections of enclosures, located adjacent to the coastal jeep road near the southern boundary of Kohana-Iki (Figure 27). These features were recorded by Reinecke and described as "[t]wo very small enclosures on the beach" (Reinecke Ms.).

Feature A is currently a squared U-shape; however, the original form is indeterminate. The double faced, core filled walls are constructed of waterworn basalt. A single section of the south wall is intact; this section is 1.0 m wide and was apparently built as a substantial exterior wall. The structure is currently 6.5 m wide, from the exterior faces of existing walls. Interior space is 4.5 m wide and 5.0 m long. A recent circular stone alignment is located immediately west of the structure; this alignment is constructed from stones from Feature A. No portable remains other than recent rubbish were observed in the vicinity of this feature.

Feature B is located 10.4 m south (180 degrees Az) from Feature A. It consists of the remnant of a faced wall corner and an alignment of boulders which formed a U-shaped form. The faced wall remnant is constructed from small waterworn boulders and cobbles. The two sides of the corner are oriented at 150 and 60 degrees Az and are 2.5 to 3.0 m long. A third wall remnant extends south from the southern wall for a distance of 1.5 m. This wall is very poorly preserved and may be a later addition to the feature. The boulder alignment parallels the south faced wall, forming a small enclosed area 1.5 x 2.0 m. This alignment is constructed from four large waterworn basalt boulders. No portable artifacts other than recent rubbish were observed in the vicinity of this feature.

50-10-27-1908 Enclosure

This single feature is a high walled enclosure, located 165.0 m north east from Site D14-11, and 24.5 m east from the coastal jeep road. It was recorded by Reinecke as Site 61 and described as a "[b]roken cattle pen" (Reinecke Ms.). The enclosure is 28.8 m long and 20.5 m wide, as measured along exterior wall faces. The walls are double faced and core filled, with an average width of 1.0 m (Figure 28). The west (*makaj*) wall is constructed of very large waterworn basalt boulders up to 0.9 m long. The remaining walls are of rough pahoehoe boulders with some waterworn

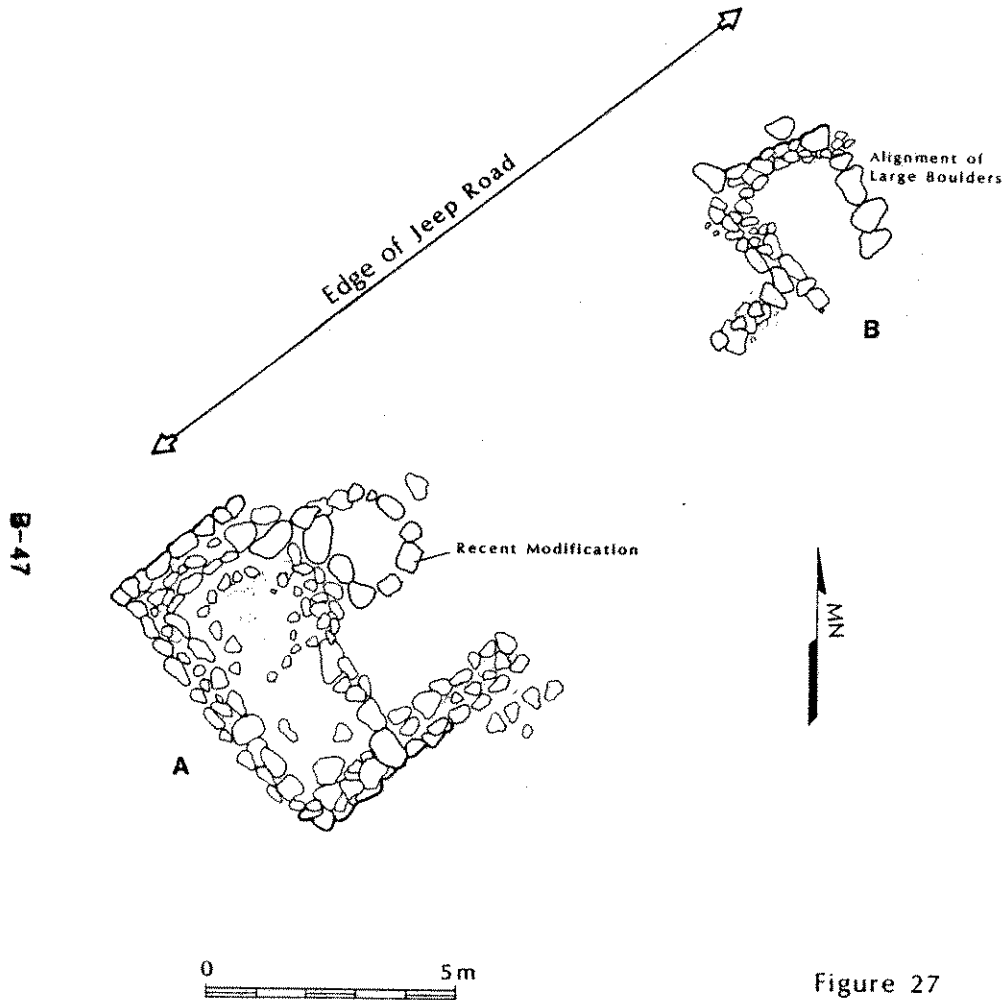


Figure 27  
 SITE 50-10-27-1902  
 FEATURE A AND B

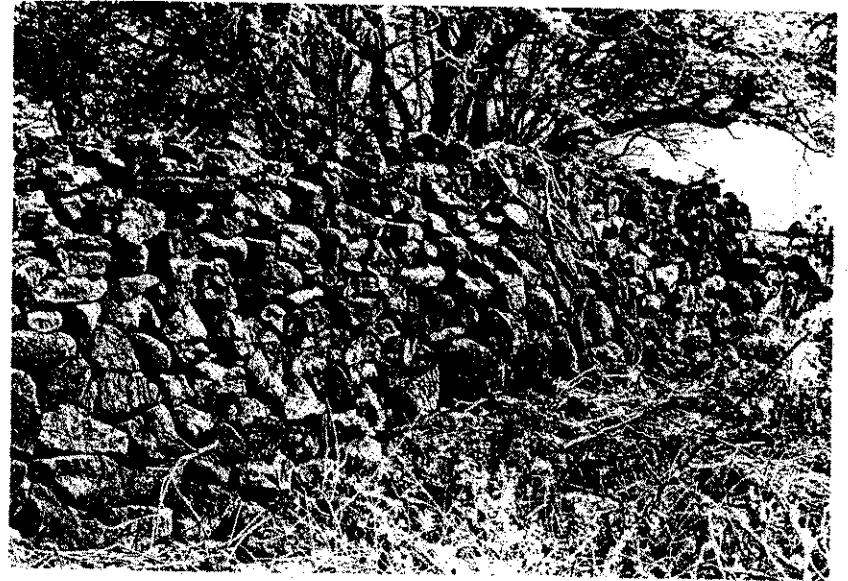


Figure 28. SITE 1908, SOUTH WALL. View to east. (PHRI Neg.448-22)

boulders interspersed. Core fill is cobble to pebble sized basalt and rough lava. Upper portions of all walls have fallen, and the maximum standing height is 2.17 m at the northwest corner.

Two faced vents occur along the base of the south wall, in shallow ravines. The westernmost vent is 0.46 m high and 0.36 m wide; it is midway along the wall. The second vent is 3.5 m to the east; it is 0.5 x 0.5 m. A third vent (0.43 x 0.34 m) is located on the opposite wall, near the northwestern corner. These faced vents apparently served to permit drainage under the walls.

Approximately 75% of the enclosed area is exposed bedrock. Soil has accumulated in low areas where large *liawe* trees are now growing. The major area of accumulated soil is at the northwest corner, where bedrock drops 0.35 to 0.60 m.

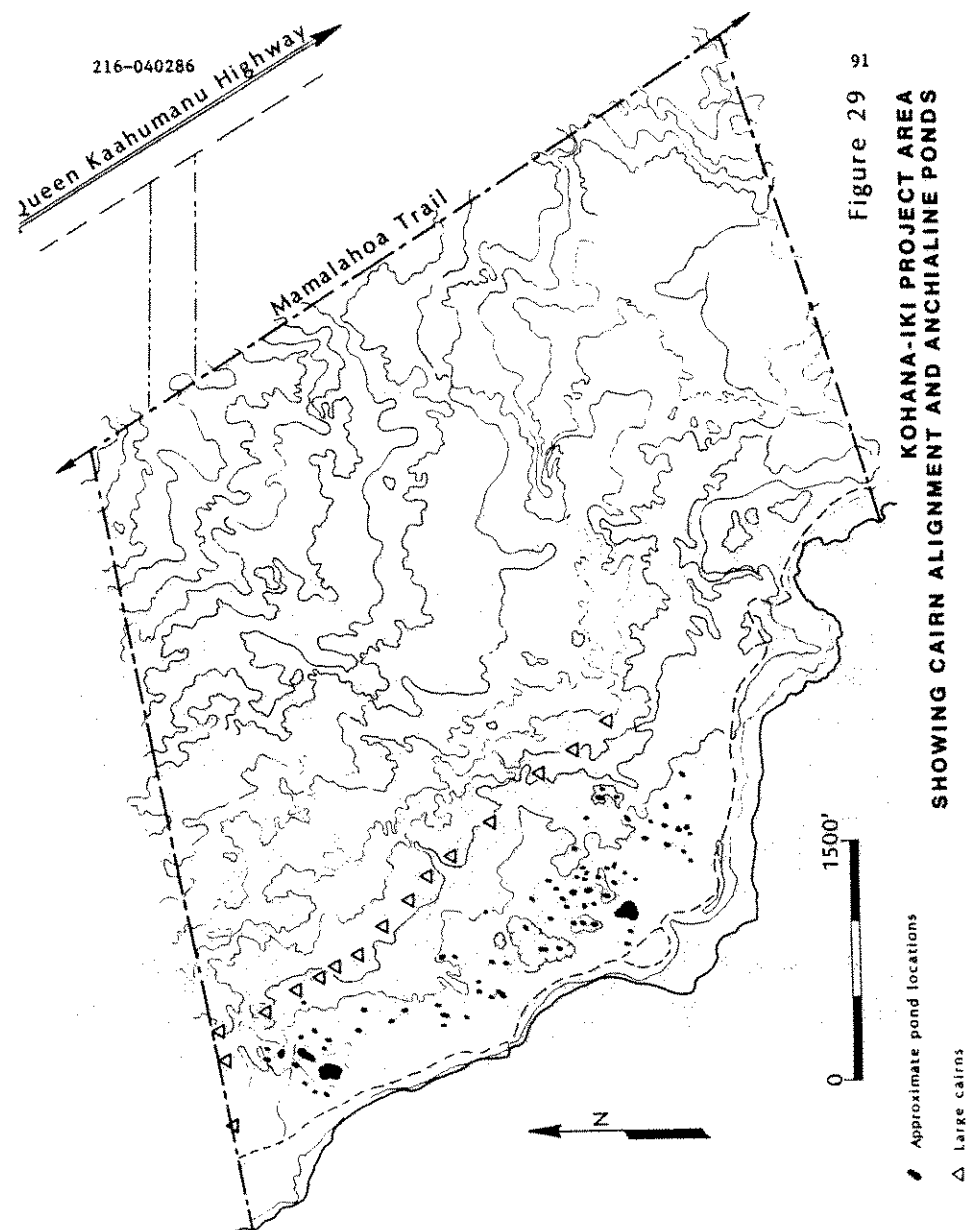
Portable artifacts observed on the surface inside the enclosure include a panel bottle base with embossed lettering on a molded base, a case bottle sherd (no mold seams), and a round bottle base (cup bottom mold). Recent rubbish is also present.

#### CONCLUSION

#### DISCUSSION

The most frequently recorded feature type in the project area is the ubiquitous cairn (N=74), which occurs in a variety of sizes and shapes, and accounts for 60% of the 53 single feature sites recorded. Less than half of these features could be given a functional interpretation, and many seem to represent relatively recent activities. Significant among these features is an alignment of 16 large cairns which appears to delineate the coastal zone of anchialine ponds (Figure 29). The southernmost cairn of this alignment (T-133) is near the southern extent of the anchialine pond zone. An additional site, T-128, which was identified in the field as a rubble pile, may represent a dismantled cairn. The location of this feature strongly suggests its association with the alignment.

Locational data for the 16 large cairns forming the alignment are presented in Table 5. The two northernmost cairns at Sites T-175 and 176 form a corner at the land division boundary and follow the boundary toward the sea. All other cairns in the alignment show a uniformity of orientation, with a range of 318-306 degrees Az to the nearest cairn to the north (mean=312 degrees, standard error=3.8 degrees). Distances between cairns are less uniform and range from 130 to 26.8 m (mean=67.8 m, standard error=29 m). This variability reflects the topographic irregularities of the terrain and suggests that the spacing was less important than the orientation and location of each cairn on a promontory. Additionally, cairns located short distances from nearest neighbors may represent features that were added to the alignment at a later time. Examination of



construction techniques may clarify this problem. In most cases, remaining intact structures are buried beneath looters rubble, which should be cleared away during subsequent examination.

Table 5.

## LOCATIONAL DATA FOR LARGE CAIRNS IN ALIGNMENT

Temporary Site No. (T-)	Approximate Elevation AMSL (feet)	Distance to NN* (meters)	Degrees AZ to NN* (meters)	Direct Distance to Coast (meters)
133	24	90.2	315	305
142	22	71.5	318	427
143	16	130.0	318	396
147	14	92.0	315	341
148	17	50.7	311	335
149	17	67.0	308	366
155	17	52.0	311	329
156	17	81.0	311	305
157	16	41.0	307	274
158	16	26.8	315	268
159	14	68.2	310	267
160	13	59.8	310	259
161	10	92.8	306	251
162	5	85.8	285	244
175	5	68.2	225	226
176	5	-	-	189

\*Nearest adjacent cairn to the north.

Initial observations of the cairns suggest that there is variability in construction techniques among the large cairns, some of which is related to immediately available building material. The primary building materials used in all cairns are pahoehoe slabs and boulders. Those cairns which appear to be more carefully constructed are those which have a greater proportion of regular slabs as opposed to boulders. Beach conglomerate boulders were identified at four cairn sites (T-142, 143, 148 and 149), where a single boulder has been incorporated into the cairns. Additional conglomerates may be present at other cairns, albeit buried in rubble.

A total of 58 smaller cairns were located, nearly half (24) of which are simple stacks of single stones. All of these simple cairns are in the coastal zone and it is likely that their number has increased since the time of this survey. Twenty-six cairns occur at habitation complexes and are associated with cave shelters, walled shelters, or C-shape shelters. None of these cairns are simple stacks and most are probably prehistoric. Most of them are likewise at least partially dismantled. The most impressive small cairn complex is Site T-166, which includes 11 cairns, a coral pavement and a C-shape shelter. This site is adjacent to Site T-157, a large cairn/cave shelter complex. Of the remaining eight cairns, two are associated with a footpath (Site T-105) and one is associated with the Mamalahoa Trail (T-104). Three cairns (T-113, 193) are suspected of being associated with an east-west trail; however, the trail could not be definitely located in the field.

Shelter features including caves, overhangs, walls and alignments, comprise 24% (62) of the 262 recorded features. These features are interpreted as temporary habitation sites, with the possible exception of two very low ceiling walled caves which may be storage facilities (T-124, 129). Most of the shelter features (N=49, 79%) occur at complexes, in association with another shelter or with different kinds of features, such as pavements, filled depressions or walled springs. The composition of these latter sites suggests more extended occupation of the shelters, or use of natural shelters in conjunction with constructed houses.

Nine complexes were located which include either natural shelters or C-shape walls with nearby pavements (T-130, 166, 176), filled depressions (T-101, 126, 177), enclosed yard space (T-144), a walled spring (T-173), or with platforms and enclosures (D14-3). All of these sites occur in the coastal or coastal/rocklands interface zone at elevations of 20 ft AMSL or below.

In contrast, complexes that consist of natural shelters only tend to occur in the rocklands zone, indicating use probably during transit between upland and coastal habitation sites. Eight complexes were located which consist of either two caves (T-107, 108), two overhangs (T-112, 187), or a cave and overhang combination (T-106, 111, 114, 122). Only two of these sites occur in the coastal zone. Several of the complexes with two natural features exhibit feature-specific variation in the archaeological deposit, suggesting spatial segregation of activities. It is possi-

ble that the organization of these sites is patterned after that of the permanent habitation sites, implying occupation by a family group, as opposed to an individual(s). Alternatively, the differences in feature deposits may reflect temporal variation in site use, or other functional constraints. For example, selection of overhangs for shelters appears to be related to exposure; all occupied overhangs open to the south (160-215 degrees Az) or west (270-300 degrees). Cave shelters, on the other hand, tend to open to the northeast (40-92 degrees) or northwest (320-360 degrees), as opposed to the southeast (1 out of 13 caves) or southwest (1 out of 13 caves).

Temporary shelter sites which consist of a single feature occur most frequently in the coastal zone (9 of 13 sites). Eight of the nine coastal single shelter sites consist of constructed walls or natural shelters with walls. These sites may be less temporary than the unaltered natural shelters and possibly reflect periodic fishing and/or coastal resource gathering camps.

Use of temporary shelters during the historic period is indicated at ten sites (T-112, 114, 119, 122, 124, 126, 129, 176, 192, and D14-3). All but two of these sites occur at elevations of 20 ft or below, in the coastal or coastal interface zone. Six of these sites consist of two natural shelters with historic material in one feature only. Historic artifacts most frequently observed are bamboo poles, milled lumber planks, and various cooking/eating utensils.

Enclosing walls (16), and single walls (25), together comprise 16% of all recorded features. Most of the enclosing walls (87%) occur at habitation complexes located along the coast. Ten of these features were previously recorded and were identified by Cordy (1981) as historic constructions added around existing house platforms. All of the coastal house enclosures have been affected in varying degrees by pedestrian and vehicular traffic along the beach. Walls at Sites D14-6, 7 and 10 are in particularly poor preservation.

Two enclosures (Sites T-116 and 1908) occur as single feature sites and are interpreted as animal pens. One of these sites is located in the coastal zone and one (T-116) is in the rocklands. Other enclosing walls occur at the modified pond complex, Site T-135. These walls, which were built to enclose water, appear to be of historic construction.

Platform and terrace features occur most frequently at habitation or ceremonial complexes located along the coast. Thirteen of 28 recorded platforms occur in previously recorded coastal complexes. Six newly recorded platforms are associated with modified ponds or pools and are also located along the coast. All 19 of the recorded terraces are likewise associated with coastal complexes or modified sinkholes and ponds. Terraces that occur at Site D14-4 (6) and platforms at Site D14-8 (8) are interpreted as possible burial features.

A wide range of shapes and construction techniques are indicated among the platforms and terraces; however, it is difficult to summarize this variability on the basis of reconnaissance data alone. A more detailed

discussion of these features must therefore await results of intensive survey investigations. Among the terrace and platform features are a number of possible burials, which cannot be definitively identified at this stage of analysis. The most concentrated possible burial complex is HRRP Site 1909/BPDM Site D14-8, which includes the previously recorded heiau.

In summary, the general patterning of sites located reflects a concentration of sites in the coastal zone, within 1000-1200 ft from the shoreline. Habitation sites are dispersed across this coastal zone, with a lower density in the northern half of the project area between the large anchialine pond and the mangrove thicket (see Figure 5, at end). Inland sites occur with greater frequency in the southern half of the project area, where the terrain is more conducive to habitation and transportation. Features occurring in the inland zone are principally small cairns, walled shelters, and overhangs. All of the more substantial habitation features and historic period sites were located in the coastal zone.

This distribution of sites conforms to the general pattern of aboriginal Hawaiian settlement that has been reconstructed on the basis of archaeological, ethnohistoric, and ethnographic sources for the portion of North Kona north of Kailua (Rosendahl 1973:60-61). In this settlement pattern model, the environmental setting is characterized by three major zones: a narrow, arid coastal habitation zone associated principally with the exploitation of various marine resources; a sloping, barren middle zone characterized by exposed and pahoehoe lava rocklands, and largely devoid of soil or vegetation other than grasses; and an upland habitation zone associated with agricultural exploitation. A forest zone, still further inland, was also exploited but not inhabited. The sites and features identified within the Kohana-Iki project area evidence the occupation of the narrow coastal zone, and the movement of people through the barren rocklands that connected coastal and inland areas of habitation and exploitation. A number of more specific research problems can be addressed within the context of the general settlement pattern described above. These issues are discussed below.

#### PRELIMINARY EVALUATIONS AND RECOMMENDATIONS

The findings, evaluations, and recommendations of this study were discussed with Ms. Virginia Goldstein--staff planner and historic sites specialist in the Hawaii County Planning Department. Ms. Goldstein concurred with the conclusions and recommendations presented here. Evaluations and recommendations are listed by site in Tables 5 and 6, which also include lists of features and brief comments by site.

#### Preliminary Evaluations

Tentative significance evaluations are summarized on a site-specific basis, for both newly identified and previously identified sites, in Tables 3 and 4 respectively (at end). The significance of archaeological

remains can be defined in terms of potential scientific research, interpretive, and/or cultural values. Research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and cultural processes at the local, regional, and interregional levels of organization. Interpretive value refers to the potential of archaeological resources for public education and recreation. Cultural value, within the framework for significance evaluation used here, refers to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and values.

Sites identified here as containing potentially significant research value have been selected within the framework of a research design, much of which was formulated after the range of cultural resources present within the project area was known. This design focuses on three principal subject areas and outlines specific research problems within each subject area. These problems are not exhaustive; however, they do attempt to define the most productive approaches to research, given the range of cultural resources present.

The first research topic concerns the anchialine pond resource zone. This 146,400 sq m area includes 80 ponds (wai 'oapa) of various sizes and depths. Many contain mollusks and crustaceans, and the largest pond is a habitat for waterfowl and shorebirds (discussed above). Nine archaeological sites have been located in or adjacent to ponds or springs in this zone. Each of these sites represents a unique formal/functional feature or complex of features. Research problems relevant to this resource area are the following: (a) How and for what purposes were the ponds exploited, both prehistorically and historically? (b) What is the extent of structural variability at modified ponds, and how does it reflect temporal change and/or adaptation to local terrain and available building materials? (c) Have cultural modifications caused or aided changes in pond ecosystems, as described by Maciolek and Brock (1974)? and (d) What implications might the alignment of large cairns have in interpreting the socio-economic role of pond exploitation in Kohana-Iki? Sites with archaeological data relevant to the above research problems are T-134, 135, 138, 145, 173, 176, 187, 189, 190, and the large cairns T-133, 142, 143, 147-162, 175, and 176.

The second research topic focuses on a 15 acre area within the coastal zone near the southern edge of the Kohana-Iki land division. A total of 62 features are located within this roughly triangular area, which is defined by three large complex sites (D14-3, 4, and 5). Unlike other coastal habitation complexes within the project area, these sites were apparently not permanently occupied during the historic period, and do not exhibit features of historic period construction. The features within these three complexes and in adjacent smaller sites represent a wide range of formal and functional types, including a major coral paved platform, numerous small enclosures and platforms, intensively occupied cave shelters, terraces and walls. The area of these complexes is south of the large cairn alignment, and represents the only portion of the Kohana-Iki coastline that is not demarcated by the cairns. Settlement within this area may therefore reflect patterning constrained by social barriers.

Possible goals of further investigations at these sites are the following: (a) to determine more conclusively the temporal range of site occupation; (b) to outline the range of activities conducted at the various complexes and within the area as a whole; (c) to determine, as accurately as possible, the extent of contemporaneity and, ideally, the functional relationship between the various complexes; and (d) to suggest reasons why this area was abandoned during the historic period, if it was in fact abandoned. Sites with archaeological data of potential value in addressing these problems include 50-Ha-D14-3, 4, 5, T-101, 119, 120, 121, and 122.

The final research subject concerns the settlement pattern of the Kohana-Iki land division. A number of hypotheses have been offered by Cordy (1981) in this subject area, and have been discussed above (Previous Work). Briefly, Cordy suggests that Kohana-Iki was not permanently settled until after AD 1400; that the prehistoric population peaked c. AD 1600; and that the ten coastal habitation sites, with their sleeping houses and men's houses, were occupied by commoners who had no substantive control over local resources.

The above conclusions are based on three assumptions made by Cordy that must be addressed before Cordy's hypotheses can be tested. The first of these assumptions is that the functional interpretations of sites and features is correct. As indicated in the site descriptions above, there is an extremely wide range of structural variability within Cordy's "sleeping house" and "men's house" categories. Cordy's excavations were conducted primarily for the acquisition of volcanic glass for dating, rather than for determination of structural/functional characteristics. It is therefore possible that testing with the latter purposes in view may result in different interpretations of some structures.

A second assumption accepted by Cordy is that the immediate coastal zone settlement pattern is representative of the pattern for the entire land division. This assumption is supported in part with data collected by Renger at Kaloko (1970) and by Rosendahl along the Queen Kaahumanu highway corridor across inland North Kona (1972). These studies confirm a general absence of permanent habitation in the rocklands between the coast and the uplands. They do not; however, confirm that coastal and upland zones were occupied by the same household groups, or that the two areas were initially populated at the same time. Data collected from temporary inland shelter sites may suggest alternatives to Cordy's "buffer zone" hypothesis that the land division was devoid of people prior to AD 1400, and to Cordy's population estimates. Additionally, examination of coastal shelters may indicate that temporary habitation sites were occupied in this zone prior to the establishment of permanent households.

Finally, Cordy's conclusions assume that all structures within complex sites are contemporaneous, and that the hydration rind dates obtained from one feature may be used to date all other features within a site (Cordy 1981:164). The problems of hydration dating are still poorly understood; however, it has been determined that volcanic glass samples can produce divergent dates when microenvironmental conditions vary. The potential effects of such variability were not discussed by Cordy, who combined



surface and subsurface glass samples in obtaining occupation ranges for the sites studied. The complexities of hydration dating should be dealt with more realistically in further work at Kohana-Iki, and additional control from radiometric dating of charcoal is recommended. Quantities of charcoal were observed at a number of sites within the study area.

In summary, specific research goals concerning settlement pattern analysis in Kohana-Iki are the following: (a) examine the site-specific functional/temporal interpretations offered by Cordy for coastal habitation complexes; (b) determine more specifically the extent and intensity of shelter usage in the rocklands environmental zone, with an emphasis on obtaining both relative and absolute dating materials; and (c) identify the range of subsistence remains present at inland shelter sites and determine resource locales/zones represented. Sites with archaeological data of potentially high value for addressing these problems include 50-Ha-D14-6, 7, 9, 10, 12, T-107, 109, 111, 122, 126, and 193. The latter five sites are cave shelters and are significant for the relatively rich deposits of subsistence remains, presence of temporally diagnostic artifacts, and their potential for providing relatively accurate functional interpretations of features and/or activity areas. A more comprehensive understanding of the above research topics will permit the development of a realistic model for land use, culture history and processual change through time within the Kohana-Iki Land Division.

Archaeological sites with potentially high interpretive value are identified at this stage of analysis by considering the following criteria:

1. Site integrity--Are the structural remains of the site sufficiently well preserved, or can original structural features be accurately reconstructed?
2. Site function--Can site function be accurately determined and sufficiently described so as to be informative to the general public? Can the temporal, social and ethnic background of site occupants/builders be ascertained or reasonably indicated?
3. Site information--Does the site, together with interpretive data, create a non-redundant, informative, and generally interesting locale? Is the site representative of a structural or functional type, as identified and generally accepted by archaeologists and ethnohistorians?

Sites with archaeological data of potentially high value in these interpretive domains are: 50-Ha-D14-4, 6, 8, 11, 50-10-27-1908, T-102, 124, 135, 157, 176, and 187.

Site 50-Ha-D14-4 is a permanent habitation site that may have contained ceremonial structures and burials. Feature A is a particularly well preserved and impressive example of a possibly ceremonial structure platform. Additional terraces and smaller platforms occur in the immediate vicinity, as well as cave shelters with rich midden deposits.

Site 50-Ha-D14-6 is the best preserved historic house platform with enclosure within the project area, and Site 50-10-27-1908 is a relatively well preserved high walled enclosure that probably represents an animal enclosure. These two sites are good examples of their respective type of historic site.

Site 50-Ha-D14-8 represents a ceremonial center, probably a heiau. This site consists of a large, stepped platform and numerous smaller burial platforms. This site also has a potentially high cultural value.

Sections of the Mamalahoa Trail (Site T-102) provide particularly informative views of this historic horse road. These sections occur in areas where the road spans deep ravines and crosses rough as.

Site T-135 is the best example of an aquaculture site within the project area. It is likely that additional clearing and investigations at the site will permit a detailed functional interpretation of this historic period site.

Sites T-176 and T-187 are significant in that they provide contrastive examples of sinkhole utilization during the prehistoric vs. historic periods. Both sites appear to represent non permanent habitation in sinkholes that had anchialine pools. The ways in which these sinkholes were modified reflects temporal as well as potentially some functional differences.

Finally, Site T-157 contains the best preserved example of the large cairns that demarcated the anchialine pond zone. It also contains a temporary habitation cave shelter. Additional large cairns are in the immediate vicinity of Site T-157, where they were spaced more closely than elsewhere along the alignment.

Sites with potentially high cultural value are those locations with traditional uses, and locations which have meaning in the context of a traditional way of life. Identification of sites with cultural value requires first, that site function is known, and second, that the social context of the site be determined. The identification of site function is a problem particularly applicable to burial sites, which have a definite social context and are of high cultural value.

A number of sites were located during reconnaissance which may contain human interments. These include 50-Ha-D14-4, 8, 11, T-126, 128, 132, 140, 175, and 183. Designation of these sites as culturally valuable is contingent upon data recovered during subsequent investigations.

Two small shrine sites (T-108, 134) were located within the project area which may have high cultural value, as well as the possible heiau (50-Ha-D14-8), which is discussed above. Site T-130 may also be identified as a shrine site, pending further investigations.

### Recommendations

Recommendations for further archaeological work are summarized on a site specific basis, for both newly identified and previously identified sites, in Tables 3 and 4 respectively (at end). Recommendations for further work at specific sites are based on the evaluative criteria described above, as well as on the kinds of information obtainable at each site, as determined during reconnaissance survey. It should be noted that the above evaluative statements are based solely on reconnaissance observations and on data collected during previous analyses of resources within the project area. They are therefore subject to continued scrutiny at a more intensive level of study.

Formal recommendations for specific site preservation are likewise very limited at this stage of analysis, due to the paucity of information from a number of sites. Recommendations for site preservation are possible in only a few cases and are not intended to be final. It is likely that sites such as 50-Ha-D14-8, T-134, T-135, T-190, portions of T-102 and 50-10-27-1098 will be recommended for preservation, in addition to possibly other sites. These six sites have been discussed above.

Further intensive survey level work is divided here into three major task categories; detailed recording, recording with surface collection, and recording with surface collection and/or test excavation. The category of further work recommended does not automatically reflect site significance; it may simply reflect a need for more information in order to assess significance adequately. Site-specific recommendations for further work are summarized in Table 6 according to major tasks category. Individual sites are identified in Table 6 by both number and inferred function.

Detailed recording includes site clearing (if necessary), compilation of a plan map which includes all features present, compilation of surface profiles which illustrate topographic and structural features, plotting of surface materials, and a complete verbal description of the site. In many cases, the adverse effects of construction or other activities on sites can be mitigated by this type of data recovery, since all obtainable information has been collected. Detailed recording was conducted at a number of sites during reconnaissance survey, thereby reducing the total count of sites which need this level of further work.

Recording with surface collection includes the above activities as well as surface collection of artifacts and subsistence remains. This level of work is recommended at sites which have no subsurface deposit, such as cave shelters with surface material on bedrock. Surface collection may be total or partial, depending upon the nature of the deposit. This type of work is recommended for sites for which the general function is known and which have been determined to contain ecofactual data relevant to stated research problems.

Recording with surface collection and test excavation includes all recording activities as well as test excavations. Surface collection is warranted at sites with substantial surface deposits; however, not all

sites recommended for test excavation have surface deposits. This level of work is recommended at sites for which the function is uncertain, yet crucial to the determination of site significance. Some sites recommended for this level of work may also be recommended for preservation, based on their high interpretive potential. In these cases, the sites contain significant research information, as well as information that will enhance their interpretive value, if recovered archaeologically. Excavation as used here does not imply total site excavation, which would be recommended only after analysis of test excavation findings.

Table 6.

#### SUMMARY OF SITE-SPECIFIC RECOMMENDATIONS FOR FURTHER ARCHAEOLOGICAL WORK - MAJOR TASKS

Major Task Category	Site Number and Inferred Function			
Detailed Recording	T-102	Mamalaboa Trail	T-155	Large cairn
	T-105	Foot path	T-156	Large cairn
	T-116	Animal pen	T-158	Large cairn
	T-117	Petroglyph	T-159	Large cairn
	T-118	Cart road	T-160	Large cairn
	T-133	Large cairn	T-161	Large cairn
	T-147	Large cairn	T-162	Large cairn
	T-148	Large cairn	T-190	Aquacultural pond
	T-149	Large cairn		
	Detailed Recording and Surface Collection	T-107	Temp. habitation	T-120
T-108		Temp. hab./ceremonial	T-157	Temp. habitation
T-109		Temp. habitation	T-176	Temp. habitation
Detailed Recording, Surface Collection, and/or Test Excavations	T-101	Habitation/burial	T-192	Temp. habitation
	T-111	Temp. habitation	D14-3	Perm. habitation
	T-122	Temp. hab./burial	D14-4	Perm. habitation/ ceremonial
	T-126	Temp. hab./burial		
	T-128	Rock mound	D14-5	Perm. hab./burial
	T-130	Habitation/ceremonial	D14-6	Perm. habitation
	T-132	Habitation/burial?	D14-7	Perm. habitation
	T-135	Aquaculture	D14-8	Ceremonial
	T-140	Rock mound	D14-9	Perm. hab./burial?
	T-144	Temp. habitation	D-14-10	Perm. hab./burial?
	T-175	Habitation/ceremonial	D-14-11	Perm. habitation/ ceremonial
	T-183	Habitation/burials?		
	T-187	Temp. habitation	D-14-12	Perm. hab./burial?
T-191	Platform	1908	Animal pen	

Detailed recording is recommended at 22 sites (Table 6). These include 12 of the large cairns, the historic cart road (T-118), the footpath (T-105), the petroglyph (T-117), the portion of the historic Mamalahoa Trail (T-102) that would be affected by the proposed access road, and three sites associated with anchialine ponds. Two of the latter sites, T-134 and T-190 have potentially high cultural and interpretive value, respectively, and may also be recommended for preservation.

Recording with surface collection is recommended for seven sites, all of which are temporary habitation cave shelters that have information relevant to research problems (Table 6). One of these sites, T-157 also includes a well preserved large cairn which has potential interpretive value. The recommendation for surface collection at this site applies to the cave shelter located beneath the cairn.

The third task category, recording with surface collection and /or test excavation, is recommended for 26 sites, nine of which are habitation sites with possible burial features (Table 4). Other possible burial sites, such as T-128 and T-140 are recommended for very limited testing, in order to ascertain the presence or absence of skeletal material. Very limited testing is also recommended at Site 50-Ha-D14-8, which has high cultural value and will probably be recommended for preservation. Again, testing would be undertaken in order to determine presence or absence of burials in the small platforms and pavements adjacent to the heiau, and to clear rubble from original platform walls.

Test excavations are recommended at Site 50-10-27-1908 in order to determine if, in fact, the structure was primarily used as an animal pen. This enclosure has been included in the list of sites with potentially high interpretive value; it is therefore imperative that the site function be ascertained. Other coastal habitation sites, such as 50-Ha-D14-3 through 7 are recommended for testing due to the research value they contain. This value has been enhanced, not mitigated, by the previous work conducted at the sites by Gordy. His work, together with that conducted by Renger and others at Kaloko, has laid foundations for important advancements in the understanding of human adaptations along the North Kona coast.

No further work is recommended at this time for 51 sites. This number is inflated by the 25 small and relatively insignificant cairns that were located during survey (cf. Figure 7). Of the remaining 27 sites, 20 are temporary habitation shelters for which site maps and verbal descriptions have been sufficiently completed. These sites hold no new information obtainable from surface materials, which are generally absent or extremely sparse at the sites. Also determined to have potential for interpretive value, but to contain little research value that has not been obtained, are Sites T-138 and T-189. Finally, Site 50-10-27-1902 is determined to be in such poor preservation that it is very unlikely that information leading to its functional or even formal definition is obtainable. No further work is therefore recommended at this site.

Despite the recommendation for no further work at the above sites, it is recommended that these and all other sites be accurately plotted by professional surveyors, with the aid of an archaeologist, on an appropriate scale topographic map. This would greatly aid development planning, as well as the planning of archaeological preservation areas within the Kohana-Iki project area. Many of the archaeological sites, while having only limited significance, could still be incorporated into the landscaping of the development if accurate locations were known during planning stages.

REFERENCES CITED

Armstrong, R.W. (ed.)

1973 Atlas of Hawaii. Honolulu: University of Hawaii Press.

Apple, Russell A.

1965 Trails: From Steppingstones to Kerbatones. E.P. Bishop Museum Special Publication 53. Honolulu: Bishop Museum Press.

Cordy, R.H.

1981 A Study of Prehistoric Social Change: The Development of Complex Societies in the Hawaiian Islands. New York: Academic Press. (Virtually identical to author's 1978 Ph.D. dissertation [Anthropology, University of Hawaii-Manoa], with addition of an epilogue.)

Emory, K.P.

1970 Inventory of Archaeological and Historical Sites in the Districts of Kona and Ka'u and in Anaeboomalu, South Kohala, Island of Hawaii. Departmental Report Series 70-12. Dept. Anthropology, E.P. Bishop Museum.

Hawaii Department of Land and Natural Resources

1970 An Inventory of Basic Water Resources Data: Island of Hawaii. Division of Water and Land Development, Hawaii Department of Land and Natural Resources Report R34. Honolulu.

Maciolek, J.A., and R.E. Brock

1974 Aquatic Survey of the Kona Coast Ponds, Hawaii Island. Sea Grant Advisory Report UNIH-SEAGRANT-AR-74-04. University of Hawaii Sea Grant College Marine Advisory Program.

Macdonald, G.A., and A.T. Abbott

1970 Volcanoes in the Sea. Honolulu: University of Hawaii Press.

Macdonald, G.A., A.T. Abbott, and F.L. Peterson

1983 Volcanoes in the Sea. Honolulu: University of Hawaii Press.

Pukui, M.K., S.H. Elbert, and E.T. Mookini

1974 Place Names of Hawaii. Honolulu: University of Hawaii Press.

Reinecke, J.E.

Ms. Survey of Hawaiian Sites: From Kailua, Kona, to Kalahuipuaa, Kohala. Unpublished manuscript. Dept. Anthropology, E.P. Bishop Museum. (1930)

Rosendahl, P.H.

1973 Archaeological Salvage of the Ke-Ahole to Anaeboomalu Section of the Kailua-Kawaihae Road (Queen Kaahumanu Highway), Island of Hawaii. Departmental Report Series 73-3. Dept. Anthropology, E.P. Bishop Museum.

1985 Preliminary Archaeological Reconnaissance Survey, Kohana-Iki Development Project Area, Land of Kohana-Iki, North Kona, Island of Hawaii (TMK:3-7-3-09:3,14). PHRI Report 191-082985. Prepared for Halber, Haastert, Van Horn & Kimura.

Sato, H.H., W. Ikeda, R. Faeth, R. Smythe, and M. Takehiro, Jr.

1973 Soil Survey of the Island of Hawaii, State of Hawaii. USDA, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station. United States Government Printing Office, Washington, D.C.

Stearns, H.T., and G.A. Macdonald

1946 Geology and Ground-Water Resources of the Island of Hawaii. Hawaii Division of Hydrography Bulletin 9. Honolulu: Territory of Hawaii.



Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-115	Wall	Temporary habitation	L	L	L			None	Low wall across ravine; apparently isolated
T-116	Enclosure	Animal pen	M/L	L	L	+	-	-	Segmented wall around rim of large, shallow sink hole; no subsistence remains, recent artifacts present
T-117	Petroglyph	Recreation	M	M	M	+	-	-	Series of pecked depressions in smooth pahoehoe
T-118	Trail/road	Cart road	M	L	L	+	-	-	Section of possibly historic cart road; surface midden
T-119	Complex (2) A Walled overhang B Wall	Temporary habitation	L	L	L			None	Semicircular wall abutting rock face and shallow overhang; Fea. B is wall across ravine
T-120	Complex (13) A-K Walls L Filled depression	Habitation	M	M	M	+	+	-	Associated with Site D14-5 platforms
T-121	Cairn	Undetermined	L	L	L			None	Cairn has been dismantled, on ridge overlooking Sites T-120 and D14-5
T-122	Complex (2) A Overhang with paving B Cave shelter	Habitation/ poss. burial	M/L	M/L	M/L	+	+	+	Fea. A has no midden; Fea. B has very dense deposit of shell, kukui, coral and historic artifacts
T-123	Cairn	Undetermined	L	L	L			None	Dismantled
T-124	Complex (2) A Walled cave B Wall	Temporary habitation/ storage	M	L	L			None	Faced, walled cupboard in cave probably historic; no deposit or artifacts

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-125	Complex (3) A Overhang shelter B Rock mound over crevice C Circular rock alignment	Temporary habitation	L	L	L			None	A single <u>Cypraea</u> shell fragment in cave, no other surface midden
T-126	Complex (6) A Cave shelter B Overhang shelter C Filled/paved depression D Paving in front of small overhang E Cairn F Cairn	Habitation/ poss. burials	M/L	L	M/L	+	+	+	Scattered surface midden with concentration in Fea. B.; historic artifacts in Fea. B, along with several water-worn boulders
T-127	Complex (2) A Walled cave shelter B Cairn	Storage	L	L	L			None	Cave walled at entrance to provide small opening 30 cm high, 75 cm wide; no portable remains; cairn dismantled
T-128	Rubble pile/ rock mound	Possible burial	L	L	H/L	+	-	+	Pile is 3 m long, 2.1 m wide and 0.4 m high; follows configuration of crevice in bed rock; single water-worn nearby
T-129	Cave shelter	Temporary habitation/ Storage	M	L	L			None	Low ceiling cave with cache of <u>Cypraea</u> shell, octopus lures and milled lumber; scattered shell on floor
T-130	Complex (2) A Overhang shelter B Coral pavement	Habitation/ ceremonial	M	M	M/H	+	+	+	Coral pavement is in floor of sink-hole nearby 3.0 m deep.
T-131	Circular stone alignment	Undetermined	L	L	L			None	Possibly recent no subsistence remains

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-132 A B C D	Complex (4) Terrace Filled depression Filled depression Filled depression	Habitation/ poss. burials	M	L	M	+	+	+	Surface midden and hearth areas discernable; water-worn pebble concentrations
T-133	Large cairn	Boundary marker	M	M	M	+	-	-	Southernmost of alignment of large cairns around brackish ponds; partially dismantled
T-134 A B	Complex (2) Platform with upright Platform	Shrine	M	M	H	+	-	-	Shrine in small sinkhole with brackish water, pool possibly cleared during construction of Fea. B
T-135 A B C D E-H	Complex (3) Wall down center of pond Faced enclosed pond Platform Platform Faced walls along pond perimeter	Aquaculture	H	H	H	+	-	+	Complex of two modified ponds and spring stream; heavily overgrown, but in good preservation
T-136 A-C D	Complex (4) Cairns Circular stone alignment	Undetermined	L	L	L				None No surface midden or artifacts; at least two cairns are probably recent
T-137 A-E	Complex (5) Cairns	Undetermined	L	L	L				None No surface midden; three cairns simple stacks, possibly recent
T-138 A B	Complex (2) Cleared pool Platform	Recreation	M/L	M/L	M				None Small pool at bottom of sinkhole cleared of stone rubble and small crude platform constructed; sparse shell midden and coral present, recent artifacts

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-139	Walled overhang shelter	Temporary habitation	M/L	L	L				None Soil deposit present; no portable remains
T-140	Rock mound	Burial?	M/L	L	M/H	+	-	+	Ovoid mound in low area; shell midden nearby but not on structure; coral, <u>Conus</u> , waterworn pebbles on mound
T-141	C-shape wall	Temporary habitation	L	L	L				None Sparse scatter of <u>Cypraea</u> , echinoidae, coral and <u>Nerita picea</u>
T-142, -143	Cairns	Boundary markers	M	M	M	+	-	-	Associated with alignment of large cairns around brackish ponds
T-144 A B	Complex (2) Walled overhang shelter Wall	Habitation	M	L	L	+	+	-	Possible hearth outside of shelter; <u>Kukui</u> and coral inside Fea. A; shallow soil accumulation
T-145	Wall	Modified pond/bath	M/L	L	M	+	-	-	Low crude wall enclosing small pond 4.5 m in diameter
T-146	Cairn	Undetermined	L	L	L				None Single cairn at edge of mangrove thicket, partially dismantled
T-147, -148, -149	Cairns	Boundary markers	M	M	M	+	-	-	Associated with alignment of large cairns around brackish ponds
T-150	Cairn	Undetermined	L	L	L				None Small stacked rocks; probably recent

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-151	Cairn	Undetermined	L	L	L	None			Partially dismantled cairn, assoc. with recent glass
T-152, -153	Cairns	Undetermined	L	L	L	None			Small stacks of rocks
T-154 A B	Complex (2) Walled cave shelter Cairn	Temporary habitation/storage	L	L	L	None			No portable remains; cave has very low ceiling (47 cm)
T-155, -156	Cairns	Boundary markers	M	M	M	+ - -			Associated with alignment of large cairns around brackish ponds
T-157 A B C	Complex (3) Large cairn Cave shelter Small cairn	Boundary marker/habitation	M/H	M	M	+ + -			Cave has three entrances; cairns positioned above two; large cairn assoc. with alignment around ponds
T-158 to -162	Cairns	Boundary markers	M	M	M	+ - -			All part of cairn alignment around brackish ponds
T-163	Cairn	Undetermined	L	L	L	None			Simple stack of rocks
T-164	Cairn	Undetermined	L	L	L	None			Small, dismantled
T-165	Cairn	Undetermined	L	L	L	None			Small, dismantled
T-166 A-K L M	Complex (13) Cairns Circular stone alignment C-shape	Habitation?	L/M	L	L	None			This complex is adjacent to Site T-157 and may be functionally related; surface midden, coral

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-167 to -172	Cairns	Undetermined	L	L	L	None			Small simple, relatively isolated cairns with no apparent locational patterning; some possibly recent
T-173 A B C D	Complex (4) Cave shelter Cave shelter Walled spring Cairn	Temporary habitation	M	L	L	+ + -			Fea. A has sand floor; hearth, shell midden; fish and mammal bones
T-174 A-C	Complex (3) Cairns	Undetermined	L	L	L	None			Simple stacks of rocks with 3 to 9 stones each; located along ridge overlooking pond
T-175 A B C D E	Complex (4) Filled depression Coral paving Coral paving Filled depression Cairn	Habitation/ceremonial	M/H	M	M/H	+ + +			Water-worn stones, hammerstone among fill rock of Fea. B; surface midden
T-176 A B C D E F	Complex (6) Spring well Paved sink floor Walled overhang shelter Walled overhang shelter Terraced facing wall Cairn	Habitation	H	M	M	+ + -			Small deep sinkhole extensively modified; midden and historic artifacts concentrated in overhangs
T-177 A B	Complex (2) Overhang shelter Filled crevice	Temporary habitation	L	L	L	+ - -			Very sparse shell midden and <u>kukui</u> in small area of overhang
T-179	Enclosing wall	Temporary habitation	L	L	L	None			Small sinkhole with stacked wall around perimeter; no portable remains



Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-180 A B	Complex (2) Enclosing wall Wall	Temporary habitation	L	L	L	None			Walled circular sinkhole and wall across ravine; no midden or portable remains
T-181	Cairn	Undetermined	L	L	L	None			Haphazard piled aa and pahoehoe slab
T-182	Rock mound	Undetermined	L	L	L	None			Burial unlikely; mound is highly irregular and of very large, chunky boulders
T-183 A B C D E F G H I	Complex (9) Terrace Wall Terrace Terrace Filled depression Filled crevice Filled depression Filled depression Filled depression	Habitation/burials?	M/H	M	M/H	+ + +			Two groups of features; western group has three adjacent terraces with pebble paving. East group are less structured, filled depressions with no paving and relatively irregular; coral and <u>Cypraea</u> on surface
T-184	Cave shelter	Temporary habitation	L	L	L	None			No hearth, only four pieces shell on rock floor;
T-185 A B	Complex (2) Cairn Wall	Temporary habitation	L	L	L	None			No midden or portable remains; cairn partially dismantled; wall is semi-circular around perimeter of depression
T-186 A B	Complex (2) L-shape wall C-shape wall	Temporary habitation	L	L	L	None			No midden or portable remains

B-60

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-187 A B C	Complex (3) Overhang shelter Overhang shelter Platform	Habitation	M/H	M	M	+ + +			Complex is modified sinkhole with water and uniquely dense midden in overhang shelters situated on shelves above water level
T-188 A-B	Complex (2) Cairns	Undetermined	L	L	L	None			Small, simple stacks of rocks
T-189	Cleared pool	Recreation	L/M	L/M	L/M	None			Small pool in shallow sink has been cleared of rock rubble
T-190	Wall	Aquaculture	M	M	M/L	+ - -			Roughly L-shape wall in water-filled sinkhole
T-191	Platform	Ceremonial/burial	M/H	M/L	M/H	+ - +			Extensively disturbed, located along jeep road
T-192 A B C	Complex (3) Walled cave shelter Cairn Cairn	Habitation	H	M	L	+ + +			Shelter has two compartments separated by wall; subsistence remains and historic artifacts present
T-193 A B	Complex (2) Cairn Cairn	Undetermined	L	L	L	None			Cairns are 4.0 m apart, both dismantled



Table 4. (Cont.)

BPBM Site No.	HRHP Site No.	Formal Site/Fea. Type	Tentative Functional Interp.	Significance			Field Work			Comments
				R	I	C	DR	SC	EX	
D14-8 A B-K	1909 - -	Complex (11) Platform Platforms	Ceremonial	H	H	H	+	+	+	Recorded on HRHP as a heiau site with two nearby platforms; Cordy (1981) located four adjacent features and six additional features were located during this survey; the site is adjacent to a coral beach
D14-9 A-D	- -	Complex (4) Platforms	Habitation/ burials	M/H	M	M	+	-	+	Feas. A to C tested by Cordy (1981), dates determined from Fea. A (AD 1500±68) and C (AD 1621±46); four small ponds in vicinity of platforms
D14-10 A B C	- - - -	Complex (3) Platform Enclosure Wall	Habitation	M/H	M	M	+	+	+	Fea. A tested by Cordy (1981), five dates ranging from AD 1580 to 1822 determined; recent housesite adjacent to Fea. A (abandoned)
D14-11 A B C	1907 - - -	Complex (3) Platform Enclosure Enclosure	Habitation/ ceremonial	M/H	M/H	M/H	+	+	+	Fea. C tested by Cordy (1981), three dates ranging from AD 1470 to 1710 determined
D14-12 A B C D	- - - -	Complex (4) Enclosure wall Filled depres- sion Walled shelter Filled depres- sion	Habitation/ possible burial	M/H	M	M/H	+	+	+	Fea. A tested by Cordy (1981), three dates ranging from AD 1460-1720 determined; recent housing rubble on Fea. A, five areas of surface midden observed, structural features poorly preserved
- A B	1902 - -	Complex (2) Enclosure (partial) Wall (partial)	Undetermined	M/L	L	L			None	These features are extensively disturbed by the jeep road and by recent camper activities

B-62

Table 4. (Cont.)

BPBM Site No.	HRHP Site No.	Formal Site/Fea. Type	Tentative Functional Interp.	Significance			Field Work			Comments
				R	I	C	DR	SC	EX	
-	1908	Enclosure	Animal pen?	M	M	L	+	+	+	This high walled enclosure appears to have no structural features inside; however, there is some surface midden and historic to recent artifacts; first interpreted as cattle pen by Reinecke (Ms.)

APPENDIX A:PRELIMINARY HISTORICAL DOCUMENTARY RESEARCH

Land of Kohana-Iki  
North Kona, Island of Hawaii  
(TMK:3-7-3-09:3)

by

Carol L. Silva, B.A.  
Historical Researcher

It is the intent of this preliminary research effort to identify and examine immediately available sources for information relative to the project area. Toward this end, a sampling of specific mythological, cultural, and historical information has been assembled from the writings of native historians, descriptive accounts, land records and cartographic sources.

Before proceeding with details relative to TMK 3-7-3-09:3 in Kohana-Iki, North Kona, a cursory study will be presented of the larger land division in which Kohana-Iki is situated. It is intended, by this approach, to define properly the setting which back-drops the project site so as to provide a historically faithful context from which Kohana-Iki can be perceived.

KEKAHA - TRADITIONAL PERSPECTIVES

Kohana-Iki sits on the southern edge of that broad land area anciently referred to as Kekaha. The boundaries and characteristic features of Kekaha land were described by an old native resident in the following words:

Kekaha (barren, desolate) was the name given to that section of North Kona from Honokohau, North of Kailua, to Napuu (The Hills) meaning Puuwaawaa and Puuanahulu, and along the coast to Anaehoomalu, the boundary of South Kohala.

It is often spoken of as Kekaha-Wai-Ole (the desolate land without water), Pele, the Volcano, has literally eaten the heart out of this section.

One readily sees the great lava stretches of country, as one travels along the road. It is no wonder that the simple fisherfolks living along the sea-coast personified the Volcano as a dreadful being with supernatural powers whose wrath bore down on them so much destruction, laying waste their gardens, and filling their fishponds with rocks, leaving them on a narrow strip of beach, the ocean on one side, and the lava fields on the other (Maguire 1926:5).

Kekaha's waterless condition is commemorated by generations of kama'aina in the familiar saying quoted in part above:

Kekaha wai'ole o na Kona.  
Waterless Kekaha of the Kona district.  
Kekaha in Kona, Hawaii, is known for its scarcity of water but is dearly loved by its inhabitants (Pukui 1983:185).

Another saying fixed in oral tradition, comments on the life-sustaining qualities of the sea off Kekaha:

Ola aku la ka sina kaha, ua pua ka lehua i kai.  
Life has come to the kaha lands for the lehua blooms are seen at sea.  
"Kaha lands" refers to Kekaha, Kona, Hawaii. When the season for deep-sea fishing arrived, the canoes of the expert fishermen were seen going and coming (Pukui 1983:271).

Kekaha was also known among those who dwelt at Kailua, Kona as the land from which the gusty Hoolua wind blew. The native historian John Papa Ii noted:

A little more frequent was a cold wind from Kekaha, the Hoolua. Because of the calm of that land, people often slept outside of the tapa drying sites at night. It is said to be a land that grows cold with a dew-laden breeze, but perhaps not so cold as in Hilo when the Alahonua blows (Ii 1973:122).

Thus did natives of that land characterize Kekaha in elemental, physical terms. Yet despite those short-comings acknowledged above, a fairly unique history sprang from this district.

KEKAHA - HISTORICAL BRIEFS

The native historian S.M. Kamakau recorded that in the war between Kekaulike of Maui and Alapa'inui of Hawaii, Kekaulike in fleeing from Alapa'inui's forces pillaged Kona and Kohala and "abused the country people of Kekaha" (Kamakau 1961:66-9). Kekaulike ruthlessly laid waste to the coconut groves of both districts. This deliberate act of destruction was a matter of no small consequence for to fell trees of such usefulness to the ancients was considered truly inhuman. Kekaha's common-folk were also slaughtered by the retreating Maui forces.

Kamakau also stated that Kekaha lands had been set apart from the whole of Hawaii island for the priestly class:

Waimea was given to the Paao kahuna class in perpetuity and was held by them up to the time of Kamehameha III when titles had to be obtained. But there was one land title held by the kahuna class of Paao for many years and that was Puuepa in Kohala. In the same way the land of Kekaha was held by the kahuna class of Ka-uahi and Nahulu (Kamakau 1961:231).

These Kauahi and Nahulu lines of priesthood assumed active and influential roles well into the historic period. They served as counsel to kings and later even dared to strongly voice their disapproval over Liholiho's "free-eating" and his general disregard of traditional precepts.

The reserving of these Kekaha lands for the priesthood went unquestioned and was guaranteed by chiefs such as Kalaniopu'u in historic times. Kekaha consequently passed quietly to the progeny of these priestly lines. Individuals descending from the Nahulu priesthood included the twin chiefs Kame'eiamoku and Kamanawa.

Of particular note in relation to Kekaha, is Kame'eiamoku's son, Ulumabeihei Hoapili, who was well-trained in all of the arts of this esteemed lineage. Kamakau recalled:

He [Hoapili] belonged to the priesthood of Nahulu and was an expert in priestly knowledge. He had been taught astronomy and all the ancient lore (Kamakau 1961:354).

Kamakau further enumerated upon some of the skills at which Hoapili excelled: debate, knowledge of the history and rule of the chiefly lines, ancient protocol, royal genealogies, and proficiency and literacy in the English language as well. So faithful and dependable was he that upon the demise of Kamehameha I, Hoapili was given the guardianship for the "Conqueror's" sacred remains which (it is believed) he carefully hid in Kekaha at Kaloko which immediately adjoins Kohana-Iki to the south (Kamakau 1961:215,355).

With facility we are able to see that in spite of an unassuming appearance Kekaha distinguished itself in its rather unique history and religious and cultural significance. Now that a sketch of the broad land area of Kekaha has been established, we are better able to center specifically on Kohana-Iki.

#### KOHANA-IKI - MYTHOLOGICAL TRADITIONS

The many shoreline springs and pools along this coast provided the residents of old with a picturesque setting in which to stage a number of legendary traditions. One such legend appears to occur either in Kohana-Iki or else in its immediate vicinity. The tale is entitled "The Pool of Wawaloli." It is a tragic romance which concerns a beautiful maiden named Malumaluiki and her involvements with the kupua (wizard) Wawaloli.

One day Malumaluiki informs her parents that she wished to travel to the shore to obtain seaweed and shellfish to eat. On route, she becomes very thirsty and stops at a pool to sip some water. While there she encounters a handsome young stranger with whom she becomes quickly infatuated. They rapture away the hours but before they part, the stranger gives Malumaluiki specific instructions as to the use of his name. He tells her that when they are together she should only call him by the name Wawa; however, upon her approach to the pool, she should call him Loli. Further, he teaches her a chant with which she is to summon him.

Their amorous trysts continue for several days before her parents become sufficiently suspicious. They notice that their daughter never returns home with any of the seaweed or shellfish that she set out to gather. Malumaluiki's wise father then follows her one morning and discovers the truth about his daughter's lover--Wawaloli possesses both sea-slug and human forms. He observes the couple and commits to memory the chant with which she summons Loli from his pool.

The father then consults with a kahuna who tells him Wawaloli must be trapped and destroyed. Once this is accomplished, all the young women of the area will be free from the lecherous manipulations of this evil wizard. The father uses the chant to Loli to entice the sea-slug into a net and Wawaloli is carried off to the imu. Malumaluiki is saddened by the loss but much wiser.

All that is left of Wawaloli is the pool he once occupied which hence bears his name (Maguire 1926:21-6).

No other mythological tradition relative to Kohana-Iki was located in the body of source material examined. However, additional notes were gathered which offer explanations of some of Kohana-Iki's place names. Relative to specific sites and landmarks, the following information was compiled:

Kohana-iki. Land sections, Kai-lua and Ke-ahole qds., North Kona, Hawai'i. Lit., small barrenness (Pukui 1974:115).

Puhili. Land section and point said to be name for a priest of the same name, Ke-ahole qd., North Kona, Hawai'i. Lit., to thwart (Pukui 1974:192).

The historical literature was culled for mention of this person named Puhili. A single reference to a member of Kalaniopu'u's retinue surfaced. Apparently Puhili was given the task of flushing-out a fugitive known to be hiding in Puna. Puhili's technique of gaining cooperation among the people of Puna was to burn native dwellings, canoes, and property until the fugitive surrendered (Kamakau 1961:108).

Puhili was again encountered in the following proverb which praises the abundance of fish in the waters off the point:

Ahu kapeku i ka nalu o puhili.  
 Much thrashing about in the surf of Puhili.  
 Signifying an abundance of food. Thrashing about in the  
 water drives fish into the nets (Pukui 1983:5).

Manuscript notes from the Kekahuna Collection (B.P. Bishop Museum)  
 merely list the following additional sites and comments:

Nawahi-waa. There is only sand there.  
 'Ai-pa'i-'ai. This is a small promontory where a canoe car-  
 rying pa'i-'ai [pounded taro] turned over, and sharks  
 ate it. Perhaps the name is modern (Kekahuna Coll. #44).

#### KOHANA-IKI - HISTORICAL ACCOUNTS

Little in the way of physical land description could be uncovered for  
 this area. It appears that because of the inhospitable conditions of much  
 of the terrain, most travel among foreigners between Kawaihae and Kailua  
 was conducted by ship or by canoe, with short stops along the coast as  
 needed. In the voyager and missionary sources consulted, no accounts of  
 foot or inland travel could be found to detail any specific land features,  
 points of interest or even general comments relative to the residents or  
 land usage.

A visiting sightseer did leave a description of Kohana-Iki in the  
 1870s. The following narrative of his tour through the district appeared  
 in The Hawaiian Kingdom Statistical & Commercial Directory and Tourists'  
 Guide, 1880-1881. Although it is not formally stated, it seems that his  
 impressions are of the upland area of Kohana-Iki rather than of the  
 shoreline.

At Kohanaike, a place about six miles short of my des-  
 tination, I came upon a store kept by a Chinaman, who has  
 Hawaiianized his name into Akao. Here the tourist, if he has  
 no supplies with him, can get anything he wants, in the way of  
 canned fish, milk, crackers, etc., and if night should overtake  
 him here, a bed can always be had (Bowser 1880:549).

In contrast is the following current description of the shoreline a  
 little over a century later:

The 4 miles of rocky shoreline from Kaloko to Keahole Point  
 are backed by a long, sandy stretch of storm beach that is  
 frequented by beachcombers, campers, fishermen, sunbathers,  
 and surfers. The two most popular sites on the beach are  
 Pine Trees and Wawaloli Beach.

Just north of Wawahiwa's Point, a number of brackish-  
 water ponds border the jeep road that follows the shore-  
 line. A tall, dense thicket of mangrove has completely  
 overrun the largest of the ponds and is a distinctive land-  
 mark in an area that otherwise contains only low-lying ve-

getation. From a distance, the mangrove can be imagined  
 to resemble a stand of pine trees, and it was this resem-  
 blance that gave the area its popular name, Pine Trees.

Pine Trees is one of the best and most popular surfing  
 sites in Kona. The mainbreak is located directly off-shore  
 of the mangrove thicket in a shallow, rock-bottomed bay.  
 During periods of calm seas, the deeper offshore areas offer  
 some excellent cave-diving opportunities and are fre-  
 quented by commercial dive classes, who come in by boat.  
 Surfers and other visitors generally reach Pine Trees in  
 four-wheel-drive vehicles, following the shoreline jeep  
 road from its intersection with the Natural Energy Labora-  
 tory of Hawai'i road. The entire area is undeveloped and  
 has no facilities (Clark 1985:115).

The old-time native residents of the area left us some of the best  
 indications of Kohana-Iki's physical appearance. Shreds of descriptive  
 data are visible in correspondence of these kamaaina in transacting land  
 matters with the government. Extracts from these letters and reports are  
 provided in the up-coming section.

#### KOHANA-IKI - SPECIFIC LAND HISTORY OF TMK:3-7-3-09:3

The earliest land records indicate that Kohana-Iki was reserved for  
 government use during the "Great Mabele" (Board 1929:9). The Department  
 of the Interior held strict control over these Government lands and in  
 1849 saw fit to classify the ahupua'a as a grazing or pasture land  
 primarily for goats (Interior Dept. #372).

The kiowai, or small water holes, along Kohana-Iki's shore captured  
 the attention of a native named J.R. Kamalo in April of 1861. He offered  
 \$10.00 per year for the lease of these from the Government (Int. Dept.  
 4/5/1861). This price was considered fair by the government land agent,  
 who recommended favorable approval by the Minister of the Interior (Int.  
 Dept. 4/4/1861). However, no action on this appears to be documented.

In 1863 a fellow named Kapena submitted an application to purchase 154  
 acres of the seaward portion of Kohana-Iki; his request is accepted and he  
 received Grant 3068. The metes and bounds description and sketch of Grant  
 3068 to Kapena (Grant Awards Book) mentions the existence and location of  
 two roads within the project area: one is the "old beach road" forming the  
 north-eastern boundary, and the other road runs on the boundary between  
 the lands of Kohana-Iki and Ooma 2. Furthermore, the accompanying sketch  
 depicts two rectangular shapes on the southern shoreline which may  
 indicate dwellings. Copies of both description and sketch have been  
 attached (Attachment 1) to this report.

In March of 1864, a woman named Kahalau applied for 216 acres of the  
 seaward portion of Kohana-Iki at 25 cents per acre. Apparently she was  
 unaware that Kapena had already acquired title to it the year before. The  
 situation above was neatly summed up by one of the land agents involved:

Kohana-iki

The forest part of this land is all that remains [sic] to Govt. this is extensive [sic], extending to the mauka side of the forest. It may contain 1500 or 2000 Ac.

The makai part of this land containing 220 Ac. has been sold boath [sic] by Sheldon and myself. In April 1863 I was surveying in Kona when "Nahuina" (who lives on the adjoining land "Kaloko") applied [sic] to me to survey the makai part of the Govt. land Kohanaiki which he wished to purchase. I inquired wheather [sic] he had applied [sic] to Sheldon for this land, (Sheldon was then in Honolulu) he told me that he had not, but would do so immediately, if it was necessary, he would go to Honolulu for that purpose. I told him that I was then writing to Sheldon and I would make the application for him which I did, but never got an answer. I wrote several times to him about that time for information about Govt. lands, but he declined to answer my letters.

On the 30 of May following I surveyed said piece of land for "Nahuina" when I was making this survey "Kapena" (who bought this land of Sheldon) was present, and afterwards went to Honolulu and payed Sheldon for this land. "Nahuina" had the money then to pay for this land, and I told him to keep it, until he know who he was pay [sic] it to. I was perfectly satisfied then that Sheldons transaction as Govt. land Agt. was not honest. Mr. Sheldon had then been away from Kona nearly three months, he had previous to this resigned his office as Judge and taken up his residence [sic] perminantly [sic] in Honolulu. Afterwards when requested by Mr. S. Spencer to act as land Agt. for Kona "Nahuina" payed me for this land \$60. which I sent to your office. I valued this land at 25 cts. pr Acre, its only value is for a place for a residence [sic] on the beach.

I have been thus particular in giving you the history of this affair, so that you mite [sic] be able to decide which of the parties ware intitled [sic] to said land...  
S. C. Wiltse (Int. Dept. 9/5/1865).

Despite the complicating circumstances of three applicants claiming the same parcel (namely Kapena, Kahalau and Nahuina), it is safe to assume that Kapena maintained ownership for the current project area.

Kahalau's claim to the seaward portion of Kohana-Iki was not readily dismissed, possibly due to a vested interest she may have had in the use of the small craft landing mentioned below. The following letter dated May 31, 1870, is also quite interesting for the other descriptive detail it recorded in relation to the project area:

The bearer of this George Mao, wishes to get a Patent for the makai part of the Govt. land "Kohanehihe" [sic] situated in North Kona Hawaii. Kahalau (w) sister to Geo.

Mao, the bearer of this payed to the Interior department through me in the fall of 1863 \$100. for this piece of land but Government declined to Patent it then because it had been previously sold by H. Sheldon to another party again. I contained a landing for small crafts which your Excellency thought proper to reserve.

I have now surveyed off 8 Acres including said landing, as you will see from the plan which I forward to your Exc. by the bearer of this.

This piece of which so much has been said & written, is 385 Acres of naked rocks, I do not believe that it contains vegetation enough to support one dozen goats - no one but a Kanaka would have it at any price. Still if your Exc. should think it sold at too low a price, I have no doubt this man would be willing to pay something more...  
S.C. Wiltse (Int. Dept. 5/31/1870).

A final reference concerns an "old road" roughed-out on a sketch in a letter clarifying Kaiakoili's boundaries. Kaiakoili's parcel is situated immediately upland of Kapena's. Much contention arose over his true boundaries--whether his property extended to the Kaloko boundary, or whether it ran only up to the "old road" passing parallel to the Kaloko boundary (Int. 2/15/89). The letter on which the sketch appears has been attached to this report (Attachment 2).

#### CARTOGRAPHY

The State Survey Division had on file two maps on which details of Kohana-Iki were provided. J. S. Emerson's 1888 map (Reg. 1449, scale 1"=1,000') plots a house site belonging to Kawaimaka situated on the southern shore of the ahupua'a. This roughly correlates with the sketch accompanying previously referred to Grant 3068 (see Attachment 1).

The second map is an enlargement of a portion of a 1924 USGS draft. This map is included for its depiction of the shoreline trail and the two larger Kohana-Iki ponds (Attachment 3).

REFERENCES CITED

1916 Index of All Grants and Patents Land Sales. Honolulu: Paradise of the Pacific Print.

Board of Commissioners to Quiet Land Claims

1926 Indices of Awards Made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands. Honolulu: Territory of Hawaii

Bowser, George

1880 The Hawaiian Kingdom Statistical & Commercial Directory. Honolulu and San Francisco: George Bowser and Co.

Clark, John

1985 Beaches of the Big Island. Honolulu: University of Hawaii Press.

Ii, John Papa

1973 Fragments of Hawaiian History. Honolulu: Bishop Museum Press.

Kamakau, Samuel M.

1961 Ruling Chiefs of Hawaii. Honolulu: Kamehameha Schools Press.

Maguire, Eliza D.

1926 Kona Legends. Honolulu: Paradise of the Pacific Press.

Fukui, Mary K., Samuel H. Elbert, and Ester T. Mookini

1983 'Olelo No'eau. B.P. Bishop Museum Special Publication 71. Honolulu: Bishop Museum Press.

1974 Place Names of Hawaii. Honolulu: University of Hawaii Press.

Sterling, Elspeth P.

1974 Index to Ruling Chiefs of Hawaii. Honolulu: Dept. Anthro., Bernice P. Bishop Museum.

State of Hawaii

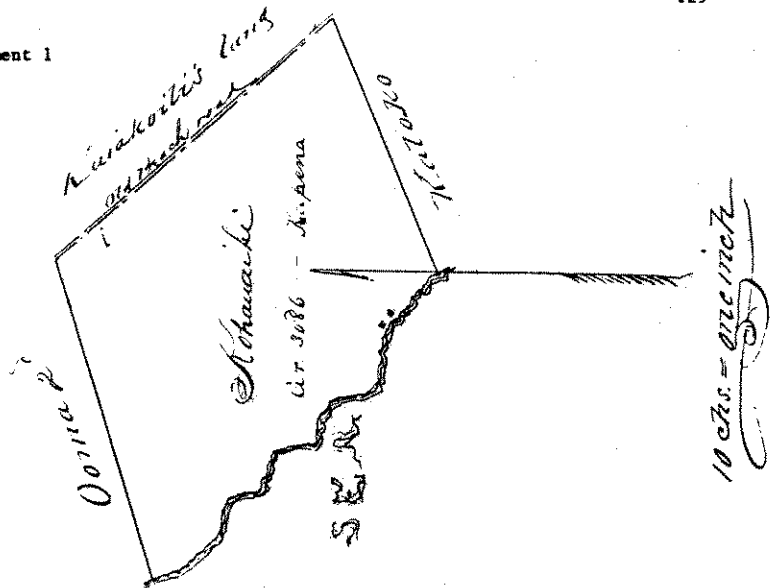
Archives  
 Court Records  
 Henry P. Kekahuna Collection  
 Interior Department Land File

Land and Natural Resources - Land Management Office  
 Grant Award Book

Survey Division

B-67

Attachment 1



Hahaione - Cir. 1886 - Subarea 181  
 Part of western part of Hahaione with to  
 Hawaii and Grand Canyon -  
 1900 map as a large area marked X  
 about 1/2 mile, corner of the Grand Canyon  
 Cir. Hahaione Cir. 1886 -  
 1/4 1/2 E 34-00-00 along the boundary  
 to road marked X on table  
 1/4 1/2 W 46-00-00 to pile of rocks on  
 western side of road for  
 boundary into Hahaione  
 and then to  
 S 72° 10' W 42.0' to point of rock group  
 - X - at end of bridge  
 along the beach

S 44° 30' E 25.5'  
 S 34° 00' E 12.0'  
 S 74° 00' E 6.5'  
 S 70° 00' E 9.0'

to point of boundary  
 containing 1/4 1/2 acre

J.C. Wick  
 Surveyor

May 29/83

10 acs - 0.25 acre



Attachment 2

## Hawaiian Gov. Survey

Honolulu, H.I. Feb 15<sup>th</sup> 1889

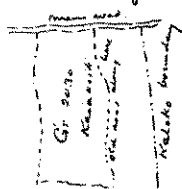
His Ex. J. A. Thurston

Minister of the Interior, Sir:

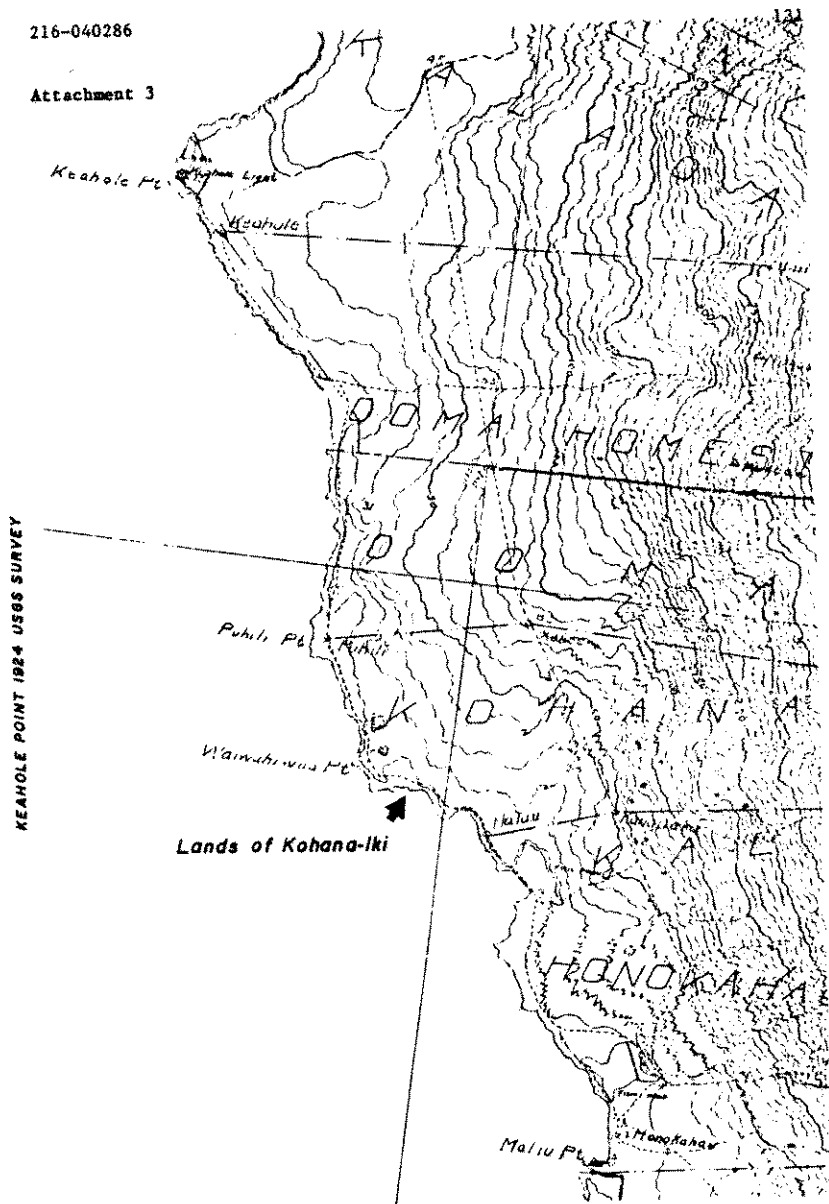
In the matter of the accompanying statements of W. Kaiakōi, dated Jan 30<sup>th</sup> 1889, relative to certain lands in Kohanāiki, Kona, Hawaii, I beg to make the following report.

Kaiakōi's land, of 2030, is said to be along Kaloko, but in fact by careful survey of J. S. Foster does not go there, but only to the old road shown in sketch, which road the survey of 1820 follows so closely in direction and distance, as to leave no doubt in my mind that that was where the survey was actually made, and intended to be.

It is however stated in the grant 2030 that the boundary was along Kaloko, and this statement is probably the main foundation of Kaiakōi's claim.



Attachment 3



**C. BOTANICAL SURVEY**



Table of Contents

	<u>Page</u>
INTRODUCTION . . . . .	1
METHODS . . . . .	1
DESCRIPTION OF VEGETATION TYPES . . . . .	2
1. Strand vegetation . . . . .	3
2. Pond vegetation . . . . .	4
3. Kiawe thicket . . . . .	5
4. Scrub vegetation . . . . .	6
SURVEY RESULTS AND DISCUSSION . . . . .	6
LITERATURE CITED . . . . .	8
APPENDIX I. PLANT SPECIES LIST, KOHANA-IKI, ISLAND OF HAWAI'I . . . .	9

BOTANICAL SURVEY  
PROPOSED KOHANA-IKI RESORT COMMUNITY  
NORTH KONA, ISLAND OF HAWAI'I

by

Winona P. Char  
CHAR & ASSOCIATES  
Botanical/Environmental Consultants  
Honolulu, Hawaii

Prepared for: HELBER, HASTERT, VAN HORN & KIMURA  
Planners

June 1986

BOTANICAL SURVEY  
PROPOSED KOHANA-IKI RESORT COMMUNITY  
NORTH KONA, ISLAND OF HAWAII

INTRODUCTION

The proposed Kohana-iki Resort Community project is located in the North Kona Judicial District, County of Hawaii. It consists of approximately 470 acres bound by the Mamalahoa Trail to the east, the Pacific Ocean to the west, the 'O'oma II parcel to the north, and the Kaloko ahupua'a (makai portion) to the south.

Prehistoric lava flows, largely pahoehoe, are covered by sparse vegetation composed of grasses and scattered scrubs. Along the coastline the plant cover is dense with well-defined strand, anchialine pond, and kiawe thicket vegetation types.

A botanical survey to inventory the flora, describe the major vegetation types, search for rare, threatened or endangered plant species, and identify areas of potential environmental problems or concerns was conducted on 10 and 11 May 1986. A team of three botanists was used to gather the technical data required for this report. The report will be incorporated into the Environmental Impact Statement.

METHODS

Prior to undertaking the survey, a search of the pertinent literature was conducted to familiarize the principal investigator with previous studies made in the general area.

Access onto the project area was by a 4-wheel drive road from the Queen Ka'ahumanu Highway. The 4-wheel drive road runs along the right-of-way over the adjacent private property for roughly 1,800 feet and then along

the boundary of the Kohana-iki-'O'oma II parcels until it connects with a coastal trail. In the field a walk-through survey method was used. Tentative vegetation types delineated from a recent, color aerial photograph were ground-checked. Areas which showed a higher concentration of vegetation on the aerial photograph were surveyed more intensively. Criteria such as structure, composition, and associated species were used in identifying and describing each vegetation type.

Notes were made of the species present in each vegetation type. Species which could not be positively identified in the field were collected for later determination in the laboratory and herbarium. The species recorded are indicative of the season and environmental conditions at the time of the survey. A survey taken at a different time and under varying environmental conditions would no doubt yield slight variations in the abundance and kinds of species present, especially of the annual species.

DESCRIPTION OF VEGETATION TYPES

To our knowledge, there have been no flora surveys which have dealt specifically with the project area. However, a few surveys have been conducted for nearby areas, especially around Ke'ahole Airport. Walker (1975, 1976) did an intensive survey of the flora and fauna on the Natural Energy Laboratory of Hawaii (NELH) property. His survey area also included the adjoining Waiholi Beach and the areas abutting the planned NELH access road and utility corridor. These areas are now included in the Hawaii Ocean Science and Technology (HOST) Park being developed by the State of Hawaii. A flora and fauna survey of the Ke'ahole Agricultural Park, which lies to the east of the airport, was conducted by Krauss in 1977.

Walker (1975, 1976) and Krauss (1977) describe the vegetation on these areas as generally sparse. Fountain grass and several small shrub species are the most common components of the vegetation. Walker (1975, 1976) also described a narrow band of strand vegetation along the coastal portion of his study area. No rare, threatened, or endangered species were found during these surveys.

Within the proposed Kohanai-iki project area four vegetation types are recognized and are described below.

#### 1. Strand vegetation

Along the coastal portion of the project area is a well-developed strand vegetation. The vegetation occurs on sandy to coral rubble substrates. These sandy/coral rubble beach areas form a narrow to wide belt along the coast. It is widest (300 to +600 feet) in the areas fronting the anchialine ponds.

Naupaka-kahakai (Scaevola taccada) shrubs, 3 to 6 feet tall, form large, extensive stands along the coast, although scattered smaller clumps may occasionally be encountered. Scattered through the naupaka-kahakai shrubs are taller (10 to 18 feet) plants of the tree heliotrope (Messerschmidia argentea). Along the seaward front of the naupaka-kahakai shrubs and in areas where the shrub cover is sparse or absent the vegetation consists of low mats of pohuehue or beach morning glory (Ipomoea brasiliensis), hinahina (Heliotropium anomalum var. argenteum), Bermuda grass (Cynodon dactylon), alena (Boerhavia diffusa), pa'u-o-Hi'iaka (Jacquemontia sandwicensis), etc. Other plants found in the strand include the native caper (Capparis sandwichiana var. zoharyi), Fimbristylis pycnocephala, 'akulikuli (Sesuvium

portulacastrum), Christmas berry (Schinus terebinthifolius), and pluchea (Pluchea odorata).

Near the southern portion of the project area where the lava flow comes close to the sea, the substrate is pahoehoe overlain by a thin layer of sand. Fountain grass (Pennisetum setaceum), Fimbristylis pycnocephala, 'ihi (Portulaca cyanosperma), 'uhaloa (Waltheria indica var. americana), and 'akulikuli are more abundant in this area.

The strand vegetation supports a number of native species. Some, such as the pohuehue and naupaka-kahakai, are used in landscaping.

#### 2. Pond vegetation

A number of anchialine ponds are found along the coastal portion of the project area (See section on Anchialine Pond survey.). Maciolek and Brock (1974) consider the series of Kohana-'iki pools a prime example of pristine ponds in older pahoehoe. The ponds are in various stages of ageing. The younger ponds are largely lava pools with some vegetation around the edges, usually 'aki'aki (Sporobolus virginicus) and 'akulikuli (Sesuvium portulacastrum). The older or shallower ponds are filled with organic material from leaves and other plant parts. There may be pools of water towards the deeper, central areas of these ponds. These more or less filled ponds support a dense growth of pickleweed (Batis maritima) and makai sedge (Scirpus paludosus).

A large forest of mangrove (Rhizophora mangle) occupies one of the ponds. The mangrove has completely filled the pond, and there is little else growing beneath the dense canopy and tangle of prop roots. The pond was littered with fallen leaves and was dry at the time of the survey.

Mangrove is considered a plant pest by the Hawaii Department of Agriculture (1981), as it blocks coastal and harbor waterways and fills in fishponds.

The anchialine pond areas support a number of native wetland species, such as the makai sedge, 'akulikuli, 'aki'aki, makaloa sedge (Cyperus laevigatus), 'ohelo-kai (Lycium sandwicense), and Bacopa monniera. The aquatic flowering plant, Ruppia maritima var. pacifica, is abundant in these ponds.

### 3. Kiawe thicket

Kiawe (Prosopis pallida) trees, 15 to +25 feet tall, form a closed to semi-open canopy on the pahoehoe lava immediately behind the sandy beach area. The kiawe forest covers only a small portion of the project area and is found near the southern boundary (Kaloko Pond side).

Located between the beach strand and inland scrub vegetation types, the kiawe forest shares species from both of these vegetation types. Small shrubs of 'ilima (Sida fallax) and hairy abutilon (Abutilon grandifolium) are common.

One small plant, about a foot tall, tentatively identified as Reynoldsia species, was found growing within the walls of a stone structure located under the kiawe forest. No larger plants were found. Reynoldsia sandwicensis or 'ohe (the Kona species formerly Reynoldsia huehuensis) is a candidate endangered or threatened species (U. S. Fish and Wildlife Service 1980). However, the plant is located within a historic site and no development is planned for this area.

### 4. Scrub vegetation

The scrub vegetation covers roughly 80 to 85% of the project area. It is composed of a mixture of grass and shrub species with scattered trees of kiawe (Prosopis pallida). Ground cover varies from 40 to 60% on pahoehoe flows, and only 5 to 10% on the rough, clinkery 'a'a flows.

Fountain grass (Pennisetum setaceum) is the most abundant species in this vegetation type. Locally common are pili grass (Heteropogon contortus) and Natal redtop (Rhynchelytrum repens), although in some areas the grass cover may be composed equally of the three species. 'Ilima (Sida fallax) and 'uhaloa (Waltheria indica var. americana) are the most commonly encountered shrubs. Maiapilo (Capparis sandwichiana var. zoharyi) may form localized patches in some areas. Other species occasionally observed in this vegetation type include partridge pea (Cassia lechenaultiana), indigo (Indigofera suffruticosa), noni (Morinda citrifolia), Christmas berry (Schinus terebinthifolius), and klu (Acacia farnesiana).

Kiawe may form small clumps composed of a few trees, 12 to 15 feet tall. Shrubs such as 'ilima, indigo, and 'uhaloa form a dense scrubby layer beneath these trees.

Ferns and a few annual species may be found in the cracks and crevices of the pahoehoe lava where it is damper and shadier.

### SURVEY RESULTS AND DISCUSSION

A scrub vegetation composed of a mixture of grass species, primarily fountain grass, and small shrubs covers the majority of the proposed project area. The other vegetation types--strand, pond, and kiawe thicket--are found along the coastal area and cover a smaller portion of the project

site. The strand and pond vegetation types support a large number of native species. Of a total of 73 vascular plant species inventoried during this survey, 42 (57.5%) are introduced or exotic species, 27 (37%) are native, and 4 (5.5%) are of Polynesian origin. Among the native species, 18 are indigenous and 9 are endemic (restricted to the Hawaiian Islands).

The vegetation of the anchialine pond areas as well as the strand should not be altered if possible. Development plans should incorporate as much of the existing vegetation in these two areas into its landscape design as possible. In addition, native plants with ornamental potential on the project area should be propagated and used in landscaping. These plants include the hinahina (Heliotropium anomalum var. argenteum), the native caper or malapilo (Capparis sandwichiana var. zoharyi), several members of the morning glory family which could be used for groundcover--beach morning glory (Ipomoea brasiliensis), Ipomoea tuboides, and pa'u-o-Hi'iaka (Jacquemontia sandwicensis), 'ilima (Sida fallax), and naio (Myoporum sandwicense).

At present, resort use is proposed for the areas around the anchialine ponds. If, however, the golf course which is planned for the resort were placed around these pond areas, then the impact to these pond areas would be minimized. A buffer zone around the pond areas should also be set aside.

Mangrove (Rhizophora mangle) poses a threat to the anchialine pond system. The large mangrove forest which occupies one of the now-filled ponds should be managed so that it expands no further than its present boundaries. It may not be possible to eliminate these large plants without damaging the pond if mechanical measures are used. Young plants in surrounding pond areas should be removed and these areas periodically monitored for new infestations.

#### LITERATURE CITED

- Hawaii Department of Agriculture, Plant Pest Control Branch. 1981. Summary of the distribution and status of the prioritized weeds in the state. Unpublished.
- Krauss, B. 1977. Report of flora and fauna survey at Keahole, Kona, Hawaii. Prepared for M & E Pacific, Inc. August 1977.
- Lamoureux, C. H. 1984. Checklist of Hawaiian Pteridophytes. Manuscript.
- Maciolek, J. A. and R. E. Brock. 1974. Aquatic survey of the Kona coast ponds, Hawaii Island. Univ. of Hawaii, Sea Grant Program-AR-74-04.
- Porter, J. R. 1972. Hawaiian names for vascular plants. Coll. of Trop. Agr., Univ. of Haw., Dept. Pap. No. 1, Honolulu.
- St. John, H. 1973. List and summary of the flowering plants in the Hawaiian Islands. Pac. Trop. Bot. Gdn. Mem. No. 1, Lawai, Kauai.
- U. S. Fish and Wildlife Service. 1980. Endangered and threatened wild-life and plants: Review of plant taxa for listing as Endangered or Threatened species. Federal Register 45(242):82480-82569.
- Walker, R. L. 1975. Flora and fauna of the Ke'ahole Point Natural Energy Laboratory Site, Island of Hawaii. November 1975.
- Walker, R. L. 1976. Flora and fauna. In: R. M. Towill, Environmental Assessment of the Natural Energy Laboratory of Hawaii at Ke-Ahole Point, Hawaii. Prepared for the Research Corporation of the University of Hawaii. January 1976.



APPENDIX I. PLANT SPECIES LIST, KOHANA-IKI, ISLAND OF HAWAI'I

In the plant species list, families are arranged alphabetically within each of three groups: Pteridophytes, Monocotyledons, and Dicotyledons. Taxonomy and nomenclature of the Pteridophytes (ferns) follows C. H. Lamoureux's checklist (1984); taxonomy and nomenclature of the flowering plants (Monocotyledons and Dicotyledons) follow St. John (1973) except where more recently accepted names are used. Hawaiian names used are in accordance with Porter (1972) or St. John (1973). The following information is given:

1. Botanical name with author citation.
2. Common English or Hawaiian name, when known.
3. Biogeographic status of the species. The following symbols are used:
  - E = endemic = native only to the Hawaiian Islands
  - I = indigenous = native to the Hawaiian Islands and also to one or more other geographic areas
  - P = Polynesian = plants of Polynesian introduction; all those plants brought by the Polynesian immigrants prior to contact with the Western world
  - X = introduced or exotic = not native to the Hawaiian Islands; brought here intentionally or accidentally after Western contact
4. Vegetation types. Four vegetation types are recognized on the project area and are discussed in detail in the text. The number heading each of the columns refers to the following vegetation types:
  - 1 = Strand vegetation
  - 2 = Pond vegetation
  - 3 = Kiawe thicket
  - 4 = Scrub vegetation
5. Within each of the vegetation types, the relative abundance of each species or its absence (-) is given. These ratings reflect the abundance of the particular species within the project area and are not applicable to areas outside the

project. The following symbols are used:

- A = abundant = the major or dominant species in a given vegetation type
- C = common = distributed throughout a given vegetation type in large numbers
- Lc = locally common = found in localized patches where it may occur in large numbers in a given vegetation type
- O = occasional = distributed throughout a given vegetation type in moderate numbers
- U = uncommon = observed infrequently but not more than 10 times in a given vegetation type
- R = rare = observed 1 to 10 times in a given vegetation type

Scientific name	Common name	Status	Vegetation types			
			1	2	3	4
<u>PTERIDOPHYTA (Ferns)</u>						
NEPHROLEPIDACEAE (Swordfern Family)						
Nephrolepis multiflora (Roxb.) Jarrett ex Moreton	swordfern, kupukupu	X	-	R	-	U
THELYPTERIDACEAE (Woodfern Family)						
Christella dentata (Forsk.) Brownsey & Jermy	downy woodfern	X	-	R	-	-
<u>MONOCOTYLEDONS (Flowering Plants)</u>						
CYPERACEAE (Sedge Family)						
Cyperus laevigatus L.	'ehu'awa, makaloa sedge	I	-	Lc	-	-
Fimbristylis af. hawaiiensis Hbd.		E	-	-	U	O
Fimbristylis pycnocephala Hbd.		I	O	O	U	U
Scirpus paludosus A. Nels.	makai sedge, makai	I	-	Lc	-	-
GRAMINEAE (Grass Family)						
Cenchrus echinatus L.	common sandbur, 'ume'alu	X	U	-	-	-
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	O	-	O	-
Dactyloctenium aegyptium (L.) Willd	beach wiregrass	X	R	R	-	R
Eleusine indica (L.) Gaertn.	wiregrass, manienie-ali'i	X	U	-	-	-
Eragrostis tenella (L.) Beauv. ex R. & S.	lovegrass	X	U	-	-	U
Heteropogon contortus (L.) Beauv. ex R. & S.	pili, piligrass	I	-	-	-	C
Pennisetum setaceum (Forsk.) Chiov.	fountaingrass	X	U	O	C	A
Rhynchelytrum repens (Willd.) C. E. Hubb.	Natal redtop	X	-	U	-	Lc
Sporobolus virginicus (L.) Kunth	beach dropseed, 'aki'aki	I	-	A	-	-
RUPPIACEAE (Ruppia Family)						
Ruppia maritima var. pacifica St. John & Fosb.	ruppia	I	-	A	-	-
<u>DICOTYLEDONS (Flowering Plants)</u>						
AIZOACEAE (Carpetweed Family)						
Sesuvium portulacastrum (L.) L.	'akulikuli	I	O	C	-	-

11

Scientific name	Common name	Status	Vegetation types			
			1	2	3	4
AMARANTHACEAE (Amaranth Family)						
Amaranthus viridis L.	slender amaranth	X	U	U	-	R
ANACARDIACEAE (Mango Family)						
Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X	Lc	O	U	O
APOCYNACEAE (Periwinkle Family)						
Catharanthus roseus (L.) G. Don	red periwinkle, Madagascar periwinkle	X	R	-	O	U
ARALIACEAE (Ginseng Family)						
Reynoldsia sp.	'ohe	E	-	-	R	-
BATIDACEAE (Batis Family)						
Batis maritima L.	pickle weed, 'akulikuli-kai	X	-	Lc	-	-
BORAGINACEAE (Heliotrope Family)						
Cordia subcordata Lam.	kou	P	R	-	-	-
Heliotropium amplexicaule Vahl	heliotrope	X	-	-	-	U
Heliotropium anomalum var. argenteum Gray	hinahina-ka-kahakai	I	O	-	-	-
Heliotropium curassavicum L.	nena, kipukai	I	-	O	-	-
Messerschmidia argentea (L.f.) Johnston	tree heliotrope	X	O	R	-	-
CACTACEAE (Cactus Family)						
Opuntia megacantha Salm-Dyck	prickly pear, pa-nini	X	-	-	-	R
CAPPARACEAE (Caper Family)						
Capparis sandwichiana var. zoharyi Deg. & Deg.	native caper, maiapilo	E	O	-	-	Lc/O
CARICACEAE (Papaya Family)						
Carica papaya L.	papaya, mikana	X	-	-	R	-
CHENOPODIACEAE (Goosefoot Family)						
Chenopodium murale L.	nettle-leaved goosefoot	X	O	O	O	R

12

Scientific name	Common name	Status	Vegetation types			
			1	2	3	4
<b>COMPOSITAE (Daisy Family)</b>						
<i>Bidens cynapiifolia</i> HBK.	West Indian beggar's tick	X	-	-	U	-
<i>Emilia fosbergii</i> Nicolson	red pua-lele	X	-	-	-	U
<i>Pluchea odorata</i> (L.) Cass.	pluchea, shrubby fleabane	X	0	0	0	U
<i>Sonchus asper</i> (L.) Hill	spiny sow thistle	X	0	-	-	-
<i>Tridax procumbens</i> L.	coat buttons	X	-	-	-	0
<b>CONVOLVULACEAE (Morning-glory Family)</b>						
<i>Ipomoea brasiliensis</i> (L.) Sweet	beach morning glory, pohuehue	I	Lc	0	-	-
<i>Ipomoea tuboides</i> Deg. & van Ooststr.	Hawaiian moon flower	E	-	R	-	-
<i>Jacquemontia sandwicensis</i> Gray	pa'u-o-Hi-'i-'aka	E	Lc	0	-	-
<b>CUCURBITACEAE</b>						
<i>Cucumis dipsaceus</i> Ehrenb. ex Spach	wild cucumber	X	R	-	R	-
<b>EUPHORBIACEAE</b>						
<i>Euphorbia hirta</i> L.	garden spurge, koko-kahili	X	U	R	-	U
<b>GOODENIACEAE (Naupaka Family)</b>						
<i>Scaevola taccada</i> (Gaertn.) Roxb.	naupaka-kahakai	I	A	0	-	-
<b>LEGUMINOSAE (Pea Family)</b>						
<i>Acacia farnesiana</i> (L.) Willd.	kolu, klu	X	0	U	U	Lc/O
<i>Cassia lechenaultiana</i> DC.	partridge pea, lauki	X	-	U	-	0
<i>Desmodium tortuosum</i> (Sw.) DC.	Florida beggarweed	X	-	-	0	R
<i>Desmodium triflorum</i> (L.) DC.	three-flowered beggarweed	X	-	R	0	0
<i>Indigofera suffruticosa</i> Mill.	indigo, 'iniko	X	-	U	-	Lc
<i>Leucaena leucocephala</i> (Lam.) de Wit	koa-haole, ekoa	X	R	U	-	U
<i>Pithecellobium dulce</i> (Roxb.) Benth.	'opiuma	X	-	R	-	R
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) HBK.	algaroba, kiawe	X	0	0	A	Lc/O
<i>Tephrosia purpurea</i> (L.) Pers.	'ahuhu, 'auhuhu	P	-	-	-	0
<b>MALVACEAE (Mallow Family)</b>						
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon, ma'o	X	-	-	0	R
<i>Malvastrum coromandelianum</i> (L.) Garcke	false mallow, hauuci	X	-	-	-	R
<i>Sida fallax</i> Walp.	'ilima	I	0	U	Lc	A/C
<i>Thespesia populnea</i> (L.) Soland. ex Correra	milo	P	R	-	-	-

Scientific name	Common name	Status	Vegetation types			
			1	2	3	4
<b>MORACEAE (Mulberry Family)</b>						
<i>Ficus microcarpa</i> L.f.	Chinese banyan	X	-	-	R	-
<b>MYOPORACEAE (Naio Family)</b>						
<i>Myoporum sandwicense</i> Gray	bastard sandalwood, amio	E	U	R	0	U
<b>NYCTAGINACEAE (Four O'Clock Family)</b>						
<i>Boerhavia coccinea</i> Mill.	alena	X	U	-	R	-
<i>Boerhavia diffusa</i> L.	white-flowered boerhavia	I	C	-	-	U
<i>Boerhavia</i> sp.		I?	-	U	-	-
<b>PAPAVERACEAE (Poppy Family)</b>						
<i>Argemone glauca</i> var. <i>decipiens</i> G. B. Ownbey	pua-kala	E	U	-	-	-
<b>PASSIFLORACEAE (Passion Flower Family)</b>						
<i>Passiflora foetida</i> L.	scarlet-fruited passion flower, pohapoha	X	-	U	0	0
<b>PORTULACACEAE (Purslane Family)</b>						
<i>Portulaca cyanosperma</i> Egler	'ihi	E	0	0	-	0
<i>Portulaca oleracea</i> L.	common purslane, 'ihi	X	0	0	-	R
<b>RHIZOPHORACEAE (Mangrove Family)</b>						
<i>Rhizophora mangle</i> L.	American mangrove	X	-	Lc	-	-
<b>RUBIACEAE (Coffee Family)</b>						
<i>Morinda citrifolia</i> L.	noni	P	-	R	-	0
<b>SAPINDACEAE (Litchi Family)</b>						
<i>Dodonaea sandwicensis</i> Sherff	a'ali'i	E	-	-	-	U
<b>SCROPHULARIACEAE (Figwort Family)</b>						
<i>Bacopa monnieri</i> (L.) Wettst.	water hyssop, herpes	I	-	0	-	-
<b>SOLANACEAE (Nightshade Family)</b>						
<i>Lycium sandwicense</i> Gray	'ohelo-kai, 'ae'ae	I	-	Lc	-	-
<i>Lycopersicon pimpinellifolium</i> Mill.	currant tomato, 'ohi 'ama-ma-ma, kanabele	X	U	-	-	-

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation types</u>			
			<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
STERCULIACEAE (Cocoa Family) Waltheria indica var. americana (L.) R. Brown ex Hosaka	hi'aloa, 'uhaloa	I	0	0	U	A/C
VERBENACEAE (Verbena Family) Lantana camara L.	lantana, lakana	X	-	R	-	R
ZYGOPHYLLACEAE (Tribulus Family) Tribulus cistoides L.	nobu	I	R	-	-	-

**D. TERRESTRIAL FAUNAL SURVEY**

TERRESTRIAL FAUNAL SURVEY  
PROPOSED KOHANA-IKI RESORT COMMUNITY  
NORTH KONA, ISLAND OF HAWAI'I

by  
Maile S. Kjargaard

Prepared for: HELBER, HASTERT, VAN HORN, & KIMURA  
Planners

Prepared by: CHAR & ASSOCIATES  
Botanical/Environmental Consultants  
Honolulu, Hawaii

June 1986

Table of Contents

	<u>Page</u>
List of Tables . . . . .	iii
INTRODUCTION . . . . .	1
Survey Objectives . . . . .	1
Description of the Study Area . . . . .	1
Previous Surveys . . . . .	2
METHODS . . . . .	3
Bird Survey . . . . .	3
Mammal Survey . . . . .	3
LIMITATIONS OF THE SURVEY . . . . .	4
RESULTS . . . . .	4
Faunal Habitats . . . . .	4
Annotated Species List . . . . .	6
I. Birds . . . . .	6
II. Mammals . . . . .	10
Additional Material . . . . .	11
RECOMMENDATIONS . . . . .	12
LITERATURE CITED . . . . .	15

D-2

List of Tables

	<u>Page</u>
1. Summary of bird species in the study area. . . . .	16
2. List of bird species in the study area and the adjacent 'O'oma II parcel by habitat. . . . .	17
3. List of waterbirds reported from 'Aimakapa Pond, Kona, Hawai'i. . . . .	18

TERRESTRIAL FAUNAL SURVEY  
 PROPOSED KOHANA-IKI RESORT COMMUNITY  
 NORTH KONA, ISLAND OF HAWAI'I

INTRODUCTION

Survey Objectives

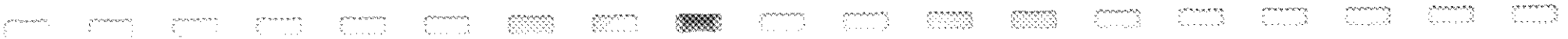
The following survey was undertaken to provide detailed information on bird and mammal populations within a proposed resort area at Kohana-iki, North Kona, Hawai'i.

The study objectives were as follows:

1. To provide a description of the vertebrate communities present in the study area.
2. To provide an annotated checklist of the vertebrate species within or near the project area.
3. To identify sighting locations for species that are listed under the Endangered Species Act.
4. To identify and discuss areas of potential environmental problems or concerns, including probable impacts of the project on vertebrate communities in the study area and appropriate mitigation measures.
5. To prepare a literature review pertinent to the project area.

Description of the Study Area

The study site is approximately five miles north of Kailua-Kona and extends inland from the coast to an approximate eastern boundary at the Mamalahoa Trail. The northern boundary abuts the 'O'oma II parcel,



while the southern boundary of the study site is about nine-tenths of a mile south of Puhuli Point (near the northern edge of Ka-loko Pond).

The Kohana-iki study site covers a total of 470 acres.

The seaward edge of the Kohana-iki parcel is the most sensitive, as much of it is dotted with numerous anchialine ponds. These ponds are not only of great intrinsic interest, but they are of potential importance as waterbird habitat. A complete description of the faunal habitats in the study area is provided below.

#### Previous Surveys

Although there have been no general faunal surveys of the study area, the wetland bird species of the region are fairly well known, particularly those of 'Aimakapa (Honokohau) Pond. This pond is located one kilometer north of Honokohau Harbor and has been identified by the Hawaiian Waterbird Recovery Plan as one of only two ponds on Hawai'i and 17 ponds statewide that are considered essential waterbird habitat (Walker *et al.* 1977). Information about the birdlife of the 'Aimakapa area comes from a number of sources. Foremost of these are the Hawaii Division of Forestry and Wildlife waterbird censuses, which have been conducted annually since the 1950's, and twice a year since 1968 (unpublished data on file, Hilo and Honolulu). In addition, a comprehensive survey of the waterbirds of Hawai'i Island (Paton and Scott 1983) provides an informational baseline of the waterbird records of 'Aimakapa going back to the early part of the present century. Since the area is known by birdwatchers, individual sightings of interest generally appear in the journal of the Hawaii Audubon Society (e.g., Pyle 1977, 1978, 1979) and are summarized in American Birds

on a regular basis. Table 3 provides a summary of the species records for 'Aimakapa taken from these sources.

#### METHODS

##### Bird Survey

The faunal survey was conducted on May 10, 14, and 24, 1986. Approximately 16 hours were spent at the study site. Most of the field work was performed between the hours of 0830 and 1530, although work on May 24 was done between 1600 and 1945 to include both a later afternoon peak in avian activity and the beginning of the nighttime activity period of the endangered Hawaiian Hoary Bat.

Birds were censused by two methods during the survey. The first of these, transect counts, was used to provide distributional information and data useful for determining relative abundances within different habitat types. During transect counts, birds were detected both by sight and by their vocalizations by an observer travelling at a constant rate to prevent counting individuals more than once.

In addition, presence of bird species was determined by indirect means such as by presence of tracks, droppings, and observations of nests. These data were particularly important for species with sparse population densities, secretive habits, or nocturnal activity cycles.

##### Mammal Survey

Mammalian presence and distribution were primarily collected by means of distributional data or by indirect means. The latter (particularly skeletal material) was very important in indicating historical occurrence



in the study area for species that were no longer present.

#### LIMITATIONS OF THE SURVEY

The major limitation of the survey is that it was performed at a time of year when migratory bird species were absent from the Hawaiian Islands. As indicated in Table 3, there are a number of these bird species that could potentially use the ponds in the Kohana-iki portion of the study area but which are only present in Hawai'i between the months of September and late April.

#### RESULTS

##### Faunal Habitats

Five major faunal habitats were present in the study area. These approximately correspond to the vegetation types in the region but are less finely divided. More complete descriptions of the area's vegetation types may be found in the botanical report prepared concurrently with that of this survey.

The predominant habitat in the study area consists of an arid plain of dense to scattered Fountain Grass on pahoehoe substrate with occasional native and alien shrub species. Common shrub species include Capparis, 'Ilima, Noni, and Klu. Bird densities in this habitat type were very low, and most birds seen in these areas were passing through on their way to more preferred habitats that provided more food, water, and cover. One species (the Grey Francolin) was found in this habitat on a more regular basis and presumably is able to utilize the available food sources more effectively than most of the birds found here. In Kohana-iki, this habitat

extends to within 30 meters or so of the shoreline where it is replaced by a well-developed coastal strand vegetation.

The coastal strand habitat occurs immediately inland from the high water level and varies in width. The primary component of this habitat is Messerschmidia shrubs to about three meters in height. Also present are a number of native coastal strand plants (e.g., Capparis, 'Ilima, Pohuehue, Hinahina, etc.), as well as some alien weedy species. Birds were much more abundant in this habitat than in the one mentioned above, although it appeared that much of the activity here was of a transient nature, as many species that fed here in daytime hours roosted elsewhere at night.

Beaches and sections of rocky coastline on the seaward edge of the strand vegetation comprise an important habitat for migratory shorebirds. As the survey was conducted during a time of year when shorebird species are generally absent from the Hawaiian Islands, only two species were found here (See the Annotated Species List below.), although at least two and possibly three others would be expected here on a regular basis. The three species absent were the Bristle-thighed Curlew, the Ruddy Turnstone, and the Sanderling.

The dense patch of Mangrove in the Kohana-iki parcel was an important habitat oasis for many of the passerine (perching) bird species in the study area and was the focus of much of the avian activity in the study area. Bird densities were very high here, particularly in crepuscular hours when most individuals were present in their roosting sites. Evidence of breeding activity of at least two bird species was present here.

Kiawe thickets that occurred inland of the strand vegetation were also foci of avian activity, although birds were not as dense here as in

the Mangrove patch. Northern and Yellow-billed Cardinals were particularly abundant in this habitat type, and the Grey Francolin occurred here as well.

The many anchialine ponds in the Kohana-iki area are potential habitat for a diverse array of migratory species that are present in the Hawaiian Islands during the winter months. While many of them are too deep for shorebird species, they are suitable for larger species such as ducks, herons, etc. In addition, these ponds are of great potential importance as habitat for some of the endangered native wetland bird species known from the larger ponds to the South of the study area such as the Hawaiian Stilt, the Hawaiian Coot, and the non-endangered Black-crowned Night Heron. Such small patches of habitat are frequently used by young birds as they leave their natal areas, as is illustrated by the presence of immature Black-crowned Night Heron at one of the ponds in Kohana-iki.

#### Annotated Species List

Following the common and scientific names for each species are two symbols: the first indicates status in the Hawaiian Islands (following Pyle 1983), and the second indicates in which portion of the study site the species occurs. A summary of this information is provided in Table 1, and data from transect counts, from which much of the following discussion is derived, are present in Table 2.

#### I. Birds

##### 1. Great Frigatebird, 'Iwa (Fregata minor palmerstoni) BI/K,O

One individual was seen flying along the coastline near Puhili Point. This seabird frequents waters around the main Hawaiian Islands,

although its breeding colonies are in the Northwest Chain. 'Iwa are known to take fresh water where it is available (pers. obs., Kawainui Marsh, O'ahu) and may utilize some of the larger anchialine ponds in the area for this purpose.

##### 2. Black-crowned Night Heron, 'Auku'u (Nycticorax nycticorax hoactli) Ri/K

An immature Black-crowned Night Heron was seen in the large pond about one-half kilometer up the coast from the Mangrove patch in Kohana-iki (very close to the northern boundary of the parcel). The fact that the bird was present on all visits to the study site and the density of Heron droppings on the pond's periphery indicates that the bird is resident in the area. Heron droppings were also found around the larger ponds south of the Mangrove patch, but neither birds nor evidence of recent activity (e.g., tracks) were present there.

##### 3. Gray Francolin (Francolinus pondicerianus) Fn/K,O

Gray Francolin or evidence of their activity were present in low numbers in the study area: birds were seen in Kiawe scrub in Kohana-iki, in Fountain Grass habitat in the adjacent 'O'oma parcel, and feather and tracks were found in strand vegetation in 'O'oma. This species is well-adapted to dry, open grasslands and scrub habitats such as those found in the study area.

##### 4. Pacific Golden-plover, Kolea (Pluvialis fulva) Vr/K

Two plover were found along the shoreline at Kohana-iki. During the winter months, plover are probably much commoner in the study area since this species utilizes not only strand habitats but also mudflats and grassland habitats.

The plover is a familiar winter visitor to the islands and is found from sea level to high elevations in suitable open habitats. Plover generally arrive from their winter breeding grounds in the Arctic in late August and remain here until late April. Some individuals may remain in the islands during the summer in nonbreeding condition.

5. Rock Dove (Columba livia) Fl/K

A flock of six individuals was seen in flight over the southern portion of Kohana-iki, presumably members of a domestic flock.

6. Zebra Dove (Geopelia striata) Fl/K,O

This species was present in strand habitat, in the Mangrove patch, and in Kiawe scrub. It was most abundant on the edges of the latter habitat type, where individuals were observed foraging on the ground on herb and grass seeds.

7. Common Barn-owl (Tyto alba) Fn/K

This introduced species is common in many parts of the state, particularly in lowland areas. It feeds primarily on rodents but will also occasionally take small birds.

One Barn-owl was flushed from its roosting site in the Mangrove patch on the morning of the 10th, and another was heard near the large pond near the northern boundary of Kohana-iki after dark on the 24th. Due to the large home range of this species, it is likely that both observations were of the same individual.

8. Melodious Laughing-thrush (Garrulax canorus) Fl/K

One Laughing-thrush was seen near the coastal jeep road south of

the Mangrove patch in a patch of Kiawe trees. This is an unusual location to observe this species since it is most common in the wetter portions of the island. No vocalizations were heard, so it may have been a transient individual.

9. Japanese White-eye (Zosterops japonicus) Fl/K,O

The white-eye was the second commonest bird species in the study area. It was most common in Kiawe scrub or in the strand vegetation where Lesserschmidia was present. It was also present in nearly as large numbers in the Mangrove patch in Kohana-iki. Although occasionally found in the grassland habitat throughout much of the study area, birds seen in this habitat were invariably flying overhead in the process of moving from one patch of trees to another.

10. Nutmeg Mannikin (Lonchura punctulata) Fl/K

A small flock of Mannikin frequented the outer edges of the Mangrove patch and nearby Kiawe thickets, where it was observed feeding on grass seed.

11. Yellow-billed Cardinal (Paroaria capitata) Fl/K,O

This species was introduced to the Kona area in the 1930's but was not documented in the region until the early 1970's. It is very abundant in the Honokohau area.

Yellow-billed Cardinals were common in the study area, especially in Kiawe and strand habitats. They were much more common in the Kohana-iki parcel than in the adjacent 'O'oma II parcel, presumably because of greater habitat availability in the former area.

12. Northern Cardinal (Cardinalis cardinalis) F1/K,0

The cardinal was common in Kohana-iki, particularly in the Mangrove patch and in Kiawe scrub. Only one individual was observed in the nearby 'O'oma II parcel, on the inland part of the strand vegetation. Males were very vocal, suggesting breeding activity in the study site, although no nests were found.

13. House Finch (Carpodacus mexicanus) F1/K,0

The House Finch was the most abundant bird in the study area: they were found in the Mangrove patch, Kiawe scrub, and strand habitat, as well as over grassland habitat as they flew from one part of the study area to another. During the day they were most common in either the strand habitat or in Kiawe thickets, while in the evening large numbers appeared to be roosting in the Mangrove patch.

II. Mammals

1. Mongoose (Herpestes auropunctatus) F1/K,0

The Mongoose was the only mammal seen during the survey, although skeletal material of other species was present in abundance throughout the study area (See below.). One individual was observed in strand vegetation near the Mangrove patch, and Mongoose droppings were found throughout the former habitat type, as well as in Kiawe scrub and on the seaward edges of the arid grassland that makes up the bulk of the study site. High concentrations of droppings near some of the anchialine ponds in the vicinity of the Mangrove patch indicate that Mongoose may be using the brackish water in these ponds, or that they are preying upon birds that frequent the area.

2. Other mammal species

Mammalian skeletal material was abundant in the study site. Much of it was found on the pahoehoe substrate that covers most of the inland part of the area, and some was discovered in lava tubes and caves that dot the pahoehoe flows. The majority of the bones were not recent, but they were useful in providing a historical perspective on the presence of mammals in the study area. The following species were represented:

1. Feral Pig, Sus scrofa
2. Feral Goat, Capra hircus
3. Donkey, Equus asinus

The three species are probably no longer found in the area, although old goat droppings were present in a large lava tube in the mauka portion of Kohana-iki (Char, pers. comm.). Also present in the lava tube were skeletons of three adult goats. Skeletal material from Feral Cat (Felis catus) was found in the adjacent 'O'oma II parcel. Cats are undoubtedly present on the Kohana-iki site.

There was no sign of the endangered Hawaiian Hoary Bat, in spite of the fact that ponds and coastal areas are known feeding areas for this species. This absence may be an artifact of the limited amount of time available for field work, since bats are known from nearby portions of North Kona (Kramer 1971).

Additional Material

A pahoehoe cave discovered in the adjacent 'O'oma II parcel by the botanical team during the course of their survey contained large numbers of shells and animal bones. I was unable to examine this skeletal material, but the botanists thought that some of the bones might have been those of

D-8

small bird species. An extinct fauna of previously unknown bird species has been discovered in similar circumstances in the course of the last decade (Olson and James 1982), and the large number of lava tubes in the Kohana-iki and 'O'oma II areas may contain additional specimens of great scientific interest.

RECOMMENDATIONS

1. Placement of development

A large portion of the coastal section of the Kahana-iki parcel is highly sensitive due to the many anchialine ponds in the area. Some of the ponds are disturbed, but most still have intact biotic communities containing both vascular plants and invertebrates (several species of crustacean and mollusc endemic to Hawaiian anchialine ponds). These are unique and very fragile communities of great biological interest. In addition to their intrinsic interest, they provide feeding habitat for both native wetland bird species and migratory shorebirds and wildfowl. Some of the effects of development in this area can be mitigated by incorporating the ponds within buffer zones as recommended by O.I. Consultants, Inc. (Appendix E) and discussed below.

2. Buffer zones to mitigate impact and discourage casual passers-by from disturbing ponds and waterfowl

Aside from destruction of anchialine pond communities during construction, one of the greatest dangers to their integrity and to their potential as wildlife habitat is human disturbance. The ponds at Ninole Cove are an example of this problem under similar conditions: once

habitat for several species of birds, these ponds ceased being used when the surrounding area was developed, even though no structures were placed in the immediate vicinity of the ponds and the surrounding areas remained unlandscaped. The great increase in accessibility of the area was undoubtedly the primary culprit in the above example, and similar problems can be expected in Kohanaiki. To some extent, adequate set-back zones planted with taller native vegetation such as shrubs and trees surrounding the ponds may mitigate these impacts by acting as a buffer to prevent undue disturbance by casual passers-by. The pond management plan discussed in the EIS should consider the impact of development on both wetland bird species and migratory shorebirds in determining the appropriate dimensions of the buffer zones surrounding the pond areas.

An additional problem of this sort can be expected to occur at the nearby Kaloko Pond. This pond is relatively remote at the present time, especially as compared to its accessibility in the event that a road and support housing are constructed very close by. Several mitigation measures to alleviate this problem are recommended. First, a fence and a wide undeveloped buffer zone (at least 200 feet) would discourage disturbance in a manner analogous to surrounding the anchialine ponds with buffer zones. In addition, access roads to developed areas nearby should be placed as far as possible from the boundary of the Kohana-iki parcel and adjacent land to the south, and casual access on foot should be discouraged. Pedestrian traffic should be directed away from the Kaloko Pond area. Planting of hedges along the boundary fence would obscure

the view of the pond and reduce the lure of its appearance in the distance.

### 3. Landscaping and weed control

The aesthetic and biological impact of resort development in this location can be somewhat softened by the use of appropriate native Hawaiian plants in landscaping. Dry leeward coastal areas are excellent areas for the use of these species since many are adapted to the harsh climatic conditions and would require minimal maintenance. Examples are the native Wiliwili (not to be confused with the alien species most commonly used in landscaping) and coastal strand plants such as Pohuehue, Capparis, Vitex, and Hinahina. The latter species are low growing and provide excellent ground cover.

Wherever possible, alien weedy species could be prevented from being more abundant than they already are, especially in the vicinity of the ponds. This process should not entail the spraying of herbicides due to the delicate nature of the anchialine ecosystem. Of particular importance in this regard is the invasion of new areas by Mangrove. When young, this species may be removed manually, but it is a considerable problem once plants reach adult stature.

### LITERATURE CITED

- Berger, A. J. (1977) Nesting seasons of some introduced birds in Hawaii. 'Elepaio 38(4):35-38.
- Berger, A. J. (1981) Hawaiian Birdlife. The University Press of Hawaii.
- Emlen, J. T. (1971) Population densities of birds derived from transect counts. Auk 88:323-342.
- Kramer, R. J. (1971) Hawaiian Land Mammals. Charles Tuttle Co., Rutland, Vermont.
- Munro, G. C. (1944) Birds of Hawaii. Ridgeway Press, Rutland, Vermont.
- Olson, S. L., and H. F. James (1982) Prodromus of the fossil avifauna of the Hawaiian Islands. Smithsonian Contributions to Biology 365:1-59.
- Paton, P. W. C., and J. M. Scott (1985) Waterbirds of Hawaii Island. 'Elepaio 45(8):69-76.
- Pyle, R. L. (1977b) Recent observations of birds--August 1976 to February 1977. 'Elepaio 38:2-5.
- Pyle, R. L. (1977c) Recent observations of birds--March to July. 'Elepaio 38:56-58.
- Pyle, R. L. (1978a) Recent observations of birds--August to November. 'Elepaio 38:101-106.
- Pyle, R. L. (1978b) Recent observations of birds--December 1977 to February 1978. 'Elepaio 39:15-20.
- Pyle, R. L. (1979) Hawaii bird observations--August 1978 through February 1979. 'Elepaio 40:13-16.
- Pyle, R. L. (1981) Hawaii bird observations--August 1979 through July 1980. 'Elepaio 41:72-78.
- Pyle, R. L. (1983) Checklist of the birds of Hawaii. 'Elepaio 44:47-58.
- Shallenberger, R. (1977) An Ornithological Survey of Hawaiian Wetlands. U. S. Army Engineer Division, Honolulu.
- Shallenberger, R., ed. (1984) Hawaii's Birds. Hawaii Audubon Society, Honolulu.
- Walker, R. L., E. Kridler, J. S. Medeiros, R. S. Saito, P. Sekora, G. Swedberg, T. Telfer, D. Woodside, and C. F. Zeillemaker (1977) Hawaiian Waterbird Recover Plan. U. S. Fish and Wildlife Service. Endangered Species Program, Portland, Oregon.

Table 1. Summary of bird species in the study area.

Species	Status*	Number
Great Frigatebird <u>Fregata minor palmerstoni</u>	Bi	1
Black-crowned Night-heron <u>Nycticorax nycticorax hoactli</u>	Ri	1
Gray Francolin <u>Francolinus pondicerianus</u>	Fn	2
Pacific Golden-plover <u>Pluvialis fulva</u>	Vr	2
Rock Dove <u>Columba livia</u>	Fi	6
Zebra Dove <u>Geopelia striata</u>	Fl	6
Barn Owl <u>Tyto alba</u>	Fn	1
Melodious Laughing-thrush <u>Garrulax canorus</u>	Fl	1
Japanese White-eye <u>Zosterops japonicus</u>	Fl	22
Nutmeg Mannikin <u>Lonchura punctulata</u>	Fl	5
Yellow-billed Cardinal <u>Paroaria capitata</u>	Fl	17
Northern Cardinal <u>Cardinalis cardinalis</u>	Fl	20
House Finch <u>Carpodacus mexicanus</u>	Fl	59

\* Bi = Indigenous breeding species, leaves when not breeding  
 Fn = Foreign, introduced since World War II  
 Fl = Foreign, introduced before World War II  
 Vr = Visitor, regular migrant to Hawaiian Islands  
 Ri = Indigenous resident species

Status abbreviations after Pyle (1977) Preliminary list of the birds of Hawaii. 'Elepaio 37:110-121.

Table 2. List of bird species in the study area and the adjacent 'O'oma II parcel by habitat.

Species	Number					
	A*	St*	G*	M*	K*	S*
Great Frigatebird	-	-	-	-	-	1
Black-crowned Night-heron	1	-	-	-	-	-
Gray Francolin	-	-	2	-	2	-
Pacific Golden-plover	-	-	-	-	-	2
Wandering Tattler	-	-	-	-	-	3
Rock Dove	-	-	-	-	6	-
Zebra Dove	-	2	-	1	5	-
Barn Owl	-	-	-	1	-	-
Melodious Laughing-thrush	-	-	-	-	1	-
Japanese White-eye	-	11	3	7	11	-
Nutmeg Mannikin	-	-	-	2	3	-
House Sparrow	-	-	-	-	13	-
Yellow-billed Cardinal	-	6	-	5	11	-
Northern Cardinal	-	3	-	8	10	-
House Finch	-	15	5	33	20	-

\* A = Anchialine ponds  
 St = Strand vegetation  
 G = Arid grassland  
 M = Mangrove  
 K = Kiawe scrub  
 S = Shoreline

Table 3. List of waterbirds reported from 'Aimakapa Pond, Kona, Hawai'i.  
 For species that do not regularly migrate to the islands, sighting  
 dates are indicated after the scientific name.

Pied-billed Grebe (Podilymbus podiceps) 1985-86  
 Snowy Egret (Egretta thula) 1980-81  
 Black-crowned Night-heron (Nycticorax nycticorax hoactli)  
 Greater White-fronted Goose (Anser albifrons) 1981  
 Brant (Branta bernicola) 1961  
 Green-winged Teal (Anas crecca) 1960'2, 1972, 1977  
 Mallard (Anas platyrhynchos)  
 Northern Pintail (Anas acuta)  
 Blue-winged Teal (Anas discors) 1977, 78, 81, 82, 83, 84  
 Northern Shoveler (Anas clypeata)  
 Eurasian Wigeon (Anas penelope) 1983  
 Canvasback (Anas valisneria) 1983  
 Lesser Scaup (Aythya affinis)  
 Hooded Merganser (Lophodytes cucullatus) 1981  
 Hawaiian Coot (Fulica americana alai)  
 Pacific Golden-plover (Pluvialis dominica)  
 Semipalmated Plover (Charadrius semipalmatus) 1974, 76  
 Hawaiian Stilt (Himantopus himantopus knudseni)  
 Lesser Yellowlegs (Tringa flavipes) 1977  
 Wandering Tattler (Heteroscelus incanus)  
 Bar-tailed Godwit (Limosa lapponica) 1978  
 Ruddy Turnstone (Arenaria interpres)  
 Sanderling (Caladris alba)  
 Least Sandpiper (Caladris minutilla) 1977  
 Pectoral Sandpiper (Caladris melanotos) 1981, 82  
 Sharp-tailed Sandpiper (Caladris acuminata) 1978  
 Long-billed Dowitcher (Limnodromus scalopaceus) 1976  
 Short-billed Dowitcher (Limnodromus griseus) 1974  
 Red-necked Phalarope (Phalaropus lobatus) 1977  
 Franklin's Gull (Larus pipixcan) 1976  
 Caspian Tern (Sterna caspia) 1981  
 Black Tern (Sterna niger) 1982-83



**E. NEAR-SHORE MARINE ENVIRONMENT AND  
ANCHIALINE POND RESOURCE IMPACT ANALYSIS**

OI CONSULTANTS, INC.

IMPACT ANALYSIS OF RESORT DEVELOPMENT AT KOHANAIKI  
ON THE NEAR-SHORE MARINE ENVIRONMENT AND  
ANCHIALINE POND RESOURCE

FINAL REPORT

Prepared for:

Helbert, Hastert, Van Horn & Kimura, Planners  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Prepared by:

OI Consultants, Inc.  
Makapuu Point  
Waimanalo, Hawaii 96795

Dr. David A. Ziemann  
Project Manager

June, 1986

MAKAPUU POINT  
WAIMANALO, HAWAII 96795  
(808) 259-7951

Preface

The coastline at Kohanaiki, Hawaii contains a series of anchialine ponds which constitutes one of the larger concentrations of relatively undisturbed ponds on the island of Hawaii. Thus, an integral part of the planning process for the proposed Kohanaiki development is the avoidance or mitigation of any adverse impacts to these ponds.

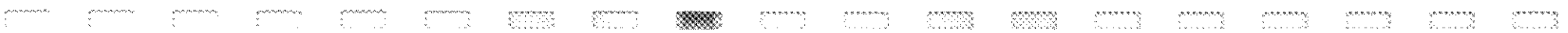
This report discusses the potential impacts of development on the nearshore marine environment, threatened or endangered species, anchialine ponds, and groundwater resources for inclusion in the Draft Environmental Impact Statement for the Kohanaiki resort.

Table of Contents

Preface.....i  
 List of Tables.....iii  
 Description of the Environment.....1  
     Nearshore Environment.....1  
     Threatened or endangered species.....5  
     Anchialine ponds.....6  
 Impacts and mitigating measures.....16  
     Construction impacts.....16  
     Surface runoff and drainage plan.....17  
     Groundwater.....17  
 Literature Cited.....19

List of Tables

Table		Page
1	Hypsographic characteristics of anchialine ponds found within the Kohanaiki area during 1985 survey.	7
2	Terrestrial vegetation found in association with anchialine ponds of the Kohanaiki area during 1985 survey.	8
3	Aquatic flora and fauna found in anchialine ponds of Kohanaiki area during 1985 survey.	11
4	Frequencies of occurrence of common aquatic species in anchialine ponds in the north and south Kohanaiki areas as determined by surveys taken in 1972.	15



## Description of the Environment

### Nearshore Marine Environment

The Kona coast of the island of Hawaii is characterized as being protected from tradewind-generated seas, partially protected from long-period north swells, and as having steep nearshore slopes which extend below the wavebase (Dollar, 1975). In addition, the coastal and offshore waters are extremely clear, with resultant deep light penetration. These characteristics combine to establish the conditions under which Kona coast coral communities develop. In general, four zones of reef corals have been recognized (Dollar, 1975) off the Kona coast. Each zone is characterized by a dominant coral species, substrate type, depth range, and suite of physical conditions. The four zones have been termed (moving from the shoreline to deeper water) the Pocillopora meandrina boulder zone, the P. lobata reef building zone, the P. compressa slope zone, and the P. lobata rubble zone. Nolan and Chaney (1981), in a study of the coral reefs of the west coast of the island of Hawaii, describe zones of coral communities based on the amount of wave energy received and water depth; the zones (high surge, shallow water; moderate surge, shallow water; moderate surge, deep water; low surge, deep water) correspond with those described by Dollar (1975).

The Pocillopora meandrina boulder zone (high surge, shallow water zone) extends from the shoreline to depths of 6 - 8 meters. In many areas of the Kona coast, the shoreline consists of a basaltic cliff, with a base 2.5 - 3 meters deep; other areas exhibit more gently sloping shorelines. The substrate is generally a basaltic pavement upon which are found large, relatively sharp-edged and immovable boulders, and smaller, rounded boulders which are moved about by wave action. Corals, dominated by Pocillopora meandrina, are generally found secured to the tops and sides of the large basalt boulders as well as on the basalt pavement. Other species of encrusting coral species are found within this zone.

Seaward of the edge of the boulder field lies the Porites lobata reef building zone (moderate surge, shallow water zone). This zone extends from depths of 6 - 8 meters to the edge of the shelf which occurs along this coastline at a depth of 12 - 14 meters. The substrate is primarily flat basaltic pavement covered by a thin limestone veneer. Porites lobata is the dominant coral species in this zone, although Pocillopora meandrina may be locally abundant.

The Porites compressa slope zone (moderate surge, deep water zone) extends from the edge of the reef shelf to depths of 25 - 30 meters. The slope of this zone may range from 30° to 45°. Most of the substrate is comprised of fine-grain sediment or coral rubble. Thickets of finely-branched Porites compressa dominate this zone, although in the deeper regions colonies of P. lobata can be found.

The Porites lobata rubble zone (low surge, deep water zone) extends from depths of 25 - 30 meters to depths where corals no longer occur, generally between 50 - 60 meters. Extensive areas of large coral rubble provide a substrate for small encrusting coral species, predominantly Porites lobata.

The nearshore region off Kohanaiki exhibits the general bathymetric features and coral community zonation described above. The following is a summary description of the coastal bathymetry off Kohanaiki, taken from Nolan and Chaney (1981).

"The surge zone at ORCA/DPC site 1 is a vertical cliff 20' in height fronted by a smooth boulder-covered basalt terrace. Similar bottom features occur at ORCA/DPC site 2. Areas of steeply-sloping boulder-covered pavement occur occasionally, but most of the submarine shoreline is a shallow, flat platform dropping off sharply at about the -10' contour. During high tide waves break across this bench. During low tide most of the wave activity is at the outer edge of the platform.

"The nearshore terrace begins at -10' to -20' in depth and ends at the shelf break at -50'. The shoreward half of the terrace consists of basalt pavement with scattered (3-6' diameter) boulders and basalt outcrops (up to 2' in height). Boulder cover decreases and rubble cover increases in the seaward half of the terrace. Patches of coarse coral sand account for about 5% of the total bottom cover in the deeper terrace areas.

"The reef slope consists largely of unconsolidated coral rubble and basalt. About 5% of the total bottom cover is pillow basalt pavement."

Coral communities off Kohanaiki also conform to the same general pattern described above. Again, to quote from Nolan and Chaney (1981).

"Bottom communities were surveyed south of Wawahiwa'a Point, which is semi-protected from ocean swell. The surge zone, upper reef terrace community to -20' has moderate to heavy surge and shallow water communities. Coral cover at ORCA/DPC site 1 is low in shallow water (up to 10% total and 5% living cover) and increases to 50% total and 25% living cover as a proportion of total bottom cover below -15'. Branching Pocillopora meandrina, massive Porites lobata and encrusting Montipora verrucosa species are dominant -- most are less than 1' in diameter. Below -20 to -50' the coral community is a moderate surge, deep water type. Coral cover ranges from 70-90% total cover (or 60-80% living cover) and is dominated by massive colonies of Porites lobata and the finger coral Porites compressa. Pocillopora meandrina occur on boulder and rocky outcrops -- as well as large branching heads of Pocillopora eydouxi, a soft coral, Anthelia edmondsoni, and a non-reef building hard coral, Tubastrea

coccinea. Some of the massive colonies range up to 2' in diameter. The reef slope is a low surge, deep water community with small colonies of less than 1' in diameter. Eighty percent of the observed corals consist of Porites compressa and less than 20% are Porites lobata. There are also small numbers of Anthelia edmondsoni and the wire coral (Cirrhopathes anguina) at depths exceeding -75'."

North of Wawahiwa'a Point, bottom features are similar to those found off Keahole Point. Nolan and Chaney's (1981) description of that area is as follows.

"A heavy surge, shallow water community occurs inshore to -10' and on upper surfaces of near-shore basalt outcrops. Pocillopora meandrina is the dominant species, except Palythoa tuberculosa and Anthelia edmondsoni are common at ORCA/DPC site 3. Lepastrea purpurea frequently occurs at ORCA/DPC site 1. Living and total coral cover is less than 5% of the bottom area and few hard coral colonies are larger than 6" in diameter. Below the surge zone the number of coral species increases greatly and conditions are more typical of a moderate surge, shallow water community. This community occurs at -10' at ORCA/DPC sites 2 and 3 and at -20' to -30' at ORCA/DPC site 1. Porites lobata is the dominant species. Pocillopora meandrina is often found on upper boulder surfaces. Encrusting species flourish at these depths and large colonies of Montipora verrucosa and Montipora patula are commonly seen on the sides of large boulders and pavement surfaces. Coral cover ranges from 5-10% at ORCA/DPC sites 1 and 3 to 40% at ORCA/DPC site 2. Some colonies are up to 3' in diameter.

"From the lower margin of the moderate surge community to about -50', the surge and substrate conditions are optimal for the moderate surge, deep-water community. Porites lobata is generally the dominant species, but may be displaced by localized concentrations of Porites compressa. Living coral cover is about 50% with average cover of 20% at ORCA/DPC site 3; 7-19% at ORCA/DPC site 2, and 10% at ORCA/DPC site 1. The maximum colony diameter is 3-4' and the largest colonies are found in Ho'ona Bay. The total coral cover declines at, or just above, the shelf and is markedly lower than in the more shallow areas of the moderate surge, deep-water community.

"The slope is a deep-water, low surge community. Coral cover at -90' is less than 1% at ORCA/DPC site 2, and less than 5% at ORCA/DPC site 1. It consists mainly of Porites compressa and Porites lobata with small numbers of Pocillopora meandrina on boulders."

The fish fauna of the Kohanaiki area has been intensively surveyed (Nolan, 1978), with permanent study stations visited between 1973 and 1978. The fish fauna offshore of Kohanaiki is extremely abundant and diverse. The following summary is taken from Nolan and Chaney (1981).

"Over 53 fish species were observed on a 30 minute dive at ORCA/DPC site 1. Fish species designated as "Abundant" are Chromis agilis, Thalassoma duperreyi, Zebrasoma flavescens, Ctenochaetus strigosus, Hemitaurichthys zoster (at depths exceeding 60'), Mulloidichthys vanicolensis, Decapterus pinnulatus, and Abudefduf abdominalis (in the shallows). Manta rays and bonefish are frequently observed in the waters off of the Pine Trees (Kohanaiki). There are many species of reef fishes at this site considered to be game fish by local fishermen that occur in abundance. The dense beds of Porites compressa provide an important refuge for juvenile fish."

The fish fauna to the north of Wawahiwa'a Point is similar to that found off Keahole Point, which supports one of the most diverse and abundant reef fish populations in the main Hawaiian Islands. The depth zonation of Keahole reef fishes is representative of that found along the west coast of the island of Hawaii. Generally the abundance of adult fish decreases with depth.

The surge zone (the high surge, shallow water coral community zone described above) supports the largest fish biomass, probably due to the presence of abundant limu (macroalgal) growths which provide food for these fish. Characteristic fish species found in this zone include Acanthurus guttatus, Acanthurus achilles, Rhinecanthus rectangulus, Abudefduf abdominalis, and Aulostoma chinensis. Large roving predatory fishes such as Caranx melampygus and Kyphosus cinerascens are found in the surge zone as well.

The moderate surge, shallow water terrace supports a less abundant and less diverse fish faunal assemblage. Between 50 and 55 species of fish have been found in this zone (ORCA, 1977; 1978). Chromis vanderbilti is by far the most abundant species, accounting for over 50% of the individuals seen. Other abundant species include Ctenochaetus strigosus, Zebrasoma flavescens, Acanthurus nigrofuscus, and Thalassoma duperreyi.

The moderate surge, deep water zone again supports fewer species (43) than shallower zones (ORCA, 1977). The lush growths of Porites compressa apparently provide shelter for juvenile reef fishes; one survey (ORCA, 1977) reported 33% of the individuals seen in this zone were juvenile forms. The most abundant species include Zebrasoma flavescens, Ctenochaetus strigosus, Chromis vanderbilti, Chromis agilis, and Cheatoodon multictinctus.

The low surge, deep water zone harbors the least number of species, and overall abundance is lower than shallower zones. Chromis agilis, Chromis hanui, Zebrasoma flavescens, Cheateodon multicinctus, and Chromis ovalis are the most abundant species.

The intertidal region of the Kohanaiki shoreline consists of stretches of vertical, rocky shoreline interspersed with shallow sloping benches. Tidepools are common, especially north of Wawahiwa'a Point. Brock and Brock (1974) recognized three distinct habitats within the intertidal region: tidepools, subtidal waters affected by freshwater input, and marine subtidal waters. No evidence of areas of freshwater input have been observed along the Kohanaiki coastline. The flora and fauna of the intertidal zone is abundant (Brock and Brock, 1974). Macroalgal species of the exposed intertidal zone include Sargassum sp., Turbinaria ornata and Giffordia sp. (Ectocarpus), Ahnfeldtia concinna, Chnoospora sp., Porphyra spp., Pterocladia caerulescens, Pterocladia capillacea, and Ulva fasciata. Tidepools support luxurious algal growth, with species including Chlorodesmis hildebrandtii, Caulerpa racemosa, Dictyota spp., Enteromorpha spp., Galaxaura spp., Laurencia spp., Jania spp., Sargassum sp., Sphacelaria sp., and Turbinaria ornata. Higher tidepools support mainly Littorina spp.

The nearshore marine environment off Kohanaiki, while supporting a coral and fish community which makes it a popular SCUBA diving spot (Hawaii DLNR, 1978), is not significantly different, either in species abundance or diversity, from other areas of the western coast of the island of Hawaii. Studies of coral communities and associated fish populations have been conducted all along the leeward Hawaii island coast (Dollar, 1975; Kay, et al, 1977; Key, et al, 1971; Madden, 1980; Hayes, et al, 1982; Brock and Brock, 1974; Department of Fish and Game, Hawaii DLNR). While differing in details between various locations, the patterns of zonation of corals and the associated fish species are a relatively constant feature of the coastline.

#### Threatened or endangered species

Two species of marine animals which have been declared threatened or endangered occur off the Kohanaiki coastline: the threatened green turtle (Chelonia mydas) and the endangered humpback whale (Megaptera novaeangliae). The green turtle is the only turtle species which lives and breeds in Hawaiian waters. Most of the breeding and nesting activity of the green turtles occurs at French Frigate Shoals; most of the remaining sites of such activity are also in the Northwest Hawaiian Islands. Important residence areas for green turtles occur at the north tip of the island of Hawaii (Hayes, et al, 1982) and along the southeast coast at Kau. Green turtles typically frequent shallow, nearshore areas only at dawn and dusk, primarily to feed on selected species of macroalgae. During the day, they remain in the deeper portions of offshore reefs, among the developed coral reef structure. Since the Kohanaiki area supports algal species known to be consumed by turtles, and since residence

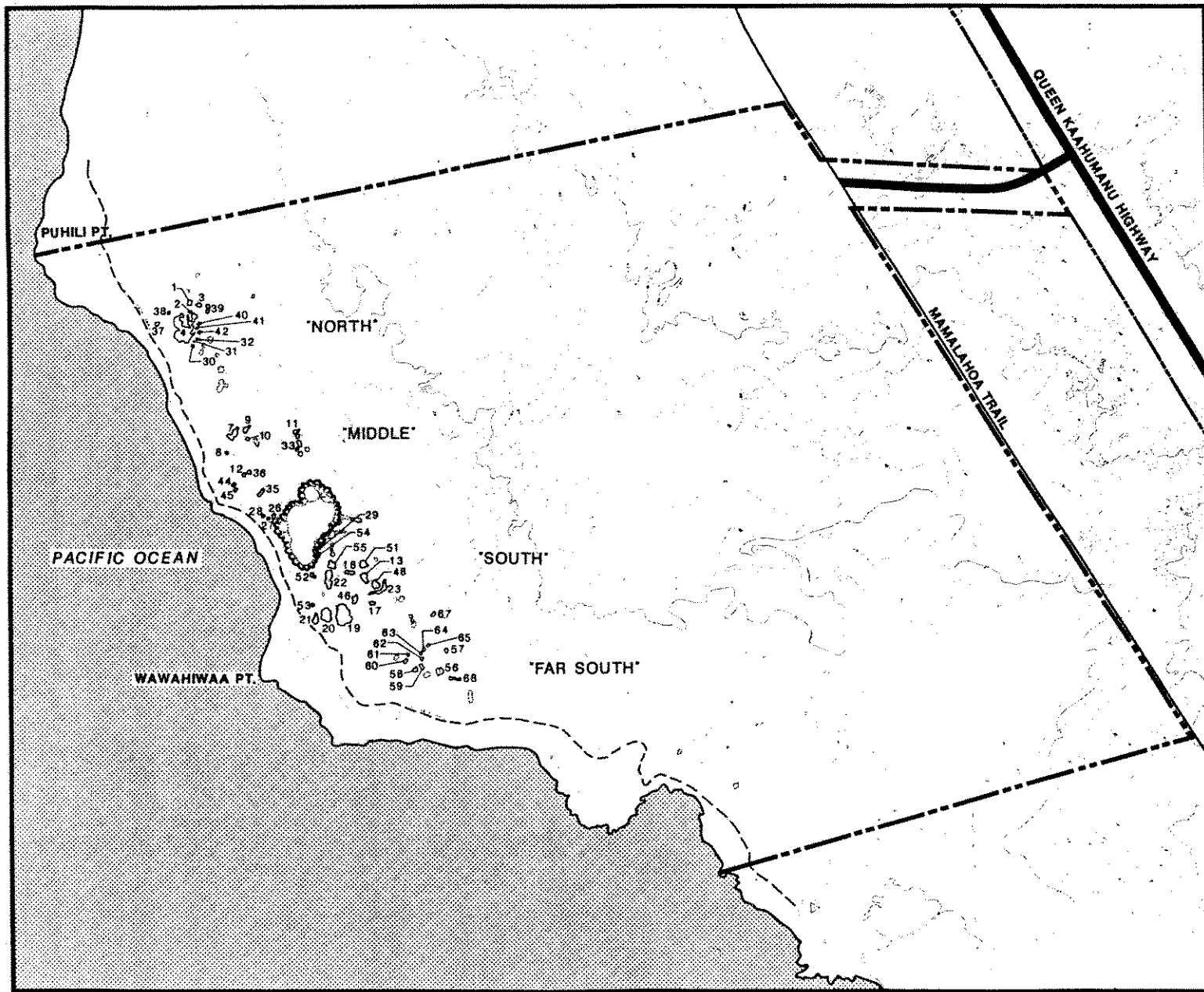
areas are located to the north and south, turtles may be found in the area at least occasionally.

Humpback whales are usually found in Hawaiian waters between November and May, with peak abundances in February. The waters of Maui County (Penguin Banks and the area between Maui, Molokai, Lanai and Kahoolawe) are of primary importance (Shallenberger, 1979). Areas of secondary importance include Kaula, Niihau, the south Kauai coast, and the northwest coast of Hawaii. The humpback whale management plan (USDC, 1983) adds the north and east coasts of Oahu and the bank extending off Ka Lae (South Point). Whales have been sighted occasionally off Keahole Point. The area offshore of Kohanaiki may be utilized as a passageway for occasional whales traveling to or from South Point.

#### Anchialine ponds




The anchialine ponds located along the leeward coast of the island of Hawaii constitute the most extensive known examples of this relatively unique ecosystem. Maciolek and Brock (1974) identified 29 ponds in three different sub-areas at Kohanaiki; two additional ponds were found just to the south. A more recent survey (OI Consultants, 1985) of the Kona coast ponds located 43 ponds in the Kohanaiki area covered by the 1972 survey; an additional 13 ponds were found in the area to the south not examined in 1972 (Figure 1). Three ponds within the mangrove thicket were not surveyed in 1985. A recent (May, 1986) brief examination of the Kohanaiki site on ground and by helicopter noted the presence of scattered depressions, mostly to the south of the mangrove thicket, which contain water only at extremely high tides. Two large ponds located at the southern edge of the site, heavily overgrown by terrestrial vegetation on their borders, were noted from the air; one pond was briefly examined from the ground.

The size, depth, surface area, water temperature and salinity of the ponds examined in 1985 are presented in Table 1; the occurrence and relative abundance of terrestrial vegetation surrounding each pond are presented in Table 2; the occurrence and relative abundance of aquatic flora and fauna in each pond are presented in Table 3. From a hydrographic standpoint, the ponds in the four main areas are similar, although small differences in salinity and temperature were noted. The mean salinity in ponds increases from 12.7 ppt in the north ponds, to 13.7 ppt in the middle ponds and 15.1 ppt in the south ponds; salinity in the far south ponds decreases to 11.9 ppt. Salinity values were more uniform in the far south ponds, ranging from 10-13 ppt, than in the other areas; salinities ranged from 8-17 ppt in the north ponds, for example. The patterns of salinity reflect both short-term variability due to tidal phase, and large-scale sub-surface processes of groundwater-seawater interactions (OI Consultants, 1985).



### Anchialine Ponds

#### LEGEND

-  Anchialine Ponds
-  Coastal Beach Trail
-  Mangrove

#### REFERENCES

- Ziemann, 1966
- MacIolek & Brock, 1974

## KOHANA-IKI

Kona Beach Development Venture

HELBER, HASTERT, VAN HORN & KIMURA  
ENGINEERING ARCHITECTS PLANNERS



0 800' Figure: 1

Table 1. Hypsographic characteristics of anchialine ponds found within the Kohanaiki area during 1985 survey (OI Consultants, Inc., 1985).

Location	Pond	Length (ft)	Width (ft)	Z (in)	Area (ft <sup>2</sup> )	S (0/00)	T (C)
North	1	70	20	15	1400	16	30
	2	25	15	8	375	17	32
	3	30	30	18	710	14	30
	4	150	70	40	10500	17	29
	30	15	2	8	30	8	29
	31	15	5	10	75	9	33
	32	34	3	10	102	8	32
	37	15	15	20	177	17	27
	38	6	6	40	28	14	25
	39	20	3	8	60	10	31
	40	7	2	2	14	10	32
	41	12	1	4	12	11	30
	42	8	8	10	50	14	28
	Middle	7	60	25	20	1500	14
8							
9		50	20	25	1000	13	29
10		6	6	15	28	13	27
11		16	9	7	144	15	29
12		15	10	45	150	13	25
26		16	3	15	48	15	23
27		4	4	3	13	16	23
28		10	5	15	50	16	23
33		8	6	4	48	13	33
35		40	40	10	1257	16	23
36		15	12	28	180	11	25
44		12	12	20	144	11	28
45		14	10	52	140	12	28
South	13	35	35	6	962	14	32
	17	40	15	15	600	17	30
	18	40	5	8	200	14	29
	19	120	120	24	11310	18	33
	20	70	70	1	3848	18	30
	21	60	20	6	1200	17	30
	22	35	35	15	962	15	30
	23	100	4	8	400	16	31
	29	7	4	10	28	13	24
	46	60	60	15	2827	17	30
	48	55	55	12	2376	16	29
	51	50	40	12	2000	14	27
	52	12	5	6	60	12	29
	53	12	10	8	120	15	27
54	40	10	10	400	13	26	
55	55	50	4	2750	13	26	
Far South	56	60	40	14	2400	12	27
	57	35	15	10	525	12	26
	58	20	5	6	100	11	28
	59	30	5	5	150	12	26
	60	10	8	3	80	11	31
	61	3	3	14	7	13	25
	62	14	6	12	84	13	25
	63	9	5	20	45	12	26
	64	20	12	8	240	11	29
	65	4	3	1	12	10	27
	66						
	67	20	8	9	160	13	24
	68	60	20	6	1200	13	26

Table 2. Terrestrial vegetation found in association with anchialine ponds of the Kohanaiki area during 1985 survey (OI Consultants, Inc., 1985).

Location	Pond	Cl	Fim	Penn	Sp	Bacp	Bats	Ipom	Lycm
North	1			2	3				
	2			1	3				2
	3			2	3				2
	4			2	3				2
	30			2	2		2		1
	31			2	2		1		1
	32		2	2	1				1
	37				2	2			
	38								
	39			1	1	2			
	40				2				2
	41				2	2			1
	42				3	3			2
	Middle	7	1		2		2		
8				2	2			1	
9				1	3	2	2		
10					1				
11				1	3				
12					1				
26				1	2		1		
27					1				
28								1	
33				2	3		2		
35				3	3				
36					1				
44				1	2				
45					1				
South	13		2	2		2	2		
	17		1	2			1		
	18				3			3	
	19	3			2	2	2	3	
	20	3			2	1		3	
	21					1		3	1
	22	3					1	3	1
	23			1	2			2	
	29					2	1		
	46	3				2		3	
	48			1	2	1	1		
	51				3	3			
	52			2				3	2
	53							3	
54					3		3		
Far South	55	3					3		
	56	3		2	2		1	1	
	57				3	1	1		
	58			1	3				1
	59			2	2	2			
	60			1		3	1		
	61				2	3	1		
	62				2				
	63			1	2				
	64				1	3			
	65			3					1
	66			1					
	67			1	2		1		1
	68	3			1	3		3	



Table 2 (cont). Terrestrial vegetation found in association with anchialine ponds of the Kohanaiki area during 1985 survey (OI Consultants, Inc., 1985).

Location	Pond	Mori	Plch	Scae	Sesv	Schi	Mesr	Pros	Mang
North	1					1			
	2								
	3		1		2	1			
	4			2	2			1	
	30	1	1		2				
	31		1	1	3	1		1	
	32				2				
	37			2			1		2
	38				3				
	39				2				
	40				3	1			
	41				1				
	42				3				
Middle	7		1		3				
	8				1	2			
	9		1		2	1			
	10				1				
	11		1		2			1	
	12								
	26			1					
	27								
	28			2			3	3	
	33				2	3		1	
	35				3				
	36								
	44		1						
South	13			1	2	2		2	
	17				2	2	1		
	18			2				2	
	19			2	2			1	
	20		1	1				2	
	21								
	22							2	
	23				2	2			
	29								
	46							2	
	48				1				
	51				1	2		1	
	52			2				1	
	53								
	54								
Far South	55				1				2
	56	1				3		2	
	57				1			1	
	58				1	1			
	59			1	2	3		1	
	60			2	2	1		3	
	61			1					
	62	1				2			
	63			1		3			
	64				1	3			
	65				1	3			
	66		1			3			
	67					2			
	68					1			

Table 2 (cont). Key to species name abbreviations for terrestrial vegetation.

Abbrev.	Species name	common name
Cla	<u>Cladium sp.</u>	sedge
Fim	<u>Fimbristylis sp.</u>	sedge
Penn	<u>Pennisetum setaceum</u>	fountain grass
Spor	<u>Sporobolus virginicus</u>	'aki 'aki
Bacp	<u>Bacopa sp.</u>	pickleweed
Bats	<u>Batis maritima</u>	'akulikuli-kai
Ipom	<u>Ipomoea pes-caprae</u>	pohuehue
Lycm	<u>Lycium sandwicense</u>	'ohelo-kai
Mori	<u>Morinda citrifolia</u>	noni
Plch	<u>Pluchea indica</u>	indian pluchea
Scae	<u>Scaevola taccada</u>	naupaka
Sesv	<u>Sesuvium portulacastrum</u>	'akulikuli
Schi	<u>Schinus terebenthifolius</u>	Christmas berry
Mesr	<u>Messerschmidia argentea</u>	tree heliotrope
Pros	<u>Prosopis pallida</u>	kiawe
Mang	<u>Rhizophora mangle</u>	mangrove

Table 3. Aquatic flora and fauna found in anchialine ponds of the Kohanaiki area during 1985 survey (OI Consultants, Inc., 1985).

Location	Pond	Schi	Rhiz	Rupp	Chae	Entr	Assm	Mela	Theo
North	1	3						2	
	2							2	
	3	2							
	4			3					
	30			3	2				
	31						1	1	
	32			2				1	
	37					3			
	38								
	39	2							
Middle	40								
	41							2	
	42		1					2	
	7	1							
	8	2							
	9								
	10	1							
	11							1	
	12	1						2	
	26	2							
South	27								
	28				2			3	
	33							2	
	35	1		2					
	36	1							
	44	2							
	45							1	
	13	2		2	2	3		3	
	17	2		3	1				
	18					3		2	
Far South	19			3		3		3	
	20								
	21			3				3	
	22			3		3		2	2
	23		2	3	2	2		2	
	29		3					2	
	46					2			
	48			3	2	3		2	
	51	2		3	2	1		3	
	52	3						3	
Far South	53							1	
	54	1		3			1	3	
	55	1		1	1	2		1	
	56		3	3				2	
	57	2		3	1			3	
	58	1			3		1	2	
	59				3		1	2	
	60						1	2	
	61				3			2	
	62				3			1	
63				3			2		
64			3	3		1	3		
65							1		
66	1					1			
67			3	3	2		3		
68			3	2	2		3		

Table 3 (cont). Aquatic flora and fauna found in anchialine ponds of the Kohanaiki area during 1985 survey (OI Consultants, Inc., 1985).

Location	Pond	Amph	Metb	Halo	Pale	Metp	Tilp	Poec
North	1							3
	2							3
	3							3
	4						1	3
	30			1				
	31							1
	32							1
	37							
	38						1	2
	39							3
Middle	40			1				
	41							1
	42							2
	7						2	
	8							
	9							3
	10					1		3
	11			3				
	12							
	26							
South	27							
	28							
	33			1				
	35		1	3				
	36			3				
	44		1					1
	45							
	13			1	3			
	17		1		2	2		
	18							
Far South	19							
	20							
	21				1	1		
	22				3			
	23				3			
	29							
	46							
	48		1		3	3		
	51				3	2		
	52							
53				2	1			
54				2				
55				3		1		
56								
57				3	1			
58			1	3	1			
59				3	1			
60				1				
61				3				
62		1		3	1			
63			1	3				
64				3	2			
65								
66								
67		1		3	2			
68				3	1			

Table 3 (cont). Key to species name abbreviations for aquatic flora and fauna.

Abbrev.	Species name	common name
Schi	<u>Schizothrix</u> sp.	
Rhiz	<u>Rhizochlonium</u> sp.	
Rupp	<u>Ruppia</u> <u>maritima</u>	
Chae	<u>Chaetophora</u> sp.	
Entr	<u>Enteromorpha</u> sp.	
Assm	<u>Assiminea</u> sp.	snail
Mela	<u>Melania</u> sp.	snail
Theo	<u>Theodoxus</u> <u>cariosa</u>	snail
Amph	<u>Amphipoda</u> , spp.	amphipod
Metb	<u>Metabetaeus</u> <u>lohena</u>	shrimp
Halo	<u>Halocaridina</u> <u>rubra</u>	opaehua
Pale	<u>Palaemon</u> <u>debilis</u>	opaehuna
Metp	<u>Metopograpsus</u> <u>thukuhar</u>	crab
Tilp	<u>Oreochromis</u> <u>mozambicus</u>	tilapia
Poec	<u>Poecilia</u> sp.	top minnow

Water temperatures in the ponds were high and variable (23-33°C). Mean temperatures in the north and south pond areas (29.8°C and 28.9°C, respectively) were higher than in the middle and far south areas (26.6°C). These high temperatures were the result of differences in solar heating due to bottom substrate and level and type of surrounding terrestrial vegetation.

The ponds to the north of the large mangrove thicket (north and middle areas) appear to be biologically different from those to the south of the thicket (south and far south areas). The frequencies of occurrence of common aquatic species in the north Kohanaiki area for 1972 and 1985 surveys are presented in Table 4. The major change in community composition in the north Kohanaiki ponds between 1972 and 1985 is the appearance of topminnows (Poeciliidae) in many of the ponds, with an apparently related decrease in the relative number of ponds containing crustaceans and general increase in the abundance of algal species. It should be noted here that Maciolek and Brock [Appendix A, page 36] state that "An interesting feature of ponds in this area is their algal diversity."; however, their data tables list the occurrence of only Schizothrix in only one pond. Not listed in the tables was the presence in at least one pond of the marine algae Ahnfeldtia conccina, Hildenbrandtia sp., and an unidentified lithophyte (R.E. Brock, pers. comm.). During the 1985 survey, an unidentified rhodophyte (Hildenbrandtia ?) was observed in several ponds in the area; none of the other marine algae were observed. It may be that the noted diverse algal communities have been replaced by Schizothrix, Rhizochlonium and Chaetophora.

The frequencies of occurrence of common aquatic species in the South Kohanaiki area for 1972 and 1985 surveys are presented in Table 4. The south Kohanaiki area appears to have remained, as Maciolek and Brock state, "a prime example of pristine ponds in older pahoehoe." None of the ponds in the southern Kohanaiki area contained fish, many contained luxuriant growths of Ruppia and Schizothrix, and almost all contained Melania and Halocaridina.

Table 4. Frequencies of occurrence of common aquatic species in anchialine ponds in the north and south Kohanaiki areas, as determined by surveys taken in 1972 (Maciolek and Brock, 1974) and 1985 (OI Consultants, Inc., 1985).

KOHANAIKI NORTH	1972		1985	
	#	%	#	%
# of Ponds	12		27	
<u>Schizothrix</u> sp.	1	8	11	41
<u>Rhizoclonium</u> sp.			2	7
<u>Chaetophora</u> sp.			2	7
<u>Enteromorpha</u> sp.			1	4
<u>Ruppia maritima</u>			3	11
<u>Assimineia</u> sp.			1	4
<u>Melania</u> sp.	5	42	13	48
<u>Theodoxus cariosa</u>	8	67		
Amphipoda	2	17	2	7
<u>Metabetaeus lohena</u>				
<u>Halocaridina rubra</u>	7	58	6	22
<u>Palaemon debilis</u>	4	33	2	7
<u>Macrobrachium</u> sp.	1	8		
<u>Metopograpsus thukuhar</u>				
<u>Oreochromis mossambicus</u>			3	11
Poeciliidae			12	44

KOHANAIKI SOUTH	1972		1985	
	#	%	#	%
# of Ponds	16		29	
<u>Schizothrix</u> sp.	3	19	9	31
<u>Rhizoclonium</u> sp.	3	19	4	14
<u>Chaetophora</u> sp.			15	52
<u>Enteromorpha</u> sp.			9	31
<u>Ruppia maritima</u>	3	19	15	52
<u>Assimineia</u> sp.	6	38	6	21
<u>Melania</u> sp.	9	56	25	86
<u>Theodoxus cariosa</u>	4	25	1	3
Amphipoda	4	25	4	14
<u>Metabetaeus lohena</u>	3	19	3	10
<u>Halocaridina rubra</u>	7	44	20	69
<u>Palaemon debilis</u>	7	44	13	45
<u>Macrobrachium</u> sp.	1	6		
<u>Metopograpsus thukuhar</u>	2	13	1	3
<u>Oreochromis mossambicus</u>				
Poeciliidae				

#### Impacts and Mitigating Measures

Preliminary site plans for the resort complex at Kohanaiki have been developed with the goal of minimizing impacts to the anchialine pond resource. Except for the construction of the marina (see below), no structures or construction activities are planned which would result in the filling or grading of any of the ponds in the area. Buffer zones will be established around each of the major pond areas to insure no grading or construction activities in adjacent areas will result in material entering the ponds. Landscaping of the pond areas will be minimized to retain the natural setting of the ponds as much as possible; any landscaping done adjacent the ponds will utilize grass or low-lying native plants.

A management plan for the anchialine ponds of the Kohanaiki area will be developed in consultation with the Army Corps of Engineers and the Fish and Wildlife Service. Such a plan has been approved for ponds at Waikoloa, and proposed for ponds at Kaupulehu and Kukio. The objectives of such a plan are to 1) maintain the environmental integrity of the existing ponds; 2) protect and manage this resource to provide educational and interpretive opportunities to the public; 3) control and monitor construction activities so that secondary impacts may be identified and mitigated to avoid any detrimental impacts to the ponds; and 4) provide for a pond manager to implement the management plan and conduct scientific monitoring programs. The management plan will detail the areas of ponds to be preserved; the dimensions of buffer zones surrounding the pond areas; allowable activities within the pond areas, if any; and establish a pond monitoring program.

#### Construction Impacts

Direct impacts due to construction will be associated with the proposed marina. The marina is presently planned to be located in an area where two large, senescent anchialine ponds have recently been discovered (pers. obs.). Preliminary marina design plans show these ponds to be located within the marina proper, thus construction of the marina would result in the destruction of these two ponds. Some flexibility in marina design may result in one of these ponds being included in a shoreline buffer zone.

Construction of the marina would also result in the destruction of a portion of the nearshore coral community. The entrance channel to the marina will be constructed by dredging a portion of the offshore area to a depth required for the passage of small boats. This dredging activity will remove some portion of the existing coral community; in addition, some coral mortality may occur as the result of siltation generated by the dredging activity.

The impacts of the construction of the marina on the nearshore marine environment will be reduced as much as possible by utilizing techniques and methods which generate the least amount of sediment. Construction of the marina basin will take place "in the dry" behind a shoreline berm which will not be

removed until construction of the marina has been completed and sediment within the marina basin has had an opportunity to settle out of the water. During construction of the marina entrance channel, water quality conditions up- and down-stream of the construction activity will be monitored to assure compliance with construction conditions likely to be imposed by the U.S. Army Corps of Engineers in the process of granting a permit for such construction. If blasting is required to construct the marina or entrance channel, the size of charge, frequency of blasting, and timing will be established in consultation with representatives from the Corps of Engineers and the National Marine Fisheries Service, to assure no significant impacts to green turtles or humpback whales.

#### Surface Runoff and Drainage Plan

Surface runoff in the Kohanaiki area occurs only under conditions of intense rainfall. These events occur only rarely. The site drainage plan (ref M&E Pacific) calls for the majority of the surface flow from resort development to be directed to ponding areas within the golf course, with excess surface flow being discharged into the marina basin. Care will be taken in the development of the drainage plan to assure that no surface runoff from surrounding resort development enters the pond areas. Natural topography currently directs surface flow from the site across the southern site boundary toward Kaloko fishpond. This pond is a prime waterbird habitat and a site of Hawaiian archaeological and cultural importance. The resort site drainage plan will incorporate features to intercept any resort site flow and dispose of any such flow within the site boundaries.

#### Groundwater

Groundwater in the Kohanaiki area is likely to be similar in chemical content to areas to the north and south. Water samples taken from anchialine ponds at Makalawena to the north, and at the Queen Liliuokalani Children's Center to the south showed similar chemical composition (OI Consultants, 1985). Levels of dissolved nutrients were higher than are found in coastal waters: nitrate ranged from 12 to 33 ug-at/l, phosphate ranged from 0.6 to 3.5 ug-at/l, and ammonium ranged from 1.7 to 8.5 ug-at/l. After completion of resort development, these levels may increase. Water use plans call for the irrigation of golf course and other planted areas with treated sewage effluent, as is commonly done in other resort developments. At Waikoloa, such irrigation has been common for a number of years. The nutrient content of anchialine ponds at Waikoloa reflects the addition of dissolved nutrients to the groundwater in increased levels of nitrate. No biological changes in the ponds have been attributed to this increased nutrient load, however (Biefang, 1984).

With careful water budgeting, the addition of nutrients to the groundwater can be minimized. Plants take up nutrients from the water as they grow, and water is lost after being applied through the processes of evaporation, uptake and transpiration by plants, and percolation. Rates of evaporation can be estimated for an area given the amount of sunlight, air temperature, wind and cloud cover. Transpiration rates can be estimated for plants of various types. Given these rate estimates, an irrigation program which balances the rate of application with the rate of evaporation and transpiration would result in little addition to the groundwater system, and minimal subsequent impacts.

The wastewater treatment plan (ref M&E Pacific) for the Kohanaiki resort development envisions two alternative scenarios: a centralized plant servicing all parts of the resort, and individual pocket treatment plants servicing resort centers of activity. The centralized plant scenario would incorporate a single subsurface disposal well to handle flow not discharged as irrigation water. The pocket plant scenario could incorporate either individual discharge wells, or at a later stage, a single collection and discharge point. The location of the discharge well as envisioned for the central plant scenario would be at the northern mauka corner of the resort site, far away from the shoreline and anchialine ponds. The scenario of pocket treatment plants would incorporate discharges nearer the shoreline and ponds, but the individual volumes discharged would be a fraction of the total discharge flow for a centralized plant, and would be located as far as practical from the anchialine ponds, and in a area which was not immediately up-gradient from any ponds, thus minimizing the chance of increased nutrient loading on the ponds.

Literature Cited

- Balazs, G.H. 1980. Synopsis of Biological Data on the Green Turtle in the Hawaiian Islands. NOAA-TM-NMFS-SWFC-7. 141 p.
- Bienfang, P.K. 1984. Postdevelopment survey of the Aquatic Biota and Water Quality Characteristics of the Anchialine Ponds at Anaeohomalū, Hawaii. Prepared for Waikoloa Land Co., Ltd. Honolulu. 28 p. + appendix.
- Brock, J.H. and R.E. Brock. 1974. The Marine Fauna of the Coast of Northern Kona, Hawaii. UNIHI-SEAGRANT-AR-74-02. 30 p.
- Dollar, S.J. 1975. Zonation of Reef Corals off the Kona Coast of Hawaii. M.S. Thesis in Oceanography, University of Hawaii, Honolulu. 183 p.
- Hayes, T.A., T.F. Hourigan, S.C. Jazwinski, S.R. Johnson, J.D. Parrish, and D.J. Walsh. 1982. The Coastal Resources, Fisheries and Fishery Ecology of Puako, West Hawaii. Hawaii Cooperative Fishery Research Unit Technical Report 82-1. 159 p. + Appendices A-K.
- Hawaii Department of Health. 1984. Water Quality Standards. Title 11, Administrative Rules, Chapter 54.
- Hawaii Department of Land and Natural Resources. 1978. Statewide Marine Research & Surveys: Survey of Fish and Habitat. Kona Coast, Hawaii.
- Kay, E.A., L.S. Lau, E.D. Stroup, S.J. Dollar, D.P. Fellows, and R.H.F. Young. 1977. Hydrologic and Ecologic inventories of the Coastal Waters of West Hawaii. Water Resources Research Center Technical Report No. 105. University of Hawaii, Honolulu. 94 p.
- Key, G.S., E.B. Guinther, and J.M. Miller. 1971. Waiulua Bay. Prepared for Sunn, Low, Tom and Hara, Honolulu. 41 p. + appendix.
- Maciolek, J.A. and R.E. Brock. 1974. Aquatic Survey of the Kona Coast Ponds, Hawaii Island. UNIHI-SEAGRANT-AR-74-04. 73 p.
- Madden, W.D. 1980. Marine Reconnaissance of Six South Kona Sites, Kona, Hawaii. Prepared for Grey, Rhee and Associates, Inc., Honolulu. 8 p. + appendix.
- Nolan, R.S. 1978. Hawaii Tropical Reef Fish Study. p. 27-34 In: Papers and Comments on Tropical Reef Fish. Working Paper No. 34. Sea Grant Program, Univ. Hawaii, Honolulu.
- Nolan, R.S. and D.P. Chaney. 1981. West Hawaii Coral Reef Inventory. U.S. Army Corps of Engineers, Pacific Ocean Division, Honolulu. 455 p. + appendices.
- Ocean Research Consulting and Analysis, Ltd. (ORCA). 1977. Coral reef survey: Keahole Point, Hawaii (winter months) for the Natural Energy Laboratory OTEC Facility, State of Hawaii. Hawaii Dept. Planning and Economic Development. 115 p.
- Ocean Research Consulting and Analysis, Ltd. (ORCA). 1978. Coral reef survey: Keahole Point, Hawaii (summer months) for the Natural Energy Laboratory OTEC Facility, State of Hawaii. Hawaii Dept. Planning and Economic Development. 119 p.
- OI Consultants, Inc. 1985. Anchialine Pond Survey of the Northwest Coast of Hawaii Island. Final Report. Prepared for Transcontinental Development Co. Honolulu. 39 p., Appendix A-E, 47 plates.
- Shallenberger, E.W. 1979. The status of Hawaiian Cetaceans. Prepared for U.S. Marine Mammal Commission. 103 p.
- U. S. Dept. of Commerce, NOAA, Office of Ocean and Coastal Resource Management, Sanctuary Programs Division, and Hawaii Dept. of Planning and Economic Development. 1983. Draft Management Plan and Environmental Impact Statement for the Proposed Hawaii Humpback Whale National Marine Sanctuary. Washington, D.C.

**F. PRELIMINARY ENGINEERING UTILITIES REPORT**

PRELIMINARY ENGINEERING  
 UTILITIES REPORT  
 FOR THE  
 PROPOSED KOHANAIKI  
 RESORT COMMUNITY

Prepared for:  
 Heiber, Hastert, Van Horn & Kimura

Prepared by:  
 M&E Pacific, Inc.  
 Engineers and Architects  
 1001 Bishop Street  
 Honolulu, Hawaii 96813

June 1986

CONTENTS

	<u>Page</u>	
CHAPTER I	INTRODUCTION	I-1
	Purpose	I-1
	Project Site	I-1
CHAPTER II	STORM DRAINAGE	II-1
	Kohanaiki Watershed	II-1
	Methodology	II-1
CHAPTER III	EROSION	III-1
	General Site Characteristics	III-1
	Existing Soil Erosion Potential	III-1
	Potential Long-Term Adverse Effects	III-4
	Potential Short-Term Adverse Effects	III-5
CHAPTER IV	WATER	IV-1
	Water Resources	IV-1
	Existing Infrastructure	IV-1
	Projected Water Demand	IV-1
	Water Development Alternatives	IV-2
	Potential Impacts	IV-4
CHAPTER V	WASTEWATER	V-1
	Purpose	V-1
	Alternative Actions	V-1
	Environmental Impact	V-6
	Mitigation of Adverse Effects	V-7
	Negative Effects That Cannot Be Mitigated	V-8
CHAPTER VI	POWER AND TELECOMMUNICATIONS	VI-1
	Purpose	VI-1
	Existing Conditions	VI-1
	Proposed Development	VI-1
	Impacts	VI-2
CHAPTER VII	SOLID WASTE	VII-1
	Disposal Sites	VII-1
	Solid Waste Quantities	VII-1

REFERENCES

TABLES

Table 1	Estimated Wastewater Flows	V-2
---------	----------------------------	-----



FIGURES

		<u>Page</u>
Figure 1	Location Map	I-2
Figure 2	Existing Drainage	II-2
Figure 3	Modified Drainage	II-5
Figure 4	Soil Types	III-2
Figure 5	Wastewater Collection System	V-3
Figure 6	Solid Waste Quantities	VII-2

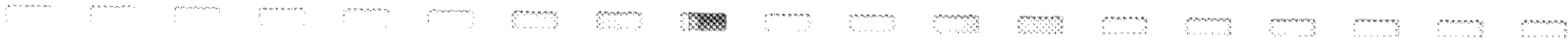
CHAPTER I  
INTRODUCTION

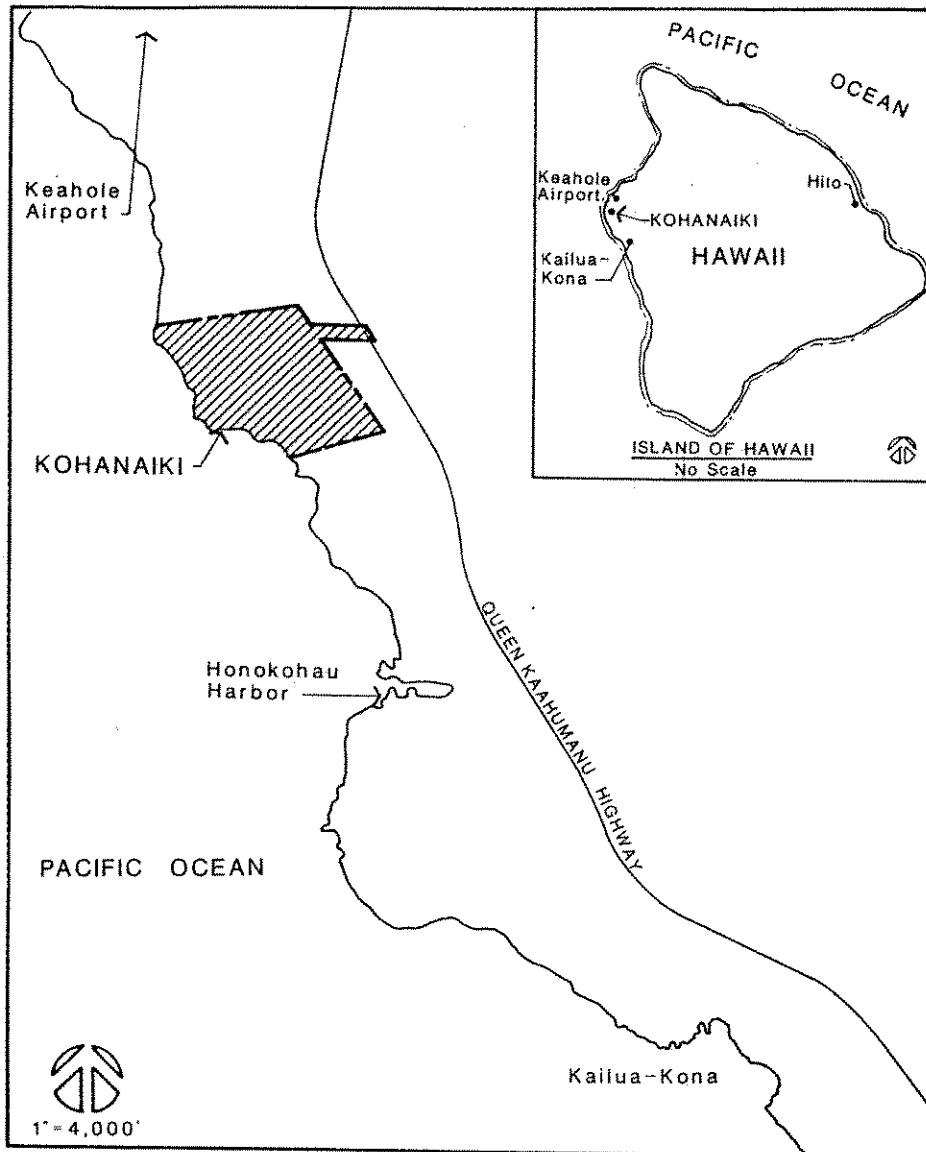
PURPOSE

This report has been prepared as a support document on utilities infrastructure for an environmental impact statement, a land use district boundary amendment petition, and any other required permit for the proposed Kohanaiki Resort Community. The information presented herein is based on public and private documents related to the project as well as the North Kona region of Hawaii.

PROJECT SITE

The proposed project is sited on the leeward coast of the island of Hawaii, between Keahole Airport and the town of Kailua-Kona (see Figure 1). The project site is currently in its natural state, consisting largely of near-barren lava fields with poorly vegetated areas in the southeast corner of the site.





Location Map  
**KOHANAIKI**  
 Kona Beach Development Venture M & E PACIFIC, INC. Figure: 1

CHAPTER II  
STORM DRAINAGE

KOHANAIKI WATERSHED

The existing Kohanaiki watershed contains an area of approximately 3,680 acres and extends from the western slopes of Hualalai volcano to the coast (see Figure 2). Elevations in the triangular-shaped watershed range from 4,800 feet to mean sea level and ground slope varies from 3 percent in the upper elevations to 1 percent near the coast. Average ground slope in the watershed is approximately 6 percent.

Soil cover within the watershed consists of lava originating from eruptions at Hualalai. The lava is very porous and highly permeable, as evident by the numerous cracks, fissures, and tubes embedded in the surface layer. Dry grasses and shrubs grow sparsely throughout the lava flows and natural soil erosion is minimal.

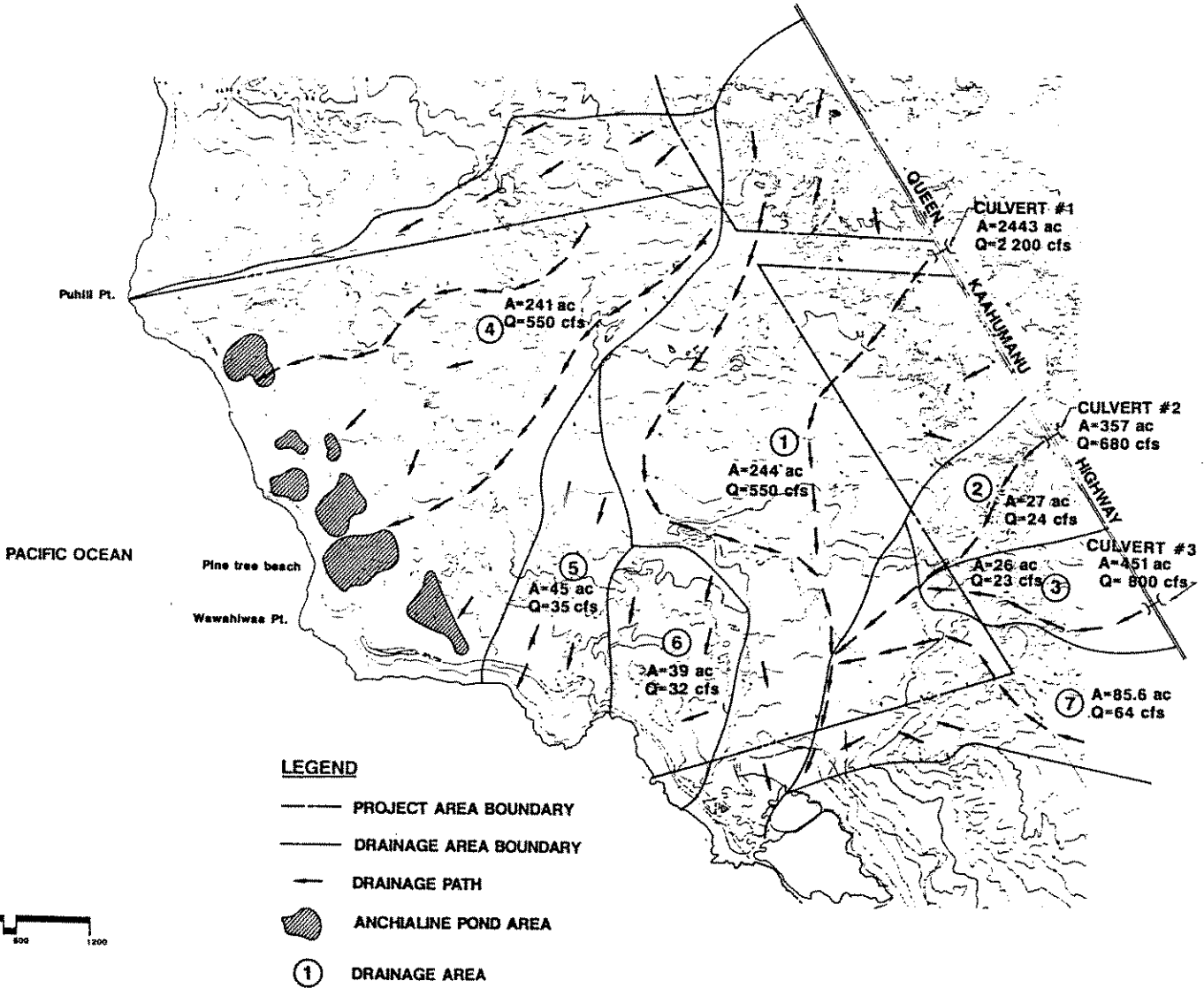
The project site, located on the semi-arid leeward side of the island, is sheltered from the rain-producing northeast tradewinds by Mauna Loa, Mauna Kea, and Hualalai. The mean annual rainfall within the coastal project site is less than 20 inches. The wettest period of the year extending from May to September receives more than half of the total annual rainfall.

METHODOLOGY

References

The estimated storm runoff quantities herein have been based on the Storm Drainage Standards, Department of Public Works, County of Hawaii. Peak flows from drainage areas greater than 100 acres were determined from design curve Zone D on Plate C, which is based upon maximum recorded flood peaks in the region. For drainage areas less than 100 acres, runoff quantities were determined according to the rational method, based upon a recurrence interval of 10 years.

F-4



Existing Drainage

# KOHANA-IKI

Kona Beach Development Venture

M & E PACIFIC, INC.



Figure: 2

### Offsite Drainage to Queen Kaahumanu Highway

There are no perennial streams of well-defined water courses in the watershed due to a combination of meager rainfall and the lava landscape. Storm water primarily sheet flows downward from the upper parts of the watershed to Queen Kaahumanu Highway. Three culverts convey storm runoff across Queen Kaahumanu Highway into the project site (see Figure 2). The design peak discharges for culverts 1, 2, and 3 are 2,200, 690, and 800 cfs respectively.

### Existing Onsite Drainage

The existing project site was divided into seven drainage areas. The existing drainage pattern and design peak discharge for each drainage area (DA) are described below. For purposes of this study, the drainage area between Queen Kaahumanu Highway and the project site will also be discussed in this section.

DA 1 is one of the largest onsite drainage areas totaling 244 acres, 34 percent of the project site. Storm runoff from DA 1 combines with offsite flow from culvert 1. The storm runoff contribution from this drainage area is 550 cfs. DA 2 is a tributary area to flow originating upstream at culvert 2. A total of 24 cfs is contributed from this 27-acre drainage area. DA 3 consists of 26 acres. The 23 cfs peak storm flow from this drainage area combines with offsite flow from culvert 3.

The final discharge point for storm runoff from DA 1, 2, 3, and 7 is Kaloko Fishpond, located at the coast near the southwest corner of the project. A total design peak flow of 2,800 cfs is predicted to drain into the pond from a total drainage area of 3,634 acres.

Storm runoff sheet flows into the ocean from DA 4, 5, and 6. DA 4 on the northern end of the project site is the largest onsite drainage area, encompassing an area of 241 acres. A design peak discharge of 550 cfs is predicted to flow into the ocean from this drainage area. The final discharge point for runoff from DA 5 is Wawahiwa Point. This 45-acre area

is predicted to contribute 35 cfs of peak storm runoff. DA 6 discharges into the coast near the proposed marina. The peak storm runoff for this 39-acre drainage area is 32 cfs.

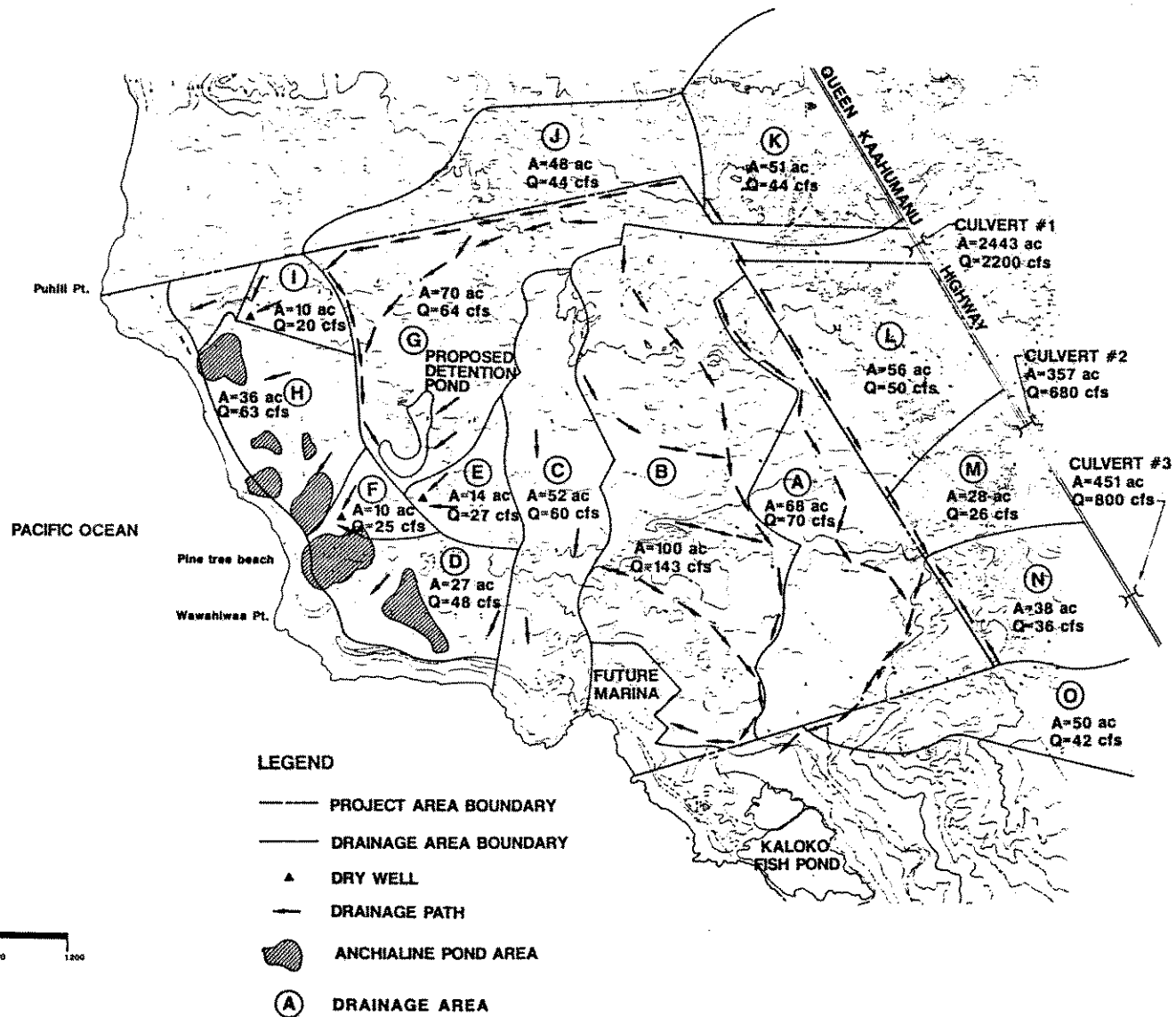
### Onsite Drainage Based on Proposed Development

The change in land use created by the Kohanaiki development will increase the amount of rainfall that is converted to surface runoff. Figure 3 shows the nine principal onsite drainage areas based on the proposed land use. Mitigation measures have been made to divert storm runoff away from more sensitive environmental areas, such as the anchialine ponds.

DA A drains into Kaloko Fishpond. A major part of this 68-acre onsite drainage area consists of the golf course. The design peak discharge entering the pond from both onsite and offsite sources is predicted to be 2,700 cfs, a decrease of 100 cfs from the estimated present peak flow into the pond. This reduction is due to a redirection of flow toward the marina for the proposed development.

Storm runoff from DA B discharges into the area of the future marina. Storm runoff is first routed to the main road where it is collected and then conveyed to the marina. A peak storm flow of 143 cfs draining from an onsite area of 100 acres is predicted to discharge into the marina. DA C includes portions of the golf course, the clubhouse and recreation center, and the marina. The storm runoff from this 52-acre area discharges into the coastal area by overland flow. This compares to 45 cfs of sheet flow runoff from this area prior to development.

Storm runoff from onsite Area A, located on the northern side of the project site, is generated primarily from the golf course area and portions of the residential areas. It is proposed that runoff from this area and offsite Area J be directed into a retention pond, located within the golf course, where it is collected and allowed to infiltrate into the soil. The retention pond should be sized to contain the 681,000 cubic feet of runoff expected from the 10-year, 6-hour rainfall. This runoff could be stored in a pond with a surface area of 2.61 acres and an average depth of 6 feet.



**Modified Drainage**

**KOHANA-IKI**

Kona Beach Development Venture

M & E PACIFIC, INC.




Figure: **3**

The storm runoff from DA D and H sheet flows into the adjacent coast line. The 27-acre DA D is comprised of the 300-room resort hotel. The 36 acres of DA H contain both the 400-room luxury hotel and a portion of the resort/residential area. Flows generated by DA D and H are 48 and 63 cfs respectively. The anchialine ponds in these areas should be protected from runoff by berms or cut-off ditches. When compared to existing conditions, storm runoff into the coastal region fronting DA H, F, and D has been reduced by 98 cfs.

Runoff from DA E, F, and I will be discharged into dry wells located in their respective areas. The soil in areas E, F, and I is classified as pahoehoe lava rock (SCS, 1973), suggesting that dry wells would be feasible due to the characteristically high permeability of the lava rock.

The incorporation of retention ponds and dry wells in strategic locations ensures that the natural ecology of the anchialine ponds as well as the recreational value of the prime beachfront areas are protected from the inevitable increases in natural storm runoff associated with developments of this type. Using these drainage strategies, runoff into coastal areas fronting areas D and H will be lowered substantially after development. The drainage system will also protect the anchialine ponds from potential runoff. Additionally, diversion of runoff from area B into the marina will similarly reduce total runoff into Kaloko Fishpond when compared to existing conditions.

### CHAPTER III EROSION

#### GENERAL SITE CHARACTERISTICS

A concomitant, though potentially more environmentally significant, effect of storm runoff is soil erosion. Potential movement of soil due to rainfall and surface runoff generated by land disturbing construction operations at the project site is evaluated in this section. Measures for controlling soil erosion and sedimentation are also discussed to mitigate any erosion problems. The guidelines of the Hawaii Environmental Simulation Laboratory were used in the analysis of soil erosion and sedimentation hazard to coastal waters and property downstream of the project.

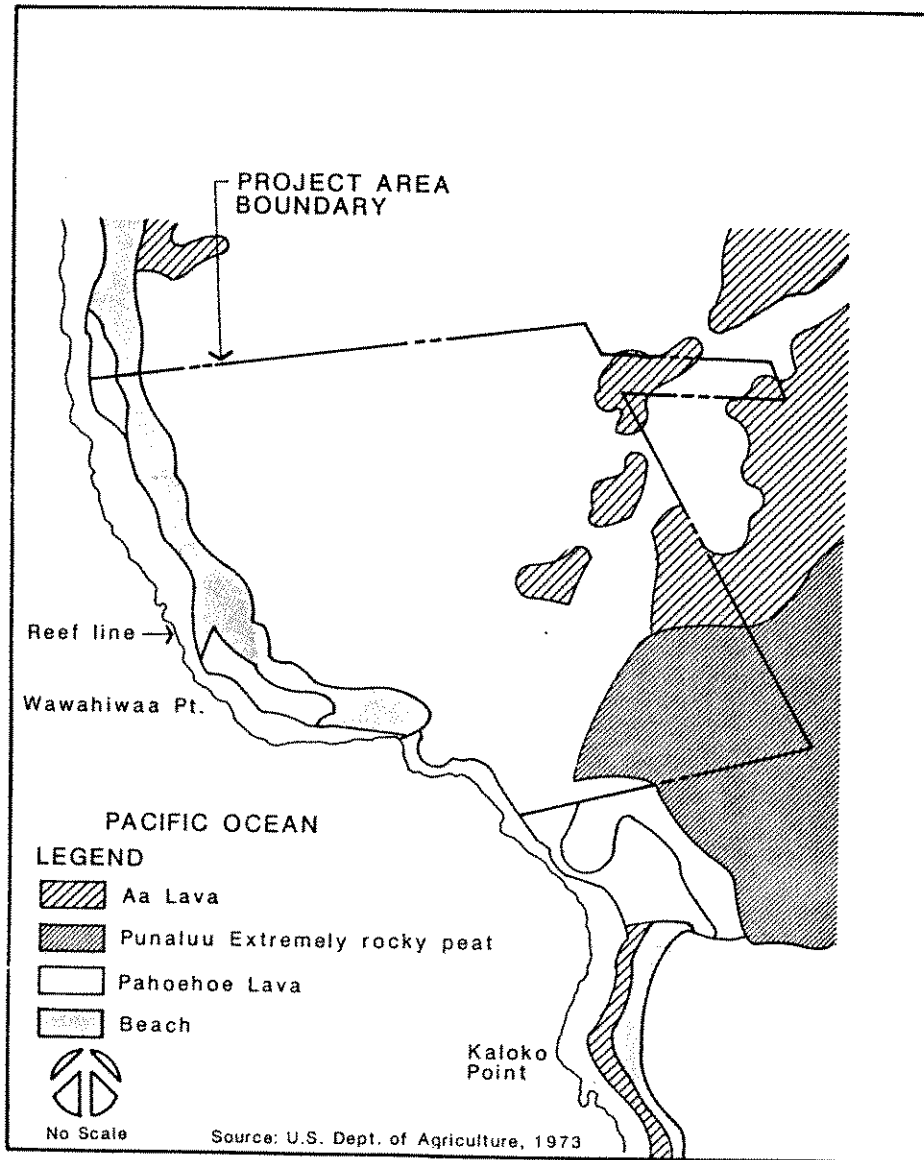
The project site, being located on the dry leeward side of the island, is sheltered from the rain-producing northeast tradewinds by Mauna Loa, Mauna Kea, and Hualalai. Mean annual rainfall within the project site is less than 20 inches. Much of the rainfall infiltrates directly into the porous lava surface layer, eliminating any chance for erosion to develop.

The topography of the project site gently slopes from the mauka boundary near Queen Kaahumanu Highway to the coast. Ground slope varies between 0 and 5 percent. There are no well-defined water courses in the project site that would serve to concentrate and transport soil sediments.

The major factors influencing soil erosion are soil characteristics, rainfall, and topography. Each factor is discussed in detail below.

#### EXISTING SOIL EROSION POTENTIAL

The general soil map from the Soil Survey of Hawaii, Soil Conservation Service (1973) classifies the soil in the project site into three types: Pahoehoe lava, Aa lava, and the Punaluu extremely rocky peat series (see Figure 4). The predominant soil type covering almost 70 percent of the project site is Pahoehoe lava. Pahoehoe has a billowy, glassy, and ropy surface that is relatively smooth. The erodibility factor for this soil is



**Soil Types**  
**KOHANAII**  
 Kona Beach Development Venture M & E PACIFIC, INC. Figure: 4

zero, indicating no soil erosion or sedimentation is produced. Pockets of the second type of lava, Aa, are also scattered throughout the project site. This lava has a rough, spiny, or rubbly surface. Again, the erodibility factor for this soil is zero.

The third soil type is the Punaluu extremely rocky peat soil series. The Punaluu series is a well-drained, thin, organic soil ranging in thickness from 0 to 12 inches. It is underlain by Pahoehoe lava bedrock. The erodibility factor for this soil of 0.05 indicates that the erosion hazard is relatively slight. This soil is found in the southwest section of the project site, covering 10 percent of the project site. Thus, the soil characteristics of the project site show that the southwest section is the only area where erosion may occur and the potential hazard from such erosion would be slight.

The existing potential for erosion of the 46-acre area covered with Punaluu soil type can be estimated through the universal soil loss equation as follows:

$$E = RKCP(LS)$$

- where:
- E = erosion (T/ac-yr)
  - R = rainfall factor
  - K = soil erodibility factor
  - C = crop management factor
  - P = erosion control practice factor
  - LS = slope factor

According to the U.S. Soil Conservation Service guidelines (SCS, 1973), appropriate values for the aforementioned parameters are as follows:

- R = 125
- K = 0.05
- CP = 0.55 (assumes 50% ground cover)
- LS = 0.39

$$\begin{aligned} \text{thus, erosion (E)} &= 1.34 \text{ T/ac-yr} \times 46 \text{ acres} \\ &= 61.5 \text{ Tons/yr} \end{aligned}$$

### POTENTIAL LONG-TERM ADVERSE EFFECTS

#### Erosion Rate

Development of the project site would require the placement of graded granular material overlain by a soil layer sufficient for the establishment of sod and other landscape vegetation. Although development would result in the covering of open lava rock fields with imported fill soil, grassing would result in a much lower erosion rate than existing areas naturally overlain by soil. Flatter slopes subsequent to grading and increased vegetative cover would result in the following erosion rate for development areas:

$$\begin{aligned} R &= 125 \\ K &= 0.05 \\ LS &= 0.355 \text{ (average value)} \\ CP &= 0.15 \end{aligned}$$

$$\text{erosion (E)} = 0.33 \text{ T/ac-yr}$$

#### Initial Phase

The initial development phase is projected to consist of one of the two proposed resort hotels, golf course, and clubhouse. The estimated acreage required for the initial phase is approximately 210 acres. The golf course would cover approximately three-fourths of the area presently overlain by the Punaluu type soil, resulting in a decrease of natural erodible area. Potential long-term soil erosion subsequent to the initial development phase is projected as follows:

$$\begin{aligned} E &= 0.33 \text{ T/ac-yr} \times 210 \text{ acres} + 1.07 \text{ T/ac-yr} \times 46/4 \text{ acres} \\ &= 81.6 \text{ T/yr} \end{aligned}$$

#### Ultimate Development

Ultimate development shall encompass the entire 470 acres. Lava fields left in a natural state for landscaping purposes and paved areas should actually lessen the actual total erodible area, but have been ignored in the following calculations. Potential long-term soil erosion upon ultimate development is projected as follows:

$$\begin{aligned} E &= 0.33 \text{ T/ac-yr} \times 470 \text{ acres} \\ &= 157 \text{ T/yr} \end{aligned}$$

#### Mitigation Measures

The mitigation measures to lessen the impact of soil erosion would incorporate the measures utilized for storm drainage, such as site grading to direct flow away from the anchialine ponds and Kaloko Fishpond, the creation of retention ponds, and the use of drainage wells or ditches. In addition, landscaping could utilize turf grasses that develop a very thick sod root structure to minimize soil particle migration while keeping areas of bare soil to a minimum.

### POTENTIAL SHORT-TERM ADVERSE EFFECTS

The potential for soil erosion is highly limited since approximately 90 percent of the project site consists of lava rock. The worst possible condition that could occur would be the clearing or grading of 20 acres at any one time (maximum allowable by County codes) of Punaluu type soils. Universal soil loss equation factors are as follows:

$$\begin{aligned} R &= 125 \\ K &= 0.05 \\ C &= 1.00 \text{ (bare soil)} \\ P &= 1.00 \text{ (construction site)} \\ LS &= 0.39 \end{aligned}$$



The resulting erosion rate is:

$$\begin{aligned} \text{erosion (E)} &= 2.44 \text{ T/ac-yr} \times 20 \text{ ac} \\ &= 48.8 \text{ T/yr, in addition to existing potential erosion.} \end{aligned}$$

The sedimentation hazard posed to coastal area waters is also considered to be small according to Hawaii Environmental Simulation Laboratory (HESL) criteria (HESL, 1975). The HESL severity rating number (H) was calculated as follows:

$$H = (2 \text{ FT} + 3D) \text{ AE}$$

- where
- F = unit factor for potential damage to areas downslope and downstream from the site
  - T = time duration of project from clearing to completion of all construction (yr)
  - D = unit factor for potential sediment damage to coastal waters
  - A = area of disturbance (ac)

The parameters in the severity rating number equation were evaluated to be:

- F = 2.0 downslope - downstream detriment - moderate
- D = 4.0 coastal water rating factor - Class AA
- A = 20 ac
- E = 1.30 ton/ac-yr from previous calculation
- T = 1 yr for each grading increment

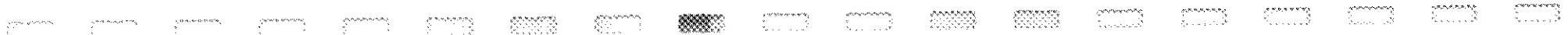
So,

$$\begin{aligned} H &= \{2(2)(1) + 3(4)\} (20)(244) \\ H &= 780 \end{aligned}$$

The standard allowable severity rating number is 50,000. Thus, sedimentation hazard to coastal waters and downstream property is small according

to the computed severity rating number. Additional control measures for mitigation, however, could be taken to lessen construction impacts even further. These are--

1. Minimize time of construction.
2. Retain existing ground cover until latest date before construction.
3. Early construction of drainage control features.
4. Use of temporary area sprinklers in nonactive construction areas when ground cover is removed.
5. Station water truck on site during construction period to provide for immediate sprinkling, as needed, in active construction zones (weekends and holidays included).
6. Use temporary berms and cut-off ditches, where needed, for control of erosion.
7. Thoroughly water graded areas after construction activity has ceased for the day and on weekends.
8. Sod or plant all cut and fill slopes immediately after grading work has been completed.



CHAPTER IV

WATER

WATER RESOURCES

Water resources in the Kona region are primarily basal groundwater. Due to the low levels of rainfall, the relatively high hydraulic conductivity of lava rock, and the proximity to the coastline, water in the coastal region is expected to be brackish. Suitable potable water sources are expected to be found further inland at elevations of 1,200 feet or higher (Hydro-physics Corp., 1970). Groundwater resources in the Kona area have been estimated at 100 MGD (KBDV, 1986).

EXISTING INFRASTRUCTURE

The existing capacity of the North Kona water system is as follows:

	Total Capacity (MGD)	Safe Capacity (based on breakdown of one pump) (MGD)
Kahaluu Well A	1.0	---
Kahaluu Well B	2.0	1.0
Kahaluu Well C	3.0	2.0
Kahaluu Well D	4.4	3.0
Kahaluu Shaft	10.4	8.4

Source: County of Hawaii, 1980.

Pumpage projections have indicated that the "safe capacity" (i.e., including standby pump capacity) would be reached by approximately 1990. Water availability is primarily a problem of infrastructure, not source availability.

PROJECTED WATER DEMAND

Based on accepted per capita water usage factors (County of Kauai et al., 1985), projected water demand for the Kohanaiki resort is as follows:

	Units	Gal/Unit	Subtotal
Initial Development Phase			
400-Room Hotel	400 rooms	500/room	200,000
Staff	642 persons	13 gpcd	8,350
Golf Course	170 acres	4,000 gpad	680,000
			<u>888,350</u>
			= 0.9 MGD
Ultimate Development Phase			
Hotels, Resort			
Units, Supporting			
Housing	1,850 units	500/unit	925,000
Staff	1,830 persons	13 gpcd	23,800
Golf Course,			
Landscaping	470 acres	4,000 gpad	1,880,000
Commercial	2.3 acres	3,000 gpad	6,900
			<u>2,835,700</u>
			= 2.8 MGD

Reclamation of treated sewage effluent could provide an estimated 0.225 MGD subsequent to the initial phase and 0.46 MGD at the ultimate phase of development. Water system infrastructure, however, should be designed to meet water needs exclusive of sewage reclamation to insure water needs can always be met.

WATER DEVELOPMENT ALTERNATIVES

Potential water development alternatives include the following:

1. Unilateral municipal expansion;
2. Buy into an existing water agreement;
3. Develop a new water agreement; or
4. Develop and maintain a new private water source.

While municipalities have been the primary developer/operator of water systems in Hawaii, agreements that dedicate systems funded by one or

E-12

more private developers to the County have also been used when water availability due to infrastructure limitations has been an obstacle to development.

Unilateral municipal source development is unlikely and cannot be presumed upon for the projected development (M&E Pacific, Inc., 1986b).

Buying into an existing water agreement could be advantageous because of the lack of uncertainties regarding cost. The Red Hill Joint Venture Kealahou Water Source Agreement currently has 1,200 water units available, each water unit equalling 600 gallons per day.

Development of a new water agreement is the most probable alternative for the proposed development. The County would be responsible for easement acquisition as well as design and development; funding would be provided by the developers. Joint funding by developers with adjacent properties would be advantageous. Potable water wells would have to be drilled above the 1,200-foot elevation. Well(s), pump house, reservoir, and transmission lines would require offsite easements. Desalting brackish water developed from onsite wells is a second infrastructure alternative, but is unlikely due to the high operational costs as well as capital cost. A water agreement involving the County would also save the developer operation and maintenance costs and is probably the most feasible alternative.

A private water system would be liable for all operation and maintenance expenses. A privately developed system would also lack the County's right of eminent domain, thus easement acquisitions could prove more difficult. In the short-term, higher capital costs could be incurred if County construction standards require additional design features prior to County acceptance versus a privately maintained system. A privately maintained system would also be free to sell any excess water to other major consumers nearby.

POTENTIAL IMPACTS

Water Availability

The impact of purchasing an existing water agreement would be neutral in regard to water availability. The development of a new water agreement or a new private water source would expand the net amount of water available in the region; should there be excess capacity, additional water could be made to others in the area.

Physical Environment

Since water limitations in the region are a problem of development and transmission rather than source availability, negative impacts on the physical environment from a properly designed and operated water system should be negligible. Overpumping of a vertical well or vertical wells too closely spaced in an area where the basal groundwater lens is thin could result in upconing and salt water intrusion. Operation of a well within the capacity of the basal lens, adequate spacing of wells within a well field, and the use of inclined or horizontal shafts where the basal lens is very thin could prevent any of the aforementioned potential adverse effects.



CHAPTER V  
WASTEWATER

PURPOSE

Collection, treatment, and disposal of wastewater generated within the Kohanaiki resort area would be necessary during initial and ultimate development phases. The purpose of this chapter is to present and evaluate wastewater treatment and disposal alternatives and to discuss the expected environmental impact of each action.

Table 1 summarizes the estimated wastewater flows for each development.

ALTERNATIVE ACTIONS

Four alternative actions are presented for both wastewater treatment and disposal.

Treatment Alternatives

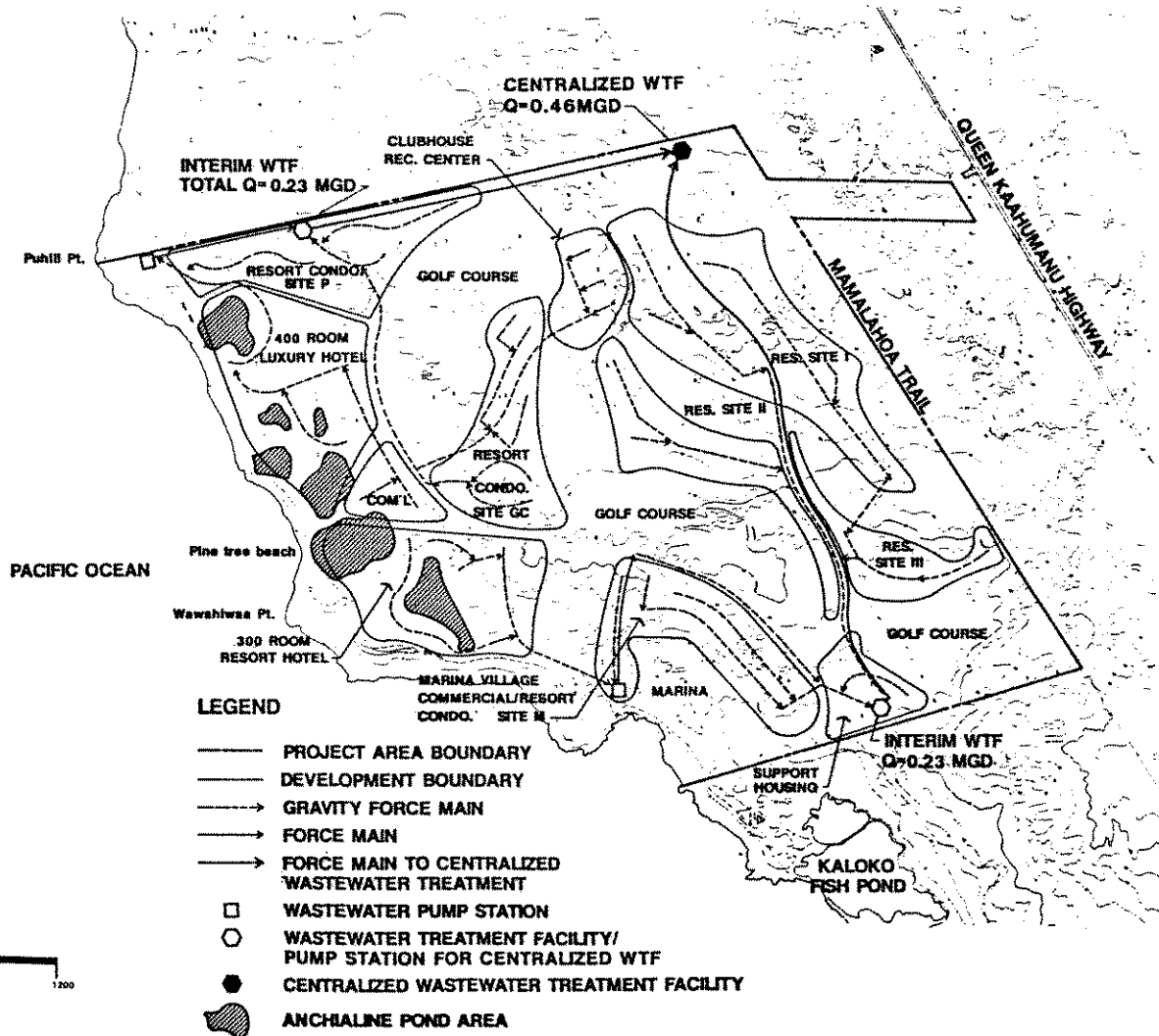
A layout of the following treatment alternatives 2, 3, and 4 is presented on Figure 5.

1. Onsite Treatment Facilities. Onsite treatment would require installation of individual units for each resort area as development occurs. Self-contained activated sludge units with aerobic digestion ranging in capacity from 17,000 to 86,000 gpd would be installed on the eight parcels housing the hotels, resort condos, support housing, and commercial areas. Onsite units for the resort residences would be individual septic tanks. This alternative is particularly attractive if development proceeds gradually in several increments or is financially constrained.
2. Two Treatment Facilities. Wastewater would be collected at two separate facilities located at opposite ends of the project district. A 0.225 MGD facility located in the support housing development would treat wastewater generated from 131 acres, including

TABLE 1  
ESTIMATED WASTEWATER FLOWS

Land Use	Acreage	Wastewater Flow (gpd)
300-Room Resort Hotel	25	55,040
400-Room Luxury Hotel	30	74,636
Resort Condominium:		
Site P	23	57,948
Site GC	23	53,635
Marina Village:		
Resort Condominium Site M	24	75,968
Commercial	1	9,753
Resort Commercial Village	9	16,315
Clubhouse/Recreation Center	8	25,600
Support Housing	10	43,075
Resort Residences:		
Site I	40	24,960
Site II	18	11,232
Site III	13	5,408
Total	224	453,570

Based on: 80 gpcd, 11 gpcd for staff,  
1,250 gpad infiltration/inflow below 15-foot elevation,  
1.9 capita per unit for hotels,  
2.7 capita per unit for resort, condos,  
2.6 capita per unit for support housing and resort residences.



**Wastewater Collection System**

**KOHANA-IKI**

Kona Beach Development Venture

M & E PACIFIC, INC.



Figure: **5**

resort residence sites I, II, and III; 300-room resort hotel; Marina Village resort condo "M"; Marina Village commercial area; and support housing. The second facility located in the Resort Condo Site "P" development would treat 0.228 MGD of wastewater generated from 93 acres, including the 400-room luxury hotel; Resort Condo Sites "P" and "CC"; clubhouse and recreation center; and resort commercial village. Both wastewater treatment facilities would include a flow equalization basin, self-contained activated sludge and aerobic digestion unit, and a polishing filter. This alternative or a similar plan where wastewater treatment facilities accommodate several resort areas would be favorable if construction of those areas occurs at the same time.

3. Single Centralized Treatment Facility. A centralized treatment facility with capacity of 0.46 MGD to treat the entire Kohanaiki development would be feasible if funds were available and the entire planned resort development were scheduled for construction.
4. Interim/Ulimate Treatment Phasing. The final alternative action for wastewater management in Kohanaiki is a two-phase treatment scheme. Initially, the onsite treatment option or multiple facility option would be employed. The interim wastewater treatment plan would serve the initially constructed resort developments. Upon completion of the entire development, wastewater would be rerouted to a single 0.46 MGD treatment facility and the interim units would be abandoned. The cost of this alternative is expected to exceed the cost of the others due to incorporation of two alternatives.

#### Effluent Disposal Alternatives

##### Golf Course Pond Storage and Irrigation

Due to the close proximity of golf course fairways to all resort areas, use of golf course ponds for effluent storage would be convenient. Ponds

would provide additional treatment due to disinfection by ultraviolet radiation from the sun. Pond water would be easily accessible and available for irrigating golf course fairways. Expected nitrogen removal by Bermuda grass would be 40 pounds per acre per month (Handley and Ekern, 1981). Pond storage and irrigation would be an appropriate effluent disposal method for all of the treatment alternatives except septic tanks.

##### Subsurface Injection/Groundwater Recharge

Subsurface disposal of effluent would be by septic tank leaching fields and/or injection wells.

Leaching fields provide additional treatment as septic tank effluent passes through gravel filled trenches and percolates into the soil. The nature of solid accumulation at or near the soil surface rather than the soil structure is the controlling factor of the soil infiltration capacity (Tchobanoglous and Schroeder, 1985). The cost of installing a leaching field system would be expensive due to the excavation of the lava rock.

Groundwater recharge would also result from direct injection into deep wells. Excavation would be expensive and high effluent quality would be required to minimize the impact on groundwater and anchialine ponds. Wells would be located so entrained effluent plumes would flow between ponds toward the coast to avoid impact with them.

##### Ocean Outfall

Ocean outfalls are an effective but expensive effluent disposal method. Assurance of adequate dilution would require a long, deep outfall at high cost. A shorter, shallower outfall would have unacceptable impacts on coastal water quality. Ocean outfalls become cost effective for large communities with large effluent disposal needs.

## ENVIRONMENTAL IMPACT

The environmentally sensitive areas within and surrounding Kohanaiki and the environmental impact of wastewater treatment and disposal alternatives are presented below.

### Sensitive Areas

#### Near Coastal Waters

Typical nutrient standards for near coastal waters are listed below.

	<u>Conc., ug/l</u>
TKN	110.00
NH <sub>4</sub> -N	3.50
(NO <sub>3</sub> +NO <sub>2</sub> )-N	5.00
PO <sub>4</sub> -P	7.00
Total P	20.00

Source: Hawaii State Department of Health,  
Administrative Rules, 1984.

#### Anchialine Ponds

The existing nutrient concentrations in the anchialine ponds near the shore of the development are higher than those of the near coastal waters. Overall concentrations for several nutrients and chlorides are listed below.

	<u>Conc., ug/l</u>
NH <sub>3</sub> -N	686
NH <sub>4</sub> -N	24.1
Total N	829
PO <sub>4</sub> -P	87.7
Total P	113
Chlorides	0.22

Source: OI Consultants, Inc., 1986.

It is imperative that effluent entering the anchialine ponds have acceptable nutrient concentrations to avoid upset of the pond ecosystem and prevent nutrient build up.

### Impact of Treatment Alternatives on Sensitive Areas

All wastewater pumping stations and treatment facilities would be located as far from the anchialine ponds as practical. Pumping and treatment facilities would also be located above the 15-foot elevation to reduce the potential for groundwater contact.

### Impact of Effluent Disposal Alternatives on Sensitive Areas

Infiltration of effluent into the groundwater by irrigation or injection could have a negative effect on the anchialine ponds if not properly managed.

### MITIGATION OF ADVERSE EFFECTS

Nutrient concentrations would be decreased below secondary standards with the addition of water hyacinths or other wetland plants to the effluent holding ponds. Removal of total nitrogen as high as 45 kg/had is reported (Tchobanoglous and Schroeder, 1985). The principal nitrogen removal mechanism is bacterial nitrification/denitrification rather than plant uptake. The harvesting of hyacinths every five weeks is suggested for effective nutrient removal (Metcalf & Eddy, Inc., 1979) since the removed nutrients are converted to cellular mass in the form of hyacinth growth.

Maintenance of aerobic conditions within the storage ponds would be an effective odor control measure. Aerobic conditions would be achieved by minimizing the pond depth and biochemical oxygen demand (BOD) loading. Aerobic conditions would also favor the growth of mosquito fish, which would feed on mosquito larvae in the pond.

Human contact with aerosols from effluent irrigation would be minimized by buffer zones or planting trees and shrubs around the irrigated areas; use of low trajectory sprinklers or downward spray nozzles; and avoiding irrigation during windy periods.

Irrigation of golf course fairways at night would reduce the chance of human contact by aerosols. Night irrigation would also aid infiltration of effluent into the ground, preventing accumulation of salts on grass blades due to rapid evaporation during daylight conditions.

#### NEGATIVE EFFECTS THAT CANNOT BE MITIGATED

Eventual effluent mixing with either groundwater or near coastal waters is impossible to avoid. Effluent will eventually reach either or both water sources. Therefore, the treatment and disposal alternative selected must provide high quality effluent to minimize adverse effects.

## CHAPTER VI POWER AND TELECOMMUNICATIONS

### PURPOSE

Acquisition of electrical and other power for the Kohanaiki resort area would be necessary for development. This chapter summarizes the existing electrical conditions, proposed development of electrical services, and alternatives for connection to Kohanaiki (HEI, 1975; and M&E Pacific, Inc., 1986a, 1986c, 1986d, 1986e).

### EXISTING CONDITIONS

Existing electrical service in the Kohanaiki area is provided by Hawaiian Electric Light Company (HELCO) by a 69 kv transmission line located mauka of the Queen Kaahumanu Highway. Present electrical generation capacity is 123 mw, with 100 mw peak demand.

Existing telephone service to the surrounding area is provided by Hawaiian Telephone Company. The closest existing facilities are located approximately 100 feet upland of Queen Kaahumanu Highway. Available telephone trunk capacity out of Kailua-Kona would be sufficient for the needs of Kohanaiki.

Sun Cablevision is licensed to provide cable television service in the Kona-Kohala region. There are presently no cable lines immediate to the project area. The closest cabled areas are Kailua-Kona to the south and the Pacific Palisades subdivision five miles to the north.

### PROPOSED DEVELOPMENT

The initial electrical requirement for Kohanaiki would be 7.5 mva for the 400-unit hotel development. An estimated requirement of 35 mva would be expected for the ultimate development totaling 1,850 units. A substation consisting of transformer and switching gear would be required to handle the ultimate demand, plans of which would be developed by HELCO. The



substation would be located mauka of Queen Kaahumanu Highway and two 12.47 kv distribution lines would run under the highway to Kohanaiki. These lines would cost \$45 per foot per circuit, and two circuits would be required. The substation would require the acquisition of an easement on private property owned by others. A phasing plan would also be needed to determine the sequence of power demands. Estimated cost of the substation would be \$500,000, and PUC approval would be required.

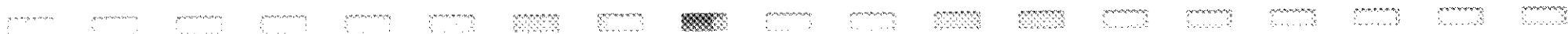
A substation site would also be required for telephone service for the ultimate development. An underground cable under Queen Kaahumanu Highway would carry the system to an onsite substation.

The projected population of the initial development phase would be insufficient to require expansion of cable television service to the Kohanaiki area by State Department of Commerce and Consumer Affairs regulations. Should cable television service be desired, the developer would be required to fund any initial capital construction costs. The most practical alternative is the placement of a 3-inch underground cable duct from the Pacific Palisades subdivision, the closest cabled area. A less feasible alternative is the construction of a microwave relay transmitter and receiver, the form of infrastructure used by more remote resort developments in the region. The microwave receiver would be funded entirely by the developer. Funding of the microwave transmitter would be split between Sun Cablevision and the developer; the developer would be eligible for a refund on a pro rata basis should a given number of additional subscribers enter the system within a stipulated period.

IMPACTS

There should be little direct impact to existing utility customers in the area since excess electrical and telephone capacity is available. The implementation of this project could accelerate any existing schedules for infrastructure expansion since a portion of existing excess capacity would be utilized for this project. The electrical substation would require the acquisition of offsite easement rights.

The implementation of cable television utilities would provide access to such services in an area where such service was previously unavailable, a benefit to other existing and future residents of the region.



CHAPTER VII  
SOLID WASTE

DISPOSAL SITES

The Kailua Landfill, one of three municipal sanitary landfills within the County of Hawaii, presently serves the North and South Kona solid waste districts (see Figure 6). This landfill is projected to reach capacity in 1990, whereupon Kailua Landfill would be converted to a transfer station and a new landfill would be opened at Puu Anahulu (Hawaii, 1981). Refuse from the commercial, residential, and resort area sources within the proposed Kohanaiki project would be accepted by the municipal landfill, but collection and transfer would require private collection companies.

SOLID WASTE QUANTITIES

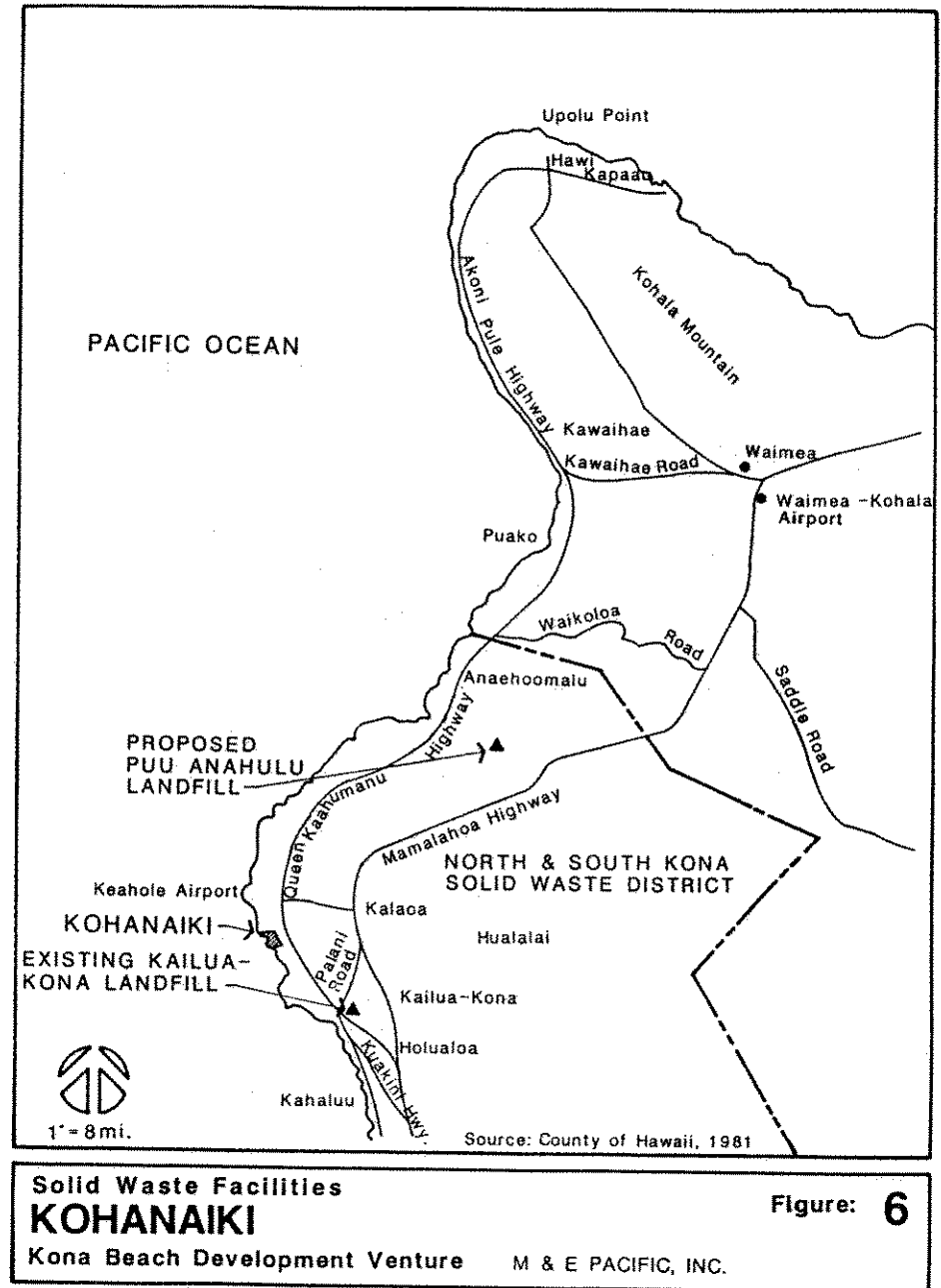
Management Plans

Waste generation quantities were projected according to the Solid Waste Management Plan for the County of Hawaii (Hawaii, 1981), whose estimates are projected to the year 2000. Although no firm development schedule exists, nor can such a schedule be realistically made for the proposed resort at this time, the projected quantities for 1990 and 2000 have been assumed to reflect the conditions of initial and ultimate development respectively.

Projected Waste Generation

The estimated de facto population for the proposed resort, under conditions of 100 percent occupancy, is as follows:

	<u>Population</u>
<u>Initial Phase</u>	
400-Room Hotel (1.9 occupancy factor)	760
Hotel, Golf Course, Clubhouse Staff	642
Initial Phase Total	1,402



Ultimate Phase

400- and 300-Room Hotels (1.9 occupancy factor)	1,330
800 Resort Condominium Units (2.7 occupancy factor)	2,160
200 Resort Residence Units (2.6 occupancy factor)	520
150 Support Housing Units (2.0 occupancy factor)	<u>1,830</u>
Ultimate Phase Total	6,230

Source: KBDV, 1986.

Applying the solid waste generation rates for the North and South Kona Solid Waste District in the county management plan of 7.41 pounds per capita per day (lbs/cd) for 1990 and 9.96 lbs/cd for 2000 would result in 2.87 tons/day (T/d) and 12.77 T/d of solid waste projected for the initial and ultimate phases of development respectively. Projected solid waste generation rates for the entire district are 726 tons/week (T/wk) in 1990 and 1,282 T/wk in the year 2000. The projected rates of solid waste generated by the proposed project would equal approximately 5 percent and 16.9 percent of projected quantities for the entire solid waste district.

The projected solid wastes to be generated by the proposed project make up a very small fraction of the proposed solid waste quantities. The proposed project should not adversely impact solid waste infrastructure (i.e., require the construction of a new landfill or significantly shorten projected landfill life).

Solid waste generated by the proposed project would also generate additional traffic. Assuming a typical 40 cubic yard container is used, an average of two-thirds of a round trip per day would be required for the projected solid waste quantities during the initial phase, increasing to three trips per day after the ultimate phase of development. The additional traffic generated by collection vehicles should be negligible.

REFERENCES

Published Sources

1. County of Hawaii, Department of Public Works (DPW), 1970. Storm Drainage Standards.
2. County of Hawaii, Department of Public Works (DPW), 1981. Solid Waste Management Plan for the County of Hawaii.
3. County of Hawaii, Department of Water Supply (DWS), 1980. Water Master Plan, Island of Hawaii, prepared by R.M. Towill Corp.
4. County of Kauai, Department of Water; City and County of Honolulu, Board of Water Supply; County of Maui, Department of Water Supply; and County of Hawaii, Department of Water Supply, 1985. Water System Standards, Volume I.
5. Hawaii, 1984. State Department of Health Administrative Rules, Title 11, Chapter 54, "Water Quality Standards."
6. Hawaii Environmental Simulation Laboratory (HESL), 1975. Soil Erosion-Sedimentation Standard.
7. Hydrophysics Corporation, 1970. Report on Phase I of Study to Locate Low-Level Water Development Sites at Kohalaiki, Hawaii.
8. Kona Beach Development Venture (KBDV), 1986. General Planning and Environmental Considerations, Kohalaiki Resort Community, prepared by Helber, Hastert, Van Horn & Kimura.
9. Kona Beach Development Venture (KBDV), 1985. Application to Amend the Hawaii County General Plan, prepared by Helber, Hastert, Van Horn & Kimura.
10. Handley, L.L. and P.C. Ekern, 1981. Irrigation of Californiagrass with Domestic Sewage Effluent: Water and Nitrogen Budgets and Crop Productivity, University of Hawaii, Water Resources Research Center Tech. Report No. 141.
11. Metcalf & Eddy, Inc., 1972. Wastewater Engineering: Treatment/Disposal/Reuse.
12. Metcalf & Eddy, Inc., 1979. Wastewater Engineering: Treatment, Disposal, Reuse, McGraw-Hill Book Company, New York, p. 812.
13. OI Consultants, Inc., 1986. Waikoloa Beach Resort, Anchialine Pond Monitoring Program, Final Report.
14. Tchobanoglous, George and Edward D. Schroeder, 1985. Water Quality. Addison-Wesley Publishing Co., Reading, Massachusetts, p. 646, 660.

15. U.S. Department of Agriculture, Soil Conservation Service (SCS), Honolulu, Hawaii, 1972. Handbook for Erosion and Sediment Control, Guide for Hawaii.
16. U.S. Department of Agriculture, Soil Conservation Service (SCS), 1973. Soil Survey for Island of Hawaii, State of Hawaii.

Other Sources

1. Hawaii, Department of Water Supply (DWS), 1986. Memorandum from H. William Sewake, DWS Manager, to County of Hawaii Planning Department.
2. Hawaiian Electric Company, Inc. (HEI), 1986. Correspondence of June 16, 1986 to Helber, Hastert, Van Horn & Kimura.
3. M&E Pacific, Inc., 1986a. Meeting of Ed Harada on May 19, 1986 with: H. William Sewake, Manager of Department of Water Supply, County of Hawaii; Hugh Y. Ono, Director of Department of Public Works, County of Hawaii; Harold Sugiyama, Head of Division of Wastewater and Solid Waste, Department of Public Works, County of Hawaii; Robert Yanabu, Head of Division of Engineering, Department of Public Works, County of Hawaii; Alva Nakamura, Head of Engineering Department, Hawaii Electric Light Co.; and Ken Tanaka, Engineering Division, Hawaiian Telephone Co.
4. M&E Pacific, Inc., 1986b. Meeting of Ed Harada on June 19, 1986 with Gary Kawasaki, Chief of Engineering Division, Department of Water Supply, County of Hawaii.
5. M&E Pacific, Inc., 1986c. Meeting of Ed Harada on June 19, 1986 with Ken Tanaka, Engineering Division, Hawaiian Telephone Co.
6. M&E Pacific, Inc., 1986d. Personal communication, Ed Harada with Sidney Izukami of Sun Cablevision on June 23, 1986.
7. M&E Pacific, Inc., 1986e. Letter from Kenneth Tanaka of Hawaiian Telephone Co. to Ed Harada.

**G. MARINA MARKET STUDY**

The  
Hallstrom  
Appraisal  
Group,  
Inc.

James E. Hallstrom, Jr., M.A.S., S.P.A.  
Donald E. Hallstrom  
Brian S. Lott, S.P.A.  
Randolph K. Flores, S.P.A.  
Tom W. Holliday  
Robert O. Eshikawa  
James S. Odani  
Anne C. Rust  
Lawrence A. Evenson  
Michael W. Wilson  
David K. Matsunami

May 22, 1986

Mr. Christian Wolffer, President  
Trans-Atlantic Consultants Inc.  
1414 Avenue of the Americas  
New York, New York 10019

Marina Market Study for the Proposed Kohanaiki  
Destination Resort Community, North Kona, Hawaii

Dear Mr. Wolffer:

At your request, we have undertaken a market study detailing the potential demand for a small boat harbor/marina facility within the proposed Kohanaiki integrated resort project to be located on the 470.13 acre oceanfront holding identified on State of Hawaii Tax Maps as Third Division Tax Map Key 7-3-09, Parcels 3 and 16. The property was the subject of a comprehensive Market Study and Highest and Best Use Analysis by our firm during the past year, with a narrative report containing our research, analysis and conclusions published on July 15, 1985. This letter report is intended as an attachment to that document, and it is assumed the reader has access to and is familiar with our previous report.

Mr. Christian Wolffer  
May 22, 1986  
Page 2

According to Helber, Hastert, Van Horn and Kimura, the land planners designing the proposed Kohanaiki Resort project, the marina component of the development is still in the conceptual planning stage, and specific size parameters have not been firmly established. At this time, a 10 to 15 acre harbor basin containing circa 150 boat docking slips is envisioned. The function of the marina is to provide a significant additional and unique amenity to the proposed luxury-class resort community; a feature not found in any other major resort statewide. The Kohanaiki marina would appeal to the large numbers of resident and tourist boaters drawn by the acknowledged mystique associated with fishing and boating in Kona waters.

The purpose of our assignment is to quantify the apparent demand (or lack thereof) for a private small boat marina in the North Kona region, and the probable pricing/rental structure and absorption levels supportable for such a venture. In order to complete this study, we have surveyed the supply, demand and pricing quotients for existing facilities in West Hawaii and the State as a whole; investigated proposed additions to the statewide supply of marina slips; and, interviewed knowledgeable individuals regarding the level of expressed and latent demand for additional facilities within Hawaiian waters. Also, we have surveyed market trends apparent in major mainland West Coast marinas, including Southern California (Los Angeles, Orange and San Diego Counties), San Francisco Bay, and the greater Puget Sound (Washington) area. Statistical data was additionally provided by the September 1985 U.S. Army Corps of Engineers report titled State of Hawaii Small Craft Navigation Facilities.

Mr. Christian Wolffer  
May 22, 1986  
Page 3

It is not the intent of this assignment to address the economic viability of a marina component within the proposed Kohanaiki resort community, nor discuss probable development costs. Such econometric analysis could be completed at a later date when the facility plans are finalized.

All research and analysis undertaken for this study has been completed according to the standards of the American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers. All conclusions and opinions are subject to the limiting conditions and assumptions contained in our July 15, 1985 narrative report addressing the entire subject property.

#### INTRODUCTION

The intimate relationship between Hawaii and the sea is not only the focal point of many resident lifestyles, but also a source of innumerable economic benefits through the vital tourism industry and commercial/charter fishing businesses. As the population and visitor base has expanded, and the overall affluence of these individuals increased, the demand for protected marina moorage facilities in the State has escalated dramatically. As discussed in the following sections, public small boat harbors find themselves overwhelmed with applications/waiting lists exceeding the total number of slips available in the State, and the prospectus for additional construction is impaired by governmental fiscal austerity and higher priority projects. Private marinas, a relatively young concept and currently confined to Oahu, are meeting with similar success trends.

Mr. Christian Wolffer  
May 22, 1986  
Page 4

This high level of demand is not limited to the state. Along the mainland West Coast a resurgence in boating interest is underway, following on the heels of a rapidly expanding regional economy. In quality marinas, waiting lists are in excess of three to five years and slip rental rates (already among the highest in the world) are increasing at the rate of 15 to 30 percent annually.

The following sections of this letter summarize our findings and analyses. For the purpose of continuity, rather than address each phase of our market study separately (i.e. "Supply", "Demand", etc.), we have presented our research on a regionalized basis, discussing the supply, demand, absorption, pricing and other trends on an area or project-by-project format. Our conclusions are then contained in a synopsis at the end of this report.

West Hawaii projects are addressed first, being within the General Economic Market Sector of the proposed subject resort development with greatest emphasis placed on the Honokohau Small Boat Harbor located approximately two to three miles south of the Kohanaiki holding. Private Oahu marinas and overall statewide demand for public moorage are the next topics discussed. Of secondary interest, and the last region presented, are the existing market trends experienced in mainland West Coast facilities.

In analyzing the subject relative to the market, it must be acknowledged that the proposed Kohanaiki marina will be just one component of an integrated destination resort community, the only such major project in Hawaii or the Western United States revealed by our study. As such, its market potential

Mr. Christian Wolffer  
May 22, 1986  
Page 5

may be magnified through the synergy created by proximity to a resort complex.

#### WEST HAWAII

The focal point of small boat operation in West Hawaii is the Honokohau Small Boat Harbor located between the Keahole Point Airport and Kailua-Kona. Otherwise, there are only extremely limited number of moorings available at various sites along the coastline, and the only plans to increase the region's capacity is development of a marina at Kawaihae. However, public agencies concede that proposed expansion will not meet the demand levels which currently do and are anticipated to exist.

Primary sources of information for this section of our assignment were David Parsons, Small Boating Manager for the State of Hawaii Department of Transportation, Harbors Division, who oversees all public small boat marinas in the state; and, Fredrick Torres, a Harbors Division Administrator stationed in Hilo.

#### Honokohau Small Boat Harbor

Upon completion of the first phase in 1969, the Honokohau Small Boat Harbor became the major pleasure craft and commercial/charter fishing anchorage in West Hawaii. Subsequent expansion has resulted in a total of 162 boat slips constructed to date,\* with short-term reconfiguration anticipated to add up to 100 more. The funding for this

\* According to current State of Hawaii Department of Transportation, Harbors Division May data differs slightly from Published Army Corps of Engineers statistics.

Mr. Christian Wolffer  
May 22, 1986  
Page 6

proposed slip addition (accomplished through construction of perpendicular mooring docks stretching into the central basin area) was finally approved in the recently ended 1986 legislative session, and calls for a total of \$1.675 million in appropriations (\$675,000 of which was previously allocated).

According to the master plan prepared by Daniel, Mann, Johnson and Mendenhall for the State DOT Harbors Division in December 1970, overall long-term planning calls for construction of additional harbor basins and a total of 455 slips to be developed on the 65.5 acre harbor site (25.1 acres of water, 40.4 acres of land) when completed. It is assumed the reader has access to this extensive public document, which despite its age, is still viewed as the general basis for future expansion plans by the State.

Fredrick Torres, Harbor Division Administrator, stated that development has significantly lagged behind original projections, which called for 308 slips to be in place by 1980. This situation apparently will not be readily rectified over the coming years, according to David Parsons, State Boating Manager for the Harbors Division. Despite the evidenced strong demand for slips in the area, he says no further substantial capital development funds for expansion of the Honokohau basin are anticipated during the foreseeable future (15-plus years). This outlook is reinforced by a series of public forums, held in North Kona during September 1984, which were sponsored by the Harbors Division and the Army Corps of Engineers. In those meetings, it was acknowledged that governmental funds are exceptionally scarce, and that projects considered as having priority by the agencies are the improvements at the Port of



Mr. Christian Wolffer  
May 22, 1986  
Page 7

Kawaihae (addressed below), and construction of a protective breakwater at the Honokohau Harbor entrance. Beyond these constructions, governmental development of additional small boat slips and facilities in West Hawaii is not "projected under current fiscal conditions until the end of the century", according to quoted spokesmen.

Parsons said the State has 133 applications on file for boat slips in the Honokohau Harbor. He also stressed that this "expressed demand" represented only a minor portion of the "latent demand" which exists in the area. The current wait for slips is "so long... in excess of five to seven years, or more" that a significant number of individuals don't even bother to submit formal applications to the waiting list, being frustrated in the knowledge of the prolonged wait. Parsons suggested that the latent demand for slips at the harbor "probably exceeds 200 to 400 spaces" beyond the official applicants.

Recent studies have concluded that the demand for boating facilities in the State will increase by a minimum of five to six percent annually over the next decade, with the major growth areas being West Hawaii, West Maui and Urban Honolulu.

The Harbors Division representatives said the existing mix of slip tenants, waiting list applicants, and latent demand is approximately as follows:

Mr. Christian Wolffer  
May 22, 1986  
Page 8

NUMBER OF SLIPS BY USE

	<u>CHARTER FISHING</u>	<u>COMMERCIAL FISHING</u>	<u>RECREATIONAL CRAFT</u>
CURRENT TENANTS	81-98	40-49	16-32
Pct. Breakdown	50-60%	25-30%	10-20%
WAITING LIST APPLICANTS	40-60	15-25	50-75+
Pct. Breakdown	30-45%	11-19%	38-57%
ESTIMATED LATENT DEMAND (1)	45-60	15-30	210-240
Pct. Breakdown	15-20%	5-10%	70-80%

(1) Based on existing estimated demand for 300 slips.

Slips are held in month-to-month tenancies by boat-owners, via one-year renewable moorage agreements. This is the standard practice throughout the State according to Parsons. Monthly rental rates have recently been increased to \$1.90 per lineal foot for pleasure craft, with a minimum charge of \$25.00. Commercial and Charter craft are assessed the \$1.90 per lineal foot figure, \$50 per month, or two percent of gross income from operations, whichever is greatest. These boats are also required to purchase special operating permits.

The \$1.90 per lineal foot assessment is an increase of 27% over previous rates.

Both spokesmen agreed these rents are "dirt cheap", well below what the market could support (particularly in high-demand areas such as Kona), and they do not currently support the amortized construction and operating cost of the facilities. Parsons stated that rents will be raised by an additional 15 to 20 percent in 1987, with the intent of achieving rates of \$3 to \$4 per lineal foot monthly within

Mr. Christian Wolffer  
May 22, 1986  
Page 9

the next four or five years. He felt this would still be circa only half what the market could readily support in West Hawaii. Currently, the main income producer envisioned for the Honokohau facility is ground space lease rental for marine-oriented use of the harbor frontage, an aspect anticipated to increase significantly over the short-term in light of the strong acceptance of Gentry's "Kona Marina" light-industrial/commercial project.

#### Other West Hawaii Facilities

Outside of the Honokohau Harbor, small boat moorings in West Hawaii are severely limited. There are nine berths available along the westerly side of the Kailua-Kona pier and four spaces along the pier at Keauhou Bay. All of these berths are held by long-time tenants, highly sought after, and "never turn over" according to Parsons; demand for these prized spaces being "virtually limitless".

Beyond these berths, some moorings are available in Kailua Bay and up to 52 shallow-water moorings are available in the outer portions of Kawaihae Harbor; however, they have limited support facilities and require independent ship-to-shore transportation.

A 300-slip small boat marina is preliminarily proposed for development in the Kawaihae Harbor basin to meet the anticipated demand for recreational and charter boats created by the rapidly expanding South Kohala resorts and resident community. However, the construction of this marina is a "minimum of eight to ten years away", stated Parsons, and "would still be insufficient" to meet the projected demand for moorage in the West Hawaii region.

Mr. Christian Wolffer  
May 22, 1986  
Page 10

A series of tables taken from the publication State of Hawaii Small Craft Navigation Facilities summarizing small boat facilities in West Hawaii and throughout the State, are attached to this letter.

#### PRIVATE MARINA FACILITIES

There are currently only five private small boat marinas in the State, with a sixth currently in the final planning stages. Additionally, there are two (the Hawaii and Waikiki) yacht clubs which lease space from the State within the Ala-Wai basin for member's use. All of these facilities are located on Oahu, which contains the significant portion of Hawaii's population and tourism plant. A variety of reasons were expressed by those individuals interviewed regarding the lack of outer island private marinas, most notable being the dispersed resident population base, and the high-cost of land in the major resort areas where strong demand might be found. Without exception, all cited West Hawaii and West Maui as being the most probable locations for private marina construction, with the former only now becoming favorable in light of the quality resort development taking place there and the vast amounts of land available, and the latter having inherent problems due to the extreme cost and scarcity of private coastal acreage for such development.

The following paragraphs summarize the five existing private marinas on Oahu.

Mr. Christian Wolffer  
May 22, 1986  
Page 11

Hawaii Kai Marina

This 98-slip facility\* is located adjacent to the Hawaii Kai Shopping Center and is operated by The Hawaii Management Company as a component of that complex. Developed by the Prudential Insurance Company, the marina is effectively full on a year-round basis according to Management, with the only vacancies resulting from lost occupancy time due to slip turnover, which is common relative to other Hawaii locations. Currently, there is a waiting list of "approximately 2 years" for boats in excess of 40 feet, and of about half that period for boats of 40 feet or less.

Rentals are on a month-to-month basis, with varying length renewable moorage agreements available. Live-aboards are not permitted. Tenants are not allowed to sub-lease or market the use rights to the slips, which revert to the management upon termination and are assigned on a first-come first-served basis.

Monthly rental rates are currently set at \$2.00 per lineal foot for all crafts, with an \$8.00 monthly marina fee added to effective rents. The rents include all taxes.

The management acknowledges that the rates are rather low, but point out that as the marina is part of a much larger retail complex, and parking, utilities, and other infrastructure were already available to the site. Additionally, the management considers the marina an effective visual and marketing amenity for the complex, and not as a profit center.

\* Figure provided by Management. Differs from published Army Corps of Engineers statistics.

Mr. Christian Wolffer  
May 22, 1986  
Page 12

Demographically, boat slip tenants are relatively evenly divided between local residents and mainland boat owners. West Coast residents comprise a significant portion of the out-of-state tenants.

Kaneohe Yacht Club

This private members-only club is located along the southerly shore of Kaneohe Bay in the lee of the Mokapu Peninsula (site of the Kaneohe Marine Corps Air Station). The club controls 170 slips and is currently filled to capacity, with waiting lists for 35 foot slips being circa 2.5 to 3 years in length, and 45 foot berths in excess of 4 to 5 years.

Membership in the club does not carry the guarantee of slip use, and all applications are served in an as-received order. The slips are not transferable in any way, not even with the sale of a craft.

Membership is required to obtain a slip, and current initiation fees are at \$1,775, which includes a \$775 allowance for capital improvement recapture of the club's development costs. Additionally, there is a \$45 per month dues. Currently, slip rental rates (all on a month-to-month tenancy) are at \$1.25 per lineal foot, a figure which the club management describes as "abysmally cheap"; however, as members set fees through a council consensus, below market rates are anticipated over the foreseeable future. In effect, non-slip holding club members, through initiation fees and monthly dues, subsidize slip tenants.

Mr. Christian Wolffer  
May 22, 1986  
Page 13

The significant majority of members (which have to be nominated by two members and approved) are windward Oahu residents. The Club strongly discourages non-resident members, but notes that interest in the slips by mainland boaters is exceptionally high.

Keehi Marine Center

Located within Keehi Lagoon adjacent to Sand Island near urban Honolulu, this 160-slip marina, also known as the Amfac Marina, is entering its second year of operation. Considered as "very successful" by the management, there are currently only "four or five" slips vacant, all of which are smaller sized in less desirable (shallow) areas of the facility. There is a waiting list of "about 10 or 15" applicants for slips in excess of 40 feet in length.

The current monthly rents are shown below and are based on slip, not boat, length. All tenancy is month-to-month, with one-year moorage commitments available. Live-aboards are permitted, with rents at twice the level shown. The figures do not include taxes. Management expressed the opinion that the rents are "slightly below" what might have been obtainable in the market, but a quick absorption of the spaces was the thrust of the ownership. Rates are anticipated to rise 10 to 15 percent annually on a stabilized basis.

<u>SLIP SIZE</u>	<u>MONTHLY RENT (1)</u>	
	<u>TOTAL</u>	<u>PER LINEAL FOOT</u>
30 Feet	\$137.50	\$4.58
40 Feet	\$187.50	\$4.69
50 Feet	\$237.50	\$4.75

(1) Non-live aboards only. Does not include applicable taxes.

Mr. Christian Wolffer  
May 22, 1986  
Page 14

Although slips are non-transferable, the management says it will attempt to allow boat-owners to transfer the slips if the moored craft is sold to another party.

A significant portion of the tenants are out-of-state residents, according to the management, (estimated at circa 40 percent or more), a level higher than originally anticipated. The response from Pacific Northwest residents (Seattle, Alaska and Canada) was exceptionally strong.

La Mariana Sailing Club

The management of the La Mariana Sailing Club, also located in the Keehi Lagoon harbor basin, elected not to cooperate in our survey, despite repeated interview attempts and a written request.

According to other available sources, the club controls 65 slips of which all but three to five are currently rented. The marina was expanded to its new size within the past year. Lease rates are set at \$3.50 per lineal foot monthly, and a one-time \$600 initiation fee/assessment is required for membership.

Makani Kai

Completed during 1976 and 1977, the eighty-unit Makani Kai Planned Development (condominium) contains an 80-slip private marina on the southwest edge of Kaneohe Bay at the mouth of Keoaloa Stream. Each slip is associated to a specific residential unit, and included in all title transfers. Sub-leasing of the slips is discouraged, and the

Mr. Christian Wolffer  
May 22, 1986  
Page 15

number of tenants and rental rate levels cannot be reliably determined.

The condominium units, which range in size from 1,280 to 1,508 gross square feet, were initially well received when first offered in 1975. A 24 to 50 foot boat slip was included in each sale. Original prices for the unit/slip combination (on a leasehold basis) was \$91,000 to \$115,000. Currently there are 15 units with slips listed on the market, with asking prices ranging from \$159,000 to \$300,000. There have been 219 recorded re-sales in the project since its original offering.

#### Proposed Marina

Still unnamed, a 1,800 slip marina is being preliminarily proposed by a mainland developer for construction along Lagoon Drive, between the Honolulu International Airport and the entrance to Honolulu Harbor. Scheduled to be constructed over a 20 to 30 year period, the Harbors Division has expressed approval for the project, and anticipates that it will have no problem achieving full occupancy.

Conceptually, the complex will have a much wider variety of services available than are located at any of the private marinas developed to date, and rental rates are currently envisioned to be in the \$5 to \$7 per lineal foot monthly range.

Due to the lengthy approval process necessary, it is estimated that completion of the first phase of the as yet

Mr. Christian Wolffer  
May 22, 1986  
Page 16

unnamed facility will not be until near the end of the decade.

#### Other Private Facilities

There are five other private small boat facilities on Oahu. In Enchanted Lakes, Kailua is a small pier/boat ramp for use by private residences fronting the lake and area canal. Many boats are moored in the area, but there are no permanent slips, and limited rental market. The Makai Pier near Makapuu Point is leased to government and private institute research vessels, with no pleasure or commercial craft use.

Near Diamond Head, adjacent to the Outrigger Canoe Club are 32 near-shore mooring spaces, mainly used by club members for storing light catamarans. Public rentals (except on a transient basis) are not available.

The other two Oahu facilities are the Hawaii and Waikiki Yacht Clubs which lease slips from the State at the Ala Wai Harbor for use by members. The former rents 25 slips, the latter 135. Both have extensive waiting lists among membership for available berths.

Some private anchorage and boat launching ramps are also located at Makaweli and Wailua Marina (tour boats) on Kauai; Heleolono, Molokai; Kaomalapa, Lanai; and, Punaluu on the Big Island. All of these, however, are considered as outlying and of insignificant impact.

Mr. Christian Wolffer  
May 22, 1986  
Page 17

#### HAWAII PUBLIC SMALL BOAT HARBORS

As of the beginning of this year, the State of Hawaii Department of Transportation Harbors Division controlled a total of 1,227 boat moorings throughout the State. More than half of these, 823 (including those leased to yacht clubs), are situated in the Ala Wai Yacht Harbor Basin. The most significant concentration of neighbor island slips are in West Maui (Lahaina and Maalaea) and West Hawaii (Honokohau).

Currently, there are 1,562 applications on file with the State for slips, and David Parsons, Small Boating Manager for the Harbors Division, estimates that this is less than one-third of the "latent demand" for public marina space. As might be anticipated, the significant number of applications are for the Ala Wai facility (1,048), West Maui (185), and Honokohau (133), which are the marinas in closest proximity to the most desirable resort areas in the State; Waikiki, Kaanapali, and the Kohala-Kona Coast, respectively.

According to Parsons, only a small marina in West Kauai is not totally filled and having a lengthy backlog of applicants.

With the exception of the Ala Wai Yacht Harbor, rental rates throughout the State are the same, currently set at \$1.90 per lineal foot per month. Slips in the Ala Wai basin and Keehi Lagoon are priced approximately 35% percent higher. It is the opinion of the State (as reinforced by market data elsewhere), that the proximity of the Ala Wai and Keehi Lagoon facilities to Waikiki, Ala Moana Park, Ala Moana

Mr. Christian Wolffer  
May 22, 1986  
Page 18

Shopping Center, and all of urban Honolulu's services and attractions, justifies these higher slip rental rates.

It was the expressed opinion of Parsons that all moorage rates throughout the State were substantially below market, particularly for the three high-demand area (Ala Wai, West Maui, and West Hawaii). It is the intent of the State to raise rental fees by 15 to 20 percent in 1987, and achieve rates of from \$3 to \$4 per lineal foot within five years.

Parsons was extremely supportive of all private attempts to increase the supply of marina facilities in Hawaii, and repeatedly spoke of the untapped and under-priced market which has historically existed. According to State plans, the boating industry has the potential to be a strong, long-term contributor to the tourism market, and should be able to achieve the success levels experienced in Southern California and elsewhere.

#### OVERVIEW OF PROMINENT WEST COAST BOATING AREAS

The following synopses are provided to illustrate the current strength of the West Coast recreational craft market, and reveal the current rental rates being achieved. Additional information on these identified prominent boating regions, and others, are on file at our office.

##### Southern California

There are three major boating areas in Southern California: Los Angeles County, South Orange County, and San Diego. Together, spurred by an estimate population base of 12

Mr. Christian Wolffer  
May 22, 1986  
Page 19

million persons, they contain some 35,700 boat slips, the majority in public facilities.

In Los Angeles County the largest small boat harbor is Marina Del Rey, located just north of the Los Angeles International Airport, which contains 6,500 individual slips. Currently, the marina is at 100 percent occupancy, with a waiting list for slips in excess of three years, longer for larger (over 45 feet) vessels. Rental rates in the public facility have recently been raised to between \$7.70 and \$7.80 per lineal foot, a figure which area yacht brokers still view as low in relation to demand and amenities provided.

The Cabrillo Marina at San Pedro (adjacent to the Port of Los Angeles) is the newest inventory addition in the region, opening on May 1 of this year. The first phase of the project contains 1,180 slips, all of which are already under contract. There is a waiting list of an estimated "over two years" for boats in excess of 50 feet, and approximately one year for boats ranging from 35 to 50 feet. The monthly rental fee is \$6.95 per lineal foot, a figure which the public operators consider a "shade below" market level, but intended as such in order to achieve capacity quickly. Plans are to achieve rates of \$9.00 per lineal foot within two to three years.

There are an estimated 2,800 other slips spread throughout the County, notably in Long Beach and in Santa Monica. Rental rates range from \$5.45 to \$9.25 per lineal foot per month in accordance with the desirability of the surrounding area, availability of proximate services, and ease of access to the open ocean. According to those individuals

Mr. Christian Wolffer  
May 22, 1986  
Page 20

interviewed, all marinas in the County are filled to capacity, with the nearest available moorage being located in Ventura, some 40 miles north.

The boating industry in Orange County is centered around Newport Beach, whose Balboa Bay is generally accepted as the focal point of West Coast interest. There are an estimated 15,200 slips available in South Orange County, 13,000 of which are in Balboa Bay or nearby inlets. The remainder are located in Seal Beach (400 slips), Dana Point (1,400) and in various smaller towns such as San Clemente, San Juan Capistrano and Laguna Beach.

Currently, there is a five year wait for a slip in Balboa Bay, with waiting lists ranging from one to five years for the other area facilities.

Rental rates in the area are among the highest in the country, ranging from \$10 to \$15 per lineal foot on a monthly basis in public marinas, and up to \$18 per lineal foot in private developments. Most of the disparity in slip rental levels is attributable to distance to the open ocean (up to 8 miles), and the exclusivity of some specific mooring areas. In addition to the rental fees, club memberships (such as the Balboa Bay Yacht Club) and association initiation fees and dues can be a substantial increase above base rentals, effectively doubling rates. Also, as many of the slips are somewhat transferable (via sub-lease or otherwise) transfer premiums of \$5,000 to \$30,000 are not uncommon.

There are some slips held through long-term (40 to 65 years) lease agreements in Balboa Bay. Although the market is

Mr. Christian Wolffer  
May 22, 1986  
Page 21

exceptionally limited, these may transact for as much as \$100,000 according to area yacht brokers.

Outside of Balboa Bay rental rates range from \$8.50 to \$14.00 per lineal foot per month.

There are an estimated 10,000 marina slips available in San Diego County, of which 7,800 are situated in San Diego and Mission Bays, located just north of the San Diego Civic Center. The majority of the remainder are located in Oceanside, some 25 miles north.

Due to the extreme size of the bays, slip rental rates vary dramatically in San Diego, ranging from \$8 to \$10 monthly per lineal foot near the harbor's entrance, downward to circa \$4.50 to \$5.00 per foot in the interior facilities near Chula Vista. The latter are some 18 miles from the open ocean and have minimal support services or proximate desirable commercial developments. During albacore season, rates escalate to a high of \$12 to \$16 per lineal foot due to increased demand.

While there are waiting lists of up to three years for the more desirable locations, interior facilities are currently only 85 to 90 percent occupied.

#### San Francisco Bay

According to area yacht brokers, there are effectively some 12,800 small boat slips in the San Francisco Bay. The number is difficult to quantify exactly due to a large number of houseboats (particularly in Sausalito), and "unsanctioned" small marina projects. The larger

Mr. Christian Wolffer  
May 22, 1986  
Page 22

developments are near Aquatic Park, along the refurbished north and easterly waterfront, and near the San Francisco International Airport. Several major marinas are also located on the east side of the bay.

Owing to the wide-ranging quality and exclusivity of the various public and private complexes, rental and occupancy rates vary dramatically throughout the region. In the prime inner-city marinas, rents range from \$7 to \$11 per lineal foot per month, and waiting lists are estimated to be as long as 10 years. In less desirable southerly or East Bay locations occupancy rates range from 85 percent to waiting lists of 18 months, and monthly rental rates from \$4.50 to \$9.00 per lineal foot.

Of particular interest is a relatively unique 20 year sub-lease plan being offered at The Marina at Pier 39, one of the moderate quality facilities within the city of San Francisco (located on the North Point, at Beach Street and Embarcadero). The program offered 20-year sub-lease, with fully transferable contracts; all pre-paid at the rates shown below. A 10-year financing contract is offered.

<u>SLIP SIZE</u>	<u>"PURCHASE" PRICE</u>
36 Feet	\$25,000
40 Feet	\$28,000
45 Feet	\$30,000
50 Feet	\$30,000
60 Feet	\$33,000
70 Feet	\$35,000

Monthly rentals are also available at the 1,480 slip marina for rates ranging from \$5.50 to \$7.50 per lineal foot. According to the developers, absorption has been brisk, and



Mr. Christian Wolffer  
May 22, 1986  
Page 23

Full sell-out of the first phase is anticipated within six months.

#### Puget Sound

The third major West Coast boating area, there are an estimated 8,400 slips in the primary marinas of the area. This does not include those located on the San Juan Islands or the northerly portions of the Olympic Peninsula and the Strait of Juan De Fuca.

Demand for centrally located slips (near urban Seattle, Bellevue and Mercer Island) is exceptionally high in this rapidly expanding areas, and waiting lists regularly exceed two to four years. In outlying northerly areas (near Anacortes) and on the westerly side of the Sound near Hood Canal, occupancy rates are in excess of 80 to 90 percent.

Prime public slips range from \$4.50 to \$8.75 per lineal foot per month, with more removed marinas charging from \$3.00 to \$5.25 per lineal foot. Private facilities typically are at the upper-end of the range, and go as high as \$9.50 per lineal foot per month.

As with Newport Beach, California, many choice sites are controlled by yacht clubs and associations which charge substantial initiation fees and monthly assessments, resulting in much higher effective rentals than quoted above. Due to the resurgence of this area's economy (as it moves away from an industrial and timber focus towards high-tech and service), and its rapidly expanding population base, without exceptions those individuals interviewed were of the opinion that marina rental rates would increase

Mr. Christian Wolffer  
May 22, 1986  
Page 24

substantially over the coming decade to a level more closely in-line with the Southern California facilities.

#### COMMENTS AND SUMMARY

Without exception, all individuals interviewed for the purpose of our study were bullish on the need for additional small boat marina facilities in the West Hawaii region, and equally certain that public development would fall woefully short of the potential demand. Concern was expressed that the limited number of slips available could harm selected aspects of the tourism industry due to the increasing difficulty in obtaining charter fishing craft sought by the expanding numbers of visitors drawn to the region by the gamefishing reputation of the Kona waters.

This sentiment was best expressed by Joe Castagna, a leading Marina Del Rey (California) yacht broker, who classified himself as a "fanatic fisherman" who often organized groups of clients and friends for exotic fishing junkets. Castagna stated that for many years his groups visited Kona at least two to three times annually, but the difficulty in obtaining charter vessels in the region became periodically so severe, that Mexico has become the area of choice for himself and a large number of Southern California fishermen. He said that many of his clients for years have sought to obtain permanent mooring for their private boats in Kona, but have become frustrated over the lack of facilities.

Parsons echoed these sentiments saying his department receives regular comments and inquiries from mainland individuals who seek a wider variety of charter craft availability, and marina space for private recreational

Mr. Christian Wolffer  
May 22, 1986  
Page 25

craft, particularly from the West Coast, Canada, Alaska, and Texas. Additionally, Parsons sees a need for expanded "day cruise type" vessels (snorkeling, sightseeing, sunset/dinner, etc.) created by the expanding West Hawaii visitor industry.

A consensus of opinion regarding the positive desirability of a marina within an integrated resort setting (as proposed for the subject property) was also expressed. All individuals stressed the tax, marketing, and use benefits created by owning a craft in Hawaii, and it is our opinion that such a development could enhance the overall reputation of the specific resort and general perception of the region. Several mainland yacht brokers interviewed (specifically in Seattle, Newport Beach and San Diego) stated that were such opportunities made available in Kona they readily had at least 10 to 20 clients each who would be very interested, and be willing to pay slip rental rates commensurate with what they currently incur on the mainland.

As discussed, slip rental rates both in private and public small boat harbors are based not only on recapture of capital investment, but also on the proximity and quality of nearby services and features, and the placement of the individual slip within the marina complex. To date, Hawaii slip rental rates have been kept significantly below the apparent market levels evident in comparable mainland regions. While the newer private Oahu marinas begin to approach these figures, their less desirable locations away from most supporting visitor-oriented facilities has limited the ability to achieve higher rates. Additionally, the historic low rates charged by public small boat harbors in the State has placed an artificial cap on public willingness

Mr. Christian Wolffer  
May 22, 1986  
Page 26

to pay the market-supported levels. As the public marina rates increase substantially over the next five years, as proposed, the reluctance of Hawaii boaters to pay the higher private marina rents (necessary for recapture of investment) is anticipated to diminish significantly.

All those interviewed were of the opinion that the prevailing slip rental rates in the State were well-below what the market would support, and an anomaly certain to change over the coming decade. Private rates of \$7 to \$10 per lineal foot per month, or more, and public rates of \$4 to \$5 per foot monthly are considered as realistic forecasts by the end of the decade.

The most insightful comment was provided by Parsons, who as manager of all state-operated Small Boating Facilities throughout Hawaii is perhaps the most singularly knowledgeable individual; he adamantly stated that he felt there would be "no problem" for a West Hawaii private developer to "fill at least 250 to 300" slips within a marina associated with an "exclusive resort-type facility", even in light of the proposed expansion of the Honokohau Harbor and planned construction of a Kawaihae marina. He expressed the opinion that rental rates of "\$7 to \$12 per lineal foot monthly, like those received at desirable Southern California facilities, could be easily sustained here". Furthermore, he stressed that the State was "very supportive" of private marina development, particularly in the high-demand area of Honolulu, West Maui, and West Hawaii, despite the recent negative reportings regarding the State opposition to "privatization" of the Honokohau Small Boat Harbor.

Mr. Christian Wolffer  
May 22, 1986  
Page 27

In summation, the demand for small boat improvements in West Hawaii, long considered a world-class fishing and boating area, far exceeds the existing and planned public facilities. Significant numbers of local and mainland recreational boaters are currently frustrated by the inability to obtain moorage in the region, and the need for commercial and charter craft serving the growth-oriented West Hawaii tourism industry is evident. An estimated 750 to 1,000 slips would be required over the next decade to ease the anticipated demand, and the tourism industry, through increased numbers of boater visitations and expanded demand for resort accommodations, services and real estate, would unquestionably benefit were the berths made available.

It is therefore our opinion, that a small boat marina as a component within the proposed subject destination resort development is both an innovative and sound concept, supported by an expressed, existing strong market demand for slips in the West Hawaii area. Such an undertaking would enhance the saleability of condominiums within the project and provide a significant marketing and guest base for hotel and commercial services.

Based on our investigation, the preliminary proposed circa 150-slip marina on the subject property would be a welcome addition to the West Hawaii small boating facilities inventory, and would be readily filled under existing market conditions. We concur with Mr. Parsons, that a marina containing from 250 to 350 slips would be supportable based on express and apparent market demand factors. If the slips are conveyed with condominium units, we would anticipate that the absorption levels of the units would be significantly increased through addition of the marina

Mr. Christian Wolffer  
May 22, 1986  
Page 28

amenity (by as much as 20 percent annually), and that on a fee simple basis the slips could be marketed for circa \$30,000 to \$40,000 each. This would represent a relatively small increase to the anticipated cost of the marina-front condominium units. Under such marketing conditions, in conjunction with individual condominium unit sales as part of a luxury-class resort community, we would anticipate the slips to be absorbed at the rate of 30 to 45 per year until total sell-out. It is likely that unsold slips would be rented out on a month-to-month basis prior to sale if economically feasible in consideration of the cost of interior basin improvements (piers, walkways, utility hook-ups, etc.).

As free-standing slips, the sales price would likely also fall within the quoted price range, although it is acknowledged that boat slips are only rarely sold, typically being rented or leased.

If the subject slips were rented, it is our conclusion that (assuming circa 150 are developed) all would be spoken for prior to the completion of the marina (estimated at 18 months to two years) if a vigorous pre-leasing program is undertaken. Were 250 or more slips constructed, it is our opinion that all could be successfully filled within 18 months of completion of the facility.

Furthermore, we are of the opinion that prevailing rental rates of \$7 to \$11 per lineal foot per month could readily be sustained by the market if the subject marina and resort community is developed to quality level as currently planned. This rate would be for non-live aboards only, and would be inclusive of all charges except State excise taxes.

Mr. Christian Wolffer  
 May 22, 1986  
 Page 29

We appreciate the opportunity to have worked with you on this interesting study, and are prepared to provide further market and appraisal services for your project should the need arise.

Respectfully Submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

*James E. Hallstrom, Jr.*  
 James E. Hallstrom, Jr., MAI, SRPA

*Tom W. Holiday*  
 Tom W. Holiday

JEH/rc/1415b

SUMMARY OF STATE OF HAWAII SMALL BOAT FACILITIES  
 Island of Oahu

Attachment  
 Page 1

SMALL BOAT NAVIGATION FACILITY	OWNERSHIP	JUDICIAL DISTRICT	BOAT HARBOR	LAUNCH RAMP (Lanes)	BERTHING SPACES	MOORING SPACES	ANCHORAGE
Haleiwa	(S)	Waialua	X	3	69	15	X
Kahana Bay	(S)	Koolauloa		1			
Heeia-Kea	(S)	Koolaupoko	X	3	18	51	
Coconut Island	(R)	Koolaupoko	X		1		
Makani Kai Marine	(R)(F)	Koolaupoko	X		80		
Kaneohe Yacht Club	(R)(P)	Koolaupoko	X		167		
Marine Corps Air Station	(R)(F)	Koolaupoko	X		22		
Kailua	(C)	Koolaupoko		1			
Enchanted Lakes	(R)(P)	Koolaupoko			X		
Makai Pier	(R)(P)	Koolaupoko			X		
Maunaloa Bay	(S)	Honolulu		1			X
Hawaii Kai Marina	(R)(P)	Honolulu	X	7	94		
Diamond Head	(P)	Honolulu				32	
Ala Wai	(S)	Honolulu	X	2	663	39	
Hawaii Yacht Club	(R)(P)	Honolulu	X		25		
Waikiki Yacht Club	(R)(P)	Honolulu	X		135		
Kewalo Basin	(S)†	Honolulu	X				
Honolulu Harbor	(S)†	Honolulu	X				
Keehi Lagoon	(S)	Honolulu	X	3	302	62	X
Armfac Marina	(R)(P)	Honolulu	X		126		100±
Club La Mariana Sailing	(R)(P)	Honolulu	X		65		
Hickam Harbor	(R)(F)	Ewa	X		25		
Rainbow Bay Marina	(R)(F)	Ewa	X		75		
Iroquois Point	(R)(F)	Ewa					X
Barbers Point	(R)(C)†	Ewa	X				
Pokai Bay	(S)	Waianae					X
Waianae	(S)	Waianae	X	7	146		
Wahiawa Reservoir	(C)	Wahiawa		1			

(C) County  
 (F) Federal  
 (P) Private  
 (R) Restricted  
 (S) State  
 † For commercial use only

Note: Attachment is excerpted from the September 1985, Army Corps of Engineers publication "State of Hawaii Small Craft Navigation Facilities". We acknowledge that some statistics contained in this excerpt (specifically in regard to available mooring and berthing spaces) differs from reported figures, which were given greater reliability.

SUMMARY OF STATE OF HAWAII SMALL BOAT FACILITIES  
Island of Kauai

Attachment  
Page 2

SUMMARY OF STATE OF HAWAII SMALL BOAT FACILITIES  
Island of Maui

Attachment  
Page 3

G-16

SMALL BOAT NAVIGATION FACILITY	OWNERSHIP	JUDICIAL DISTRICT	BOAT HARBOR	LAUNCH RAMP (Lanes)	BERTHING SPACES	MOORING SPACES	ANCHORAGE
Hanalei Bay	(C)	Hanalei		1			X
Anini	(C)	Hanalei		1			
Waikaea Canal	(S)	Kawaihau		2			
Wailua Marina	(R)(P)	Kawaihau	X				
Kaunualii	(S)	Kawaihau		1			
Wailua	(S)	Kawaihau		1			
Hanamaulu	(C)	Lihue		1			
Niumaiu	(C)	Lihue		1			
Nawiliwili	(S)	Lihue	X	2	20	15	X
Koloa	(C)	Koloa		1			
Kukuiula	(S)	Koloa	X	1		9	X
Port Allen	(S)	Koloa	X	2	34		X
Makaweli	(P)	Waimea		1			X
Kikiaola	(S)	Waimea	X	1		8	X

(C) County  
(P) Private  
(R) Restricted  
(S) State

SMALL BOAT NAVIGATION FACILITY	OWNERSHIP	JUDICIAL DISTRICT	BOAT HARBOR	LAUNCH RAMP (Lanes)	BERTHING SPACES	MOORING SPACES	ANCHORAGE
Kahului	(S)]	Wailuku	X	1			X
Maliko	(S)	Makawao		1			
Keanae	(C)	Hana		1			
Hana Bay	(S)	Hana		1			X
Kihei	(S)	Wailuku		2			
Kalama	(C)	Wailuku		1			
Maalaea	(S)	Wailuku	X	1	31	66	X
Lahaina	(S)	Lahaina	X		21	78	X
Mala	(S)	Lahaina		2			X

(C) County  
(P) Private  
(S) State  
] Primarily a commercial harbor

SUMMARY OF STATE OF HAWAII SMALL BOAT FACILITIES  
Islands of Molokai and Lanai

Attachment  
Page 4

SUMMARY OF STATE OF HAWAII SMALL BOAT FACILITIES  
Island of Hawaii

Attachment  
Page 5

SMALL BOAT NAVIGATION FACILITY	OWNERSHIP	JUDICIAL DISTRICT	BOAT HARBOR	LAUNCH RAMP (Lanes)	BERTHING SPACES	MOORING SPACES	ANCHORAGE
Kalaupapa	(R)	Kalawao	X				X
Kaunakakai	(S)j	Molokai	X	1	3	29	
Haleolono	(P)	Molokai	X				X

- (C) County  
(F) Federal  
(P) Private  
(R) Restricted  
(S) State  
j] Mainly for commercial use

SMALL BOAT NAVIGATION FACILITY	OWNERSHIP	JUDICIAL DISTRICT	BOAT HARBOR	LAUNCH RAMP (Lanes)	BERTHING SPACES	MOORING SPACES	ANCHORAGE
Manele	(S)	Lanai	X	1	28		
Kaumalapau	(P)	Lanai	X				X

SMALL BOAT NAVIGATION FACILITY	OWNERSHIP	JUDICIAL DISTRICT	BOAT HARBOR	LAUNCH RAMP (Lanes)	BERTHING SPACES	MOORING SPACES	ANCHORAGE
Laupahoehoe	(C)	North Hilo		1			
Waiakea	(C)	South Hilo		1			
Wailoa	(S)	South Hilo	X	2		42	
Wailoa Sampan Basin	(S)	South Hilo			12		
Reed's Bay	(S)	South Hilo				25	X
Radio Bay	(S)	South Hilo				12	X
Pohoiki	(S)	Puna		1			
Punaluu	(P)	Kau		1			
Kaulana	(S)	Kau		1			
Honzunau	(C)	South Kona		1			
Keauhou	(S)	North Kona	X	2	4	24	
Kailua-Kona	(S)	North Kona	X	1	9		X
Honokohau	(S)	North Kona	X	4		155	X
Puako	(S)	South Kohala		1			
Kawaihae	(S)	South Kohala	X	1		52	X
Mahukona	(C)	North Kohala					Xj

- (C) County  
(P) Private  
(S) State  
j] Seasonal

G-17

### 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 nationally recognized appraisal and real estate counseling organizations such as the American Institute of Real Estate Appraisers (AIREA) and the Society of Real Estate Appraisers (SREA).

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 purpose 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  
Recertified with the American Institute of Real Estate Appraisers through 1986  
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

#### 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

**H. OCEANOGRAPHIC ENVIRONMENT AND CONCEPTUAL  
FEASIBILITY EVALUATION FOR KOHANA-IKI MARINA**



KOHANA'IKI MARINA  
KONA, HAWAII  
OCEANOGRAPHIC ENVIRONMENT  
AND  
CONCEPTUAL FEASIBILITY EVALUATION

Prepared for:

Helber, Hastert, Van Horn & Kimura, Planners  
733 Bishop Street, Suite 2590  
Honolulu, Hawaii 96813

Prepared by:

Edward K. Noda and Associates  
615 Piikoi Street, Suite 1000  
Honolulu, Hawaii 96814

June 1986

TABLE OF CONTENTS

	<u>Page</u>
List of Figures .....	ii
List of Tables .....	ii
1.0 Introduction .....	1
2.0 Waves .....	3
2.1 Typical Annual Wave Statistics .....	3
2.2 Deepwater Design Wave .....	10
3.0 Currents .....	16
3.1 Typical Annual Current Statistics .....	16
3.2 Eddy Currents .....	17
3.3 Tidal Currents .....	23
3.4 Wind-Driven Currents .....	23
4.0 Technical Feasibility of Proposed Marina .....	26
References .....	31
Appendix A - Monthly & Annual % Frequency of Occurrence Distributions of Significant Wave Height vs. Period Offshore Keahole Point	
Appendix B - % Frequency of Occurrence Distribution of Current Speed vs. Direction and Monthly Current Statistics Offshore Keahole Point	

FIGURES

	<u>Page</u>
1. Typical Wave Types for Hawaiian Waters .....	4
2. Comparison of Hindcast and Measured Wave Data at Keahole Point for the Month of January .....	8
3. Comparison of Hindcast and Measured Wave Data at Keahole Point for the Month of July .....	9
4. Cumulative Percent of Time Waves <4 Feet at Keahole Point .....	11
5. Annual Frequency of Occurrence Distribution of Wave Heights and Periods at Keahole Point .....	12
6. Joint Probability Distribution of the Independent Wave Height Distributions .....	14
7. Percent Frequency of Occurrence Distributions of Current Speed and Direction Offshore Keahole Point (19°43.6N, 156°3.9W), Discontinuous Record from August 1983 to October 1985, Meter Depth Approx. 65 Feet, Water Depth 350 Feet .....	18
8. Cumulative % Frequency of Exceedence of Current Speeds .....	19
9. Location and Drift of Eddies in the Lee of the Hawaiian Islands .....	20
10. Typical Strong Eddy Currents Offshore Keahole Point, 21-28 August 1984, Aanderaa Current Meter Depth 65 Feet, Water Depth 350 Feet .....	22
11. Typical Strong Tidal Currents Offshore Keahole Point, 16-23 May 1985, Aanderaa Current Meter Depth 65 Feet, Water Depth 350 Feet .....	24
12A. Conceptual Plan A for Marina Entrance .....	27
12B. Conceptual Plan B for Marina Entrance .....	28
12C. Conceptual Plan C for Marina Entrance .....	29

TABLES

1. Design Wave Parameters - Joint Distribution .....	13
--	----

1.0 INTRODUCTION

During the initial planning of the Kohanaiki Development, an ocean engineering study was accomplished by Bretschneider and Gerritsen (1970). This study, entitled "Ocean Engineering Environment and Hydraulic Characteristics of a Proposed Small Craft Harbor for Kohanaiki, Hawaii", provided information on the physical oceanographic environment as well as evaluation of the hydraulic characteristics of the harbor with respect to technical feasibility.

Since the 1970 study was completed, a significant quantity of oceanographic data has been obtained in the vicinity of the Kohanaiki Development site. Notably, extensive oceanographic studies have been undertaken for QTEC-related projects at the Natural Energy Laboratory of Hawaii (NELH) at Keahole Point and for the adjacent Hawaii Ocean Science and Technology (HOST) Park seawater pipelines located just south of the NELH property. Thus, this present report provides a summary description of the oceanographic environment (waves and currents) based on the most recent data.

The available data can characterize the general oceanic conditions offshore the Kohanaiki marina sufficient for conceptual planning purposes. Should the marina concept proceed toward design, site-specific oceanographic field investigations may be required for detailed design.

Since the presently proposed marina is of a much smaller size than previously evaluated by Bretschneider and Gerritsen, the conceptual feasibility of the new marina plan was evaluated based on the results of the 1970 study and with respect to the additional data available. This was accomplished by reviewing the design parameters and concepts established by the Bretschneider and Gerritsen study with a view towards the present marina concept. No new

oceanographic analysis was undertaken at this stage of the re-evaluation. Additional ocean engineering effort would be required during the detailed design phase.

## 2.0 WAVES

### 2.1 TYPICAL ANNUAL WAVE STATISTICS

The expected typical wave climate at the site is dependent on the time of year (season) as well as the proximity to shore. Figure 1 shows the typical deepwater wave climate for Hawaiian waters. The wave climate in Hawaiian waters is characterized by two primary seasons: summer and winter. The summer wave climate is dominated by the strong northeasterly tradewind-generated waves as well as southern swell generated by distant winter storms in the southern hemisphere. At the project site, the southern swell predominates since this leeward coast is shielded by the island mass from the northeast tradewind waves. The winter wave climate is characterized by a weakening of the tradewinds and the occurrence of infrequent local "Kona" storm waves as well as North Pacific swell generated by winter storms in the North Pacific or by mid-latitude low pressure systems. The project site is affected by both of these winter wave types, although the North Pacific swell is greatly attenuated due to shielding by the islands to the northwest of Hawaii. The locally generated wind waves and swell waves generated by distant sources are not mutually exclusive, meaning that they can occur simultaneously. The months of May through September are generally considered summer months, while October through April are considered winter months.

There are several sources of data which describe the expected deepwater wave conditions in the Hawaiian Islands area:

(a) Marine Advisers Wave Data: The Marine Advisers' report entitled "Characteristics of Deep-Water Waves in the Oahu Area for a Typical Year" (revised March 1964) provides deepwater wave statistics developed from hindcasts of meteorological events. While this study was generally

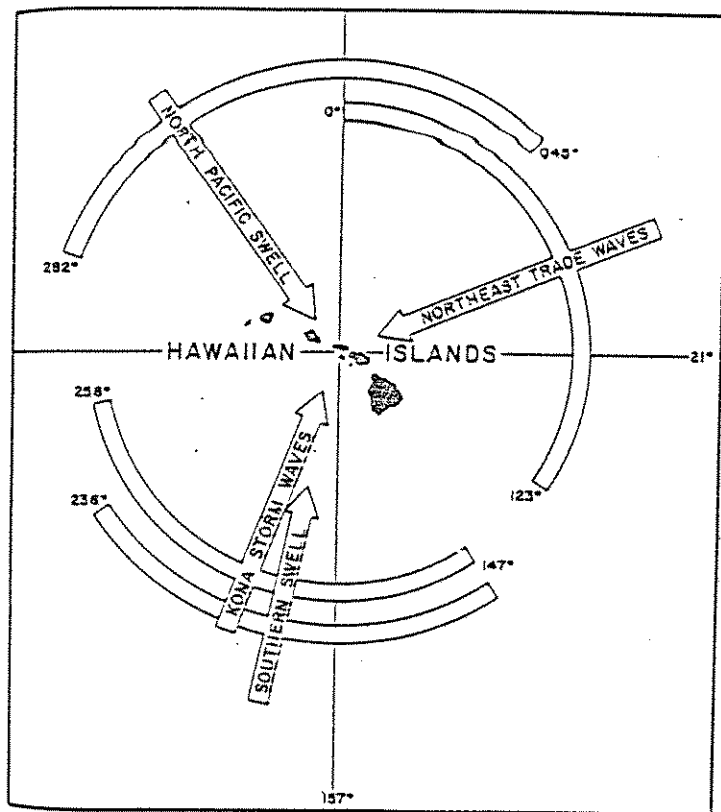


Figure 1. TYPICAL WAVE TYPES FOR HAWAIIAN WATERS  
(from Moberly and Chamberlain, 1964)

considered the most definitive set of deepwater wave statistics for the Hawaiian area when it was published in the early 1960's, the methodologies and very limited data base used to derive the statistics have serious shortcomings in relation to the present state-of-the-art.

(b) The Summary of Synoptic Meteorological Observations (SSMO): Published by the National Climatic Center (1971) for the area leeward of the Hawaiian Islands (20.3N, 158.3W), the SSMO statistics is the compilation of shipboard visual observations and therefore considered to be representative of expected conditions rather than extreme storm conditions. In fact, the larger waves which can occur on a yearly basis are probably under-represented by the SSMO statistics since ships tend to bypass or stay out of heavy weather conditions. The SSMO data also under-represent long period swell, since the short period wave trains are more easily distinguished in the open seas and tend to mask the long period ground swells.

(c) Spectral Ocean Wave Model (SOWM): Developed by the National Climatic Center, the SOWM is a sophisticated hindcast model which utilizes the atmospheric pressure fields to determine the large-scale wind fields and subsequent wind-generated wave fields. Deepwater wave statistics for a typical year were developed from data generated over a 13-year period from 1964 to 1977. The statistics appear to under-represent the North Pacific swell from the northwesterly direction and the model does not include wave generation in the southern hemisphere. Therefore, while this data is probably applicable for the high-energy windward areas, it has serious shortcomings for definition of the wave climate on the leeward coasts.

(d) Wave Information Studies (WIS): Developed by the Waterways Experiment Station, US Army Corps of Engineers, a spectral wave model was used to hindcast winds and waves over a 20-year period from 1956 to 1975. The data for Station 30 (19.89N, 153.62W) were evaluated by Evans-Hamilton, Inc (EHI) to determine deepwater wave

statistics applicable to Keahole Point. Considerations such as sheltering by the islands and inclusion of southern swell data from Marine Advisers were taken into account to modify the WIS data for the leeward coast of Hawaii.

(e) Coastal Data Information Program: This ongoing program is jointly sponsored by the US Army Corps of Engineers and the California Department of Boating and Waterways. A system of wave measuring instruments, primarily located on the California coast, is maintained by the Scripps Institution of Oceanography. The data are transmitted via telecommunications to computers at Scripps, where the data are processed in near real-time and can be accessed via telecommunications. Two Waverider buoys located in Hawaii are part of this system. The first buoy was installed in August 1981, located five miles offshore Makapuu Point, Oahu, in 600 feet of water. A second buoy, operated by the US Navy Pacific Missile Range Facility at Barking Sands, Kauai, was incorporated into this system in October 1982. Unfortunately, these Waverider buoys do not provide directional information. Both buoys are exposed to different wave conditions than that expected along the Kona coast.

(f) OITEC CWP At-Sea Test Phase III Project: As part of the OITEC CWP At-Sea Test Phase III Project, wave data were acquired over a one-year period from June 1984 to May 1985 offshore Keahole Point. A Waverider buoy was moored in approximately 130-foot water depth on the north side of Keahole Point. Wave records were obtained at various sampling intervals ranging from about 1 hour to 12 hours. Significant wave heights from each record were used to develop monthly and annual percent frequency of occurrence statistics as given in Appendix A.

(g) Hawaii Deep Water Cable Program (HDWCP): As part of the HDWCP, wave data were acquired over a two-year period from May 1984 to 1986 offshore Upolu Point, Hawaii. A Sea Data Wave and Current Meter was moored in 550-foot water depth just offshore Upolu Point within the Alenuihaha

Channel. Wave conditions in the Alenuihaha Channel are unusually severe due to strong winds and currents. Therefore, the wave data would not be directly applicable for characterizing the typical wave climate along the Kona coast.

From the evaluation of the data sources described above, the Waverider data obtained off Keahole Point provides a more realistic representation of the expected wave climate along the Kona coast than the hindcast data. Although the WIS hindcast data were specifically modified by EMI to account for sheltering effects by exclusion of waves from certain directions, the data does not account for diffraction and decay effects. For example, Figure 2 graphically compares the significant wave heights and periods from the two data sets for the month of January. West-northwesterly swell is expected to dominate during this "winter" month, as is reflected in the frequency of occurrence distribution of wave periods. The hindcast data shows a majority percentage of "calm" conditions (0-2 feet, 0-2 seconds) due to the exclusion of waves from directions which cannot reach the Kona coast. The remaining percentage of waves are distributed over the entire range of wave height classes, with  $\geq 10$  foot wave heights occurring about 22% of the time. The Waverider data, on the other hand, shows a majority percentage of 2-4 foot wave heights, with no waves greater than 10 feet. This reflects the diffraction of northwesterly wave energy around the islands, such that large wave heights are reduced due to the spreading of energy. While the one year data period is too short to provide a true statistical representation of a "typical" year in that the large wave heights which can occur on a yearly basis may be under-represented, it does provide a reasonable representation for the majority of wave types which occur at the site.

Figure 3 compares the hindcast and Waverider data at Keahole

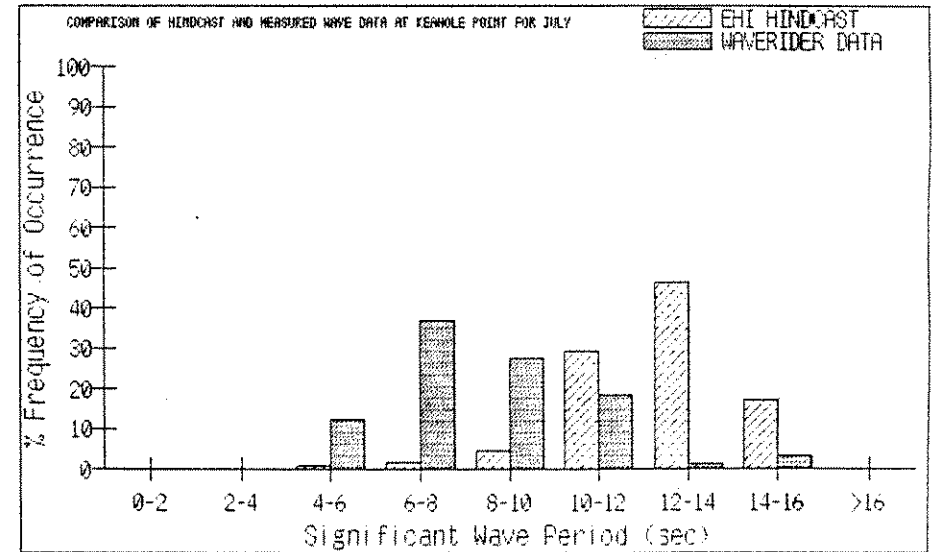
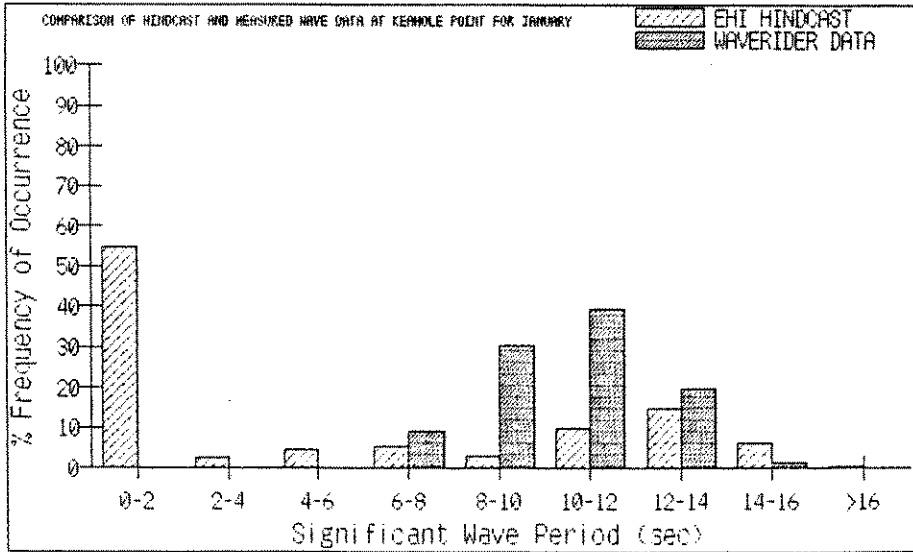
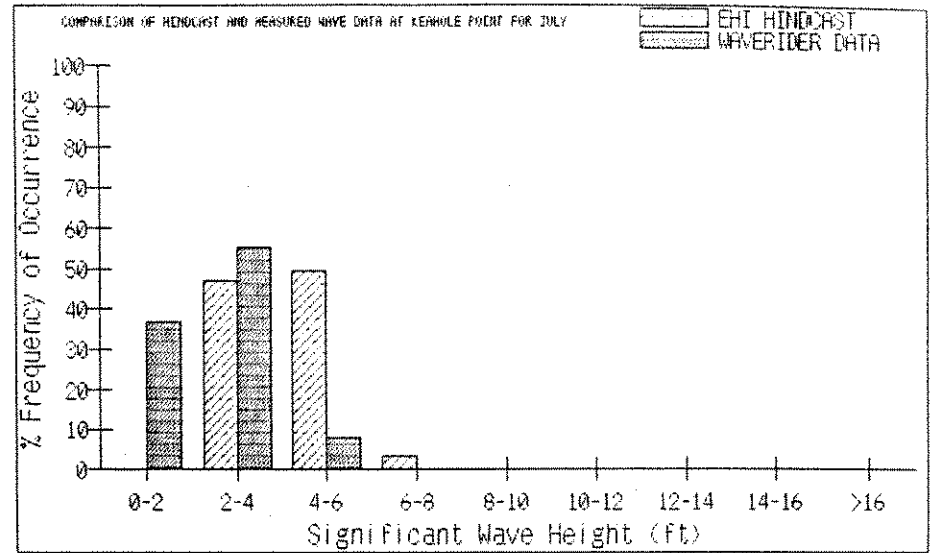
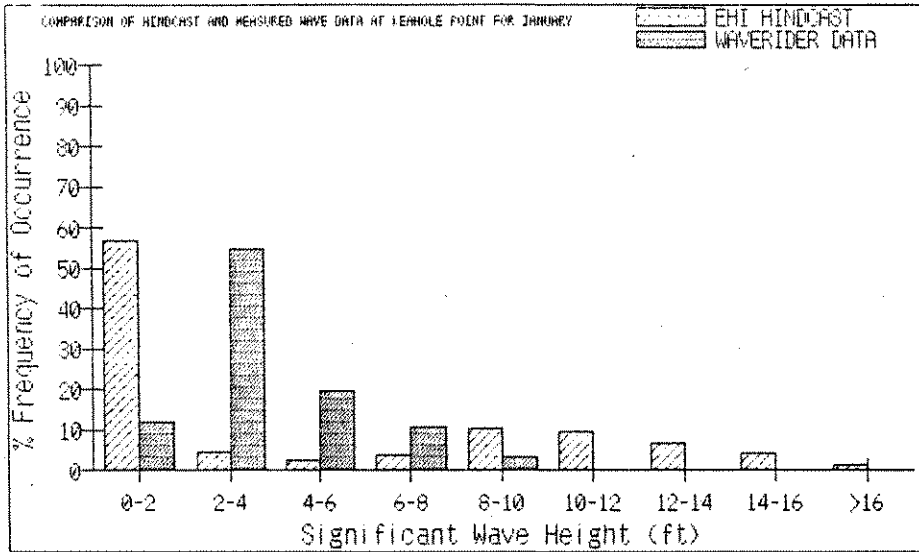


Figure 2. COMPARISON OF HINDCAST AND MEASURED WAVE DATA AT KEAHOLE POINT FOR THE MONTH OF JANUARY (from Edward K. Noda & Assoc., 1986)

Figure 3. COMPARISON OF HINDCAST AND MEASURED WAVE DATA AT KEAHOLE POINT FOR THE MONTH OF JULY (from Edward K. Noda & Assoc., 1986)



Point for the month of July, which is a typical "summer" month. The hindcast data reflects the predominance of south swell, with majority percentage of heights between 2-6 feet, and periods 12-14 seconds. The Waverider data shows a majority percentage of heights 2-4 feet, with periods generally less than 12 seconds. This is probably due to the local wind waves overshadowing the low, long-period southern swell waves.

In general, the Waverider data indicates a lesser percentage of large wave heights than the hindcast data. Figure 4 depicts the cumulative percentage of wave heights <4 feet on a monthly basis. While it may not be appropriate to say that the June 1984-May 1985 Waverider data reflects the wave climate for a typical year, the measured data is probably a more reasonable representation of the distribution of wave heights and periods than the hindcast data. Figure 5 shows the frequency of occurrence distribution of wave heights and periods on an annual basis. The hindcast data indicates that wave heights are less than 4 feet about 83% of the time during a typical year, while the Waverider data indicates that 94% of the time waves were less than 4 feet during the period June 1984-May 1985.

## 2.2 DEEPWATER DESIGN WAVE

The extreme wave heights due to infrequent storms and hurricanes are not reflected in the typical annual wave statistics. The evaluation of extreme waves is generally accomplished using statistical probability distributions of storm wave events. Large waves which can affect the site are generated by hurricanes, local Kona storms, or North Pacific swell.

The deepwater extreme wave parameters were recently evaluated by EHI for the Keahole area in support of proposed OTEC pipelines at the Seacoast Test Facility, NELH. Figure

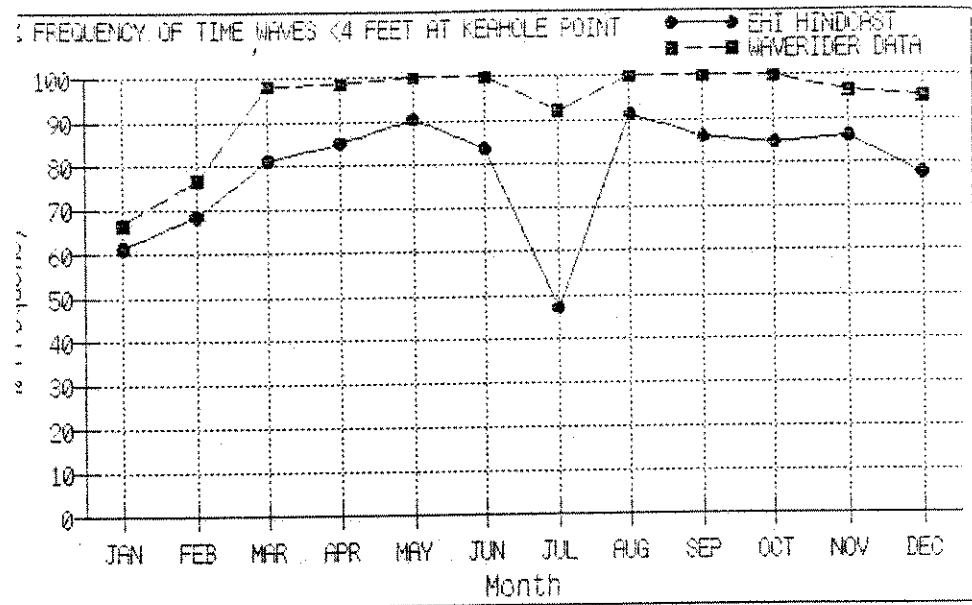


Figure 4. CUMULATIVE PERCENT OF TIME WAVES <4 FEET AT KEAHOLE POINT (from Edward K.Noda & Assoc., 1986)

H-7

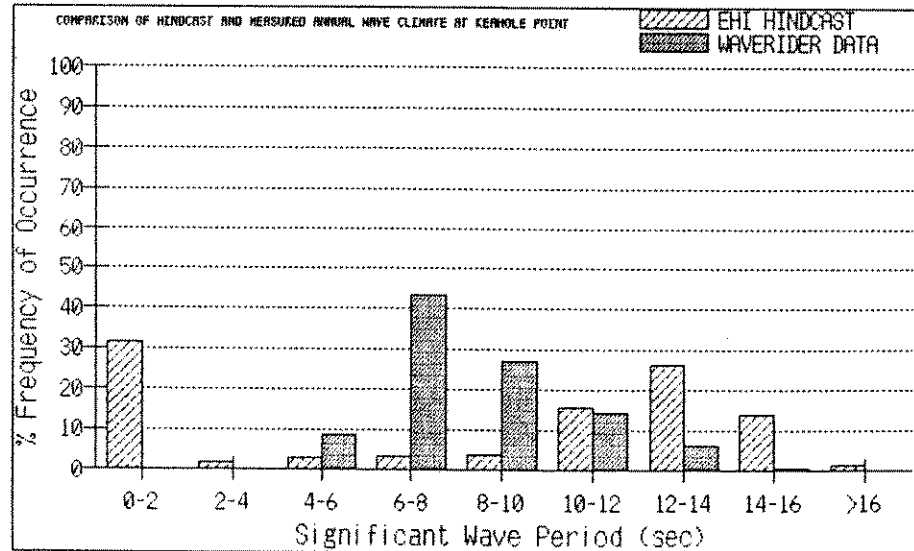
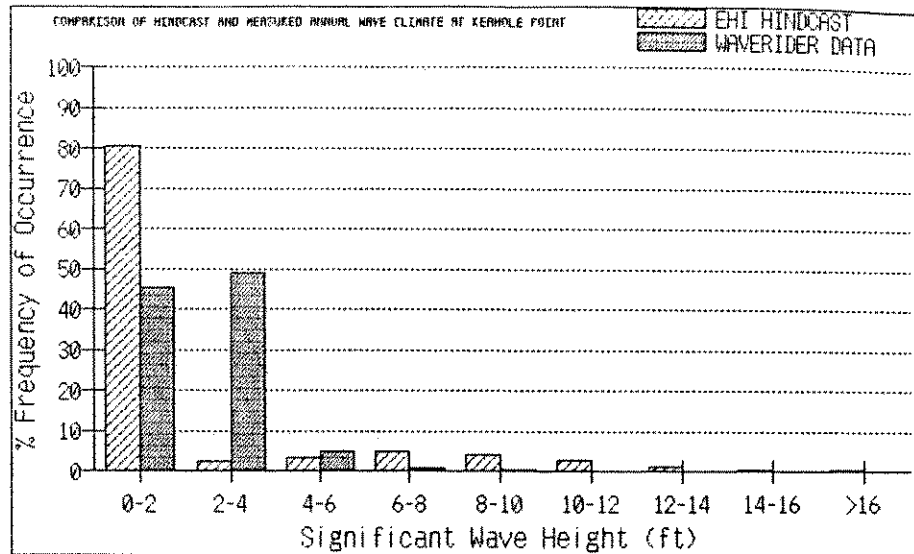


Figure 5. ANNUAL FREQUENCY OF OCCURRENCE DISTRIBUTION OF WAVE HEIGHTS AND PERIODS AT KEAHOLE POINT

6 depicts the wave height probability distributions for the three independent wave populations, as well as the joint probability distribution. The North Pacific storm waves dominate the low recurrence intervals while the hurricane waves dominate the longer recurrence intervals. Table 1 summarizes the joint probability distribution of wave heights for the 10, 25, 50, 75, 100 and 200 year recurrence intervals.

Table 1. Design Wave Parameters-Joint Distribution (from Evans-Hamilton, Inc)

Return Period (yrs)	H <sub>s</sub> <1> (ft)	H <sub>max</sub> <2> (ft)	T <sub>s</sub> <3> (sec)
10	21.0	37.8	8-18
25	23.0	41.4	8-18
50	24.6	44.2	8-18
75	25.7	46.3	8-18
100	26.4	47.5	8-18
200	28.2	50.8	8-18

- <1> H<sub>s</sub> = significant wave height
- <2> H<sub>max</sub> = maximum wave height = 1.8H<sub>s</sub>
- <3> T<sub>s</sub> = spectral wave period

The wave periods are not specifically defined for the joint probability design waves. It was recommended that a range of possible periods from 8-18 seconds be considered. The longer periods (14-18 seconds) are applicable to the wave approach directions for North Pacific swell (286-310°T), while the shorter periods (8-14 seconds) could apply to the entire wave approach sector for either hurricanes or North Pacific swell (160-310°T).

The distribution of extreme waves determined by EHI results in slightly lower wave heights than previously established by Bretschneider and Gerritsen for Kohanaiki. The latter recommended design wave heights to 30 feet corresponding to recurrence intervals of less than 100 years. The more recent EHI study indicates that these 30-foot waves have



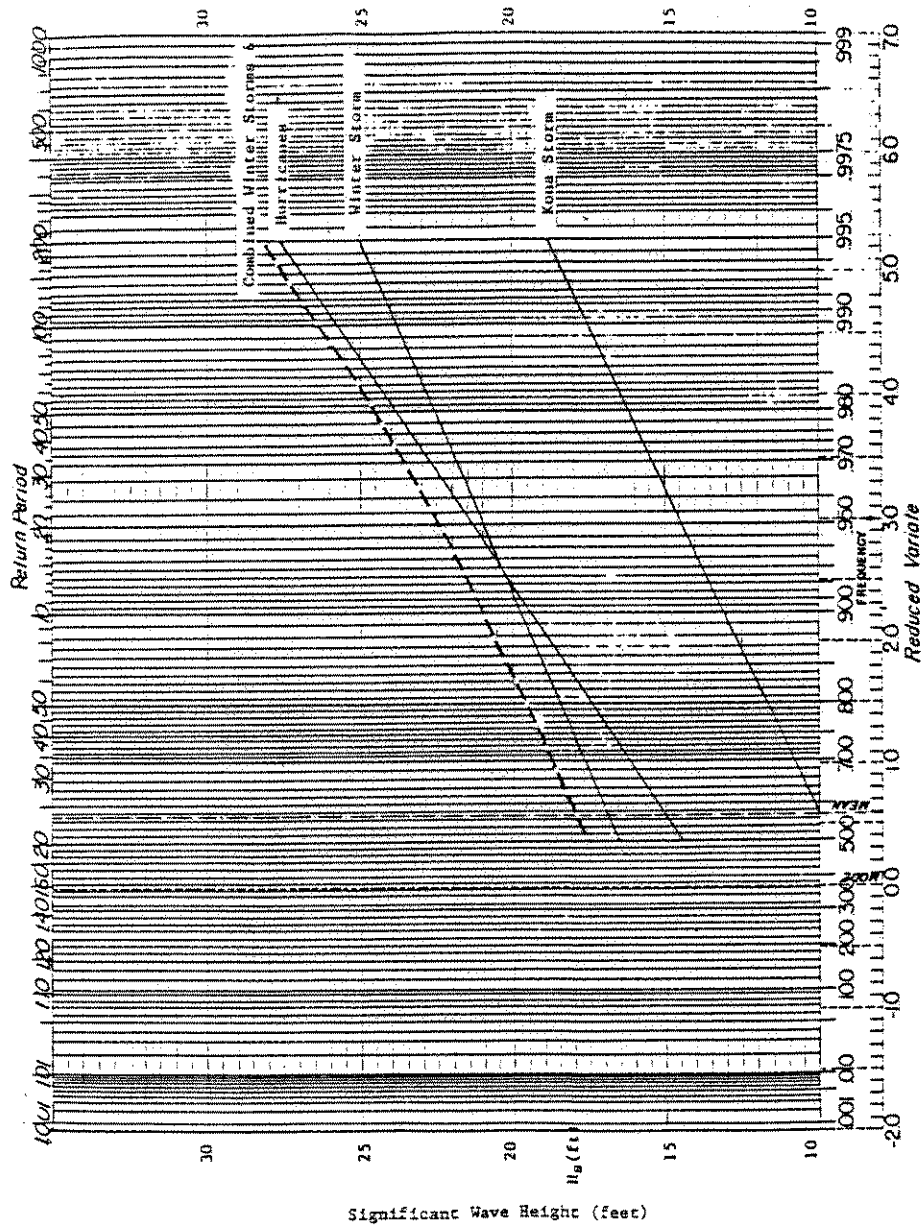


Figure 6. JOINT PROBABILITY DISTRIBUTION OF THE INDEPENDENT WAVE HEIGHT DISTRIBUTIONS (FROM EHI)

recurrence intervals in excess of 200 years. Design significant wave heights of about 25 feet would be more appropriate, considering the larger and more up-to-date data base used by EHI for the analysis.

Wave refraction and shoaling effects would modify the deepwater waves as they approach shore. In general, wave refraction effects tend to reduce the deepwater wave heights, while shoaling effects tend to increase the wave height just prior to breaking. Numerical computer models are available to evaluate the combined effects for specified wave periods and deepwater approach directions. This analysis is appropriate for later detailed design studies.

### 3.0 CURRENTS

#### 3.1 TYPICAL ANNUAL CURRENT STATISTICS

Currents at the site are comprised of the following components:

- Tidal currents
- Eddy currents
- Wind-driven circulation
- Background oceanic currents

The relative magnitudes of these components vary as a function of the distance from shore as well as vertically with depth. These currents would also be expected to vary alongshore since they are influenced by bathymetry and island effects. Current measurements taken near Keahole Point indicate that tidal and eddy currents are the dominant components in nearshore waters. More detailed descriptions of each of the current components are provided in the following sections.

While site specific current measurements may be required to characterize the relationship of each of the current components at Kohanaiki, available current data from directly offshore Keahole Point may be considered representative of the order-of-magnitude currents expected at the site. Appendix B contains percent frequency of occurrence distributions of current speed and direction as well as monthly statistics from an Aanderaa current meter which was moored in 350-foot water depth offshore Keahole Point (19°43.6N, 156°03.9W). The sensor was located 65 feet below the water surface. The data were decomposed into tidal and residual components using a least squares procedure, where the predicted tidal currents are subtracted vectorially from the raw signal (Edward K. Noda and Associates, 1986). The residual currents reflect short term eddy fluctuations as well as the long period eddy flows. Figure 7 shows the percent frequency of occurrence

distributions of current speed and direction for the entire data record from August 1983 to October 1985. Distributions are given for the measured currents, as well as the decomposed tidal and residual components. Figure 8 depicts the cumulative percent frequency of exceedence of these current speeds. Measured currents exceeded 50 cm/sec (approx. 1 knot) about 17% of the time. The maximum recorded current speed was 116 cm/sec. The higher speeds are associated with eddy events. Generally, the higher speeds have shorter durations. The maximum duration in which currents equalled or exceeded 100 cm/sec was about 4 hours. The maximum duration in which currents equalled or exceeded 50 cm/sec was 71 hours.

#### 3.2 EDDY CURRENTS

Strong eddy currents typically dominate the current regime offshore the Kona coast. Both cyclonic (counterclockwise) and anticyclonic (clockwise) eddies have been observed off the west coast of Hawaii, as well as eddy pairs. Patzert (1969) describes the hydrography and theoretical analysis of eddies observed west of Hawaii. Figure 9 locates the centers of observed eddies from 20 cruises that documented the hydrographic conditions of the eddies. Eddies were observed as close as 40 km from shore and as far away as 350 km from the islands. The eddy radius varies from 28 km for a weak eddy near Hawaii to 80 km for a well-developed eddy farther offshore. Eddy flows are shallow and generally confined to the upper 300 to 400 meters. It is postulated that strong tradewinds blowing through the Alenuihaha Channel and resultant wind shears in the lee of the island may be the mechanism for eddy formation. Formation time of the eddies is about 1-2 weeks for a weak eddy to a month for an intense eddy. Eddies can have lifetimes of two months or more before they decay.

Figure 10 shows a 1-week interval of measured currents

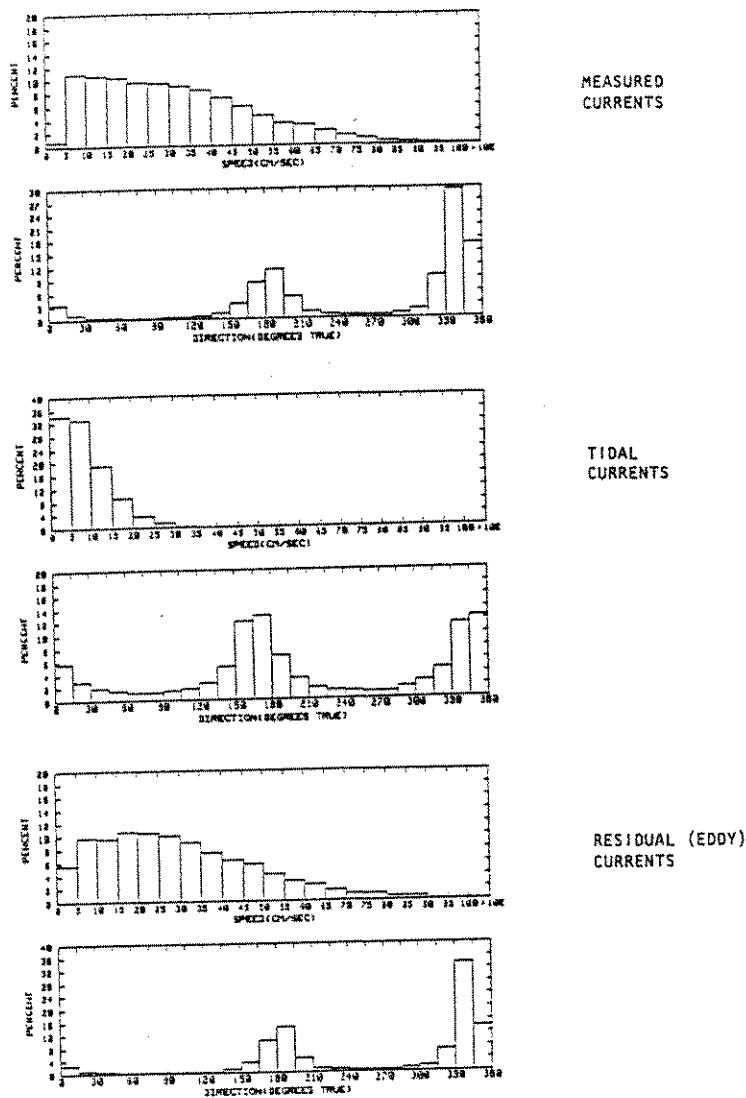


Figure 7 PERCENT FREQUENCY OF OCCURRENCE DISTRIBUTIONS OF CURRENT SPEED AND DIRECTION OFFSHORE KEAHOLE POINT ( $19^{\circ}43.6N$ ,  $156^{\circ}3.9W$ ), DISCONTINUOUS RECORD FROM AUG 83 TO OCT 85, METER DEPTH APPROX. 65 FT, WATER DEPTH 350 FT. (from Edward K. Noda & Assoc., 1986)

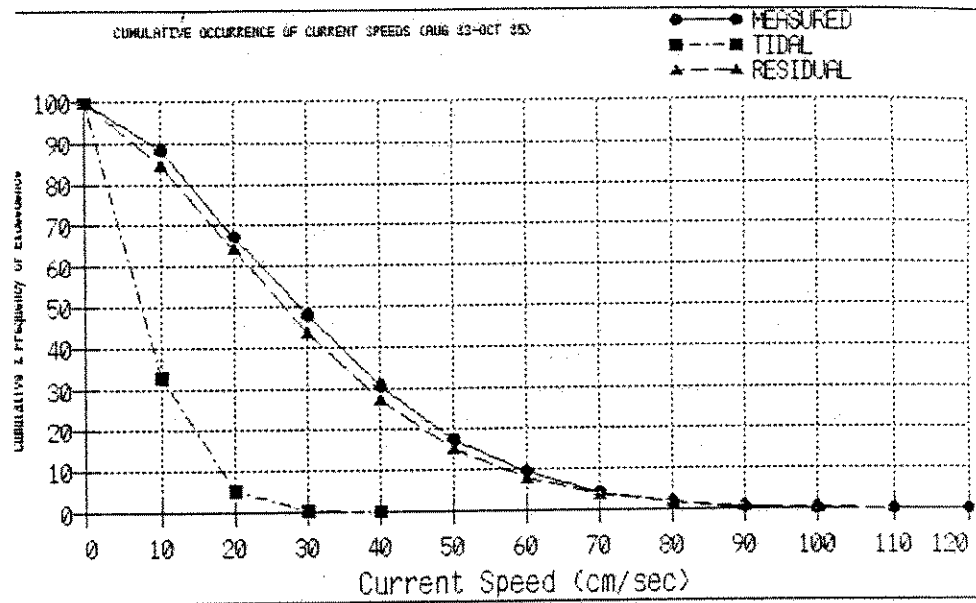


Figure 8. CUMULATIVE % FREQUENCY OF EXCEEDENCE OF CURRENT SPEEDS (from Edward K. Noda & Assoc., 1986)

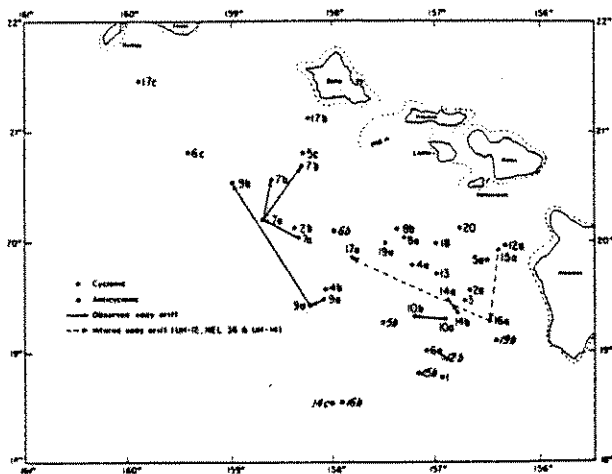


Figure 9. Location and drift of eddies in the lee of the Hawaiian Islands. The positions represent the centers of the eddies. (Patzert, 1969)

offshore Keahole Point from the Aanderaa current meter during a strong anticyclonic eddy event (Edward K. Noda and Associates, 1986). This eddy resulted in persistent southward flows with maximum speed of about 2 knots. Hourly vectors of the measured currents are given in the upper plot, the extracted tidal currents are shown in the next plot, and the residual eddy currents are given in the third plot. The Honolulu tidal heights are also depicted in the bottom plot. This strong eddy event lasted about one week before it dissipated or migrated out of the range of the current meter. Strong northward flows have also been recorded, and appear to be more predominant at this site than the southerly eddy currents.

The resultant currents in nearshore waters due to offshore eddies would be dependent on the eddy size and distance offshore, and the duration of eddy currents at the site would depend on the speed and direction of eddy migration. The maximum eddy current from the Aanderaa current meter data offshore Keahole Point was 109 cm/sec (2.1 knots) (Edward K. Noda and Associates, 1986). This current data is considered representative of the shelf region between water depth of 100-400 feet. In very nearshore waters less than 100 feet deep, eddy currents are expected to be less. Current data obtained over a one-year period on the north side of Keahole Point in water depth of 100 feet (on the nearshore slope region) indicated a maximum speed of 76 cm/sec (1.5 knots) (Edward K. Noda and Associates, 1986).

Current data obtained offshore Kaiwi Point south of Honokohau Harbor and offshore the old Kona airport (Sea Engineering Inc, 1985) also show the prominence of eddy flows. Both northerly and southerly eddy currents were observed superposed on the reversing tidal currents. Maximum measured speed was 85 cm/sec for a current meter located in 483-foot water depth off Kaiwi Point (meter depth 85 feet, September 83-January 84). Maximum measured speed

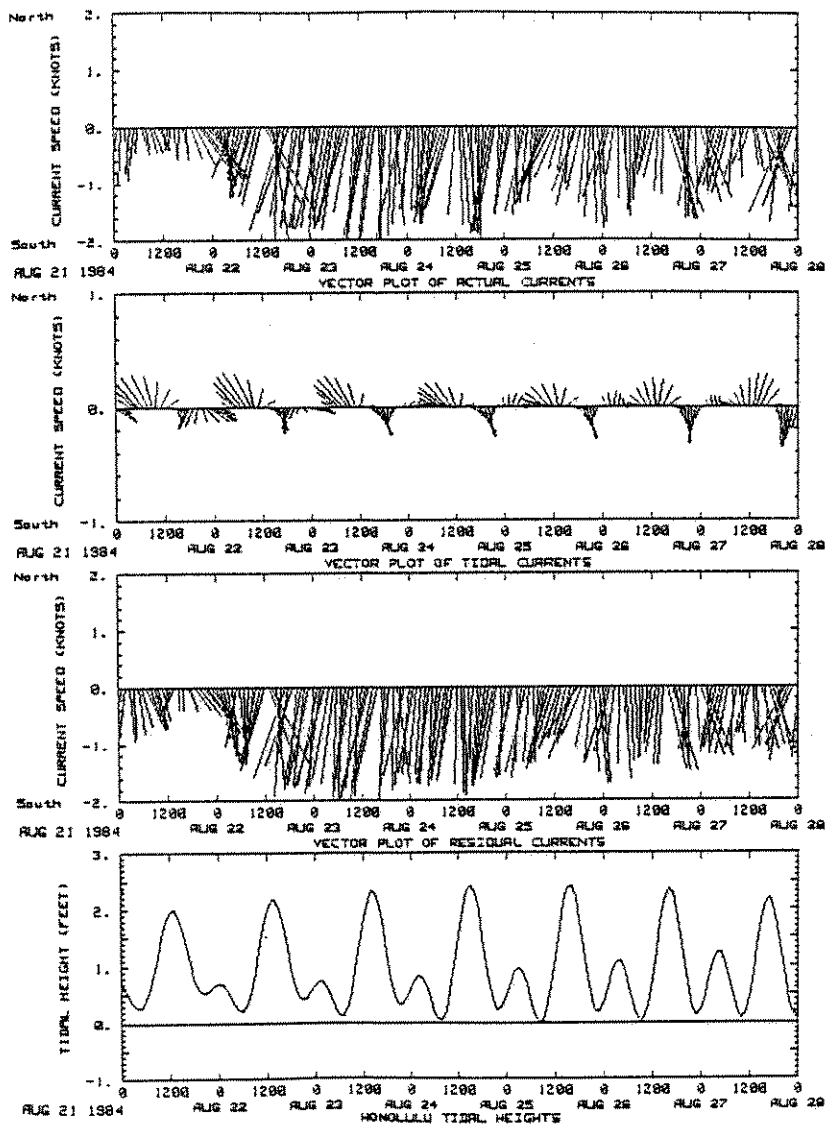


Figure 10. TYPICAL STRONG EDDY CURRENTS OFFSHORE KEAHOLE POINT,  
21-28 AUGUST 1984, AANDERAA CURRENT METER DEPTH  
65 FEET, WATER DEPTH 350 FEET

22

for a current meter located in 400-foot water depth offshore the old Kona airport was 123 cm/sec (meter depth 120 feet, April 84-September 84). Maximum measured speed for a current meter located in 260-foot water depth offshore the old Kona airport was 51 cm/sec (meter depth 100 feet, April 84-September 84).

### 3.3 TIDAL CURRENTS

In the absence of eddy currents, tidal currents typically dominate the nearshore current regime. Figure 11 shows a one-week interval of measured currents offshore Keahole Point from the Aanderaa current meter during strong tidal currents and no significant eddy event (Edward K. Noda and Associates, 1986).

Tides are mixed semi-diurnal with diurnal inequality. The tidal currents are rotary in nature, with the nearshore tidal currents tending to flow parallel with bathymetry contours. Along the Kona coast, flood tide currents are northerly while ebb tide currents are southerly. From the Aanderaa current data offshore Keahole Point, both the semi-diurnal and diurnal tidal ellipses were oriented in a north-south direction, with approximately the same amplitudes. Maximum tidal current speed (from the least squares analysis of the data) was 36.3 cm/sec (0.7 knots) (Edward K. Noda and Associates, 1986).

### 3.4 WIND-DRIVEN CURRENTS

Wind-induced currents are caused by direct wind stress on the water surface. The Kona coast is sheltered from the strong-persistent tradewinds, and the winds are predominantly land-sea breezes caused by the diurnal heating and cooling of the land mass. Wind-driven surface currents are about 2-3% of the wind speed, and therefore are typically quite weak compared to the eddy and tidal



#### 4.0 TECHNICAL FEASIBILITY OF PROPOSED MARINA

The presently proposed marina is approximately one-half the size of Honokohau Harbor. Marina features include a 100-foot wide entrance channel and berths for about 150 boats.

The ocean engineering study accomplished in 1970 evaluated the technical feasibility of a much larger marina. The study recommended an entrance channel location and marina features to minimize adverse wave exposure and to provide sufficiently quiet conditions in the harbor basin. The presently proposed marina entrance is in the same location as previously recommended. The entrance channel is somewhat protected from west-northwesterly waves, but is directly exposed to southwesterly waves. Due to the much smaller scale of the present marina, wave attenuation features in the vicinity of the entrance channel cannot be as extensive as recommended by the 1970 report.

The 1970 report recommended a dissipation basin with wave spending beach, about 400 feet of wave absorbers lining the entrance channel, and stub breakwater. While detailed engineering studies would be required for final design and layout of the marina and entrance channel, the present scaled-down marina plan is conceptually feasible from a technical viewpoint. Possible alternatives for minimizing wave energy within the marina are conceptually shown in Figures 12A, 12B, and 12C.

Figure 12A provides a stub breakwater to block wave energy from the southwest. The entrance channel approach is from the south, with a change in direction at the entrance to the marina basin to prevent the southerly waves from entering the harbor. This plan minimizes the possibility of breaking or shoaling waves at the marina entrance.

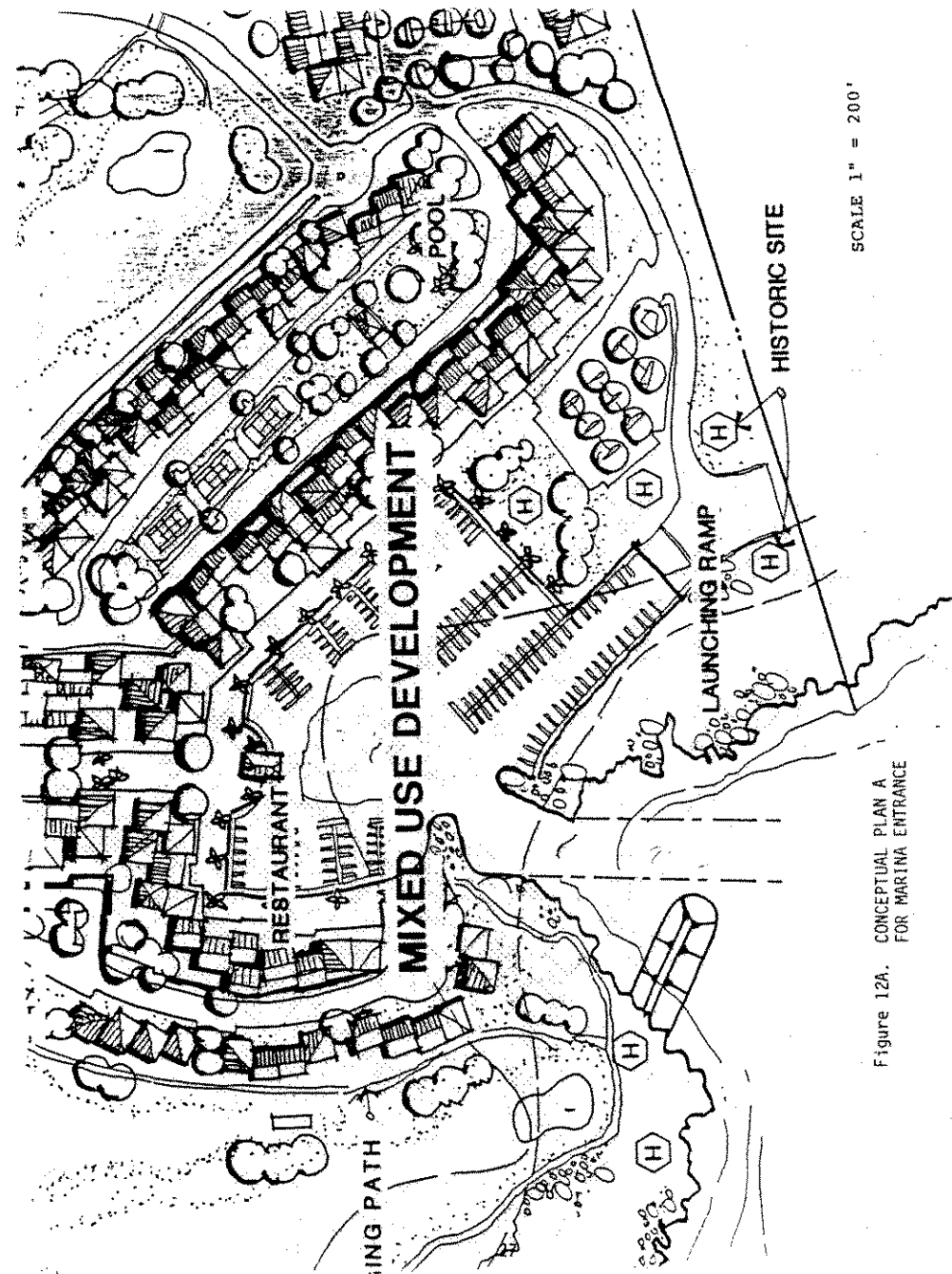


Figure 12A.  
CONCEPTUAL PLAN A  
FOR MARINA ENTRANCE

SCALE 1" = 200'

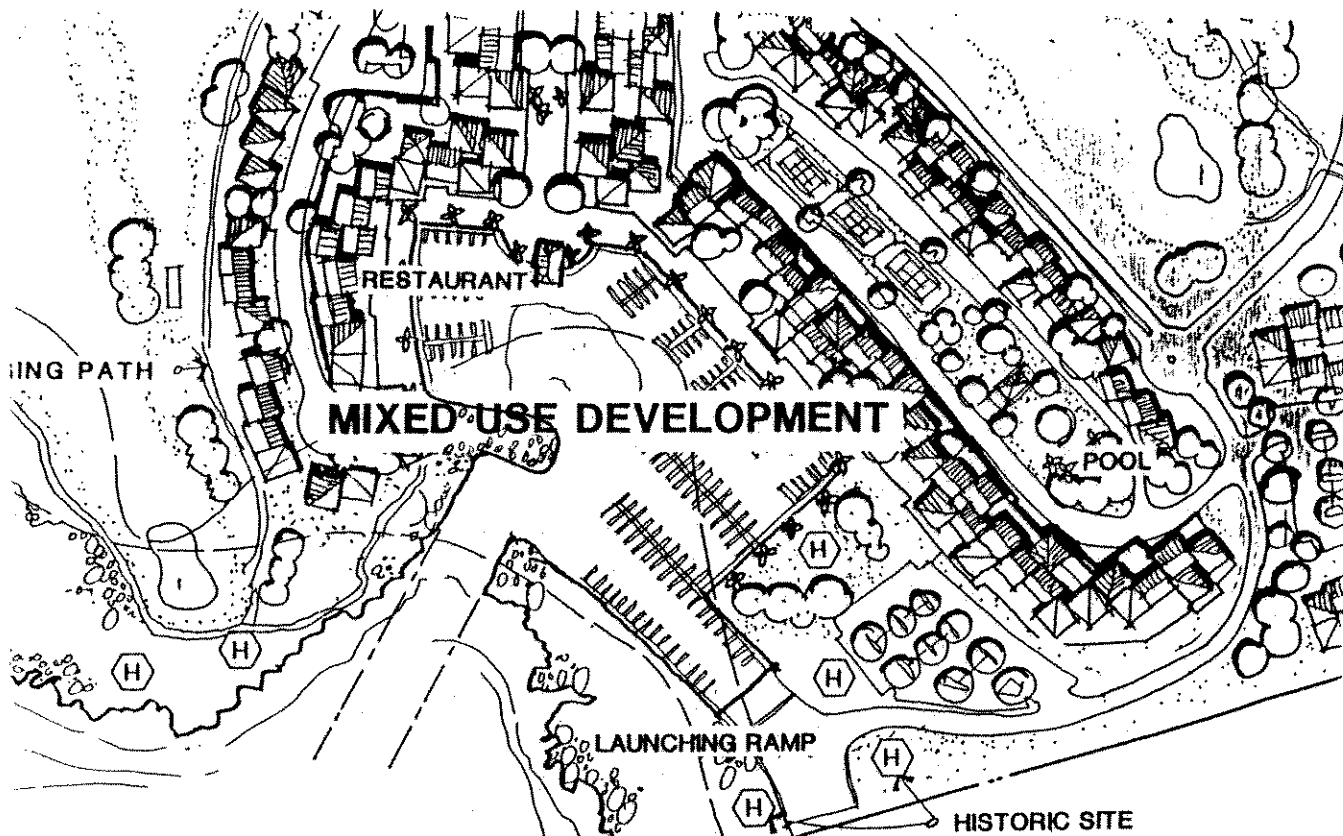


Figure 12B. CONCEPTUAL PLAN B FOR MARINA ENTRANCE

SCALE 1" = 200'

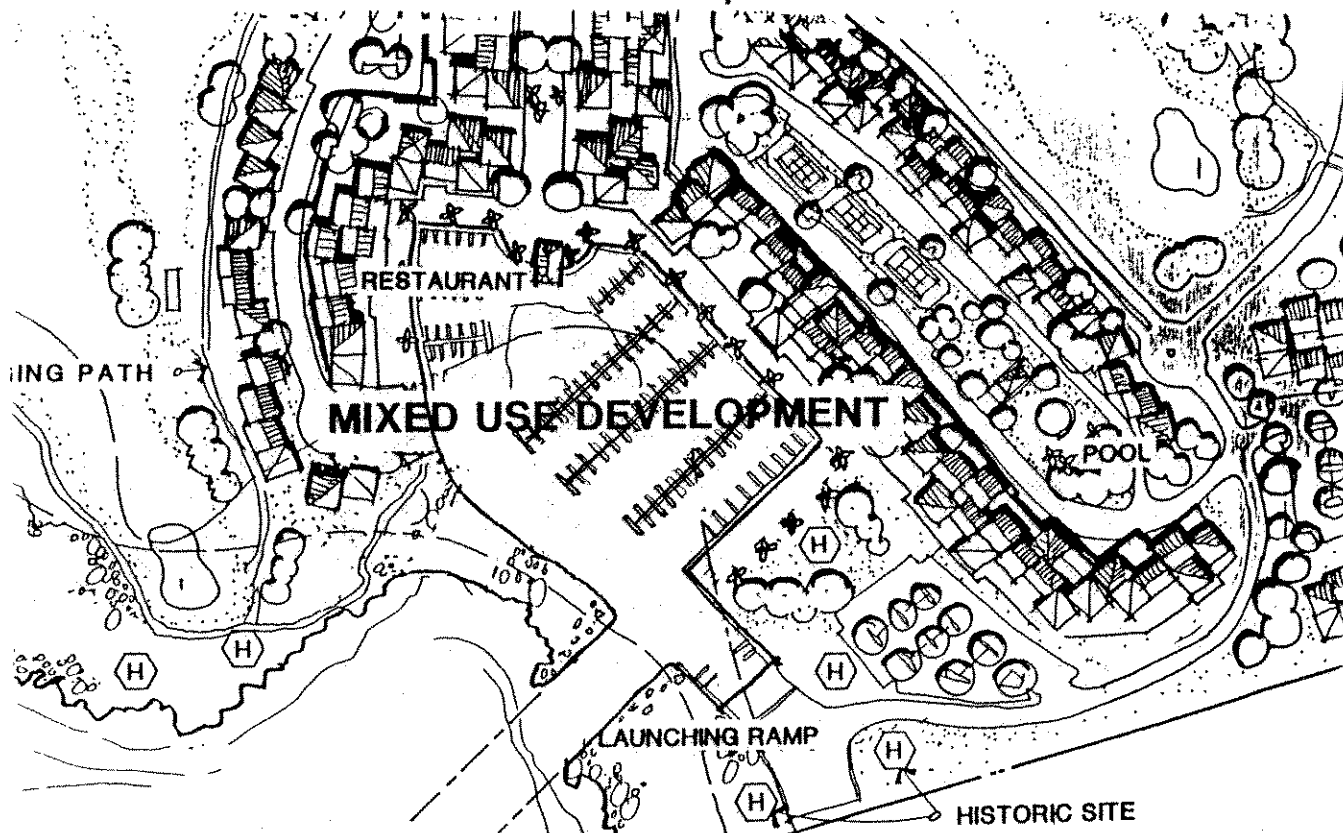


Figure 12C. CONCEPTUAL PLAN C FOR MARINA ENTRANCE

SCALE 1" = 200'



Figure 12B provides a southwesterly channel approach with a change in direction at the entrance to the marina basin. Since no offshore protective structures are provided, the jog at the entrance is more severe than in Plan A since incoming wave energy must be blocked from the interior basin. Due to the potential for large breaking waves at the coast near the entrance channel, it is recommended that no berths be permitted within about 100 feet from the entrance.

Figure 12C provides a southwesterly channel approach at the south end of the marina, with a change in direction at the entrance to the marina basin. This plan provides better navigation aspects than Plan B. Also, since the main basin is oriented away from the incoming waves, this plan provides the best potential for quiet conditions within the marina basin. However, for this reason, flushing characteristics are poorer than with the other alternative plans.

Due to the relatively small water area, circulation and flushing within the marina should not be a significant problem. As with Honokohau Harbor, groundwater flows into the basin can probably be expected to enhance flushing.

## REFERENCES

- Bretschneider, C.L. and Gerritsen, F. (1970), "Ocean Engineering Environment and Hydraulic Characteristics of a Proposed Small Craft Harbor for Kohalaiki, HI".
- Edward K. Noda and Associates (1986), "Hawaii Ocean Science and Technology Park, First Increment Design, Oceanographic Criteria for Design and Deployment of the Cold Water Pipe System", prepared for R.M. Towill Corp.
- Evans-Hamilton, Inc. (undated), "Design and Operational Meteorological/Oceanographic Criteria for the Seacoast Test Facility Sea Water Pipelines", prepared for Energy Technology Engineering Center, Rockwell International Corp.
- Marine Advisers (1964 rev.), "Characteristics of Deep-Water Waves in the Oahu Area for a Typical Year", prepared for the State of Hawaii, Department of Transportation.
- Moberly, R. and Chamberlain, T. (1964), "Hawaiian Beach Systems", Hawaii Institute of Geophysics, Univ. of Hawaii, HIG-64-2.
- National Climatic Center (1971), "The Summary of Synoptic Meteorological Observations (SSMO) - Hawaiian and Selected North Pacific Island Coastal Marine Areas, Vol. 1, Area 1", NOAA.
- National Climatic Center, "Spectral Ocean Wave Model (SQWM) Data", NOAA (unpublished).
- Patzert, Wm. C. (1969), "Eddies in Hawaiian Waters", Hawaii Institute of Geophysics, Univ. of Hawaii, HIG-69-8.
- Sea Engineering, Inc. (1985), "Kealahou Ocean Outfall, Ocean Data Collection Program, Final Report", prepared for R.M. Towill Corp.
- U.S. Army Corps of Engineers, "Coastal Data Information Program", Scripps Institution of Oceanography, Nearshore Research Group, La Jolla, CA.
- Waterways Experiment Station, "Wave Information Studies", U.S. Army Corps of Engineers, as contained in Evans-Hamilton, Inc. (undated).

**I. PUBLIC ECONOMIC BENEFIT STUDY FOR THE PROPOSED  
KOHANA-IKI RESORT**

The  
Hallstrom  
Appraisal  
Group,  
Inc.

James E. Hallstrom, Jr., MAI, SRA  
Donald L. Hallstrom  
Brian S. Goto, SRA  
Randolph K. Hines, SRA  
Tom W. Holliday  
Roberta O. Ishikawa  
James S. Odano  
Abne C. Rost  
Lawrence A. Lovensan  
Michael W. Wilson  
David K. Matsumoto

June 24, 1986

Mr. Mark H. Hastert  
Helber, Hastert, Van Horn & Kimura  
Grosvenor Center  
PRI Tower, Suite 2590  
Honolulu, Hawaii 96813

Public Economic Benefit Study  
for Proposed Kohanaiki Resort

Dear Mr. Hastert,

I  
At your request, we have completed a summary analysis of the potential public costs and benefits that may inure as a result of the development of the proposed Kohanaiki destination resort community to be located near Keahole Point, North Kona, Hawaii. The project is preliminarily planned to contain a total of 700 hotel rooms, 800 condominium units, as many as 75 to 80 single family residences, support housing, a commercial center, and a variety of recreational, historic, and scenic amenities which will contribute to the quality resort industry being developed along the Kona-Kohala shoreline.

The subject site contains a total of 470.13 acres, and is identified on State of Hawaii Tax Maps as Third Division 7-3-09, Parcels 3 and 16. It is situated approximately 7 miles north of Kailua-Kona Village, circa one mile south of the Keahole Airport facility. Over the past year, The Hallstrom

Mr. Mark H. Hastert  
June 24, 1986  
Page 2

Appraisal Group, Inc., has prepared a variety of objective, comprehensive studies analyzing the potential market demand for subject development and a Highest and Best Use analysis addressing favorable land use types and densities. It is our assumption, that the reader of this letter has access to and is familiar with these previous reports.

**Purpose and Function of the Letter.** The purpose of this letter is to delineate the areas in which the proposed subject resort development will potentially impact the sphere of public agency resources and quantify (where possible) the costs of providing enhanced services versus the economic benefits that accrue to the community through increased tax payments and other capital infusion.

In order to complete this assignment we have interviewed spokespersons for various governmental agencies regarding the need and costs for additional public services (or impact on existing facilities), and projected the increase in tax levies which would flow to the County and State coffers as a result of the subject's improvement. Ideally, the direct and indirect tax and community economic benefits would more than offset the need for increased outlays for public services. Within this letter we also address other indirect and non-economic issues such as increase in employment opportunities and achievement of stated public goals.

The function of this letter is to provide a summary of direct costs/benefits to the Big Island community as-a-whole resulting from the construction of the Kohanaiki resort project. It is our understanding that all or portions of this letter may be incorporated into governmental land use

Mr. Mark H. Hastert  
June 24, 1986  
Page 3

change applications currently being prepared by yourselves and other developer representatives.

We have made a variety of assumptions regarding the level of commitment anticipated by the developer in enhancing public services to the subject community through contributions, improvements or otherwise. These assumptions are based on the historic actions of other West Hawaii and statewide resort projects, and are not necessarily indicative of specific commitments made in regard to the proposed subject development. Should the Kohanaiki developer be willing to incur additional service enhancements beyond those addressed herein, or fail to provide them, the conclusions of our study would require adjustment.

The research, analysis and opinions comprising this assignment are subject to the standard limiting conditions and assumptions of The Hallstrom Appraisal Group, Inc., in addition to any others which may be contained herein or within previous documents prepared regarding the proposed Kohanaiki resort. All work undertaken has been completed according to the Standard Practices of the American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers.

Introduction. The body of our study is divided into three sections. The first discusses the potential impacts of the proposed resort project on various integral public services, such as fire and police protection, water service, access and other minor concerns. Costs of providing/altering services and ways the developer may mitigate such costs are also addressed.

Mr. Mark H. Hastert  
June 24, 1986  
Page 4

The second section estimates the increased direct tax payments to the County and State arising from subject development in the form of Real Property Tax roll increases and additional excise tax revenues. Indirect economic benefits, including enhanced regional employment opportunities (through construction and operation of the resort), subsequent income and other tax revenue increases, and other community benefits are summarized.

A cursory review of intangible impacts of the resort project on stated community goals comprises the third section of our study. Such issues as desirability of development of pristine space versus increased public shoreline access, and the "fit" of the proposed subject development within County land use plans are the primary concerns. Secondary issues include whether the project fills any unmet community needs, and its impact on creating the "critical mass" of tourism development needed to enhance the standing of West Hawaii in the visitor industry.

#### SECTION I: POTENTIAL PUBLIC COSTS

There are six areas of public concern that could potentially be impacted by the proposed subject resort development by requiring enhanced services or infrastructure facilities which may result in a cost to the community. The items are: police protection, fire protection, water service, access from existing roadways, availability of parks, and public education needs.

Each of these items is addressed in the ensuing paragraphs, with concern given to parameters of service enhancement,

Mr. Mark H. Hastert  
June 24, 1986  
Page 5

costs of such enhancement, developer funded alternatives, and overall level of impact on the Kona community.

Indirect costs to the community, such as public services required by the employees of the resort, are not considered in this analysis

#### Police Protection

According to Inspector Glory of the County of Hawaii Police Department, the department is required by law to answer all calls which may arise within the proposed subject resort community whether or not there are personnel increases made to the already taxed police force in the Kona District. However, due to the extent of the increasing demand for services in the Kailua to Keauhou urban corridor, any additional needs resulting from the Kohanaiki development would result in a "stacking of calls" were additional personnel not made available.

Although the inspector noted that funds for five additional positions (four patrolmen, one inspector) have been allocated by the County, he stated that this would still be insufficient to effectively meet the anticipated increase in the number of calls, resulting from both the general growth sector and any subject development, in a timely manner. Currently, the department does have regular beats covering the Keahole Airport during congested periods.

It is doubtful, particularly during the first phases of development, that the proposed subject resort would require a full-time patrolman on the premises, or result in

Mr. Mark H. Hastert  
June 24, 1986  
Page 6

sufficient numbers of call to justify such an allocation. Also, the security staff of the resort would be anticipated to help mitigate the problems created by minor disturbances which would likely comprise the bulk of the Police services need. Yet, the inspector is of the opinion that a full-time position would be required were the corridor stretching from Keahole Point to Kailua-Kona developed as currently envisioned, with several resorts (including the subject), an increase in industrial areas at Kaloko and the Kona Industrial Park, the expansion of Honokohau Harbor, and the development of the proposed National Historic Park.

According to Glory, the current cost of providing one individual patrolman on service is approximately \$42,000 per year, this includes wages, benefits, overhead and equipment. One full-time position consists of five individual patrolmen working in three daily shifts throughout the week. Thus, the cost of one full-time position is circa \$210,000 annually.

For the purpose of our study, and acknowledging the difficulties associated with estimating service demands in less than one-full individual, we have assumed that calls for service equivalent to one-quarter full-time patrolman position will be required upon the completion of the first hotel within the subject development, increasing to and stabilizing at the need for one-half of a full time position upon the completion of the second hotel facility. During the first phase, this would equate to \$52,500 annually (in constant, current dollars), increasing to the stabilized level of \$105,000 per year expenditures by the County for Police protection for the subject. In all likelihood, this

Mr. Mark H. Hastert  
June 24, 1986  
Page 7

estimate is very liberal, as there is little probability that patrolman efforts for the proposed subject resort would be required for six or twelve hours daily, respectively.

#### Fire Protection

As with police services, the fire protection facilities in the North Kona region are already taxed to the limit according to County of Hawaii Deputy Chief Don Coloma. The existing station at the junction of Palani Road and Queen Kaahumanu Highway, approximately 6 to 7 miles south of the subject, is insufficient to meet the projected demand resulting from increased development throughout the region encompassing the subject.

Because of the existing need for service enhancement, the impact of the subject development would be more extensive than merely acquiring additional personnel or equipment, a new station house would be recommended. Also, as stressed by the deputy chief, fire insurance costs for improvements (particular for capital intensive projects such as hotels and condominiums) increase dramatically the further the structure is from a fire station, especially if outside a five mile radius.

In light of the insurance savings, tax breaks associated with improvement, and confidence instilled by the proximity of service, the Mauna Lani Resort formed a co-op of the South Kahala resort developers to fund construction of a fire station on a donated parcel near the Mauna Lani resort. The cost of development (not including the donated land) was \$1.1 million dollars, according to Coloma, for a three bay

Mr. Mark H. Hastert  
June 24, 1986  
Page 8

station, furnishings and fixtures other than fire-fighting equipment. The co-op also purchased a \$70,000 medical unit. Beyond the facility, the County will spend \$416,751 Coloma said for the necessary engines and other equipment as a start-up cost.

A minimum of four persons per shift (one officer and three drivers/firemen) are required to man such a facility, but due to the scheduling efficiencies of fire service, a total of only 12 persons are needed to man the station on a full-time basis. As with police personnel, the cost of maintaining one fireman in-service is circa \$42,000 annually. Or a total of approximately \$504,000 per year for a station as is being cooperatively developed by the South Kohala resorts.

It is doubtful if the planned subject resort could justify the expense of constructing an on-site fire station on an individual basis as part of the first phase of development. However, it is likely that a similar co-operative as found in South Kohala would be formed in the Keahole Point region among the subject and other resort or other developments should they be approved. Such a station would benefit the County by providing service to the subject, other coastal developments, and the Kalaoa residential subdivisions which are currently on the fringe of effective fire protection services.

For the purpose of our projections, we have assumed that fire protection services for the Kohanaiki community will be improved in a similar fashion as was followed at Mauna Lani and its co-operative partners, i.e. with in-house services

Mr. Mark H. Hastert  
June 24, 1986  
Page 9

(as much as possible) until the planning/construction of the second hotel/resort expansion phase commences, and then subsidizing a facility on-site or in the near vicinity. Thus, immediate cost to the County upon the beginning of subject development will not be substantial, but will place additional burdens on the existing facilities; upon construction of the fire station (prior to second hotel development) the County would be liable for start-up equipment purchases of approximately \$420,000 and personnel costs of \$504,000, in current dollars.

As the co-operatively improved facility would also service nearby developments, not all of the start-up and operational costs would be attributable to the subject development. We have therefore assumed that one-half of the costs will be ascribed to the proposed destination resort, or roughly \$210,000 prior to the construction of the second hotel in start-up cpst, and \$252,000 in personnel expenses on an annual basis thereafter.

#### Water Service

As discussed in our previous study on the subject, prepared by ourselves and others, the resort would be able to receive public water supply were there sufficient water resources available. Although the problems affecting current supply are being resolved in a timely manner, the difficulty lies in transmission. There is a 16" line along Queen Kaahumanu Highway which would be substantial enough for subject use, however, the line terminates at Honokohau Small Boat Harbor, and continues on thereafter (to the airport) as a 12" line,

Mr. Mark H. Hastert  
June 24, 1986  
Page 10

which has insufficient capacity for the proposed Kohanaiki development.

According to Mr. Quirino Antonio, Jr., Staff Engineer with the County of Hawaii Water Supply Department, should the subject seek County supply (if available) the developer would have to fund the cost of any transmission line enhancement necessary to transport the water to the site. The line would be the County property, and the developer unable to recoup capital investment from any subsequent developments which would share the expanded line.

Therefore, there would be no additional costs to the County in regards to supplying water to the subject. It is assumed that the individual unit hook-up costs currently estimated at circa \$4,000 per unit would more than offset any source (well) development costs. In this regard, the County may, in fact, profit slightly from supplying water service to the subject both by having the developer pay for any line expansion (which could serve later developments), and through the hook-up costs, which also include a allocations for transmission and storage that may not be required for the subject.

#### Access

Queen Kaahumanu Highway is designed to be a limited-access, high-speed, high-volume roadway, as described at-length in foregoing analyses of the proposed Kohanaiki development. Although a substantial amount of long-term development in the Keahole Point area may provide an impetus for expansion

Mr. Mark H. Hastert  
June 24, 1986  
Page 11

of the existing roadbed from two to four lanes, this is not foreseen for many years by the State.

The subject site has the right to access onto the highway via an 80-foot wide easement from parcel 7-3-9-16 (which was acquired for this purpose). The financial responsibility of improving the access, complete with turnpockets and accel-decel lanes, lies entirely upon the developer, and not with any governmental agencies.

According to Mr Bruce McClure, District Design Engineer for the State of Hawaii Transportation Department Division Right-of-Way, Hawaii County Division, who was interviewed during our original study, the cost of developing such a "fully-channelized" intersection is currently circa \$200,000 to \$500,000. He noted the State is stringent regarding improvement of the intersections, and will not move the designated access easement from the points delineated on the existing maps except under rare circumstance.

In our projection process, we have therefore not included any costs to the State of County for access development, as the existing roadway is sufficient for the proposed subject's resort use, and the cost of constructing access ways is entirely borne by the developer.

#### Parks and Recreation

Preliminary subject plans call for a public oceanfront park as part of the Kohanaiki resort community, thus enabling ease of access to the shoreline, which is currently difficult for the average Big Island citizen to reach. As

Mr. Mark H. Hastert  
June 24, 1986  
Page 12

discussed following this is in keeping with the goals of to increase public oceanfront access.

Both the Mauna Lani and Waikoloa Beach Resorts have self-developed public parks and shoreline trail systems to enhance oceanfront access. According to Pat Engeljard, a supervisor with the Hawaii County Parks and Recreation Department, these facilities are maintained by the respective resort developers at no cost to the County. She stated the County would pursue the establishing of a public access area in any major proposed shoreline development, but would likely request that the developer maintain the park as do the two resorts cited.

We have therefore concluded that the County will absorb no additional expenses as a result of the development of a public access park area within the planned subject project, that all costs will be borne by the developer.

#### Education

In our opinion, it is highly unlikely that the proposed subject resort community will be the residence for a significant number of school-age children, as evidenced in resort projects throughout the state. As such, we do not foresee the need to expand any existing facilities as a result of its construction, and it is doubtful that any overcrowding of classrooms (beyond current levels) would ensue.

Should public education services be required, transportation to the schools, not facility or faculty enhancement, is the



Mr. Mark H. Hastert  
June 24, 1986  
Page 13

only conceivable cost factor. We note that school buses already extend their routes into the Kona Palisades subdivision, less than four miles from the subject site, and it is probable that re-routing of one bus would be more than sufficient to handle any demands created by the Kohanaiki development at minimal cost.

Thus, our cost projections do not contain any allowance for public costs resulting from the need for public education services.

#### Summary

Based on our analysis, we foresee only two areas of significant public expenditures associated with the proposed subject development, for police and fire protection.

In regard to police protection, we have estimated the cost (in current dollars) at circa \$52,500 per year during the first phase of development, increasing to a stabilized level of \$105,000 annually upon the completion of the second phase of development (after the second hotel is open for occupancy).

For fire protection services, we do not forecast any appreciable expenditures by the County during the first phase of development. However, assuming a co-operative auxiliary fire station is constructed in the area by the subject and other developers, prior to completion of the second phase of subject development, the County would incur start-up costs at that time of approximately \$210,000 which

Mr. Mark H. Hastert  
June 24, 1986  
Page 14

would be ascribed to the subject, and a proportionate subject share of \$252,000 in annual operating expenses.

We note, that these assumptions are quite liberal, in that service arising from subject development of a fire station facility and enhanced police protection would benefit an increasing number of residents and developers in the Keahole Point area other than the subject, which is being ascribed a large portion of these service increases.

#### SECTION II: POTENTIAL PUBLIC FINANCIAL BENEFITS

There are four areas in which the state and County purses will benefit from the proposed subject development: through increased property tax revenues, excise tax on the various operations of the resort, state income taxes paid by the employees, and the other tax collections arising from the expenditure of employee wages and purchased goods which trickle through the local economy. Income and other taxes arising from wages paid to construction workers was not included in this study, because it is unknown the number of workers which will be required for the various development phases, and the length of their time of employ at the site. However the tax revenues generated by the efforts of these workers could be substantial.

We have constructed a 15-year cash flow model to depict the levels of public tax income generated by the first three levies listed above. The model is displayed on Table 1.

All revenues and expenses shown ARE IN CURRENT DOLLARS, being based upon the tax rates, estimated expenses, property



Mr. Mark H. Hastert  
June 24, 1986  
Page 15

values and income levels existing at the time of our study. As such, the THE REVENUES ARE LIKELY TO BE UNDERSTATED over time, as typically, tax rates, property value appreciation, vacation costs, and workers wages increase more rapidly than the general rate of inflation.

For the purpose of forecasting revenues we have made the following assumptions:

Property Tax

We have assumed that County zoning will be approved for the entire resort at one time, and the construction will begin on the first phase as soon as zoning approvals are granted. We have also assumed zoned hotel acreage will be assessed at circa \$750,000 per acre, multifamily acreage at \$500,000 per acre, single family residential at \$180,000 per acre. Commercial acreage was assumed to be assessed at \$250,000 per acre, and the marina (for the purpose of this study supposed to be improved during the first phase of development) at the aggregate sales value of the individual slips. All remaining acreage (for the golf course and other recreational areas, which will remain designated as open spaces) and the support housing acreage was assumed to be assessed at a minimal rate of \$12,000 per acre.

The assessed values selected are slightly below the market values for the acreage were the resort in-place at the time of our study, in this regard, our conclusions may be understated were the County to adopt an aggressive assessment posture toward the subject.

Mr. Mark H. Hastert  
June 24, 1986  
Page 16

Improvement values for hotels were conservatively estimated according to anticipated construction costs approximately \$175,000 per room (compares with the \$200,000 per room cost of the Mauna Lani Bay Hotel), for luxury water oriented condominium units at the projected average market sales price of \$400,000 per unit, for more mauka single family residences at \$350,000 per house, for commercial space at \$60 per square foot, and for the marina slips at \$35,000 per slip. Again, we view these estimates at being at the low end of the probable range based on current dollars.

For ease in the projection process, we have assumed that assessment for the improvements will be incurred in the year the property is constructed, and that the condominium units will be constructed only a market (i.e. with no market overhang). This latter assumption, while being the only realistic way to forecast property tax revenues in a summary study such as this, again contributes to the slight understatement of revenues, in that typically an entire condominium project is built at once, and the developer must pay applicable property taxes for each unit until it is successfully marketed. Condominium units are assumed to be absorbed at the rate of 55 units per year over a 14.5 year period. Single family homes are assumed to be built within one year after lot sale, and the commercial center as part of the second phase of resort construction.

Mr. Mark H. Hastert  
 June 24, 1986  
 Page 17

The applicable tax rates for 1985-86, as shown below, were employed in our study.

Use	Tax Rate per \$1,000 Assessed Value	
	Land	Building
Hotel/Resort Residential Improved	\$10.00	\$8.50
Vacant	8.50	8.50
Commercial	10.00	8.50
Conservation	10.00	8.50

State Excise Tax

A four percent state tax is applicable to all gross sales revenues generated by the resort and its components. In the subject, this would include rentals of hotel rooms and use of a hotel facilities (restaurants, shops, concessionaire and other income); rental of condominium units on a transient basis; sales in the commercial (retail, restaurant and services) center, golf course revenues (green fees, pro shop, etc.), and other minor revenue producing sources.

The following paragraphs summarize our preliminary assumptions regarding the proposed subject development. We note that these assumptions are based on prevailing market levels and our perception of the quality of the proposed development. Should more specific plans become available, we reserve the right to adapt our projections.

**Hotel Revenue.** Beyond room rental receipts, there are other income generating departments within a hotel facility. On an industry-wide basis, income from these items are

Mr. Mark H. Hastert  
 June 24, 1986  
 Page 18

projected as a function of (or percentage ratio to) room revenue forecasts. The following table depicts our assumption for the subject hotels based on prevailing West Hawaii market trends and a daily room rate of \$170 per night after all discounts.

Department	Gross Income Levels			Annual Income Based on 80% Stabilized Occupancy
	Ratio to Room Revenues	Daily per Room Occupied	Per Room Annually (at 80% Occupancy)	
Room Revenues		\$170.00	\$49,640	\$34,748,000
Food Sales	50.00%	85.00	24,820	17,374,000
Beverage Sales	18.00	30.60	8,935	6,254,500
Other Income <sup>(1)</sup>	10.00	17.00	4,964	3,474,800
		\$302.60	\$88,359	\$61,851,300

Total State Excise Tax Per Hotel Room per year (4% of \$88,359, rounded)

\$3,500

Total Annual State Excise Tax Based on 80% Stabilized Occupancy (4% of \$61,851,300, rounded)

\$2,474,000

<sup>(1)</sup>Includes minor operating departments, concessionaire income, space lease rental, and other income sources.

**Condominium Rental.** We have assumed that 70 percent of the finished condominium units will be made available for rental on a transient basis, a figure slightly below the prevailing average. We also assume that those units placed in such a hotel pool will achieve stabilized occupancy rates of circa 70 percent annually, and room rates of \$200 per night. Typically, there are no other revenue sources in a condominium rental pool.

Thus, the quantification of excise tax levels is as follows:

	<u>Gross Income Levels</u>	
	<u>Daily Per Occupied Unit</u>	<u>Per Unit Annually (at 70% Occupancy)</u>
Condominium Unit Rental	\$200.00	\$51,100
Total Excise Tax Per Rentable Condominium Unit per Year		<u>\$ 2,044</u>

Commercial Sales. For the purpose of this projection, we have assumed that commercial sales will average \$250 per square foot annually, or slightly below those levels experienced at various Maui resort having commercial centers, and in better-located outer-island luxury hotels. Preliminarily, a commercial center of circa 25,000 square feet is proposed for the subject community as part of the second phase of development. Additionally, it is assumed that each hotel will have approximately 10,000 square feet in leased retail space.

Based on \$250 of sales per square foot per year, excise tax payments will thus average \$10.00 per square foot annually for all commercial space. On an annual basis, this translates into an additional \$450,000. Paid to the State in excise taxes generated by the 45,000 square feet of commercial space.

Golf Course. As with hotels, golf course revenues for the various operating departments within a facility are projected as a function of the prevailing green fee. The

table below displays the calculation for the proposed subject course and clubhouse according to current market standards, with the course operating at 70 percent of reasonable capacity (or 70,000 rounds per year, and a cost (after all discounts of \$25 per round in green fees.

<u>Department</u>	<u>Ratio Green Fees Revenues</u>	<u>Per Round</u>	<u>At 70,000 Rounds Annually</u>
Green Fees		\$25.00	\$1,750,000
Golf Cart Rental	40.00%	10.00	700,000
Club Storage	1.00	0.00	17,500
Misc. Fees & Dues	1.00	0.25	17,500
Equip. Rental	10.00	2.50	175,000
Pro Shop Sales	30.00	7.50	525,000
Rest./Lounge Sales	35.00	8.75	612,000
Other (1)	2.00	0.50	35,000
Totals		\$54.75	\$3,832,500

Total Annual Excise Tax Generated by  
 Golf Course Facility (4% of \$3,832,500) \$153,300

(1) Includes driving range, lessons, etc.

Other Income. For the purpose of our projections, we have also assumed that an additional \$500,000 per year in stabilized income will be generated in other forms in the resort, through marina retail/restaurant sales, long-term unit rentals, and other concessions. This would equate to an additional \$20,000 annually in excise taxes.

State Income Tax

The third item within our public financial benefit projections is the state income tax which will be paid by resort employees. Of all the benefit items, this is the

most difficult to project, as management philosophy and other as yet unknown variables have a significant impact on number and remuneration of employees.

We have assumed that there will be 1.75 employees for each hotel room in operation, .75 employees for each condominium unit in rental pools, two employees for each 1,000 square feet of retail space, 50 employees involved in the golf course operation, 20 employees in the marina operation, and 100 employees involved in upkeep, security, and administration of the resort as-a-whole. All estimates are for full-time employees, with allowances for round-the-clock services as is typical of quality resorts.

For the purpose of our forecasting, we have assumed that the average annual remuneration on an overall basis is \$15,000, acknowledging the great disparity between non-union retail employees and resort upper-management personnel. Furthermore, we have assumed that the effective income tax rate is 3 percent. Hotel and condominium positions would be filled as the units are placed in operation, as are commercial employees, all others (golf, marina, administration) commence with the opening of the resort.

#### Other Tax Revenues

There are a variety of minor, indirect, or difficult to quantify tax revenues which will be generated as a result of the proposed Kohanaiki resort project. Among them are: excise tax on materials and services purchased for construction and development, which would be anticipated to be an amount in excess of \$13,000,000 (based on a total

development cost of circa \$325,000,000); income taxes paid by construction workers; state conveyance taxes for the recordation of the privately-held units and homes in the resort; and, other levies and fees not foreseen at this time.

Additionally, on a stabilized basis, the estimated 1,905 full-time employees which will work in the resort upon its completion will take-home some \$28,575,000 annually in wages. Typically, it is assumed that each dollar in wages is multiplied by circa 1.5 to 2.25 as it flows through the local economy, and the effective tax rate on such expenditures (accounting for excise, income and other taxes) is circa 7.5 percent of the total monies involved. Using a multiplier of two-times, the wages from the proposed subject resort employees will grow to circa \$57,150,000 annually as it moves through the Big Island economy, creating extra taxes of approximately \$4,286,250 per year.

#### Summary

There is no doubt, that the proposed subject project would prove to be beneficial to the tax coffers of the state and county. As shown on Table 1, property and excise taxes will constitute the majority of revenues, with employee income taxes and other taxes providing, substantial but secondary revenues.

On a stabilized basis the subject development will contribute some \$10,818,415 per year to State and County coffers in direct net tax benefits upon its completion. This amount can be divided between \$5,719,425 to the County

11  
2

Mr. Mark H. Hastert  
June 24, 1986  
Page 23

of Hawaii, and \$5,098,990 to the State. This does not include the over \$4 million annually in other tax revenues generated through economic multipliers in the community, or other overall island-wide economic benefits resulting from increased employment levels.

### SECTION III. POTENTIAL INTANGIBLE IMPACTS

In addition to the community-wide economic benefits discussed above, we foresee two other areas of potential concern in regard to public costs/benefits that may be associated with the proposed Kohanaiki resort development. They are: the dilemma of increased public shoreline access versus desirability of maintaining pristine open space; and, does the planned development concur with reasonable public planning goals.

In regard to the first issue, it is our opinion that the subject development would benefit the Kona community by providing easy access to a usable beachfront (which would be developed by the resort). Currently, there are only three significant beaches in the Keahole Point to Keahou Resort urbanized corridor: Kahaluu Beach Park, Disappearing Sands Beach Park, and the beach fronting the Honokohau Fishpond. Kahaluu Beach Park, and Disappearing (or Magic) Sands Park, which receives its name from the fact the sandy beach is often lost during high wave action are heavily used and often crowded. The beach at Honokohau is a quality strand, but requires a lengthy walk from available parking at the Honokohau small boat harbor, and has an established history as a nudist beach, which deters many area families from its use.

Mr. Mark H. Hastert  
June 24, 1986  
Page 24

A public beach at the subject would mitigate the need to travel as far north as Anaehoomalu or Hapuna in order to enjoy a developed drive-up beach park facility, thereby filling a significant need in the Kona community. This is particularly so as the residential areas of Kealakehe and Kalaoa are further developed. The lack of available, accessible white sand beaches is a well-known problem in North Kona, and has proven to be a detriment to the visitor industry in the region, and is a common complaint among residents. In this respect, the subject would be helping achieve a long-standing County goal of increasing public access to the Kona shoreline, as well as providing needed additional recreational facilities that are open to the public, proximate to the residential areas.

As to the argument that the development would be destroying pristine or historically significant areas, we note that the Keahole Point to Kailua-Kona corridor does not meet the definition of pristine, with a large airport facility, boat harbor, high-speed highway and new industrial development all within a short distance from the site. Additionally, there are rock quarries, the regional dump, and an ever increasing number of developments taking place on the lower Hualalai slopes (including the Keahole Agricultural Park) that are turning the corridor into the urban expansion area of the Kailua community. There are no significant archaeological sites directly on the subject property, and the near offshore waters are constantly traversed by boats heading from the harbor to "The Grounds" off of Keahole Point. In light of the trend of development, and the demand for accessible oceanfrontage near the Kailua urban area, it would seem prudent to establish pristine/conservation zones

1  
4  
6

Mr. Mark H. Hastert  
June 24, 1986  
Page 25

in areas where development can be more fully controlled, and not disturbed by existing negative influences as exist near the subject, such as in the more northerly areas of the North Kona District, or in South Kohala.

AS to meeting reasonable planning goals, in addition to ~~THOSE ADDRESSED ABOVE, THE SUBJECT IS IN A PRIME~~ location to take advantage of the existing infrastructure, which was developed for the purpose of enhancing the economic development of the region. The Keahole Airport, Honokohau Small Boat Harbor, Old Airport Park, and the services available in Kailua-Kona all enhance the reasonableness of placing a resort community at Kohanaiki. The outlying resorts in South Kohala do not stimulate the income of Kailua-Kona to a significant degree, and are, in fact, somewhat of a drain on available resources due to the long drive to them from the airport, harbor or town; and the prolonged commute for the majority of their workforce, which is located within five miles of the subject.

In addition to these community attributes, others have been discussed in previous studies prepared by ourselves and others. The most notable is that the property southerly adjacent to the subject (stretching to Honokohau Harbor) is to be developed as a National Historic Park. A quality resort near the park would be an excellent addition to the Kona tourism plant, and help revive the Kailua-Kona visitor industry which is now hampered by the competition from the South Kohala projects.

Mr. Mark H. Hastert  
June 24, 1986  
Page 26

#### SUMMARY

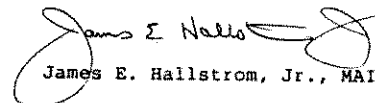
Based on our investigation and research, as summarized in this letter of opinion, it is our conclusion that the proposed subject resort development would prove advantageous to Hawaii County, and the North Kona community by increasing employment ~~opportunities~~, tax revenues, and shoreline access, at relatively small cost to the County budget or the quality of the Keahole Point-Kailua corridor.

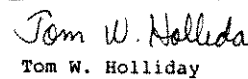
The income generated by the increased tax structure would more than offset any required public expenditures, and would prove to be a strong utilization of existing infrastructure facilities.

We appreciate the opportunity to continue being of service to you in this quality resort project. Please contact us if further clarification of our assumptions or calculations are desired.

Respectfully submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

  
James E. Hallstrom, Jr., MAI, SRPA

  
Tom W. Holliday

:gc 1415C



## 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 nationally recognized appraisal and real estate counseling organizations such as the American Institute of Real Estate Appraisers (AIREA) and the Society of Real Estate Appraisers (SREA).

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 purpose 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  
Recertified with the American Institute of Real Estate Appraisers through 1986  
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

### Association Memberships

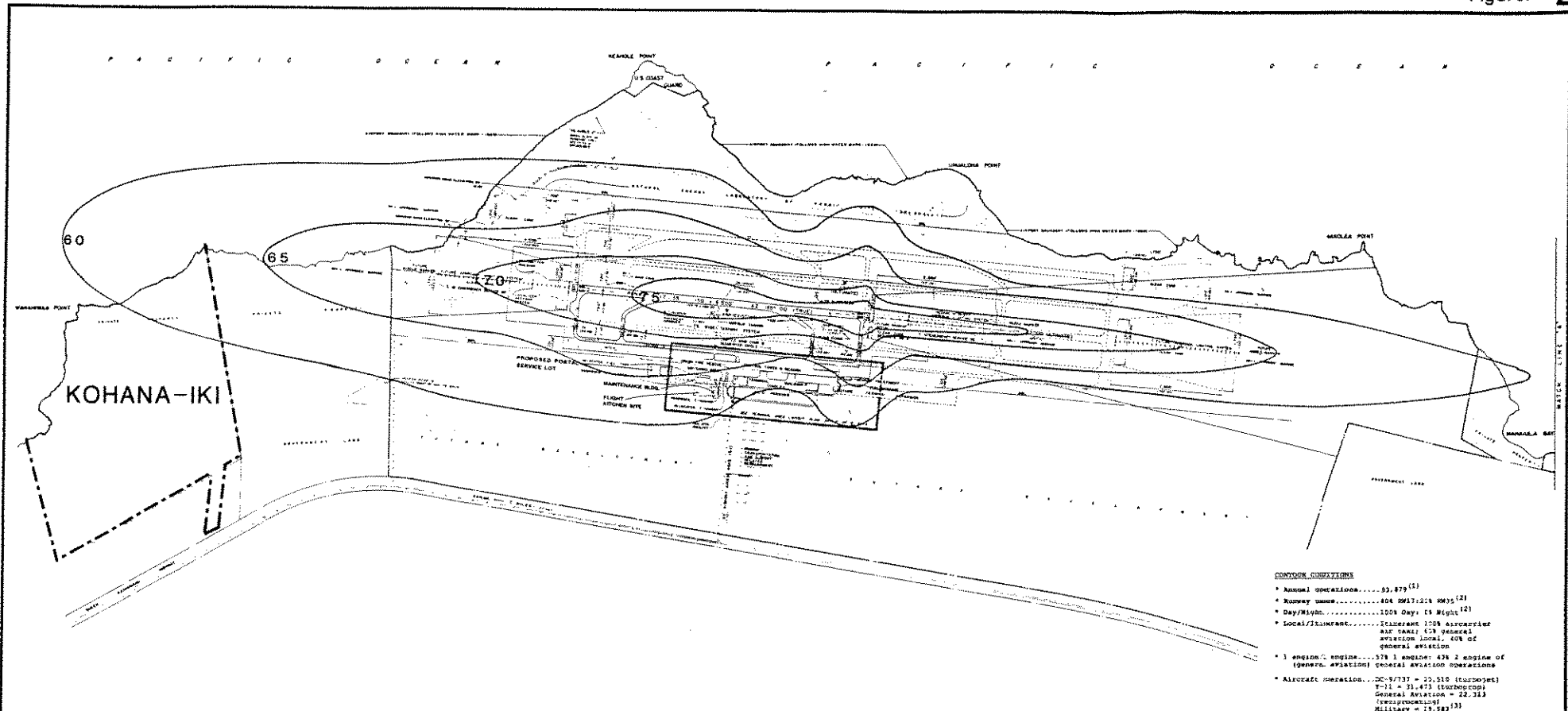
MAI Designation (1976) - American Institute of Real Estate Appraisers (AIREA),  
Chapter President for the year 1982  
SRPA Designation (1975) - Society of Real Estate Appraisers (SREA),  
Chapter President for the year 1980-81  
Realtor - Honolulu Board of Realtors; Hawaii Association of Realtors

**J. AIRCRAFT NOISE EXPOSURE ANALYSIS**



1985 LDN CONTOURS  
FOR 100% STRAIGHT IN-OUT OPERATIONS

Figure: 2



- CONTINUED OPERATIONS**
- \* Annual operations..... 52,879<sup>(1)</sup>
  - \* Runway users..... 404 261:228 883<sup>(2)</sup>
  - \* Day/Night..... 1008 Day; 15 Night<sup>(2)</sup>
  - \* Local/Interstate..... 1208 aircraft  
KAL TAKI; 678 general  
aviation local; 408 of  
general aviation
  - \* 1 engine; 2 engine..... 578 1 engine; 438 2 engine of  
(general aviation) (general aviation operations)
  - \* Aircraft operation..... DC-9/737 = 20,518 (intercept)  
T-1 = 31,473 (intercept)  
General Aviation = 22,313  
(intercept)  
Military = 19,883<sup>(3)</sup>

(1) Source: FAA  
(2) Source: Airport Staff  
(3) Not included due to lack of pattern data.

PREPARED BY LORSON BRICKER AND ASSOCIATES JUNE 1986  
1801 E. 17TH STREET, SANTA ANA, CALIF. 92701

**WIND ROSE**  
SCALE: 1"=50 MPH

**LOCATION MAP**  
NOT TO SCALE

RUNWAY DATA		NOTE
Runway 1	ASPH/CONCRETE	
Runway 2	ASPH/CONCRETE	
AIRPORT DATA		<b>LEGEND</b> 100 FT 200 FT 300 FT 400 FT 500 FT 600 FT 700 FT 800 FT 900 FT 1000 FT
Runway 3	ASPH/CONCRETE	

REVISIONS	DATE

APPROVED: \_\_\_\_\_  
 DEPARTMENT OF TRANSPORTATION  
 STATE OF HAWAII  
 AIR TRANSPORTATION FACILITIES DIVISION  
**KE-ANOLE AIRPORT**  
**AIRPORT LAYOUT PLAN**  
 SHEET 1 OF 2 SHEETS  
 DATE: FEBRUARY 1986

KEAHOLE AIRPORT  
AIRCRAFT OPERATIONS BY TYPE

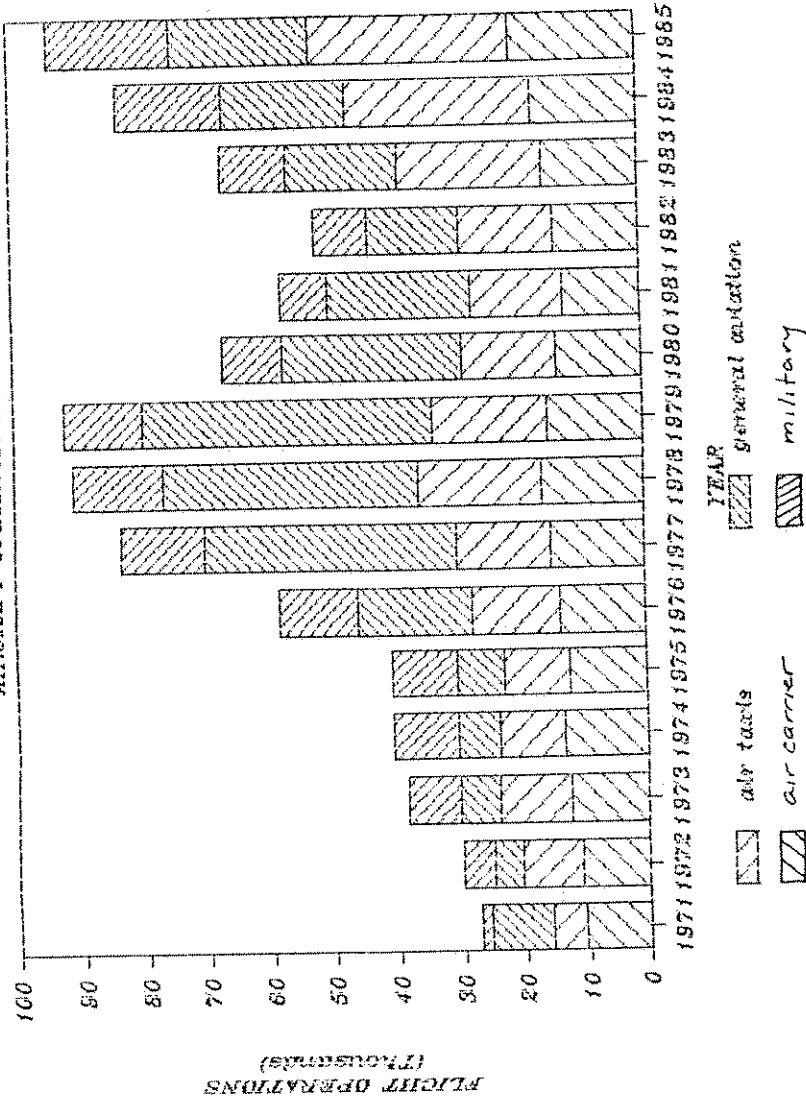


Figure: 3

Table 1A: KEAHOLE AIRPORT  
AIRCRAFT OPERATIONS BY USER GROUP  
(1971-1985)

Year	Air Carrier	Air Taxi	General Aviation	Military	Total
1971	10,653	5,110	9,734	1,635	27,132
1972	10,766	9,690	4,414	5,167	30,007
1973	12,484	11,502	6,305	7,955	38,246
1974	13,529	10,570	6,350	10,310	40,757
1975	14,554	10,446	7,462	10,160	40,622
1976	13,937	14,090	17,867	12,531	58,425
1977	15,109	15,084	40,179	13,404	83,616
1978	16,369	19,740	40,542	14,382	91,033
1979	15,602	18,088	46,299	12,246	92,235
1980	13,895	14,953	28,354	9,742	66,944
1981	12,681	14,633	22,416	7,758	57,488
1982	13,945	15,112	14,392	8,440	51,889
1983	15,621	22,731	17,732	10,497	66,581
1984	17,033	29,569	19,528	17,190	83,320
1985	20,510	31,473	22,313	19,583	93,879

Notes:

- 1) Air Traffic Control tower opened in 1971.
- 2) Air taxi operations were combined with general aviation until July 1971.

Source: Airports Division, State Department of Transportation

Table 1B: KEAHOLE AIRPORT  
 DAILY AIR CARRIER OPERATIONS BY TYPE OF AIRCRAFT  
 (1986)

Type of Aircraft	Air Carrier	Flights/Day* (in & out)	Percentage
737	Aloha	22	29
DC-9	Hawaiian	22	29
YS-11	Mid-Pacific	14	18
Dash 7	Hawaiian	12	16
DC-8 (stretch)	United	<u>6</u>	<u>8</u>
TOTAL		76	100

\* Based on schedules for winter 1986 which is the peak period for local flights, suggest using percentages in last column rather than actual numbers when applying to 1985 total operations for air carriers.

Source: HELBER, HASTERT, VAN HORN & KIMURA, Planners, 1986

**TABLE 2-A**

**LAND USE COMPATIBILITY\* WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVELS**

Land Use	Yearly Day-Night Average Sound Level ( $L_{dn}$ ) in Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
<i>Residential</i>						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
<i>Public Use</i>						
Schools, hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
<i>Commercial Use</i>						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
<i>Manufacturing And Production</i>						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
<i>Recreational</i>						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

(Numbers in parentheses refer to notes.)

\* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses remains with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

**KEY TO TABLE 2**

SLUCM	Standard Land Use Coding Manual.
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land used and related structures generally compatible; measures to achieve NLR or 25, 30, or 35 must be incorporated into design and construction of structure.

**NOTES FOR TABLE 2**

- (1) Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
- (2) Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- (3) Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- (4) Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- (5) Land use compatible provided special sound reinforcement systems are installed.
- (6) Residential buildings require an NLR of 25.
- (7) Residential buildings require an NLR of 30.
- (8) Residential buildings not permitted.

Source: Reprinted from "Part 150" FAA Regulations, January 1981





Mr. Mark H. Hastert  
June 24, 1986  
Page 9

(as much as possible) until the planning/construction of the second hotel/resort expansion phase commences, and then subsidizing a facility on-site or in the near vicinity. Thus, immediate cost to the County upon the beginning of subject development will not be substantial, but will place additional burdens on the existing facilities; upon construction of the fire station (prior to second hotel development) the County would be liable for start-up equipment purchases of approximately \$420,000 and personnel costs of \$504,000, in current dollars.

As the co-operatively improved facility would also service nearby developments, not all of the start-up and operational costs would be attributable to the subject development. We have therefore assumed that one-half of the costs will be ascribed to the proposed destination resort, or roughly \$210,000 prior to the construction of the second hotel in start-up cpst, and \$252,000 in personnel expenses on an annual basis thereafter.

#### Water Service

As discussed in our previous study on the subject, prepared by ourselves and others, the resort would be able to receive public water supply were there sufficient water resources available. Although the problems affecting current supply are being resolved in a timely manner, the difficulty lies in transmission. There is a 16" line along Queen Kaahumanu Highway which would be substantial enough for subject use, however, the line terminates at Honokohau Small Boat Harbor, and continues on thereafter (to the airport) as a 12" line,

Mr. Mark H. Hastert  
June 24, 1986  
Page 10

which has insufficient capacity for the proposed Kohanaiki development.

According to Mr. Quirino Antonio, Jr., Staff Engineer with the County of Hawaii Water Supply Department, should the subject seek County supply (if available) the developer would have to fund the cost of any transmission line enhancement necessary to transport the water to the site. The line would be the County property, and the developer unable to recoup capital investment from any subsequent developments which would share the expanded line.

Therefore, there would be no additional costs to the County in regards to supplying water to the subject. It is assumed that the individual unit hook-up costs currently estimated at circa \$4,000 per unit would more than offset any source (well) development costs. In this regard, the County may, in fact, profit slightly from supplying water service to the subject both by having the developer pay for any line expansion (which could serve later developments), and through the hook-up costs, which also include a allocations for transmission and storage that may not be required for the subject.

#### Access

Queen Kaahumanu Highway is designed to be a limited-access, high-speed, high-volume roadway, as described at-length in foregoing analyses of the proposed Kohanaiki development. Although a substantial amount of long-term development in the Keahole Point area may provide an impetus for expansion

Mr. Mark H. Hastert  
June 24, 1986  
Page 11

of the existing roadbed from two to four lanes, this is not foreseen for many years by the State.

The subject site has the right to access onto the highway via an 80-foot wide easement from parcel 7-3-9-16 (which was acquired for this purpose). The financial responsibility of improving the access, complete with turnpockets and accel-decel lanes, lies entirely upon the developer, and not with any governmental agencies.

According to Mr Bruce McClure, District Design Engineer for the State of Hawaii Transportation Department Division Right-of-Way, Hawaii County Division, who was interviewed during our original study, the cost of developing such a "fully-channelized" intersection is currently circa \$200,000 to \$500,000. He noted the State is stringent regarding improvement of the intersections, and will not move the designated access easement from the points delineated on the existing maps except under rare circumstance.

In our projection process, we have therefore not included any costs to the State of County for access development, as the existing roadway is sufficient for the proposed subject's resort use, and the cost of constructing access ways is entirely borne by the developer.

#### Parks and Recreation

Preliminary subject plans call for a public oceanfront park as part of the Kohanaiki resort community, thus enabling ease of access to the shoreline, which is currently difficult for the average Big Island citizen to reach. As

Mr. Mark H. Hastert  
June 24, 1986  
Page 12

discussed following this is in keeping with the goals of to increase public oceanfront access.

Both the Mauna Lani and Waikoloa Beach Resorts have self-developed public parks and shoreline trail systems to enhance oceanfront access. According to Pat Engeljard, a supervisor with the Hawaii County Parks and Recreation Department, these facilities are maintained by the respective resort developers at no cost to the County. She stated the County would pursue the establishing of a public access area in any major proposed shoreline development, but would likely request that the developer maintain the park as do the two resorts cited.

We have therefore concluded that the County will absorb no additional expenses as a result of the development of a public access park area within the planned subject project, that all costs will be borne by the developer.

#### Education

In our opinion, it is highly unlikely that the proposed subject resort community will be the residence for a significant number of school-age children, as evidenced in resort projects throughout the state. As such, we do not foresee the need to expand any existing facilities as a result of its construction, and it is doubtful that any overcrowding of classrooms (beyond current levels) would ensue.

Should public education services be required, transportation to the schools, not facility or faculty enhancement, is the

Mr. Mark H. Hastert  
June 24, 1986  
Page 13

only conceivable cost factor. We note that school buses already extend their routes into the Kona Palisades subdivision, less than four miles from the subject site, and it is probable that re-routing of one bus would be more than sufficient to handle any demands created by the Kohanaiki development at minimal cost.

Thus, our cost projections do not contain any allowance for public costs resulting from the need for public education services.

#### Summary

Based on our analysis, we foresee only two areas of significant public expenditures associated with the proposed subject development, for police and fire protection.

In regard to police protection, we have estimated the cost (in current dollars) at circa \$52,500 per year during the first phase of development, increasing to a stabilized level of \$105,000 annually upon the completion of the second phase of development (after the second hotel is open for occupancy).

For fire protection services, we do not forecast any appreciable expenditures by the County during the first phase of development. However, assuming a co-operative auxiliary fire station is constructed in the area by the subject and other developers, prior to completion of the second phase of subject development, the County would incur start-up costs at that time of approximately \$210,000 which

Mr. Mark H. Hastert  
June 24, 1986  
Page 14

would be ascribed to the subject, and a proportionate subject share of \$252,000 in annual operating expenses.

We note, that these assumptions are quite liberal, in that service arising from subject development of a fire station facility and enhanced police protection would benefit an increasing number of residents and developers in the Keahole Point area other than the subject, which is being ascribed a large portion of these service increases.

#### SECTION II: POTENTIAL PUBLIC FINANCIAL BENEFITS

There are four areas in which the state and County purses will benefit from the proposed subject development: through increased property tax revenues, excise tax on the various operations of the resort, state income taxes paid by the employees, and the other tax collections arising from the expenditure of employee wages and purchased goods which trickle through the local economy. Income and other taxes arising from wages paid to construction workers was not included in this study, because it is unknown the number of workers which will be required for the various development phases, and the length of their time of employ at the site. However the tax revenues generated by the efforts of these workers could be substantial.

We have constructed a 15-year cash flow model to depict the levels of public tax income generated by the first three levies listed above. The model is displayed on Table 1.

All revenues and expenses shown ARE IN CURRENT DOLLARS, being based upon the tax rates, estimated expenses, property

TABLE 1

ESTIMATE OF POTENTIAL TAX REVENUES GENERATED BY THE PROPOSED APPRAISAL RESTRUCTURING REPORT  
 HONOLULU, HAWAII, 2004  
 ALL AMOUNTS SHOWN IN CURRENT DOLLARS AND 1990 DOLLARS

YEAR	CURRENT	ANNUALLY REVENUE	1990 OPERATIONAL	YEAR												TOTAL
				2	3	4	5	6	7	8	9	10	11	12	13	
<b>PROPERTY TAXES (1)</b>																
Revenue in Millions																
<b>Land</b>																
Hotels/Resorts CD	\$0	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000	\$66,250,000
Low Residential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Med. Residential	\$0	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000	\$6,840,000
Commercial	\$0	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000	\$1,250,000
Conservation/Open CD	\$5,941,500	\$5,100,000	\$4,100,000	\$3,100,000	\$2,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000
<b>Total Land Assessment</b>	<b>\$5,941,500</b>	<b>\$75,380,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>	<b>\$77,520,000</b>
<b>Buildings</b>																
Hotels	\$0	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000	\$61,250,000
Commercial	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Residential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Commercial/Office	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total Bldg. Assessment</b>	<b>\$0</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>	<b>\$61,250,000</b>
<b>Property Tax Liens</b>																
Land																
Hotels/Resorts CD	\$0	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500	\$662,500
Low Residential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Med. Residential	\$0	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400	\$68,400
Commercial	\$0	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000
Conservation/Open CD	\$594,150	\$510,000	\$410,000	\$310,000	\$210,000	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000
<b>Total Land Tax Lien</b>	<b>\$594,150</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>
<b>Buildings</b>																
Hotels	\$0	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500	\$612,500
Commercial	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Residential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Commercial/Office	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total Bldg. Tax Lien</b>	<b>\$0</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>	<b>\$612,500</b>
<b>TOTAL PROPERTY TAX REVENUES</b>	<b>\$594,150</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>	<b>\$775,200</b>
<b>EXCISE TAX REVENUES (4)</b>																
Revenue in Millions																
<b>Hotels</b>																
Commission Hotels	\$0	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500	\$1,236,500
Commercial Sales	\$0	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
Buff Course	\$0	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200	\$520,200
Others	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTAL EXCISE TAX REVENUES</b>	<b>\$0</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>	<b>\$1,756,700</b>
<b>INCOME TAX REVENUES (4)(5)</b>																
Through Employment By																
Hotels	\$0	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643	\$275,643
Commission Hotels	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Commercial Facilities	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Buff Course	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Others	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Research Administration	\$0	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
<b>TOTAL INCOME TAX REVENUES</b>	<b>\$0</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>	<b>\$45,000</b>
<b>TOTAL TAX REVENUES</b>																
To County of Hawaii	\$594,150	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700
To State	\$0	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
<b>TOTALS</b>	<b>\$594,150</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>
<b>CHARGES TO PROVIDING SERVICES</b>																
To County of Hawaii																
Police Protection	\$0	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500
Fire Protection	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sub-total	\$0	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500	\$52,500
To State	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTALS</b>	<b>\$0</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>	<b>\$52,500</b>
<b>NET REVENUE PROCEEDS</b>																
To County of Hawaii	\$594,150	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700	\$1,307,700
To State	\$0	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
<b>TOTALS</b>	<b>\$594,150</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>	<b>\$1,352,700</b>

1) Paid to Hawaii County.  
 (2) Includes hotel and militarily acreage.  
 (3) Includes marine basin acreage, assumed to be classified as "Other" or similar.  
 (4) Paid to State.  
 (5) Represents average salary of \$15,000 annually per employee, with effective income tax rate of 20% or \$4500 is paid to income taxes per employee per year.

Mr. Mark H. Hastert  
June 24, 1986  
Page 15

values and income levels existing at the time of our study. As such, the THE REVENUES ARE LIKELY TO BE UNDERSTATED over time, as typically, tax rates, property value appreciation, vacation costs, and workers wages increase more rapidly than the general rate of inflation.

For the purpose of forecasting revenues we have made the following assumptions:

Property Tax

We have assumed that County zoning will be approved for the entire resort at one time, and the construction will begin on the first phase as soon as zoning approvals are granted. We have also assumed zoned hotel acreage will be assessed at circa \$750,000 per acre, multifamily acreage at \$500,000 per acre, single family residential at \$180,000 per acre. Commercial acreage was assumed to be assessed at \$250,000 per acre, and the marina (for the purpose of this study supposed to be improved during the first phase of development) at the aggregate sales value of the individual slips. All remaining acreage (for the golf course and other recreational areas, which will remain designated as open spaces) and the support housing acreage was assumed to be assessed at a minimal rate of \$12,000 per acre.

The assessed values selected are slightly below the market values for the acreage were the resort in-place at the time of our study, in this regard, our conclusions may be understated were the County to adopt an aggressive assessment posture toward the subject.

Mr. Mark H. Hastert  
June 24, 1986  
Page 16

Improvement values for hotels were conservatively estimated according to anticipated construction costs approximately \$175,000 per room (compares with the \$200,000 per room cost of the Mauna Lani Bay Hotel), for luxury water oriented condominium units at the projected average market sales price of \$400,000 per unit, for more mauka single family residences at \$350,000 per house, for commercial space at \$60 per square foot, and for the marina slips at \$35,000 per slip. Again, we view these estimates at being at the low end of the probable range based on current dollars.

For ease in the projection process, we have assumed that assessment for the improvements will be incurred in the year the property is constructed, and that the condominium units will be constructed only a market (i.e. with no market overhang). This latter assumption, while being the only realistic way to forecast property tax revenues in a summary study such as this, again contributes to the slight understatement of revenues, in that typically an entire condominium project is built at once, and the developer must pay applicable property taxes for each unit until it is successfully marketed. Condominium units are assumed to be absorbed at the rate of 55 units per year over a 14.5 year period. Single family homes are assumed to be built within one year after lot sale, and the commercial center as part of the second phase of resort construction.

The applicable tax rates for 1985-86, as shown below, were employed in our study.

Use	Tax Rate per \$1,000 Assessed Value	
	Land	Building
Hotel/Resort Residential	\$10.00	\$8.50
Improved	8.50	8.50
Vacant	10.00	8.50
Commercial	10.00	8.50
Conservation	10.00	8.50

State Excise Tax

A four percent state tax is applicable to all gross sales revenues generated by the resort and its components. In the subject, this would include rentals of hotel rooms and use of a hotel facilities (restaurants, shops, concessionaire and other income); rental of condominium units on a transient basis; sales in the commercial (retail, restaurant and services) center, golf course revenues (green fees, pro shop, etc.), and other minor revenue producing sources.

The following paragraphs summarize our preliminary assumptions regarding the proposed subject development. We note that these assumptions are based on prevailing market levels and our perception of the quality of the proposed development. Should more specific plans become available, we reserve the right to adapt our projections.

**Hotel Revenue.** Beyond room rental receipts, there are other income generating departments within a hotel facility. On an industry-wide basis, income from these items are

projected as a function of (or percentage ratio to) room revenue forecasts. The following table depicts our assumption for the subject hotels based on prevailing West Hawaii market trends and a daily room rate of \$170 per night after all discounts.

Department	Gross Income Levels			
	Ratio to Room Revenues	Daily per Room Occupied	Per Room Annually (at 80% Occupancy)	Annual Income Based on 80% Stabilized Occupancy
Room Revenues		\$170.00	\$49,640	\$34,748,000
Food Sales	50.00%	85.00	24,820	17,374,000
Beverage Sales	18.00	30.60	8,935	6,254,500
Other Income <sup>(1)</sup>	10.00	17.00	4,964	3,474,800
		\$302.60	\$88,359	\$61,851,300

Total State Excise Tax Per Hotel Room per year (4% of \$88,359, rounded)

\$3,500

Total Annual State Excise Tax Based on 80% Stabilized Occupancy (4% of \$61,851,300, rounded)

\$2,474,000

(1) Includes minor operating departments, concessionaire income, space lease rental, and other income sources.

**Condominium Rental.** We have assumed that 70 percent of the finished condominium units will be made available for rental on a transient basis, a figure slightly below the prevailing average. We also assume that those units placed in such a hotel pool will achieve stabilized occupancy rates of circa 70 percent annually, and room rates of \$200 per night. Typically, there are no other revenue sources in a condominium rental pool.

Thus, the quantification of excise tax levels is as follows:

	<u>Gross Income Levels</u>	
	<u>Daily Per Occupied Unit</u>	<u>Per Unit Annually (at 70% Occupancy)</u>
Condominium Unit Rental	\$200.00	\$51,100
<b>Total Excise Tax Per Rentable Condominium Unit per Year</b>		<b>\$ 2,044</b>

Commercial Sales. For the purpose of this projection, we have assumed that commercial sales will average \$250 per square foot annually, or slightly below those levels experienced at various Maui resort having commercial centers, and in better-located outer-island luxury hotels. Preliminarily, a commercial center of circa 25,000 square feet is proposed for the subject community as part of the second phase of development. Additionally, it is assumed that each hotel will have approximately 10,000 square feet in leased retail space.

Based on \$250 of sales per square foot per year, excise tax payments will thus average \$10.00 per square foot annually for all commercial space. On an annual basis, this translates into an additional \$450,000. Paid to the State in excise taxes generated by the 45,000 square feet of commercial space.

Golf Course. As with hotels, golf course revenues for the various operating departments within a facility are projected as a function of the prevailing green fee. The

table below displays the calculation for the proposed subject course and clubhouse according to current market standards, with the course operating at 70 percent of reasonable capacity (or 70,000 rounds per year, and a cost (after all discounts of \$25 per round in green fees.

<u>Department</u>	<u>Ratio Green Fees Revenues</u>	<u>Per Round</u>	<u>At 70,000 Rounds Annually</u>
Green Fees		\$25.00	\$1,750,000
Golf Cart Rental	40.00%	10.00	700,000
Club Storage	1.00	0.00	17,500
Misc. Fees & Dues	1.00	0.25	17,500
Equip. Rental	10.00	2.50	175,000
Pro Shop Sales	30.00	7.50	525,000
Rest./Lounge Sales	35.00	8.75	612,000
Other (1)	2.00	0.50	35,000
<b>Totals</b>		<b>\$54.75</b>	<b>\$3,832,500</b>

**Total Annual Excise Tax Generated by Golf Course Facility (4% of \$3,832,500) \$153,300**

(1) Includes driving range, lessons, etc.

Other Income. For the purpose of our projections, we have also assumed that an additional \$500,000 per year in stabilized income will be generated in other forms in the resort, through marina retail/restaurant sales, long-term unit rentals, and other concessions. This would equate to an additional \$20,000 annually in excise taxes.

State Income Tax

The third item within our public financial benefit projections is the state income tax which will be paid by resort employees. Of all the benefit items, this is the

Mr. Mark H. Hastert  
June 24, 1986  
Page 21

most difficult to project, as management philosophy and other as yet unknown variables have a significant impact on number and remuneration of employees.

We have assumed that there will be 1.75 employees for each hotel room in operation, .75 employees for each condominium unit in rental pools, two employees for each 1,000 square feet of retail space, 50 employees involved in the golf course operation, 20 employees in the marina operation, and 100 employees involved in upkeep, security, and administration of the resort as-a-whole. All estimates are for full-time employees, with allowances for round-the-clock services as is typical of quality resorts.

For the purpose of our forecasting, we have assumed that the average annual remuneration on an overall basis is \$15,000, acknowledging the great disparity between non-union retail employees and resort upper-management personnel. Furthermore, we have assumed that the effective income tax rate is 3 percent. Hotel and condominium positions would be filled as the units are placed in operation, as are commercial employees, all others (golf, marina, administration) commence with the opening of the resort.

#### Other Tax Revenues

There are a variety of minor, indirect, or difficult to quantify tax revenues which will be generated as a result of the proposed Kohanaiki resort project. Among them are: excise tax on materials and services purchased for construction and development, which would be anticipated to be an amount in excess of \$13,000,000 (based on a total

Mr. Mark H. Hastert  
June 24, 1986  
Page 22

development cost of circa \$325,000,000); income taxes paid by construction workers; state conveyance taxes for the recordation of the privately-held units and homes in the resort; and, other levies and fees not foreseen at this time.

Additionally, on a stabilized basis, the estimated 1,905 full-time employees which will work in the resort upon its completion will take-home some \$28,575,000 annually in wages. Typically, it is assumed that each dollar in wages is multiplied by circa 1.5 to 2.25 as it flows through the local economy, and the effective tax rate on such expenditures (accounting for excise, income and other taxes) is circa 7.5 percent of the total monies involved. Using a multiplier of two-times, the wages from the proposed subject resort employees will grow to circa \$57,150,000 annually as it moves through the Big Island economy, creating extra taxes of approximately \$4,286,250 per year.

#### Summary

There is no doubt, that the proposed subject project would prove to be beneficial to the tax coffers of the state and county. As shown on Table 1, property and excise taxes will constitute the majority of revenues, with employee income taxes and other taxes providing, substantial but secondary revenues.

On a stabilized basis the subject development will contribute some \$10,818,415 per year to State and County coffers in direct net tax benefits upon its completion. This amount can be divided between \$5,719,425 to the County



Mr. Mark H. Hastert  
June 24, 1986  
Page 23

of Hawaii, and \$5,098,990 to the State. This does not include the over \$4 million annually in other tax revenues generated through economic multipliers in the community, or other overall island-wide economic benefits resulting from increased employment levels.

### SECTION III. POTENTIAL INTANGIBLE IMPACTS

In addition to the community-wide economic benefits discussed above, we foresee two other areas of potential concern in regard to public costs/benefits that may be associated with the proposed Kohanaiki resort development. They are: the dilemma of increased public shoreline access versus desirability of maintaining pristine open space; and, does the planned development concur with reasonable public planning goals.

In regard to the first issue, it is our opinion that the subject development would benefit the Kona community by providing easy access to a usable beachfront (which would be developed by the resort). Currently, there are only three significant beaches in the Keahole Point to Keahou Resort urbanized corridor: Kahaluu Beach Park, Disappearing Sands Beach Park, and the beach fronting the Honokohau Fishpond. Kahaluu Beach Park, and Disappearing (or Magic) Sands Park, which receives its name from the fact the sandy beach is often lost during high wave action are heavily used and often crowded. The beach at Honokohau is a quality strand, but requires a lengthy walk from available parking at the Honokohau small boat harbor, and has an established history as a nudist beach, which deters many area families from its use.

Mr. Mark H. Hastert  
June 24, 1986  
Page 24

A public beach at the subject would mitigate the need to travel as far north as Anaehoomalu or Hapuna in order to enjoy a developed drive-up beach park facility, thereby filling a significant need in the Kona community. This is particularly so as the residential areas of Kealakehe and Kalaea are further developed. The lack of available, accessible white sand beaches is a well-known problem in North Kona, and has proven to be a detriment to the visitor industry in the region, and is a common complaint among residents. In this respect, the subject would be helping achieve a long-standing County goal of increasing public access to the Kona shoreline, as well as providing needed additional recreational facilities that are open to the public, proximate to the residential areas.

As to the argument that the development would be destroying pristine or historically significant areas, we note that the Keahole Point to Kailua-Kona corridor does not meet the definition of pristine, with a large airport facility, boat harbor, high-speed highway and new industrial development all within a short distance from the site. Additionally, there are rock quarries, the regional dump, and an ever increasing number of developments taking place on the lower Hualalai slopes (including the Keahole Agricultural Park) that are turning the corridor into the urban expansion area of the Kailua community. There are no significant archaeological sites directly on the subject property, and the near offshore waters are constantly traversed by boats heading from the harbor to "The Grounds" off of Keahole Point. In light of the trend of development, and the demand for accessible oceanfrontage near the Kailua urban area, it would seem prudent to establish pristine/conservation zones

Mr. Mark H. Hastert  
June 24, 1986  
Page 25

in areas where development can be more fully controlled, and not disturbed by existing negative influences as exist near the subject, such as in the more northerly areas of the North Kona District, or in South Kohala.

As to meeting reasonable planning goals, in addition to those addressed above, the subject is in a prime location to take advantage of the existing infrastructure, which was developed for the purpose of enhancing the economic development of the region. The Keahole Airport, Honokohau Small Boat Harbor, Old Airport Park, and the services available in Kailua-Kona all enhance the reasonableness of placing a resort community at Kohanaiki. The outlying resorts in South Kohala do not stimulate the income of Kailua-Kona to a significant degree, and are, in fact, somewhat of a drain on available resources due to the long drive to them from the airport, harbor or town; and the prolonged commute for the majority of their workforce, which is located within five miles of the subject.

In addition to these community attributes, others have been discussed in previous studies prepared by ourselves and others. The most notable is that the property southerly adjacent to the subject (stretching to Honokohau Harbor) is to be developed as a National Historic Park. A quality resort near the park would be an excellent addition to the Kona tourism plant, and help revive the Kailua-Kona visitor industry which is now hampered by the competition from the South Kohala projects.

Mr. Mark H. Hastert  
June 24, 1986  
Page 26

#### SUMMARY

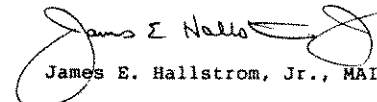
Based on our investigation and research, as summarized in this letter of opinion, it is our conclusion that the proposed subject resort development would prove advantageous to Hawaii County, and the North Kona community by increasing employment opportunities, tax revenues, and shoreline access, at relatively small cost to the County budget or the quality of the Keahole Point-Kailua corridor.

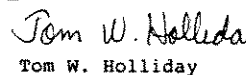
The income generated by the increased tax structure would more than offset any required public expenditures, and would prove to be a strong utilization of existing infrastructure facilities.

We appreciate the opportunity to continue being of service to you in this quality resort project. Please contact us if further clarification of our assumptions or calculations are desired.

Respectfully submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

  
James E. Hallstrom, Jr., MAI, SRPA

  
Tom W. Holliday

:gc 1415C

## 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 nationally recognized appraisal and real estate counseling organizations such as the American Institute of Real Estate Appraisers (AIREA) and the Society of Real Estate Appraisers (SREA).

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 purpose 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  
Recertified with the American Institute of Real Estate Appraisers through 1986  
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

### 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

**J. AIRCRAFT NOISE EXPOSURE ANALYSIS**





# KEAHOLE AIRPORT AIRCRAFT OPERATIONS BY TYPE

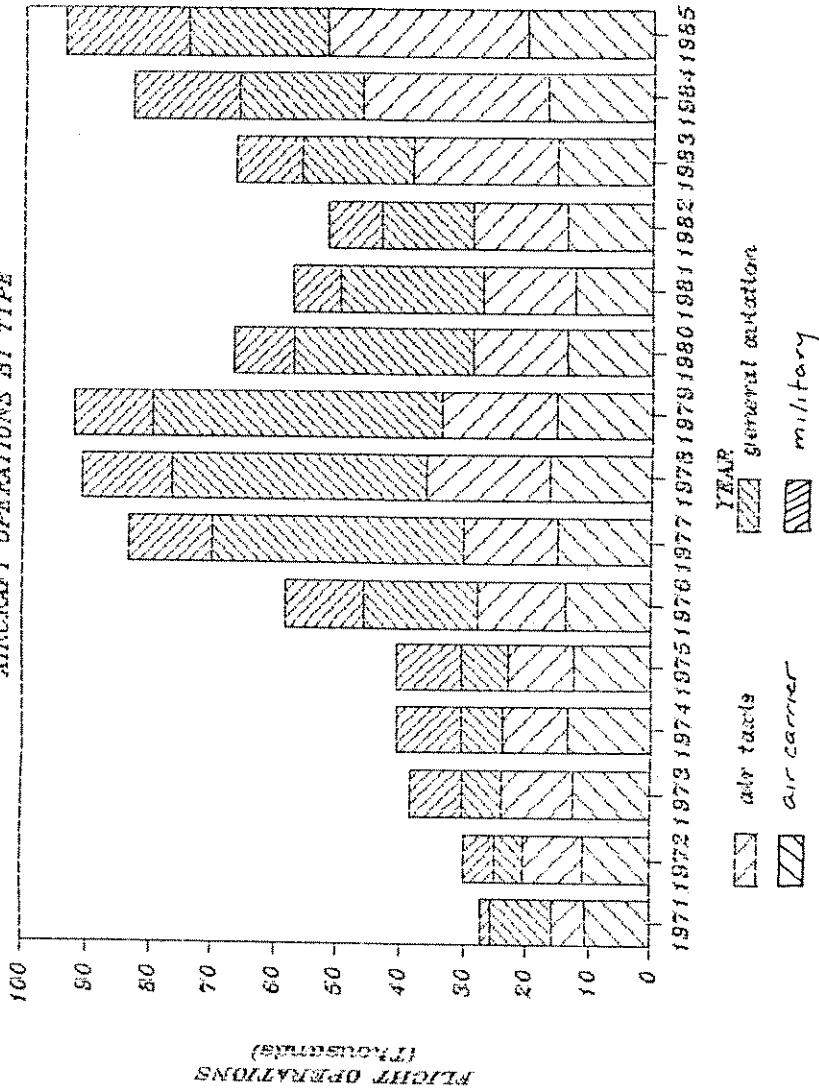


Figure: 3

Table 1A: KEAHOLE AIRPORT  
AIRCRAFT OPERATIONS BY USER GROUP  
(1971-1985)

Year	Air Carrier	Air Taxi	General Aviation	Military	Total
1971	10,653	5,110	9,734	1,635	27,132
1972	10,766	9,690	4,414	5,167	30,007
1973	12,484	11,502	6,305	7,955	38,246
1974	13,529	10,570	6,350	10,310	40,757
1975	14,554	10,446	7,462	10,160	40,622
1976	13,937	14,090	17,867	12,531	58,425
1977	15,109	15,084	40,179	13,404	83,616
1978	16,369	19,740	40,542	14,382	91,033
1979	15,602	18,088	46,299	12,246	92,235
1980	13,895	14,953	28,354	9,742	66,944
1981	12,681	14,633	22,416	7,758	57,488
1982	13,945	15,112	14,392	8,440	51,889
1983	15,621	22,731	17,732	10,497	66,581
1984	17,033	29,569	19,528	17,190	83,320
1985	20,510	31,473	22,313	19,583	93,879

Notes:

- 1) Air Traffic Control tower opened in 1971.
- 2) Air taxi operations were combined with general aviation until July 1971.

Source: Airports Division, State Department of Transportation

Table 1B: KEAHOLE AIRPORT  
 DAILY AIR CARRIER OPERATIONS BU TYPE OF AIRCRAFT  
 (1986)

Type of Aircraft	Air Carrier	Flights/Day* (in & out)	Percentage
737	Aloha	22	29
DC-9	Hawaiian	22	29
YS-11	Mid-Pacific	14	18
Dash 7	Hawaiian	12	16
DC-8 (stretch)	United	<u>6</u>	<u>8</u>
TOTAL		76	100

\* Based on schedules for winter 1986 which is the peak period for local flights, suggest using percentages in last column rather than actual numbers when applying to 1985 total operations for air carriers.

Source: HELBER, HASTERT, VAN HORN & KIMURA, Planners, 1986



**TABLE 2-A**

**LAND USE COMPATIBILITY\* WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVELS**

Land Use	Yearly Day-Night Average Sound Level ( $L_{dn}$ ) in Decibels					
	Below				Over	
	65	65-70	70-75	75-80	80-85	85
<i>Residential</i>						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
<i>Public Use</i>						
Schools, hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
<i>Commercial Use</i>						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
<i>Manufacturing And Production</i>						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
<i>Recreational</i>						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

(Numbers in parentheses refer to notes.)

\* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses remains with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

**KEY TO TABLE 2**

- SLUCM Standard Land Use Coding Manual.
- Y (Yes) Land Use and related structures compatible without restrictions.
- N (No) Land Use and related structures are not compatible and should be prohibited.
- NLR Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
- 25, 30, or 35 Land used and related structures generally compatible; measures to achieve NLR or 25, 30, or 35 must be incorporated into design and construction of structure.

**NOTES FOR TABLE 2**

- (1) Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
- (2) Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- (3) Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- (4) Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- (5) Land use compatible provided special sound reinforcement systems are installed.
- (6) Residential buildings require an NLR of 25.
- (7) Residential buildings require an NLR of 30.
- (8) Residential buildings not permitted.

Source: Reprinted from "Part 150" FAA Regulations, January 1981

SUGGESTED LAND USE COMPATIBILITY STANDARDS IN  
AIRCRAFT NOISE EXPOSURE AREAS  
(State Department of Transportation)

Land use	Below Ldn 60	Ldn 60 to 65	Ldn 65 to 70	Ldn 70 to 75	Ldn 75 to 80	Ldn 80 to 85	Over Ldn 85
<b>Residential:</b>							
Residential, other than mobile homes and transient lodgings	Compatible	Compatible <sup>a</sup>	NLR required <sup>b</sup>	NLR required <sup>b</sup>	Incompatible	Incompatible	Incompatible
Mobile homes	Compatible	Compatible <sup>a</sup>	Incompatible <sup>b</sup>	Incompatible <sup>b</sup>	Incompatible	Incompatible	Incompatible
Transient lodgings	Compatible	Compatible <sup>a</sup>	NLR required <sup>b</sup>	NLR required <sup>b</sup>	Incompatible	Incompatible	Incompatible
<b>Public use:</b>							
Schools, hospitals, and nursing homes	Compatible	Compatible <sup>a</sup>	NLR required <sup>b</sup>	Incompatible	Incompatible	Incompatible	Incompatible
Churches, auditoriums, and concert halls	Compatible	Compatible	NLR required <sup>b</sup>	NLR required	Incompatible	Incompatible	Incompatible
Governmental services	Compatible	Compatible	Compatible	NLR required <sup>c</sup>	NLR required <sup>c</sup>	Incompatible	Incompatible
Transportation	Compatible	Compatible	Compatible	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Compatible <sup>c</sup>
Parking	Compatible	Compatible	Compatible	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Incompatible
<b>Commercial use:</b>							
Offices, business, and professional	Compatible	Compatible	NLR required	NLR required	NLR required	Incompatible	Incompatible
Wholesale and retail--building materials, hardware, and farm equipment	Compatible	Compatible	Compatible	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Incompatible
Retail trade--general	Compatible	Compatible	NLR required	NLR required <sup>c</sup>	NLR required <sup>c</sup>	Incompatible <sup>c</sup>	Incompatible
Utilities	Compatible	Compatible	Compatible	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Incompatible
Communication	Compatible	Compatible	NLR required	NLR required	NLR required	Incompatible	Incompatible
<b>Manufacturing and production:</b>							
Manufacturing, general	Compatible	Compatible	Compatible	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Compatible <sup>c</sup>	Incompatible
Photographic and optical	Compatible	Compatible	Compatible	NLR required	NLR required	Incompatible	Incompatible
Agriculture (except livestock) and forestry	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Livestock farming and breeding	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Mining and fishing resources production and extraction	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
<b>Recreational:</b>							
Outdoor sports arenas and spectator sports	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Outdoor music shells, amphitheaters	Compatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Nature exhibits and zoos	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible
Amusements, parks, resorts, and camps	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Golf courses, riding stables, and water recreation	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible

Ldn = Yearly day-night average sound level in decibels.

Compatible = Generally, no special noise attenuating materials are required to achieve an interior noise level of Ldn 45 in habitable spaces, or the activity (whether indoors or outdoors) would not be subject to a significant adverse effect by the outdoor noise level.

NLR = NLR (Noise Level Reduction) is used to denote the total amount of noise transmission loss in decibels required to reduce an exterior noise level in habitable interior spaces to Ldn 45. In most places, typical building construction automatically provides an NLR of 20 decibels. Therefore, if a structure is located in an area exposed to aircraft noise of Ldn 65, the interior level of noise would be about Ldn 45. If the structure is located in an area exposed to aircraft noise of Ldn 70, the interior level of noise would be about Ldn 50, so an additional NLR of 5 decibels would be required if not afforded by the normal construction. This NLR can be achieved through the use of noise attenuating materials in the construction of the structure.

Incompatible = Generally, the land use, whether in a structure or an outdoor activity, is considered to be incompatible with the outdoor noise exposure, even if special attenuating materials were to be used in the construction of the building.

- a. In climates where existing structures have thin, single-wall construction with minimal insulation, the Ldn 60 to 65 area may not be compatible without additional noise level reduction incorporated into the design and construction. However, it should be noted that in many urban areas, the ambient noise level may be above Ldn 65, so structures in the Ldn 60 to 65 must be evaluated on a case-by-case basis.
- b. The land use is generally incompatible and should only be permitted in areas of infill in existing neighborhoods or where the community determines that the use must be allowed.
- c. NLR required in offices or other areas with noise-sensitive activities.

Source: Peat, Marwick, Mitchell & Co., as derived from the U.S. Department of Transportation, Federal Aviation Administration, "Interim Federal Aviation Regulations, Part 150, Airport Noise Compatibility Planning," Table 2, January 26, 1981.