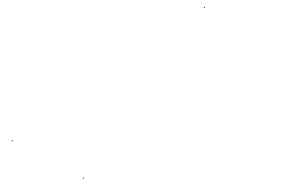


Mahukona

Final Environmental Impact Report

April 1991

Mahukona

Final Environmental Impact Report

Prepared for: Chalon International of Hawaii, Inc.
Hawi, Hawaii

Prepared by: PBR HAWAII in association with
Chapman Consulting Services
and
GK & Associates
Honolulu, Hawaii

April 1991

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

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

TABLE OF CONTENTS
(Continued)

APPENDICES

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF FIGURES

LIST OF FIGURES
(Continued)

Mahukona

Chapter I: Introduction and Summary

CHAPTER I
INTRODUCTION AND SUMMARY

1. INTRODUCTION

1.1 PURPOSE AND CONTENT OF THIS EIR

This Environmental Impact Report (EIR) has been prepared to describe the potential environmental impacts that could result from the development of Mahukona Lodge by Chalon International of Hawaii, Inc. (Chalon) in North Kohala, Hawaii. The overall development would include a low-rise lodge with about 80-90 accommodation units, about 120-150 low-rise accommodation units separated from the lodge and about 125-150 one-acre residential/agricultural lots on approximately 430 acres of Chalon lands. Tennis facilities, a golf course and other amenities also would be provided. It is noted that, at this time, the land use changes and permits to be requested do not require an environmental impact statement and/or environmental assessment for the proposed project under Chapter 343 Hawaii Revised Statutes (HRS). However, this EIR has been prepared in keeping with the intent of State and County of Hawaii environmental protection and analysis rules and regulations to ensure that the residents of the areas surrounding the proposed project, as well as state and county regulatory and planning agencies, are informed of the potential environmental impacts of the project. This EIR has been patterned after Chapter 343, HRS and Title 11, Department of Health, Chapter 200, Subchapter 7, Sections 11-200-09 through 11-200-18. The information contained herein has been drawn from site visits, planning, engineering and environmental studies conducted specifically for the proposed project and generally available sources regarding the environmental characteristics of the project site and surrounding area.

1.2 APPLICANT AND PROJECT SUMMARY

Chalon International of Hawaii, Inc. (Chalon) proposes to develop a low-rise resort/recreation/residential/agricultural project on about 430 acres of land at Mahukona/Kapaanui in the North Kohala District on the Island of Hawaii. The proposed project lands are located on the northwest coast of the island, approximately 12 miles north of Kawaihae town and Harbor and about six miles southwest of Hawi on the Kohala/Kawaihae Coast (see Figures II-1 and II-2).

1.3 DESCRIPTION OF THE PROPERTY

The lands on which the project would be developed are mostly vacant at present and are used as wildlife habitat and, to a limited extent, for cattle grazing. The parcels on which the project would be developed or are owned by Chalon are identified as Tax Map Keys (TMK's) 5-7-02:11; 5-7-03:02; 5-7-03:03; 5-7-03:07; 5-7-03:08; 5-7-03:10; 5-7-03:12; and 5-7-03:16 (see Figure II-3 and Table II-1). The majority of the lands on which the proposed project would be located are primarily designated Agriculture by the State Land Use Commission (SLUC) and designated Urban Expansion, Resort and Extensive Agricultural on the Hawaii County General Plan. The lands are zoned, by the County of Hawaii, as A-1a [one (1) acre agriculture lots] and Unplanned (UP). A strip of coastal land varying in width from about 75 feet to more than 300 feet fronting the project site is designated Conservation [Conservation, Resource Subzone (CR)] by the SLUC. Other than possible improvements, for public benefits and in cooperation with the state and/or county, to the harbor, general maintenance and cleanup of debris and/or Mahukona Park facilities, the proposed project activities would be outside the Conservation District area. Akoni Pule Highway (State Highway 27) bisects the project lands at about the 150-foot elevation. The project lands makai of the highway are within the Special Management Area (SMA) as designated by the county under the state Coastal Zone Management Program.

Mahukona Harbor, which is outside the project boundaries to the southwest, is a state-owned, county-operated facility that consists of an old concrete wharf and small boat launch winch. Kapaa Park, which is maintained by the county and is also outside the project boundaries, is located adjacent to the northwestern boundary of the property. The northern boundary of Lapakahi State Historical Park abuts the southern boundary of the project property.

Mahukona Harbor once served as a loading point for sugar ships and several buildings associated with harbor operations were located there. Additionally, a narrow gauge railway terminated at the harbor. All of the buildings, with the exception of one corrugated metal warehouse and a house that was formerly part of the railroad terminal, were removed from the site several years ago. Remnants of building foundations and floor slabs are still found around the harbor.

All of the proposed project lands are owned in fee by Chalon International of Hawaii, Inc. (see Table II-1). Lands adjacent to the project site are owned by the state and

private land owners. The total land area of the proposed project site is about 430 acres, of which about 14.5 acres would be utilized for the proposed low-rise lodge and villas. About 150 acres of the project site would be utilized for the proposed golf course. The remaining acreage of the property would be developed as one-acre residential/agricultural home sites or retained in its present natural condition.

1.4 PROPOSED GOVERNMENTAL ACTION

This EIR has been prepared to accompany applications for various government permits which are required for project development (see Table I-1). A land use district boundary amendment petition, that will be submitted to the County of Hawaii Planning Department, Planning Commission and County Council, will be required to redesignate approximately 14.5 acres of the Agricultural District lands into the Urban District. This will allow development of the Lodge and villas (see Figures II-4 and II-5). Also, at the county level, an SMA permit application will be required for that portion of the property located makai of Akoni Pule Highway and an application is being submitted for Change of Zone (COZ).

1.5 AGENCIES CONSULTED IN MAKING ASSESSMENT

Governmental agencies that have been consulted in the preparation of this EIR include the State Department of Land and Natural Resources and the County of Hawaii Planning Department. In addition, Chalon has participated and worked with a Citizens Participation Committee (CPC), comprised of residents of the North Kohala area, in the development of its concept for the proposed project.

2. PROJECT DESCRIPTION

2.1 BACKGROUND AND STATEMENT OF OBJECTIVES

Chalon International is a company founded on a sound philosophy of balancing spiritual and humanistic values with economic reality. Our goal is to foster peace and mutual trust among peoples of the world and to contribute to the well-being of the communities where we do business. All of our projects seek to incorporate local lifestyles and values based on equal considerations toward spiritual and economic well-being.

Chalon's major objectives with regard to North Kohala have been:

- Total commitment to achieving economic and social balance which will be of mutual benefit both to Chalon and the Kohala community.
- Retain long-term ownership of current land holdings in order to effectively implement a development plan which meets the needs and desires of Chalon and the community.
- Enhance the quality of life by providing a diversity of economic opportunities and employment options within the district.
- Preserve, maintain and interpret sites of historic and cultural significance in close cooperation with the community and other interested agencies.
- Maintain the rural character and lifestyle of the district through fostering increased agricultural opportunities.
- Develop a range of housing opportunities to meet the needs of the community with an initial emphasis on providing affordable housing for local residents.
- Expand existing and create new recreational opportunities in conjunction with county and state agencies.
- Create an environment for international exchange and cooperation.

In keeping with these objectives, the proposed project becomes à key economic element of Chalon's overall Kohala plans and provides the economic impetus for the accomplishment of those plans. The proposed project has been planned:

- To provide an economic generator that would assist in the political and economic justification for additional public and private infrastructure and community services expenditures in the North Kohala area;
- To provide a low-rise, retreat type lodge facility in the West Hawaii area for those who do not wish to experience a larger-scale "destination resort" type vacation experience;
- To provide additional public and private recreational opportunities (golf and tennis) in the North Kohala area to complement existing public facilities; and
- To provide large house lots with frontage onto garden features, the golf course and natural settings.

2.2 PROJECT DESCRIPTION

As indicated above, the proposed project would consist of the following elements (see Figure II-6):

- A low-rise lodge that would include the main lodge building consisting of about 80-90 accommodation units, restaurant facilities and golf clubhouse;
- Approximately 120-150 low-rise villa type accommodation units detached from the main lodge building;
- An 18-hole golf course (situated both mauka and makai of Akoni Pule Highway);
- A stadium-type tennis court;
- A freshwater swimming "lagoon"; and
- About 125-150 one-acre residential/agricultural lots.

The project also includes creation of a historic park and interpretive center, provision for access to the shoreline and the necessary internal and external infrastructure to serve the project. These latter elements include a potable water transmission and distribution system; non-potable water transmission and distribution system (for golf course and landscape irrigation purposes); wastewater collection, transmission, treatment and disposal system; and internal roadway and vehicle parking system.

The project would be developed over a twenty-year period as market forces indicate. The first elements of the project would include the main lodge and a portion of the villas associated therewith, the golf course and the necessary infrastructure to support those elements. These elements would be constructed first because they are the primary income generators that would provide the economic incentive to continue development of the remaining elements.

2.3 NEED FOR THE PROJECT

The need for the project and the market studies that have been performed (see Appendix A) to determine the mix of project elements are fully described in Chapter II, Section 3.3. The market studies prepared specifically for the project indicate the following:

- A high-service luxury lodge, with personal services, an intimate scale and a variety of services, such as a fine-dining restaurant, could be developed and would be competitive and consistent with the state's forecast 1990's growth of luxury-class destination resorts.

- Complementing the lodge facility, between 120 and 150 low-rise, villa type accommodation units could be developed and marketed with success.

- The residential/agricultural lots planned are unique because they contain features of two types of residential lot projects: agricultural/estate lots similar to those at Kohala Ranch and resort lots similar to the Fairways at Mauna Kea North. The Mahukona lots are considered to be attractive in terms of location, size and availability of resort amenities. It is forecast that all lots would be absorbed within the first five years of marketing with build-out of improved lots completed after 2010.

- Golf course usage at Mahukona is forecast to be from 80 rounds per day in 1995 to 150 rounds per day in 2010, with lodge guests, single family residents, golf club members and regional visitors being the four principal demand sources. Tennis facilities would also be supported by lodge guests, residents and regional visitors.

3. SUMMARY OF EXISTING CONDITIONS AND POTENTIAL IMPACTS

3.1 PHYSICAL ENVIRONMENT

The existing physical environment of the project site is characterized as mostly vacant, coastal kiawe/buffel grass scrubland that serves as limited wildlife habitat and pasture land. The site is mostly gently sloping with an overall slope of the property being about 7 percent. The mauka top crest side of the project site is relatively flat but the slope increases to 20 percent at the lower end of the agricultural zone and flattens out again in the coastal conservation zone. Typical of West Hawaii coastal land, the project site and surrounding area has relatively little soil cover. A number of rock outcroppings occur on the project site.

The hydrological and drainage characteristics of the project site are typical of West Hawaii and western North Kohala with no perennial streams and highly porous lava. Except for one location at the head of Mahukona Harbor, groundwater efflux at the coastline is estimated to be relatively low and probably ranges less than 2.0 million gallons per day per coastal mile (see Appendix D).

The primary potential natural hazards to which the proposed project may be subjected are volcanic hazards and floods caused by intensive rainfall over an extended period of time. Along the coastline, tsunamis and floods due to high waves are also natural hazards to which the property is subjected. However, because the project elements would be outside the coastal strand, these hazards would not affect the project. The volcanic hazards of the project site have been assessed by Mullineaux, *et al.* (1987). The project lies within lava hazard Zone 9, indicating that although the area has not been affected by lava flows for at least 60,000 years, the area could be affected by an unusually long lava flow from Mauna Kea. The project site is also located within tephra fall hazard Zone 3, indicating that tephra falls from eruptions would be thin. The project site is outside of the pyroclastic surge hazard zone for Kilauea Volcano. Although volcanic events could occur in the future, there is no way of predicting when they might occur or the magnitude of any event should it occur.

In addition, inundation hazard from slow regional subsidence exists along the entire shoreline of the island. The project area is located in ground fracture and subsidence hazard Zone 4, in which hazards are the least for the entire island.

The coast adjacent to portions of the project site are subject to tsunamis, with the 12-foot 1946 tsunami being the largest known tsunami the area has experienced. The Flood Insurance Rate Map (FIRM) for the area and the 1982 Flood Insurance Study for The County of Hawaii, indicate that the 100-year tsunami elevation of the area ranges from seven to eight feet. Lands adjacent to the project site fall into zones designated VE, indicating that base flood elevations have been determined (8 feet) and coastal flooding with velocity hazard (wave action) may occur; and AE indicating that base flood elevations have been determined (8 feet). Near the project area, the VE zone extends inland a maximum of about 100 feet from the shoreline and the AE zone extends inland a maximum of about 100 feet from the inland boundary of the VE zone.

The absence of caprock along the coast of the Kohala Mountain causes the basal water table to stand nearly at sea level and the high permeability of the lavas along most of the coast allows ocean water to move freely underground. As such, the groundwater below the site is believed to be brackish and generally unsuitable for agricultural or potable purposes. Although there is an old well near Mahukona Harbor, there are no presently working potable or non-potable water wells within the project site and none are planned.

The climate of the area is generally hot, arid and savanna-like. Daytime temperatures range from about 89 degrees F in the summer months to about 82 degrees F in the winter months. Nighttime temperatures for the same periods range from about 70 degrees F to 64 degrees F. Rainfall in the project area averages 13.5 inches per year. Air quality in the project area is good due to the lack of stationary air pollutant generators, the relatively low level of vehicular traffic and the prevailing winds. Similarly, the noise regime of the project area is quiet with sound levels typical for undeveloped, sparsely populated areas.

The proposed project is not expected to significantly impact or be significantly impacted by the geology and physiography, soils or agricultural potential, hydrology and drainage, natural hazards, climate and meteorology, air or noise quality of the project site or area. The visual attributes of the project area will be impacted by the project. These impacts are expected to be positive through the addition of landscaping around the proposed facilities and maintenance of the natural vegetation to improve mauka and makai view planes. The physical environmental factors associated with the proposed project are discussed in detail in Chapter IV, Section 2.1.

3.2 NATURAL ENVIRONMENT

The existing natural environment of the project site is characterized as sparse vegetation, with the inland portions of the project site consisting primarily of kiawe trees with a dense ground cover of buffel grass (see Appendix B). A narrow band of coastal vegetation is found along the rugged shoreline. There are no known officially listed threatened or endangered plant species or candidate species on the project site. A complete description of the project site vegetation is included in Chapter IV, Section 3.1 and Appendix B.

The fauna of the project site (see Appendix C) consists primarily of introduced bird species such as Doves, Francolins, Mockingbirds, Sparrows, Common Myna, Japanese White-eye and Cardinals. Native birds that have been observed on the project site, or possibly could occur on the site, include Hawaiian Hawk, Hawaiian Owl, Lesser Golden Plover, Great Frigate Bird, Wandering Tattler, Brown Booby and White-tailed Tropic Bird. Mammals that are or may be present at the site include the Small Indian Mongoose, Hawaiian Bat, Black Rat, House Mouse, feral cats and dogs and cattle. All of the bird

species recorded in the area to date are relatively common throughout Hawaii. A complete description of the terrestrial fauna is included in Chapter IV, Section 3.2 and Appendix C.

The offshore marine environment consists of four major biotopes or zones (see Appendix D): (1) a shallow high energy (wave) biotope adjacent to the shoreline; (2) a high coral cover biotope at greater depths seaward of the high wave energy zone; (3) a deep low coral cover biotope; and (4) a sand biotope. The shallow high energy and high coral cover biotopes occur as two near-continuous bands paralleling the shore. The deep low coral cover zone is restricted to one small area at the north end of the project site and the sand biotope lies seaward of the project site at depths greater than about 60 feet. The project site does not contain any coastal or anchialine ponds or old fish ponds. Water quality along the project site coastline is comparable to that at other pristine locations along the West Hawaii coast. A complete description of the marine environment along the project site coastline is given in Chapter IV, Section 3.3 and Appendix D.

3.3 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Based on archaeological inventory surveys of the entire project site by professional archaeologists and a community group (see Appendices E, F and G), 127 sites containing over 300 component features were identified within or immediately adjacent to the site. The physical condition of the sites ranges from poor to good and they consist of both single and multiple features. Both formal feature types and functional feature types are represented in the project area. Formal feature types present at the sites include terraces, walled terraces, double terraces, C-shaped and double C-shaped enclosures, walls, trails, platforms, enclosures, mounds, midden scatter, cupboard, modified outcrop, cairn, overhang, border alignment, road, Mahukona Harbor complex, railroad bed and machine gun emplacement. Functional feature types include habitation, temporary habitation, transportation, possible burial, ceremonial, possible marker, agriculture, water catchment, boundary, harbor, World War II military and features of indeterminate function.

Based on National Register criteria for evaluation, sites have been determined to be potentially significant for information content (Criterion D) and potentially significant as representative examples of site types (Criterion C). Based on the evaluation criteria, 91 of the sites identified are assessed as significant solely for scientific information content. No further work has been recommended for 35 of these sites and for the remaining 56 sites, further data collection (detailed recording of sites and features, surface collection and

selected limited excavation) has been recommended. Seven sites have been assessed as important for information content and as excellent examples of site types at the local, regional, island, state or national level. These sites have been recommended for further data recovery and preservation with some level of interpretive development. Nine sites have been assessed as important for information content, as culturally significant and as excellent examples of site types at the local, regional, island, state or national level. Preservation with some level of interpretive development is recommended for all nine sites. Seventeen sites have been assessed as potentially culturally significant because they are possible burials or contain features that may hold burials. Further data collection, with limited excavations to determine the presence or absence of burials is recommended for all possible burial sites. If burials are located, preservation "as is" (no further work) is recommended. A complete description of the archaeological resources of the project site is included in Chapter IV, Section 4 and Appendices E, F and G.

3.4 SOCIOECONOMIC FACTORS

The existing and forecast socioeconomic factors associated with the development of the project area and the development and operation of the lodge and associated amenities, have been thoroughly analyzed and are discussed in Appendices H and I and in Chapter IV, Section 5. These analyses considered the overall socioeconomic character of the North Kohala area including other proposed and planned projects and facilities. Following this socioeconomic analysis, several mitigation measures relating to job awareness, training and educational programs; management strategies; child care programs; entrepreneurial programs; transportation assistance; employee housing; and career advancement were suggested.

In general, the analyses indicated that implementation of the overall Chalon North Kohala Master Plan would assist in relieving the need for affordable housing in North Kohala; upgrade the medical facilities in the district; assist in identifying sites for schools and assist in developing a solid waste management plan and in making roadway improvements. The analyses also indicated, with specific regard to the proposed project, that the project would have a beneficial effect on Mahukona Park and Harbor by improving access and use of the facilities by the general public; provide better public access to the shoreline and improve lookouts and scenic points; provide new employment and recreational opportunities for the residents of the area; and probably not significantly affect real estate taxes or home prices. Further, the project will support the district's economy and provide

a stable source of income for many residents and possibly increase traffic problems on some district roads. The project is also expected to add to the population of Hawaii County through the visitors who would be staying at the lodge; full- and part-time residents at the development; and to the extent that the island's available labor supply proves insufficient to fill new operational and/or construction positions, in-migrants would be needed for the project's labor force. It is estimated that the total projected population impact would be about 1,400 new residents on the island. A portion of these new residents would probably live in North Kohala.

Based on the analyses performed, the proposed project is forecast to require approximately 730 person-years of construction labor from 1993 to 2010. An annual average of about 56 construction workers would be needed from 1993 to 2010. Total employment associated with construction, including induced and indirect positions would total about 2,500 person-years.

Similarly, permanent jobs at the lodge and related facilities are projected to be about 470 with another 420 indirect or induced jobs created by the project.

Wages and salaries paid to those directly employed in resort development and operation are expected to be about $153 million through 2010. Total household income attributable to the project is expected to be about $701 million during the same time period.

Similarly, the fiscal impact analysis indicates that during the 1993 to 2010 period the project is expected to generate about $64.2 million in state tax revenues and $27.4 million in county real property tax revenues. Over the same time period, state expenditures required to support the project are estimated to be about $10.2 million and county expenditures are estimated to be about $2.9 million.

3.5 INFRASTRUCTURE AND PUBLIC FACILITIES

3.5.1 Transportation Facilities

3.5.1.1 Vehicular Traffic

Traffic impacts related to the overall North Kohala District development and the proposed project have been thoroughly analyzed and are described in Appendix J and

Chapter IV, Section 6.1. Based on these analyses, present levels of service (LOS) (see Chapter IV, Section 6.1 for definition of LOS) on all state and county roadways and highways, are "A" and "B" for morning (am) and afternoon (pm) peak hours respectively. Akoni Pule am and pm LOS are forecast to be "C" and "D" in 2015. The results of the analysis indicate that the project would have a minor adverse impact on Akoni Pule Highway operations, particularly in the pm peak hour.

3.5.1.2 Air Transportation

The majority of the visitors to the Mahukona Lodge project are expected to transit through Keahole Airport. Keahole Airport served about 160,000 overseas and 1.66 million interisland passengers in 1988. As a result of existing as well as planned resort developments in West Hawaii, passenger levels and aircraft operations at the airport are forecast to significantly increase in the future. Present planning for the airport by the State Department of Transportation includes expansion of the airport facilities, including extension of the runway, to accommodate forecast increases in passenger levels and direct mainland US flights by wide-bodied aircraft.

The proposed project, in and of itself, is not expected to significantly affect air passenger and/or cargo levels at Keahole or any of the other state airports on the island. However, as part of the overall development, it is likely that a portion of the visitors to and homeowners within the proposed project will transit through Keahole Airport. These visitors and owners are not expected to significantly affect Keahole Airport's service or facilities requirements.

3.5.1.3 Surface Vessel (Ship and Barge) Transportation

Kawaihae Harbor, south of the proposed project, is the only deep water harbor in West Hawaii and is used primarily by interisland barges and a limited number of smaller recreational and commercial boats. Cargo transiting through the harbor includes building materials, consumer goods, large equipment and machinery, as well as the provisions and supplies required to service the hotels and resorts in South Kohala and Kona. Over 870,000 short tons of cargo passed through the harbor in 1987, an increase of almost 300,000 tons over 1986. Currently, the expansion of Kawaihae Harbor, to include a public small boat harbor, is being studied by the U.S. Army Corps of Engineers and State Department of Transportation, Harbors Division. Plans for the development of a small boat harbor at

Kawaihae are a priority with the State Department of Transportation, Harbors Division. However, neither federal nor state funding nor a timetable for planned improvements are fixed.

3.5.2 Other Public Services and Facilities

The proposed project area solid waste disposal facilities; electrical power and communication systems; schools; health care facilities; and police and fire protection services facilities are described in Chapter IV, Sections 6.7 through 6.11. At present, these facilities and services are generally undersized and in need of improvement to accommodate future growth of the project and the North Kohala area.

3.5.3 Potable Water, Non-Potable Water and Wastewater Systems

Potable water, non-potable water and wastewater systems will be developed specifically for the proposed project by Chalon. Rather than utilizing the County's Hawi-Kokoiki potable water system, as had originally been planned, Chalon now intends to construct its own potable water system. The system would consist of two wells above Hawi, two 500,000 gallon tanks, an 8-inch transmission pipeline, and two pressure reducing stations. The two wells would provide 100% redundancy. Development of the new system will be in compliance with State Department of Health Title 11, Chapter 20, Administrative Rules and County of Hawaii Department of Water Supply rules and regulations. It is estimated that an average of about 235,000 gallons per day (gpd) of potable water will be required at buildout. In general, water limitations in the region are a problem of transmission and development rather than source. As such, the water requirements of the proposed project are not expected to adversely impact the availability of potable water for other uses in the region.

In addition to the above, a non-potable water system will be developed for golf course and landscape area irrigation purposes. The project will require an average of about 2.7 mgd for irrigation purposes. This system will be an extension of the Kohala Ditch system and will supplement treated wastewater for irrigation purposes. Use of non-potable water for irrigation purposes will reduce potable water demands and assist in the conservation of regional potable water supplies.

The proposed project is expected to generate approximately 205,000 gpd of wastewater. This wastewater will be collected and pumped to an on-site treatment facility which will screen and biologically treat the wastewater. The effluent will be filtered, disinfected and utilized as a supplemental irrigation source for the golf course. The wastewater treatment system will include a stabilization pond system consisting of two aerated ponds, "polishing ponds" and storage ponds. The wastewater collection, treatment and disposal system will be designed, constructed and operated in compliance with applicable State Department of Health and County of Hawaii rules and regulations. Information relative to the potential impacts of utilizing treated wastewater on the golf course is provided in Chapter IV, Section 3.3.

4. SUMMARY OF PROPOSED MITIGATION MEASURES

The proposed project is generally expected to have minimal impacts on the environment. As such, for most environmental areas of concern, mitigation measures to minimize potential adverse impacts that might result from the proposed project are either not warranted due to the lack of expected adverse impacts or are designed into the project, e.g., use of native plants in landscaping plans. The following areas of particular concern, however, have warranted mitigation measures to ensure that potential adverse impacts are either avoided or minimized.

4.1 MARINE ENVIRONMENT

To ensure that construction of the proposed facilities has a minimal impact on the marine environment, all graded areas would be protected with berms and water retention basins to prevent siltation of the nearshore coastal waters. Further, all graded areas would be replanted with appropriate ground cover as soon as practical. In addition, the construction contractor will be required to comply with all state and county environmental protection rules and regulations regarding air, noise and water quality. Because the majority of construction would be inland from the coastline, few impacts to the marine environment are expected to occur as a result of construction.

4.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

During the planning and preliminary design phases of the project, careful attention has been given to identified archaeological and historical sites. The planners and designers

have worked closely with the professional and community archaeologists to ensure that the proposed facilities avoid significant sites. In addition, prior to construction, appropriate measures, such as fencing and marking of archaeological sites, will be taken to ensure that significant historical and archaeological sites are adequately protected and preserved. It is the intent of Chalon to incorporate significant archaeological and cultural resources into the project and to provide interpretive educational programs to inform residents and guests of the historical/archaeological features of the project area.

4.3 NATURAL HAZARDS

To mitigate potential natural (volcanic, tsunami and flood) hazards, all structures would be designed and constructed in accordance with applicable building codes. In addition, the project area would be connected to the county coastal hazard emergency siren warning system and the operators of the lodge would coordinate with the County Civil Defense to implement appropriate county procedures for emergency management.

5. SUMMARY OF ALTERNATIVES CONSIDERED

The alternatives that have been considered include the "no project" alternative, the alternative of developing a smaller project, alternative combinations of the amenities to be provided and/or different configurations of the proposed amenities. In general, these alternatives have been rejected because they do not meet the objectives of the proposed project. All of the alternatives that have been considered and the reasons for rejection of those alternatives are described in detail in Chapter III.

6. SUMMARY OF UNRESOLVED ISSUES

Chalon is aware of concerns raised by the general public during the on-going Citizens Participation Committee (CPC) meetings and public informational meetings, as well as discussions with governmental agencies regarding the potential impacts of the proposed project (see Chapter VII for information relative to CPC and public informational meetings). Based on the studies conducted specifically for the project, as well as commitments to the community that have been made by Chalon, the project is expected to have a long-term positive impact on the project area. Chalon is cognizant of the need to keep the general public informed of its plans and in this regard has held numerous public and private meetings with concerned citizens and government officials. Chalon will continue

to hold these meetings to assist the public in understanding the extent of the proposed project and the potential environmental impacts of the project.

Other issues that remain unresolved at this time are permitting and procedural issues that this EIR is designed to help resolve. It is believed that these issues can be resolved without undue difficulty.

7. SUMMARY OF COMPATIBILITY OF LAND USE POLICIES AND CONTROLS

The proposed project would be located within presently designated Urban Expansion, Resort and Extensive Agricultural lands as defined by the County General Plan. State Land Use Commission (SLUC) designation of the project site is primarily Agriculture with a narrow band (approximately 75-300 feet wide) of Conservation District (CR) land along the shoreline. All project related development work, with the exception of possible improvements to the harbor for public benefits, general maintenance and cleanup of debris and/or Mahukona Park facilities (in cooperation with the state), would be outside the Conservation District area. A land use boundary amendment petition that will be submitted to the County of Hawaii Planning Department, Planning Commission and County Council, will be required to redesignate approximately 14.5 acres of the Agricultural District lands into the Urban District. This will allow development of the Lodge and villas (see Figure II-4). Also, at the county level, an SMA permit application will be required for that portion of the property located makai of Akoni Pule Highway and an application is being submitted for Change of Zone (COZ) (see Table I-1 below).

Upon adoption of requested land use changes and issuance of required environmental protection permits, the proposed project would be consistent with the Hawaii State Plan and all Functional Plans prepared thereunder, the Hawaii Coastal Zone Management Plan and the Hawaii County General Plan. The project would not be consistent with the West Hawaii Regional Plan prepared by the Office of State Planning in that it does not designate Mahukona a "Resort Destination Node."

8. NECESSARY APPROVALS AND PERMITS

This EIR has been prepared to document the potential environmental impacts of the proposed project and as part of the various county land use change requests that will be

filed. Table I-1 identifies the various county and state approvals and permits that will be required for the proposed project to proceed.

9. PREPARERS OF THIS EIR

Table I-2 lists the principal preparers of this EIR, the organization with which they are associated and their area(s) of expertise.

TABLE I-1

PROJECT APPROVALS REQUIRED

APPROVALS NEEDED	APPROVING AGENCY OR BODY
HAWAII COUNTY	
Land Use District Boundary Amendment	County Planning Department/Planning Commission/County Council
Special Management Area (SMA) Permit	Planning Department/Planning Commission
Change of Zone	Planning Department/Planning Commission/County Council
Special Use Permit	Planning Department/Planning Commission
Plan Approval	Planning Department
Subdivision Approval	Planning Department/Department of Public Works
Building Permit	Department of Public Works
Grubbing, Grading, Excavation and Stockpiling Permit	Department of Public Works
Outdoor Lighting Permit	Department of Public Works
Conformance with County Flood Control Ordinance	Departments of Planning and Public Works
Sign Permit	Department of Public Works
Water System Expansion Approval	Department of Water Supply
STATE OF HAWAII	
Conservation District Use Permit	Department and Board of Land and Natural Resources*
Drinking Water System Approval	Department of Health
Wastewater System Approval	Department of Health
FEDERAL PERMITS	
None Required	

* Conservation District Use Permit may be required to provide public shoreline access. If required, CDUA will be submitted at the time the location of the access is determined.

TABLE I-2

LIST OF PREPARERS OF THIS EIR

NAME/AFFILIATION	TITLE	AREA OF EXPERTISE
Paul Sennett/Chalon International of Hawaii, Inc.	Executive Director	Project Management
Gordon Ogasawara/Chalon International of Hawaii, Inc.	Project Manager	Project Management
Michael Gomes/Chalon International of Hawaii, Inc.	Project Manager	Project Management
Matthew Grady/Chalon International of Hawaii, Inc.	Planner	Project Planning/ Coordination
Frank Brandt/PBR HAWAII	President	Project Management
James Leonard/PBR HAWAII	Managing Director, Hilo Office	Project Management/ Coordination
Chris Kimura/PBR HAWAII	Graphics Specialist/ Assistant Planner	EIR Graphics/ Project Coordination
Guy Tsutsui/PBR HAWAII	Cartographer	EIR Graphics
Hillary Hicks/PBR HAWAII	Graphics Artist	EIR Preparation
Gage Davis/Gage Davis Associates	President	Architectural Design/Layout
Gordon A. Chapman/ Chapman Consulting Services	Owner/Environmental Analyst	EIR Preparation/Principal Author
George Krasnick/ GK & Associates	Owner/Environmental Analyst	EIR Editing
Winona Char/Char & Associates	Owner/Botanist	Botanical Survey

CONTINUED

TABLE I-2

LIST OF PREPARERS OF THIS EIR
(Continued)

NAME/AFFILIATION	TITLE	AREA OF EXPERTISE
Dr. Paul H. Rosendahl/ Paul H. Rosendahl, Ph.D., Inc.	President	Archaeology
Dr. Richard Brock/ Environmental Assessment Company, Inc.	President	Marine Biology
Maile A. Kjargaard/ Independent Consultant	Owner/Wildlife Biologist	Avifauna and Feral Mammal Survey
Dr. John Knox/Community Resources, Inc.	President	Social Impact Assessment
Dr. John Kirkpatrick	Senior Research Associate	Social Impact Assessment
Malcom J. Tom/KPMG Peat Marwick	Partner	Fiscal/Economic Impact Assessment/Market Assessment
Michael McElroy/KPMG Peat Marwick	Engagement Manager	Fiscal/Economic Impact Assessment/Market Assessment
William Bow/M & E Pacific	Project Engineer	Traffic Assessment/ Infrastructure Engineering
David Shibata/Rush Moore Craven Sutton Morry Beh	Partner	Legal Counsel
Irene Anzai/Rush Moore Craven Sutton Morry Beh	Partner	Legal Counsel

Mahukona

Chapter II: *Description of the Proposed Project*

CHAPTER II

DESCRIPTION OF THE PROPOSED PROJECT

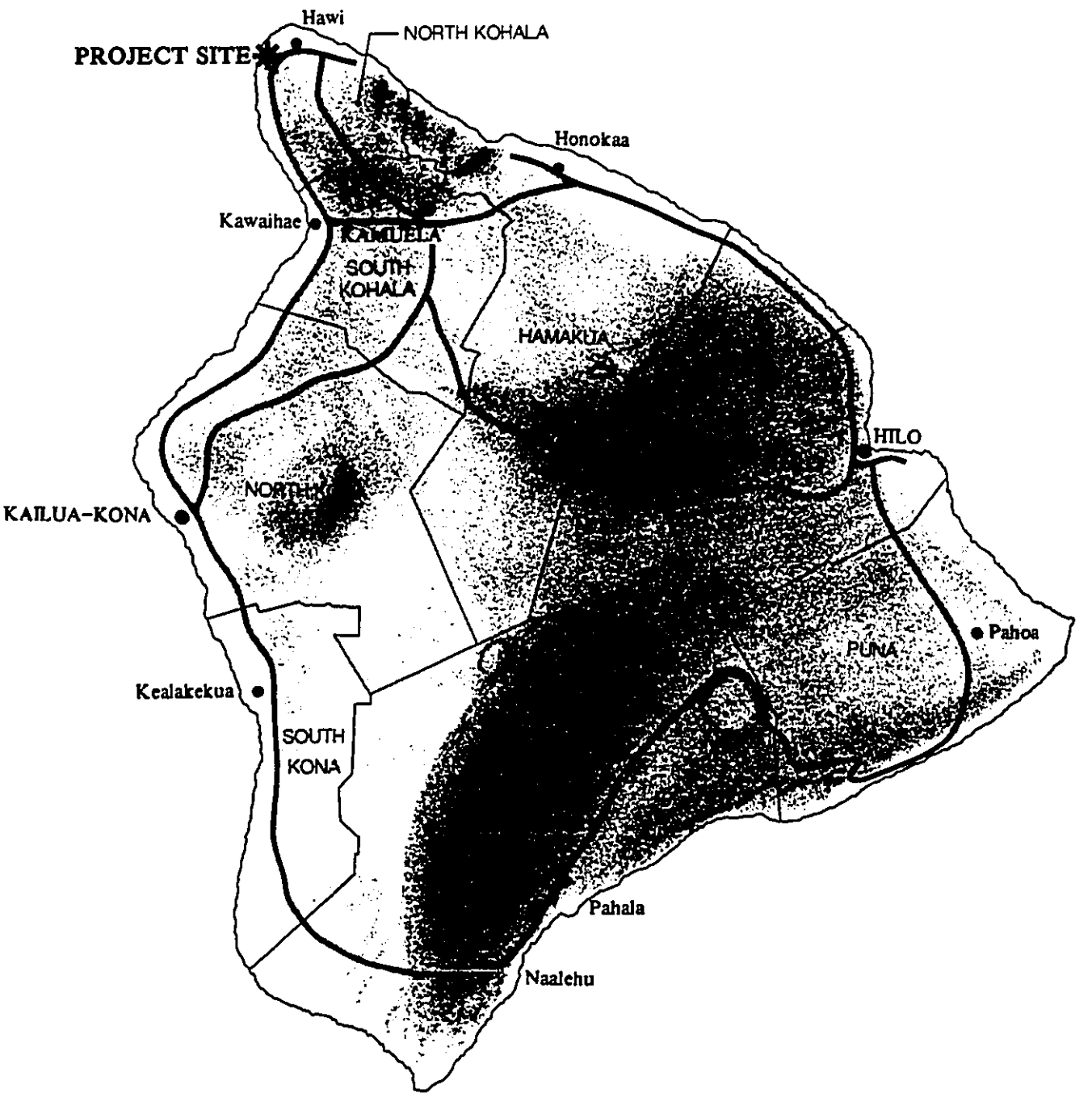
1. REGIONAL SETTING

The project site is located on the Kohala/Kawaihae coast of the Island of Hawaii, about 12 miles north of Kawaihae Harbor and town and about 6 miles southwest of Hawi, the nearest population and commercial center (Figure II-1). Mahukona Park and Mahukona Harbor are located adjacent to the project boundaries. Lapakahi State Historical Park is located adjacent to the southern boundary of the project boundaries. The topography and boundaries of the site are shown in Figure II-2.

There is a beach pavilion, picnic tables and a camping area at Mahukona Park. Mahukona Harbor once served as a loading point for sugar barges, and many buildings associated with harbor operations were located there. Additionally, a narrow gauge railway terminated at the harbor. The foundations and building slabs of some of the old buildings are still present.

The parcels on which the project would be developed are identified as Tax Map Keys (TMK's) 5-7-02:11; 5-7-03:02; 5-7-03:03; 5-7-03:07; 5-7-03:08; 5-7-03:10; 5-7-03:12; 5-7-03:16; and 5-7-03-18 (Figure II-3 and Table II-1).

The project lands are owned in fee by Chalon International of Hawaii, Inc. (Chalon) and consist of about 430 acres of mostly vacant lands that are currently used for wildlife habitat and seasonal cattle grazing. The majority of the lands on which the proposed project would be located are primarily designated Agriculture by the State Land Use Commission (SLUC) and designated Urban Expansion, Resort and Extensive Agricultural on the Hawaii County General Plan (Figure II-4). The lands are zoned, by the County of Hawaii, as A-1a [one (1) acre agriculture lots] and Unplanned (UP). A strip of coastal land varying in width from about 75 feet to more than 300 feet fronting the project site is designated Conservation [Conservation, Resource Subzone (CR)] by the SLUC. Other than possible improvements for public benefit to the harbor and/or Mahukona Park facilities, the proposed project activities would be outside the Conservation District area. Akoni Pule Highway (State Highway 27) bisects the project lands at about the 150-foot elevation.



ISLAND OF HAWAII

FIGURE II-1
PROJECT LOCATION MAP
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

NORTH LINEAL SCALE 0 7 14 MILES

PBR HAWAII

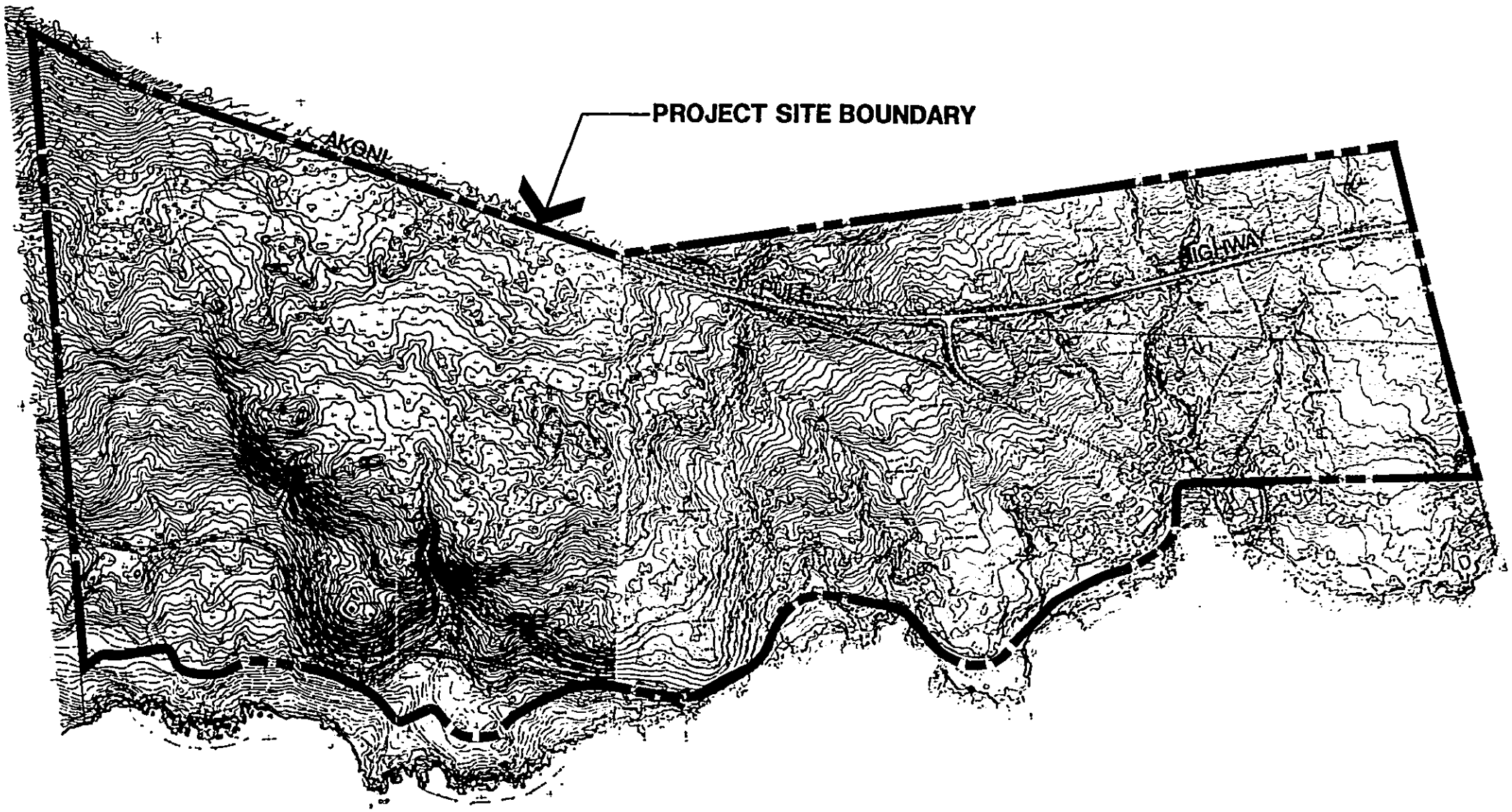


FIGURE II-2
PROJECT SITE
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE
MAHUKONA, NORTH KOHALA, HAWAII

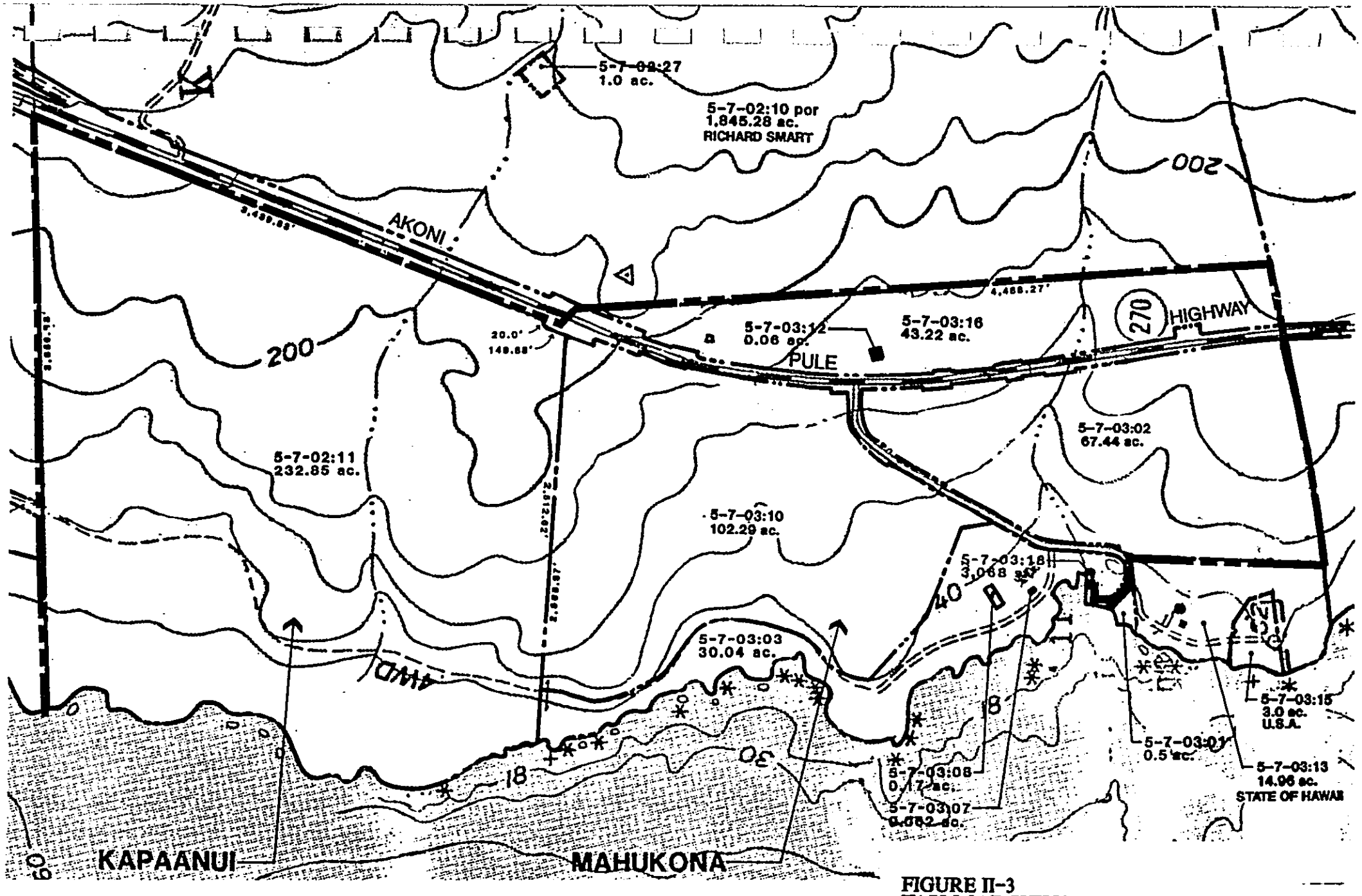


FIGURE II-3
TAX MAP KEYS
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

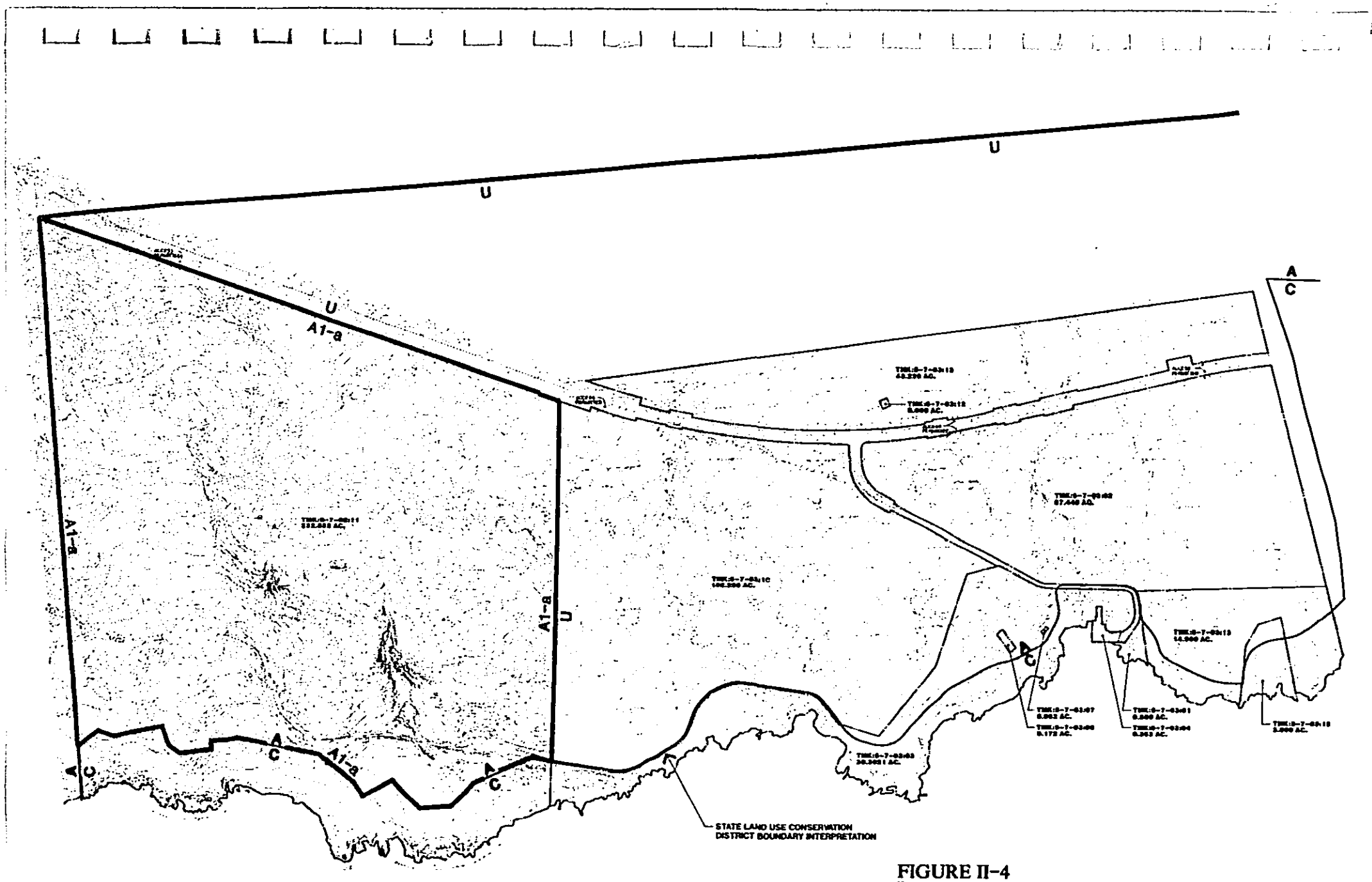
AREA
2 AC.
1 AC.

NORTH

LINEAL SCALE
0 200 400 800
FEET

PBR

NOTE: ALL TMK'S OWNED BY CHALON INTERNATIONAL OF HAWAII INC., UNLESS OTHERWISE INDICATED



LEGEND

STATE LAND USE		COUNTY ZONING	
A	AGRICULTURE	U	UNPLANNED
C	CONSERVATION	A1-a	AGRICULTURE (1 ACRE LOTS)

FIGURE II-4
EXISTING STATE LAND USE
& HAWAII COUNTY ZONING
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE
MAHUKONA, NORTH KOHALA, HAWAII

TABLE II-1

SUMMARY OF LAND USE OWNERSHIP/REGULATORY DESIGNATIONS

TAX MAP KEY ACREAGE	TYPE OF OWNERSHIP	STATE LAND USE DESIGNATION		COUNTY ZONING DESIGNATION		
		AG	CON	A1a	UP	SLU CON*
5-7-02:11 232.852 Ac	Fee	206.802	26.05	206.802	---	26.05
5-7-03:02 67.449 Ac	Fee	67.449	---	---	67.449	---
5-7-03:03 30.3921 Ac	Fee	9.802	20.59	---	9.802	20.59
5-7-03:07 0.062 Ac	Fee	0.062	---	---	0.062	---
5-7-03:08 0.172 Ac	Fee	0.172	---	---	0.172	---
5-7-03:10 102.295 Ac	Fee	102.295	---	---	102.295	---
5-7-03:12 0.060 Ac	Fee	0.060	---	---	0.060	---
5-7-03:16 43.226 Ac	Fee	43.226	---	---	43.226	---
5-7-03:18 0.070 Ac	Fee	0.070	---	---	0.070	---
TOTALS:		429.938	46.64	206.802	223.136	46.64
TOTALS TO DEVELOP:		429.938	---	206.802	223.136	---

* The State Land Use Conservation District is under the jurisdiction of the Board of Land and Natural Resources.

Legend: AG = Agriculture; CON = Conservation; A1a = Agriculture, One-Acre Lot Size; UP = Unplanned.

For the proposed project to move forward, a land use district boundary amendment petition will be submitted to the County of Hawaii Planning Department, Planning Commission and County Council, to redesignate approximately 14.5 acres of the Agricultural District lands into the Urban District (see Figure II-5).

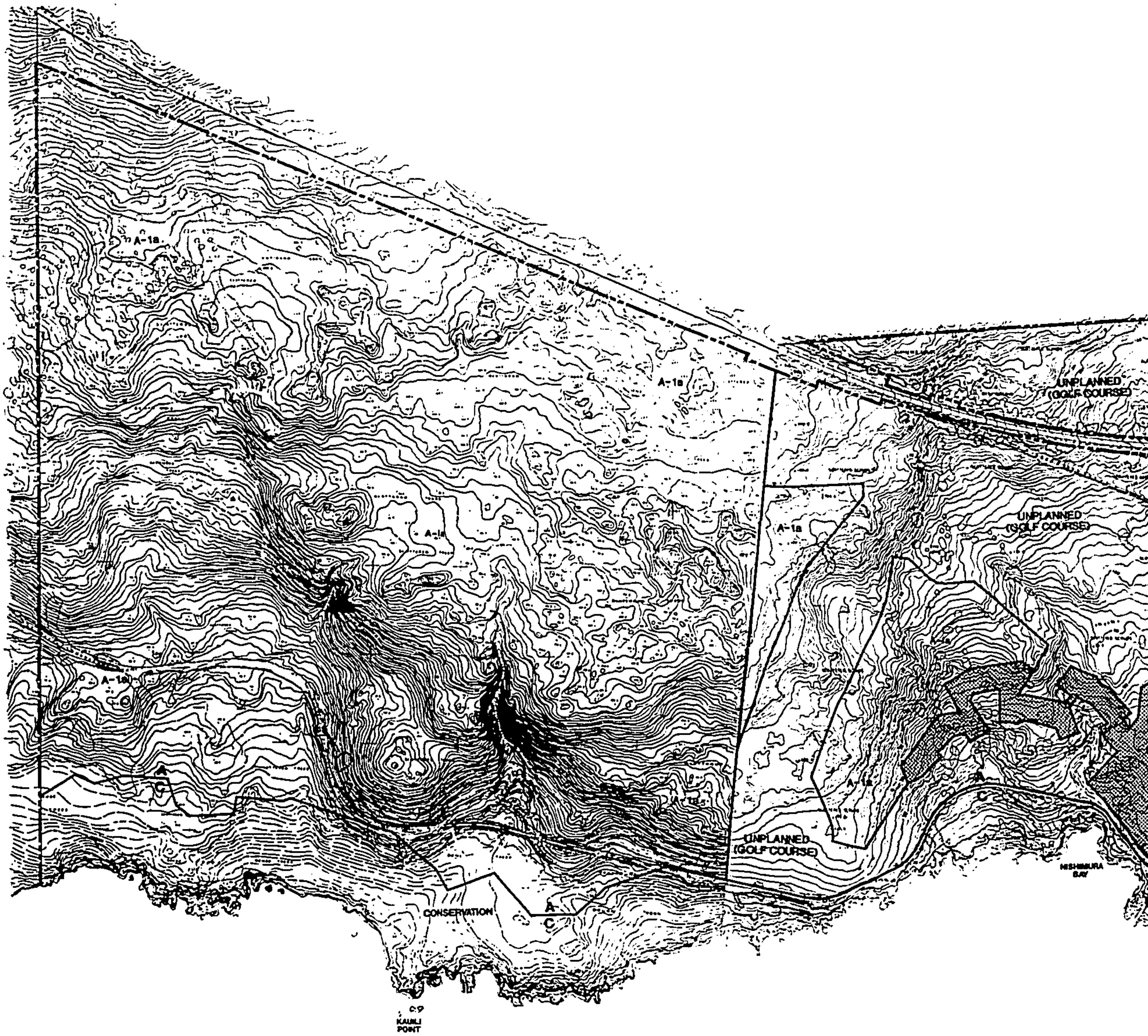
The project lands makai of the highway are within the Special Management Area (SMA) as designated by the county under the state Coastal Zone Management Program. Therefore, an SMA use permit application will be submitted for that portion of the property located makai of Akoni Pule Highway. An application is also being submitted to the county for Change of Zone (COZ).

The land is gently sloping with an average slope of about 7 percent. The top of the project site is relatively flat, but the slope increases to about 20 percent at the lower end of the Agriculture District zone and flattens out again in the coastal Conservation District zone. The project site offers panoramic views of the West Hawaii coastline to the south and the Pacific Ocean to the west. Mauna Loa, the Kohala mountains and Hualalai are visible from some vantage points along the coastline.

Soils of the area are shallow and the area exhibits a number of rock outcrops. The vegetation of the site is dominated by kiawe trees and buffel grass with large agave plants scattered throughout the site. There are numerous archaeological sites within the project boundaries, as is common along this section of the island (see Chapter IV, Section 4).

2. PROJECT BACKGROUND

The proposed Mahukona Lodge project is part of Chalon's overall North Kohala Master Plan, which calls for development of several types of facilities in the region. The Master Plan for the area, and specifically for the project site, has been under development for the past two to three years. In essence, Chalon's plans call for upgrading the basic infrastructure of the North Kohala area by adding various types of urban and agriculturally related facilities in its efforts to provide increased economic and social opportunities for the present and future residents of the area.



Mahukona

CHALON INTERNATIONAL OF HAWAII NORTH KOHALA, HAWAII

SOURCE: GAGE DAVIS ASSOCIATES 1990

LEGEND

STATE LAND USE

- A — AGRICULTURE
- C — CONSERVATION
- PROPOSED URBAN

COUNTY ZONING

- U — UNPLANNED
- A-1a — PROPOSED AGRICULTURE

PROPOSED RESORT (V-2.0)

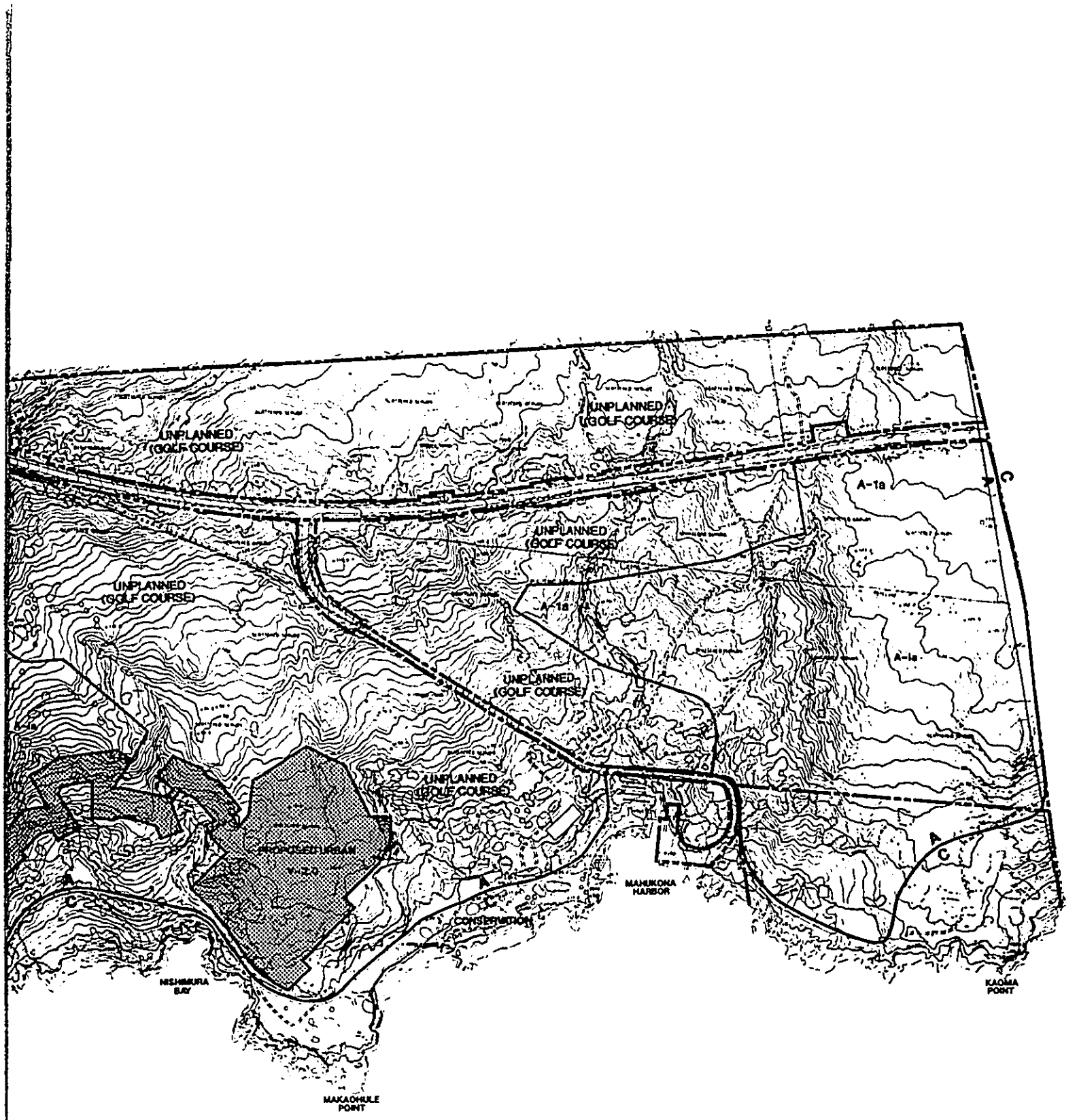


FIGURE II-5
PROPOSED STATE LAND USE AND HAWAII COUNTY ZONING
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

AREA
2 AC.
1 AC.
NORTH
LINEAL SCALE
0 133 266 533
FEET

PBR HAWAII

3. DEVELOPMENT CONCEPT

The Mahukona Lodge project has been master planned as a retreat-type resort. In developing the master plan for the project, the primary aim of Chalon has been "to create and
preserve an environment people will always look to return to." Corporate statements support limited development for North Kohala and close cooperation with the community. The major objectives with regard to North Kohala have been:

- Total commitment to achieving economic and social balance which will be of mutual benefit both to Chalon and the Kohala community.
- Retain long-term ownership of current land holdings in order to effectively implement a development plan which meets the needs and desires of Chalon and the community.
- Enhance the quality of life by providing a diversity of economic opportunities and employment options within the district.
- Preserve, maintain and interpret sites of historic and cultural significance in close cooperation with the community and other interested agencies.
- Maintain the rural character and lifestyle of the district through fostering increased agricultural opportunities.
- Develop a range of housing opportunities to meet the needs of the community with an initial emphasis on providing affordable housing for local residents.
- Expand existing and create new recreational opportunities in conjunction with county and state agencies.
- Create an environment for international exchange and cooperation.

3.1 PROJECT OBJECTIVES

In keeping with the above objectives, the proposed project becomes a key economic element of Chalon's overall Kohala plans and would provide the economic impetus for the accomplishment of those plans. As such, the proposed project has been planned:

- To provide an economic generator that would assist in the political and economic justification for additional public and private infrastructure and community services expenditures in the North Kohala area;

- To provide a low-rise, retreat-type lodge facility in the West Hawaii area for those who do not wish to experience the large-scale "destination resort" type vacation experience;

- To provide an additional residential product to those currently offered in the North Kohala/West Hawaii area, i.e, large agricultural oriented house lots with frontage onto garden features, the golf course and natural settings; and

- To provide additional public and private recreational opportunities (golf and tennis) in the North Kohala area to complement existing public facilities.

3.2 PROJECT DESCRIPTION

As indicated previously in Chapter I, Section 2.2, the proposed project would consist of the following elements (see Figure II-6):

- A low-rise lodge that would include the main lodge building consisting of about 80-90 accommodation units, restaurant facilities and golf clubhouse;

- Approximately 120-150 low-rise villa type accommodation units detached from the main lodge building;

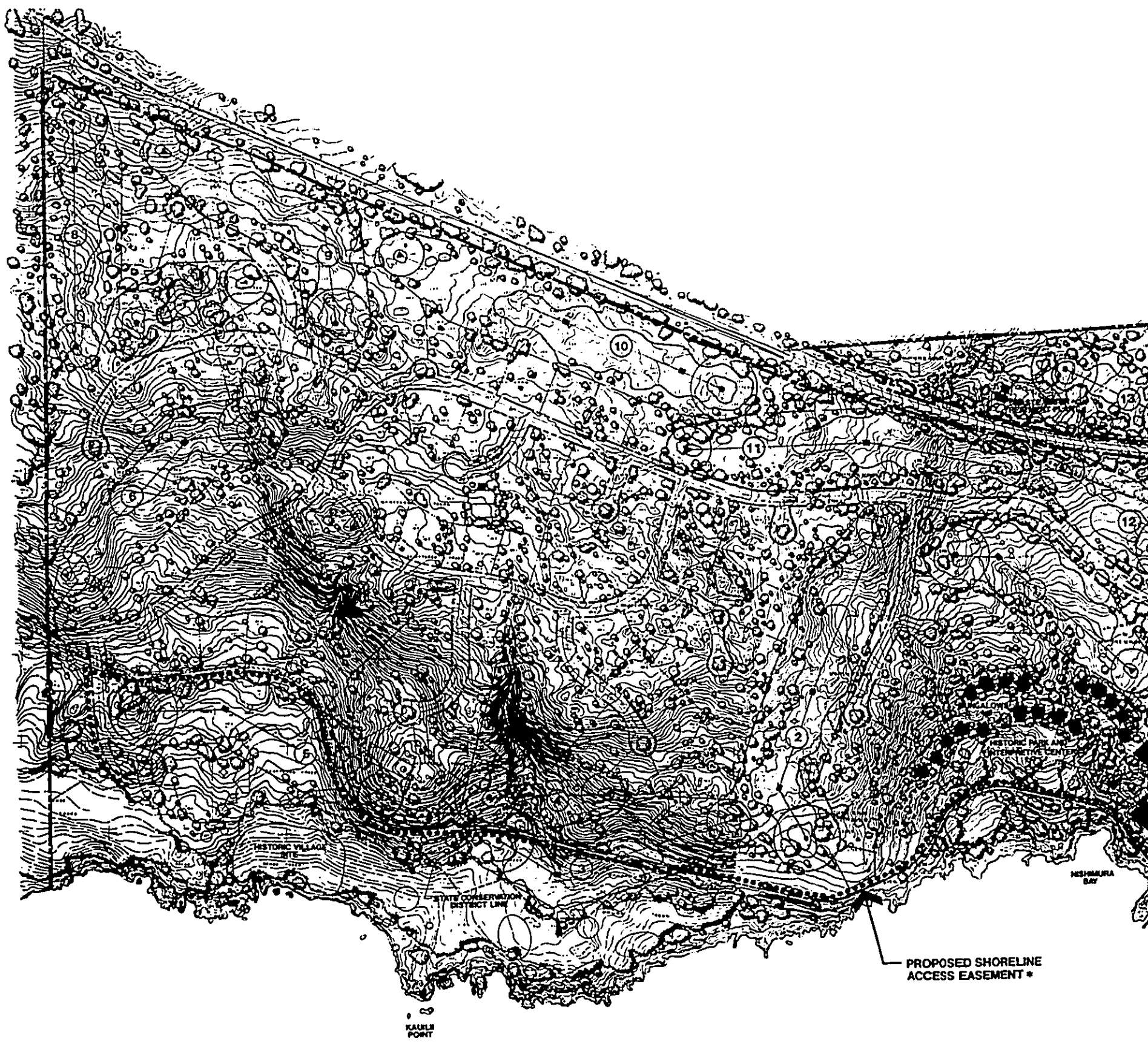
- An 18-hole golf course (situated both mauka and makai of Akoni Pule Highway);

- A stadium-type tennis court;

- A freshwater swimming "lagoon"; and

- About 125-150 one-acre residential/agricultural lots.

The project also includes a historic park and interpretive center, provision for access to the shoreline and the necessary internal and external infrastructure to serve the project. These latter elements include a potable water transmission and distribution system; non-potable water transmission and distribution system (for golf course and landscape irrigation purposes); wastewater collection, transmission, treatment and disposal system; and internal roadway and vehicle parking system.



Mahukona

CHALON INTERNATIONAL OF HAWAII NORTH KOHALA, HAWAII

SOURCE:
GAGE DAVIS ASSOCIATES

*EXACT LOCATION NOT DETERMINED

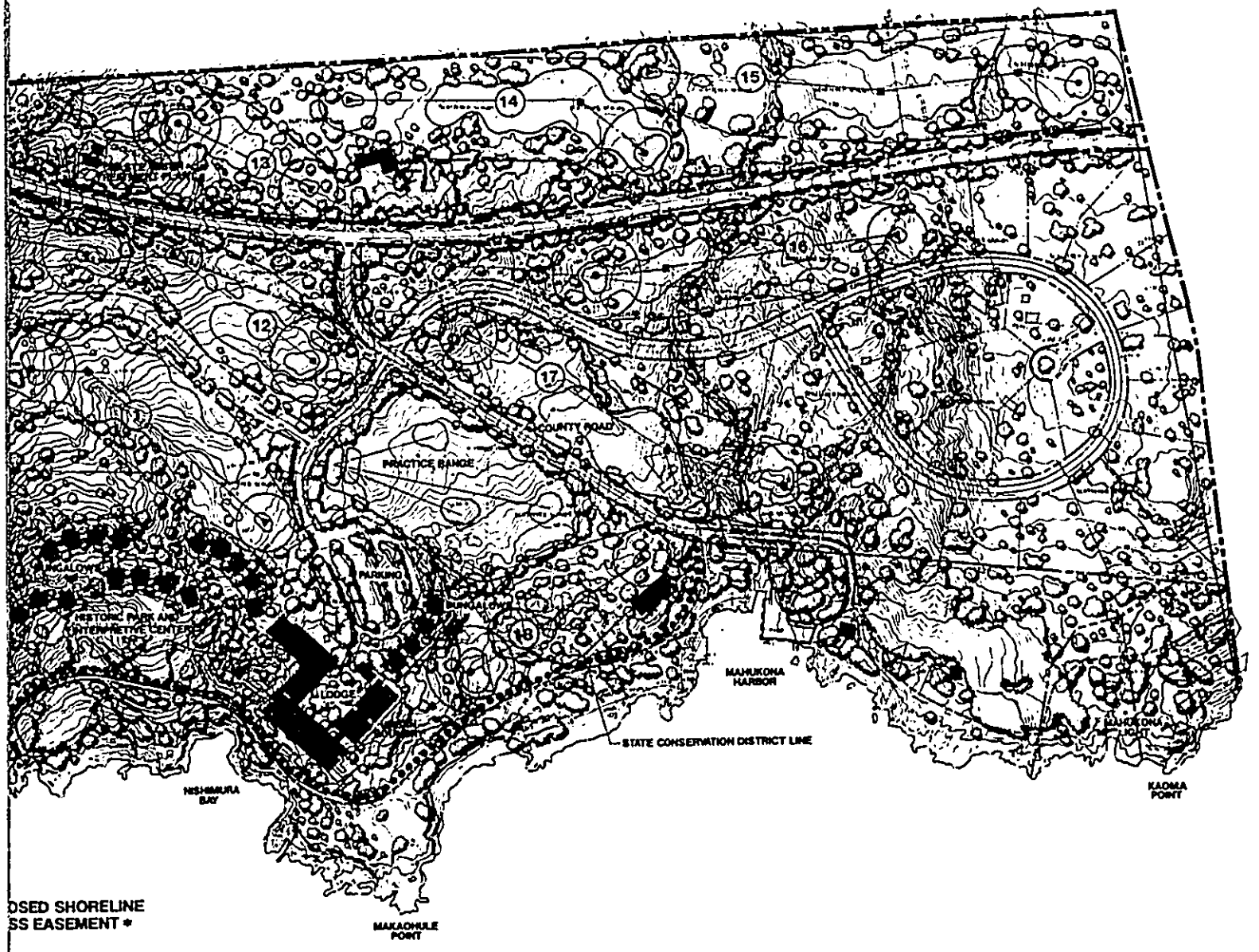


FIGURE II-6
PRELIMINARY DEVELOPMENT PLAN
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

AREA
2 AC.
1 AC.

NORTH

LINEAL SCALE
0 133 266 533
FEET

PBR HAWAII

The project would be developed over a twenty-year period as market forces indicate. The first elements of the project would include the main lodge and a portion of the villas associated therewith, the golf course and the necessary infrastructure to support those elements. These elements would be constructed first because they are the primary income generators that would provide the economic incentive to continue development of the remaining elements.

The low-rise lodge would include fine dining and specialty restaurants as well as more casual dining facilities. In addition, dining and lounge facilities would be located in the golf clubhouse. The low-rise villas would be sited to avoid archaeological site areas as well as to take maximum advantage of the sloping topography of the site and commanding ocean views. It is possible that meeting facilities and other amenities would also be located in the villas, to avoid centralizing too many activities in the lodge building. The lodge and villas are expected to be patronized by a clientele centered on free independent travelers (FIT) rather than tour groups. Another market segment would consist of incentive and corporate business travellers, and "kamaainas" would make up a small percentage (approximately 5 percent) of the market.

The residential lots would be a minimum of one-acre in size and would have golf course frontage, coastal views or natural area views. Buyers from the mainland U.S. and from Hawaii are expected to represent key market targets. It is also anticipated that the Japanese market will continue to provide a larger percentage of the buyers. The market analysis indicates that the lots could be absorbed within the first five years of marketing and buildout of the lots could be expected to occur after 2010.

3.3 NEED FOR THE PROJECT

The market studies prepared specifically for the project (see Appendix A) indicate, based on an analysis of existing and forecast state and county economic and demographic conditions as well as visitor trends, that a high service luxury lodge hotel, including a fine dining restaurant and other guest facilities would be appropriate for the physical and natural surroundings at Mahukona; that a complete resort experience, with personal service, an intimate scale and a variety of services consistent with the size of the facility and luxury market position would be appropriate for the location; that a social and recreational center for residential lot owners in the project community and for residents of other estate lot and upscale communities in the West Hawaii region, e.g., Kohala Ranch, would be appropriate

for the location; and that the project would provide an attraction to regional visitors venturing outside of other West Hawaii resort destination areas.

Complementing the development of the low-rise lodge concept, the market analysis indicated that between 200 and 300 low-rise villa type units could be developed and marketed with a high level of success. Based on the site's sloping topography and commanding ocean views, as well as the development of the recreational facilities and other guest amenities, e.g., fine-dining/specialty restaurants, etc., the proposed villa concept is appropriate to the location and project, however, present plans call for only 150-165 villa units.

The market study also concluded that the residential lots planned for the project were an attractive and marketable element, with build-out expected to occur after the 2010 planning horizon. Because of its location, Mahukona is anticipated to emerge as a resort-oriented estate lot community in which residential and resort-oriented homes would be constructed. The market analysis concluded that the residential lots would be attractive not only in terms of location, but also because of on-property recreational facilities and the availability of the other resort type facilities that would be developed.

With regard to the proposed recreational facilities, the market analysis indicated that, with demand for golf from lodge guests, villa guests, single family residents and regional visitors, demand for play is projected to increase from an estimated 80 rounds per day in 1995 to about 150 rounds per day in 2010. Similarly, the use of the other recreational facilities can be expected to increase as the number of lodge guests, residents and other groups continues to increase.

Mahukona

Chapter III: *Alternatives Considered*

CHAPTER III

ALTERNATIVES CONSIDERED

1. INTRODUCTION

The proposed Mahukona Lodge project has been planned and designed to provide a retreat type resort in the West Hawaii/North Kohala District area. The primary objective of the developers of the project are:

- To provide an economic generator that would assist in the political and economic justification for additional public and private infrastructure and community services expenditures in the North Kohala area;

- To provide a low-rise, retreat-type lodge facility in the West Hawaii area for those who do not wish to experience the large-scale "destination resort" type vacation experience;

- To provide an additional residential product to those currently offered in the North Kohala/West Hawaii area, i.e, large agricultural oriented house lots with frontage onto garden features, the golf course and natural settings; and

- To provide additional public and private recreational opportunities (golf and tennis) in the North Kohala area to complement existing public facilities.

While actual development of the property will be phased to respond to market demand, the entire 430 acre area has been master planned to assure orderly and timely development. The proposed project is low-density, featuring low-rise buildings, pedestrian-oriented spaces, ample open space and extensive landscaped setbacks and buffer zones. The character of the development has been planned to reinforce and extend the existing character of Kohala.

In compliance with the provisions of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 11-200-17(f), the "known feasible" alternatives to the proposed project are discussed in this chapter. Those alternatives which could "feasibly" attain the objectives of the project are described and evaluated. An exploration and evaluation of the environmental impacts of all reasonable alternative actions, particularly those that might enhance environmental quality or avoid or reduce some

or all of the adverse environmental impacts, cost and risks, is included in order not to prematurely foreclose options which might enhance environmental quality or have less detrimental effects. In each case, the analyses have been sufficiently detailed to allow the comparative evaluation of the environmental benefits, costs and risks of the proposed action and each reasonable alternative. Also, in compliance with the applicable rules, the alternatives have been evaluated relative to their capability to meet the proposed project objectives as stated in Chapter II, Section 3.1. In addition to the preferred alternative (proposed project), the alternatives of no-action, alternative configurations of the site and alternative uses of the project site property were evaluated.

2. EVALUATION OF ALTERNATIVES

2.1 PROPOSED ACTION - DEVELOPMENT AS DESCRIBED IN MASTER PLAN

The proposed project (Figure II-6) has been designed to provide a retreat type resort consisting of a low-rise lodge type hotel, low-rise villas, golf course, tennis facilities and residential lots. As presently defined, the lodge would consist of about 80-90 guest accommodation units and the villas would have about 120-150 accommodation units. Approximately 125-150 one-acre residential/agricultural lots are planned. A freshwater swimming lagoon would be provided. Restaurant and meeting facilities would be open to the public, as well as guests of the hotel. The project also includes the necessary internal and external infrastructure to serve the project. These latter elements include a new potable water source and the necessary transmission and distribution system; a non-potable water transmission and distribution system (for golf course and landscape irrigation purposes); a wastewater collection, transmission, treatment and disposal system; an on- and off-site surface water drainage system; a tsunami and civil defense warning system; and an internal roadway and vehicle parking system.

The proposed project envisions a relatively small lodge-type facility with a golf clubhouse and detached villas to the north. The visual impact of this alternative is less than the other alternatives investigated because the lodge can be designed into the slope rather than on top of it as in Alternative B, as described below. Detached villas to the north of the lodge would be complemented by an historic park and interpretive center.

This alternative has the major advantages of (1) being less visually intrusive than any of the other alternatives that were investigated (because it can be designed and constructed

into rather than on top of the slope); (2) avoids all significant archaeological sites and features; (3) is projected to be readily marketable, thereby assuring economic viability; and (4) allows all of the project objectives to be met while being acceptable to the community.

2.2 ALTERNATIVE CONFIGURATIONS/LAYOUTS OF PROPERTY

The analysis of alternative configurations and sizes of project elements took into consideration several factors. They included the number and types of individual components that could be efficiently and economically located within the project boundaries, the opportunities and constraints of the site, and community group and governmental agency input regarding the proposed project. Following the evaluation of all of the various factors, the preferred alternative (proposed project) was selected as the alternative that could best meet the objectives of the project; provides the greatest flexibility in phasing of construction; provides the most amenities and services forecast to be required over the development period; and allows the county's goals and objectives regarding the development of the project area to be met in the most expeditious manner. Development of the master planned project as described in this EIR will have definite positive social and economic benefits.

During the conceptual master planning, a number of alternative concepts and variations were evaluated. The following three alternatives are representative of those considered in response to achieving a development program to include a hotel and related amenities, an 18-hole golf course and residential lots on the 430-acre development parcel.

2.2.1 Alternative A - Kapaanui Subdivision

Prior to the acquisition of the property by Chalon, the Kapaanui Subdivision had been approved by the county to permit 170 one-acre lots that were to be developed in two phases on approximately 232 acres of land (Figure III-1). With the exception of land within the Conservation District along the shoreline, all of the property was subdivided into residential lots, roadways and easements.

This alternative provided an adequate number of residential sites but did not allow for development of a lodge or golf course. Consequently, following discussions with the community and review of the project objectives, this alternative was rejected as being too restrictive, possibly premature considering possible development of the adjacent Mahukona parcel and, from the community's view, the density, i.e., numbers of residential units, was

too high for the project area. That is, this alternative would not have fully met the project objectives.

2.2.2 Alternative B - Resort Hotel Concept

Initial development objectives for the Mahukona project included a 300-unit resort hotel, an 18-hole golf course and 170 one-acre residential home sites. Alternative B (Figure III-2), envisioned a 3 to 4-story "wing-shaped" hotel located on a small bluff overlooking Makaohule Point to the west. Achieving a 300-unit hotel with ocean views for all rooms required an extensive building footprint and mass with a height of at least 45 feet.

In response to a development suitability evaluation, the remainder of the property was planned for 170 one-acre lots and an 18-hole golf course. Residential sites were proposed mauka and makai of Akoni Pule Highway, utilizing the golf course as a landscape buffer between the highway and residences. More detailed analyses of this alternative indicated significant visual impacts, primarily resulting from the overall bulk and prominent location of the hotel. Further analyses indicated that this alternative would also impact several archaeologically significant sites due to the size of the building footprint. Consequently, this alternative was dropped from further consideration and attention was given to Alternative C.

2.2.3 Alternative C -Nishimura Bay Lodge Concept

Alternative C (Figure III-3) proposed relocating the hotel further north at a lower elevation overlooking Nishimura Bay with the golf clubhouse remaining on the bluff to the south. Further, it was proposed that the hotel be reduced in size to 240 units and reconfigured into a central lodge facility with rooms in the form of detached villas. While the golf course remained similar to Alternative B in terms of routing configuration, residential sites were relocated makai of the highway and reduced in number to 150 one-acre lots. The shift in concept from a large-scale resort hotel to a smaller lodge-type facility in a sheltered location had many desirable attributes from the physical planning and design orientation viewpoints, as well as market viability and community acceptance.

However, upon further analysis, the potential conflict of this alternative with significant archaeological sites and features, as well as massing of the facilities in the locations selected, indicated that this alternative had too many potential adverse impacts.

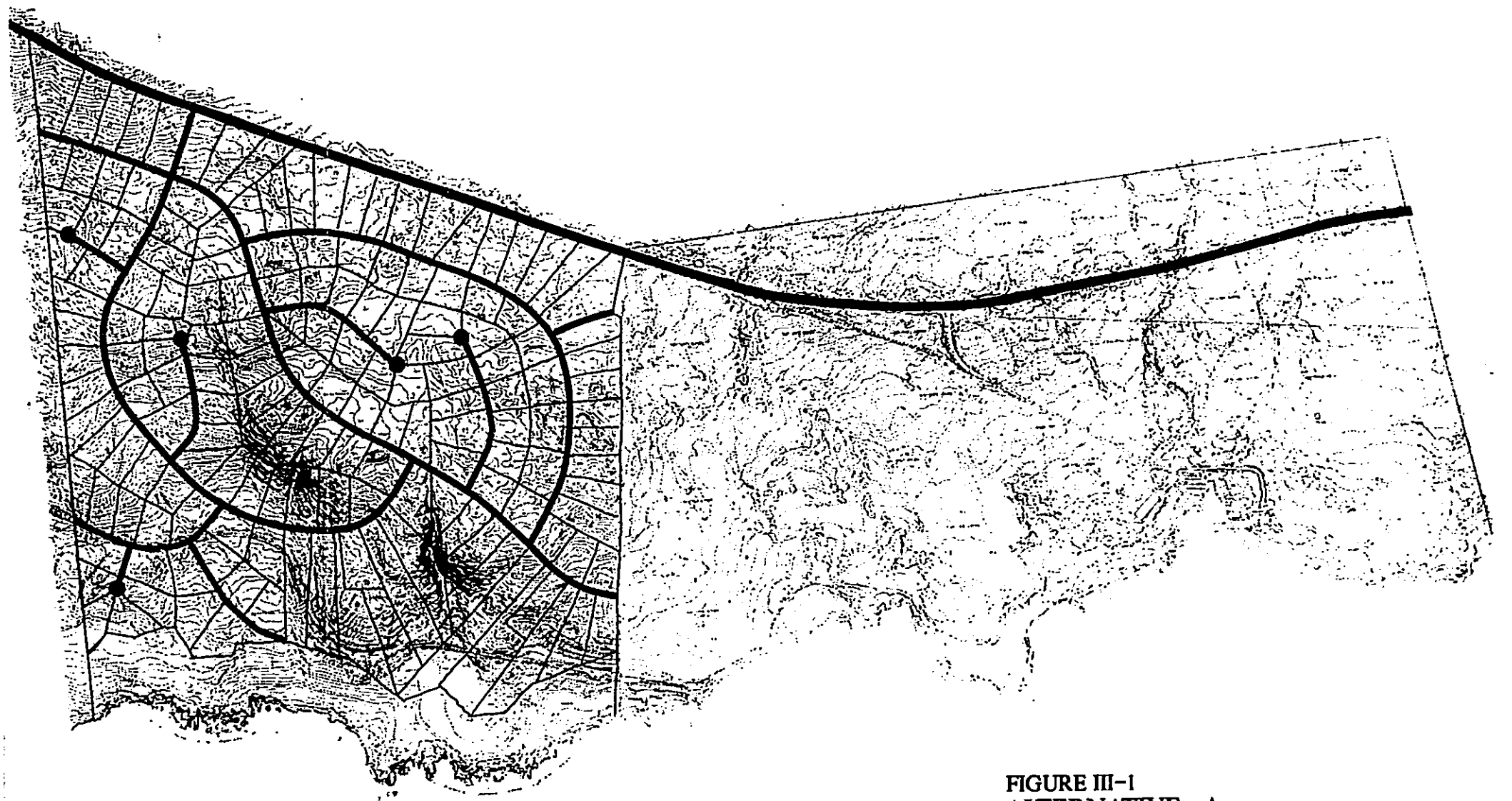
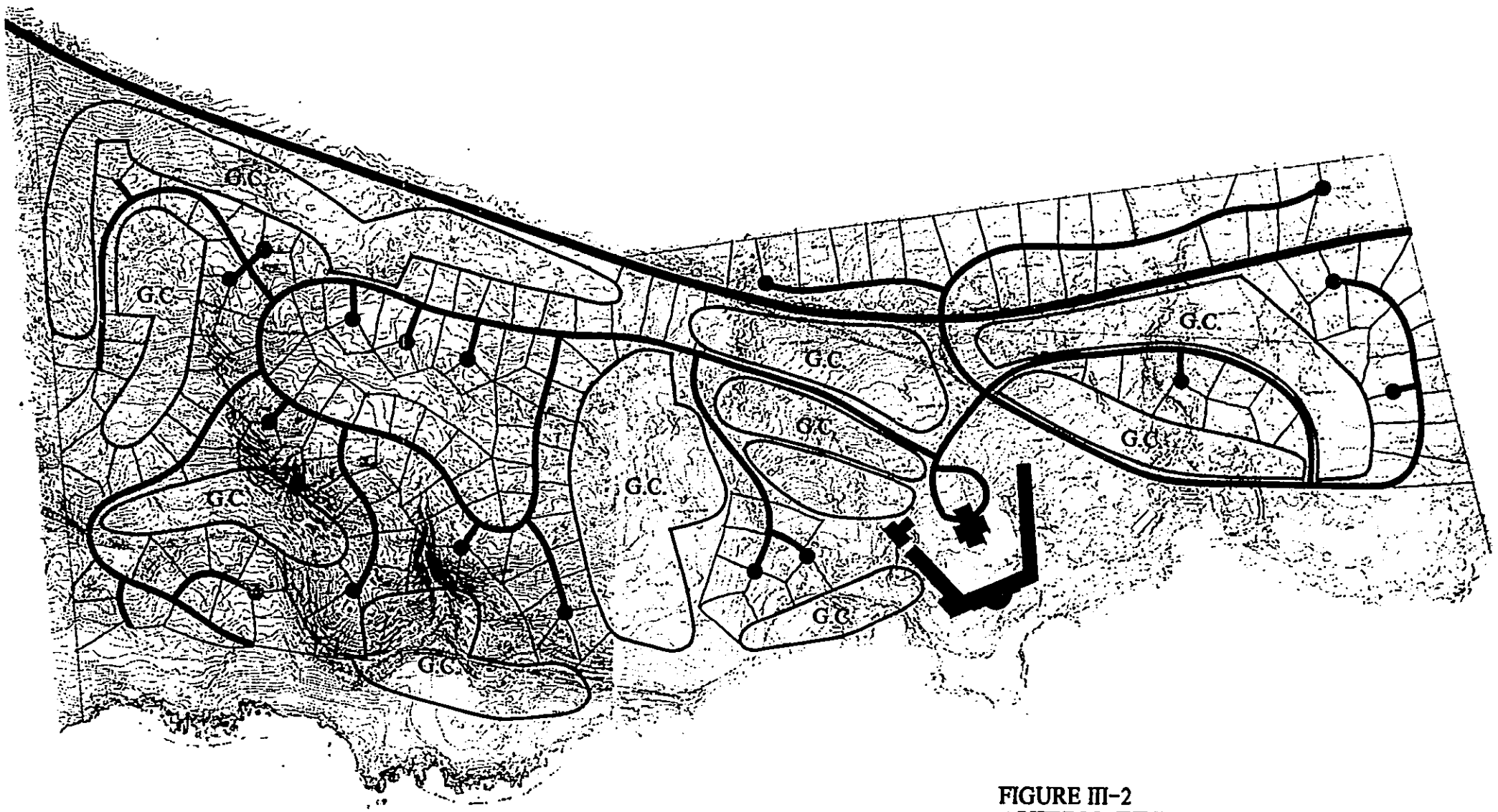


FIGURE III-1
ALTERNATIVE A
PROJECT LAYOUT/CONFIGURATION
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

MAHUKONA, NORTH KOHALA, HAWAII



300 UNIT HOTEL

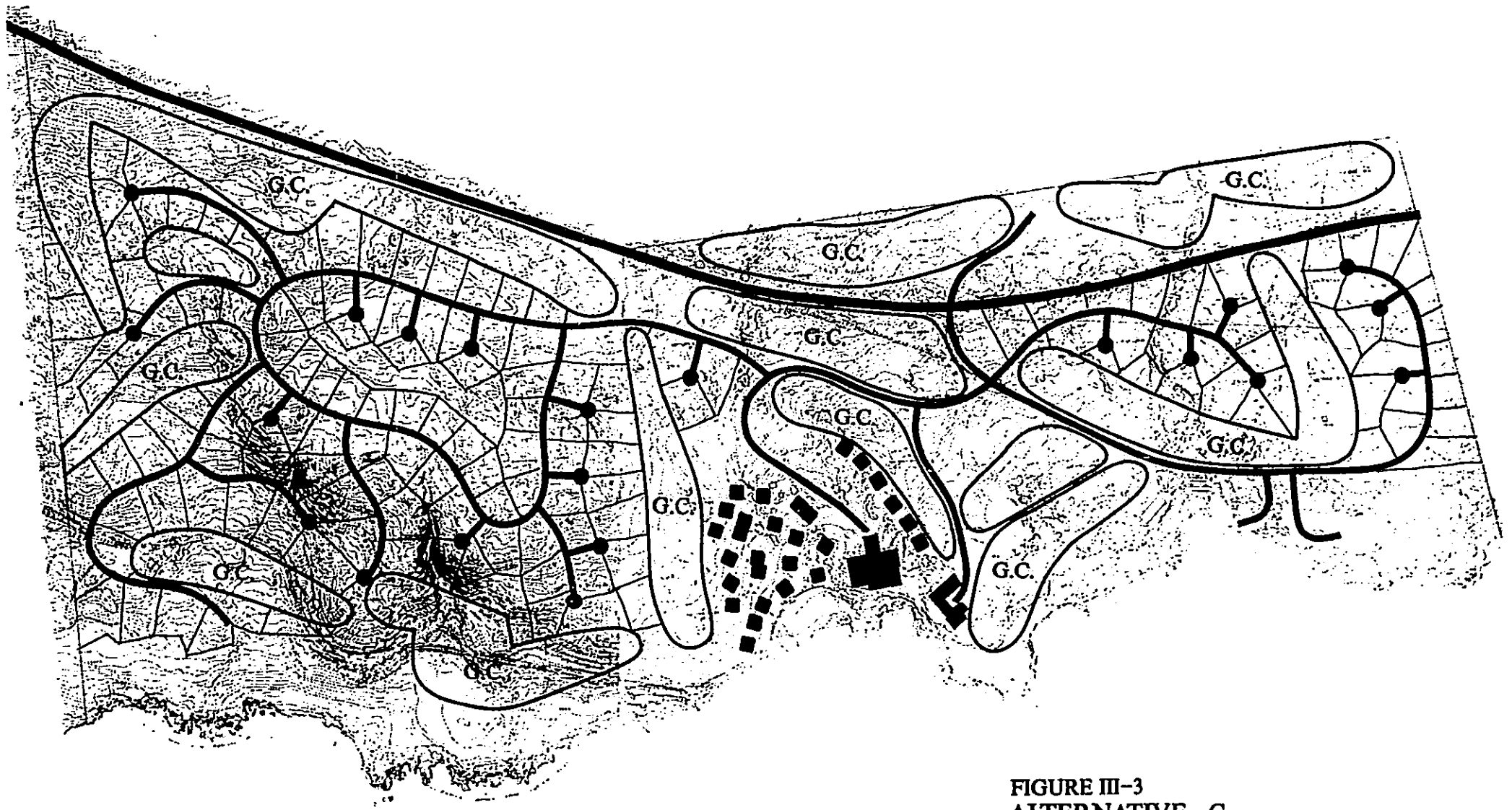
170 RESIDENTIAL SITES

18 HOLES GOLF

FIGURE III-2
ALTERNATIVE B
PROJECT LAYOUT/CONFIGURATION
ENVIRONMENTAL IMPACT REPORT

MAHUKONA LODGE

MAHUKONA, NORTH KOHALA, HAWAII



240 LODGE/VILLA UNITS

150 RESIDENTIAL SITES

18 HOLES GOLF

FIGURE III-3
ALTERNATIVE C
PROJECT LAYOUT/CONFIGURATION
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

MAHUKONA, NORTH KOHALA, HAWAII

Consequently, this alternative was dropped from further consideration in favor of the selected alternative.

Development of the property for a larger resort does not appear either economically attractive or a proper use of the lands given the announced plans for other resort development in the West Hawaii region. While a low-rise lodge type hotel is planned for the site, this facility is considered to be a relatively small- scale use rather than a regional facility such as a larger resort hotel complex.

2.2 "NO-ACTION" ALTERNATIVE

The "no-action" or "no-project" alternative would retain the present status of the project lands. This alternative would not allow the developer, state or county governments to generate any significant income from the project lands. To receive any reasonable benefits, the developer would have to sell the land to either private or public buyers. Selling the land to private buyers would not generate sufficient income over the long-term to justify the action. The state is in the process of developing the Lapakahi State Historical Park site as well as the Kealakehe residential project in North Kona. Presently, there does not appear to be any interest from the state in purchasing the Chalon property for park or other uses. Similarly, the county does not appear to be in a position to purchase the property.

Leaving the property undeveloped will result in the loss of an opportunity to expand employment alternatives and recreational and public services/facilities in an area that is presently lacking in these amenities. Development of these activities in another part of North Kohala will likely result in increased infrastructure costs to the general public. It is noted that the geographic location of the project site as well as the County General Plan land use designations are key factors contributing to the economic viability of the proposed project. It is unlikely that these same factors would be as advantageous in another area of North Kohala. Leaving the property undeveloped will also result in the loss of potential revenue to the developer, state and county governments.

2.3 ALTERNATIVE USE OF THE SITE

In addition to the preferred alternative configuration for the proposed project, three other site uses were examined. The three alternative uses included development of the lands for agricultural purposes, park uses and solely residential units.

Due to the poor quality of the soils (classified as "E" by the Land Study Bureau, 1967) and rockiness of the land, it is not presently suitable for cultivation. Further, the costs to make the lands suitable for agricultural purposes would be prohibitive and even if they could be overcome, the economic viability of an agricultural use would be suspect given the relative availability of other, better suited agricultural lands in the district and on the island. The use of the lands for grazing or similar non-cultivation type agricultural activities is considered an uneconomical use of the property and could be an incompatible use given the recreational opportunities the site presents. Lastly, this alternative use is inconsistent with the Hawaii County General Plan designations for much of the area.

Development of all or a part of the project lands for public park purposes implies its acquisition by the state or county. These actions appear unlikely as discussed previously. Development of the area as a private park cannot be justified in economic terms when considering the extent of investment that would be required to convert the project lands to usable park land versus the return on investment. Similarly, a park development would not provide the level of long-term income needed to meet the needs of the landowner. Park development would also work against state initiatives to develop a regional park at Hapuna Beach Park.

The alternative of limiting the development of the project lands to residential units is not consistent with the overall objectives of the proposed project, the county general plan and it does not appear, based on the market studies performed for the project, that a market for more up-scale residential sites than those planned exists or would exist in the future. Although residential development of the entire site would result in impacts similar to the proposed project, assuming units could be located to avoid archaeologically and environmentally sensitive areas as the proposed project does, this alternative does not appear compatible with the developer's or the county's plans to develop other West Hawaii/North Kohala areas for residential purposes. Similarly, there would still be a lack of support facilities, i.e., public services to serve an all residential development. The sale of the entire property for residential development is not considered to be economically viable. Retaining the property and developing it as leasehold residential could result in the eventual forced sale of the property to the lessees, and result in the general loss of long-term revenue for the landowner as would outright sale of the property.

None of the alternative uses of the property that have been investigated appeared to Chalon as the best use of the property for various reasons. Included among these reasons

are incompatible land uses, economics, return on investment required and the inability to meet the objectives of the proposed project, i.e., to provide the community with a regional center that would accommodate the growth of the region over the next 20 years or more.

3. COMPARATIVE EVALUATION

In general, as shown in Table III-1, the alternatives evaluated do not provide the degree of satisfaction of meeting the project objectives as well as the preferred alternative; have greater adverse environmental impacts; have higher on- and off-site infrastructural costs; have less expansion capabilities; are incompatible land uses for the area; and/or would not allow the county's overall goals and objectives regarding the project area to be met as well as would the selected project. Because of potential adverse internal and regional traffic patterns that would result from alternative configurations of the site, as well as potentially limiting construction phasing problems, the alternative configurations were rejected. Alternative uses of the property were also rejected because they do not meet the objectives of the proposed project. The alternative of no-action was also rejected because it would not allow the project objectives to be met.

The preferred alternative satisfies the project objectives and provides the best opportunity to assist in supporting West Hawaii's forecast residential/recreational/ educational/commercial facility needs over the forecast period of development. Although each of the alternatives evaluated has merits that are worthy of consideration, none of the alternatives have as many or the degree of positive merits as the proposed project.

TABLE III-1

POTENTIAL FOR ALTERNATIVES TO MEET PROJECT OBJECTIVES AND AVOID SIGNIFICANT ENVIRONMENTAL IMPACTS

OBJECTIVE	NO ACTION	PREFERRED ALTERNATIVE	ALTERNATIVE			OTHER USES OF SITE
			A	B	C	
Provide an Economic Generator		√	√	√	√	
Constitute a "Minor" Resort		√			√	
Provide Residential/ Agricultural Lots		√	√	√	√	√
Provide Recreational Opportunities and Facilities		√		√	√	√
Avoid Significant Environmental Impacts	√	√	√			√

Legend: √ = Alternative satisfies objective.

Mahukona

Chapter IV: *Description of the Affected Environment, Environmental Consequences and Mitigation Measures*

CHAPTER IV

DESCRIPTION OF THE AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

1. INTRODUCTION

The general and/or specific physical, natural and social environmental characteristics, archaeological and cultural resources and infrastructure and public facilities serving the proposed project and area are described in the following sections of this chapter. The analyses presented herein are generally based on an assumed "worst case" situation that would include the full development of the project, as described in chapter II, within the project boundaries. Should fewer units or elements be constructed, it is presumed that potential impacts would be less for most environmental resource issue areas. Additionally, the information contained herein, to the extent possible at this time, covers both the on- and off-site infrastructural components that will serve the proposed project. For ease of review and evaluation, information and analyses of the impacts of the proposed project are provided from the standpoint of existing conditions, probable impacts and mitigation measures that would be required to minimize potential adverse impacts. The information contained in this chapter has been developed from (1) field and/or office environmental, engineering or planning studies conducted specifically for this project, the North Kohala Master Plan, the project Concept Plan and this EIR; (2) the input, advice, guidance and information provided by public agencies, community and private groups, organizations and residents of the project area, prior to and during the development and review of this EIR; and (3) comparisons and evaluations by specialty consultants (see Table I-2) of the proposed project relative to similar planned or existing resort projects.

Table IV-1 summarizes by alternative the impacts described in the remainder of this chapter. This table assumes that for a given alternative, mitigation would be employed to the maximum extent possible. Commitments have been made by Chalon to mitigate the impacts of the preferred alternative, and these measures are included in the definition of that alternative. Mitigation measures for the other alternatives are possible, but firm plans have not been prepared.

TABLE IV-1

COMPARATIVE ENVIRONMENTAL IMPACT EVALUATION OF ALTERNATIVES

ENVIRONMENTAL RESOURCE	NO ACTION	PREFERRED ALTERNATIVE	ALTERNATIVE			OTHER USES OF SITE
			A	B	C	
Geology, Physiography, Soils		M	m	m	m	m
Hydrology & Drainage		M	m	m	m	m
Floods, Tsunamis, Volcanic Events		M	m	m	m	m
Flora		M	O	●	●	O
Fauna		O	O	O	O	O
Marine Environment		M	m	m	m	m
Visual Attributes		M	m	m	m	m
Historical/Archaeological Resources	●	M	m	m	m	m
Socioeconomic Factors		■	■	■	■	■
Transportation/Traffic		M	m	m	m	
Air Quality		O	O	O	O	O
Noise Quality		O	O	O	O	O
Water Supply	O	■	m	m	m	m
Wastewater System		■	m	m	m	m
Solid Waste Disposal		M	m	m	m	m
Electrical Power/ Communications		■	O	■	■	O
Public Services[1]		■	O	■	■	O
Recreation Facilities		■			■	
Land Use Plans, Policies, Controls	O	■	O	■	■	O

Note: [1] Public Services includes police and fire protection, schools and health care facilities.

Legend: ■ = Positive Impact; ● = Significant Negative Impact; O = Insignificant Negative Impact; m = Potential Mitigation; M = Mitigation as Part of the Alternative; Blank Space = No Impact.

2. PHYSICAL ENVIRONMENT

2.1 GEOLOGY, PHYSIOGRAPHY, SOILS AND AGRICULTURAL POTENTIAL

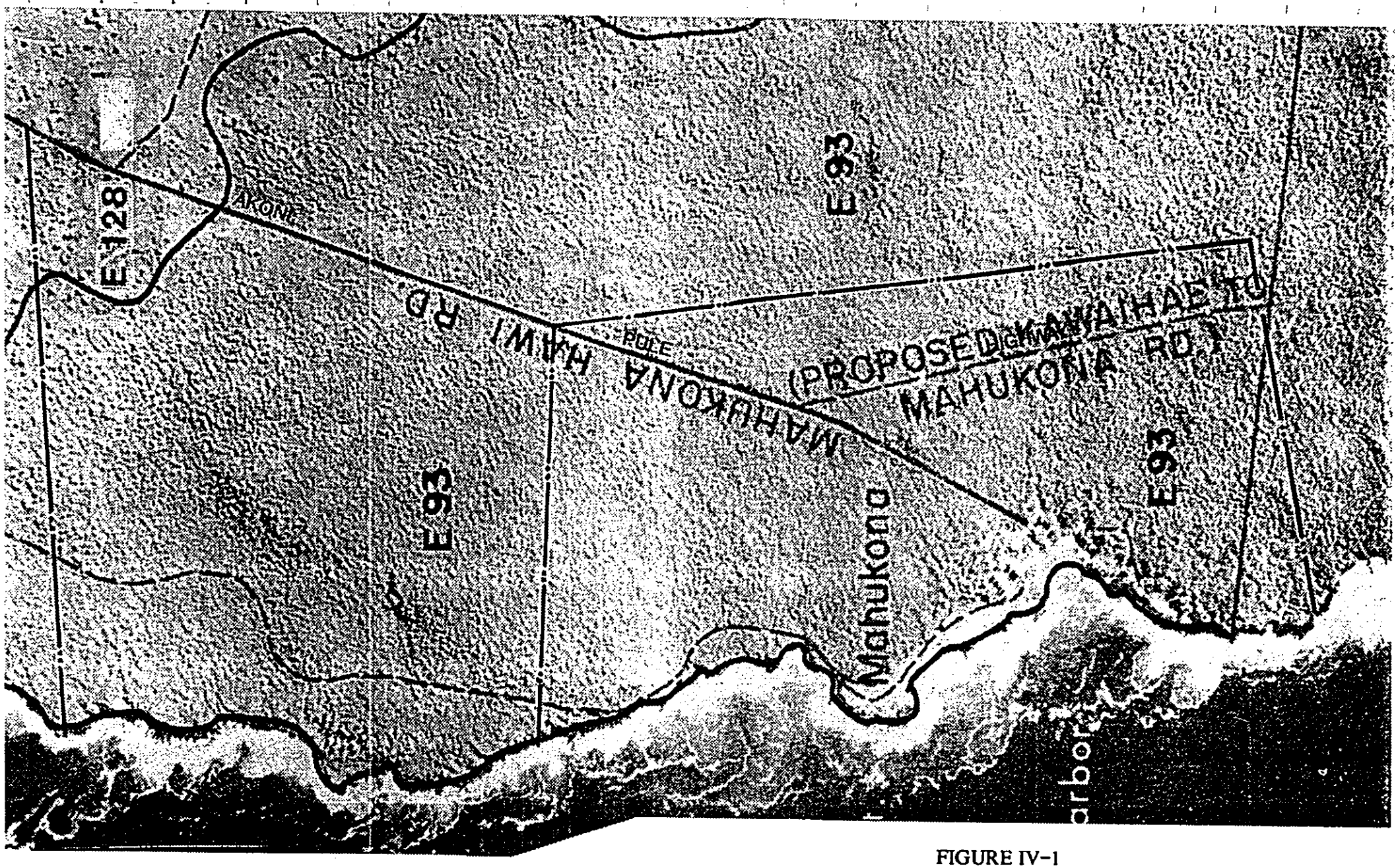
2.1.1 Existing Conditions

The project site is situated on the western flank of the Kohala Mountain. Kohala volcano was built over a northwest rift, a southeast rift and a poorly developed southwest rift (Stearns, 1967). The mountain is 21 miles long and 13 miles wide. Much of the south slope is buried under lava flows from Mauna Kea. Streams have barely cut into the west slope of the mountain and the project location, whereas the canyons on the east side are more than 2,000 feet deep. The west or lee coast is not cliffed and, except near the several large cinder cones, has only a thin soil covering. The lava beds on the west slope are younger than most of those on the east slope.

The rocks of Kohala Mountain are divided into two volcanic series. The older Pololu series is composed of thin-bedded primitive olivine basalts with porphyrites at the top in most places. The younger Hawi series is composed chiefly of oligoclase andesites and a few soda trachyites. The Hawi lavas lie mostly at the top of the mountain and are usually from one to three flows thick.

The overall slope of the property is about 7 percent. The top of the project site is relatively flat but the slope increases to about 20 percent at the lower end of the agricultural zone and flattens out again in the coastal conservation zone.

All of the surrounding Kohala Mountain is of volcanic origin and, consequently, the geology of the project site and area is volcanic. Two different land and soil types have been identified on the project site by the Soil Conservation Service: Kawaihae extremely stony very fine sandy loam (KNC) and Mahukona very stony silty clay loam (MKC). Neither of the soil or land types are significant agriculturally. The soils are rated E93 and E128 by the Land Study Bureau (Figure IV-1). They are alluvial soils that have washed down from mauka areas (Land Study Bureau, 1967), not the weathered remains of pahoehoe flows. The following briefly describes the soils of the project site.



SOURCE: DETAILED LAND CLASSIFICATION-ISLAND OF HAWAII, LAND STUDY BUREAU, UNIVERSITY OF HAWAII, NOVEMBER 1965

FIGURE IV-1
DETAILED LAND CLASSIFICATIONS
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

AREA
2 AC.
1 AC.
NORTH
LINEAL SCALE
0 200 400 800
FEET
PBR HAWAII

Kawaihae extremely stony very fine sandy loam, 6 to 12 percent slopes (KNC): The Kawaihae series consists of somewhat excessively drained extremely stony soils that formed in volcanic ash. These soils have a very thin surface layer of fine sandy loam over silt loam and loam. They are gently sloping to moderately sloping solid on coastal plains at an elevation ranging from near sea level to 1,500 feet. The annual rainfall is 5 to 20 inches, most of which falls in the winter months. The mean annual soil temperature is between 74 degrees F and 77 degrees F. The natural vegetation consists of kiawe, piligrass, ilima and fingergrass. The Kawaihae soils are used primarily for pasture, recreation areas, wildlife habitat and homesites. Small acreages are used for truck crops. In a representative profile the surface layer is dark reddish-brown extremely stony very fine sandy loam about two inches thick. Below this is dark reddish-brown and dusky-red stony silt loam and loam. Hard pahoehoe lava bedrock is at a depth of about 33 inches. The surface layer is neutral and the subsoil is neutral to mildly alkaline. Permeability is moderate, runoff is medium and erosion hazard is moderate. Capability subclass is VIIIs, nonirrigated, pasture group 1.

Mahukona very stony silty clay loam, 6 to 12 percent slopes (MKC); The Mahukona series consists of well-drained silty clay loams that formed in volcanic ash and basalt residuum. These are undulating to rolling hills that occupy leeward coastal areas of the Kohala Mountains. They are at an elevation ranging from near sea level to 550 feet and receive 20 to 30 inches of rainfall annually. Their mean soil temperature is between 72 degrees F and 75 degrees F. The natural vegetation consists of kiawe, uhaloa, ilima, swollen fingergrass and bermudagrass. In a representative profile the surface layer is dark reddish-brown very stony silty clay loam about 6 inches thick. The subsoil is dark reddish-brown and dusky-red silty clay loam about 30 inches thick. The substratum is hard saprolite, the surface layer is medium acid and the subsoil is slightly acid to neutral. Permeability is moderate, runoff is medium and erosion hazard is moderate. The available water capacity is about 1.5 inches per foot of soil. This soil is used for pasture; capability subclass is Vis, nonirrigated, pasture group 2.

Project lands are not classified within the Agricultural Lands of Significance to the State of Hawaii (ALISH) system due to their unsuitability for agricultural use.

2.1.2 Probable Impacts

The proposed project is not expected to affect the geology of the project site or area. However, the grading and excavation work for the project will affect the physiography of the

site. Impacts to the geology, physiography, soils and agricultural potential of the project site are expected to be minimal and insignificant. Of concern, however, is the possibility of silt being washed or blown into coastal waters. Transport of sediment to marine communities could be associated with a high rainfall event. In the Hawaiian Islands zones of low rainfall are found in leeward areas; the rainfall minima are usually attributed to the "rain-shadow effect" in which air, desiccated by its uplift over an orographic barrier, subsides into a low leeward area as a warm, dry wind. The rainfall minimum that results from the rain-shadow effects of the Kohala Mountain and Mauna Kea makes Kawaihae and environs the driest area in the state. This means that the probability of a high rainfall event coinciding with exposed soil during construction is low. The soils in this area, when disturbed or exposed, are also particularly susceptible to wind erosion. Mitigation measures will be required to minimize this potential impact.

It is possible that landscaping for the project will require the importation of soils from other areas of the island. Should this be required, appropriate measures would be taken to assure that the imported soils are free of pest plants and other potentially harmful constituents.

The project will include curtailment of the present limited use of the project lands for grazing purposes. However, given the extent of other more suitable grazing lands in the vicinity of the project site, this curtailment of use is not considered a significant adverse impact.

2.1.3 Mitigation Measures

During construction, measures will need to be provided to protect near-shore waters from excessive sedimentation. An erosion and sedimentation plan will need to be prepared and approved by the Department of Public Works as part of the permitting procedure for the grading work. Mitigation measures which could be employed include limiting exposed areas, dust control measures (frequent sprinkling) and immediate seeding of exposed areas. Phasing of construction could be employed to establish early on the detention basins which will form part of the eventual drainage system for the project. Because the majority of the rainfall occurs during the May through September period, additional mitigation could result from scheduling grading as much as possible to drier periods. Appropriate engineering and landscape architecture precautions will be taken with the soils that require importation.

2.2 GROUNDWATER, HYDROLOGY, SURFACE WATER AND DRAINAGE

2.2.1 Existing Conditions

All along the West Hawaii/North Kohala shoreline, groundwater occurs in a basal lens configuration. A layer of relatively fresh water (brackish water) saturates the lavas at and near sea level. The absence of a caprock along the coast causes the basal water table to stand at nearly sea level. The high permeability of the lavas along most of the coast allows sea water to move freely underground resulting in groundwater with a salt content too high for potable water purposes. Potable water sources are primarily from high level springs and tunnels in upper regions of Kaauhuuhu, Niulii, Halaula and Makapala. One well in the vicinity of the project site at an elevation of 543 feet produces about 575,000 gallons per day of excellent quality water with a low chloride content.

The North Kohala watershed contains an area that extends from elevation 2,400 feet to mean sea level (MSL). The watershed covers an area of about 4,260 acres above Akoni Pule Highway. Average ground slope in the watershed is approximately 5 to 10 percent in the upper reaches and increases to more than 15 percent in the lower reaches along the coastline.

There are no perennial streams on the project property but there are natural drainageways that do cross the property. The relatively low average annual rainfall in the area (about 13.5 inches) and the characteristic high permeability of the lavas preclude significant surface runoff. At present, total storm runoff from the 4,260 acre watershed above Akoni Pule Highway is approximately 4,680 cubic feet per second (cfs) (see Appendix K). Storm water originating mauka of the project site is conveyed across the project site via 11 culverts under the highway. These culverts range in size from 24-inch diameter pipe culverts to a 16 by 10-foot sectional plate arch (see Appendix K).

2.2.2 Probable Impacts

The proposed project is not expected to affect the quantity or quality of groundwater flow nor will the project be affected by groundwater flow. Additional information relative to irrigation of the golf course and landscape areas and the possible introduction of contaminants into the groundwater stream is presented below in Section 3.3 of this chapter.

The off-site storm runoff will be routed through the project site and incorporated into the general water features of the golf course. The majority of the runoff will flow into the ocean as non-point source discharges. Some of the runoff will be routed through detention basins and allowed to percolate into the porous soil.

Total on-site runoff has been calculated utilizing County of Hawaii, Department of Public Works, Storm Drainage Standards, to be approximately 800 cfs. The golf course and residential areas will generate approximately 750 cfs. This runoff would be directed into retention ponds located within the golf course and allowed to percolate into the soils. The storm water would be filtered as it passes through the soils and eventually enters the groundwater stream. Filtering of the water through the soils is expected to remove contaminants that might have be entrained in the surface water runoff. It is also possible that sand filters could be used within the drainage system to further filter potential contaminants that the stormwater may contain.

Runoff from the lodge, villas, tennis facilities and parking areas (approximately 14.5 acres) has been calculated to be about 50 cfs. This runoff will be directed to the golf course retention basins and/or dry wells through a series of culverts, grassed swales, catch basins and underground drain pipes. Approximately 47.5 acres of Conservation District land along the coastline will remain undeveloped and will not contribute to the total project storm runoff. Runoff from this area has been calculated to be about 50 cfs.

Drywells, strategically located within the road rights-of-ways, will be utilized throughout the residential areas to collect storm water runoff. These wells will handle all on-site flow except runoff from those areas that normally flow directly off the project site into coastal areas and areas that flow into the central floodway. The drywells will have a planned capacity of 6 cfs, i.e., about twice the maximum flow from any of the project areas, and will be registered with the State Department of Health in compliance with the Underground Injection Control rules and regulations. Culverts will be utilized to pass flows across roads where an inlet flow exceeds 6 cfs. To reduce runoff flowing into the roadway inlet system, backlot channels will be used to route water toward the retention basins located within the golf course. Culvert, channel and drywell designs have been based on a recurrence interval of 50 years because drainage areas are less than 100 acres. Other drainage options may also be considered during the design stages of the project.

2.2.3 Mitigation Measures

The proposed project is not expected to result in significant adverse impacts to groundwater hydrology and/or surface water and drainage. To assure that groundwater and nearshore marine water quality is maintained, surface water runoff generated on-site will be disposed of on-site. As noted above, on-site surface water runoff will be allowed to percolate into the soils of the project site and, if required, sand filters would be used to assist in removing any contaminants that may be present in the surface water runoff. Given the lack of expected adverse impacts, additional mitigation measures are not warranted. The drainage structures and system will be designed, constructed and operated in compliance with applicable state and county rules and regulations.

2.3 NATURAL HAZARDS

2.3.1 Existing Conditions

The natural hazards to which the project site is potentially subjected include volcanic events, earthquakes, tsunamis and high wave floods. Volcanic hazards on the Big Island have been described by Mullineaux, *et al.*, (1987). The proposed project is located in lava flow Hazard Zone 9, which consists of the Kohala volcano. No eruption has occurred there for about 60,000 years and the hazard is considered extremely low. The project site is also located in tephra fall and volcanic gases Hazard Zones 3, indicating areas in which only thin deposits of tephra erupted from Kilauea, Mauna Loa or Hualalai are likely to fall. The low frequency of winds that blow northward across Mauna Kea and Kohala from the three more active volcanoes indicates that even thin ash is likely from only a minority of eruptions. The project site is outside the one pyroclastic surge hazard zone on the island, that zone being limited to the area surrounding Kilauea caldera on the southeast side of the island, about 70 miles southeast of the project site. Ground fractures and subsidence hazards are relatively low in the project area, with the site being located in Zone 4, which includes the majority of the island (Mullineaux, *et al.*, 1987).

Earthquake hazards at the project, as with the rest of the island, cannot be avoided. However, the project site is not subjected to greater earthquake hazards than other areas of the island.

Development along the North Kohala coastline must take into account the possibility that a tsunami will strike. Because tsunamis occur infrequently and due to the paucity of shoreline development along the coast, reliable tsunami runup information for the area is scarce. Of the 85 tsunamis that have been observed in Hawaii since 1813, the one occurring in 1946 was the largest in recent history. It reached a height of about 12 feet above mean low low water (MLLW) at Kawaihae, about 12 miles to the south of the project site. It is probable that the same runup height was experienced at the project site.

The Flood Insurance Rate Map (FIRM) for the area and the 1982 Flood Insurance Study for The County of Hawaii, indicate that the 100-year tsunami elevation of the project area ranges from 7 to 8 feet. The project site falls into zones designated VE, indicating that base flood elevations have been determined (8 feet) and coastal flooding with velocity hazard (wave action) may occur; and AE indicating that base flood elevations have been determined (8 feet). In the project area, the VE zone extends inland a maximum of about 100 feet from the shoreline and the AE zone extends inland a maximum of about 100 feet from the inland boundary of the VE zone.

2.3.2 Probable Impacts

Volcanic event hazards are low, with the latest lava flows in the area of the project site being over 60,000-years old. Although volcanic events could occur in the future, there is no way of predicting when they would occur or the magnitude of any event that might occur.

Earthquake hazards are a constant factor on the Big Island and potential damage from strong earthquakes is widespread and cannot be avoided. Adherence to federal, state and county building codes and standards generally precludes most earthquake damage, although a very strong quake would cause damage to most structures.

Tsunami and flood hazards due to high waves are not expected to cause damage at the proposed project site because the elevation of the structures planned to be closest to the shoreline would be +40 feet MLLW.

2.3.3 Mitigation Measures

In general, the primary measures that will be employed to mitigate potential loss due to natural hazards will be to utilize standard federal, state and county building codes during the design and construction of the facilities. This will include constructing facilities above the historical high water level and use of proper materials and techniques.

Volcanic events cannot be predicted with any degree of certainty. Generally most historical events have allowed sufficient time for areas to be evacuated. A civil defense/tsunami warning system (siren) would be established within the project area and used in case of a volcanic event that could impact the resort area. The system would also be used in the event of a tsunami and/or high storm waves. In addition, a project area emergency evacuation plan would be prepared in consultation with county civil defense administration personnel and procedures.

2.4 VISUAL ATTRIBUTES

2.4.1 Existing Conditions

The major portion of the proposed project would be located just below Akoni Pule Highway and partially visible from the highway, primarily as a low-rise, low-density lodge-type facility surrounded by a golf course, extensively landscaped low-rise buildings, lagoons, gardens and widely scattered single family residences. Maximum building height above grade is expected to be no more than about 25-35 feet. This will be in contrast to the present lava/scrub brush character of the area. The present view mauka of Kohala Mountain from the shoreline is mostly obscured due to the vegetation. However, the vegetation does provide a feeling of "country" and open space. Figures IV-2 through IV-3C indicate the present visual character of the site.

2.4.2 Probable Impacts

In general, the visual character of the project will be one of a low-rise, low-density lodge type facility surrounded by a golf course, extensively landscaped low-rise buildings, lagoons, gardens and widely scattered single family residences. The project will allow the general public the opportunity to continue to enjoy the view of the ocean from the highway. The views of the background mountains in the mauka direction will be increased somewhat

by the removal of some of the naturally occurring vegetation. Landscaping around the facilities will replace some of the natural scrub vegetation and clearing for the golf course will increase some views mauka from the shoreline. The project will serve as a visual break in the views between Kawaihae and Hawi and present an extensively landscaped area contrasting with the present scrub brush character of the site. Figures IV-3 A, B and C show the overall character of the project site from various view points. The use of extensive landscaping and an architectural style designed to blend the buildings with the environment of the area will further enhance the visual character of the site. The shoreline area itself is planned to remain as natural as possible, with landscaping around and along the public beach accessways and the historic park and interpretive center site. These amenities will be designed to blend in with the existing shoreline vegetation.

To help understand the project's visual impacts, two types of analyses were completed. First, site sections through the most developed areas of the proposed project were drawn. Figure IV-4 is the key to the sections shown in Figure IV-5. It can be seen from these figures that the proposed project would not be a major visual obstruction from Akoni-Pule Highway.

The second analysis consisted of generating a photo montage of the view with the project in place from four significant vantage points. Figure IV-6 is a key map showing the location and direction from which the underlying photographs were taken. Figures IV-7 A, B, C, and D present photographs of the existing views and renderings of the project onto the respective photographs showing what the project would actually look like at completion. In each case, the results indicate very minimal visual impacts.

2.4.3 Mitigation Measures

The primary mitigation measure that will be employed to minimize potential adverse visual impacts will be the use of extensive landscaping in and around various facilities and maintaining building heights of less than the 45-foot maximum allowable (by code) height. In addition, the buildings and homes will be designed to blend in with and complement the natural environmental setting of the project area.

FIGURE IV–2
VISUAL KEY MAP
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

MAHUKONA, NORTH KOHALA, HAWAII

(A) LOOKING SOUTH TOWARDS MAHUKONA

(B) NISHIMURA BAY LOOKING NORTHEAST

FIGURE IV-3 A
PHOTOS OF SITE A & B
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR HAWAII

(C) OLD RAILROAD BED LOOKING SOUTHWEST

(D) LOOKING NORTHEAST FROM MAHUKONA HARBOR ROAD

FIGURE IV-3 B
PHOTOS OF SITE C & D
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR

(E) LOOKING SOUTH TOWARDS MAHUKONA PARK

(F) LOOKING WEST FROM AKONI PULE HIGHWAY

FIGURE IV-3C
PHOTOS OF SITE - E & F
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR

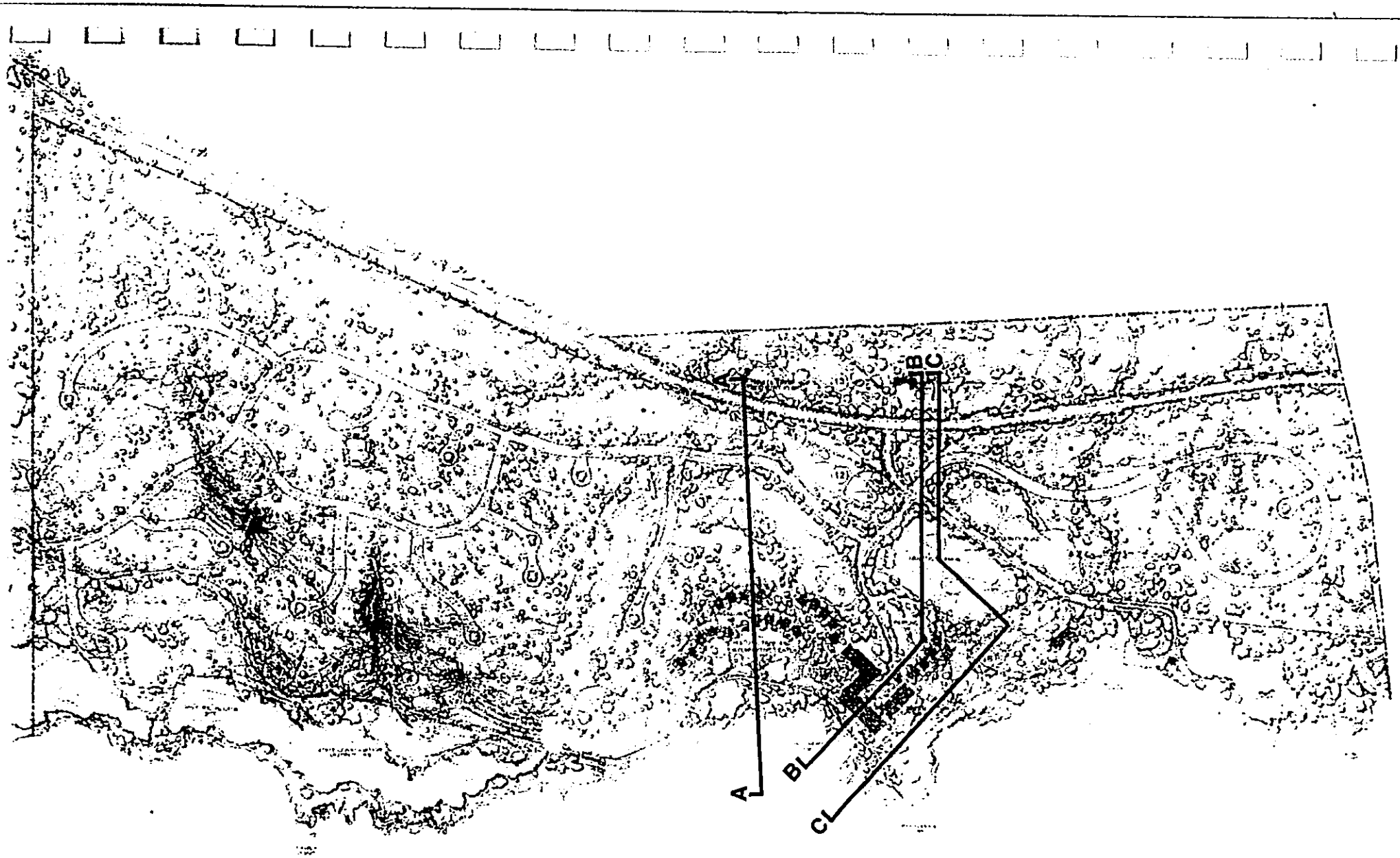
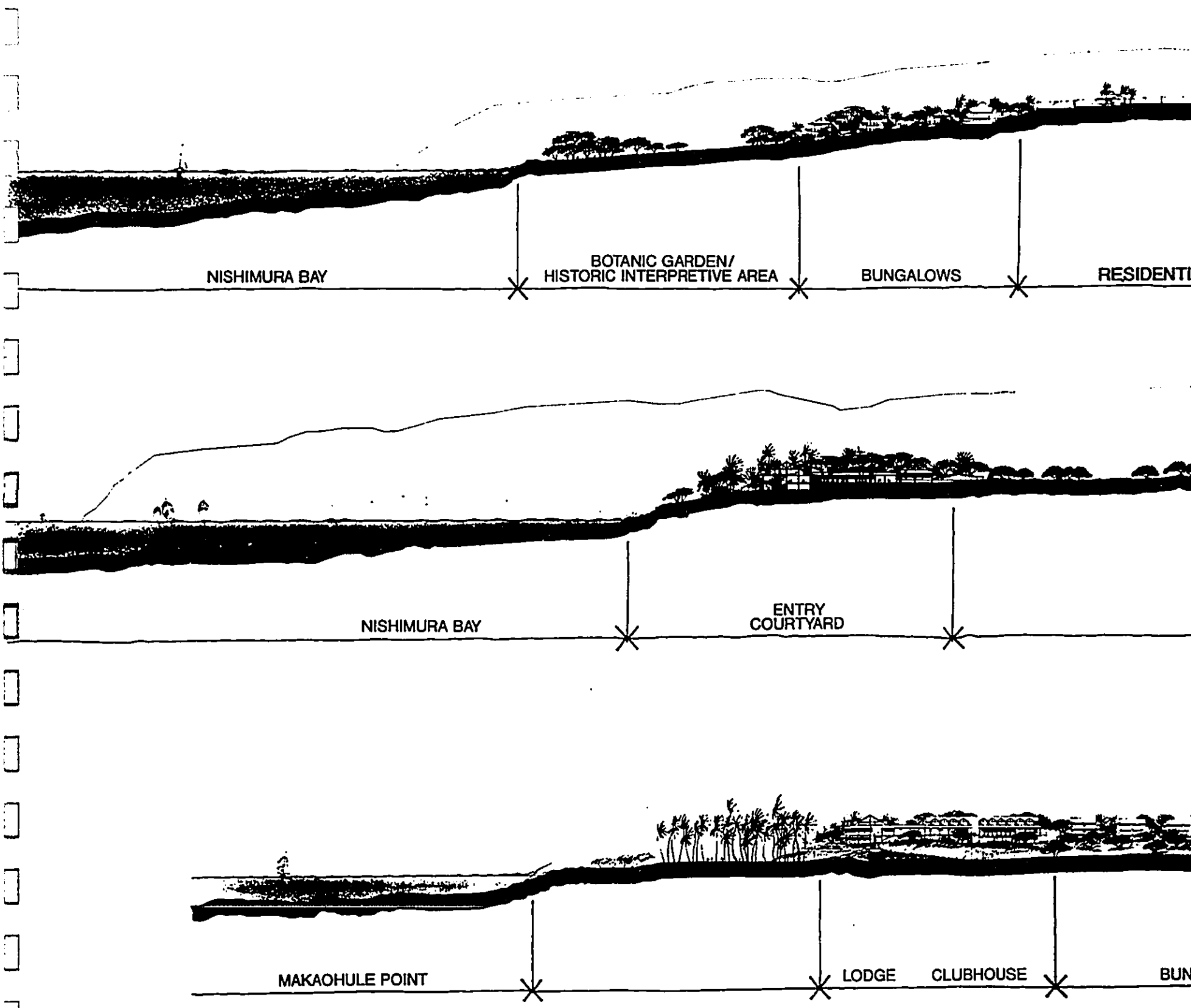


FIGURE IV-4
SITE SECTIONS KEY MAP
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

AREA
2 AC.
1 AC.
NORTH
LINEAL SCALE
0 300 600 1200
FEET
PBR HAWAII



NOTE: This is an artist's rendering to show the order of magnitiude of building masses only. The purpose of this exhibit is not to mathematically convert existing ridge heights.

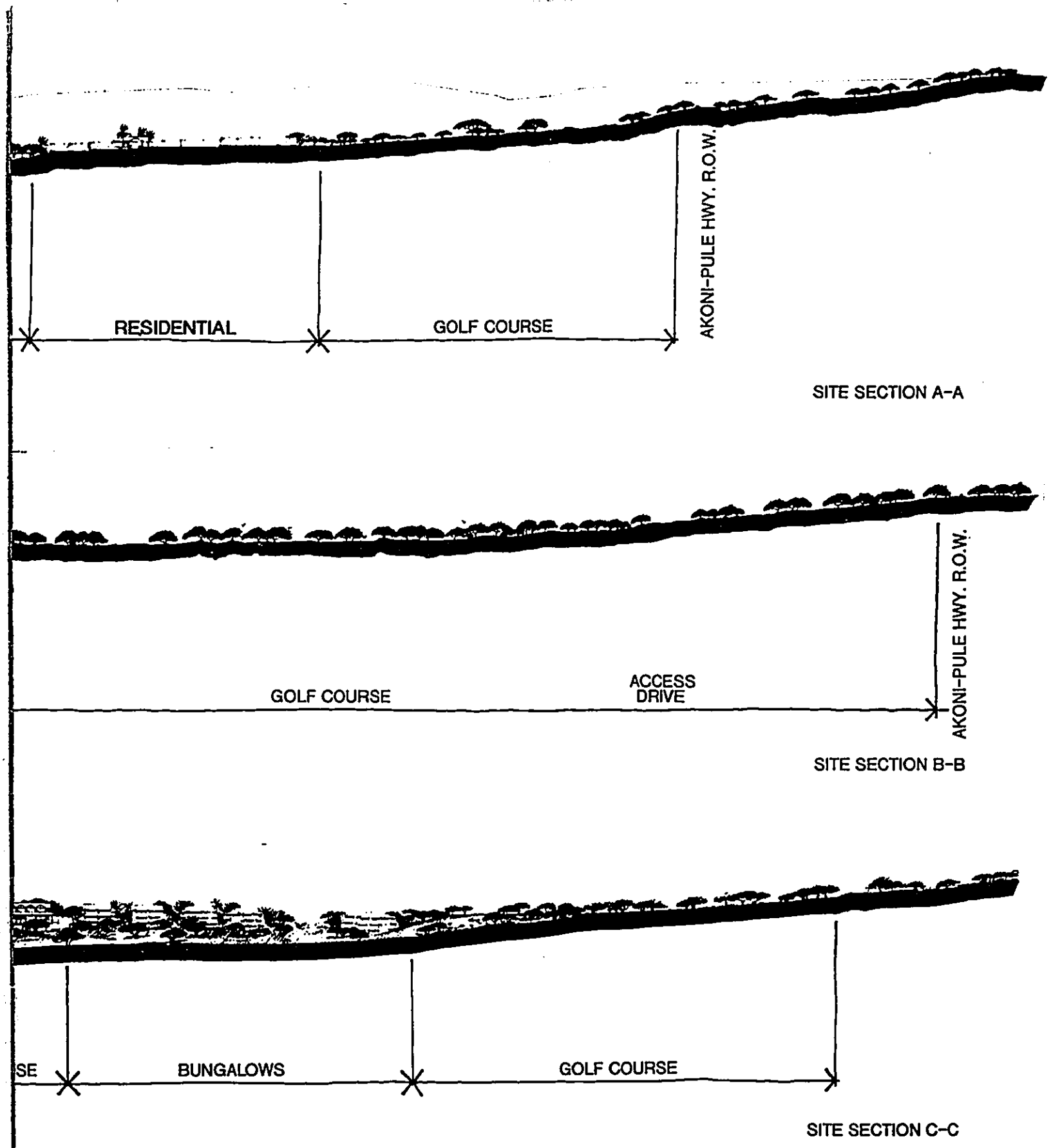


FIGURE IV-5
SITE SECTIONS A-A TO C-C
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR

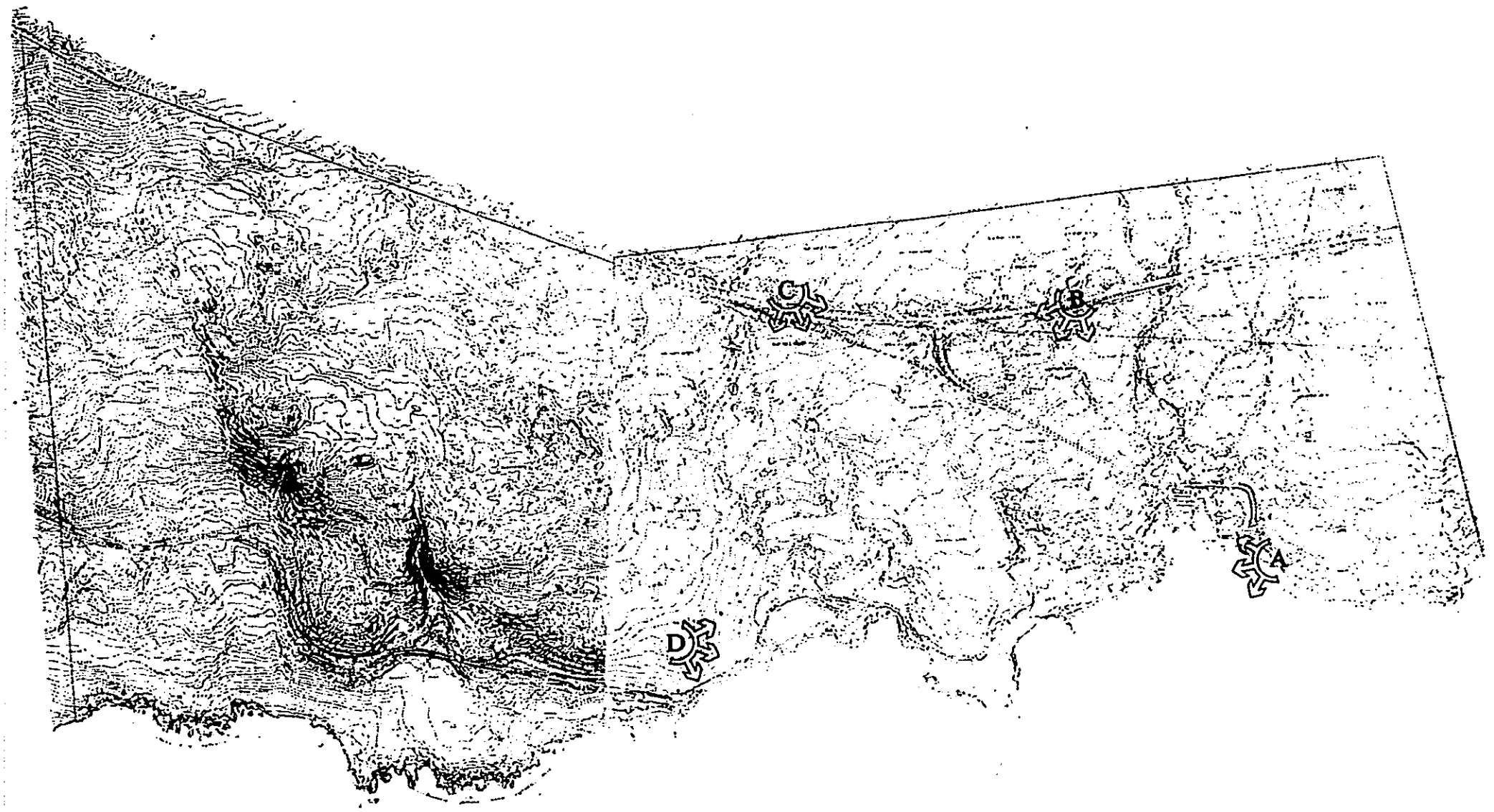
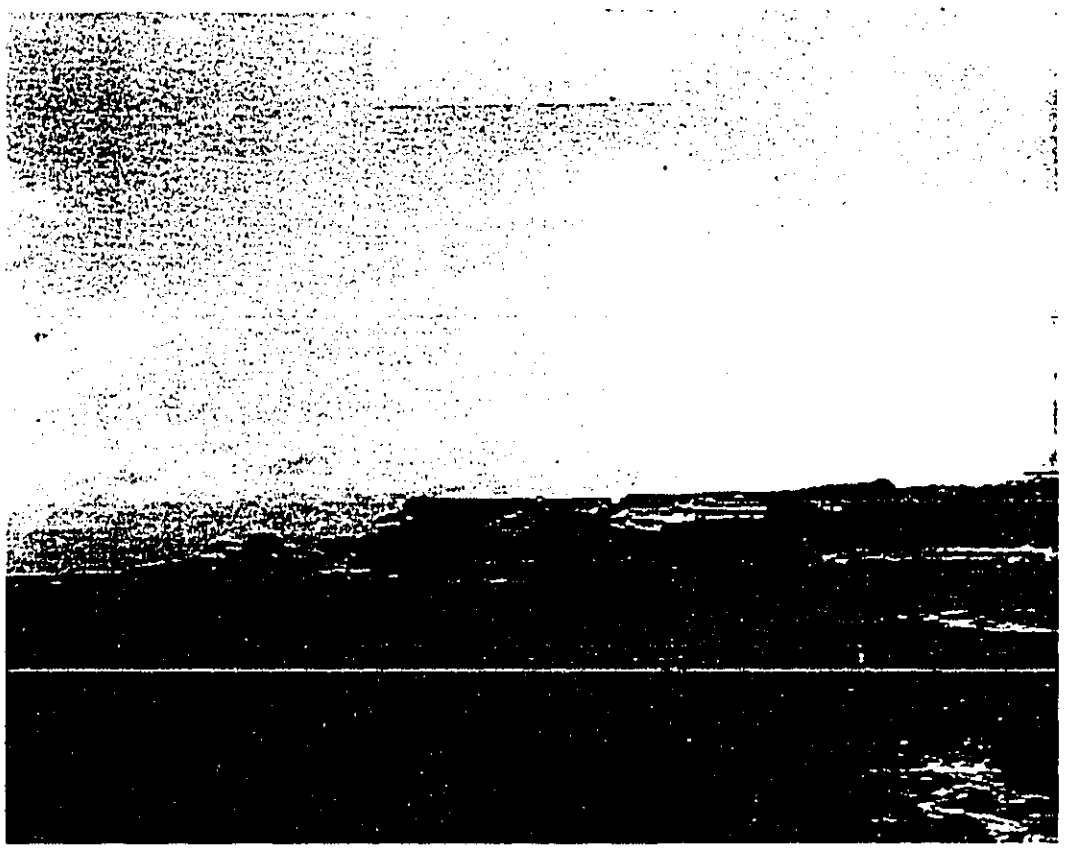


FIGURE IV-6
PHOTO MONTAGE KEY MAP
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE
MAHUKONA, NORTH KOHALA, HAWAII

EXISTING VIEW A

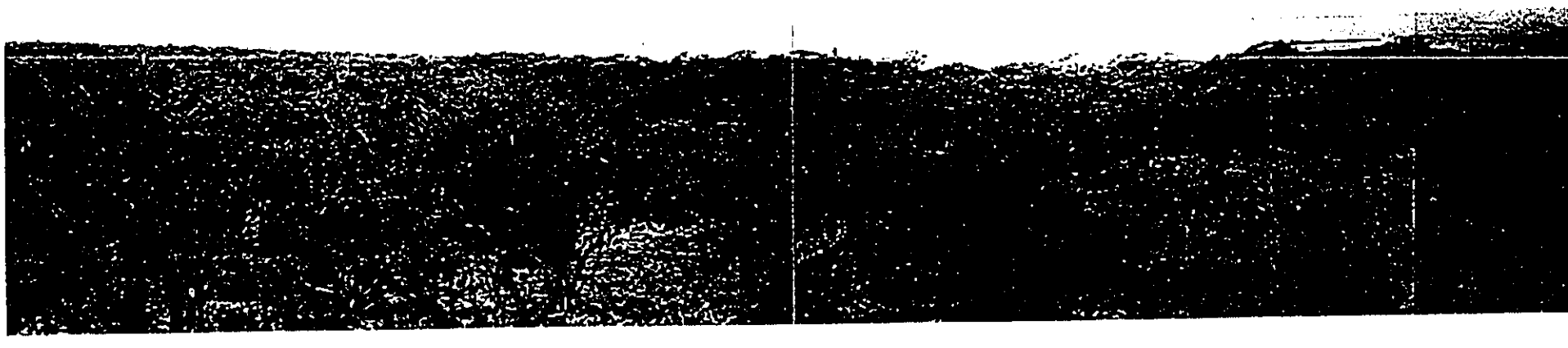


PROPOSED VIEW A

FIGURE IV-7A
VIEW A
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR HAWAII

EXISTING VIEW B



PROPOSED VIEW B

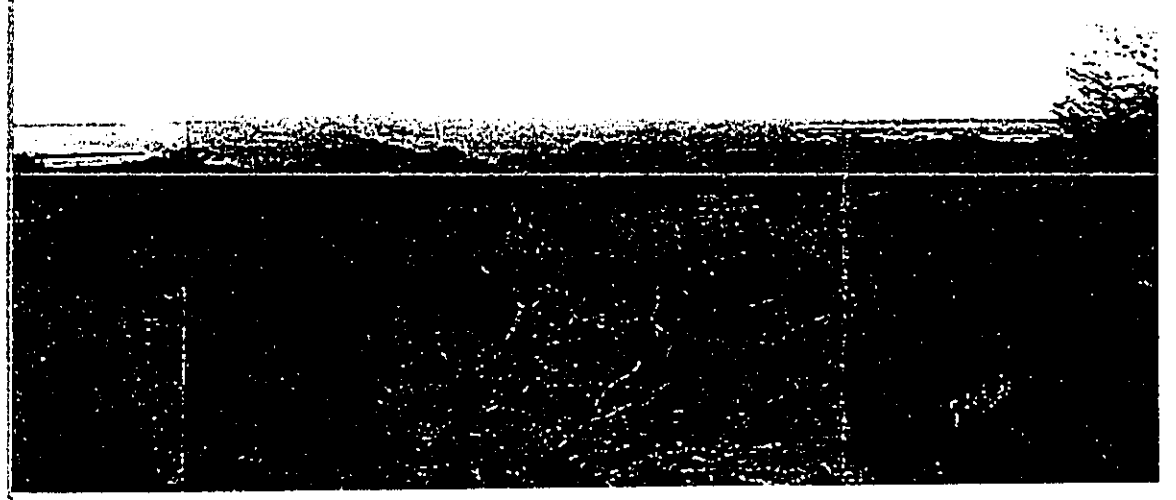
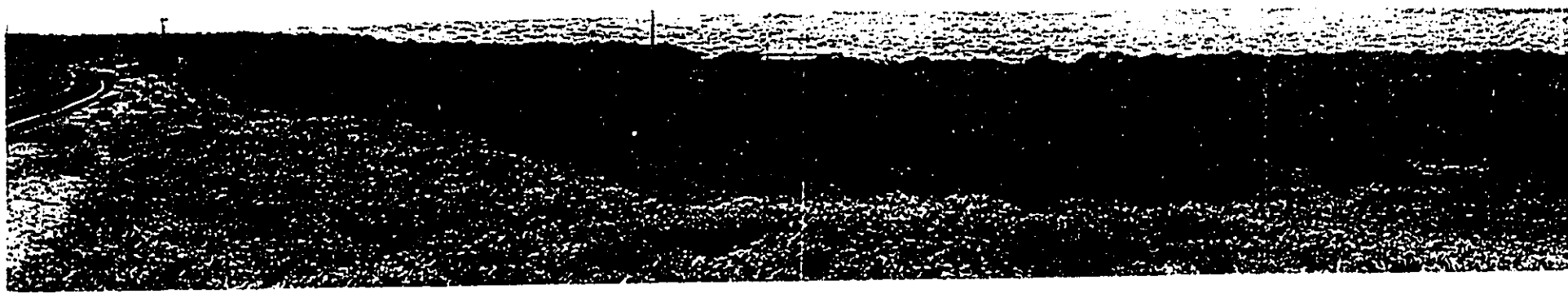
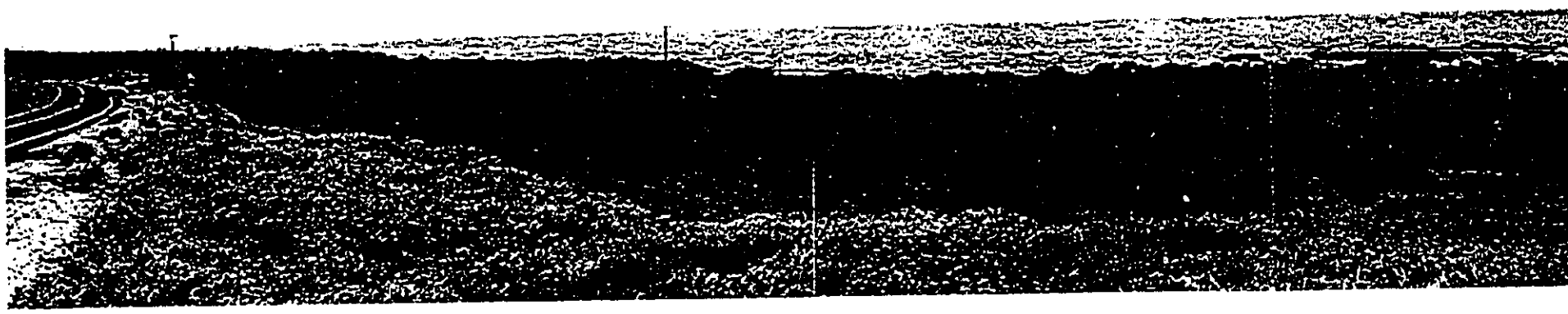


FIGURE IV-7B
VIEW B
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR HAWAII



EXISTING VIEW C



PROPOSED VIEW C

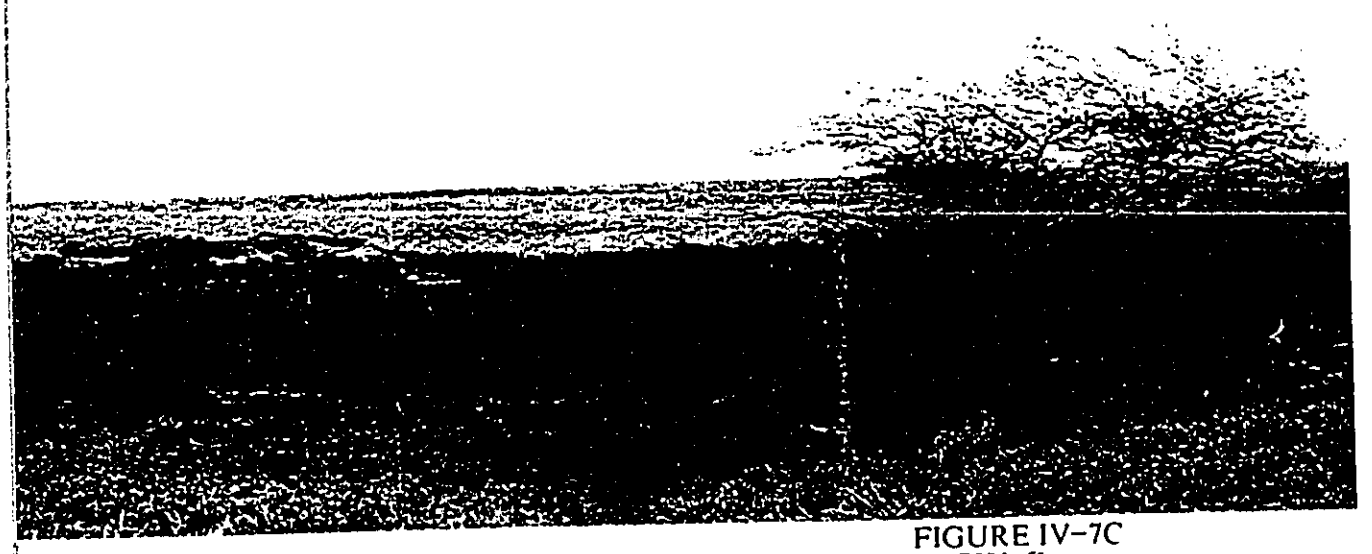
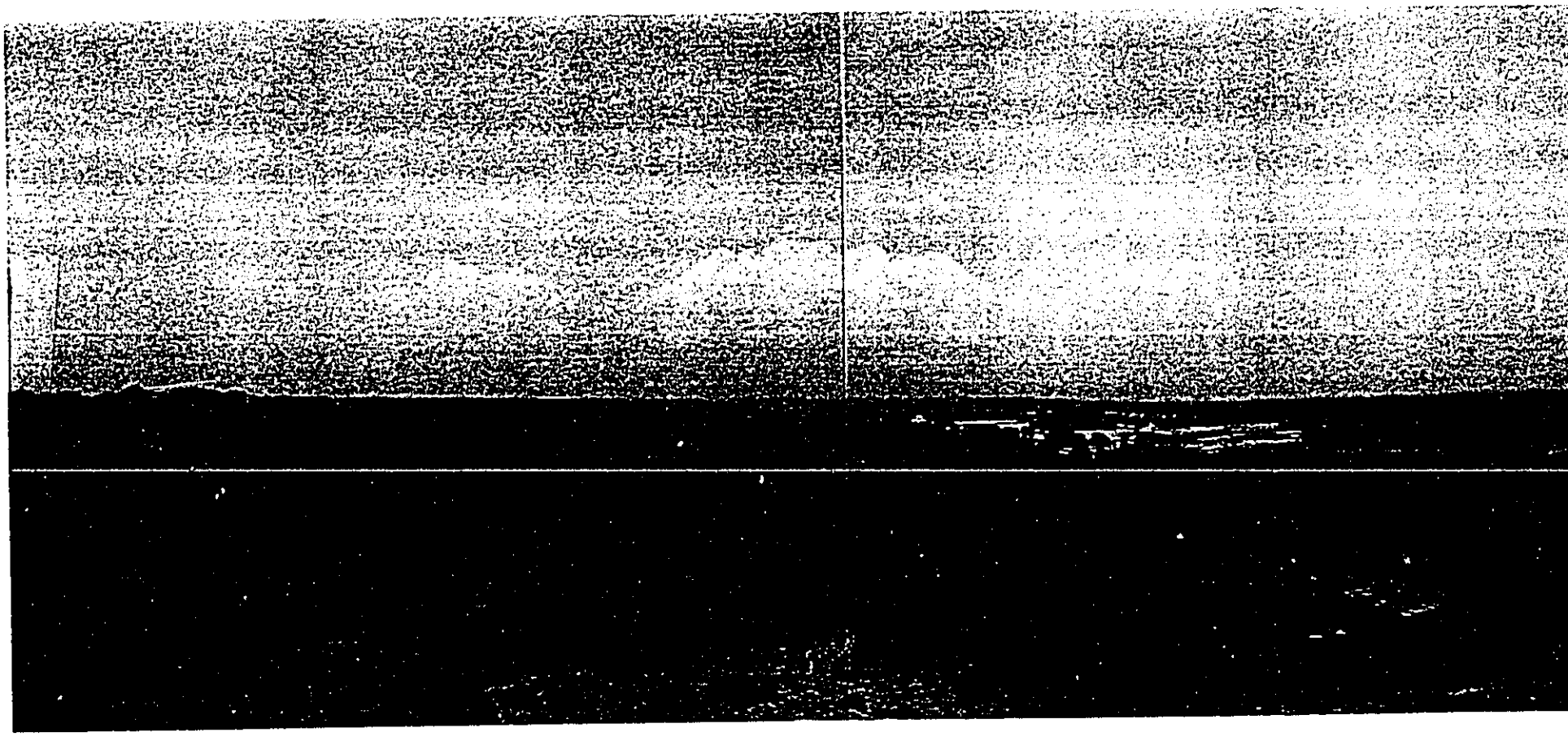


FIGURE IV-7C
VIEW C
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR HAWAII

EXISTING VIEW D



PROPOSED VIEW D

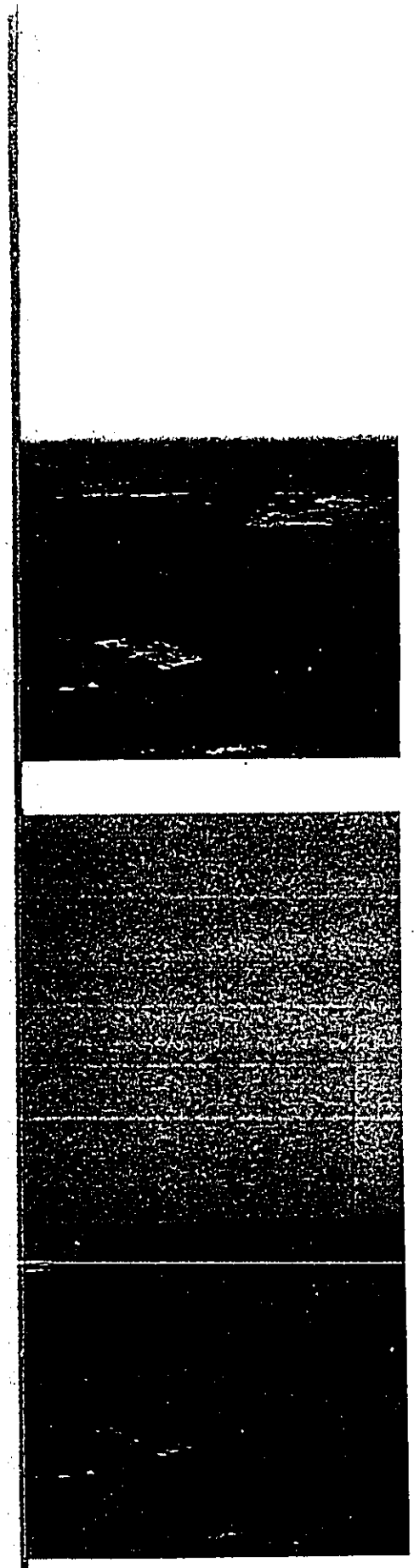


FIGURE IV-7 D
VIEW D
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

PBR HAWAII

3. NATURAL ENVIRONMENT

3.1 TERRESTRIAL FLORA

3.1.1 Existing Conditions

The vegetation of the project site and area has been surveyed specifically for the proposed project (Appendix B). The project site presently consists of two general vegetation cover types: (1) kiawe trees with a dense ground cover of grasses, primarily buffel grass, and (2) a very narrow band of coastal vegetation (Figure IV-8). The two plant cover types are described below.

Coastal Strand:

The coastal strand vegetation forms a very narrow belt along the rocky coastline and is poorly developed, often with kiawe-buffel grass community displacing it in many places. It is best developed on boulder covered beaches and rocky points such as around Kauilii Point. A number of native coastal species can be found in such areas. The most common being 'aki'aki or seashore rushgrass (*Sporobolus virginicus*) and pa'u-o-Hi'i-aka (*Jacquemontia ovalifolia* ssp. *sandwicensis*), both of which form extensive low-lying mats. Other native species found occasionally include the silver leaved hinahina (*Heliotropium anomalum* var. *argenteum*), kipukai or nena (*Heliotropium curassavicum*), the orange-flowered 'ilima (*Sida fallax*), alena (*Boerhavia repens*) and pua-kala or the native white-flowered poppy (*Argemone glauca*).

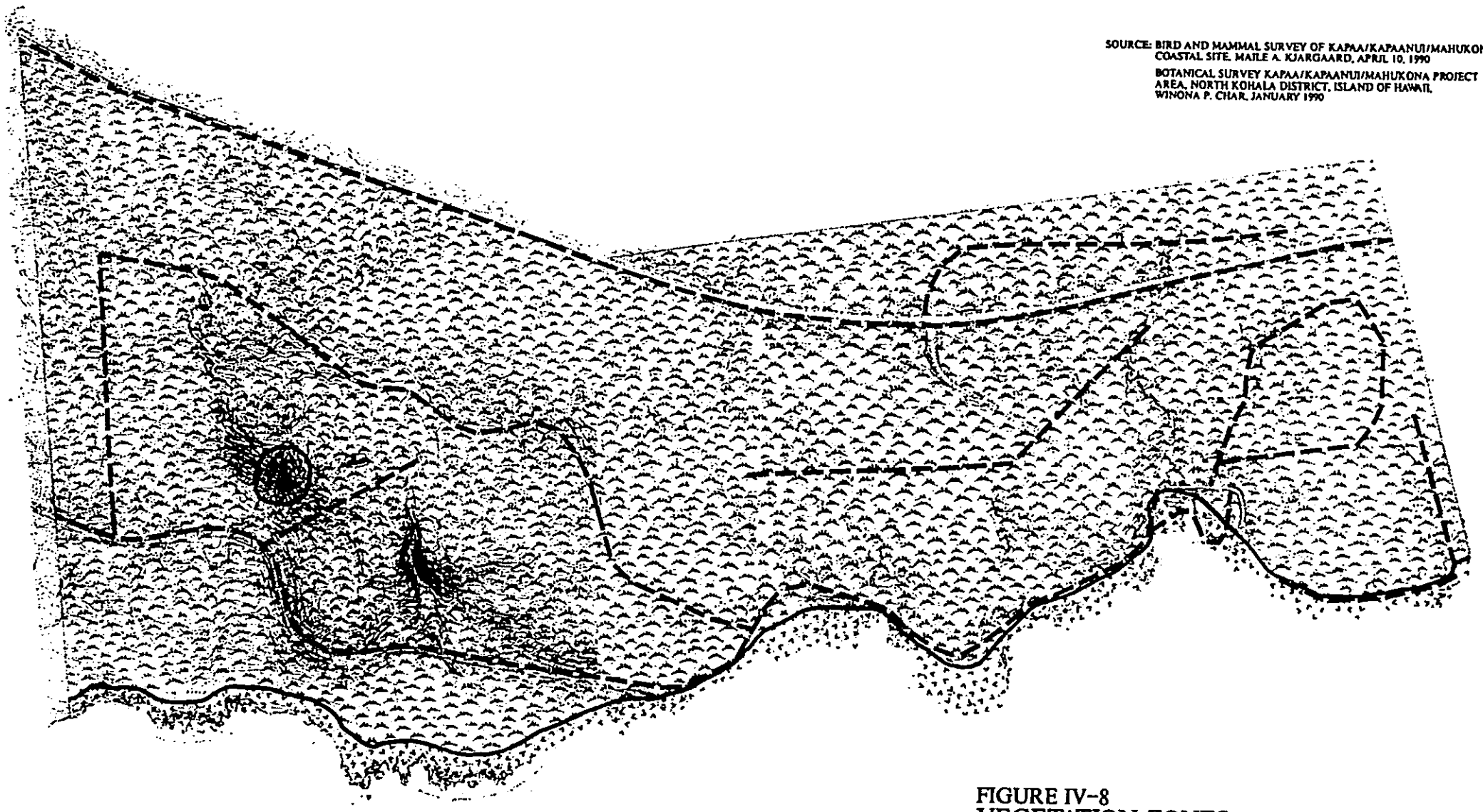
Among the introduced or alien species that can be found in the coastal strand are Australian saltbush, (*Atriplex semibaccata*), swollen finger grass (*Chloris barbata*), khaki weed (*Alternanthera sessilis*), the unpleasant puncture vine (*Tribulus cistoides*) with its spiny fruits and pluchea shrubs (*Pluchea symphytifolia*) that form rounded, windswept clumps. A few small coconut palms (*Cocos nucifera*) can be found planted in sheltered areas where fishermen frequent.

Kiawe-Buffel Grass Community:

The kiawe-buffel grass community covers the majority of the project site. Typically it is composed of kiawe trees (*Prosopsis pallida*), 12 to 20 feet tall, that are open, i.e., the trees are spaced so that their canopies do not touch. In some areas, the trees may be very widely spaced (30 percent cover)

SOURCE: BIRD AND MAMMAL SURVEY OF KAPAA/KAPAANUI/MAHUKONA COASTAL SITE. MAILE A. KJARGAARD, APRIL 10, 1990

BOTANICAL SURVEY KAPAA/KAPAANUI/MAHUKONA PROJECT AREA, NORTH KOHALA DISTRICT, ISLAND OF HAWAII. WINONA P. CHAR, JANUARY 1990



BOULDER COVERED SLOPE WITH NATIVE PLANTS

KIAWE/BUFFEL GRASS/AGAVE PLANT ASSOCIATION

COASTAL STRAND VEGETATION

BIRD CENSUS TRANSECTS

FIGURE IV-8
VEGETATION ZONES
& BIRD CENSUS STATIONS
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

MAHUKONA, NORTH KOHALA, HAWAII

PBR

and the physiognomy is of an open parkland with scattered trees. Buffel grass (*Cenchrus ciliaris*), with upright clumps to 3 feet tall, forms a dense ground cover that generally tends to exclude other species.

Three variants of this vegetation type are found on the project site and they are usually correlated with variations in the substrate type. On Mahukona very stony silty clay loam soil, located on the upper slopes of the Kapaanui parcel, adjacent to the highway, pitted beardgrass (*Bothriochloa pertusa*) becomes locally abundant and forms extensive patches, especially near cattle watering troughs. Where rocky outcroppings predominate on the lower half of the Kapaanui parcel on Kawaihae soil, pili grass (*Heteropogon contortus*) is co-dominant with buffel grass. One large boulder covered slope, located about 1,000 feet in from the northern boundary of the project site (see Figure IV-8), supports a small community of native plants. These are 'ilima, nehe (*Lipochaeta* aff. *subcordata*), 'awikiwiki (*Canavalia hawaiiensis*), 'ilie'e (*Plumbago zeylanica*), koali-'awania) (*Ipomoea indica*), *Ipomoea littoralis*, anunu (*Sicyos* aff. *anunu*) and kumu-niu (*Doryopteris decipiens*). The large boulders are encrusted with a dense covering of lichens, turning them a whitish-gray color. One plant of native sandalwood or 'ili-ahi-alo'e (*Santalum ellipticum*) is found on a rocky outcropping near the old railroad bed. On the Kou and Mahukona parcels, sisal plants (*Agave sisalana*) are locally common.

3.1.2 Probable Impacts

The vegetation of the project site is dominated largely by introduced (or alien) species such as kiawe and buffel grass. These two species form the bulk of the biomass on the project site. Of a total of 98 species inventoried during the botanical survey for the proposed project (Appendix B), 76 (78 percent) are introduced; 20 (20 percent) are native; and 2 (2 percent) are originally of Polynesian introduction. Of the native plants, 12 are indigenous, i.e., native to the Hawaiian islands and elsewhere; and 8 are endemic, i.e., native only to Hawaii and not found elsewhere.

None of the native plants are officially listed as endangered or threatened by the U.S. Fish and Wildlife Service. While the 'awikiwiki (*Canavalia hawaiiensis*) is known from South Point, Hualalai, Mauna Loa and the Ka'u Desert, it has not been recorded from the Kohala area before.

Extensive earthwork and excavation would accompany development of the proposed resort facilities and houselots. It is anticipated that portions of the site would be left intact where feasible, especially along the shoreline. Potential impacts to the vegetation of the site

will be significant in that much of the existing vegetation will be lost. However, as noted below, the potential adverse impacts will be largely mitigated. Of some concern is the boulder covered slope that supports a small community of native plants. Although none of the plants are considered threatened or endangered, the plants should be preserved if possible, as continued development of the Kohala coast will diminish their populations and range in the future.

3.1.3 Mitigation Measures

To mitigate the limited loss of native species, landscape plantings in appropriate areas will include use of native plants such as the 'awikiwiki and nehe. Both are attractive plants and can be effectively used as ground cover. Similarly, 'ilima, pa'u-o-Hi'i-aka and pu'a-kala would be used in landscape areas subject to salt spray. The boulder covered area will be maintained as part of the golf course and serve as a landscape feature for the course. As indicated in Chapter II, Section 3.2, the proposed project includes extensive landscaped areas and lagoons. These areas provide ideal locations for the use of native vegetation in association with introduced species to create the atmosphere desired in the project setting.

3.2 TERRESTRIAL FAUNA

3.2.1 Existing Conditions

The terrestrial fauna of the project site and area has been surveyed for the proposed project (Figure IV-8 and Appendix C). Based on the field survey, the terrestrial fauna of the project site is characterized as follows:

> There are three major faunal habitats in the project area. The majority of the area consists of a kiawe (*Prosopsis pallida*) savanna with an understory of mixed alien grasses and herbs. Canopy height is approximately 20 to 30 feet. There is considerable variation in the density of the kiawe cover; with some areas dense enough to form a closed canopy situation (i.e., tree branches touching and interwoven with each other), with the majority of the area typified by a much sparser canopy cover. Dense stands of sisal (*Agave*) are present in a number of locations within the kiawe savanna habitat.
>
> The second major habitat consists of small areas near Mahukona Harbor that contain a more diverse assemblage of plant species, many of

which are ornamentals that have been planted in the immediate vicinity of buildings and roadways.

The third major habitat is the shoreline that occurs all along the western boundary of the project site. The majority of this habitat consists of small rocky intertidal areas with a few localities that are relatively well-protected with small boulder or sandy beaches.

The predominant avian (bird) community in the project area consists of a complex of introduced species that are well adapted to the arid habitats available. Among the more common species are the Grey and Black Francolins (*Francolinus pondicerianus* and *F. francolinus* respectively), Japanese White-eye (*Zosterops japonicus*), Common Myna (*Acridotheres tristis*), Northern Cardinal (*Cardinalis cardinalis*), Warbling Silverbill (*Lonchura malabarica*),Mockingbird (*Mimus polyglottos*) and Nutmeg Mannikin (*Lonchura punctulata*). Other species inhabiting areas more frequented by humans, especially around Mahukona Harbor and Kaoma Point, include Spotted and Zebra Doves (*Streptopelia chinensis* and *Geopelia striata* respectively), Yellow-billed Cardinal (*Paroaria capitata*) and House Sparrow (*Passer domesticus*).

Relatively few shorebirds were observed on the project site. Wandering Tattler (*Heteroscelus incanus*) were sighted along rocky shorelines and Lesser Golden Plover (*Pluvialis dominica*) occurred in grassy areas on the coastline and along the roadsides of the project area.

Mammals sighted during the survey included the House Mouse (*Mus domesticus*), feral cats (*Felus catus*) and the Small Indian Mongoose (*Herpestes auropunctutatus*). There was no evidence of the native Hawaiian Hoary Bat (*Lasiurus cinerius semotus*) in the project area.

Similarly, there was no evidence that any endangered or threatened species utilize the area. The Hawaiian Hawk (*Buteo solitarius*) and Hawaiian Hoary Bat may frequent the area, but the habitat is marginal for both species and the area is outside the normal range of the Hawaiian Hawk.

3.2.2 Probable Impacts

Changes in the land use of the project site will alter the nature of its bird and mammal communities. The replacement of the savanna habitat by wetter landscaped vegetation will most likely decrease the abundance of game birds, e.g., Francolins, but will greatly increase the density and diversity of perching birds, e.g., Mannikins and Cardinals.

Changes in vegetation and increased development will also increase the density of nuisance species such as the Common Myna and House Sparrow, as well as rodents.

The only native bird species that might be affected by the proposed project would be the Hawaiian Owl or Pueo (*Asio flammeus*). This species is known to occur in lowland habitats in the Kohala District and has been sighted on the project site (Appendix C). Residential development is unlikely to affect the use of the property by the Hawaiian Hoary Bat, if this species is present or frequents the site. Impacts could occur as a result of pesticide use on the golf course or landscaped areas by depleting the supply of insects that some of the birds feed upon.

3.2.3 Mitigation Measures

Given the lack of expected significant adverse impacts that might result from the proposed project, mitigation measures are not warranted. As indicated above, newly landscaped areas will provide habitat for introduced and some native species. Pesticide use will be minimized and in compliance with label instructions in an effort to avoid causing adverse impacts as a result of secondary poisoning of bird or mammal species.

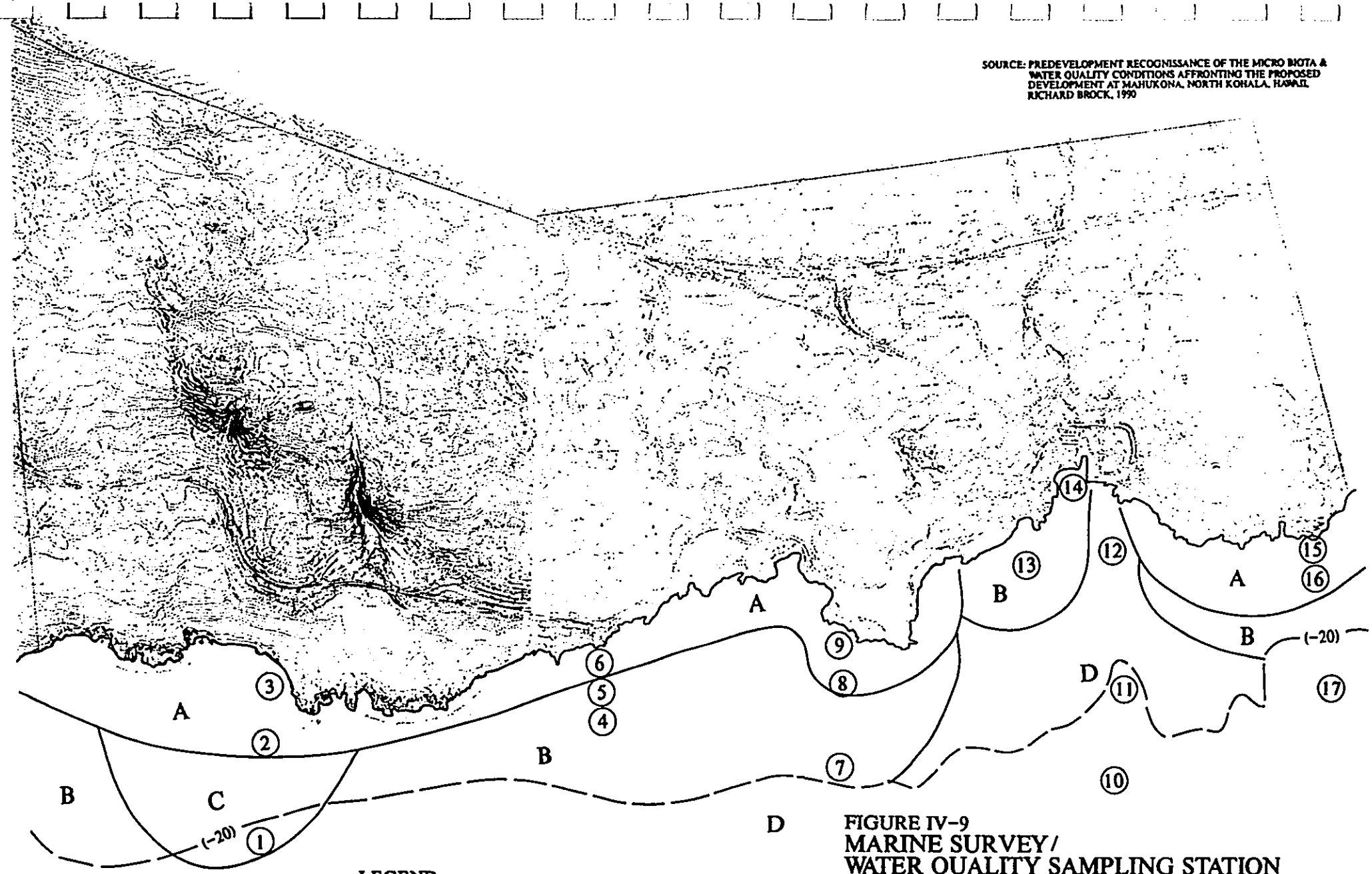
3.3 MARINE ENVIRONMENT

3.3.1 Existing Conditions

Because the proposed project has the potential for affecting the shoreline and marine environment adjacent to the project site, a baseline, reconnaissance marine biota and water quality survey of the area was conducted specifically for this EIR (Appendix D). The following is based on the results of that survey.

The study area for the survey extended from the northern boundary of the Lapakahi State Marine Life Conservation District on the southern boundary of the project site to Kapaa Park at the northern boundary of the project site, and from the shoreline to the 20 m (about 60-foot) depth contour that ranged from about 450 feet to 1,350 feet offshore (Figure IV-9). Four major biotopes or zones were defined in the study area: (1) shallow high wave energy biotope adjacent to the shoreline; (2) high coral cover at greater depths

SOURCE: PREDEVELOPMENT RECOGNISSANCE OF THE MICRO BIOTA & WATER QUALITY CONDITIONS AFFRONTING THE PROPOSED DEVELOPMENT AT MAHUKONA, NORTH KOHALA, HAWAII
RICHARD BROCK, 1990



LEGEND

A	SHALLOW HIGH ENERGY BIOTOPE
B	HIGH CORAL COVER BIOTOPE
C	LOW CORAL COVER BIOTOPE
D	SANDY BOTTOM BIOTOPE
	ISOBATH

FIGURE IV-9
MARINE SURVEY/
WATER QUALITY SAMPLING STATION
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE
MAHUKONA, NORTH KOHALA, HAWAII

PBR

seaward of the high wave energy zone; (3) deep low coral cover; and (4) sand biotope. Both the shallow high energy biotope and the biotope of high coral cover occur as two near-continuous bands parallelling the shore through much of the study area. The biotope of deep low coral cover is restricted to one small area at the north end of the study area and the biotope of sand lies primarily seaward of the study site at depths greater than 60 feet. However, directly fronting Mahukona Harbor, the sand biotope approaches the shore bisecting the study area.

3.3.1.1 Existing Water Chemistry/Quality Characteristics

To determine the existing baseline water chemistry/quality characteristics of the area that could be impacted by the proposed project, water samples from a series of 15 water quality stations were quantitatively assessed (see Figure IV-9). The sample analyses indicated an elevation of nitrate-nitrogen and silicate concentrations at the shore at the head of Mahukona Harbor. Within a short distance seaward, concentrations are low. The concentration of nitrate-nitrogen and silicate are elevated in groundwater, thus serving as tracers for its diffuse input to oceanic settings where these and other nutrient levels are low. Other than this one small area of diffuse groundwater input, the waters off the project site are completely marine, with respect to water quality parameters as defined in the state water quality regulations, and typical of well-flushed, open coasts. Using the "Dry" state water quality standards (indicating groundwater efflux of less than 2 million gallons per day per mile of coastline), the geometric means of concentrations of all parameters, with the exception of chlorophyll *a* and ammonia-nitrogen, are all well within state water quality standards. The reasons for the two parameters exceeding state "Dry" standards are not known. However, the state standards for the two parameters, chlorophyll *a* and ammonia-nitrogen, under "Wet" conditions were not exceeded. Complete results of the water quality sampling program are included in Table 2 of Appendix D. It is interesting to note that concentrations of the water quality parameters measured in the study area are lower than those found off Keahole Point, and those waters are considered to be pristine oceanic waters.

3.3.1.2 Existing Biological Conditions

The existing biological conditions were quantitatively sampled at 12 stations (Figure IV-9). The biological studies found a diverse assemblage of fishes in the biotope of high

coral cover as well as in the shallow high energy biotope. This abundance of fish and invertebrate species of commercial and recreational interest suggests that fishing pressure through much of the study area is probably low, i.e., lower than other areas along the West Hawaii coastline. Fish community development was less in the biotopes of sand and deep low coral cover. The coral community is well developed in areas protected from the impact of waves at Mahukona Harbor, thus usually at depths greater than about 18 feet. The low apparent diversity and abundance of motile invertebrates is probably due to the abundant shelter afforded by corals and basalt substratum as well as to the cryptic and nocturnal habits of most motile macroinvertebrates. A complete listing of the invertebrates and fish observed during the marine survey is included in Appendix D.

Briefly, corals are a dominant element of the benthos in the area fronting the project site. Coverage values often exceed 60 percent and dominant species are *Porites lobata* and *P. compressa*. Most of the common Hawaiian corals were observed in the study area and the coral communities are very similar to those found elsewhere along the Kona/Kohala coast. The fish communities resident in the study area are also similar to those found in other areas off the West Hawaii coast. However, the presence of uku (*Aprion virescens*), mu (*Monotaxis grandoculis*), moano kea (*Parupeneus cyclostomus*) and omilu (*Caranx melampygus*) in the quantitative survey suggest that fishing pressure at the project site is less than at many other West Hawaii sites.

3.3.1.3 Endangered/Threatened Species

Three green turtles (*Chelonia mydas*) were observed during the marine survey. None of the individuals were found resting on the bottom but rather were on the surface. Algal species known to be important forage for green turtles, such as *Amansia glomerata* and *Pterocladia capillacea*, are virtually absent in the study area, although considerable effort was made to locate potential algal forage. Humpback whales (*Megaptera novaengliae)* are also known to transit the project area, at some distance offshore, during their annual winter visits to Hawaii. There are no known incidences of humpback whales coming inshore at the project site.

3.3.2 Probable Impacts

A concern for any coastal development is the potential for impact on coral reefs due to sedimentation caused by surface water runoff. Typically, if high sedimentation occurs on

a reef, motile species simply move away. Sessile organisms are unable to move, and would therefore be most affected by increased sedimentation. Many benthic species, including corals, are capable of removing sediment settling on them but there are threshold levels of deposition beyond which cleaning mechanisms are overwhelmed and individuals or colonies may become buried. The potential impact from the proposed project is the uncontrolled deposition of sediment in the nearshore marine waters due to surface water runoff. Generally the transport of sediment to marine communities would occur during periods of high rainfall. In that the project site is located in one of the driest areas of the island, with an annual average rainfall of about 13.5 inches, the potential for uncontrolled runoff does not appear to be great. Consequently the potential for increased sedimentation of the coral reefs is not great.

Other marine environmental concerns focus on the potential for changes in nearshore water quality. Soil that serves to adsorb excess inorganic nutrients occurs as a well developed horizon in the project site and would assist in controlling leaching of materials to the water table below the site. Studies in other West Hawaii areas, as well as those conducted on other Hawaii Islands and the mainland U.S., indicate that standard golf course/landscape maintenance and operations practices do not adversely impact nearshore waters.

Potential impacts of golf courses and other landscaped areas on groundwater supplies and storm water runoff quality has been investigated for numerous projects on Oahu, Maui and the Big Island. The general consensus of all of these investigations is that, (1) although nutrient levels in nearshore receiving waters are elevated at times, there does not appear to be any short-or long-term adverse impact on marine biota; (2) that by the time most pesticides and herbicides enter receiving waters, they are either diluted or degraded to the point where they are non-toxic and do not pose a hazard to either humans or marine biota; and (3) the measures that are being taken with the proposed project, i.e., use of retention basins and channeling flow into defined basins, are adequate to prevent adverse impacts as a result of the use of fertilizers and biocides (see PBR HAWAII. 1988; Brock, et al., 1987; Bienfang, 1977 and 1980; Chang and Young, 1977; Cox, et al., 1969; Marsh, 1977; Kay, et al., 1977; Maciolek and Brock, 1974; Smith, et al., 1981; Sunn, Low, Tom & Hara, 1974; Sakoda, 1975; and U.S. Army Engineer District, 1975; Murdoch and Green in Group 70, 1988; and Murdoch and Green in W. E. Wanket, Inc., 1989). Additionally, because of the relatively low rainfall level (about 13.5 inches per year), evapotranspiration rates generally preclude irrigation waters entering groundwater supplies. Also, fertilizers and/or biocides

are generally not applied to golf courses and/or residential areas during rainy periods. Because of these factors, fertilizers and biocides are not expected to enter the groundwater and/or surface water runoff streams.

Following a thorough study of the potential environmental impacts of golf courses in Hawaii, the University of Hawaii (1990) concluded the following:

> 1. "... proper location of golf course sites and water management techniques can result in golf course construction which will have a neutral or positive impact on water recharge."
>
> 2. "... risks of groundwater contamination from pesticides, herbicides, fungicides, or human waste products are insignificant. Scientific studies do not support concerns that golf courses are a source of environmental danger when properly managed."
>
> 3. "... proper application of fertilizers, pesticides and other chemicals and the avoidance of overwatering will result in little or no risks to the surface and coastal waters contamination."
>
> 4. "... golf courses are very effective in absorbing large amounts of water and reducing water runoff and thereby reducing erosion."
>
> 5. "... the weight of scientific evidence supports the use of properly treated effluents in the irrigation of golf courses. Wastewater currently being expelled into the ocean should be reallocated to irrigate golf courses and other greenbelts in the state."

Given the above findings, it appears unlikely that the proposed project would have any impact on the marine environment, groundwater stream or surface water runoff stream.

The proposed project does not include any work in the nearshore or offshore waters fronting the project site. Nor are any offshore recreational activities planned by Chalon. As such, it is highly unlikely that the proposed project would have any impact on the green turtles and/or humpback whales frequenting the project area.

Impacts to the fisheries of the area could occur with increased public access to the shoreline. It is presumed that resident as well as visitor recreational fishermen would practice appropriate conservation measures and only take that which is required for their own use and enjoyment.

3.3.3 Mitigation Measures

To assure that sedimentation due to uncontrolled surface water runoff does not occur during construction, sedimentation basins and diversion ditches/berms would be constructed on the downhill side of construction areas. The basins and temporary drainage structures would be constructed in compliance with county rules and regulations and would generally be constructed to completely hold the worst expected runoff quantity. The final drainage system and structures for the project also would be designed and constructed in compliance with applicable state and county rules and regulations with the principal design intent being to avoid direct discharge of surface water runoff into the marine environment. As noted previously, the golf course would be designed such that sedimentation and retention basins are included in the fairways, with eventual percolation of surface water into the underlying soils and lavas following filtration through the soils and lavas.

To assist in developing and/or increasing the conservation ethic among recreational fishermen and users of the public parks, interpretive, educational signs and displays could be erected, directing the public's attention to the need to protect and preserve the natural resources of the project area specifically and, in general, the island's and state's natural resources.

4. HISTORICAL AND ARCHAEOLOGICAL RESOURCES

4.1 EXISTING CONDITIONS

The historical and archaeological resources of the project site and area have been investigated specifically for this EIR (Appendices E, F and G) via the performance of archaeological surveys by both professional and community archaeologists. The objectives of the surveys, which covered the entire project site, were to (a) identify all sites and site complexes present within the project area, including relocating and evaluating previously recorded sites; (b) evaluate the potential significance of all identified archaeological remains; (c) determine possible impacts of any proposed development upon the identified remains; and (d) define the general scope of any subsequent archaeological work that might be deemed necessary or appropriate. The surveys were conducted in two phases; Phase I being performed to identify any sites of such obvious significance as to seriously constrain or prevent future development, and Phase II being performed to conduct detailed recording (and surface collections if necessary) at all sites identified during Phase I activities.

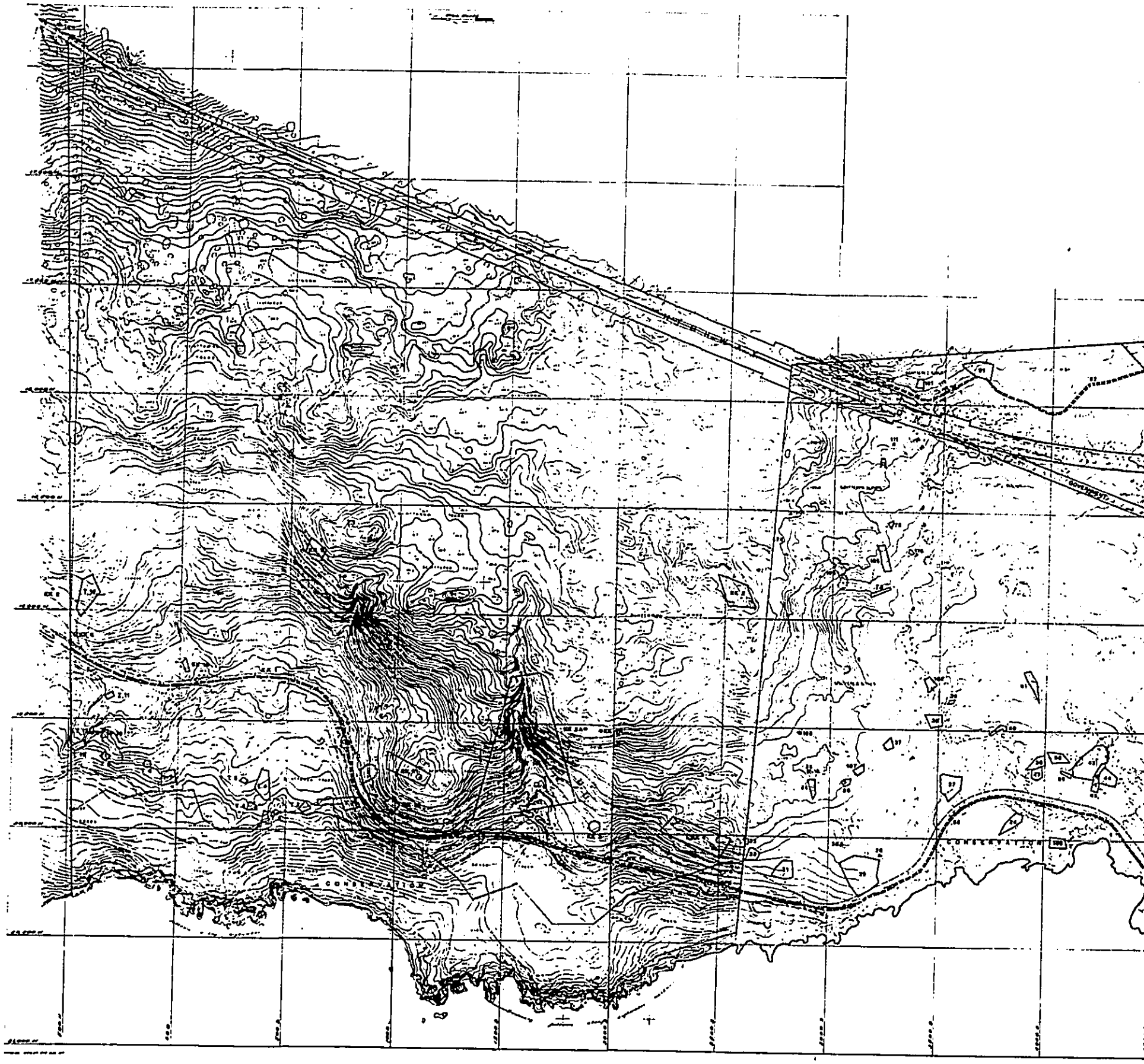
Based on the results of Phases I and II, 127 sites containing over 300 component features were identified within or immediately adjacent to the site. The physical condition of the sites ranges from poor to good. Both formal feature types and functional feature types are represented in the project area. Formal feature types present at the sites include terraces, walled terraces, double terraces, C-shaped and double C-shaped enclosures, walls, trails, platforms, enclosures, mounds, midden scatter, cupboard, modified outcrop, cairn, overhang, border alignment, road, Mahukona Harbor complex, railroad bed and machine gun emplacement. Functional feature types include habitation, temporary habitation, transportation, possible burial, ceremonial, possible marker, agriculture, water catchment, boundary, harbor, World War II military and features of indeterminate function. Archaeological site and feature locations are shown on Figure IV-10 and in relation to the proposed project facilities on Figure IV-11.

The abandoned railroad bed running through the property along the coast and the associated facilities at Mahukona Harbor are of historical interest, and are described by J. C. Conde in his book *Narrow Gauge in a Kingdom: The Hawaiian Railroad Company, 1878-1897* (1971). Beginning in the late 1870's, Mr. Samuel G. Wilder planned and built nearly 20 miles of narrow gauge (36") rail line connecting Mahukona Harbor with the sugar mills of North Kohala. The line extended around the northern tip of Kohala near the coast to Niulii Mill. In 1883 the railroad brought the statue of Kamehameha I back to the King's birthplace at Kohala, and transported then King Kalakaua and Princess Kekaulike to the unveiling ceremony. In 1884 the railroad carried 20,000 tons of freight and 6,000 passengers.

Mr. Wilder died in 1888, but the railroad was maintained by his estate until 1897 when it was disincorporated. The assets were transferred first to the Hawaii Railway Company, and then in 1937 to Mahukona Terminals Ltd., a subsidiary of Kohala Sugar Company. In 1939 the most distant portion of the line was abandoned as trucks became the preferred method of transport. In 1945 the closing of the Kohala Mill resulted in the permanent closure of the railroad.

4.2 PROBABLE IMPACTS

Impacts to the features found within the project boundaries would essentially be a loss of the features due to excavation and/or construction of the planned facilities. As shown on Figure IV-11, the proposed project facilities have been sited to avoid significant archaeological sites and features.



SOURCE: SURVEY OF ARCHAEOLOGICAL SITES OF HISTORICAL SIGNIFICANCE FOR THE MAHUKONA LODGE PROJECT SITE, M & E PACIFIC INC., 1990 and P. H. ROSENDAHL, INC., 1990

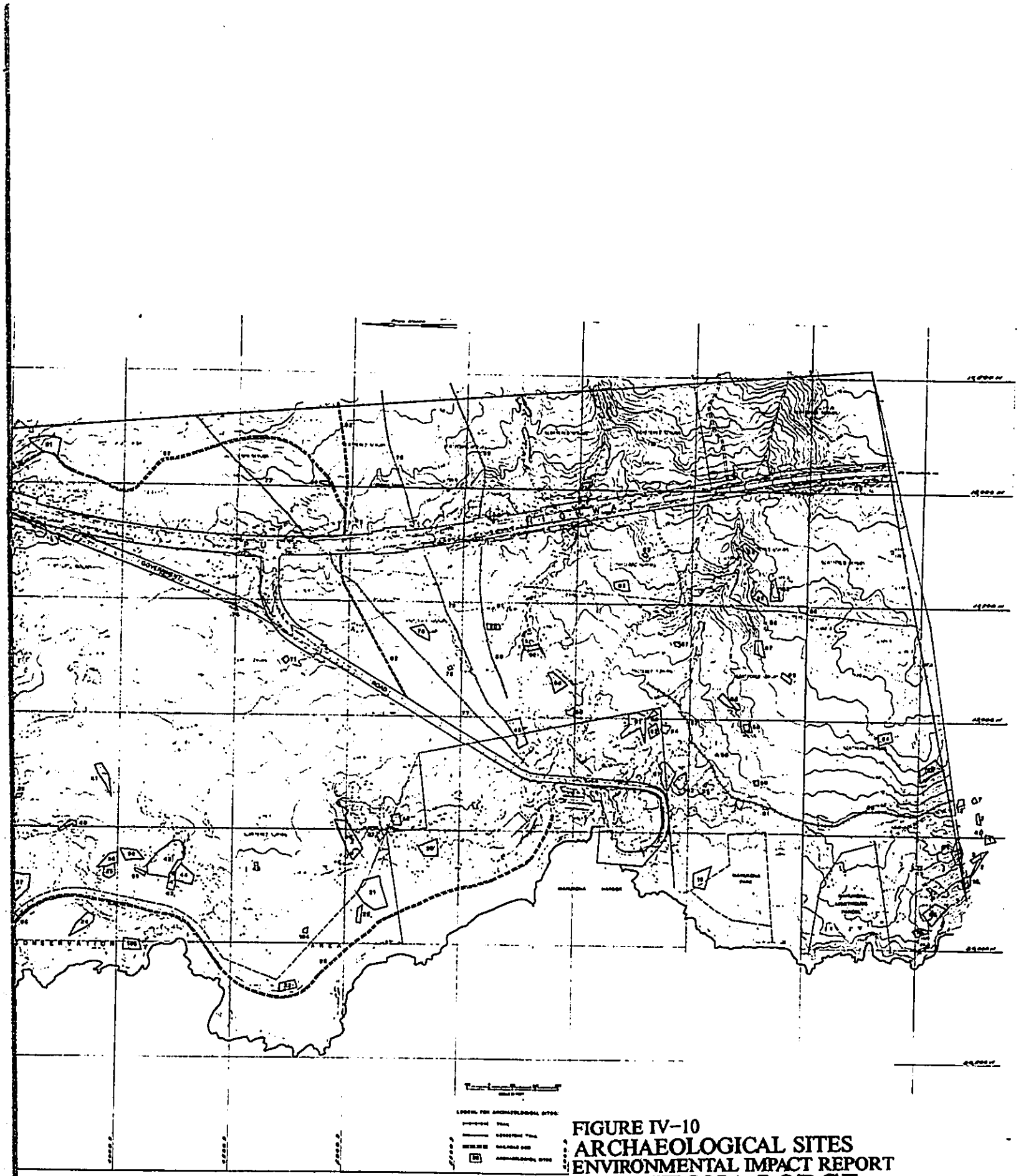


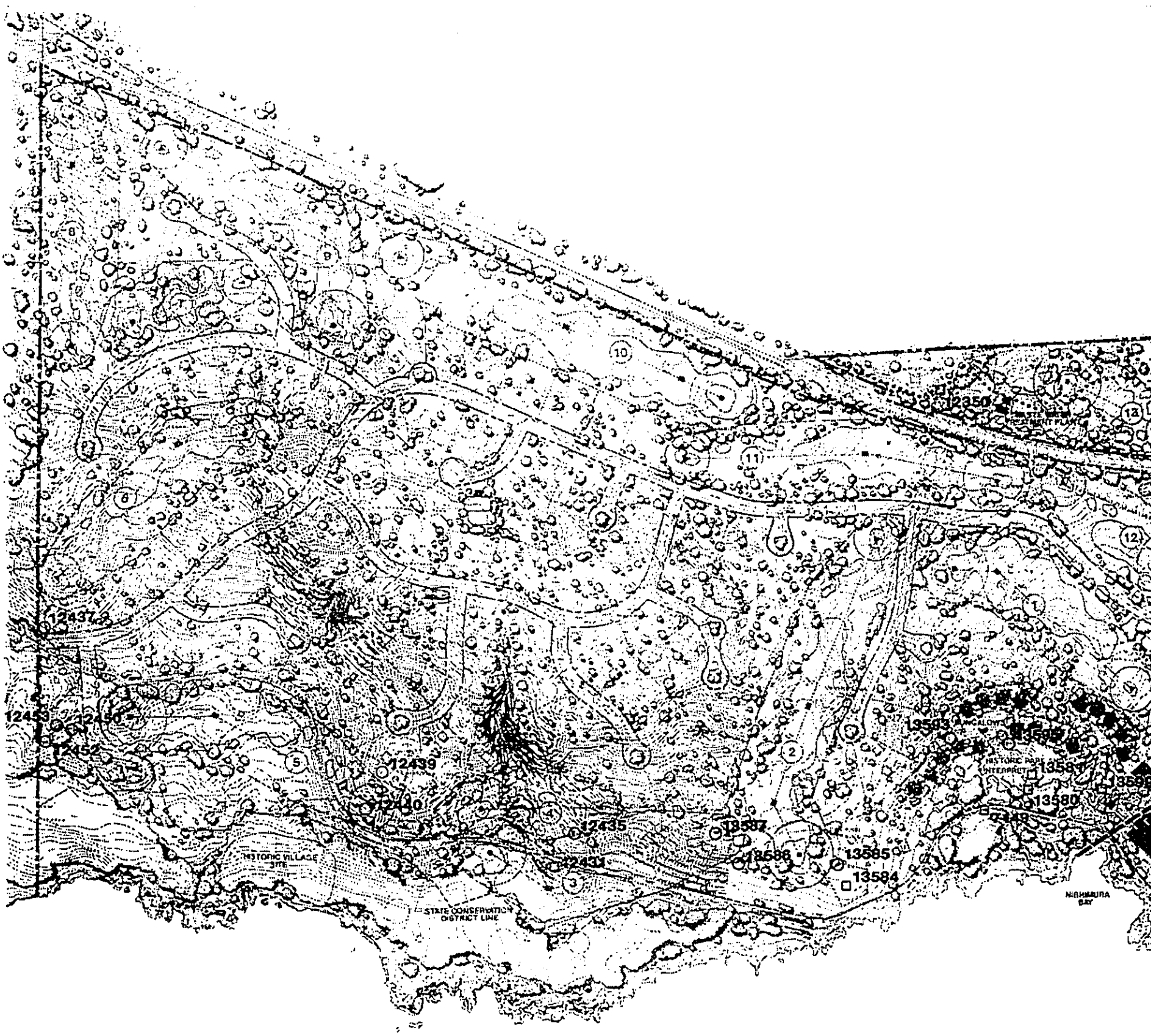
FIGURE IV-10
ARCHAEOLOGICAL SITES
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

AREA
2 AC.
1 AC.

NORTH

LINEAL SCALE
0 133 266 533
FEET

PBR HAWAII



SOURCE: ARCHAEOLOGICAL INVENTORY SURVEY KAPAANUI AGRICULTURAL SUBDIVISION, LANDS OF KAPAANUI AND KOU, NORTH KOHALA DISTRICT, ISLAND OF HAWAII, PAUL H. ROSENDAHL, PH.D., INC., 1990

ARCHAEOLOGICAL INVENTORY SURVEY MAHUKONA PROPERTY, LANDS OF KOU, KAMANO, MAHUKONA 1ST AND 2ND, HIHIU, AND KAOMA, NORTH KOHALA DISTRICT ISLAND OF HAWAII, PAUL H. ROSENDAHL, PH.D., INC., 1990

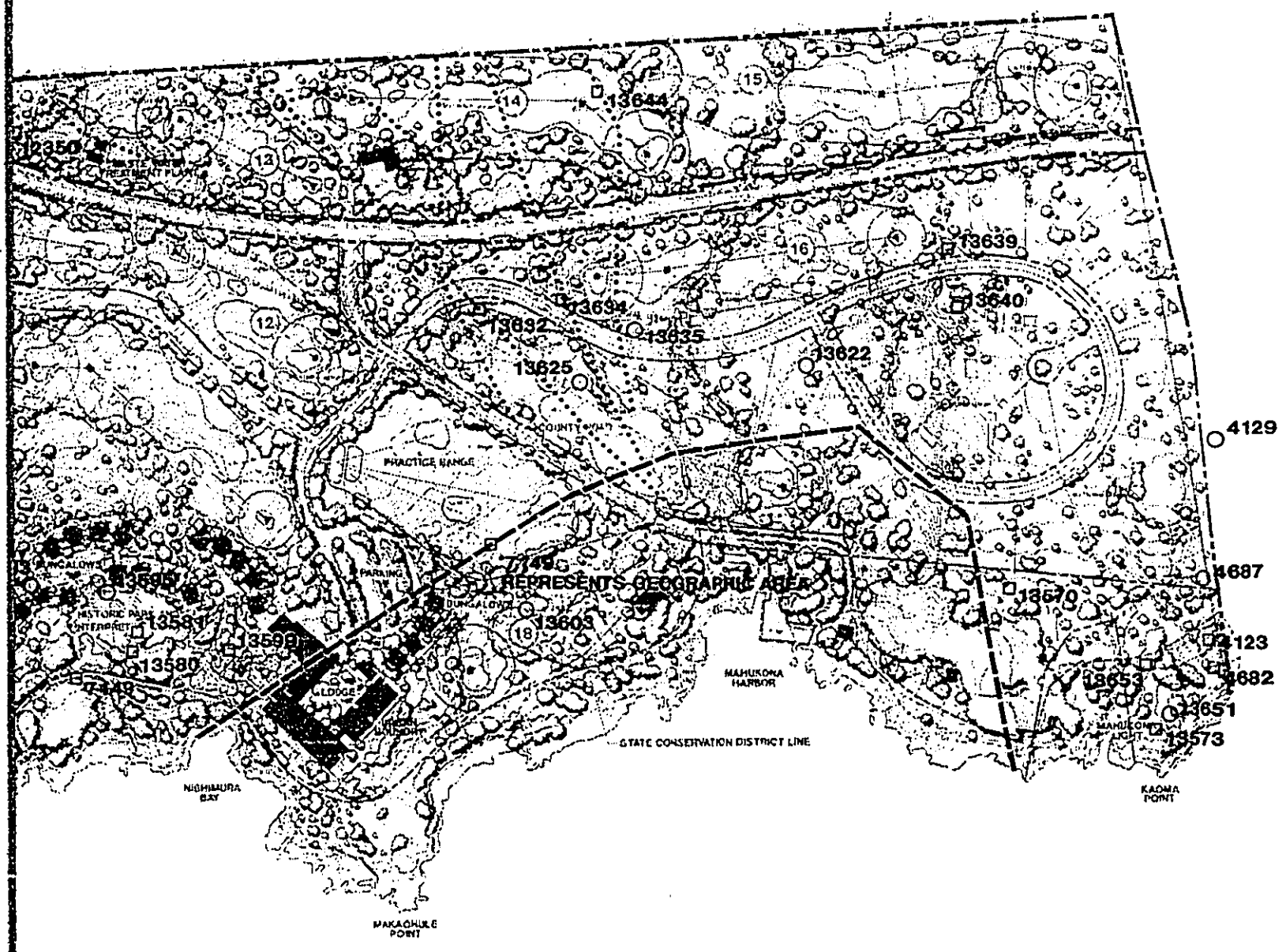
GAGE DAVIS ASSOCIATES, 1990

Mahukona

CHALON INTERNATIONAL OF HAWAII NORTH KOHALA, HAWAII

- PRESERVE "AS IS" WITH NO FURTHER WORK
- PRESERVE WITH SOME LEVEL OF INTERPRETIVE DEVELOPME
- TRAIL
- GEOGRAPHIC BOUNDARY AREA THAT INCLUDED MAHUKONA TERMINALS AND HAWAIIAN RAILROAD COMPANY

NOTE: SITE NUMBERS ARE THOSE OF THE STATE INVENTORY OF HISTO



RTHER WORK

F INTERPRETIVE DEVELOPMENT

HAT INCLUDED MAHUKONA
OAD COMPANY

HE STATE INVENTORY OF HISTORIC PLACES

FIGURE IV–11
PRELIMINARY DEVELOPMENT PLAN
W/ ARCHAEOLOGICAL SITES
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

AREA
2 AC.
1 AC.

NORTH

LINEAL SCALE
0 133 266 533
FEET

PBR HAWAII

Based on National Register criteria for evaluation, sites have been determined to be potentially significant for information content (Criterion D) and potentially significant as representative examples of site types (Criterion C). Based on the evaluation criteria, 91 of the sites identified are assessed as significant solely for scientific information content. No further work has been recommended for 35 of these sites and for the remaining 56 sites, further data collection (detailed recording of sites and features, surface collection and selected limited excavation) has been recommended. Seven sites have been assessed as important for information content and as excellent examples of site types at the local, regional, island, state or national level. These sites have been recommended for further data recovery and preservation with some level of interpretive development. Nine sites have been assessed as important for information content, as culturally significant and as excellent examples of site types at the local, regional, island, state or national level. Preservation with some level of interpretive development is recommended for all nine sites. Seventeen sites have been assessed as potentially culturally significant because they are possible burials or contain features that may hold burials. Further data collection, with limited excavations to determine the presence or absence of burials is recommended for all possible burial sites. If burials are located, preservation "as is" with no further work is recommended.

The Mahukona Harbor Complex is rated as moderate to high in value for scientific research, interpretive and cultural purposes (Appendix F). The exposed railroad bed in the Kapaanui parcel (Appendix E) is rated as having high interpretative value, moderate scientific value and low cultural value.

4.3 MITIGATION MEASURES

To mitigate potential impacts to the historical/archaeological resources of the project area, the recommendations of the consulting archaeologists will be followed by the developer. The developer and consulting archaeologists have been and will continue to meet with community groups and individuals regarding the historical and archaeological resources of the project area and it is the intent of the developer to incorporate as many of these features into the proposed project as possible. With regard to the possible burials identified within the project area, if they are not preserved "as is", it is required that the procedures of Section 43 of Chapter 6E (Historic Preservation, HRS, as amended) be followed. As noted above, proposed project facilities have been sited to avoid significant archaeological sites and features and an historic park and interpretive center will be set aside for educational and interpretive uses by the community and guests to the project area.

For the Mahukona Harbor Complex, recommended mitigation measures are:

- o Further data collection, and
- o Preservation with some level of interpretative development.

The site is important as it "...relates to the transportation and agricultural history of North Kohala and generally to the economic history of Hawaii." It is being contemplated that the old railroad office building at the harbor be turned into a museum, and if these plans were to move forward, attempts would also be made to acquire one of the original locomotives.

Data collection, preservation and interpretative development are also the recommended for the exposed railroad bed site.

5. SOCIOECONOMIC IMPACTS

5.1 EXISTING SOCIOECONOMIC CONDITIONS

5.1.1 Overview of Existing Conditions and Setting for Impact Assessment

A socioeconomic impact assessment of the proposed project has been completed (Appendix H) and is summarized in the following paragraphs.

The project site is located in North Kohala District, County of Hawaii. The immediate area is little populated. The site is about six miles south of Hawi, the largest community of North Kohala, and about 12 miles north of Kawaihae in South Kohala. The socioeconomic impact assessment study area consists of the two judicial districts of North and South Kohala. North Kohala is the area in which socioeconomic impacts are considered most likely to occur, but South Kohala is important as the site for new housing, jobs and shopping facilities for area residents. (Where appropriate, data and forecasts dealing with all of West Hawaii are cited. West Hawaii is defined as the four judicial districts of North Kohala, South Kohala, North Kona and South Kona.) Construction of new hotels, golf courses, and/or major residential developments is in progress or proposed for sites in nearly all districts of Hawaii County. The proposed project includes 2 percent or less of the new visitor units officially expected to be built in West Hawaii over a 20-year planning period (1990-2010) (Hawaii Office of State Planning, 1989).

Existing socioeconomic conditions have been analyzed in terms of (1) historic and geographic factors; (2) economic base and employment; (3) population; (4) housing patterns; and (5) lifestyle and values.

5.1.1.1 Geography and History

The Kohala region's social setting is largely shaped by its geographical setting -- both directly, and, through the impact of climate and terrain on economic activities, indirectly. The Kohala Mountain (peak elevation 5,480 feet) divide both North and South Kohala into a "dry side" on the western slope and plains and a lush "wet side" to the east.

North Kohala: This district is a peninsula formed by the Kohala Mountains. It can be separated into two distinct environmental zones. The windward or "wet" zone extends from the Hamakua boundary and along the Kohala Mountain summit. The leeward or "dry" zone encompasses the area east of the Kohala Mountain ridge line. The long ridge of the Kohala Mountain lies perpendicular to the predominant northeast tradewinds. As the mountains deflect the winds upwards, the air cools and condenses, resulting in cloud and rainfall formation over summit areas. The rainfall decreases rapidly on the leeward side as the air warms in its descent to lower elevations. Ancient Hawaiians made use of both the "wet" and "dry" portions of the Kohala region, but twentieth century Kohala residents focused almost all their economic and social activities in the "wet side" until 1965. Until very recently in the last century, the western, "dry side" mountain slopes and coastal areas have been populated only by a few cattle ranch employees. Human settlement has been concentrated in villages located in the "wet side," on the northeastern part of the peninsula. The road ends at Pololu Valley, marking the beginning of a series of steep cliffs and valleys that render the rest of the eastern coast virtually uninhabitable for significant numbers of people. Therefore, the settled parts of North Kohala have historically been isolated from the rest of the island.

By the 19th century, the North Kohala population had grown significantly and agricultural priorities shifted from subsistence farming to export agriculture. This led to a decline in leeward area communities and growth in windward communities with abundant irrigation sources. The settled "wet side" area is actually comprised of six villages (Hawi, Kapaau, Halaula, Makapala, Halawa, and Niulii). Sugar production on the windward side of North Kohala began during the 1860s. It rapidly became the dominant economic force and retained that position until 1975. Since the introduction of sugar production, the district

history parallels that of many rural Hawaiian plantation regions. As waves of immigrants were brought to North Kohala to cultivate the cane, the area gained an ethnically diverse population. That diversity remains, after sugar cultivation has ended.

South Kohala: The South Kohala district has both a mauka and makai zone. The mauka zone extends from the "wet" to the "dry" side of the island. The mauka region in South Kohala lies within the saddle area between the Kohala Mountain and the northwestern flanks of Mauna Kea. The central South Kohala community of Waimea (also called Kamuela) is located in this cool, upland area. For most of the past century, most of South Kohala's sparse population has lived in Waimea. However, rapid growth in the Waikoloa Village area since the early 1970's has created another population center in the South Kohala District. There are also small coastal settlements at Puako and Kawaihae, as well as some strip development along the road from Waimea to Kawaihae.

The mauka area's gently sloping hills and limited rainfall made the area highly suitable for cattle ranching, which dominated the South Kohala economy from the mid-1800s through the 1970's. The influence of the ranch in South Kohala created a different ethnic composition than that found in North Kohala.

The Project Site: The project site includes open land now used for pasturage and the gathering of sisal, and is adjacent to Mahukona Harbor and Park. (The park is owned by the state and leased to the County of Hawaii.) Mahukona Harbor was the major port serving the Kohala Sugar Company and North Kohala's people until it closed in 1956. Houses, a store and recreational facilities stood near the harbor. Both the park and harbor were used for recreation. With the closing of the harbor and the provision of houselots for residents elsewhere in North Kohala, Mahukona lost its resident population.

5.1.1.2 Current Economic Base and Employment

Major Industries: There is no major commercial activity in North Kohala at present. Local industries include ranching, small-scale retail enterprises and diversified agriculture (macadamia nuts and nursery products). The Kohala sugar industry ended in 1975 with the permanent closure of the Kohala Sugar Company mill. In response to the plantation closure, the state government established the "Kohala Task Force", with a mandate to develop new industries which would capitalize on the area's resources. Those new industries proposed were generally agricultural in orientation. The Task Force had minimal success

in creating new jobs, except for the creation of a successful nursery operation. Several additional government-sponsored programs, such as the Lapakahi State Historic Park ground clearing, provided some stability for some North Kohala families. However, many people still chose to leave the area during the 1970's, and the overall population declined between 1970 and 1980.

Until the mid-1960's, ranching and truck farming were the mainstay of the South Kohala economy. These activities experienced stable growth in part because Waimea is directly linked to the island's economic and population centers via the Hawaii Belt Highway (the principal route between Hilo and Kona). In 1965, a major hotel (Mauna Kea Beach Hotel) opened in the dry coastal region. With further expansion of the visitor industry in recent years, the Parker Ranch is no longer the dominant economic force in the area. Economic activities now growing in importance in South Kohala include:

- The Visitor Industry.
- High Technology activities at the Mauna Kea astronomy complex.
- Diversified Agriculture.

Labor Force and Employment: High percentages of North Kohala workers commute elsewhere in West Hawaii for service jobs, according to Census and survey data. In a 1989 survey (SMS Research, 1989), nearly as many respondents worked outside North Kohala as in the district. Preliminary results from a 1988 survey for the State Department of Business and Economic Development, Tourism Branch (Community Resources, Inc., 1989) provides the following information about the combined North and South Kohala workforce:

- The study area's adult participation in the labor force is now 73 percent, compared to an islandwide figure of 69 percent and a North Kona rate of 79 percent.
- About 25 percent of employed workers living in Kohala commute at least thirty minutes or more to work, compared to 16 percent of North Kona residents and an islandwide figure of 19 percent.
- The percentage of workers who work 49 or more hours per week was 23 percent in the Kohala district. This is well above the islandwide figure of 17 percent.

The most recent detailed analysis of occupational patterns for the study area is provided by the 1980 Census. Selected data from the 1980 and 1970 Censuses, show:

- Tourism-related occupations employed a higher percentage of North and South Kohala residents than islandwide or statewide residents in 1980.

- In North Kohala, there was a dramatic 1970-1980 shift from agriculture to tourism-related work, due to the sugar phaseout. Most tourism jobs were located outside North Kohala, as indicated by high average commute times.

- North Kohala had relatively low proportions of both managerial/professional workers and construction workers. The most recent available unemployment and workforce estimates from the Department of Labor and Industrial Relations (DLIR) (personal communication, Manuel Fragrante, Researcher, Research and Statistics Office, Hawaii State DLIR, January 31, 1990) are shown below in Table IV-2.

TABLE IV-2

PROJECT AREA WORK FORCE/UNEMPLOYMENT RATES

AREA	1989 Annual Average Civilian Labor Force	1989 Annual Average Unemp. Rate (%)	December 1989 Civilian Labor Force	December 1989 Unemp. Rate (%)
North Kohala	1,900	5.9	1,850	4.2
South Kohala	2,950	4.0	2,950	2.8
Study Area	4,850	4.7	4,800	3.3
Hawaii County	57,400	4.4	57,100	3.1

(NOTE: DLIR estimates for sub-county areas are based on 1980 census shares. By the end of the decade, these estimates usually under-estimate numbers for high-growth areas like West Hawaii.)

5.1.1.3 Population Levels and Composition

Since 1980, the study area's rate of population growth has been faster than in either the State or the County of Hawaii. Nearly all of the study area's population increase has occurred in South Kohala, where major resorts have been developing. For most of this century, North Kohala's people outnumbered South Kohala's.

Figure IV-12 shows both the decline in the North Kohala population that occurred as sugar became less labor-intensive, then ceased production and the recent growth in South Kohala. South Kohala had only 41 percent of the study area population in 1970 and reached 68 percent by 1988. In North Kohala, there was no growth from 1970 to 1980 and only modest increases during the 1980's. The respondents to the 1989 North Kohala phone survey (SMS Research, 1989) included both relative newcomers, 28 percent had lived in the district less than 10 years, and a substantial group of lifetime residents (40.5 percent). Census data show North Kohala's population to have been far more settled, overall, than South Kohala's (Appendix H).

5.1.1.4 Housing Stock

Housing in the study area is now considered to be in very short supply. Crowding, high rentals and high sales prices have resulted. During the 1980's, the study area housing inventory grew more slowly than the resident population, meaning that more people must share living quarters. From 1980 to 1988, study area population increased by more than 47 percent. However, County data indicate that even by March 1989, the total study area housing unit inventory had increased by only 27 percent. Moreover, over a quarter of the new inventory was dedicated to visitor use in 1989 (Hawaii Visitors Bureau, 1989). Population grew much faster than housing for residents in North Kona as well as in the study area. In the rest of Hawaii County, growth in housing units more closely matched population growth. Census data indicate:

- High housing costs have been characteristic of parts of the region for some time. South Kohala median rents and housing values were already over 36 percent higher than countywide averages in 1980. However, median rents in North Kohala were about 31 percent below the county averages in 1980.

NORTH AND SOUTH KOHALA DISTRICTS, HAWAII COUNTY

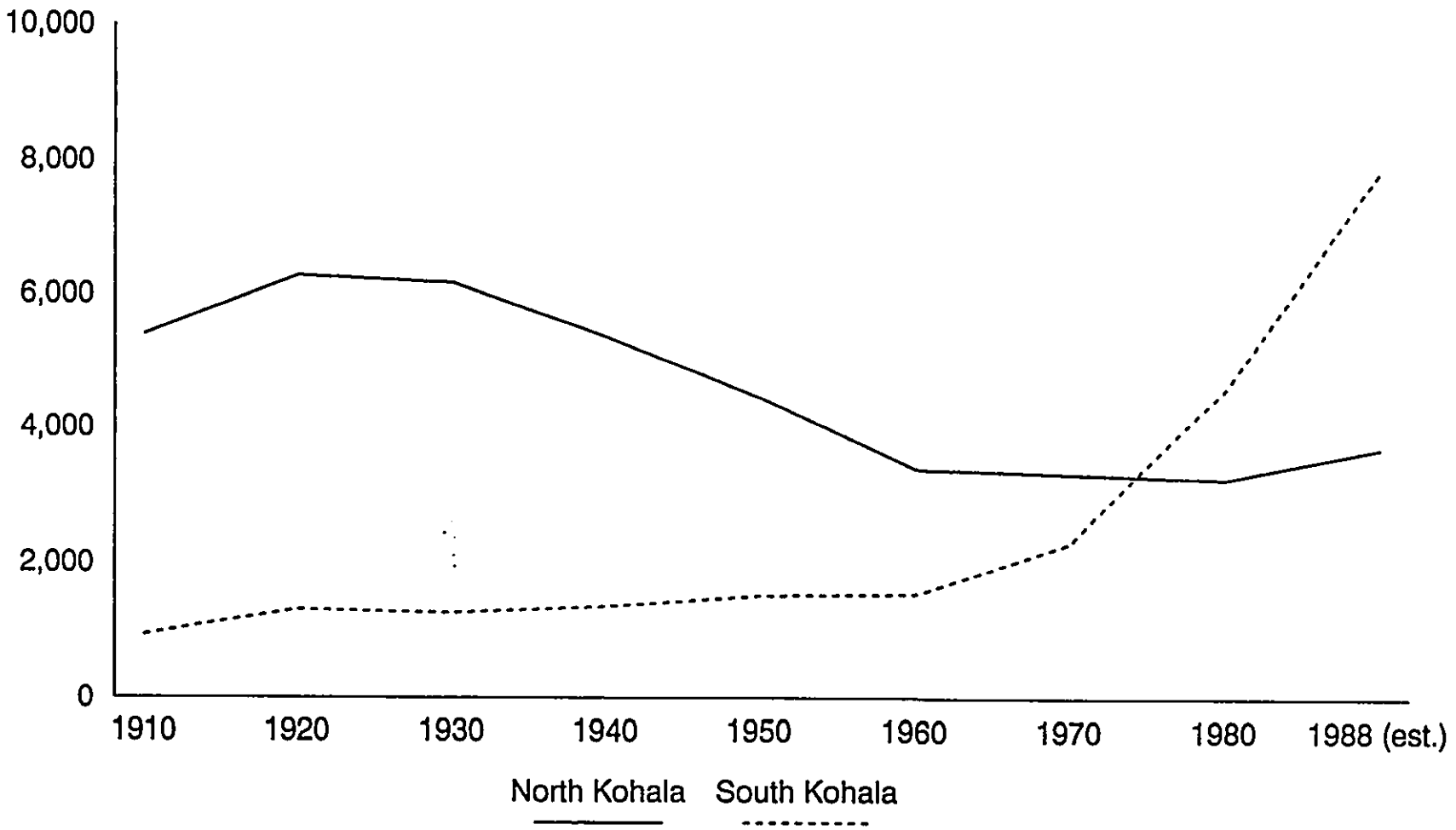


FIGURE IV-12
HISTORICAL POPULATION TRENDS
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

SOURCE: US CENSUS, 1930, 1942, 1952, 1960, 1970, 1980; HAWAII STATE DEPT. OF BUSINESS AND ECONOMIC DEVELOPMENT, 1989.

PBR

- Few housing units were available for rent in both North and South Kohala ten years ago. This was especially true in North Kohala.

Currently, properties for sale or rent are in short supply in both North and South Kohala (personal communication, Bob Chancer, Realtor, C and H Properties, January 26, 1990). Moreover, much of the housing for sale is located in upscale, costly subdivisions, such as Kohala Ranch and Puakea Bay. All properties in North Kohala now list for $100,000 or more. Values for average single family sales prices in South Kohala are lagging only slightly behind those in North Kona (Pang, 1990). There has been a consistent upward trend in South Kohala average single-family sales prices since 1985 (Figure IV-13).

5.1.1.5 Lifestyle and Values

All of North Kohala is a single community, in the sense that commercial activities are concentrated in Hawi, Kapaau or Halaula. In another sense, Hawi-Kapaau-Halaula represents the comparatively "urban" part of North Kohala and Makapala-Halawa-Niulii is the "rural" area. North Kohala today remains an area with a predominantly rural lifestyle.

Plantation managers, mixing paternalism and authoritarianism, controlled most social and economic aspects of life in the North Kohala area until mid-century. Although this was partly modified after the sugar plantations were unionized in 1946, barriers to both geographic and social mobility remained.

Until the mid-1960's, the highway system left North Kohala as one of the most physically isolated places on the island. The only highway into or out of North Kohala was the 22-mile road over the Kohala Mountain into Waimea. A 6-mile road from Hawi to the Mahukona Harbor (where sugar was shipped) was the only penetration into the "dry side." On the other side, the highway stopped at the Pololu Valley lookout.

North Kohala formed an "end of the road" community in all respects. North Kohala residents made ample use of outdoor resources in the past. Family picnics, hunting, fishing and shoreline gathering brought residents to parks and open areas. (In 1961 and 1971, surveys showed that over half the households of North Kohala gained some of their food through fishing (Hawaii State Department of Planning and Economic Development, 1972). About a fifth of the households depended in part on hunting.

BIG ISLAND AVERAGE SINGLE FAMILY HOME SALES PRICES

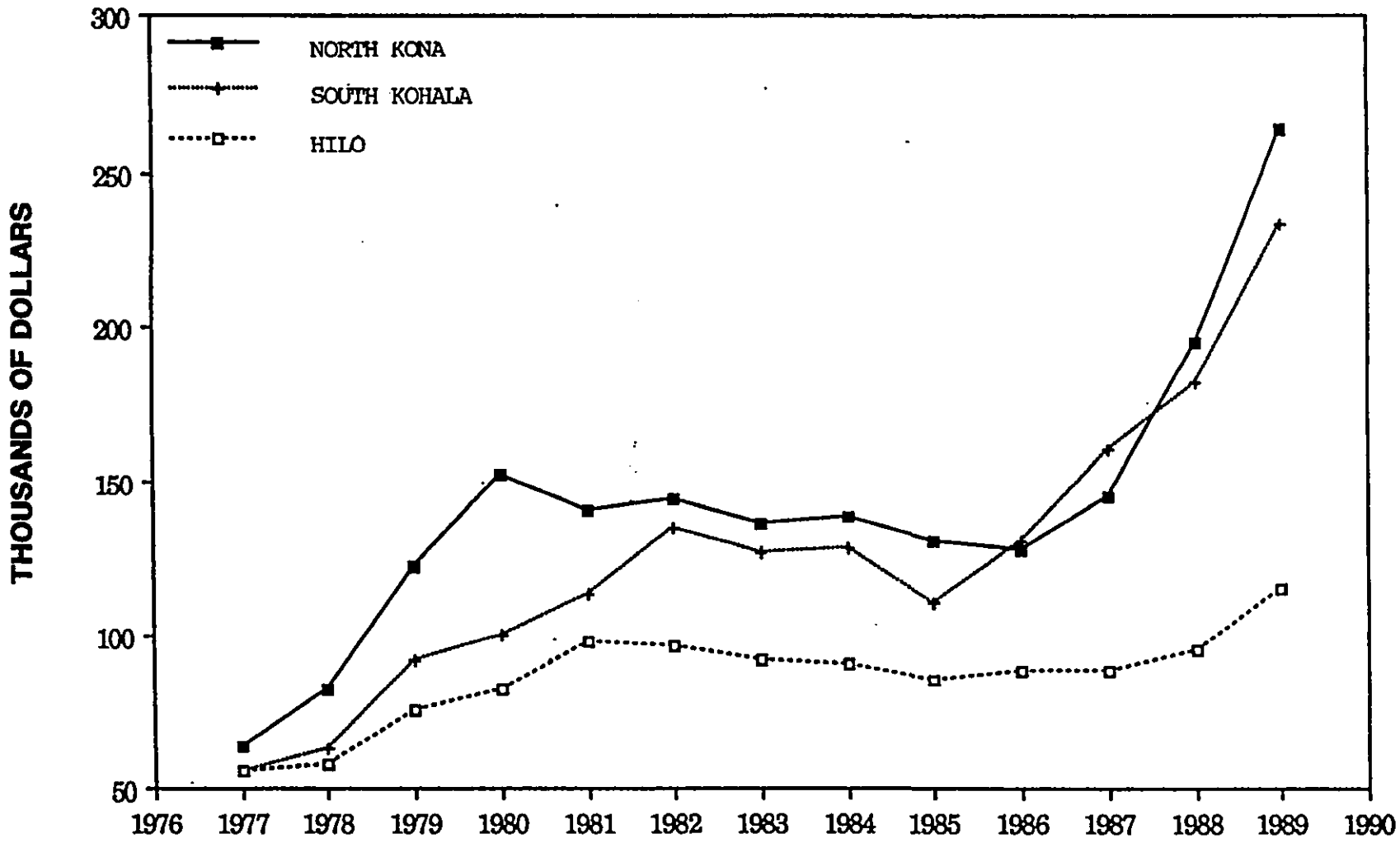


FIGURE IV-13
BIG ISLAND
AVERAGE SINGLE FAMILY SALES PRICES
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

SOURCE: LOCATIONS, INC, HAWAII REAL ESTATE INDICATORS, 1990

PBR

South Kohala was historically a close-knit community, following establishment of the Parker Ranch in the 1800's. In the manner of the times, Ranch managers exercised paternalistic control over many aspects of employees' lives, including provision of housing and health care. In the past several decades, the transition from an agricultural to a service-based economy -- along with substantial in-migration and demographic shifts -- has modified these patterns.

South Kohala has grown in popularity as a vacation home area for relatively affluent residents of Oahu and the West Coast of the Mainland U.S. The community of Waikoloa Village, now a prominent part of South Kohala, has a lifestyle which has mostly developed around golfing.

Some quantified indications of lifestyle and values are provided by preliminary results of a 1988 state survey with combined samples for both North and South Kohala. Asked why they chose to live in their part of the island, Kohala residents were much more likely than other Big Island residents to talk about "family/roots in the area," the "outdoor character of the area" and "climate/health", much less likely to refer to "housing value/affordability" or "social character of the area."

5.1.2 Likely Future Trends

West Hawaii's population and economy are expected to grow substantially in the next two decades. North Kona and South Kohala, as the major visitor areas, are expected to see greater expansion than South Kona and North Kohala. The latter two areas are likely to experience continuing population growth, even if no new sources of employment are located in those districts. Many of North Kohala's people are already involved in the visitor industry. This involvement is expected to grow, whether or not the project is built.

The project will create construction employment mainly in the period 1993-1995, and most operational jobs will begin in 1995. Project buildout, including houses on all the residential lots, is estimated as occurring in 2031 (personal communication, Max Umegaki, Research Associate, KPMG Peat Marwick, February 15, 1990). As a result, this assessment is concerned mainly with near-term (to 1995) changes, but also with long-term trends, to 2010 and beyond.

5.1.2.1 Near-Term Developments in the Study Area

Sources of Employment: Resort hotels likely to be built in the study area by 1995 (when the proposed lodge at Mahukona would open) will add about 1,200 visitor units:

- The Ritz-Carlton Mauna Lani, now under construction, will have 540± rooms;
- A new hotel at the Waikoloa Beach Resort is likely to be built, with about 400 rooms; and
- The South Kohala Resort Hotel will have 350 rooms.

North Kona hotel projects and expansions with State and County approvals (at Kona Village, Kaupulehu, Regent Beach, and Kohanaiki) could account for an additional 1,800 units by 1995 (KPMG Peat Marwick, 1990a).

Condominium projects now under construction or with land use approvals could add nearly 1,600 new resort units in South Kohala by 1995, and about 700 units in North Kona (KPMG Peat Marwick, 1990b). Resort condominiums have been proposed for North Kohala projects, including Kahua Makai, Kahua Shores and Kohala Makai. These are not included in forecasts for the near future, as they do not have all the necessary land use permits.

Housing: In North Kohala, several residential developments have been proposed. Housing for North Kohala residents will be provided by 1995 in three Chalon International projects:

- Ainakea: Phases 1 and 2 of this project include 170 - 10,000 square foot lots, of which 70 remain to be sold. The North Kohala Master Plan calls for further development, possibly including elderly housing, in the long term.
- Hawi: Chalon's plans call for development of a mix of affordable housing types in the area between Hawi and Kohala High School in the next few years, and further expansion of Hawi afterwards to meet community needs for housing.

  Current plans, which are only provisional, call for the development of nearly 400 units in Ainakea and Hawi by 1995. About 290 affordable units would be developed.

- Maliu Ridge: This development involves one- to six-acre lots priced below lots of similar size in "estate" projects. Plans call for completion of Phases 2 and 3, for a total of 170 units, in the near term. Homes have been built on about 40 percent of the lots sold thus far.

These developments are on the "wet" side of North Kohala. On the northern end of the "dry" side, construction is likely on a few lots at Puakea Bay Ranch. Towards South Kohala, some building on lots at Kohala Estates and Kohala Ranch is expected. If current trends continue, no more than 50 new houses will be built in existing increments of "dry" side North Kohala estate projects by 1995.

At Kohala Ranch, the first phase of a fourth increment will be developed in the near term, if County approvals are gained. This phase is to include 300 single family lots and space for 200 multifamily units (personal communication, Harry Otsuji, Project Manager, Kohala Ranch Development, February 9, 1990). No subsidized or "affordable" units would be within this project, which will aim at a "market" to "upscale" clientele.

Kohala Ranch's land use permits include affordable housing requirements, to be satisfied by cash payments. Future projects are likely to be subject to similar requirements. It is state policy to locate such housing near the project in question (personal communication, Abe Mitsuda, Land Use Division, Office of State Planning, February 13,1990). However, with major government efforts devoted to housing projects to the south, Kealakehe in North Kona and the Kawaihae and Lalamilo projects, it is unlikely that more than a few affordable units will be developed in North Kohala by government agencies by 1995. Consequently, only the Chalon projects are probable sources of affordable housing in North Kohala in the early 1990's.

In South Kohala, a 225-unit increment of affordable housing is proposed for Waikoloa Village on County land. However, the project is currently under litigation and those involved are likely to appeal a decision (personal communication, Brian Nishimura, Planner, Department of Housing and Community Development, County of Hawaii, February 14,1990). Some units could be built in South Kohala planned communities by 1995, but development of the other major housing projects listed will likely continue beyond that date.

5.1.2.2 Long-Term Growth Projections Countywide

The State of Hawaii's official "M-K Series" forecast for the period through year 2010 indicate substantial economic and population growth for Hawaii County:

- Resident population increasing by 75 percent between 1988 and 2010;
- The visitor count reaching 36,900 in 2010, nearly 350 percent of the 1988 level;
- Per capita personal income increasing by 40 percent from 1990 to 2010, to an average of $13,600 (1982 dollars).

West Hawaii: Projected massive growth in West Hawaii's visitor industry is expected to produce major increases in employment and population. For example, the West Hawaii Regional Plan (Hawaii Office of State Planning, 1989) estimates that over 25,000 visitor units (in hotels and condominiums) will be built by 2005, nearly three and a half times the existing inventory. Unpublished projections made by the Hawaii County Planning Department in April 1989 assumed only slightly slower growth, a total of about 26,000 visitor units (13,600 hotel rooms plus 12,400 resort condominiums) by the year 2010. More than 60 percent of these are assumed to be located in North Kona; most of the rest in South Kohala; and only a handful in South Kona or North Kohala.

The County Planning Department's unpublished April 1989 projections anticipate that about 53 percent of the island's employment will be located in West Hawaii (primarily North Kona and South Kohala) by the year 2010.

The State's M-K projections apply only to the county level. Regional and district population forecasts are available in the County's General Plan. This contains three sets of population and visitor industry projections. The lowest of these ("Series A," the current basis for County infrastructure planning) indicates a year 2005 countywide population of 173,000, slightly lower than the M-K figure of 180,800. Projected distribution of this total population is shown in Table IV-3.

TABLE IV-3

PROJECTED POPULATION DISTRIBUTION FOR ISLAND OF HAWAII
(Estimated 2005 County Wide Population)

AREA	POPULATION	PERCENT OF TOTAL
North Kohala	5,363	3
South Kohala	19,203	11
North Kona	43,250	25
South Kona	10,899	6
West Hawaii Subtotal	78,715	46
South Hilo	44,115	26
Puna	39,790	23
Rest of East Hawaii	10,380	6
County Total	173,000	100

Source: Appendix H.

5.1.2.3 Study Area

The study area will participate in the overall pattern of growth. The County's "Series A" forecast shows South Kohala's population increasing by 143 percent by 2005 and North Kohala's by 45 percent.

By 2010, South Kohala could have 2,600 more hotel units than are currently available, and 4,900 more condominium units (according to current consultants' estimates, in KPMG Peat Marwick, 1990a, 1990b). Condominium development in North Kohala could account for up to 1,600 units eventually. Estate projects, mostly in North Kohala, could add

up to 1,700 lots, not units, because construction need not follow lot sales quickly, to the existing inventory.

New golf courses will bring South Kohala's total up to 11 (Kwon, 1990). In North Kohala, both the project and Kohala Ranch propose golf courses.

Relatively few new job opportunities are expected to be created in North Kohala by 2010, compared to South Kohala. However, Finance Factors has proposed development of a resort south of Lapakahi State Park, which could employ as many as 1,800 operational workers (Belt Collins & Associates, 1981). That project does not have government approvals needed to begin construction, but the developer indicates that it will be built as planned (personal communication, Wellington Chu, President, Mahola, Inc., February 13, 1990). In late 1990, subsequent to this inquiry, Finance Factors withdrew its request for a County General Plan Amendment. Parker Ranch, the remaining major landowner along the "dry" coast of North Kohala, has no plans to develop its land (personal communication, Mel Hewett, Land Consultant to Parker Ranch, January 31, 1990). Also, the ranch has announced that it will not sell its oceanfront land north of the proposed project. The Bishop Estate owns two large North Kohala parcels north of the project site. Current plans call for continued use of these as pasture lands at least through 1995 (personal communication, Sidney Keliipuleole, Land Manager, Bishop Estate, February 21,1990).

The projected population increase in North Kohala is largely due to (a) natural increase, (b) movement into North Kohala by persons working to the south and (c) development of upscale developments at the southern edge of the district, such as Kohala Ranch.

The projections reviewed here assume that most of the workforce for North Kona and South Kohala resorts will live in those districts. Planned communities for West Hawaii residents, if developed in pace with economic expansion, could go far towards (a) housing residents of moderate means in affordable shelter, (b) encouraging persons with roots in Hawaii to live in the study area and (c) directing population growth more to these developments and resort areas, than to existing communities. Major residential projects in South Kohala include:

- Kawaihae: The State Department of Hawaiian Home Lands is now contracting for a Master Plan for the makai portions of its land at Kawaihae

(personal communication, Hardy Spoehr, Acting Director of Planning, State Department of Hawaiian Home Lands, February 2, 1990). Future developments will likely include a planned community of up to 1,500 homes, most of which would be developed by the Department, rather than leaseholders. Also, expansion of the commercial area at Kawaihae is probable. One possibility under consideration is the development of a regional commercial center.

- Lalamilo: This has been identified as a site for a major support community (Office of State Planning, 1989). The State Housing Finance Development Corporation (HFDC) plans to have 28 units built in the near future. Additional affordable housing development is proposed, but specific plans will be affected by water development and the outcome of private developers' planning (personal communication, Francis Blanco, Project Officer, HFDC, February 5, 1990).

- Puako: The Signal Puako Master Plan covers a residential project with 2,700 units. The State Land Use Commission has required the developer to provide 1,600 units for families with moderate incomes or in the "gap group" (120 percent to 140 percent of median income). The development still needs zoning permits. New homes are not likely to be available until the mid- to late-1990's. Since Signal Puako is a private development, homes there will likely not be subject to restrictions found in State and County projects. An unknown percentage of units could then be dedicated to visitor rentals or vacation use, rather than resident housing.

- Waikoloa Village: The County of Hawaii has been ceded 300 acres for affordable housing projects by Waikoloa Development. A master plan is being developed. Construction of 1,200 to 1,500 units, including both single-family and multifamily housing, is envisioned (personal communication, Brian Nishimura, Planner, Department of Housing and Community Development, County of Hawaii, February 14,1990). The community would include housing for all segments of the "affordable" market (including families with incomes up to 140 percent of median). The precise mix of units would respond to market demand.

In North Kohala, several residential projects offer large lots to affluent buyers. So far, about 500 lots have been sold at Kohala-by-the-Sea, Kohala Estates, Kohala Ranch and Puakea Bay Ranch. In the long term, estate developments could include about 2,000 housing units in the study area, mostly in North Kohala. However, less than 50 homes have been built. Many lots in these projects have been acquired for investment purposes. It is not yet clear whether a strong market for upscale estates in North Kohala will emerge. Developers of some projects in North Kohala towards Kawaihae have proposed building

condominium units for the vacation and visitor markets. The number of units involved is not certain, but would be far fewer than those proposed for South Kohala. In North Kohala, Chalon will continue to develop lots for residents at Ainakea and Maliu Ridge. Chalon also plans to develop both single-family and multifamily housing in Hawi. The long-term aim is to meet North Kohala residents' need for affordable housing.

5.1.2.4 Factors Affecting the Impacts of Growth

The social impacts of the preceding trends will depend in large part on factors which cannot be fully specified at this time: (1) the geographical distribution of growth; (2) the development of infrastructure (including housing); and (3) characteristics of in-migrant workers.

Geographical Distribution of Growth

This is still being determined through the government land use process, but broad policies are emerging:

- Projected distributions of population indicate that West Hawaii growth will be concentrated primarily in North Kona and secondarily in South Kohala.

- The West Hawaii Regional Plan calls for South Kohala housing development at Waikoloa, Lalamilo, Puako and Kawaihae, and development of a major new support community in Kealakehe (just north of Kailua-Kona).

- Land Use Commission approvals granted Kohala Ranch amount to government acceptance of a combination of urban and upscale estate development in North Kohala, outside the major resort areas. (Kohala Ranch is, however, only three miles north of Kawaihae and closer to the South Kohala resort centers than to the towns of North Kohala.) Resort and resort-related developments such as golf courses have been proposed for sites in all districts of West Hawaii, Ka'u, Puna and Hamakua. However, the West Hawaii Regional Plan calls for resort development to be distributed among various coastal "nodes" -- two in North Kona (Keahole-Keauhou and Kaupulehu-Kukio) and two in South Kohala (Mauna Kea and Waikoloa-Mauna Lani).

Physical and Social Infrastructure Development

Existing infrastructure is widely seen as inadequate; lack of affordable housing and congested highways are major sources of unhappiness. Also, construction of planned developments is contingent on the development and transmission of water. The location and timing of infrastructure development will determine the extent of social impacts of growth. Notably, it is not certain whether or when the affordable South Kohala communities will be built out to the levels estimated. If these should only be built after the South Kohala workforce increases greatly, crowding and related problems could affect the entire study area.

Characteristics of New In-Migrant Population

This element is the third major determinant of social impacts from future West Hawaii growth. Two components may be identified:

- Relatively affluent retirees and second-home owners; and
- In-migrant workers, who will be required to fill anywhere from 60 percent to 90 percent of new West Hawaii jobs (based on analysis in Community Resources, Inc., 1990).

In reality, West Hawaii in-migrant workers will probably come from a variety of locations, including some returning former Hawaii residents, foreign nationals, Pacific Islanders and non-Caucasian Mainlanders. Also, reductions in other sectors of the State economy, such as sugar in East Hawaii or military-related employment on Oahu, could also free additional labor for West Hawaii. The exact composition of the in-migrant workforce cannot be predicted at present. However, projected growth levels clearly imply some major shifts in the Big Island's overall population composition over the next 15 to 30 years.

5.1.3 Community Issues and Concerns

5.1.3.1 Approach

Interviews were conducted in January and February 1990 with some 50 persons, mostly from North Kohala (see Appendix H for lists of those interviewed). The interviewees were leaders and established members of the community. A set of known

leaders and participants in ongoing community dialogue with Chalon were interviewed first. Then interviews were conducted with others thought by study area residents to be especially knowledgeable or concerned. Elected officials were not interviewed. The interviews were conducted for the purpose of issue identification. It was not a random public opinion survey, and no attempt was made to measure the extent of project support. Interviews were loosely structured, usually beginning with questions about general concerns and then moving on to the specifics of the project. (However, project design was not fully determined at the time. Most importantly, the plan to disperse Lodge guest units in villas was not yet known.) Most of the interviews were with North Kohala residents. However, a few South Kohala community leaders were contacted to see if they believed residents there would have any particular concerns about the project. Because the Mahukona-Kapaanui project is located in North Kohala, South Kohala community leaders judged that residents of their area were not likely to have strong reactions to the project. However, they noted that persons concerned with islandwide issues, such as public coastal access, might become concerned should such issues arise with regard to the project.

5.1.3.2 Findings from Surveys

The following briefly describes the results of the surveys. Presented first are issues and concerns independent of the project and secondly, are issues and concerns specific to the project. Detailed descriptions of the results of the surveys are included in Appendix H. Surveys provide indications of the broad concerns of the population, apart from the controversies of the moment. On the Big Island, surveys during the 1980's have tapped two sides of residents' attitudes toward the visitor industry and economic development:

Issues and Concerns Independent of Project

- Most Big Island residents support economic development as providing needed jobs for their communities; yet
- Big Island residents are concerned about the preservation of open space and environmental quality and many find that existing and planned developments could strain their island's infrastructure.

Study area residents have expressed views broadly similar to islandwide opinions. However, East Hawaii residents, who are not experiencing the visitor industry growth of West Hawaii, bring different perspectives to surveys.

Issues and Concerns Specific to Project

When asked to identify general issues and concerns that they thought important, members of the North Kohala community stressed growth and the value of maintaining North Kohala's rural lifestyle. Housing, growth, shoreline and mauka access, and general social and political concerns were major topics.

Housing: A majority of persons interviewed thought a lack of affordable housing is Kohala's most pressing problem. High prices were most often seen as resulting from speculation by outsiders. Other factors mentioned were a low inventory of housing and low wages.

Growth: More jobs, better public facilities and services, and amenities such as supermarkets were identified as positive impacts of growth. Many residents would like these benefits for North Kohala, but not at the cost of its rural character.

Shoreline and Mauka Access: Many commented that ranches and estate developments have limited public access. They expressed concern that future developments will decrease access even more. According to many long-time residents, the community enjoyed relatively free access to mountain and shoreline areas when Castle & Cooke operated its sugar plantation. One resident described food growth or gathered locally as of great value: "We want gardens, to be able to go out and get fish or hunt pig, collect opihi or opae. You like, you go get; it the way it has traditionally been. We don't want to lose that."

General Social and Political Concerns: A majority of interviewees discussed social tensions in the community. Most identified three distinct groups with different interests in the community: long-time residents, newcomers and affluent newcomers.

Education/Youth: Some residents view the improvement of education in Kohala as an important issue. Several commented that only a few of Kohala's children pursue a college education and obtain high level jobs. Those with college degrees move elsewhere for better job opportunities. A few mentioned fights and discipline problems at Kohala High School. Teen pregnancies were discussed by a few residents as obstacles to higher education and better jobs.

Kohala's Economy: Several interviewees stressed the need to diversify the area's economy. A few commented that the economy is too dependent on tourism. Most said diversification could offer greater opportunity to future generations and bring back those who left Kohala. Others commented that Kohala's economy was saved by tourism. After the plantation closed, residents were able to find work at the Mauna Kea Hotel and Mauna Lani Resort.

Infrastructure: Few residents made comments on infrastructure needs. The most common remark was that Kohala Hospital has limited equipment. Some said the fire station needs building improvements.

5.1.3.3 Community Input Developed in Chalon Community Involvement Process

Chalon began meeting with a group of North Kohala citizens, the Citizen Participation Committee (CPC), in February 1989. Some 15 persons were invited to participate because of their leadership roles in Kohala organizations such as the Kohala Community Association. The CPC has functioned to inform Chalon of the needs and concerns of Kohala residents and to find ways that Chalon's North Kohala Master Plan can respond to those needs and concerns. The CPC met at least once a month from February 1989 to January 1990. Meetings of the CPC and its various subcommittees were open to the public (see Chapter VII). In January 1990, a version of the North Kohala Master Plan that incorporated many CPC recommendations was presented to the community at large. Chalon plans to continue meeting with the CPC and the community in the future. CPC subcommittees were formed to address major concerns. Subcommittees dealt with Housing; Public Infrastructure/Recreation/Access; Natural Resources/Environmental Quality; Historic/Cultural Resources; Commercial/Industrial Land Use; and Agricultural Land Use.

Two surveys were developed by CPC subcommittees working in conjunction with Chalon's planners. The surveys were administered in North Kohala in 1989. The Land Use- Commercial/Industrial Subcommittee created a questionnaire that was mailed to 1,400 post office boxholders in North Kohala in June, 1989. About 30 percent of the questionnaires were returned. Respondents favored further commercial and industrial development in North Kohala (on a limited scale) as shown in Table IV-4. Respondents identified preferred locations for commercial and industrial development (largely in the Hawi area). Most (62 percent) also saw need for multifamily housing in North Kohala.

A telephone survey was conducted by SMS Research for the Housing Committee of the CPC in September 1989. Heads of 306 households responded. The survey documented the need for affordable housing in North Kohala. Members of 37 percent of the households called were interested in buying a house. Extrapolating from the sample to the entire population, about 350 householders and about 90 others are interested in buying. Most of those who were interested reported low to moderate household incomes. Some interest was expressed in townhouses or apartments and in renting rather than buying housing, if these alternatives were cheaper. Interest in, and presumably need for, housing was greater among those who work outside North Kohala than among those who work in the district.

During community interviews, several major issues emerged. While members of the community had different perspectives on these issues, most interviewees agreed that the central issues were employment, access to the shoreline and the landowner's relation to the community. All the persons interviewed spoke, in one way or another, of North Kohala residents' concern with a rural lifestyle. Most long-term residents spoke of a need for more jobs in North Kohala. Newcomers tended to be more suspicious of new jobs in the visitor industry. Both groups expressed strong concern about shoreline access.

TABLE IV-4

LAND-USE COMMERCIAL/INDUSTRIAL SUBCOMMITTEE SURVEY RESULTS

DEVELOPMENT ELEMENT	PERCENT FAVORING	PERCENT OPPOSING
Development and expansion of enterprises such as fishing, energy (windfarms), recycling	67	18
A light Industrial Area	61	29
A Mini-Mall	57	33
Off-Road Parking Lots	43	23

During interviews, members of the community suggested possible changes and additions to the resort and master plan. Interviewees initiated discussions of possible changes themselves. The ideas mentioned in the interviews can be briefly listed under four headings:

- Overall Design of Resort
- Resort Design Elements
- Resort Employment
- Master Plan Elements (Outside the Resort)

5.2 SOCIOECONOMIC IMPACTS

In an impact assessment, an "impact" is not defined as the difference between existing conditions and the future with the proposed project. Rather, it is defined as the difference between two possible futures: future conditions that will occur even without the project and future conditions with the project. In short, the project must be assessed in the context of anticipated changes in the study area.

5.2.1 Impacts Following From Implementation of the North Kohala Master Plan

The Mahukona Resort project is the key to a larger development program, contained in the preliminary North Kohala Master Plan. Likely impacts of the overall Master Plan program include increased prosperity for North Kohala residents and businesses, reduction of housing need and enhancement of existing communities. Although the Master Plan impacts can only be assessed when it is finalized, there are several reasons for believing it will have significant social benefits: (1) Since the sugar plantation of the 1970's, much of North Kohala has undergone economic and physical stagnation. Some storefronts on the main streets of Hawi and Kapaau remain unpainted; some buildings have even collapsed. There has been little sense of positive change or growth in the area; (2) The preliminary Master Plan for the overall region is primarily based on recommendations from the community itself, through the participation process described earlier. Thus, it reflects existing community values, especially in regard to: Community revitalization through limited commercial and housing expansion in town areas; Preservation and enhancement of agriculture in rural areas outside of towns. However, because many elements of the Master

Plan do not generate income, according to Chalon, the Mahukona Resort is necessary to pay for the various other community benefits that are currently envisioned. Elements of the master Plan with socioeconomic impacts for North Kohala include:

- Affordable Housing
- Development of Community Infrastructure
- Support for Limited Commercial/Industrial Development in North Kohala
- Expanded Recreation Resources
- Maintenance and Development of North Kohala's Historic/Cultural Resources

5.2.2 Displacement

Currently, most of the project site is little used. Mahukona Park and Harbor are popular recreation areas. The former is used for picnics, the latter for swimming and boating. Also, fishermen use shore areas along the length of the project's ocean frontage. The project will not displace the general public. Instead, the facilities available to the public will increase. Two lessees now have rights to much of the project site on a month-to-month basis. One is preparing to graze about 40 head of cattle on-site. The second gathers plants for resale to nurseries and florists. Both are aware that their leases will end when construction begins. Project construction is not expected to limit public use of Mahukona Park and Harbor. Dust and noise due to construction may deter some persons from using those sites during the major construction period, before the Lodge opens.

5.2.3 Shoreline Access and Recreation

The project is likely to have immediate impacts on recreation at Mahukona Park and Harbor. Those impacts will be, on balance, beneficial. Available facilities will increase and access will be improved. The impact on the use of other coastal and recreation areas are expected to be indirect and minimal. The project will keep access routes and coastal areas clean. Resort areas will be landscaped. As a result, the overall appearance of the site is expected to improve. The entry road leading to the harbor and park is public and will remain open. Other roads will lead to access points. The project design calls for low-rise development and architecture rooted in Hawaiian history. Extensive landscaping will help

the Lodge buildings fit in with their surroundings. Additional public parking will be provided. Public access to the shoreline will be provided. The coastal area will be left open, all structures will be set back from the shoreline. Because the Lodge and associated villas will be relatively low-rise structures, views from the shore (along the coast and mauka) will be little affected. Project visitors and residents are likely to visit lookouts and other scenic sites in the study area. They are not expected to increase usage to a point that resident use would be affected.

5.3 SOCIOECONOMIC MITIGATION MEASURES

Mitigation measures that respond to community members' concerns that area residents will feel out of place in an upscale area will be implemented through project design and community activities. These include:

- Public access to the shoreline will be guaranteed by Chalon;
- The presence of established members of the community on the staff at the resort can help to avoid misunderstandings between resort personnel or residents and community residents;
- Chalon will help maintain Mahukona Park and Harbor and make these areas more attractive to many community members; and
- Through continuing involvement with the community, Chalon can demonstrate openness to all segments of the community.
- Plans to improve Pololu Lookout and Kamehameha Park would augment facilities outside the project site far more than increased use by project residents will affect these.

Project impacts on Mahukona Park and Harbor will be minimized by:

- Development of additional parking (per the Chalon North Kohala Master Plan).
- Landscaping and signage at the highway and along the access road to encourage "quality access", i.e., open access for the public, but little encouragement for persons not familiar with the area to come to these areas.
- Discouraging project residents from using cars to reach the Lodge, Harbor and Park, perhaps by providing transport from their homes to these areas.

- Encouraging project residents to join existing fishermen's associations or to support those associations in maintaining facilities at the harbor.

5.4 EMPLOYMENT AND LABOR SUPPLY IMPACTS

Estimated quantitative employment impacts, including need for importation of workers as described herein, are considered maximal likely effects. They are based on the assumption of a 300-unit lodge. Current plans are for a 45-unit Lodge and about 150-165 villa units, and employment impacts would be correspondingly less. The resort will create both short-term (construction) and permanent (operational) employment. Jobs in each category are of several types:

- Direct on-site jobs;
- Indirect jobs, created when resorts purchase goods or services from other businesses; and
- Induced jobs, created when direct and indirect employees spend their wages and stimulate the general economy.

Various state or county multipliers can be applied to the on-site direct job figure to generate estimates of the off-site indirect or induced figures. Generally, a "Type II multiplier" is used to calculate combined indirect/induced jobs. A "Type I multiplier" would calculate indirect jobs only.

5.4.1 Construction Employment

Estimated direct on-site construction jobs, as well as statewide total jobs including indirect and induced jobs are shown in Table IV-5. As shown, during the initial two-year construction period for the golf course, these activities will support 160 average annual on-site jobs; 25 other jobs elsewhere in the North/South Kohala study area (for a regional total of 185); 75 additional jobs elsewhere on the Big Island (for an islandwide total of 260); and 190 in the rest of the state. Construction activity is expected to drop off in the late 1990's, as the only remaining construction activity would be buildout of homes on the residential lots and a little associated infrastructure development. By the year 2000, all infrastructure will be in place, and remaining residential lots are expected to build out more gradually.

5.4.2 Operational Employment

Non-Mahukona Study Area Resort Development, 1990 - 1995:

For purposes of the subsequent labor supply analysis, it is necessary to calculate additional study area jobs coming on line prior to or about the same time as expected Mahukona Resort jobs. Market studies (Appendix A) indicate there will likely be one major new hotel opening by 1995 at each of the three major South Kohala resort destinations; the Ritz-Carlton Mauna Lani (currently under construction), the South Kohala Resort hotel near Hapuna Beach and Mauna Kea Beach Hotel and one yet-to-be-specified additional hotel at Waikoloa Beach Resort. Additionally, developer plans call for 80,000 square feet of commercial space at Waikoloa and nearly 1,600 new condominium units (208 at South Kohala Resort, 500 at Mauna Lani and 880 total for two Waikoloa Beach Resort projects). The method used to calculate islandwide and study area employment is that developed for the Hawaii County Planning Department by Decision Analysts Hawaii, Inc. (DAHI, 1986) and utilized by CRI in past South Kohala resort EIS's (Belt Collins and Associates, 1987). The analysis (Appendix H) indicates that the expected new South Kohala resort development will generate more than 4,000 new islandwide jobs by 1995. Of these, some 2,900 could be in the North and South Kohala study area. The great majority of the study area jobs would presumably be located in South rather than North Kohala.

Mahukona Resort Development:

When the lodge achieves its "mature" (maximal expected average) occupancy by 2010, the overall resort will create employment for about 480 on-site workers; 60 workers elsewhere in North and South Kohala (for a study area total of 540); 190 workers elsewhere in the Big Island economy (for an islandwide total of about 730); and 170 workers on other islands (summing to an estimated 900 statewide total). Initial impacts would be slightly less (e.g., 400 study area jobs by 1995) due to the lower expected start-up occupancy rate. Additional Mahukona Resort development job information is given in Table IV-5.

5.4.3 Labor Supply and In-Migration

This part of the analysis focuses on operational employment alone because the availability of construction labor will depend on the exact timing of other construction

projects, which cannot be predicted at present. However, given the variety of other announced West Hawaii hotel construction projects, it may be assumed that off-island construction workers will have to be imported, either for the proposed Mahukona project or for some other project starting soon after the proposed project has absorbed locally available labor. The labor supply analysis has both qualitative and quantitative components. The quantitative aspect, i.e., "how many in-migrant workers will be needed?", depends in part on assumptions derived from the qualitative analysis.

TABLE IV-5

TOTAL STATEWIDE, ISLANDWIDE AND STUDY AREA OPERATIONAL JOBS FROM MAHUKONA LODGE DEVELOPMENT 1990-2010
(Numbers Rounded)

AREA	1995	2000	2005	2010
On-Site[1]	360	430	480	480
Off-Site, Elsewhere in Study Area[2]	40	50	60	60
STUDY AREA SUBTOTAL	400	480	540	540
Off-Site, Elsewhere on Island	110	160	180	190
ISLAND SUBTOTAL[3]	500	630	720	730
Off-Site, Other Islands	170	170	180	170
STATE TOTALS	670	800	900	900

Notes:

[1] Calculated from assumptions in Table 4-D, Appendix H. Slight variation from KPMG Peat Marwick results due to lower assumed staffing ratio in early years of lodge operations.

[2] Assumes 25 percent of off-site islandwide jobs are in study area (North and South Kohala).

[3] Calculated from assumptions in Table 4-D, Appendix H, according to the same procedures shown in Table 4-C, Appendix H. Islandwide figures vary more widely than statewide figures because the islandwide figures are sensitive to changing assumptions about occupancy in the Mahukona Lodge.

[4] On-site figure times overall statewide tourism multiplier of 1.87 (based on extrapolation of trends noted in State Data Books and roughly consistent with cumulative statewide multiplier used by KPMG Peat Marwick in Market Study (Appendix A).

5.4.3.1 Qualitative Analysis

Kohala personnel officers, union representatives, Employment Service officials and islandwide school counselors were interviewed to determine probable answers to the following questions:

Will the Mahukona Resort itself need to import workers to staff up?

Despite an expected continued worsening of the West Hawaii labor shortage by 1995, most personnel officers believed that the Mahukona Resort should be able to meet most of its staffing needs, except for management, from the North Kohala population. This would be due primarily to the appeal of jobs close to North Kohala residents' homes, of which there are currently few.

This conclusion was subject to some qualifications by the labor supply key informants:

- The need for in-migrant workers would be largely displaced to hotels and other businesses in South Kohala, which might have hired the North Kohala residents going to work at Mahukona. As discussed shortly, these effects will probably be experienced more by upcoming new hotels than by existing ones.

- Due to the labor shortage, resort wages and benefits will probably be increasing throughout West Hawaii. The Mahukona Resort will need to match or exceed conditions at other hotels to attract workers.

- North Kohala residents may need additional training in social skills required for highly interactive jobs such as food and beverage positions.

Will the Mahukona Resort harm existing hotel or sugar operations?

Although government officials expect new hotels to "steal" workers from other hotels, South Kohala personnel officers interviewed for this report said the effect of the Hyatt Regency Waikoloa opening on their own workforces was much slighter than originally expected. They said the Mahukona Resort could have some effect on them, but expressed no serious concern. Basically, the most important employees for established hotels are longtime workers filling key positions. Recent history indicates these workers are unlikely to sacrifice seniority and associated benefits to move to another hotel. Employees most

likely to move are those in more junior positions, where turnover is usually high even under normal conditions. Mahukona lodge will probably draw most of its workforce from North and South Kohala workers either entering the workforce for the first time or currently holding junior positions and seeking advancement. North Kohala residents with more senior positions in South Kohala may be interested in additional part-time work at Mahukona.

Regarding sugar, Hamakua Sugar Company draws its workforce primarily from East Hawaii, not Kohala. The company has been losing some workers to South Kohala resorts and other service businesses. Golf course development could also attract a certain number of sugar workers. The underlying problem is an attitudinal one, a growing Big Island unwillingness to take jobs requiring outdoor manual labor, which is largely independent of resort development.

Where will the labor come from for the other planned West Hawaii resorts?

This question is still relevant for Mahukona because of the tentative conclusion that need for in-migrant (or commuter) labor will be mostly displaced to South Kohala or North Kona. Few definite answers to this question are available. Basic points raised have been:

- In the South Kohala area, there are few if any untapped pools of willing workers. North Kohala probably has a small number of available workers who need training in basic skills and work habits.

- Lack of affordable West Hawaii housing is preventing in-migration from anywhere at present. It is a barrier both to systematic importation of workers and to natural movement of job-seekers.

- The only recent examples of systematic worker importation by employers have involved agricultural companies bringing in seasonal workers. This has had the effect of making importation "thinkable" for hotels, but none are giving any serious thought, due both to housing shortages and to standard high turnover rates which make it uneconomical to bring in workers.

- Long-term labor sources are highly speculative. One possible source is a government program to relocate Southeast Asian refugees from Oahu (or, ultimately, California). This is in the very preliminary stages and is more oriented to agriculture. Other targets of speculation include Filipino immigrants, Samoans, Tongans and West Coast residents (including Hispanics and other "ethnics"). There is little consensus on the practical availability or theoretical relative desirability of any of these groups. However, one or two

people thought that, if plantations on other islands succeed in getting Immigration Service waivers to bring in foreign immigrants for "unskilled" agricultural work, it could establish a statewide precedent for hotels and other businesses as well.

- In the short term, hotels and other employers are doing more "sharing" of employees (i.e., facilitating mutual "moonlighting" by workers) and concentrating on retention of valued employees through improved benefits and more positive management practices.

- Kona is not considered a productive labor source by South Kohala resort employers, because Kona residents reportedly are uninterested in commuting to South Kohala.

- There is much more interest in resort employment among residents of the Hamakua, Hilo and even Puna areas. Several resort personnel officers say they are pinning their hopes for the foreseeable future on new workers from East Hawaii.

Will East Hawaii residents actually meet future West Hawaii labor needs to any great extent?

Answers were complex and dependent on some future public- or private-sector actions, but they tended to be positive on balance:

- Commuting from Hilo and Puna is on the increase, although nobody had any estimated total number of commuters. At the time of the interviews, the Hyatt Regency Waikoloa was running four buses a day from Hilo; the Mauna Lani Bay Hotel, one. However, the Mauna Kea Beach Hotel, the Royal Waikoloan and the Mauna Lani had just reached a tentative agreement with the County for a "pilot" daily public bus from Hilo to Waimea and the South Kohala coast. There was cautious optimism that more public transportation will mean more commuters from Hilo.

- Perceptions were mixed as to whether current Hilo commuters to South Kohala are adjusting well or are "burning out" because of the long travel time and (for auto drivers) cost of gasoline. Several people felt that older workers are adapting to the routine of the commute, while younger ones are more likely to be unhappy. Hamakua commuters are reportedly very content with the drive to nearby South Kohala. Their numbers could increase greatly if the sugar plantation shuts down.

- Several people also felt that Saddle Road improvements would induce more commuting from Hilo, since the Saddle Road route cuts some 20 miles from the total distance to Hilo.

- Relocation (i.e., moving to South or North Kohala) was generally considered an unlikely alternative for older Hilo-area residents with established families. The primary reason was housing (lower East Hawaii housing costs and the probability that such people already owned a home in Hilo or Puna). But even if more West Hawaii affordable housing becomes available, it was generally felt that older East Hawaii workers had deep family and social "roots" in East Hawaii; were accustomed to that climate; and disliked the "Mainland-style" social structure evolving in the Kona area.

- South Kohala personnel officers and most East Hawaii school counselors agreed that younger people would be willing to relocate to West Hawaii if affordable housing becomes available there. Young singles and couples with very young children were felt to be more mobile and attracted to the higher wages now being paid in West Hawaii compared to East Hawaii.

- The various business, union and school informants were also asked which parts of West Hawaii would be most attractive to East Hawaii relocatees, if *housing availability were equal. Most people felt that young singles would* be most attracted to Kailua-Kona or Waimea, as centers of excitement or activity.

- North Kohala would be very attractive to younger East Hawaii residents just starting families, if affordable housing is available. In climate, architecture and social structure, the Hawi-Kapaau area is perceived as far more compatible with East Hawaii than is the Kona area. The major qualification to this perception involved the need to upgrade the quality of public schools in North Kohala.

- Several South Kohala informants felt that Chalon has a unique advantage in attracting workers (from anywhere) because of the land it could make available for affordable housing. One individual stated, "Whoever solves the housing problem solves the labor problem. If Chalon is going to be both a resort developer and a housing developer, they can do things that nobody else can do to make sure their workers get housing."

5.4.3.2 Quantitative Analysis

Labor supply can come from the following sources:

- Natural increase and higher labor force participation rates;
- Net in-migration with or without resort development;
- Natural increase in East Hawaii labor force

Assuming that natural increase in East Hawaii will be adequate to fill the new indirect resort jobs there, needed off-island in-migration would then focus on filling new jobs located in South Kohala (including displaced impacts of the Mahukona Lodge). The combined 1995 study area labor demand from South Kohala resorts and the Mahukona Resort would be 3,410. Mahukona's share of this demand is about 16 percent. The combined expected labor supply from study area natural increase, in-migrants coming anyway and East Hawaii relocatees/ commuters would be 1,555, leaving a shortfall of about 1,850 workers for all the new South and North Kohala resort development by 1995. Applying Mahukona's 16 percent share, this comes to 290 new in-migrant workers attributable to Mahukona Resort alone. This is equivalent to 54 percent of the study area employment generated by Mahukona Resort.

A more conservative approach would be to include the in-migrant workers expected to come anyway, on the basis that they would need jobs to remain. Given this approach, about 410 (or 76 percent) of the ultimate employment would be taken by off-island in-migrants, although the jobs filled by in-migrants are expected to be displaced from North Kohala to South Kohala. As previously indicated, the source of these off-island workers cannot currently be predicted with accuracy. If the housing shortage is not solved, the labor shortage may not be solvable. Thus, the success of planned public- and private-sector housing projects will help determine if imported labor is available, and from where it will come. For example, if the Department of Hawaiian Home Lands moves rapidly to develop Kawaihae, the "off-island labor" could be native Hawaiians from other islands. As a hypothetical opposite extreme, total failure to develop housing for new South Kohala might lead new hotels there to build worker dormitories and the imported workers could be largely young single people from the Mainland or Asian immigrants living cheaply in order to send money home to families.

5.4.4 Recommended Labor Supply Mitigation Measures

The following consultant recommendations (see Appendix H) do not imply any commitment on the part of Chalon International of Hawaii, Inc. It is noted that the

company has five years to assess the actual extent of the regional labor shortage as of 1995 and to develop mitigation measures that meet the true needs of that time. Mitigation measures could include:

(1) Participate in regional public-private partnership efforts to address the labor supply questions: A number of organizations have initiated plans or actions to address labor concerns.

(2) Fund training programs for North Kohala residents: Resort projects such as Kuilima, Ko Olina and Lanai (Castle and Cooke) have funded programs to help immediate area residents become more job-ready. It is noted that resort operators generally prefer to train employees according to their own methods after they have been tentatively hired. Therefore, developer-sponsored programs have focused instead on pre-employment training, to help residents overcome any deficiencies in basic skills, work habits, appearance or job interview skills, i.e., to help them become more qualified to be hired by the resort operators.

(3) Providing assistance to Kohala High School: The school is the most important source of future workers. It is currently overcrowded and several key informants for this analysis stressed the need to improve the quality of education there. The exact form of assistance, whether facilities, equipment, scholarships or vocational programs, would best be determined through consultation with the school staff, Department of Education and Parent-Teacher Association. However, linkages with Kohala Elementary and High School should be a critical component of any labor supply program worked out for Mahukona Resort.

(4) Work with existing Kohala families to encourage the return of former residents who have moved elsewhere: Some of the potential off-island "in-migrants" could well be returning residents. Some of these might be able to share housing with family members still in the area. Kohala families can be expected voluntarily to inform their out-migrant family members of new job opportunities. The developer can assist by providing standard information and compiling records of potentially interested former residents and their concerns about returning. On Lanai, RockResorts (which will operate both new Lanai hotels to open this year) put a brief survey in a community newspaper which current residents could send to family members living elsewhere. As a result of this effort and natural family communication, about 10 percent of the first Lanai hotel's tentative workforce consists of returning former residents. This amounts to one-third of all the "off-island" people hired for the hotel (personal communication, Lindy Valentin, Koele Lodge Personnel Director, February 6, 1990).

(5) Consider targeting new affordable housing for resort employees: At present, in response to community desires, Chalon is planning to build only enough affordable housing to meet the existing needs of current community residents, with no regard

to whether or not these residents will work at the Mahukona Resort. It is noted that South Kohala resort development may so increase regional housing pressures that many workers from elsewhere in West Hawaii will compete for new affordable units in North Kohala. Given federal anti-discrimination laws, it may be difficult to assure that the new units actually go to North Kohala employees. Targeting at least some of the units for actual resort employees could both (a) help the resort to recruit and retain workers and (b) meet the community goal of housing for current residents, because most Mahukona Resort staff are expected to come from the North Kohala community itself. Such housing should probably be a mix of rental units and starter fee-simple housing, in which initial rental or leasehold payments would be credited toward eventual purchase price if the individual remained an employee for a specified number of years.

5.5 POPULATION IMPACTS

Population impacts are of two types, (1) on-site at the resort and (2) off-site, through induced in-migration.

5.5.1 On-Site Population

As part of its market and fiscal impact analysis (see Appendices A and I), the number of average daily visitors at Mahukona Resort is estimated to increase from 310 in 1995 to 450 in the year 2010 (Appendix A). Full- and part-time resort residents would increase their numbers from 20 in 1995 to 200 by 2010. The combined figures thus begin at 330 for 1995, approximately doubling to 650 by 2010. These figures represent new population in the area staying on-site at the resort. Another type of "on-site" population is de facto population, which means the total number of persons present at any one time. This would include workers and golfers who are not resort guests or residents. Table IV-6 presents the CRI estimate of the maximum daytime de facto population at final buildout. The table indicates that approximately 940 people would be on-site at any given time, once all residential lots have been built upon.

5.5.2 Off-Site and Total Population

Off-site population "supported" means the total number of people dependent on employment at the Mahukona Resort (i.e., workers and their families). This would include people already living on the island. Off-site population "impacts" would mean the number of people expected to move onto the island due to this project, i.e., actual population

growth. Table IV-7 shows estimates of both types of population figures.

Based on expected overall labor force participation rates of 49 percent in 1995, the population "supported" by Mahukona Resort employment would be about twice the number of workers, both on-site and off-site. Thus, in 1995, the number of workers and dependents supported by Mahukona Resort employment would be about 800 for the study area; 1,000 for the Big Island in total; and 1,340 statewide. By the year 2010, those figures would increase to 1,080 for the study area; 1,470 for the Big Island overall; and 1,800 statewide.

TABLE IV-6

DE FACTO POPULATION AT MAHUKONA RESORT
(Estimated for 2010)

POPULATION TYPE	POPULATION SIZE AT BUILDOUT[1]
VISITORS	
At Lodge	428
House Rentals	21
PROJECT RESIDENTS	
Full-Time	153
Part-Time	85
STAFF[2]	240
GOLFERS[3]	12
TOTAL	939

NOTES:

[1] Based on KPMG estimates of occupancy in 2010. (Adapted to reflect full buildout on 170 house lots.
[2] Based on assumption that 60 percent of staff are present.
[3] In addition to project residents and visitors.

TABLE IV-7

POPULATION SUPPORTED AND POPULATION IMPACTS
FROM MAHUKONA RESORT 1995-2010

OFF-SITE POPULATION SUPPORTED[1]	1995	2000	2005	2010
Study Area	790	960	1,070	1,080
Elsewhere on Island	210	310	370	380
ISLAND SUBTOTAL	1,010	1,270	1,440	1,470
Off-site, Other Islands	330	330	360	330
STATE TOTALS	1,340	1,600	1,800	1,800
POPULATION IMPACTS[2]				
EARLY[3]				
Resort Residents[4]	20	110	170	200
In-Migrant Workers and Families	440	530	600	600
RESIDENTIAL SUBTOTAL	460	640	770	800
Daily Visitors[4]	310	390	440	450
TOTAL IMPACTS	770	1,030	1,250	1,250
SETTLED[3]				
Resort Residents[4]	20	110	170	200
In-Migrant Workers and Families[5]	610	730	820	820
RESIDENTIAL SUBTOTAL	630	840	990	1,020
Daily Visitors[4]	310	390	440	450
TOTAL IMPACTS	940	1,230	1,430	1,470

NOTES:

[1] Workers (on-site and off-site) and dependents at one dependent/worker. Includes workers already living in study area and/or on-island. (These would be "Settled" persons per assumptions below).

[2] New population, excluding those already living there. All population impacts are expected to be confined to study area.

[3] "Early" means immediate impacts upon initial arrival of in-migrants when they have fewer dependents. "Settled" refers to eventual impacts, as family sizes grow.

[4] Estimated by KPMG (1990). Includes both full- and part-time resort residents present on average day.

[5] Study Area workers derived from Table 4-E (Appendix H) multiplied by percentage in-migrant from Table 4-H multiplied by one plus assumed number dependents/worker. "Early" assumption is 0.46 dependents/worker, "Settled" is 1.0 dependents/worker, based on projected overall labor force participation rates.

Past research by CRI has established that recent in-migrants working at South Kohala resorts have fewer dependents than long-time residents. Over time, their family patterns may be expected to approximate those of other residents. Therefore, the lower portion of Table IV-7 presents both "Early" and "Settled" estimates. In 1995, the Early off-site population impacts, assumed to take place mostly within the South Kohala portion of the study area, would be about 440 in-migrant workers and families. With resort residents and visitors, the total actual 1995 impact is expected to be about 770 additional people. As more in-migrant workers arrive in later years and as their family sizes grow, the Settled off-site population impacts from development in place by 2010 would eventually reach about 820. With an expanded on-site resort population, the total Settled population impact from development in place by 2010 would be about 1,470. (NOTE: Both the population impact calculations of Table IV-7 and the housing impact figures of Table 4-J of Appendix H are somewhat conservative, in that they include impacts of in-migrants who are expected to move into the area anyway. This is done on the assumption that most such in-migrants must eventually find jobs in order to remain, even if their reasons for moving to the area were not primarily related to available employment opportunities.)

Another theoretical source of population growth from resort development consists of people who (1) are attracted to the area through exposure during their stays as resort visitors; (2) are not dependent on local employment; and (3) choose to purchase full- or part-time residential homes in Hawaii. The majority of these who settle in the study area are expected to purchase residential lots at the resort itself. However, an unknown number of others could purchase off-site property, most likely in existing subdivisions such as Maliu Ridge, Puakea Bay Ranch, or Kohala Ranch.

5.6 OFF-SITE HOUSING IMPACTS

Housing effects can also be categorized as "households supported" (i.e., number of households with workers filling direct or indirect/induced Mahukona Resort jobs) and "housing impacts" (actual growth in housing units). Required new housing units (housing "impact") occurs primarily through in-migrant demand for new housing, but also because some existing residents in larger households are expected to establish their own separate households as a result of increased income from new employment. The ultimate number of "households supported" is roughly a third of the total "population supported" from Table 4-J (Appendix H), 350 islandwide households (and 460 statewide) by 1995; 510 islandwide

(and 620 statewide) by 2010. Housing "impacts", new housing units required, may, like population impacts, be categorized into both Early and Settled. In the short term, new in-migrants tend to share housing units and relatively fewer existing resident households split apart right away. Over time, in-migrants are less willing to share and more existing residents form separate households. In 1995, the Early study area impacts are expected to be about 115 required new housing units, mostly for in-migrants and probably mostly needed in South Kohala. Existing residents would require another 30 new units throughout the island and the state. The Settled study area (see Table IV-7 and Appendix H) impacts from development put in place by 2010 would about 220 required new housing units; 40 elsewhere on the island; and 30 elsewhere in the state. It has been assumed here that most of the in-migration effects (including housing impacts) generated by the Mahukona Resort would be felt in South Kohala, rather than North Kohala. That does not mean that housing pressures in North Kohala will not continue to increase. If affordable housing is not developed on a timely basis for workers at new South Kohala resorts, the demand will be region-wide, affecting North Kohala as well. If land and/or rentals in North Kohala continue to be relatively cheaper than elsewhere in West Hawaii, people from outside the district will be attracted to North Kohala, bidding up the price of housing there. This pattern is already evident on the Big Island in districts such as Puna or South Kona, which have witnessed "spillover" population and housing effects from economic growth in nearby districts of Hilo and North Kona, respectively. Thus, the tentative conclusions in this report that housing and population effects will be primarily felt in South Kohala are contingent on the assumption that affordable housing will be soon provided either in South Kohala itself or in North Kona. If this is not the case, it may be expected that there will be increasing regional pressure for housing development anywhere, including North Kohala.

5.6.1 Consultant-Recommended Mitigation

In the preceding labor supply discussion, CRI (1990) recommended that Chalon consider targeting some of its planned North Kohala affordable housing for actual Mahukona Resort employees. On an even more tentative basis, CRI recommends consideration of affordable housing development on a larger scale than currently being discussed by Chalon or its Citizens Participation Committee. Such housing would not be linked to employment at the Mahukona Resort but would help to meet regional housing needs generated by both the Mahukona Resort and (to an even greater degree) other planned new West Hawaii resorts. CRI recognizes that the North Kohala community is split

on the issue of additional growth. As discussed previously, some older residents recall days when North Kohala did have a larger population; many feel the community was more vital then and could today support more services and amenities with a somewhat larger population base. Other residents feel they have sacrificed various opportunities in life precisely because they wanted to move to, or remain in, a community of North Kohala's present size. However, additional infill of established North Kohala towns such as Hawi and Kapaau could help to meet regional housing needs while still retaining the "feel" of present-day North Kohala. It could help assure that current North Kohala residents with housing needs (not just those working at the Mahukona Resort) would gain new housing without fierce competition from outsiders due to limited supply. The existing sense of community, climate, and architectural style of North Kohala make it more likely that the people attracted to additional housing opportunities in the area would be families from areas such as East Hawaii, rather than young singles interested in the "action" of a Kailua-Kona or even a Waimea. It could be a moderately expanding population center which "still feels like Hawaii, not California." The exact amount of additional housing and population growth would obviously be subject to continued community discussion. However, it may be noted that a doubling of the present population over a 20-year period would amount to less than a 4 percent per year growth rate, a figure which met with community approval in the context of the 1984 North Kohala Community Development Plan. Realistically, infrastructure development to support new housing would require growth to occur in increments rather than in a steady stream. If the currently contemplated South Kohala resort development actually takes place, the 1990's could be a desirable period for several such increments.

5.7 IMPACTS ON PROPERTY VALUES AND DEVELOPMENT

5.7.1 Anticipated Impacts

Residents have expressed concern over potential impacts of the project on land values and uses in North Kohala, notably:

- Increased property taxes due to resort development;
- Decreased property values in existing North Kohala communities due to new housing provided by Chalon; and

- Additional resort development in North Kohala, due to the project serving as a catalyst for other developments.

Questions about future valuations and development cannot be answered with absolute certainty. Still, likely answers can be identified on the basis of available evidence and expert judgments. The major findings are:

- Property values have risen in North Kohala because demand has grown far faster than supply. Appreciation in residential property values (and hence in tax assessments) is likely to continue, with or without the project.

- The creation of a resort will have no direct impact on residential property values in the settled communities of North Kohala.

- Because the project's labor force is expected to be largely recruited among study area residents, the project is not likely to have much of an indirect effect of increasing demand for residential housing.

- The development of affordable housing in or near existing residential areas could meet some of the pent-up demand for housing and hence affect the rate of increase in value of existing properties. No decrease in value seems likely.

- The speed of development of South Kohala residential communities is likely to be a major determinant of North Kohala residential values in the coming decades.

- In the near term, government processes stand in the way of further resort development along the North Kohala coast. Over the long term, such development could only occur after extensive permit processes in which both government and community perspectives on the proposed developments could be expressed.

5.7.2 Property Taxes

General Considerations: Both market forces within the study area and government decisions applied countywide can raise property taxes. Future taxes cannot be predicted with certainty, because they depend on decisions of elected officials as well as market forces. A resort development could conceivably affect the assessment of nearby properties, either by providing amenities to some immediately adjacent properties or by making the area more valuable to potential buyers, leading to higher market prices. ("Nearby" properties would

be located within a mile or so of a resort at most.) Assessors do not assume that the value of new properties automatically carries over to existing ones. Nor do they compute the value of residential property on the basis of resort properties in the area. Instead, value is estimated on the basis of sales of properties similar in type (e.g., residential), location and amenities. In the Hawi area, residential land assessments increased in spurts between 1980 and 1989. The uneven pattern was due to the small number of sales in the area, making it difficult to establish value, rather than any slowing of increase in value. Over time, the rate of increase of residential assessments has not kept pace with increase in demand, as study area residents seek housing (personal communication, Les Brown, February 20, 1990). It appears that North Kohala properties have increased in value as part of a larger island market, but that changes in the trend of assessments, increases or decreases in value, are experienced about a year or two later in North Kohala than in more populated parts of the County.

Impacts of Project Development: The project is expected to have little impact on residential land values in the settled communities of North Kohala. The County appraiser interviewed for this report noted that North Kohala property tax assessments could well rise sharply about the time that the project opens. Such a rise would not be attributable to the project, any indirect effects of the project would not be felt so quickly. Instead, it would follow from increases in value that had already occurred but had not been registered in tax assessments. The potential indirect impact of project development, increased demand for housing from new resort workers, is expected to be small in scale, because the project will be able to recruit the large majority of its employees in the study area. Also, Chalon's affordable residential projects will provide new housing in amounts equal to or greater than those needed by project employees. A review of employment and housing trends in West Hawaii (in Section 5.1.2) shows a clear long-term trend towards population growth due to in-migration of resort workers for North Kona and South Kohala resorts. That trend has begun, and will probably be felt throughout the next two decades. Its impact on housing in the study area can be limited, if new planned communities provide housing in South Kohala for that district's workforce. If, however, new communities are not developed or are built after the new workforce comes to the study area, increases in demand for existing housing will be felt throughout the region, independent of the Mahukona project. Recent studies of the value impacts of golf course development and upscale single- family residential areas support the finding that value impacts of the project will be limited. (While the project is a resort, not just a golf course, it is on a small scale, compared to other Hawaii resort

projects and hence roughly comparable to the cases studied.) Golf and exclusive residential projects were found to have little effect on existing residential areas (Locations, Inc., 1988 and 1989 and Community Resources, Inc.,1988 and 1989b). The two approaches reach similar findings from different analytical starting points. The Locations, Inc. studies dealt with areas such as tax map key (TMK) zones. These studies used quantitative data only. The Community Resources, Inc. studies dealt with both communities and smaller areas and combined quantitative data with expert assessments.

Impacts of Chalon's New Residential Projects: Some residents have expressed concern that new affordable housing projects, especially a multifamily project in Hawi, could lower the value of nearby properties. Similar concerns have emerged among neighbors of proposed State planned communities. Studies by real estate experts and assessors indicated in one such case (PBR Hawaii, 1990) that the new housing would tend to slow the rate of increase of nearby property values, by increasing supply, but would not depress those values. The provision of new affordable units could tend to stabilize or lower rental prices. The project could affect amenities now afforded to a few immediately adjacent homes because the site is undeveloped, if views and/ or noise levels change markedly. (Also, should a new project be poorly designed, managed and maintained so it became an eyesore, adjacent property values could be affected). Chalon's housing developments, which are intended as contributions to the wider North Kohala community, are not expected to have these failings. As noted above, the major factor affecting residential values will be the level of demand for housing for South Kohala resort workers. Potential impacts on properties immediately adjacent to new multifamily housing projects could be partly mitigated through careful design and management of the site.

5.7.3 Impacts of the Project for Property Development in North Kohala

There is some concern that the project will serve as an "icebreaker" or catalyst for further development of the North Kohala coast. Evidence is available that the project could encourage some additional development, but probably not the large coastal resorts (with marinas, man-made beaches, other major changes in the land and viewplanes) opposed by North Kohala residents. Instead, it may support the buildout of upscale projects already under way or proposed for North Kohala. Major North Kohala landowners will certainly reassess their plans for land use after the Mahukona/Kapaanui project is developed. The project could spur development by:

- Improving the Kohala Ditch's delivery of irrigation water to the "dry" side of North Kohala, allowing further landscaping;

- Exposing North Kohala to tourists who may later wish to return or to own property; and

- Providing a restaurant and entertainment center enjoyed by visitors in (as yet non-existent) condominiums or part-time residents in estate lot developments.

These factors are not spurs to resort development, so much as amenities which could marginally encourage sales of vacation and visitor lodgings at sites without full resort facilities. Prospects for existing and already proposed developments at Kohala Ranch, Kahua Makai, Kahua Shores and Kohala Makai could be improved as a result of the project. The project's amenities could conceivably complement those of a mountain lodge or bed-and-breakfast facility. Such a facility has been proposed in the North Kohala Community Development Plan (Phillips, Brandt, Reddick & Assoc. (Hawaii), Inc., 1984), and is identified in the Chalon Master Plan for North Kohala as a possibility for further consideration. The project's impact on future development will be limited by several factors:

- The project's resort facilities will be developed to serve lodge guests and residents, rather than a large population of visitors. The project is a small-scale resort, not a major destination area such as Waikoloa.

- The development likely to be most affected by the Mahukona Lodge is the residential component of the project, rather than off-site developments.

- Community and government opposition to additional coastal resort development.

- Permit processes in which future resort proposals will be examined in terms of such considerations as:

  - available infrastructure and resources such as water;

  - impacts on the community, possibly including the creation of non-resort jobs; and

  - fit with community and government policies for the area.

Any proposed resort would be subject to public hearings in which community views could be expressed and to review by elected and appointed officials.

5.8 IMPACTS OF PROJECT JOBS FOR NORTH KOHALA COMMUNITIES

The project will depend on study area residents for its workforce. Some employees will likely live in South Kohala, but the resort will be especially convenient for North Kohala residents. In conditions of very high employment, such as now exist on Maui and are emerging in West Hawaii, employers are at pains to find and retain staff (First Hawaiian Bank, 1989; Hooper, 1989; Aleshire and Smith, 1989). In interviews conducted by CRI staff, visitor industry employers on Maui, Oahu and the Big Island have all said they prefer residents of areas near their establishments as employees, on the grounds that they are likely not to suffer stress due to commuting, and are likely to want to keep a job near home. The labor shortage has led to higher pay and improved benefits for hotel workers. Employers report changing management practice to be sensitive to workers' needs and morale. Resort workers have largely benefitted from the shortage. Many small businesses, however, have found it difficult to find and retain staff, or to offer wages and benefits comparable to those of hotel workers.

While recent State figures suggest that unemployment is fairly low in North Kohala and almost absent in South Kohala, Census and survey data point to two local pools of potential employees, persons now commuting long distances, who would prefer to work closer to home, and some adults who might enter (or re-enter) the labor force since employment at the project would be near home and/or would offer attractive working conditions (part-time work, or work on a particular schedule). In Hawaii County, labor force participation has been notably lower than elsewhere in Hawaii. Official projections have largely assumed that participation will remain low (Hawaii State Department of Business and Economic Development, 1988b and 1988c). However, the statewide trend, visible in parts of West Hawaii, is for labor force participation to increase as the visitor industry grows. Accordingly, the project is expected to draw employees from adults now outside the labor force as well as those who are now resort workers. Also, young people joining the labor force may be counted among potential employees of the project. However, the Chalon North Kohala Master Plan calls for expansion of agriculture and, to an extent, commercial activity in North Kohala. These sectors will also provide new jobs for North Kohala residents. For the period from 1995 to 2010, North Kohala residents will likely be able to choose between resort jobs and other ones.

5.8.1 Specific Impacts

With up to 480 employees working in North Kohala, rather than resort areas to the south, up to a quarter of the North Kohala workforce could benefit from a shorter commute. Also, project employment may lead some South Kohala residents to relocate to North Kohala, and will bring a few new residents to the study area. The overall impact of these changes is likely to be positive for North Kohala social life.

5.8.1.1 Family Life

With less time spent commuting, many North Kohala adults will have more time to spend in family and community activities. Resort hiring will also encourage North Kohala young people to stay near home. With growing participation in the labor force, Hawaii's working families have increasingly needed help with child care. If the Mahukona Lodge is to hire people not now in the job market, the demand for child care in North Kohala will likely increase. The idea that resort employment has disruptive impacts on rural family life has been examined in studies of North Kohala (Cottington, 1969, Hawaii State Department of Planning and Economic Development, 1972 and Smith, 1972). The introduction of resort employment in a plantation society was thought to bring marital tensions, child care problems and increased delinquency, when wives took on new roles as resort workers. However, most families adapted to the new situation, so disruption, if it occurred, was short-lived (Smith, 1972). A psychiatric study done in Kahuku, on Oahu (Young and Kinzie, 1973), and community interviews in Kahuku and in Kilauea, on Kauai (Community Resources, Inc., 1985, Belt Collins & Associates, 1983), found little or no family or mental health problems at the time rural women took resort jobs. By now, resort employment is widespread in North Kohala and ex-plantation communities are no longer isolated. Currently, new employment near home is more likely to lower family tensions than to cause these.

5.8.1.2 Community Life

Resort workers living in North Kohala are likely to have more time for community involvement due to the project. However, resort employment may involve changing and/or unusual work hours, making participation in community activities difficult. Some study area residents have expressed concern that the project will bring additional in-migrants to the

area, compounding existing tensions between long-term residents and newcomers. However, the analysis in Section 5.4 showed that few persons not now living in the study area will come because of project jobs. Resort workers could come to live in North Kohala in appreciable numbers if housing is not available in South Kohala for workers in that district's resorts, but that possible change would not be an impact of the Mahukona-Kapaanui project.

5.8.1.3 Job Satisfaction

In surveys, many study area (and statewide) residents view visitor industry jobs critically. Also, visitor industry jobs commonly involve weekend and/or evening work. Nonetheless, when over 5,000 hotel employees were surveyed in 1986, respondents said:

- They were proud to work in the hotel business (88 percent);
- They liked their jobs (87 percent);
- Most employees of their hotels had a sense of pride in their work (71 percent); and
- They were paid fairly (57 percent).

Most of the hotel employees thought that supervisors from outside Hawaii did not understand the needs of workers from Hawaii (55 percent). (This survey, conducted by Strategic Information Research Corporation for the Council of Hawaii Hotels, is reported in Belt Collins & Associates, 1987b.)

5.8.2 Potential Mitigation Measures

The labor shortage will make hiring and retention of employees harder for small businesses in the study area, independent of the project. In North Kohala, Chalon's involvement in regional planning and development can be directed to minimize disruption for other businesses. If child care proves to be a problem for project employees, the resort could sponsor or support a child care center. Alternatively, the resort could consider providing child care benefits to employees, leaving them to arrange the form of child care that suits their situation best. Currently, pilot child care projects are under way at Waikoloa and Mauna Lani. The resort can support community involvement on the part of its employees by several means, notably:

- flexible scheduling;
- release time given for employee participation in charitable activities; and
- contributions given to match employee contributions to or participation in community groups.

5.9 ADDITIONAL IMPACTS OF THE PROJECT ON NORTH KOHALA'S SOCIETY AND ECONOMY

The statewide survey on the impacts of tourism showed that Hawaii residents largely take a tolerant view of visitors (Community Resources, Inc., 1989a). Most people do not see tourists as behaving badly and many enjoy interactions with visitors. The visitor industry is associated with some perceived benefits, notably, jobs and amenities such as restaurants and with negative impacts of some concern, increased cost of living, traffic congestion and crime.

5.9.1 Impacts of Demographic and Economic Growth

Many North Kohala residents interviewed for this report welcomed growth as a source of new amenities. The project will support the district's economy and provide a stable source of income for many residents. Retail operations in North Kohala will likely find additional customers among project visitors and residents. However, the project is a small-scale resort. It is not likely to generate enough income, for the developer or for the community at large, to support major expansion of either public facilities or commercial sites. It will provide amenities on-site (dining, entertainment) that are now lacking in North Kohala and it will support Master Plan improvements.

5.9.2 Interactions Between Area Residents and Visitors

Currently, visitors are not present in North Kohala in great numbers. The resort population will not increase visitor numbers greatly. Still, Mahukona Lodge guests and residents will be far more likely to visit other parts of North Kohala than visitors to resorts in other districts of West Hawaii. Based on the 1988 tourism impact survey (Community Resources, Inc., 1989), it seems likely that residents will be most affected by the increased presence of visitors on the roads. Respondents reported that visitors cause them "irritation" in traffic far more often than in other situations. Residents could feel they have been

pushed out from a valued area, unless care is taken to preserve access. North Kohala residents already express some concern over traffic, especially on the Mountain Road and parking. Improvements included in the Chalon Master Plan will respond to some of those concerns. In addition, the Mahukona Lodge could lower the number of visitors and resort residents driving in areas where the potential for friction is greatest by providing minivan service to Hawi and/or to various scenic points on the coast and along the Mountain Road. Interactions between area residents and resort guests will also occur at the resort. Residents, especially residents of the estate developments along the "dry" coast, could well find the resort a social center, offering fine dining and other amenities. However, a few key informants have suggested that those residents will feel out of place in the Lodge itself, and will not use the resort, if the Lodge's guests are mainly from Japan. The Lodge's clientele is expected to come mostly from Hawaii, the Mainland U.S. and Japan (Appendix A). Also, the extent of resident involvement at the resort will no doubt depend on amenities offered (such as golf and tennis rates) and the resort management's attitude toward customers from the district.

5.9.3 Public Safety

Residents repeatedly expressed concern that the proposed resort will increase crime in the area. Such an increase could occur, but it would mostly affect the resort area itself, tourists, and traffic. Public safety impacts on settled communities could be mitigated by co-operative efforts of the developer and the community. Residents' concern is in part due to reports of major increases in crime in South Kohala associated with the opening of the Hyatt Regency Waikoloa. According to that district's police commander, much of the Hyatt's impact on crime is related to the sudden influx of a large number of new residents. Large personnel needs and the current labor shortage led to the hiring of many workers from outside Kohala. In South Kohala, drug use has been increasingly frequent, leading to other crimes. Much of the crime increase has occurred on-site at the Hyatt, in the hotel and in the employee parking lot, rather than in residential areas. Burglaries in bedroom communities such as Waikoloa Village, Puako, and Kawaihae have increased since the Hyatt has opened. Many living in these areas are resort workers and transient. In the settled Waimea community, burglaries are not a major problem. Hotel employees traveling to work have been a large factor in an increase of traffic accidents and violations in South Kohala. Workers travel from distant parts of the island. Speeding and drivers that make

misjudgments when passing slower vehicles on the Queen Kaahumanu Highway are problems. In 1989 four traffic fatalities were resort workers commuting to work.

Impacts of the Mahukona Lodge are not expected to be comparable to those of the Hyatt Regency Waikoloa's early days. Personnel needs of the proposed resort are much smaller than those of the Hyatt. Few non-Kohala residents will have to be recruited. Crime statistics of West Hawaii provide a long-term view of the problem. Crime rates increased significantly during the 1970's when the tourist population was growing much more rapidly than the resident population. Rates decreased slightly in the 1980's as both resident and tourist populations have continued to grow. Thus, the evidence of long-term trends is that additional resident and tourist population growth may generate less crime per person than does the current population, though there is considerable historic variation in this regard. This does not conclusively disprove any link between crime and tourism in Kohala. Statistical relationships are complex and can be masked by other variables. However, it does illustrate that any such relationship (if it exists) is not a simple one, and that building new visitor units will not automatically lead to increased crime, except for expected increase as a function of increased population. To investigate the impacts of smaller resorts on public safety, telephone interviews were conducted with police officers of stations near such resorts. The Hanalei Substation on Kauai, Hana Station on Maui and the Molokai Police Station were contacted:

- Theft from hotel rooms, burglary of part-time residences and theft from cars are the most common crimes in Hanalei. Perpetrators of such crimes are usually individuals that steal to support a drug habit or the unemployed (personal communication, Sgt. Hanz Martin, Hanalei Sub-Station, Kauai, February 22, 1990).

- In Hana, very few crimes are committed at resort areas. Hana's largest crime problem is theft from cars of tourists that make daytrips to the area. Tourists unfamiliar with the winding Hana Road have caused traffic accidents (personal communication, Sgt. Robert Fernandez, Hana Police Station, February 23, 1990).

- Much of the crime in Kaunakakai, Molokai is attributed to drug and alcohol problems. Theft from cars at beaches and parks and burglary of homes and business are generally committed by those that need money for drugs. Resort areas and tourists have not been singled out for such crimes. Drinking at parks and other areas is the cause for many assaults (personal communication,

Sgt. Timothy Meyer, Special Investigator, Molokai Police Department, February 26, 1990).

From these interviews, it can be concluded that crime related to the presence of resorts has generally affected tourists and part-time residences. Neighborhoods consisting of long-time residents and long-time residents themselves, have not been the targets of crime. As in Hanalei, Hana and on Molokai the proposed resort may increase theft from cars and burglaries in North Kohala. Visitors that leave their cars to sightsee may be easy targets for theft from cars. Burglaries may increase if the resort homes are occupied by part-time residents. Several measures can be taken to minimize or avoid crime impacts:

- Recruitment of North Kohala residents at the resort (reducing the number of transients and reducing the commuting time for employees);
- Project design and resort security measures (to avoid crime-vulnerable areas, such as the Hyatt employee carparks);
- Support for anti-drug programs in the study area; and
- Support for neighborhood watch programs in established communities. (Such programs are now beginning in South Kohala communities.)

5.10 ECONOMIC AND FISCAL IMPACTS

5.10.1 Economic Impacts

The project economic and fiscal impacts have been studied in detail and are fully described in Appendix I. In brief, the analysis indicates that development of the proposed project would impact the state, island and regional economy by generating additional visitor expenditures, jobs in construction and operation of the lodge and associated facilities and additional personal income. Population growth factors have been discussed previously.

With regard to visitor expenditures, it is expected that the average daily population of visitors at the lodge and residential units would be about 450 by 2010. Direct visitor expenditures are estimated to be about $43 million in 2010.

During construction it is estimated that an annual average of 56 construction workers would be required between 1993 and 2010. Total employment associated with construction, including induced and indirect positions, would be about 1,050 person-years. During operation of the facilities, it is estimated that about 470 new jobs would be created. Total employment, including induced and indirect jobs, would be about 890 positions. Personal income resulting from wages and salaries paid to those directly employed in the resort development and operation are expected to represent about $153 million through 2010. Total household income could amount to about $701 million through 2010.

5.10.2 Fiscal Impacts

The fiscal impacts of the proposed project have been determined by comparing the anticipated government revenues from the project with the government service costs associated with the project population.

The project would bring additional tax revenues to the county and state in the form of increased general excise tax payments and increased real property taxes respectively. State revenues would also be derived from personal income taxes and general taxes or license fees. State tax receipts, individual income or other taxes resulting from the project have been estimated to be about $64.2 million for the 1993 to 2010 period. The projected annual net new property tax revenues for the county are expected to be about $27.4 million for the 1993 to 2010 period.

Estimated county government expenditures for the 1995 to 2010 period range from $0.62 million in 1995 to $0.77 million in 2010. Annual state government expenditures related to the project are estimated to range from $2.3 million during the 1993 to 1995 period; $2.5 million in the 1996 to 2000 period; and $2.7 million during the 2000 to 2010 period.

Based on the preceding, the net county benefit/cost ratio of revenues to expenditures resulting from the project is estimated to be 2.1 and the state benefit cost/ratio of expenditures to costs is estimated to be 1.4. It is estimated that projected annual net county revenues in 2010 will be $0.89 million and state annual net additional revenues would be $1.15 million.

5.10.3 Mitigation Measures

Given that the proposed project fiscal impacts will be positive, mitigation measures are not warranted.

6. INFRASTRUCTURE AND PUBLIC FACILITIES

6.1 TRANSPORTATION FACILITIES

6.1.1 Highways and Public Access

6.1.1.1 Existing Conditions

State Highway 27, known as the Akoni Pule Highway, provides access to the resort area from the north and south. This highway is a two-lane road, fully paved which connects the project area to Kawaihae to the south and Hawi to the north. Access to the project is gained via the existing county roadway leading to Mahukona Harbor and Park, consisting of a 15-foot paved surface within an average 40 foot right-of-way. Parking is provided in two separate areas, one area adjacent to the harbor servicing harbor users, and another area adjacent to the park servicing park users.

Traffic volumes, as counted by the State Department of Transportation in May 1988 at two points along the Akoni Pule Highway (in the town of Hawi and just north of Kawaihae), indicated that, as is typical of many rural highways in the state, there is no real morning peak hour (see Table IV-8 and Appendix J). Traffic generally rises to one daily peak in the afternoon.

6.1.1.2 Probable Impacts

Traffic impacts related to the overall Mahukona Resort development have been thoroughly analyzed and described in the traffic analysis performed specifically for the proposed project (Appendix J).

Traffic flows are described in terms of Levels of Service (LOS). Levels of Service are labelled A through F, reflecting best to worst conditions. For unsignalized intersections

such as those associated with this project, LOS is an evaluation of gaps in major street traffic flow and a calculation of capacities available for left turns across oncoming traffic and for left and right turns onto a highway from a minor street. For unsignalized intersections, LOS A is little or no delay; LOS B is short delays; LOS C is average traffic delays; LOS D is long delays; LOS E is very long delays; and LOS F is a condition where traffic volume demand exceeds the capacity of the roadway, resulting in extreme delays with queuing that may cause severe congestion and affect other traffic movements at an intersection.

TABLE IV-8

HAWI TRAFFIC COUNTS
(1988)

TIME/FLOW DIRECTION	SOUTHBOUND	NORTHBOUND	TOTAL
6:00 TO 7:00 am	130	120	250
3:30 to 4:30 pm	145	195	340

Source: Appendix J

For the Mahukona Lodge project, the traffic that would be generated by the project was added to the ambient traffic forecasts to obtain total traffic forecasts. Traffic forecasts were developed for the years 1995, 2000, 2005, 2010 and 2015. Because there are no long-range traffic forecasts for the project area, a four percent annual growth rate was assumed for the through traffic. When applied to the State Department of Transportation 1988 traffic volumes, the resultant ambient traffic volumes are as shown in Table IV-9. As shown, traffic is expected to increase more than twofold from 1988 to 2015.

TABLE IV-9

AMBIENT TRAFFIC FORECAST

YEAR	GROWTH FACTOR	AM PEAK		PM PEAK	
		SOUTH BOUND	NORTH BOUND	SOUTH BOUND	NORTH BOUND
1988	1.00	130	120	145	195
1990	1.08	140	130	155	210
1995	1.28	165	155	185	250
2000	1.48	190	180	215	290
2005	1.68	220	200	245	320
2010	1.88	245	225	275	365
2015	2.08	270	250	300	405

Source: Appendix J

Based on the analyses of through traffic that were performed, the LOS for the total forecast traffic decreases from ambient forecasts for several years in the am peak and pm peak hours. For the am peak in 2005, LOS decreases from B to C. For the pm peak hour in 2010 and 2015, LOS decreases from C to D. Both of these conditions are acceptable, with LOS D being less desirable. The results of the analyses indicate that the project would have a minor adverse impact on Akoni Pule Highway operations, particularly in the pm peak hour (Table IV-10).

TABLE IV-10

LEVEL OF SERVICE SUMMARY

YEAR	AMBIENT FORECAST		TOTAL FORECAST	
	AM	PM	AM	PM
1988	A	B	NA	NA
1995	A	B	B	C
2000	B	C	B	C
2005	B	C	C	C
2010	C	C	C	D
2015	C	C	C	D

Source: Appendix J

The analysis of turning movements from the highway into and out of the proposed project indicate that right-turns from the project access road onto the highway will be at LOS A for all forecast years. The left turn movement is at acceptable levels for all forecast years, although the 2010 and 2015 pm peak hour LOS would be D, which although considered acceptable, is a less desirable condition.

Development of the proposed project would change the pattern of public access to the project area. It is Chalon's intention, however, to provide access to and along the entire shoreline fronting the properties.

6.1.1.3 Mitigation Measures

Given the potential traffic impacts, mitigation measures are warranted. Appropriate state and county roadway design standards would be followed during the design of the project roadways and intersection with Akoni Pule Highway. In addition, Chalon engineers

would continue to work with both the State Department of Transportation and the County Department of Public Works in the design and construction of the project roadways.

Three court cases have dealt with the issue of public access to and along the shoreline fronting the project properties. Each case was resolved by stipulating that the public be provided reasonable access, and specifying an easement, but also allowing the developer some leeway in placement of the actual easement. The specified easements do not really provide the intended access to the public. The easements do not all connect. In two cases the easements along the shoreline do not connect, nor do they connect with public roads. To improve on these easements, Chalon proposes to provide and operate a shoreline shuttle service along the length of the property. Convenient parking for persons wishing to use the shuttle would also be provided. This will ensure complete public access, while allowing the developer some control over type, speed and noise of vehicles traversing in front of the lodge.

6.1.2 Air Transportation Facilities

6.1.2.1 Existing Conditions

The majority of the visitors to the project would transit through Keahole Airport in North Kona. Keahole Airport served about 160,000 overseas and 1.66 million interisland passengers in 1988. As a result of existing as well as planned resort developments in West Hawaii, passenger levels and aircraft operations at the airport are forecast to significantly increase in the future.

6.1.2.2 Probable Impacts

The proposed project, in and of itself, is not expected to significantly affect air passenger and/or cargo levels at Keahole or any of the other state airports on the island. However, as part of the overall resort development, it is likely that a portion of the visitors to and homeowners within the proposed project will transit through Keahole Airport. These visitors and owners are not expected to significantly affect Keahole airport's service or facilities requirements.

6.1.2.3 Mitigation Measures

Present planning for the airport by the State Department of Transportation includes expansion of the airport facilities, including extension of the runway, to accommodate forecast increases in passenger levels and direct mainland US flights by wide-bodied aircraft.Because of the lack of significant impacts attributable to the proposed project, mitigation measures are not warranted. Chalon would continue to cooperate with the State Department of Transportation in the planning of the airports serving the resort.

6.1.3 Harbors

6.1.3.1 Existing Conditions

Kawaihae Harbor, about 10 miles south of the proposed project, is the only deep water harbor in West Hawaii and is used primarily by interisland barges. Cargo transiting through the harbor includes building materials, consumer goods, large equipment and machinery, as well as the provisions and supplies required to service the hotels and resorts in South Kohala and Kona. At present there are approximately 55 small boat moorings at Kawaihae Harbor and soon to be implemented alterations will add another 10 moorings. The state plans to enlarge the small boat harbor to accommodate about 320 boats. However, it is not known when construction on the new facilities will begin. There are over 60 people presently on a waiting list for moorings at Kawaihae.

Puako, about 13 miles south of the project site (three miles south of Kawaihae), serves small boaters with a boat launch facility, small parking area and fresh water.

The Honokohau Small Boat Harbor, about 40 miles south of the project area, presently is the only other small boat harbor in West Hawaii. Honokohau serves commercial, charter and recreational fishing boats and privately owned recreational sail boats. There is a boat launch ramp at the harbor. There currently are about 250 small boat moorings with about 300 people on a waiting list. The state plans to enlarge Honokohau Harbor at some time in the future.

Mahukona Harbor has an electric boat hoist which permits the launching and retrieval of vessels up to 18 feet in length. This hoist services primarily boaters in the North Kohala district and those users who have boats small enough to safely use the hoist.

Although future project related actions could include minor improvements to Mahukona Harbor, none are planned at this time. These improvements could take the form of new boat launching equipment, rehabilitation of existing facilities or the addition of new amenities. Should improvements be made to the harbor in the future, these improvements would be made in consultation with the State Department of Transportation, Harbors Division, and the potential impacts of these changes assessed at that time.

6.1.3.2 Probable Impacts

Based on analyses conducted for the proposed project, the commercial facilities at Kawaihae are adequate to accommodate the foreseen long-term water transportation needs of West Hawaii. A new 350-slip, small boat harbor at Kawaihae is currently in the planning stages. The timing of construction is unknown due to the lack of federal and state funding at this time. Similarly, Honokohau Harbor does not appear adequate to serve the West Hawaii demand for small boat mooring space given the fact that there are approximately 300 people on a waiting list for moorings, but there are plans to expand the harbor.

The proposed project is not expected to significantly impact existing and/or planned small boat and/or commercial harbors serving the Big Island, although there is a potential for increased usage of the Mahukona Harbor hoist. As noted above, the present project does not include any improvements to or alterations of Mahukona Harbor facilities.

6.1.3.3 Mitigation Measures

Because of the lack of expected impacts of the project on the island's commercial and/or recreational harbor facilities, mitigation measures to minimize potential adverse impacts are not warranted.

6.2 CLIMATE, METEOROLOGY AND AIR QUALITY

6.2.1 Existing Conditions

Temperature readings taken at the Mahukona station indicate that the highest daytime temperatures are usually recorded in September (89 degrees F) with the lowest daytime temperatures recorded in January (81 degrees F). Nighttime temperatures range between about 64 degrees F in the winter months and 70 degrees F in the summer months.

Annual rainfall in the project area averages 13.5 inches with maximum rainfall occurring in December and January and minimum rainfall occurring in July and August. Generally in Hawaii, rainfall amounts may show considerable monthly variability, and the amounts for a few days occasionally exceed the annual total. Table VI-11 is taken from a rainfall frequency atlas of the Hawaiian Islands (U.S. Dept. of Commerce, 1962) which was "...prepared for the Soil Conservation Service to provide rainfall criteria for planning and design purposes in connection with its Watershed Protection and Flood Prevention Program."

TABLE IV-11

RAINFALL FREQUENCIES

YEARS	RAINFALL DURATION IN HOURS (VOLUME IN INCHES)						
	0.5	1	2	3	6	12	24
1	<1.0	<1.25	<1.25	<1.5	<2.0	<2.5	<3.0
2	<1.0	<1.5	<1.5	<2.0	<2.5	<3.0	<3.5
5	<1.25	<1.5	<2.0	<2.5	<3.0	<3.5	<4.0
10	<1.25	<2.0	<2.0	<3.0	<3.5	<4.0	<5.0
25	<1.5	<2.0	<2.5	<3.0	<4.0	<5.0	<6.0
50	<1.5	<2.5	<3.0	<3.0	<5.0	<6.0	<7.0
100	<2.0	<2.5	<3.0	<4.0	<5.0	<7.0	<8.0

Source: U.S. Dept. of Commerce, 1962

The rainfall frequency data show, for example, that in any given year it is likely that a rainfall volume between 2.5 and 3.0 inches can be expected in a 24-hour period. In a 100-year period, it is likely that rain totaling between 7.0 and 8.0 inches would fall in a 24-hour period.

Because of the lack of significant stationary sources of air pollutants and the relatively low level of vehicular traffic in the project area, it is presumed that the air quality of the project area is good and meets all applicable federal and state standards. The nearest air quality sampling stations are located in Hilo and Kailua-Kona, both of which are too far from the project site to provide meaningful data.

6.2.2 Probable Impacts

Although the proposed project would increase traffic in the area, the proposed project is not expected to cause adverse impacts on the air quality of the area. The relatively low level of traffic at buildout is not expected to generate significant levels of air pollutants and those that are generated would be dispersed rapidly by the prevailing wind.

There could be short-term air quality impacts due to construction activities, especially clearing and grubbing operations. However, these impacts can be mitigated through water spraying and planting of ground cover as soon as practical.

6.2.3 Mitigation Measures

As indicated above, short-term air quality impacts associated with construction would be mitigated through water spraying and planting of ground cover as soon as practical following clearing and grubbing. Because the project is not expected to cause long-term adverse air quality impacts, mitigation measures are not warranted.

6.3 NOISE

6.3.1 Existing Conditions

The existing noise environment of the proposed project site is primarily a function of vehicular generated noise on Akoni Pule Highway and natural sounds including surf and

wind moving through the vegetation on-site. There are no significant human-generated noise sources at present within the project boundaries or in the neighboring area. Ambient sound levels are estimated to be indicative of rural areas and in the range of 35 to 55 DBA.

6.3.2 Probable Impacts

During construction of the proposed project, construction activity is expected to be the primary noise generator in and around the project site. This would be a short-term impact that would cease upon completion of construction of the proposed project. Following completion, major noise generators at the project site are expected to be vehicular traffic and present natural sounds. Both sources are expected to be less than construction activity generated noise. Vehicular activity would predominantly be limited to daylight hours with the exception of the Lodge and restaurant facilities which will generate some noise slightly above ambient conditions during the evening hours. It is expected that all noise levels would be well within state standards.

6.3.3 Mitigation Measures

To mitigate potential noise impacts, landscape buffers would be planted along roadways, appropriate building setbacks maintained and nighttime activities regulated.

6.4 WATER SUPPLY

6.4.1 Potable Water System

6.4.1.1 Existing Conditions

No potable water facilities exist in this area.

6.4.1.2 Probable Impacts

The proposed project would generate an average daily and maximum daily potable water demand of approximately 235,000 and 352,000 gpd respectively (Table IV-12).

TABLE IV-12

PROJECTED WATER DEMANDS

DOMESTIC DEMANDS			
DESCRIPTION	**UNITS**	**GPD/UNIT**	**DEMAND**
Lodge	15 Acres	4,000	60,000
Villas	240 Rooms	400	96,000
Employees	341 Staff	35	12,000
Residential Lots	150 Lots	400	60,000
Mahukona Park (Camp Sites)	13 Sites	400	5,200
(Caretaker)	1 House	400	400
Kapaa Park			1,000
Total Average Daily Flow			234,600
Maximum Daily Demand (1.5 x Average Flow)			351,900
Peak Hour Flow (5 x Average Flow)			1,173,000

IRRIGATION DEMANDS			
DESCRIPTION	**UNITS**	**GPD/UNIT**	**DEMAND**
Golf Course	120 Acres	10,000	1,200,000
Mahukona Park	15 Acres	4,000	60,000
Kapaa Park	2 Acres	4,000	8,000
Residential Lots	150 Lots	*7,500	*1,125,000
Total Average Daily Flow			2,393,000

Source: Appendix K

* Based on present usage patterns, it is not expected that the entire lot will be irrigated.

The planned storage capacity would be sufficient for potable water demands of the project while also providing the required fire protection requirements.

Water limitations in the region are a problem of development of transmission lines rather than a problem of source availability. Over pumping or inadequate well spacing could result in upconing and seawater intrusion. Operation of wells within the sustainable yield of the basal lens and adequate well spacing will prevent potential adverse impacts.

Rather than utilizing the County's Hawi-Kokoiki potable water system, as had originally been planned, Chalon now intends to construct its own potable water system. The system would consist of two wells above Hawi, two 500,000 gallon tanks, an 8-inch transmission pipeline, and two pressure reducing stations. The two wells would provide 100% redundancy.

6.4.1.3 Mitigation Measures

Development of all potable water system improvements will be in compliance with the terms and conditions of Potable Water Systems, Title 11, Chapter 20, Administrative Rules, Department of Health and the regulations of the County Department of Water Supply.

6.4.2 Irrigation Water

6.4.2.1 Existing Conditions

The Kohala Ditch is the primary source of irrigation water in the Kohala District. This system taps several mountain streams, diverting millions of gallons of water each day into the combination ditch, tunnel and pipe system that runs approximately 22.5 miles. The system delivers on average about 26.7 million gallons of water per day.

Irrigation water is provided from the Kohala Ditch system owned and operated by Chalon International. The system consists of a 1.5 inch diameter pipe which runs from the Ditch to a 50,000 gallon steel tank just mauka of the Akoni Pule Highway. From the tank site the water flows via a 6 inch line to the project site, servicing the warehouse, residence and park.

6.4.2.2 Probable Impacts

Table IV-12 summarizes irrigation water demands. At full build-out, total project demand for irrigation water is expected to reach approximately 2.4 MGD. The present proposal is to use Kohala Ditch water to dilute and supplement the treated sewage effluent from the project, thereby conserving potable water sources. A recent study of the Kohala Ditch system (Gomes, 1990) estimates a potential demand of approximately 7 MGD from North Kohala agricultural production. Combined with the estimated 2.4 MGD demand from this development, this represents only about 35% of the historical average delivery of the Kohala Ditch. More importantly, the higher value use at Mahukona will help pay for needed improvements to the Ditch and water distribution system, thus ensuring a reliable supply of irrigation water for agricultural development throughout North Kohala.

6.4.2.3 Mitigation Measures

The irrigation system would be part of a dual water system comprised of a potable and non-potable piping system. The treated effluent would be used only for irrigation of the golf course and not in close proximity to occupied areas. Each system would be designed, constructed and operated in compliance with applicable state and county rules and regulations.

6.5 WASTEWATER TREATMENT AND DISPOSAL

6.5.1 Existing Conditions

There are no public wastewater collection and treatment facilities in the North Kohala region. The project area, as are other Kohala coast areas, is served by privately operated wastewater treatment plants and/or underground collection/treatment systems (cesspools/septic tanks).

6.5.2 Probable Impacts

The proposed project includes the construction and installation of all necessary wastewater collection and transmission lines, and a treatment and disposal system. Wastewater will be collected and pumped to an on-site treatment facility where it will undergo screening and biological treatment. The effluent will be filtered and disinfected

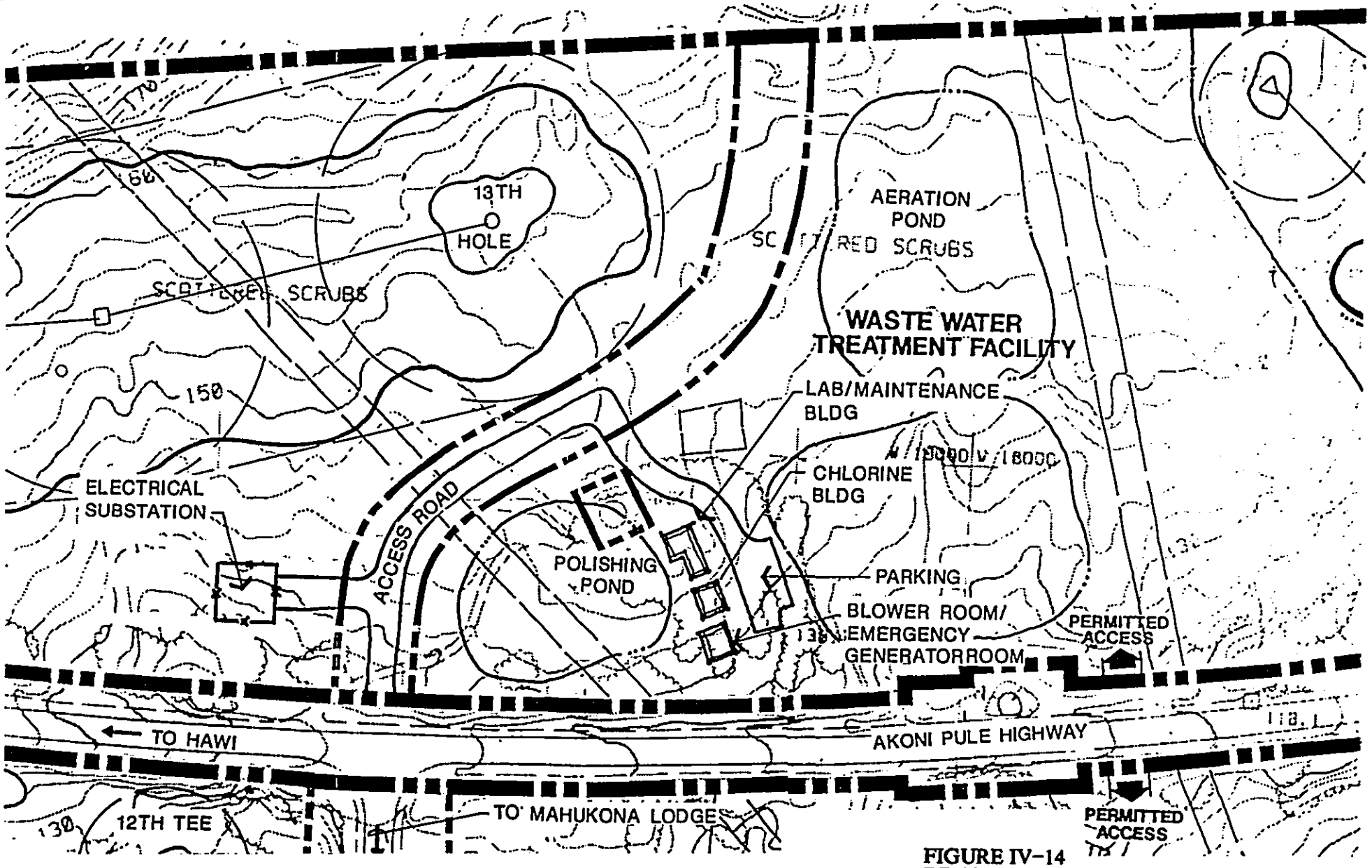
and utilized as a supplemental irrigation source for the golf course. The location of the transmission lines and treatment facility would be coordinated with the consulting archaeologist to avoid disturbing significant archaeological sites.

The proposed waste stabilization pond treatment system will consist of a series of ponds: two aerated ponds that are approximately one-acre in size; "polishing ponds" and storage ponds (Figure IV-14). The aerated ponds will be aerated by a submerged diffused air system which will result in biological treatment by stabilization of organic matter in the wastewater. Provisions will be included in the design of the wastewater facility to minimize adverse impacts that may result from power failure and/or maintenance shutdown. A standby emergency generator will be installed and, in general, redundancy will be built into the entire system. All wastewater collection, transmission, treatment and disposal will be in compliance with appropriate state and county rules and regulations.

6.5.3 Mitigation Measures

Wastewater collection, treatment and disposal systems would be constructed and operated in compliance with applicable state and county standards. As noted above, to minimize the potential for adverse impacts due to equipment failure, redundant equipment will be installed. Moreover, qualified wastewater treatment plant operators will operate the plant in accordance with an operations and maintenance (O&M) manual specifically developed for this facility. Preventive maintenance requirements will be specified in the manual. The combination of redundant equipment, qualified operators, programmed preventive maintenance and planned on-site availability of critical spare parts, will minimize the occurrence of equipment failure and the duration of equipment outages should a failure occur. Under emergency conditions, the irrigation holding ponds could be emptied and used as storage or equalization ponds. When the emergency has ended, the sewage held temporarily in the irrigation ponds can be recycled into the aerated stabilization ponds.

The wastewater treatment plant will not have an ocean outfall system to bypass partially treated sewage to the ocean. This is not an acceptable method of emergency response.



SOURCE: PRELIMINARY ENGINEERING REPORT FOR MAHUKONA LODGE. NORTH KOHALA, HAWAII, M & E PACIFIC INC.

FIGURE IV-14
PROPOSED LOCATION
OF STABILIZATION PONDS
ENVIRONMENTAL IMPACT REPORT
MAHUKONA LODGE

AREA
.2 AC.
.1 AC. .1 AC.

NORTH

LINEAL SCALE
0 25 50 100
FEET

PBR

6.6 SOLID WASTE COLLECTION AND DISPOSAL

6.6.1 Existing Conditions

At present, the majority of the solid wastes generated in the West Hawaii area are disposed of at the Kealakehe Landfill which is operated by the county. However, the landfill has reached capacity and some wastes are now being trucked to Hilo for disposal. The county is in the process of selecting a new landfill site in West Hawaii.

6.6.2 Probable Impacts

Based on preliminary engineering analyses, it is projected that at total build-out the proposed project would generate about 15 tons per day of solid wastes. This represents about 12 percent of the total projected solid waste volumes for the North Kohala District. As such, the volumes of solid wastes which would be generated by the project are not expected to have a significant impact on the new landfill site.

6.6.3 Mitigation Measures

The expected impacts resulting from solid waste collection and disposal indicates that some mitigation measures may be warranted. Chalon will investigate the possibilities of establishing recycling programs, perhaps in concert with the rest of the community, in an effort to reduce solid waste volumes. In particular, Chalon will actively pursue the development of a green waste facility in which to collect, store and decompose green matter thus reducing the volume of solid waste to be landfilled.

6.7 ELECTRICAL POWER AND COMMUNICATIONS

6.7.1 Existing Conditions

Electrical power to the project area is supplied by Hawaii Electric Light Company (HELCO) through a 2.4 kV transmission line.

Telephone service to the site is provided by Hawaiian Telephone Company.

6.7.2 Probable Impacts

Based on preliminary engineering studies, it is estimated that the proposed project at maximum build-out would require about 1.3 megawatts (MW) of electrical power. This requirement would be provided by one of two alternatives; The first is that transmission lines would be installed along the mauka side of Akoni Pule Highway from the Kohala Ranch substation located within the subdivision to Mahukona (the actual routing could be mauka of the existing highway right-of-way depending on feasibility and logistics). The second alternative is developing a private electrical generation source and the necessary transmission lines closer to the project site. Present and planned HELCO generating facilities have the capacity to serve the project without adversely affecting their overall generating, transmission and distribution system. If necessary, Chalon and HELCO will be responsible for construction of electrical generating facilities to accommodate the proposed 1.3 MW demand. A new substation to serve the Mahukona Lodge project will be constructed to handle the ultimate needs of the project. The plans for this substation will be developed by HELCO. On-site installation will include distribution cables and underground ducts.

6.7.3 Mitigation Measures

Further engineering studies will be performed to determine the possibility of utilizing solar and/or waste heat recovery systems to lessen electrical demands on the HELCO system. HELCO is supporting the development of alternate generating technologies. Chalon is considering the use of hydro and wind power to offset energy requirements.

Chalon will continue to work with Hawaiian Telephone Company engineers to assure that the telephone system for the project is efficiently designed and meets the needs of the customers and telephone company. Similarly, the resort will work with the cable TV company to assure that the project is provided adequate CATV service.

6.8 POLICE AND FIRE PROTECTION SYSTEMS

6.8.1 Existing Conditions

Police services for North Kohala are located in Kapaau. Other police facilities in the general project area are located at the Waimea station, which also serves the North Kohala

area, and the Kona station in North Kona. Both the Waimea and Kapaau stations are relatively new and both have room for expansion should it be required in the future.

The primary fire protection services for the area are located approximately ten miles away in Kapaau. The North Kohala Fire Station provides 24-hour fire and basic life support services with one Fire Equipment Operator and two Fire/Emergency Medical Technicians on each shift. Three shifts (nine persons) are assigned to the facility and are under the supervision of one Fire Captain who is on 8-hour duty during week-days only. For this reason, the County Fire Department relies on the community's Volunteer Fire Fighters to co-respond with the under-staffed regulars. A 1,500 gpm pumper carrying 1,000 gallons of water, one basic life support medical unit, and a reserve fire apparatus are maintained at the station. According to Mr. Thomas J. Bello (Hawaii County Fire Chief), North Kohala should be fully staffed with regular fire persons by 1993.

Service is presently supplemented in Waimea and at the newly constructed station on Queen Kaahumanu Highway about 20 miles south of the project site near the Mauna Lani Resort. Emergency medical service personnel are also stationed at the Mauna Lani fire station.

6.8.2 Probable Impacts

Although the proposed project may result in increased criminal activity associated with growth (see Section 5.9.3), as well as an increase in requests for police services, it is expected that these will be relatively minor and not cause an increase in county police manpower requirements. The project is expected to employ its own security service, which will be increased as required to serve the project and related facilities. As the resident population increases in the project area, the need for additional county police personnel will require evaluation in the context of a county police department needs assessment.

The development of the project and related facilities could lead to increased demand for fire protection service and facilities. However, given the location of the existing fire station and the fact that all new facilities, public and private, would be constructed in accordance with the county fire code, it is expected that any increased demand can be accommodated by existing and planned fire protection services and facilities.

6.8.3 Mitigation Measures

The lack of expected adverse impacts on the present county and private police and fire protection services indicates that mitigation measures are not warranted. As noted, the resort security force will be increased as required to accommodate the proposed project and associated facilities. Per the county building code, all resort facilities would be equipped with automatic fire sprinkler systems.

6.9 HEALTH CARE FACILITIES

6.9.1 Existing Conditions

The Island of Hawaii has five hospitals that provide a range of medical services. The Kohala area is served by two state-operated hospitals, the Kohala Hospital located in Kapaau in North Kohala and the Kona Hospital. Kona Hospital is a "full-service" health care facility and, in Waimea, the Lucy Henriques Medical Center provides outpatient health services. All of the health care facilities serving the project area require upgrading and plans to do so are being made by the State Department of Health and private operators.

6.9.2 Probable Impacts

As indicated above, existing conditions indicate that the health care facilities in the West Hawaii region require upgrading with or without the proposed project. Residents and visitors to the project will be able to seek emergency care at the Lucy Henriques Medical Center in Waimea, the Honokaa Hospital, Kohala Hospital or Kona Hospital. Also, as noted previously, the fire station is equipped with emergency medical service.

6.9.3 Mitigation Measures

Although the proposed project is not expected to result in significant new demands on health care facilities, existing services are in need of upgrading and the state and private parties are assisting with those upgrades. These measures are expected to result in adequate health care facilities to serve the growing resident and visitor population of North Kohala and West Hawaii.

6.10 SCHOOLS AND EDUCATION FACILITIES

6.10.1 Existing Conditions

The project area is served by public elementary and high schools located in North and South Kohala. Private lower and upper schools serving the project area include the Hawaii Preparatory Academy and Parker School. The nearest public school is at Honomakau, approximately 6 miles from the project site. The Kohala School includes grades from elementary through high school.

6.10.2 Probable Impacts

The proposed project is not expected to have a direct impact on the schools serving the area. The majority of the homes are expected to serve as "second" homes for the owners and/or be constructed by older persons whose children are of adult age and no longer attend school. As indicated in Section 5.4, the proposed project is expected to generate about 540 new jobs. Presumably these new employees to serve the facilities would be existing residents of the island and most likely residents of North Kohala, whose children are in the existing school system. However, the new facilities may induce some in-migration that could add to the demand for public school services.

Plans for the proposed project were reviewed by the State Department of Education for potential enrollment impacts on Kohala High and Elementary School. Based on 170 residential lots (125-150 are now planned) they projected increases of 15-20 students in grades K-5, 5-7 students in grades 6-8, and 8-10 students in grades 9-12. If buildout of the residential lots occurs at a steady pace over 20 years, the net impact would be the addition of less than two students per year to Kohala High and Elementary Schools combined.

6.10.3 Mitigation Measures

Given the minimal impacts, mitigation measures are not warranted. Chalon will continue to work with the State Department of Education to assure that adequate public school services are provided to the employees of the resort.

6.11 RECREATIONAL FACILITIES

6.11.1 Existing Conditions

Kohala and North Kona recreational facilities include golf courses, tennis courts, beaches, riding stables, historic sites, small boat harbors at Honokohau and Kawaihae, beach parks at Keokea, Hapuna, Kawaihae, Mahukona, Samuel Spencer Beach Park and Kapaa and other amenities and attractions. As noted previously in this EIR, both Honokohau and Kawaihae small boat harbors are crowded and there are waiting lists for slips at both. In addition, public access to the shoreline and historic areas is provided at Mahukona Park and Harbor, Kapaa Park and Lapakahi State Historical Park.

6.11.2 Probable Impacts

The proposed project has been designed to assist the state and county in providing recreational amenities in West Hawaii. Public access to the shoreline will be provided and the historic features within the project area will be improved. These actions will add to the recreational amenities of North Kohala and West Hawaii, serving both the general public and visitors to the area.

6.11.3 Mitigation Measures

The proposed project will improve the recreational facilities and amenities of the area. Consequently, mitigation measures are not warranted.

Mahukona

Chapter V: *Relationship of the Proposed Action to Land Use Plans, Policies and Controls for the Affected Area*

CHAPTER V

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

1. INTRODUCTION

The applicable governmental land use plans, policies and controls affecting the proposed project include Chapter 205, Hawaii Revised Statutes (HRS), Land Use Commission Rules (Chapter 15-15 Hawaii Administrative Rules), the Hawaii State Plan and State Functional Plans for Agriculture, Conservation Lands, Employment, Energy, Health, Historic Preservation, Housing, Human Resources, Recreation, Tourism, Transportation and Water Resources Development; Hawaii Coastal Zone Management Program, Hawaii County Special Management Area (SMA), Hawaii County General Plan and Hawaii County Zoning. Additionally, the North Kohala Community Development Plan, West Hawaii Regional Plan, Kona Regional Plan and Waimea Design Plan are applicable to the proposed Mahukona project. The project's relationship to these plans, policies and controls is described in the sections that follow. Following receipt of all necessary permits and approvals (see Chapter I, Section 11.0), the proposed project would be consistent with the above noted plans and land use controls.

1.1 CHAPTER 205, HRS, LAND USE COMMISSION RULES

As indicated in Chapter I, Section 1.3, the majority of the project lands are designated Agriculture by the State Land Use Commission (SLUC). For the project to move forward, a land use district boundary amendment petition, that will be submitted to the County of Hawaii Planning Department, Planning Commission and County Council, will be required to redesignate approximately 14.5 acres of the Agricultural District lands into the Urban District. This will allow development of the Lodge and villas (see Figures II-4 and II-5).

1.1.1 Section 205-17, HRS

Section 205-17, HRS, sets forth the following decision making criteria for reclassification of District boundaries by the SLUC:

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

(2) The extent to which the proposed reclassification conforms to the applicable district standards; and

(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;

(F) Provision for housing opportunities for all income groups and gap groups.

The subject matter of these criteria are addressed respectively in Sections 1.2 and 1.1.2 of this chapter and in Chapter IV regarding probable impacts on the environment. Based on these discussions, the project meets the criteria contained in Section 205-17, HRS.

1.1.2 Section 205-2, HRS

The SLUC District Regulations require that the application for a boundary amendment show that it is "reasonable, not violative of Section 205-2 and consistent with the Interim Statewide Land Use Guideline Policies." The reasons for the requested changes in the State Land Use District Boundaries are discussed in Chapter II, Section 3.3 of this EIR. The consistency of the proposed district designation with Section 205-2, HRS, and with the State Interim Land Use Guideline Policies are discussed below.

The proposed amendment to the State Land Use district boundaries is consistent with the basic standards for determining boundaries that are set forth in Section 205-2, HRS. Relevant standards from this section include the following:

Agricultural District

Agriculture districts shall include activities or uses characterized by the

1. cultivation of crops, orchards, forage and forestry;

2. farming activities or uses related to animal husbandry, aquaculture, game and fish propagation;

3. aquaculture, which means the production of aquatic plant and animal life for food and fiber within ponds or other bodies of water;

4. wind generated energy production for public, private and commercial use;

5. services and uses accessory to the above activities including but not limited to living quarters or dwellings, mills, storage facilities, processing facilities and roadside stands for the sale of products grown on the premises;

6. wind machines and wind farms;

7. agricultural parks;

8. open area recreational facilities including golf courses and golf driving ranges, provided that they are not located within agricultural district lands with soil classified by the land study bureau's detailed land classification as overall (master) productivity rating class A or B.

9. These districts may include areas which are not used for, or which are not suited to, agricultural and ancillary activities by reason of topography, soils, and other related characteristics.

Response: The Agricultural District land that is proposed for Urban designation is not suitable for the cultivation of crops, orchards, forage or forestry. The land is classified E93 and E128 under the land study bureau detailed land classification system and is characterized as rocky and unsuitable for mechanical cultivation. The land is suitable for seasonal grazing purposes but this use is limited due to the lack of improved irrigation facilities and precipitation. Similarly, the land is not suitable for wind generated energy uses due to the general lack of sustainable winds required for the production of electrical energy. The land may be suitable for agricultural parks, however, there does not appear to be a lack of better suited agricultural land in the North Kohala District. The land is not particularly well suited to aquaculture activities given the lack of basic infrastructural services and the

availability of those services at Keahole Point in North Kona. The proposed project includes a golf course which would increase the "agricultural" use of the property, however, reserving the property solely for open space recreational activities would not fulfill the goals and objectives of Chalon relative to the proposed project and/or relative to the overall North Kohala Master Plan. With the exception of seasonal grazing, the topography and physiography of the land does not lend itself to agricultural activities. Lastly, the county, recognizing the unsuitability of the land for agricultural purposes, has designated the project lands as "Urban Expansion," "Resort," and "Extensive Agricultural." The proposed project is consistent with these designations. Urbanization of the project lands would greatly enhance its present and future value which would, in turn, generate new income to fulfill the goals and objectives of Chalon with regard to North Kohala and the implementation of the overall North Kohala Master Plan.

1.2 HAWAII STATE PLAN (REVISED 1989)

The Hawaii State Plan (Chapter 226, Hawaii Revised Statutes, as amended and approved June 8, 1989), establishes a set of goals, objectives and policies that are to serve as long-range guidelines for the growth and development of the state. The Plan is divided into three parts: Part I (Overall Theme, Goals, Objectives and Policies); Part II (Planning, Coordination and Implementation); and Part III (Priority Guidelines). Part II elements of the State Plan pertain primarily to the administrative structure and implementation process of the Plan. As such, comments regarding the applicability of this part to the proposed project are not appropriate. The following sections of the Hawaii State Plan are directly applicable to the proposed project:

1.2.1 Part I, Overall Theme, Goals, Objectives and Policies

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

(1) A strong, viable economy, characterized by stability, diversity and growth that enables fulfillment of the needs and expectations of Hawaii's present and future generations.

(2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems and uniqueness, that enhances the mental and physical well-being of the people.

(3) Physical, social and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring and of participation in community life.

Response: The proposed project would contribute to the attainment of the three goals. The project would provide direct and indirect short- and long-term employment opportunities for the present and future residents of North Kohala and West Hawaii; the proposed project would generate increased state and county tax revenues; the project would contribute to the stability, diversity and growth of local and regional economies; and the archaeological, historic and natural site features would be protected. Key elements of the proposed project relative to the above noted goals are that the proposed project would provide additional employment, recreational and cultural opportunities for existing and future residents of North Kohala and West Hawaii; that it would provide these opportunities in a planned setting wherein design, operation and maintenance and environmental protection provisions can be effectively, efficiently and economically controlled; that it would provide these opportunities close to existing and planned resort/residential developments such that travel times are minimized and yet separated from planned or existing residential developments such that the activities within the proposed project are not a nuisance to residential communities or other resort related activities; and the proposed project would enhance the sense of community responsibility and participation.

Specific objectives, policies and priority directions of the State Plan most relevant to the proposed project are discussed below. Note, objectives and policies not listed are those that are not applicable to the proposed project.

Section 226-5 Objectives and Policies for Population

Objective:

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

Policies:

(b)(1) Manage population growth statewide in a manner that provides increased opportunities for Hawaii's people to pursue their physical, social and economic aspirations while recognizing the unique needs of each county.

(b)(2) Encourage an increase in economic activities and employment opportunities on the Neighbor Islands consistent with community needs and desires.

(b)(3) Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the state.

(b)(7) Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

Response: Rapidly increasing population levels in the West Hawaii area are presently a concern to both state and county planners because of the present lack of affordable housing, limited public facilities and services and increased demands on those facilities and services. The proposed lodge and residential project will have an effect on these factors, but that effect would be less than that which would occur should the project area remain undeveloped. That is, the proposed project will provide the economic means by which other elements of the overall North Kohala Master Plan can be implemented. Without an income generating product, implementation of the master plan elements serving housing and other employment opportunities becomes questionable. The Mahukona project is expected to provide long-term economic and employment opportunities for businesses servicing and providing equipment and supplies for the lodge and rural/residential units. The development of the project and residential/agricultural lots is also expected to contribute to the overall growth of the North Kohala area that is consistent with the community's desire and need as demonstrated in the County General Plan. As previously indicated in this EIR, marketing studies and a survey indicate a definite market for both the project and related facilities and the residential/agricultural lots, thereby indicating resultant positive primary and secondary employment and economic opportunities for socioeconomic growth and development of the area.

226-6 Objectives and Policies for the Economy - General

Objective:

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

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

Policies:

(b)(2) Promote Hawaii as an attractive market for environmentally and socially sound investment activities that benefit Hawaii's people.

(b)(4) Expand existing markets and penetrate new markets for Hawaii's products and services.

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

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

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

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

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

(b)(14) Promote and protect intangible resources in Hawaii such as scenic beauty and the aloha spirit, which are vital to a healthy economy.

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

Response: As a master planned, low-rise lodge with associated residential/agricultural lots and recreational amenities, the project would add an environmentally and socially sound investment amenity to the marketing and promotion of Hawaii. Further, the project would expand an existing market and penetrate a new market for Hawaii's products and services. The proposed project would provide continued construction activity in the West Hawaii/North Kohala area that would closely follow construction of other West Hawaii projects, thereby ensuring local construction workers continued employment as well as provide employment opportunities for other types of construction trades. Given the present land use designations for the project site, the proposed project is consistent with state growth objectives. The proposed project would provide increased employment, income and job opportunities for Big Island residents, thereby leading to improved living standards for those residents. The development of the proposed project would also increase the opportunities to control the working conditions of the businesses that would service the project, increase the opportunities for businesses having favorable financial multiplier effects and provide a climate conducive to the expansion of existing businesses and the creation of new business.

226-8 Objective and policies for the economy - visitor industry

Objective:

(a) Planning for the State's economy with regard to the visitor industry shall be directed towards achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy.

Policies:

(b)(1) Support and assist in the promotion of Hawaii's visitor attractions and facilities.

(b)(2) Ensure that visitor industry activities are in keeping with the social, economic and physical needs and aspirations of Hawaii's people.

(b)(4) Encourage cooperation between the public and private sectors in developing and maintaining well-designed, adequately serviced visitor industry and related developments which are sensitive to neighboring communities and activities.

(b)(5) Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawaii's people.

(b)(6) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the visitor industry.

(b)(7) Foster a recognition of the contribution of the visitor industry to Hawaii's economy and the need to perpetuate the aloha spirit.

Response: The proposed project is in keeping with and would assist in attaining the above stated objective and policies by providing a facility that would be one of Hawaii's premier visitor attractions and facilities; provide a facility that is in keeping with the social, economic and physical needs and aspirations of Hawaii's people; provide a facility that is well designed to adequately serve the visitor industry as well as residents of Hawaii while being sensitive to neighboring activities and communities; provide new job opportunities and steady employment; and further the policy of providing opportunities for Hawaii's people to obtain job training and would allow for upward mobility within the visitor industry. The proposed development would offer short-term and long-term employment to residents of the state and county of Hawaii and would contribute to sustaining the level of construction activity in the state. As noted in Chapter II, the proposed project is being carefully planned and developed, with extensive public input, to meet existing and future market demands and the project would provide a diverse range of employment opportunities within the region. Similarly, the project is being planned to aid in fostering a recognition in North Kohala of the positive contribution made by the visitor industry to the state's economy and the need to perpetuate the aloha spirit that is so common in North Kohala.

226-10 Objectives and policies for the economy - potential growth activities

Objective:

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

Policies:

(b)(1) Facilitate investment and employment in economic activities that have the potential for growth such as diversified agriculture, aquaculture, apparel and textile manufacturing, film and television production and energy and marine-related industries.

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

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

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

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

Response: The proposed project would assist in the achievement of the above state objective and policies by providing a facility that directly promotes the growth of diversified agriculture and aquaculture; encourages existing business to expand and provides the impetus for the creation of new businesses to golf and tennis activities centered around the project; assist in enhancing and promoting Hawaii's role as a center for international and domestic relations, trade, finance, services and technology, and promote the State's geographic, environmental, social and technological advantages, especially given the project's location relative to the internationally known recreational facilities and sport fishing grounds off West Hawaii; and granting of the requested permits and future zoning requests would represent the extent of public incentives required to encourage the private interests to construct homes and utilize planned facilities, thereby supporting the State's social, economic, physical and environmental objectives.

226-11 Objectives and policies for the physical environment - land-based, shoreline and marine resources

Objectives:

(a) Planning for the State's physical environment with regard to land-based, shoreline and marine resources shall be directed towards the achievement of the following objectives:

(a)(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.

(a)(2) Effective protection of Hawaii's unique and fragile environmental resources.

Policies:

(b)(1) Exercise an overall conservation ethic in the use of Hawaii's resources.

(b)(2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.

(b)(3) Take into account the physical attributes of areas when planning and designing activities and facilities.

(b)(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.

(b)(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.

(b)(7) Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.

(b)(8) Pursue compatible relationships among activities, facilities, and natural resources.

(b)(9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational and scientific purposes.

Response: The demonstrated policy of Chalon International of Hawaii, Inc. is to exercise a strong overall conservation ethic in the use of Hawaii's resources. This has been demonstrated in the care and planning that is occurring with regard to the natural and historical/cultural resources found within the project boundaries. This same ethic would be continued with the proposed project to ensure compatibility between the project-associated activities, the natural resources and the ecological systems that would be affected by the proposed project. As indicated previously in this EIR, the planning and design of the project has taken into account the physical attributes of the Mahukona and North Kohala areas. Further, it is the intention of Chalon to manage the natural resources and environs of the project area such that beneficial and multiple uses are encouraged as to not cause damage to those resources. As has also been noted in this EIR, endangered and threatened plant and animal species and habitats native to Hawaii have been protected and serve as educational and scientific resources. As indicated previously, the only public incentive required to encourage private actions to protect significant natural resources from degradation or unnecessary depletion is the granting of the requested permit and land use

actions. This incentive will allow Chalon to pursue compatible relationships among the activities, facilities and natural resources of the area. The proposed project would also promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational and scientific purposes.

Plans for the proposed Mahukona project are being developed and prepared in conjunction with extensive environmental studies of the site as well as extensive public input. This EIR documents the process by which these environmental considerations have been integrated into the planning process. Although no threatened or endangered species of plants or animals were encountered through these studies, any potentially threatened or candidate species would be respected through appropriate site planning considerations. Similarly, significant archaeological/historical features within the project boundaries would be preserved and protected in compliance with applicable federal, state and county rules and regulations and implementation of a community/developer/state/county prepared and approved mitigation plan.

226-12 Objectives and policies for the physical environment - scenic, natural beauty and historic resources

Objective:

(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multicultural/historical resources.

Policies:

(b)(1) Promote the preservation and restoration of significant natural and historic resources.

(b)(2) Provide incentives to maintain and enhance historic, cultural and scenic amenities.

(b)(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

(b)(4) Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.

(b)(5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Response: The proposed Mahukona project was conceived based on the unique site attributes and has thus been planned and designed to maintain and/or enhance the natural features of the site. As with other Chalon projects, significant historical/cultural/ archaeological sites will be protected; building pads have been planned and sited to maintain the primary vistas to the mountains and ocean as well as to avoid significant archaeological sites. The low density, golf course and landscaped character of the project site, as well as the waterways and swimming lagoons would provide a means for the development to accommodate and be complemented by the surrounding land and ocean environment.

226-13 Objectives and policies for the physical environment - land, air and water quality.

Objectives:

(a) Planning for the State's physical environment with regard to land, air and water quality shall be directed towards achievement of the following objectives:
(a)(1) Maintenance and pursuit of improved quality in Hawaii's land, air and water resources.

(a)(2) Greater awareness and appreciation of Hawaii's environmental resources.

Policies:

(b)(1) Foster educational activities that promote a better understanding of Hawaii's environmental resources.

(b)(2) Promote the proper management of Hawaii's land and water resources.

(b)(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground and coastal waters.

(b)(8) Foster recognition of the importance and value of land, air and water resources to Hawaii's people, their cultures and visitors.

Response: An important element of the proposed project is the construction of an historic park and interpretive center to convey Hawaiian lifestyles of the area, thereby providing an educational experience regarding the importance of the area's land and water resources. The proposed project has been designed and would be constructed in such a manner that the land and water resources of the area can be managed in an environmentally compatible and beneficial manner and foster the recognition of the importance and value of the area's land, air and water resources to Hawaii's people, their cultures and visitors.

226-19 Objectives and policies for socio-cultural advancement - housing

Objectives:

(a) Planning for the State's socio-cultural advancement with regard to housing shall be directed towards achievement of the following objectives:

(a)(2) The orderly development of residential areas sensitive to community needs and other land uses.

Policies:

(b)(1) Effectively accommodate the housing needs of Hawaii's people.

(b)(5) Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services and other concerns of existing communities and surrounding areas.

(b)(7) Foster a variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods that reflect the cultures and values of the community.

Response: The proposed Mahukona lodge concept has been planned and designed to lend itself towards fostering a sense of community and cohesiveness. This planning, as noted previously, has actively involved the North Kohala community. It is the intent of the proposed lodge to create a character that reflects the values that are traditional to Hawaii in general and specifically North Kohala, and an appreciation and respect for the beauty of the land. Development of another large-scale resort hotel in the area would add undue burdens on the public facilities and services of the area and not be in keeping with the lower density housing and recreational facilities desired by existing communities. The project will

also provide a range of guest accommodations and housing options available for Hawaii residents.

226-23 Objectives and policies for socio-cultural advancement - leisure

Objective:

(a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

Policies:

(b)(1) Foster and preserve Hawaii's multicultural heritage through supportive cultural, artistic, recreational, and humanities - oriented programs and activities.

(b)(2) Provide a wide range of activities and facilities to fulfill the cultural, artistic and recreational needs of all diverse and special groups effectively and efficiently.

(b)(3) Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities and improved facility design and maintenance.

(b)(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.

(b)(5) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.

(b)(10) Assure adequate access to significant natural and cultural resources in public ownership.

Response: The project would provide a new array of recreational opportunities that would be integrated into the community. The project includes provisions for open spaces, public shoreline access, public access to the project facilities, educational displays and facilities and continued access to significant historical and cultural sites. In addition, opportunities for community activities would be available. As such, a wide range of recreational facilities and

opportunities would be made available to the residents of North Kohala, as well as residents of the overall West Hawaii area.

1.2.2 Part II. Planning, Coordinating and Implementation

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

1.2.3 Part III. Priority Guidelines

The purpose of this part of the Plan is to establish overall priority guidelines to address areas of statewide concern. The Plan notes (Section 226-102) that the State shall strive to improve the quality of life for Hawaii's present and future population through the pursuit of desirable courses of action in five major areas of statewide concern which merit priority attention:. economic development, population growth and land resource management, affordable housing, crime and criminal justice and quality education. The priority guidelines applicable to the proposed project are discussed below:

226-103 Economic Priority Guidelines

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

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

(a)(8) Provide public incentives and encourage private initiative to develop and attract industries which promise long-term growth potentials and which have the following characteristics:

(a)(8)(A) An industry that can take advantage of Hawaii's unique location and available physical and human resources.

(a)(8)(B) A clean industry that would have minimal adverse impacts on Hawaii's environment.

(a)(8)(D) An industry that would provide reasonable income and steady employment.

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

(b) Priority guidelines to promote the economic health and quality of the visitor industry:

(b)(1) Promote visitor satisfaction by fostering an environment which enhances the Aloha Spirit and minimizes inconveniences to Hawaii's residents and visitors.

(b)(2) Encourage the development and maintenance of well-designed, adequately serviced hotels and resort destination areas which are sensitive to neighboring communities and activities and which provide for adequate shoreline setbacks and beach access.

(b)(3) Support appropriate capital improvements to enhance the quality of existing resort destination areas and provide incentives to encourage investment in upgrading, repair and maintenance of visitor facilities.

(b)(4) Encourage visitor industry practices and activities which respect, preserve and enhance Hawaii's significant natural, scenic, historic and cultural resources.

(b)(7) Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.

(f) Priority guidelines for energy use and development:

(f)(3) Provide incentives to encourage the use of energy conserving technology in residential, industrial and other buildings.

Response: The proposed Mahukona project would assist in meeting the above stated guidelines by allowing private investment in a facility that would assist in expanding existing businesses as well as provide the impetus for new businesses to be created to serve an expanded market; assist in the development of an industry that can take advantage of Hawaii's location and available physical and human resources; encourage expansion of a clean industry that would have minimal adverse impacts on Hawaii's environment; assist an industry that provides a reasonable income and steady employment; and provide the market for and stimulus needed to increase vocational training in an area where growth is desired and feasible. With regard to promoting the economic health and quality of the visitor industry, the proposed project would provide an ideal visitor and resident oriented area

while allowing the development of the businesses that would serve the project and residents of the project; and allow the expenditure of private capital to upgrade and improve the quality of facilities in an area where they are now lacking. The proposed project would also aid in the attainment of the energy related guidelines through the energy conservation measures that would be taken during the design, construction and operation of lodge facilities.

226-104 Population Growth and Land Resources Priority Guidelines

(a) Priority guidelines to effect desired statewide growth and distribution:

(a)(1) Encourage planning and resource management to insure population growth rates throughout the State that are consistent with available and planned resource capacities and reflect the needs and desires of Hawaii's people.

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

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

(b) Priority guidelines for regional growth distribution and land resource utilization:

(b)(6) Seek participation from the private sector for the cost of building infrastructure and utilities and maintaining open spaces.

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

(b)(13) Protect and enhance Hawaii's shoreline, open spaces and scenic resources.

Response: The project would comply with and assist in the achievement of the above stated population growth and land resources priority guidelines and objectives. The proposed project would provide the means by which Chalon would make available investment capital for the lodge, villas and house lots, thereby providing additional housing in an area

designated by the county for residential/resort development. As such, growth would continue to be focused in a planned urban expansion area. Further, the project would maintain the open space character of the area; would be designed to protect and enhance the shoreline and coastal resources of the area; and provide additional recreational facilities available to the public. The proposed development would provide employment opportunities paralleling future employment needs; encourage private investment on a neighbor island; and profitably utilize urban expansion lands for urban uses. Infrastructural components required by and for the project would be provided by Chalon at no cost to the state or county.

1.3 STATE FUNCTIONAL PLANS

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

1.3.1 State Agriculture Functional Plan (1985)

The project site is rock lava land that is covered primarily with a buffel grass/kiawe vegetation cover. The land is rated E under the land study bureau land classification system and is unsuited to mechanical tilling. The entire project site is designated Resort, Urban Expansion and Extensive Agricultural by the County General Plan. It is not designated as important agricultural land on the ALISH (Agricultural Lands of Importance to the State of Hawaii) map of the area. Consequently, the majority of the implementing actions of the State Agriculture Functional Plan do not apply either directly or indirectly to the proposed project. Those that do apply are related to non-cultivation activities such as grazing, for which there is no present or forecast shortage of lands in the North Kohala District.

1.3.2 State Conservation Lands Functional Plan (1984)

There are several implementing actions in the State Conservation Lands Functional Plan that are relevant to the proposed project. This functional plan addresses more than officially designated Conservation District lands in that it establishes a conservation ethic that the state should strive to attain and maintain.

MANAGEMENT OF NATURAL RESOURCES

Objective:

A. Effective protection and prudent use of Hawaii's unique, fragile and significant environmental and natural resources.

Policies:

A(1) Exercise an overall conservation ethic in the use of Hawaii's resources by protecting, preserving and conserving the critical and significant natural resources of the State of Hawaii and controlling use of hazardous areas.

A(1)(c) Review the various rules and regulations and permit systems applicable to Conservation District lands for possible simplification and/or consolidation for effective and efficient management controls and compliance with the Coastal Zone Management program.

A(1)(d) Provide for effective enforcement of rules and regulations and permit system applicable to the Conservation District.

A(1)(d) Review applications for use of Conservation lands to control impacts on natural and cultural resources.

Response: In compliance with the Coastal Zone Management Program regulations a Special Management Area permit will be requested from the County Planning Department. The proposed project does not utilize any of the State Land Use Conservation District land. This EIR will allow extensive review by governmental agencies and the general public with regard to the potential impacts on natural and cultural resources and the controls (mitigating measures) proposed to minimize potential adverse impacts.

PROTECTION OF ENDANGERED SPECIES

Objective:

B. Protection of rare or endangered species and habitats native to Hawaii.

Policies:

B(1) Protect and preserve habitats of rare and endangered wildlife.

B(2) Protect and preserve unique native plant species.

Response: As noted previously, based on the studies conducted specifically for the project, there are no threatened or endangered species of plants or animals found within the project boundaries. However, to preserve examples of the native and introduced vegetation on-site, the landscaped areas will include the use of appropriate species that are presently found on-site. In one location a small community of native plants has been identified, and this area will be preserved in open space.

MANAGEMENT OF OPEN SPACE, WATERSHEDS AND NATURAL AREAS

Objective:

C. Effective protection and management of Hawaii's open space, watersheds and natural areas.

Policies:

C(3) Protect and manage the lands with historic or natural resources value.

C(3)(a) Establish criteria and evaluate and prioritize areas of private lands with historic or natural resources value for possible acquisition by public or private agencies.

C(3)(b) Acquire and maintain historic sites for park and other purposes.

C(4) Provide opportunities and facilities to meet public needs for a wide range of recreational and educational activities within Conservation lands.

C(4)(a) Where possible, make available areas of unique biota or geology for public appreciation and enjoyment.

C(4)(c) Maintain scenic and natural open space areas as part of a Statewide system of parks.

Response: To determine the extent and nature of historic and cultural resources within the project boundaries, an archaeological survey of the project site was conducted. The survey was performed in compliance with guidelines established by the State Department of Land and Natural Resources, Historic Sites Division and guidelines developed by the Advisory Council on Historic Preservation.

Significance determinations have been assessed in compliance with the criteria established by the above noted groups and those published in the Federal Register (36 CFR Part 60). The results of the archaeological survey indicated that there are 102 sites within the project boundaries consisting of 223 component features, 20 of which require no further work. For the remaining sites, additional data collection is recommended for 49 sites prior to construction of the planned facilities. Of the remaining 33 sites, 16 have been assessed as significant for information content and have been tentatively evaluated as culturally significant. These sites may contain burials; further data collection has been recommended for them and preservation "as is" has been tentatively recommended, pending data collection results. Six sites have been assessed as significant for information content as excellent examples of site types. For these six sites, further data collection has been recommended and preservation with some level of interpretive development has been tentatively recommended. The final 11 sites have been assessed as significant for information content, cultural value and as excellent examples of site types. Because these sites consist of possible ceremonial sites, primary trail routes, an historical railroad bed and the historic Mahukona Harbor Complex, further data collection followed by preservation with some level of interpretative development has been recommended.

Similarly, as noted previously, the natural resources of the area, especially the shoreline area will be preserved and maintained for the enjoyment of visitors and residents.

1.3.3 State Education Functional Plan (1989)

The State Education Functional Plan reflects the Department of Education's strategies to address the policies and priority guidelines of the Hawaii State Plan and the goals of the Board of Education and the concerns of the Education Functional Plan Advisory Committee. As such, it serves as a mechanism for implementing the Hawaii State Plan as it relates to the directions of the Board of Education and the programs of the Department. All of the actions are to be undertaken by the Department of Education and hence, they are not applicable to the proposed Mahukona project.

1.3.4 State Higher Education Functional Plan (1984)

There are no objectives, policies or implementing actions in this functional plan that are directly applicable to the proposed project.

1.3.5 State Employment Functional Plan (1989)

The State Employment Functional Plan, the preparation of which was coordinated by the Department of Labor and Industrial Relations, lists four major issue areas under which specific objectives have been defined. These issue areas and objectives are as follows:

ISSUE AREA I. EDUCATION AND PREPARATION SERVICES FOR EMPLOYMENT

Objectives:

I.A Improve the qualifications of entry level workers and their transition to employment.

I.B Develop and deliver education, training and related services to ensure and maintain a quality and competitive workforce.

ISSUE AREA II. JOB PLACEMENT

Objective:

II.A Improve labor exchange.

ISSUE AREA III. QUALITY OF WORK LIFE

Objective:

III.A Improve the quality of life for workers and families.

ISSUE AREA IV. EMPLOYMENT PLANNING INFORMATION AND EMPLOYMENT COORDINATION

Objective:

IV.A Improve planning of economic development, employment and training activities.

Under each of the above listed objectives are defined policies to implement the objectives. The implementation actions are primarily the responsibility of the Department of Labor and Industrial Relations (DLIR) with assistance from other agencies and groups.

Response: The proposed project is generally in concert with the objectives of the State Employment Functional Plan in that new jobs will be created and/or others, such as in construction, will be continued for a period of time. By providing additional employment opportunities in several areas the proposed project would be one more element of the North Kohala/West Hawaii environment assisting in the improvement of the quality of life for workers and families. As noted in Chapter IV, Section 5, the proposed project, at completion of build-out, is expected to generate about 600 jobs including on-site and off-site positions.

1.3.6 State Energy Functional Plan (1984)

The State Energy Functional Plan's most relevant objective is that of the promotion of energy-efficient design. This relates to both overall land use planning and to specific building design and equipment selection decisions. While specific building designs have not been completed, the proposed project will adhere to energy conservation standards whenever possible. Elements of energy conservation that may be incorporated into the project include the use of solar energy for water heating and air conditioning purposes, the use of heat recovery pumps and the use of energy conservation lighting systems.

1.3.7 State Health Functional Plan (1989)

The State Health Functional Plan identifies four major priority issue areas on which the plan focuses. These are (1) preventive health, (2) access to health care, (3) environmental protection, and (4) internal administrative issues. Of these four, the environmental protection issue is the most relevant to the proposed project.

Objective:

> Environmental programs to protect and enhance the environment. Continued development of new environmental protection and health services programs to protect, monitor and enhance the quality of life in Hawaii.

Policy:

> Air, land and water quality programs. The Department of Health (DOH) will develop and implement new programs to prevent degradation and enhance the quality of Hawaii's air, land and water.

The objective and policy of the DOH will be implemented through programs that will include development and implementation of a comprehensive air toxic control program; development and implementation of a comprehensive solid and hazardous waste management program; development and implementation of a comprehensive recreational water quality monitoring strategy; development and implementation of a non-point source pollution program to protect recreational and other surface waters; development and implementation of an indoor air pollution control program; and development and implementation of a groundwater protection program including groundwater monitoring, safe drinking water and underground injection control. These actions, in concert with existing duties and responsibilities of the DOH, form the primary environmental protection elements of the department.

Response: The proposed project will be in compliance with applicable DOH rules and regulations as well as those established by Hawaii County. A complete marine survey, including water quality analysis, of the area that may be impacted by the proposed project has been performed and forms the basis of a part of this EIR (see Chapter IV, Section 3.3.2). In addition, applicable DOH permit/approval requirements will be complied with. The proposed project will comply with all necessary requirements related to the DOH permitting procedures.

1.3.8 State Historic Preservation Functional Plan (1984)

The objectives, policies and implementing actions of the State Historic Preservation Plan are directed toward state agencies, primarily the Department of Land and Natural Resources, Historic Preservation Program (DLNR-HPP). The archaeological resources at the project site have been surveyed and evaluated by DLNR-HPP. Site surveys and identification continue by the consulting archaeologist and Na Maka'ala 'O Kohala. Chalon, with approval from the County Planning Department, will implement the mitigation measures recommended by the consulting archaeologist for the one site that requires additional investigation. As noted in Chapter IV, Section 4, the proposed lodge, villa and other facilities and amenities of the project, have been sited to avoid significant archaeological sites and/or those sites would be preserved as part of an historic village preserve. Chalon is eager to maintain and preserve the significant archaeological sites and features found within the project boundaries for the education and enjoyment of the residents and visitors to the project area.

1.3.9 State Housing Functional Plan (1989)

The State Housing Functional Plan, prepared by the State Housing Finance and Development Corporation, addresses six major areas of concern: (1) increasing homeownership; (2) expanding rental housing opportunities; (3) expanding rental housing opportunities for the elderly and other special need groups; (4) preserving housing stock; (5) designating and acquiring land that is suitable for residential development; and (6) establishing and maintaining a housing information system. The plan assumes the use of existing programs at both the state and county levels to attain the goals of the Hawaii State Plan. Most of the objectives, policies and implementing actions of the State Housing Functional Plan apply to the government sector. With regard to the provision of employee housing, Chalon International of Hawaii, Inc. is continuing to discuss, with the county and state, methods of satisfying its affordable housing requirements for development of the entire planned North Kohala area.

1.3.10 State Human Services Functional Plan (1989)

The State Human Services Functional Plan identifies elderly care, children and family support, self-sufficiency and service delivery improvements as its priority issues. The objectives, policies and implementing actions of the plan are directed toward state and county agencies for accomplishment. In general, the proposed project is in concert with the basic philosophy of the Human Services Functional Plan in that it will assist, through the provision of employment opportunities, families in achieving economic and social self-sufficiency.

1.3.11 State Recreation Functional Plan (1984)

The objectives, policies and implementing actions of the State Recreation Functional Plan are oriented toward improving public recreation opportunities both now and in the future. The following objectives and policies of the plan are relevant to the proposed project.

LAND USE PLANNING

Objective:

A. Achieve a pattern of land and water resources usage which is compatible

with community values, physical resources, recreation potential and recreation uses which support comprehensive public land use policies.

Policies:

A(2) Ensure that intended uses for a site respect community values and are compatible with the area's physical resources and recreation potential.

A(3) Emphasize the scenic and open space qualities of physical resources and recreation areas.

Response: The proposed project is favored in part by nearby communities over much larger facilities that could be planned for the project site. The general feeling of the communities that would be most affected by the project is that, as planned and discussed in this EIR, the project is the correct scale for the area. The proposed project is not only compatible with the area's physical resources but enhances the area's recreation potential and will assist in the realization of that potential. Further, the proposed project emphasizes the scenic and open space qualities of the physical resources and recreation characteristics of the area.

CONSERVATION AND RESOURCE MANAGEMENT

Objective:

B. Establish a system of maintaining natural and cultural resources for present and future generations, and of managing recreation and other uses in accordance with sound conservation principles.

Policy:

B(1) Exercise an overall conservation ethic in the use of Hawaii's resources.

Response: Throughout the development of the plans for the project area, Chalon has sought the community's input and fostered the definition and development of programs and activities that would enhance the physical, cultural and recreational characteristics of the area. The programs that will be developed and implemented will be designed to preserve the valuable resources of the project site and area for the use and enjoyment of visitors and residents. The proposed project will continue to follow the conservation ethic that has been established, as demonstrated through the involvement of the communities with regard to the maintenance of the coastal and cultural resources of the project site and area.

RECREATIONAL FACILITIES AND PROGRAMS

Objective:

C. Provide a comprehensive range of opportunities which fulfill the needs of all recreation groups effectively and efficiently.

Policy:

C(1) Maintain an adequate supply of recreation facilities and programs which fulfill the needs of all recreation groups.

Response: The proposed project will assist in implementing the above state objective and policy by providing a facility that will allow groups to pursue and enjoy their recreational needs. The provision of the project and associated facilities will be accomplished by private investment, thereby allowing public funds to be available for other recreation oriented programs.

ACCESS

Objective:

D. Assure the provision of adequate public access to lands and waters with public recreation value.

Policy:

D(2) Promote the securing of public access to resources with recreational value.

D(3) Ensure that the community feels safe and comfortable in accessing to public recreation lands.

Response: The proposed project includes provisions for public access to the shoreline and to those lands that have public recreation value. Further, the proposed project, acting in concert with previously established public recreational facilities in the North Kohala and West Hawaii areas, will ensure that facilities for both residents and visitors are enhanced.

1.3.12 State Tourism Functional Plan (1984)

The State Tourism Functional Plan is a guide to help coordinate the various sectors of government and private industry toward achieving the statewide objectives of the Hawaii State Plan and is an expression of legislative policy toward tourism. The following objectives and policies of the State Tourism Functional Plan are relevant to the proposed project.

PHYSICAL DEVELOPMENT

Objective:

B. Development and maintenance of a well-designed and adequately serviced industry and related developments in keeping with the needs and aspirations of Hawaii's people.

Policies:

B(1) Ensure that visitor industry activities are in keeping with the economic and physical needs and aspirations of Hawaii's people.

B(2) Improve the quality of existing visitor destination areas.

B(3) Encourage greater cooperation between the public and private sectors in developing and maintaining well-designed and adequately serviced visitor industry and related developments.

B(4) Ensure that visitor facilities and destination areas are carefully planned and sensitive to existing neighboring communities and activities.

Response: The proposed Mahukona project has been conceived and is being planned and designed to enhance the attractiveness of the project area to visitors and residents alike. The project is in keeping with the desires of the neighboring communities and needs and will provide a needed infrastructure component in North Kohala. The development of the project will expand the recreational opportunities available to visitors to the North Kohala area as well as to residents of the area. Further, the project will utilize privately developed infrastructure, thereby greatly reducing the need for new government investment in infrastructure.

EMPLOYMENT AND CAREER DEVELOPMENT

Objective:

C. Enhancement of career and employment opportunities in the visitor industry.

Policies:

C(1) Develop the industry in a manner that will provide the greatest number of primary jobs and steady employment for Hawaii's people.

C(2) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the visitor industry.

Response: The proposed project will add to the variety of primary job opportunities and provide steady employment for those who wish to take advantage of those opportunities. In addition, it is expected that the majority of the existing and new businesses that will service the project will provide in-house job training for those that require such training as well as provide opportunities for employees to move upward within the business.

COMMUNITY RELATIONS

Objective:

D. Development of better relations and mutual awareness and sensitivity between the visitor industry and the community.

Policies:

D(1) Ensure that visitor industry activities are in keeping with the social needs and aspirations of Hawaii's people.

D(3) Foster an understanding by visitors of the Aloha Spirit and of the unique and sensitive character of Hawaii's cultures and values.

Response: The project will aid in the development of better relations and mutual awareness and sensitivity between visitors to the lodge and residents of the project and nearby communities through the development of a mutual respect for each other's knowledge regarding land and water oriented activities. Further, the lodge is in keeping with the social needs of the residents of nearby communities and by preserving archaeological and natural

resources, a better understanding of the unique and sensitive character of Hawaii's cultures and values will be developed by visitors to the lodge and surrounding community.

1.3.13 State Transportation Functional Plan (1984)

The overall objective of the State Transportation Functional Plan is to provide for the efficient, safe and convenient movement of people and goods. As such, none of the policies or implementing actions of the plan apply specifically to the proposed project.

1.3.14 State Water Resources Development Functional Plan (1984)

This functional plan primarily affects governmental operations. The purpose of the plan is to set forth specific water-related objectives, policies, programs and projects to guide state and county governments in implementing the broader objectives, policies and priority guidelines of the Hawaii State Plan. In essence, the plan presents guidelines for the regulation of the development and use of water to assure adequate supplies in the future; development of water resources to meet municipal, agriculture and industrial requirements and the reduction of flood damage; and preservation of water-related ecological, recreational and aesthetic values and the quality of water resources. With regard to the development and use of water to assure adequate supplies in the future, the proposed project includes provisions to develop potable and non-potable supplies in compliance with appropriate State Department of Health and Land and Natural Resources, Water Resources Development Commission rules and regulations. Non-potable sources would be used for golf course and landscaped area irrigation. Within this context, the proposed project is in concert with the State Water Resources Development Functional Plan.

1.4 COASTAL ZONE MANAGEMENT ACT (CHAPTER 205-A, HRS)

The objectives of the Hawaii Coastal Zone Management (CZM) Program, as set forth in Chapter 205A, HRS, include the protection and maintenance of valuable coastal resources. The proposed project conforms to applicable CZMP objectives as indicated below.

1. RECREATIONAL RESOURCES

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

1.b. Provide adequate, accessible and diverse recreational opportunities in the coastal zone management area by:

i. Protecting coastal resources uniquely suited for recreation activities that cannot be provided in other areas;

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

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

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

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

Response: Public access points to the shoreline fronting the project site will be created as part of the proposed project. A swimming lagoon will be created within the lodge facilities and provide needed recreational facilities for the guests and residents of the project. As noted previously in this EIR, the coastal resources found within the project boundaries will be retained for the use and enjoyment of the public.

2. HISTORIC RESOURCES

Objective:

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

Policies:

2.a. Identify and analyze significant archaeological resources;

2.b. Maximize information retention through preservation of remains and artifacts or salvage operations; and

2.c. Support state goals for protection, restoration, interpretation and display of historic resources.

Response: As has been noted previously, an archaeological survey of the project site has been performed and the recommendations of the consulting archaeologist followed. In addition, the community has been involved in the preparation of the archaeological resource mitigation plan and would continue to be involved in the implementation of that plan. Also as noted previously, an important element of the project is the establishment of an historic center that will serve as an educational feature of the project site.

3. SCENIC AND OPEN SPACE RESOURCES

Objective:

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

Policies:

3.b. Insure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.

3.c. Preserve, maintain, and where desirable, improve and restore shoreline open space and scenic resources.

Response: The proposed project would be in keeping with the present scenic resources of the area. Facilities would be low-rise type buildings that would maintain coastal views from mauka areas and facilities would be located such that views along the coast would not be obstructed. Coastal scenic resources will not be significantly affected as a major component of the proposed project is open space itself and landscaping will be incorporated into the project design to ensure the smooth visual integration of the project and makai views. All building and facility designs will conform to county general plan and zoning regulations.

4. COASTAL ECOSYSTEMS

Objective:

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

Policies:

4.a. Improve the technical basis for natural resource management;

4.b. Preserve valuable coastal ecosystems of significant biological or economic importance.

Response: A marine survey of the coastal area offshore of the project site has been performed to assist in the definition of measures that will be taken to protect those resources during construction and operation of the lodge. The results of that survey and the mitigation measures that will be employed are described in Chapter IV, Section 3.3 of this EIR. Chalon has also committed to a monthly coastal water quality monitoring program to obtain relevant baseline and comparative data.

5. ECONOMIC USES

Objective:

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

Policies:

5.b. Insure that coastal dependent development such as harbors and ports, visitor industry facilities and energy generating facilities are located, designed and constructed to minimize adverse social, visual and environmental impacts in the coastal zone management area.

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

ii. Adverse environmental effects are minimized.

Response: The proposed project would be constructed within an area that has already received approval of the county General Plan as an urban expansion/resort and agricultural area. The project and associated facilities are being designed and would be constructed such that potential adverse environmental effects would be minimized and mitigated. In general, the social and visual aspects of the proposed project are expected to be positive. The proposed project would add to the visitor and resident facilities of the area and aid in the long-term development of the area as one of the state's premier destination areas as well as a significant income generator of county and state revenues.

Historically, the Mahukona area has been associated with coastal dependent activities including shipping, transportation, fishing, and to some extent, tourism. The proposed project would enhance the association with coastal dependent tourism while preserving the linkages to historical coastal dependent activities.

6. COASTAL HAZARDS

Objective:

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

Policies:

6.b. Control development in areas subject to storm wave, tsunami, flood, erosion and subsidence.

6.c. Ensure that developments comply with the requirements of the Federal Flood Insurance Program.

Response: The governmental agency and public review of this EIR along with the various permits required for the proposed project ensure that adequate governmental controls on the project are being applied. The proposed project will be designed and constructed in compliance with all applicable federal, state and county environmental protection, design and building standards and regulations, including the Federal Flood Insurance Program.

7. MANAGING DEVELOPMENT

Objective:

Improve the development review process, communication and public

participation in the management of coastal resources and hazards.

Policies:

7.a. Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development.

7.b. Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements.

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

Response: This EIR has been prepared in compliance with existing state and county environmental rules (Chapter 343, HRS and Chapter 200, Department of Health, Environmental Impact Rules). It will be used as the environmental documentation required to apply for the required permits. Further, Chalon has been meeting with appropriate state and county agency personnel as well as affected and interested community groups and individuals to communicate the plans for the project and to solicit their comments for incorporation into the planning process and this EIR. . Public review of the Draft EIR also assures adequate public and governmental agency review of the project.

2. HAWAII COUNTY PLANS AND CONTROLS

2.1 HAWAII COUNTY SPECIAL MANAGEMENT AREA

The majority of the project area makai of Akoni Pule Highway falls within the "Special Management Area" (SMA) as defined by the Hawaii County Planning Commission under the provisions of Chapter 205A, Hawaii Revised Statutes and the county's Rule 9, Special Management Area. As such, an SMA permit application will be filed with the Hawaii County Planning Commission for the proposed project. That permit application will be supported in part by this EIR. In essence, county objectives and policies regarding the Special Management Area mirror the state objectives and policies as discussed in the preceding section (1.4). County SMA guidelines relevant to the proposed project are as follows:

Guidelines A.1, 2, 3,4 and 5

> These guidelines seek to minimize alterations to any body of water; impose restrictions on public access to tidal and submerged lands and beaches; interfere with or detract from the line-of-sight toward the sea; and minimize adverse effects on water quality and wildlife habitats.

Response: Although the proposed project would not affect the offshore area, the project is intended to expand and enhance the recreational opportunities available to the residents of the area as well as visitors to the lodge. The visual character of the proposed project is expected to be positive and assist in maintaining the open space character of the site. Views inland from the shoreline and views seaward from the highway are not expected to be adversely affected.

Guidelines B.1, 2 and 3

> These guidelines seek to minimize potential adverse environmental impacts; assure that projects are consistent with state objectives and policies; and assure that projects are consistent with the County General Plan.

Response: As indicated in Chapter IV, the proposed project is not expected to result in any adverse impacts that cannot be mitigated. The project is consistent with applicable provisions of the State's coastal zone management objectives and policies as indicated in the preceding section (1.5) and the project is located within the urban expansion area designated for resort development on the Hawaii County General Plan.

Guidelines C.1, 2, 3, 4, 5 and 6

> These guidelines seek to assure adequate public access to publicly owned beaches, recreation areas and natural reserves; reserve public recreation areas and wildlife preserves; and provide liquid and solid waste treatment, disposition and management that will minimize adverse effects on Special Management Area resources.

Response: As indicated previously, the proposed project includes provisions for public access to the shoreline; would provide additional recreational opportunities for the residents and visitors to the project area; and includes provisions to restore and preserve the archaeological/historical resources of the project area. Liquid and solid wastes will be

treated, disposed of and managed in compliance with applicable federal, state and county rules and regulations. Liquid wastes will be treated and disposed of in the wastewater treatment and disposal system to be developed as part of the project. Solid wastes would be collected and disposed of at approved county sanitary landfill sites.

2.2 HAWAII COUNTY GENERAL PLAN

The Hawaii County General Plan is the policy document for the long-range comprehensive development of the island of Hawaii and provides direction for balanced growth of the County. (The latest version of the General Plan, the result of a comprehensive review and revision process, has become available since completion of the draft EIR.) The Plan contains goals, policies and standards concerning thirteen functional areas as well as a series of land use maps referred to as General Plan Land Use Pattern Allocation Guide (LUPAG) Maps. The present LUPAG Map designations for the property are a mixture of resort, urban expansion and extensive agricultural. The proposed project is consistent with the present LUPAG Map designations. The proposed project is also consistent with the policies of the County General Plan. The Mahukona project is on the list of resorts in the land use element of the plan.

The relevant goals, policies and standards of the functional areas are discussed below.

A. ECONOMIC

Goals:

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

Policies:

- o The County of Hawaii shall strive for an economic climate which provides its residents an opportunity for choice of occupation.

- o The County of Hawaii shall encourage the development of a visitor industry which is consistent with the social, physical and economic goals of the residents of the County.

Standards:

- o The island of Hawaii should be developed into a unique scientific and cultural model. The island should become a model of living where economic gains are in balance with social and physical amenities. Development should be reviewed on the basis of total impact on the residents of the County, not only in terms of immediate short run economic benefits.

- o New industries which provide favorable benefit-cost relationships to the people of the County should be encouraged. Benefit-cost relationships as used here include more than fiscal considerations.

Response: The proposed project is consistent with these goals and objectives in its design, its mix of elements and its scale. The Lodge and associated facilities will be physically in concert with their surroundings. The residential/agricultural lots will increase diversified agricultural opportunities and provide other economic benefits to existing businesses.

B. ENERGY

Goals:

- o Strive towards energy self-sufficiency for Hawaii county.

- o Establish the Big Island as a demonstration community for the development and use of natural energy resources.

Policies:

- o The County shall strive to educate the public on new energy technologies and foster attitudes and activities conducive to energy conservation.

- o The County shall strive to assure a sufficient supply of energy to support present and future demands.

- o The County shall provide incentives which will encourage the use of new energy sources and promote energy conservation.

Standard:

- o New power plants shall incorporate devices which minimize pollution.

Response: To the extent possible, the engineering design of the Lodge and associated facilities will utilize appropriate technologies to ensure efficient use of energy. Opportunities to conserve energy in the areas of water heating, lighting, air conditioning, refrigeration and others, as appropriate, will be diligently explored.

C. ENVIRONMENTAL QUALITY

Goal:

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

Policies:

- o The County of Hawaii shall take positive action to further maintain the quality of the environment for residents both in the present and in the future.

- o Encourage the concept of recycling agricultural and municipal waste material.

Standards:

- o Pollution shall be prevented, abated, and controlled at levels which will protect and preserve the public health and well-being, through the enforcement of appropriate Federal, State and County standards.

- o Environmental quality controls are to be incorporated either as standards in appropriate or as conditions of approval.

- o Federal and State environmental regulations shall be adhered to.

Response: The visitor industry is dependent upon the maintenance of environmental quality for its very survival. Every effort will be made to maintain and improve environmental quality. All applicable pollution control measures will be employed. In the area of recycling, treatment plant effluents will be used to irrigate the golf course rather than being discharged to groundwaters or coastal marine waters. It is also very likely that landscape and golf course cuttings will be composted and that glass and paper will be recycled, thus reducing the stream of solid waste.

D. FLOOD CONTROL AND DRAINAGE

Goals:

- o Protect human life.

- o Prevent damage to man-made improvements.

- o Control pollution.

- o Prevent damage from inundation.

- o Reduce surface water and sediment runoff.

Policies:

- The County shall promote participation in the Soil and Water Conservation Districts' conservation programs for developments on agricultural and conservation lands.

- All development-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works.

- It is the responsibility of both the government and the private sector to maintain and improve existing drainage systems and to construct new drainage facilities.

Standards:

- "Storm Drainage Standards," County of Hawaii, October, 1970, and as revised.

- Applicable standards and regulations of Chapter 27, "Flood Control," of the Hawaii County Code.

- Applicable standards and regulations of the Federal Emergency Management Agency (FEMA).

- Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawaii County Code.

Response: The proposed facilities have been sited outside of the areas of flood hazards. All applicable standards and regulations will be followed in designing and maintaining the drainage system. Consideration will be given to mauka runoff and its drainage through the property. Temporary catchment systems will be employed to minimize runoff and siltation during construction.

E. HISTORIC SITES

Goals:

- o Protect and enhance the sites, buildings and objects of significant historical and cultural importance to Hawaii.

- o Access to significant historic sites, buildings and objects of public interest should be made available.

Policies:

- o Agencies and organizations, either public or private, pursuing knowledge about historic sites should keep the public apprised of projects.

- o The County of Hawaii shall require both public and private developers of land to provide a historical survey prior to the clearing or development of land when there are indications that the land under consideration has historical significance.

- o Public access to significant historic sites and objects shall be acquired.

- o The County of Hawaii shall encourage the restoration of significant sites on private lands.

- o Signs explaining historic sites, buildings and objects shall be in keeping with the character of the area or the cultural aspects of the feature.

Standards:

The evaluation of the importance of specific historic sites is necessary for future action. The following standards establish a framework for evaluating sites.

- o Importance in the life or activities of a major historic person.

- o Associated with a major group or organization in the history of the island or community.

- o Associated with a major historic event (cultural, economic, military, social, or political).

- o Associated with a major recurring event in the history of the community (such as annual celebrations).

- o Associated with a past or continuing institution which has contributed substantially to the life of the community.

- o Unique example of a particular style or period.

- o One of the few of its age remaining.

- o Original materials and/or workmanship which can be valued in themselves.

- o Sites with a preponderance of original materials in context and complexes rather than single isolated sites unless they are of great significance.

- o Sites of traditional and cultural significance.

Response: Archaeological surveys of the property were conducted and the results appended to this EIR. The plans for restoration, interpretation and public access to the sites and features present are completely in concert with the above goals and policies. Additional site surveys and identification is continuing by consulting archaeologists and the non-profit group Na Maka'ala 'O Kohala.

F. NATURAL BEAUTY

Goals:

- o Protect, preserve and enhance the quality of areas endowed with

natural beauty, including the quality of coastal scenic resources.

- o Protect scenic vistas and view planes from becoming obstructed.
- o Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

Policies:

- o Access easement to public or private lands which have natural or scenic value shall be provided or acquired for the public.
- o Standard criteria for natural and scenic beauty shall be developed as part of design plans.
- o The County shall consider structural setback from major thoroughfares and highways and shall establish development and design guidelines to protect important view planes.

Standards:

The following standards provide guidelines for designating sites and vistas of extraordinary natural beauty which shall be protected.

- o Distinctive and identifiable landforms distinguished as landmarks, e.g. Mauna Kea, Waipio Valley.
- o Coastline areas of striking contrast, e.g. Laupahoehoe Point.
- o Vistas of distinctive features.
- o Natural or native vegetation which makes a particular area attractive.
- o Areas which are harmoniously developed and enhanced by man so as to appear natural.

Response: The project has been designed and sited so as to have a minimal impact on scenic views, as analyzed in Chapter IV, Section 2.4. Furthermore, public access to the scenic coastline will be maintained and improved. Chalon's project includes structural setbacks along major thoroughfares.

G. NATURAL RESOURCES AND SHORELINE

Goals:

- Protect and conserve the natural resources of the County of Hawaii from undue exploitation, encroachment and damage.
- Provide opportunities for the public to fulfill recreational, economic, and educational needs without despoiling or endangering natural resources.
- Ensure that alterations to existing land forms and vegetation, except crops, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of earthquake.

Policies:

- The County of Hawaii should require users of natural resources to conduct their activities in a manner that avoids or minimizes adverse effects on the environment.
- The shoreline of the island of Hawaii shall be maintained for recreational, educational, and/or scientific uses in a manner that is protective of resources and is of the maximum benefit to the general public.
- The shoreline shall be protected from the encroachment of man-made improvements and structures.

- Encourage the use of native plants for screening and landscaping.

Standards:

The following shall be considered for the protection and conservation of natural resources.

- Areas necessary for the protection and propagation of specified endangered native wildlife, and conservation for natural ecosystems of endemic plants, fish and wildlife.

- Lands necessary for the preservation of forests, park lands, wilderness and beach areas.

- Lands with a general slope of 20% or more which provide open space amenities or possess unusual scenic qualities.

- Lands necessary for the protection of watersheds, water sources and water supplies.

- Lands with topographic, locational, soils, climate or other environmental factors that may not be normally adaptable or required for urban, rural, agricultural or public use.

- The Coastal Zone and Special Management Area as defined by statute and in accordance with the adopted objectives and guidelines.

Response: All components of the project are being designed to have minimal impact on visual resources. Landscape screens will be used where appropriate. All necessary precautions are being taken to avoid damage due to natural hazards. Natural resources will be used prudently to provide the public opportunities to fulfill recreational, economic and educational (relative to the interpreted historic sites) needs. Structures will be sited back from the shoreline and shoreline access will be maintained and improved. Consideration will be given to the use of native plants, especially those common to the area, in landscaping.

H. HOUSING

Goals:

- Attain safe, sanitary, and livable housing for the residents of the County of Hawaii.
- The cornerstone of the County's housing programs and activities shall continue to be the encouragement and expansion of appropriate home ownership opportunities for our residents.

Policies:

- The County shall encourage a volume of construction and rehabilitation of housing sufficient to meet growth needs and correct existing deficiencies.
- The County shall protect residential property values from depreciating influences.

Standards:

Housing standards shall consist of and comply with:

- Housing Code
- Building Code
- Electrical Code
- Plumbing Code
- Zoning Code
- Subdivision Code

- Standards of the single-family and multiple residential land use element.

Response: The project contains about 170 one-acre residential/agricultural lots on which individual owners may determine the appropriate dwelling size. Other elements of Chalon's master plan for its North Kohala properties, exclusive of this project, address the housing needs of a variety of segments of the community.

I. PUBLIC FACILITIES

Public facilities are separated into four groups in the General Plan: education, protective services, health and sanitation, and government operations. The goals, policies and standards provided pertain to provision of facilities by government agencies and, in the area of health and sanitation, by government and private entities. The following pertain to health and sanitation.

Goal:

- Encourage the provision of public facilities that effectively service community needs and seek ways of improving public service through better and more functional facilities which are in keeping with the environmental and aesthetic concerns of the community.

Policy:

- The County should encourage the development of new or improvement of existing health care facilities to serve the needs of Hamakua, North and South Kohala, and North and South Kona.

Standards:

- Sanitary landfill sites for refuse disposal shall be established in accordance with the needs of communities and shall be landscaped. Appropriately designed and cost effective transfer station sites shall be located in areas of convenience and easy access to the public.

Response: Chalon will continue to work with the County to identify appropriate sites for the necessary facilities, and to improve the existing ones.

J. PUBLIC UTILITIES

Goals:

- o Ensure that adequate, efficient and dependable public utility services will be available to users.
- o Maximize efficiency and economy in the provision of public utility services.
- o To have public utility facilities which are designed to fit into their surroundings or concealed from public view.

Policies:

- o Public utility facilities shall be designed so as to complement adjacent land uses and shall be operated so as to minimize pollution or disturbance.
- o Provide utilities and service facilities which minimize total cost to the public and effectively service the needs of the community.
- o Utility facilities shall be designed to minimize conflict with the natural environment and natural resources.

The Public Facilities functional group is subdivided into five subgroups: water, telephone, electricity, gas and sewer. Specific policies and standards within those areas are as follows.

(1) Water

Policies:

- o All water systems shall be built to Department of Water Supply standards.
- o Improve and replace inadequate systems.
- o Water sources shall be adequately protected to prevent depletion and contamination from natural and man-made occurrences or events.
- o The fire prevention systems shall be coordinated with water distribution systems in order to ensure water supplies for fire protection purposes.

Standard:

- o Water systems shall meet the requirements of the Department of Water Supply and the Subdivision Control Code.

(2) Telephone

Policy:

- o The County shall encourage underground lines where they are economically and technically feasible.

Standard:

- o In the development and placement of telephone facilities, such as lines, poles and substations, the design of the facilities shall consider the existing environment, and scenic view and vistas shall be considered and preserved where possible.

(3) Electricity

Policies:

- Power distribution shall be placed underground when and where feasible. The County shall encourage developers of new urban areas to place utilities underground.

- Route selection for high voltage transmission lines should include consideration for setbacks from major thoroughfares and residential areas.

- Safety standards for power systems shall conform to safety standards as established by appropriate regulatory authority.

Standards:

- There shall be a minimization of obstruction of scenic views and vistas by electrical facilities.

- Facilities such as substations shall be aesthetically pleasing.

(4) Gas

Policy:

- Gas storage facilities shall be located so as to minimize danger to commercial and residential areas.

Standard:

- The County's ordinances shall reflect appropriate safety standards for gas facilities.

(5) Sewer

Policies:

- The "Sewerage Study for All Urban and Urbanizing Areas of the County of Hawaii, State of Hawaii," December 1970 and the "Water Quality Management Plan for the County of Hawaii," December 1980, shall be used as guides for the general planning of sewerage disposal systems.

- Private systems shall be installed by land developers for major resort and other developments along shorelines and sensitive higher inland areas, except where connection to nearby treatment facilities is feasible and compatible with the County's long-range plans, and in conformance with state and county requirements.

- Schemes for wastewater reclamation and reuse for irrigation shall be utilized where feasible and needed.

Standards:

- Incorporate sewage works standards proposed in the "Sewerage Study for All Urban and Urbanizing Areas of the County of Hawaii" and the "Water Quality Management Plan for the County of Hawaii."

- Sewerage systems shall be designed for the particular area, depending on topography, geology, density of population, costs, and other considerations of the specific area.

Response: The proposed development is consistent with the goals, policies and standards for public utilities. Where availability and/or reliability are a question, Chalon will provide primary or back-up service. Facilities will be designed and landscaped to minimize visual intrusions. Utility lines will be installed underground. All applicable standards will be observed. A remaining unresolved issue is the route of the necessary transmission line into the area. Chalon is working with HELCO engineers to select a route with minimal visual impacts. Wastewater reclamation and reuse to irrigate the golf course is planned.

K. RECREATION

Goals:

- Provide a wide variety of recreational opportunities for the residents and visitors of the County.
- Maintain the natural beauty of recreation areas.
- Provide a diversity of environments for active and passive pursuits.

Policies:

- Recreational facilities in the County shall reflect the natural, historic, and cultural character of the area.
- Public access to the shoreline shall be provided in accordance with an adopted program of the County of Hawaii.

Response: The proposed project will offer a variety of active and passive recreational opportunities to residents and visitors alike. Public access to the shoreline will be maintained and improved.

L. TRANSPORTATION

Goal:

- Provide a transportation system whereby people and goods can move efficiently, safely, comfortably and economically.

Policy:

- The improvement of transportation service shall be encouraged.

Standard:

- Transportation systems shall meet the requirements of the State Department of Transportation and the County of Hawaii.

Response: Plans for parking, thoroughfares, streets and intersections comply with all state and county requirements and goals.

M. LAND USE

Goals:

- Designate and allocate land uses in appropriate proportions and mix and in keeping with the social, cultural, and physical environments of the County.

- Protect and preserve forest, water, natural and scientific reserves and open areas.

Policy:

- The County shall encourage the development and maintenance of communities meeting the needs of its residents in balance with the physical and social environment.

Standard:

- The designated land uses will be delineated on the General Plan Land Use Pattern Allocation Guide Map....

Eight types of land uses are addressed individually. Relevant goals, policies and standards are summarized and discussed below.

(1) Agriculture

Goal:

- Identify, protect and maintain important agricultural lands on the island of Hawaii.

Policies:

- Agriculture land shall be used as one form of open space or as green belt.

- Rural-style residential-agricultural developments, such as new small-scale rural communities or extensions of existing rural communities, shall be encouraged in appropriate locations.

(2) Commercial Development

Commercial development is not a part of the present proposal.

(3) Industrial

Industrial development is not a part of the present proposal.

(4) Multiple Residential

Multiple residential is not part of the present proposal.

(5) Single-Family Residential

Goals:

- To maximize choices of single-family residential lots and/or housing for residents of the County.

- To ensure compatible uses within and adjacent to single-family residential zoned uses.

Policies:

- Rural-style residential-agricultural developments, such as new small scale rural communities or extensions of existing rural communities, shall be encouraged in appropriate locations.

Standards:

- There shall be a transitional area between single-family residential areas and incompatible uses.
- Major traffic routes shall not be located through single-family residential areas.
- Areas shall have basic improvements and amenities necessary for immediate use.
- Areas shall be limited to low-density and medium density residential uses.

(6) Resort

Goals:

- Maintain an orderly development of the visitor industry.
- Provide for resort development that maximizes convenience to its users and optimizes the benefits derived by the residents of the County.
- Ensure that resort developments maintain the social, economic, and physical environments of Hawaii and its people.

Policies:

- The County shall designate and allocate future resort areas in appropriate proportions and in keeping with the social, economic, and physical environments of the County.

- The County shall encourage the visitor industry to provide resort facilities which offer an educational experience of Hawaii as well as recreational activities.

- Coastal resort developments shall provide public access to and parking for beach and shoreline access.

Standards:

The General Plan provides standards based on resort size. The following standards apply to Minor Resorts such as the Mahukona Lodge. A minor resort is generally an area with many small property owners or an isolated resort development without sufficient land area to develop into a self-contained destination area.

- Maximum hotel and condominium-hotel units: 500 Rooms.

- Resort acreage: 35 acres minimum.

- Provide active and passive recreational area commensurate with the scale of development.

- The required employee housing ratio and method of provision shall be determined by an analysis of housing needs of each district or relative area and with the adoption of the resort zoning; provided that the ratio shall not exceed one employee unit for every two hotel units built.

(7) Open Space

Goal:

- Provide and protect open space for the social, environmental, and economic well-being of the County of Hawaii and its residents.

Policy:

- Open space in the County of Hawaii shall reflect and be in keeping with the goals, policies, and standards set forth in the other elements of the General Plan.

(8) Public Lands

Goal:

- Utilize publicly owned lands in the best public interest and to the extent possible, to the maximum benefit for the greatest number of people.

Policy:

- Encourage uses of public lands which will satisfy specific public needs, such as housing, recreation, open space and education.

Response: The scale and design of the proposed development is in keeping with the social, cultural and physical environment. Most of the land will be in a form of open space, either golf course or small-scale agriculture/residential. The development is in conformance with the LUPAG Map, although its core area is smaller than the guideline for minor resorts. The rural-style residential-agricultural lots will be a significant feature of the project providing benefits in the areas of agriculture, single-family residences and an open space buffer. Public access to the shoreline and to Mahukona Harbor will be maintained and improved. Parking will be provided. Active, passive and educational types of recreational opportunities will be provided. The size of the development is well under the indicated maximum number of hotel units for a minor resort.

Section 5 of the General Plan provides "Courses of Action" for the districts of the island. Relevant recommendations for North Kohala stated in Subsection "E" include the following.

(1) Economic

- o Resort facilities compatible with the physical, social and economic goals of the residents of the district should be encouraged.

(2) Flood control and Drainage

- o Drainage systems proposed by the Hawaii County "Drainage Master Plan" for the Hawi and Honomakau-Kapaau areas shall be implemented.

(3) Housing

- o The County shall require that developments which create a demand for employee housing shall provide for that need.

(4) Public Facilities

This area is provided for by government agencies.

(5) Public Utilities

- o Encourage efforts to improve the Kohala ditch system and its use for agriculture purposes.

(6) Recreation

- o Recommend the expansion of small boat harbor facilities at Mahukona Harbor and multi-use recreation area on adjacent lands.

(7) Transportation

(a) Thoroughfares and Streets

- o Improve mauka-makai county maintained homestead roads and encourage improvement of the non-county owned roads by the State of Hawaii or private subdivision.

(8) Land Use

(a) Agriculture

- o Assist in the further development of diversified agriculture in the district.

- o Encourage the maintenance of and the more intensive utilization of the Kohala Ditch irrigation system for agricultural production.

(e) Single-Family Residential

- o The County shall encourage the concentration of residential structures to avoid strip residential development.

- o The County shall aid and encourage industry to make available residential lands in the area for employee housing and the private market.

(f) Resort

- o Consider possible development of resort facilities at Mahukona.

- o Consider small-scale retreat resort development.

Response: Chalon has worked diligently with members of the Citizens Participation Committee, its subcommittees and various members of the community to plan a low-profile resort that assimilates physical, social and economic goals of the participants. Drainage and

flood control measures will be accommodated in the design stages of the project. Chalon will continue to work with the county to determine the location, amount and timing of employee, as well as affordable, housing required for the project. Chalon is seeking users for Kohala Ditch water for agricultural purposes so that revenue can be generated to continue maintenance of the system. Presently, Chalon does not plan to expand the boat harbor facilities at Mahukona, however, Chalon is actively participating in the renovation and refurbishment of the existing boat winch. Discussions continue with other harbor users regarding the concept of a small boat launch ramp. In regards to multi-use recreation on adjacent land owned by the State of Hawaii, the existing Mahukona Park already serves this purpose. Should the State of Hawaii and the county, as well as the community members, desire to expand or improve the facilities, Chalon will actively participate. Chalon's proposal results in the creation of new private roads and the improvement of the county access road to the Mahukona Harbor and Park. This proposal does provide for a marginal increase in diversified agriculture, as the residential/agricultural lots must conform to state agriculture land use practices. Chalon is actively pursuing maintenance and more intensive utilization of the Kohala Ditch irrigation system for agriculture production. The site design concentrates the residential structures purposely avoiding any and all strip development. Chalon's proposal, the subject of this EIR, is pursuing the development of resort facilities at Mahukona, which is in direct concert with the stated course of action.

2.3 WEST HAWAII REGIONAL PLAN

The West Hawaii Regional Plan (Office of State Planning, 1989), was prepared because of the state's interest in formulating and implementing a plan for West Hawaii that would (1) coordinate state activities in the region in order to respond more effectively to emerging needs and critical problems, (2) address areas of state concern, (3) coordinate the capital improvements program within a regional planning framework and (4) provide guidance in the state land use decision-making process. The plan addresses critical topical issues which require state attention in order to most effectively meet the region's present and emerging needs. The West Hawaii Regional Plan is meant to complement the County General Plan and Community Development Plans.

With specific reference to the proposed project, the Mahukona project area is not recognized in the West Hawaii Regional Plan as a "proposed development" and is located outside of four "resort destination nodes" currently identified. The County General Plan, however, designates the area primarily as resort, urban expansion and extensive agriculture.

The Mahukona project relates to the West Hawaii Regional Plan in that it fosters the economic well being of Hawi, which is recognized as a secondary support area.

Aside from being geographically separated from one of the resort nodes, development of the Mahukona Lodge will preserve the best agricultural lands, as well as provide a source of tourism and related service industries which will provide income and employment opportunities within Kohala. Mahukona, in the context of Chalon's overall master plan for the entire area will function as an economic generator which will assist in the further development of agriculture, aquaculture, recreation, and affordable housing ventures throughout the district.

2.4 HAWAII COUNTY ZONING

The present county zoning designation of the subject property is A-1a and Unplanned. The developer will apply for a Change of Zone from Hawaii County to allow development of the proposed project.

The proposed zoning is Open District to permit the golf course, Resort District (V-2.0) to permit the Lodge and villas and RA-1a, Residential and Agricultural, to permit the residential/agricultural lots.

Concerns were expressed in letters of comment on the draft EIR regarding potential land uses permitted on RA zoned land. The RA zone provides for low density, large lot suburban or rural areas where the principal use is residential mixed with compatible agricultural uses. It may be characterized by residential estates, small farms, or subsistence lots. The following uses are permitted in RA districts:

(1) One single family dwelling per building site.

(2) Botanical gardens, nurseries and green houses, seed farms, plant experimental stations, arboretums, floriculture, and similar uses dealing with the growing of plants.

(3) Truck gardening, crop, bush and tree farming, and all forms of plant agriculture.

(4) Except for cooking and canning, any physical processing, storage and sale of plant products produced on the premises....

(5) The raising or keeping of animals, except pigs, for home use or for sale elsewhere, with certain restrictions.

(6) The raising and keeping of pigs, with certain restrictions.

(7) Golf courses, country clubs, swimming parks, tennis clubs and courts, and other similar recreational uses.

(8) Public parks, public playground, and other similar public recreational areas that are essentially open lands.

(9) Home occupations.

(10) Commercial or boarding stables, when on a parcel of land containing at least five acres.

(11) Private clubs, lodges, hunting and fishing lodges, and fraternal and social orders.

(12) Guest or resort ranches.

(13) Airfields, heliports, and private landing strips.

(14) Driving ranges, drive-in theaters, stadiums, sports arenas, and other similar open air recreational uses.

(15) Veterinarian's office, clinic or animal hospital involving in-patient boarding only.

(16) Aquaculture activity.

(17) *Subject to approval by the director, buildings and uses accessory to the above* permitted uses.

It should be noted that the above uses must also be in conformance with permitted uses of the state Agricultural District.

2.5 DECISIONS ACTION 90'S: STRATEGIES FOR A STRONGER COMMUNITY

In recent years a group of concerned and involved Big Island residents initiated a process whereby they can provide input to community decision making and the allocation of resources. Phase I of the process identified five broad issue areas for consideration: development, housing and transportation; education; health and social functioning; income and material needs; and safety and environment.

Phase II of the process resulted in production of 43 strategy papers written by volunteers. Implementation (Phase III) was scheduled to begin in 1990.

The Phase II report, containing the strategy papers, for the most part consists of recommendations appropriately directed toward one or another level of government. Certain conclusions of relevance to the proposed development, however, are summarized here.

- o It is recommended that clear, logical formulae be developed to determine cost/benefit ratios for County infrastructure projects. If such formulae can be found, they would also serve to establish who should pay for infrastructure (State, County, or private sector).

- o It is recommended that in addition to impact fees, which have some limitations in their use, other methods of raising money to pay for infrastructure should be explored. Presently excise taxes on development are being used by several communities to circumvent the limitations of impact fees.

- o The major developers should be required to provide affordable housing for all proposed employees who cannot afford available housing. The developers/owners must conduct a housing study to determine the number of employees who will need assistance.

- o Devise matrix formulae for determining specific impact fees required for each development project so that the developers will know what their costs will be, when they must be paid, and how they will be collected. The county is currently working on such formulae and should be encouraged to complete and implement them quickly.

- o Require each new development (resort hotel, commercial, industrial, etc.) to pay impact fees sufficient to provide the required infrastructure.

- o Require developers of major resort or industrial projects to provide affordable housing for a larger percentage of their low income employees/families.

- o Eliminate the redundancy in land use approval process.

- o Require each developer of a major project to submit social, economic and environmental impact statements with a review by selected members of the affected communities as well as by the Planning Commission.

- o Each major project shall have a master plan that includes a social, economic and environmental impact statement; infrastructure requirements; specific impact fees; specific time table for development; agreements between the developer and the county, etc., which is coordinated with the general plan and affected industry master plans.

- o Require that development proposals include expected energy consumption profiles to allow comparison with energy supplies projected to be available through the mature states of the development process.

- o Develop plans for agriculture, transportation, and sewage/trash systems which are energy efficient and sustainable over long periods of time.

Response: Chalon is in agreement with the general sentiment expressed that a major project should be master planned to fit into the fabric of the affected community. This is being done with the Mahukona Lodge project and all of Chalon's planned developments in North Kohala. Furthermore, as evidenced by the details of the present project, Chalon is committed to providing housing for its employees and to providing its share of infrastructure development costs, either directly or indirectly. Finally, Chalon's commitment to disclosure of its intentions and their possible social, economic and environmental impacts is evidenced by this document.

2.6 NORTH KOHALA COMMUNITY DEVELOPMENT PLAN

There are numerous references in the North Kohala Community Development Plan to the employment opportunities and economic base that the South Kohala resorts have and will continue to provide for North Kohala residents. The plan notes that the South Kohala resorts and tourism development fill the employment gap that has been left as a result of the closure of North Kohala sugar plantations. This gap is less now than in the past due to progressive development in the North Kohala area itself. The proposed project will assist in providing employment opportunities to the people of North Kohala and will provide those opportunities without the need to commute the longer distances to the South Kohala resort

areas. South Kohala resorts will still depend, to a certain degree, on the North Kohala area as a source of employees. This will most likely increase the competition for employees. However, as noted in Chapter IV, Section 5, it is unlikely that many current employees will leave their present jobs due to loyalties to current employers. The extent of competition that may develop is unknown at this time and will, to a certain extent, depend on the timing of new resort development in South Kohala and the pace of development in North Kohala. It is expected that a certain amount of visitor industry employee housing would be developed in North Kohala as part of the overall Chalon North Kohala Master Plan. The extent to which such development might be directed to the southern portion of the district is unclear at this time.

The land use concept plan specifically designates the project site as "Coastal Resort," "Unplanned" and "Open." Further, the resort land use component mirrors statements made in the General Plan with reference to Mahukona: "Designate Mahukona Harbor for a small coastal resort facility as indicated in the County General Plan."

3. PLANS OF NEARBY COMMUNITIES

No regional plan has been prepared for South Kohala. In addition to the West Hawaii Regional Plan, the following plans have been examined to note the relevance and position of the South Kohala resorts in the planning for these nearby communities and the overall West Hawaii area.

3.1 KONA REGIONAL PLAN

The Kona Regional Plan has references to the North and South Kohala Resorts only in the Economic Activities and Land Use chapters. The relationship between the visitor facilities in the Kona and Kohala districts is noted several times. The competition that the destination resorts in North and South Kohala will pose for Kona's visitor industry is stressed. Since publication of the Kona Regional Plan, and initial development of the North Kona and South Kohala resorts, visitor industry facility development in North Kohala (the proposed project) and Ka'u District has also been proposed. As noted previously, this development will add to the competition for employees and increase demands on public services as well as increase the need for affordable employee housing. In addition, the opportunities for industrial expansion in the area immediately north of Kailua/Kona is noted in the Kona Regional Plan. At present, there appears to be a need for additional

light industrial facilities and siting opportunities, in the Kona area, for businesses that would serve the visitor industry as well as the growing population of the West Hawaii area in general. Employment opportunities related to the industrial and service sectors that the South Kohala resorts, and proposed project, will create for West Hawaii residents are in addition to the direct jobs that the proposed project will provide.

It is expected that the economies of the Kohala and Kona Districts will become more and more interdependent, especially as both are largely based on the tourism industry. Thus, land use and facilities planning has to be coordinated. The proposed project recognizes this interdependence and will provide another recreational facility for use by both residents and visitors to the South Kohala and Kona area resorts.

3.2 WAIMEA DESIGN PLAN

The Waimea Design Plan makes one brief mention of the prospects for continued growth in the town due to the resort developments on the coast. However, as indicated above, increased development of the North Kohala and Waimea areas is occurring and is expected to continue as market demands for "country" type living opportunities increase and are met. As increased development of the Waimea area continues, along with increased development of tourist related facilities in South Kohala, the interdependence of the two areas will also increase.

4. STATE ENVIRONMENTAL IMPACT STATEMENT REQUIREMENTS

4.1 CHAPTER 343 (HAWAII REVISED STATUTES)

Section 343-5(a) of Chapter 343 HRS states that except as otherwise provided, an environmental assessment shall be required for eight (8) different types of actions that utilize state lands and/or monies, propose actions in Conservation District Lands, require the redesignation of Conservation District Lands to another classification or are concerned with helicopter facilities. The proposed action does not fall within any of the categories of actions that require an environmental impact statement. However, because of the potential impacts that may be caused by the proposed action and in keeping with Chalon International of Hawaii, Inc.'s commitment to preservation and protection of the environmental character of the project area and in consideration of the sensitivity of the North Kohala community's feelings regarding the Mahukona area, this EIR has been

prepared. As noted previously, the overall North Kohala Master Plan and the proposed project have been developed with considerable community input and participation. That input and participation will continue in an effort to assure that the concerns of the community are incorporated into Chalon's development plans.

Upon completion of review of the Draft EIR, incorporation of appropriate review comments and agreement by the County Planning Department that the EIR adequately addresses environmental issues, Chalon will be requesting redesignation of the Agricultural District lands into the Urban District by the County of Hawaii Planning Department, Planning Commission and County Council. Additionally, a Special Management Area permit and Change of Zone and other permit requests from the County Planning and other Departments will be requested. With approval of these requested land use changes and permits, the proposed development at Mahukona would conform with relevant state and county land use regulations, as well as other regulations pertinent to the proposed development.

Mahukona

Chapter VI: Topical Issues

CHAPTER VI

TOPICAL ISSUES

1. RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

Analyses of various on-site environmental features have found the Mahukona Lodge property to possess physical attributes that are desirable both as amenities in a residential/resort development and for their own sake. These attributes include magnificent ocean and mountain views, relatively flat terrain and dry, warm climate. The studies performed (see Chapter I, Section 3.0) have also indicated that the proposed project is compatible with and will enhance the existing natural environment. The specific measures that will be employed to mitigate potential adverse environmental impacts, as discussed in Chapter I, Section 4.0 and Chapter IV, would be followed in the design, construction and operations phases of the project.

No short-term exploitation of resources that will have negative long-term consequences has been identified. The proposed residential/resort development as envisioned by the developer will be of the same high quality as selected other West Hawaii resorts and will be designed to last for decades. The principal long-term benefits of the proposed project include the productive use of the property at a lower density than that which is presently allowed and the provision of a needed recreational facility that will serve North Kohala and West Hawaii residents and visitors alike. Increased residential, resort, recreational and economic opportunities for all socioeconomic levels would be provided along with increased community services and activities. The proposed project is a logical extension of the residential/resort community that is developing in the North Kohala-West Hawaii area. Open spaces surrounding the project site and vistas to the ocean and mountains would be retained for the long-term benefit of residents and visitors to the area.

As noted in the discussion of alternatives to the proposed project (Chapter III), one short-term use of the property would be to retain the present vacant status of the property. This appears to be a less than optimum use of the property. As lodge facilities, residential units and amenities are developed, significant socioeconomic benefits to the community will result, in the form of increased job opportunities and increased tax revenues. Direct, full- and part-time employment opportunities and temporary construction employment will be

generated by the project and these in turn will have benefits that ripple through the regional and island economy. Similarly, indirect and induced employment will be generated in those industries and services that cater to the construction and service related businesses serving the proposed project. Public revenues from excise, personal and real property taxes are expected to more than offset any expenses associated with the expansion of public services to meet the requirements of the proposed project development and indirect population growth (see Chapter IV, Section 5).

2. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The development of the proposed project and resultant construction of detached single family units, lodge facilities, restaurants, etc. and recreational facilities would result in the irreversible and irretrievable commitment of certain natural and fiscal resources. Major resource commitments include the land on which the project is located and on which the facilities would be constructed, as well as money, construction materials, manpower and energy. The impacts of using these resources should be weighed against the expected positive socioeconomic benefits to be derived from the project versus the consequences of taking no action or adopting another less beneficial use of the property.

A significant portion of the property would remain as open space (golf course, shoreline, public areas). In addition, the project would include landscaping planted along the roadways and buildings and around the residential units, contributing positively to the aesthetic character of the area.

The commitment of resources required to accomplish the project includes building materials and labor, both of which are generally non-renewable and irretrievable. Construction of and resultant travel to/from the project by residents and visitors, would require the consumption of petroleum products and petroleum based electrical generation. This, too, represents an irretrievable commitment of resources.

The proposed project does not call for a substantial commitment of government supplied services or facilities that would not be required without the proposed project. The project would add to the cultural and recreational facilities available to the residents of the project and the North Kohala and West Hawaii areas in general. Similarly, the project would add to the tax revenues of the county and state.

3. OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES

By the very existence of a complex system of land use policies, plans, goals, objectives and controls at both the state and county levels of government, development proposals requiring land reclassification are often faced with inherent contradictions and conflicts within the land use regulatory system. As such, the project must be reconciled against those privately and publicly planned elements that may appear to conflict with the proposed project. As indicated in Chapter V, the proposed project is generally consistent with the applicable Hawaii State Plan and various Functional Plans, the County General Plan and various Community Plans goals, policies and standards relating to the future growth of the North Kohala/South Kohala/West Hawaii areas. Granting the requested permits would enable the project to meet the initial land use regulatory requirements. Other actions, including application for and acceptance of zoning and subdivision requests would enable the project to meet all land use regulatory requirements. Further, the analysis of public revenues versus public expenditures indicates an extremely favorable ratio of revenues to expenditures (see Chapter IV, Section 5). Public access to and along the beach would be improved and the coastal resources of the area would be preserved as would significant historical/archaeological sites.

4. UNRESOLVED ISSUES

Chalon International of Hawaii, Inc. is aware of many questions and public concerns at this time regarding the proposed project. Chalon has been and will continue to work with the residents and businesspeople of the area, as well as administrative and elected officials to assure that the final development plans meet the developer's project objectives and satisfactorily address concerns that have been raised to date as well as those that may be raised during public review of this EIR.

A specific unresolved issue at this time is the route of the required high voltage electrical transmission line into the area. Chalon is working with HELCO engineers to discuss both possible power generating options and alternatives for transmission line routing.

Mahukona

Chapter VII: *Public Involvement*

CHAPTER VII

PUBLIC INVOLVEMENT

1. INTRODUCTION

This Chapter describes the public involvement program to which the proposed project and this EIR have been subjected.

2. CITIZENS PARTICIPATION COMMITTEE

As noted in Chapter I, Chalon has participated and worked with a Citizens Participation Committee (CPC), comprised of residents of the North Kohala area, in the development of its concept for the proposed project. The CPC consists of Agriculture; Housing; Natural Resources/Environmental Quality; Public Infrastructure; Recreation and Access; Historic and Cultural Resources; and Commercial and Industrial Land Use subcommittees. Meetings with the CPC and several subcommittees have been held since April 1989. A partial list of those meetings is provided in Table VII-1.

The members of the CPC are as follows: Jeff Coakley, David Fuertes (Agriculture Subcommittee Chairperson), Larry Gaddis, Mike Gomes (Housing Subcommittee Chairperson), Bill Graham (Environment and Natural Resources Subcommittee Chairperson), Harold Higa, Ikuo Hisaoka, Margaret and Ed Hoshida, Jeanne Hughes, Collins Kaholo (Public Infrastructure, Recreation and Access Subcommittee Chairperson), Mike Luce, Harris Moku, Mel Pobre, Kelii Sine (Commercial and Industrial Land Use Subcommittee Chairperson), Marlenajon Stafford (Historic and Cultural Resources Subcommittee Chairperson) and Shiro Takata.

The following are highlights of the CPC recommendations.

<u>Housing</u>

- Develop affordable housing in the area between Hawi and Kohala High School because it is already close to a residential area and infrastructure costs would be relatively low.

- o Proceed with Phase 2 of the Ainakea housing project, but with safeguards to ensure that housing built there is affordable.

- o Develop a well-designed, affordable multi-unit residential complex designed to meet the needs of young adults, young married couples and the elderly.

Public Infrastructure/Recreation/Access

- o Keep Kohala Ditch in private hands and improve and maintain the ditch and delivery system.

- o Work with the County to relocate and expand Pololu Lookout, install sanitary facilities and an emergency telephone and build a viewing pavilion.

- o Restore the old railroad as far as Upolu and eventually to Niulii.

- o Work with the County to study an "urgent care" center at or near the North Kohala Hospital.

- o Expand facilities at Mahukona Park, including more pavilions and restroom facilities, improved access to the ocean and parking, new volleyball courts and camping areas.

- o Expand facilities at Kamehameha Park, including leaving in open space the area from the present park boundary to the shoreline and building a jogging and biking trail around the perimeter.

Natural Resources/Environmental Quality

- o Maintain the natural open character and viewplanes along the coastline; maintain the mauka views along Akoni Pule Highway; and maintain the viewplanes along Kohala Mountain Road.

- o Maintain free of development the shoreline area with no restrictions on lateral access along the shoreline.

- o Retain the traditional storefront architectural design in Hawi and Kapaau.

- o Retain the open park-like area in the center of Hawi.

- o Facilitate access to the forest reserve and to the shoreline for residents.

Historic/Cultural Resources

- o Develop a community center where residents may establish, embellish and perpetuate their heritage.

- o Preserve important historic sites, improve their upkeep and allow public access to them.

- o Take an archaeological survey of the area before development of lands.

Commercial/Industrial

- o Develop a light industrial complex on the west outskirts of Hawi close to the Upolu Airport.

- o Develop a mini-mall with a "country-style" atmosphere close to the Hawi area.

- o Develop, promote and expand other commercial and industrial enterprises, including aquaculture.

Agriculture

- o Retain for agricultural purposes the area between Hoea and Upolu roads from Akoni Pule Highway to the SMA boundary.

- o Preserve the existing aquacultural operations east of Hawi.

- o Upgrade Kohala Ditch and its water distribution system, and make a top priority the availability of a reliable water source to local farmers.

- o Develop an agricultural roadside stand on the main highway.

- o Implement Phase 2 of the Kahei agricultural lots.

- o Establish "community gardens" in agricultural parks that would allow residents to grow their own food or supplement their income.

3. KOHALA COMMUNITY ASSOCIATION

In addition to the CPC meetings, Chalon met with the Kohala Community Association in June 1989 and January 1990 to discuss plans for Mahukona and to assure that the association was aware of Chalon's plans. Chalon also met with the Planning Committee of the Kohala Community Association in August 1990.

4. PUBLIC REVIEW OF DRAFT EIR

The Draft EIR was distributed to the federal, state and county governmental agencies and private groups and interested parties identified in Table VII-2. As noted in Chapter I, although an environmental impact statement for the proposed project is not required, Chalon has prepared this EIR to assure that governmental agencies and private groups are aware of Chalon's plans for the Mahukona area. At the conclusion of the review period, responses to comment letters were prepared and, where appropriate, comments incorporated into this Final EIR. All comment letters received and responses thereto are included in this Final EIR. Table VII-3 lists agencies and individuals commenting on the Draft EIR.

TABLE VII-1

DATES OF CPC MEETINGS

CPC OR SUBCOMMITTEE						
CPC	AGRI.	HOUSING	NATURAL RES.	INFRASTR.	HIST.	COM/IND
02/08/89	04/05/89	06/28/89	06/19/89	06/21/89	08/09/89	06/20/89
02/22/89	04/12/89	07/19/89	07/17/89	07/12/89	09/21/89	07/11/89
03/08/89	06/07/89	09/13/89	09/21/89	07/26/89	10/09/89	07/25/89
04/05/89	06/21/89	10/18/89	09/27/89	08/30/89		
05/03/89	07/05/89	11/27/89	10/19/89	09/27/89		
06/06/89	07/12/89		11/22/89	10/18/89		
07/05/89	07/26/89			11/02/89		
08/04/89	08/23/89			11/15/89		
09/06/89	08/29/89			11/29/89		
10/04/89	09/13/89			11/13/90		
11/08/89	10/03/89			03/20/91		
11/20/89	11/28/89					
12/06/89	05/03/90					
01/10/90	08/29/90					
04/18/90	09/06/90					
05/17/90	11/09/90					
08/06/90	03/20/91					
10/17/90						
03/12/90						

TABLE VII-2

DRAFT EIR DISTRIBUTION LIST

Federal Agencies

Department of Agriculture, Soil Conservation Service
US Environmental Protection Agency
Department of Commerce, National Marine Fisheries Service
Department of the Interior, Fish and Wildlife Service
Department of the Interior, Geological Survey

State of Hawaii

Office of the Governor
Department of Agriculture
Department of Business and Economic Development
Department of Education
Department of Hawaiian Home Lands
Department of Health
Department of Labor and Industrial Relations
Department of Land and Natural Resources
Department of Social Services and Housing
Department of Taxation
Department of Transportation
Housing Finance & Development Corporation
Office of Hawaiian Affairs
Office of State Planning
Office of Environmental Quality Control
University of Hawaii, Manoa, Environmental Center

Libraries

Hilo Library
Kona Library
Hawaii State Library, Honolulu
University of Hawaii Hamilton Library
Kohala Library

TABLE VII-2

DRAFT EIR DISTRIBUTION LIST
(Continued)

State Legislature

Senator Richard M. Matsuura
Senator Malama Solomon
Senator Andrew Levin
Representative Virginia Isbell
Representative Michael O'Kieffe
Representative Wayne Metcalf
Representative Harvey Tajiri
Representative Dwight Takamine
Representative Jerry Chang

Hawaii County

Office of the Mayor
Planning Department
Department of Public Works
Department of Parks and Recreation
Department of Water Supply
department of Research and Development
Fire Department
Police Department
Office of Housing and Community Development
Civil Defense Agency
Finance Department
Hawaii Redevelopment Agency

County Council

Russell Kokubun, Chairman
Merle K. Lai, Vice Chairman
Takashi Domingo
Helene H. Hale
Lorraine R. Inouye
Robert K. Makuakane
Harry S. Ruddle
Spencer Kalani Schutte
Stephen K. Yamashiro

TABLE VII-2

DRAFT EIR DISTRIBUTION LIST
(Continued)

Public Utilities

Hawaii Electric Light Company
Hawaiian Telephone

Community Organizations, Individuals and other Public Interest Groups

Hawaii Island Chamber of Commerce
Big Island Business Council
Hawaii Hotel Association
Hawaii Visitors Bureau - Hawaii Island Chapter
Japanese Chamber of Commerce
Kona/Kohala Chamber of Commerce
Hawaii Portuguese Chamber of Commerce
ILWU, Hawaii Division
Destination Hilo
Hawaii Island Carpenters Union
Hawaiian Civic Club
Kohala Hospital
Kohala Citizens Participation Committee
Kohala High and Elementary School
Kohala Senior Citizens Club
Friends of Kohala
Citizens for Protection of the North Kohala Coastline
Na Ala Hele
Kohala Community Association
Na Maka'ala 'O Kohala

TABLE VII-3

COMMENTS RECEIVED ON THE DRAFT EIR

U.S. Department of the Interior Geological Survey Water Resources Division	7/17/90*
State of Hawaii Department of Taxation	7/19/90*
County of Hawaii Fire Department	7/20/90
U.S. Department of Agriculture Soil conservation Service	7/20/90
County of Hawaii Department of Public Works	8/1/90
State of Hawaii Office of State Planning	8/7/90
State of Hawaii Department of Education	8/8/90
State of Hawaii Department of Labor and Industrial Relations	8/9/90*
Mr. Bill Graham	8/18/90
Mr. J.F. Johnson	8/18/90
Ms. Marian Johnson	8/20/90
Mr. J.F. Johnson Hawi East Zoning Committee	8/20/90
Ms. Toni Withington, Chairman Kohala community Association Planning Committee	8/20/90
Ms. Toni Withington, Chairman Citizens for Protection of the North Kohala Coastline	8/20/90

TABLE VII-3

COMMENTS RECEIVED ON THE DRAFT EIR
(Continued)

Ms. Margaret Hoshida Kohala Hawaiian Civic Club	n.d.
County of Hawaii Department of Parks and Recreation	8/20/90*
County of Hawaii Planning Department	8/20/90
Ms. Mililani B. Trask Kia'aina, Ka Lahui Hawai'i	8/20/90
Mr. Fred Cachola, Jr.	8/20/90
State of Hawaii Department of Agriculture	8/20/90
State of Hawaii Department of Budget and Finance Housing Finance and Development Corporation	8/27/90
Ms. Toni Withington, Chairman Kohala Community Association Planning Committee	8/28/90
Hawaii Electric Light Company	8/28/90
Dr. Kelii Sine	9/1/90
State of Hawaii Department of Health	9/17/90
State of Hawaii Department of Land and Natural Resources State Historic Preservation Division	1/9/91

* No substantive comment.

KAHEKILI HIGHWAY WIDENING AND INTERCHANGE
Location: Windward, Oahu
TMK: 4-5-02
4-5-25
4-5-26

Proposing Agency: Department of Transportation Highway Division

Accepting Authority: Governor, State of Hawaii c/o Office of Environmental Quality Control

Status: Currently being processed by the Office of Environmental Quality Control

The Kahekili Highway Widening and Interchange project is located on the Windward side of Oahu between Likelike Highway in Kaneohe and Kamehameha Highway near Kahaluu Stream. Kahekili Highway passes through Kaneohe, Hecia, Haiku and Ahuimanu. The proposed project involves the construction of a traffic interchange at the intersection of Likelike and Kahekili Highways and the widening of Kahekili Highway from a two-lane road to a multi-lane, divided facility from the interchange to Kamehameha Highway, a distance of approximately 4.4 miles.

The existing Kahekili Highway, a two-lane facility, intersects Likelike Highway, a four-lane, divided facility, at a T-type of intersection. A third lane between Likelike Highway and Haiku Road was recently completed to accommodate left turning movements in both directions. Kahekili Highway was constructed as the first increment of a future four-lane divided highway within a minimum 120 feet right-of-way. Kahekili Highway is a principal arterial roadway which connects the communities of Kahaluu and the Koolaukoa coast to Likelike Highway. The other major roadway in the Kaneohe-Kahaluu corridor is Kamehameha Highway. Kamehameha Highway is a major collector road which passes through Kaneohe Town.

NEPA DOCUMENTS

The following documents have been prepared pursuant to the requirements of the National Environmental Policy Act of 1969. Should you require further information on these projects, please call the Office of Environmental Quality Control at 548-6915.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

1800 MEMBER U.S. ARMY RESERVE CENTER AND ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE SHOPS AT FORT SHAFTER
Location: Honolulu, Oahu
TMK: 1-1-08:01

Proposing Agency: Commander U.S. Army Support Command, Hawaii

Please send your comments to:

Consultant: Commander
U.S. Army Engineer Division, Pacific Ocean
c/o Captain Katherine Woodward
Attn: CEPOD-ED-M
Fort Shafter, Hawaii 96858-5000

The proposed action consists of two Military Construction, Army Reserve Fiscal Year 1992 projects: the U.S. Army Reserve Center and Organizational, Direct Support and General Support Maintenance Facility. These two projects are required to move the Army Reserve units from Fort DeRussey in advance of the construction proposed for that area.

The Reserve Center consists of an administrative building, education/assembly building, and unit storage building. The Maintenance Facility is one double story building with associated parking area.

The major environmental concern was with the historical significance of the area. The Bishop Museum conducted a survey of the area. The suggested plan is that the area be remembered with an appropriate plaque. The archaeological significance of the area will be studied prior to construction.

The proposed action did not constitute a major federal action having singly or cumulatively significant effects on the quality of human environment. Therefore, a Federal Environmental Impact Statement is not required.

NOTICES

AVAILABILITY OF REPORT

HAWAII'S ENVIRONMENT 1988: THE ANNUAL REPORT OF THE ENVIRONMENTAL COUNCIL

Copies of this report may be obtained at no charge by writing to:

Environmental Council
465 South King Street, Room 104
Honolulu, Hawaii 96813

The number of copies is limited, so readers are advised to write early.

The report contains synopses of some of the important environmental events and issues of 1988. Submissions were received from many public and private agencies.

MAUTUKONA LODGE - ENVIRONMENTAL IMPACT REPORT
Location: North Kohala, Hawaii
TMK: 5-7-02:11
5-7-03:01, 02, 03, 07, 08, 10, 11, 12, 16, 17, 18

Please send your comments to:

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

with a copy to:

Mr. James Leonard
Managing Director
PBR HAWAII
101 Aupuni Street, Suite 310
Hilo, Hawaii 96720

Deadline: August 20, 1990

This Environmental Impact Report has been prepared to describe the potential environmental impacts that could result from the development of Mauhtona Lodge by Chalon International of Hawaii, Inc., in North Kohala. The overall development would include a low-rise lodge with about 45 accommodation units, about 300 low-rise accommodation units and about 170 one-acre rural/residential lots on approximately 490 acres of Chalon lands. Tennis facilities, a golf course and other amenities also would be provided. It is noted that, at this time, the land use changes and permits to be requested do not require and environmental impact statement and/or environmental assessment for the proposed project under Chapter 343 HRS. However, this Environmental Impact Report was prepared in keeping with the intent of State and County of Hawaii environmental protection and analysis rules and regulations to ensure that the residents of the areas surrounding the proposed project, as well as state and county regulatory and planning agencies, are informed of the potential environmental impact of the project.

EIS ADVISORY

ENVIRONMENTAL ASSESSMENTS AND NOTICES OF DETERMINATION

Agencies and applicants should be diligent in preparing environmental assessments to assure that they meet the letter and intent of the law.

Information should be contained in the documents which will substantiate statements and decisions. (i.e. There should be substantiating evidence to justify the statement that there will be no environmental impacts.)

Per Section 10, Chapter 200 of Title 11, Administrative Rules, Department of Health, environmental assessments shall contain:

(1) Identification of applicant or proposing agency;
(2) Identification of approving agency, if applicable;
(3) Identification of agencies consulted in making assessment;
(4) General description of the action's technical, economic, social, and environmental characteristics;
(5) Summary description of the affected environment, including suitable and adequate location and site maps;
(6) Identification and summary of major impacts and alternatives considered, if any;
(7) Proposed mitigation measures, if any;
(8) Determination;
(9) Findings and reasons supporting determination; and
(10) Agencies to be consulted in the preparation of the environmental impact statement, if applicable.

Projects should not be done on an incremental basis to avoid preparation of an environmental impact statement. Per Section 12, Chapter 200, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short and long-term effects of the action.

Please refer to Chapter 200 for more information or call OEQC at 548-6915.

$704,000. The material removed from the marsh may be disposed at a landfill.

Coordination of the construction and maintenance work with fish and wildlife, and historic preservation agencies will be required in the construction contract documents. Public notification will be provided before any use of explosives is authorized. All required permits will be obtained prior to the initiation of work.

KAHEKILI HIGHWAY WIDENING AND INTERCHANGE

Location: Windward, Oahu
TMK: 4-5-02
4-5-25
4-5-26

Proposing Agency: Department of Transportation Highway Division

Accepting Authority: Governor, State of Hawaii c/o Office of Environmental Quality Control

Status: Currently being processed by the Office of Environmental Quality Control

The Kahekili Highway Widening and Interchange project is located on the Windward side of Oahu between Likelike Highway in Kaneohe and Kamehameha Highway near Kahaluu Stream. Kahekili Highway passes through Kaneohe, Heeia, Haiku and Ahuimanu. The proposed project involves the construction of a traffic interchange at the intersection of Likelike and Kahekili Highways and the widening of Kahekili Highway from a two-lane road to a multi-lane, divided facility from the interchange to Kamehameha Highway, a distance of approximately 4.4 miles.

The existing Kahekili Highway, a two-lane facility, intersects Likelike Highway, a four-lane, divided facility, at a T-type of intersection. A third lane between Likelike Highway and Haiku Road was recently completed to accommodate left turning movements in both directions. Kahekili Highway was constructed as the first increment of a future four lane divided highway within a minimum 120 feet right-of-way. Kahekili Highway is a principal arterial roadway which connects the communities of Kahaluu and the Koolauloa coast to Likelike Highway. The other major roadway in the Kaneohe-Kahaluu corridor is Kamehameha Highway. Kamehameha Highway is a major collector road which passes through Kaneohe Town.

NEPA DOCUMENTS

The following documents have been prepared pursuant to the requirements of the National Environmental Policy Act of 1969. Should you require further information on these projects, please call the Office of Environmental Quality Control at 548-6915.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

KILAUEA FOREST NATIONAL WILDLIFE REFUGE

Location: Kilauea, Hawaii

Proposing Agency: United States Department of the Interior, Fish and Wildlife Service

Contact: John Ford (808) 541-1314 Pacific Islands Land Protection Coordinator

In accordance with the National Environmental Policy and the Council on Environmental Quality regulations, the Finding of No Significant Impact will become final on August 31, 1990, following a 30-day public review period.

The United States Department of the Interior, Fish and Wildlife Service proposes to acquire approximately 2,956 acres of forest lands plus road access for the purpose of contributing to the recovery of endangered birds and plants and for the preservation of their habitat. Protection and maintenance of quality habitat for the four endangered Hawaiian forest birds, the Hawaiian Hawk, and the Hawaiian vetch are crucial elements of their respective recovery program.

NOTICES

AVAILABILITY OF REPORT

HAWAI'S ENVIRONMENT 1988: THE ANNUAL REPORT OF THE ENVIRONMENTAL COUNCIL

Copies of this report may be obtained at no charge by writing to:

Environmental Council
465 South King Street, Room 104
Honolulu, Hawaii 96813

The number of copies is limited, so readers are advised to write early.

The report contains synopses of some of the important environmental events and issues of 1988. Submissions were received from many public and private agencies.

MAHUKONA LODGE - ENVIRONMENTAL IMPACT REPORT

Location: North Kohala, Hawaii
TMK: 5-7-02:11
5-7-03:01, 02, 03, 07, 08, 10, 11, 12, 16, 17, 18

Please send your comments to:

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

with a copy to:

Mr. James Leonard
Managing Director
PBR HAWAII
101 Aupuni Street, Suite 310
Hilo, Hawaii 96720

Deadline: August 20, 1990

This Environmental Impact Report has been prepared to describe the potential environmental impacts that could result from the development of Mahukona Lodge by Chalon International of Hawaii, Inc., in North Kohala. The overall development would include a low rise lodge with about 45 accommodation units, about 300 low-rise accommodation units and about 170 one-acre rural/residential lots on approximately 490 acres of Chalon lands. Tennis facilities, a golf course and other amenities also would be provided. It is noted that, at this time, the land use changes and permits to be requested do not require and environmental impact statement and/or environmental assessment for the proposed project under Chapter 343 HRS. However, this Environmental Impact Report was prepared in keeping with the intent of State and County of Hawaii environmental protection and analysis rules and regulations to ensure that the residents of the areas surrounding the proposed project, as well as state and county regulatory and planning agencies, are informed of the potential environmental impact of the project.

MEETING NOTICE

MEETING OF THE STATE ENVIRONMENTAL COUNCIL

Location: Department of Health Board Room
1250 Punchbowl Street, 3rd Floor
Date: Wednesday, August 15, 1990
Time: 5:00 p.m.

Agenda

1. Call to Order
2. Approval of July 18, 1990 Meeting Minutes
3. Department of Public Works, EIS Exemption List
4. Annual Report
5. Correspondence
6. Other Business
7. Adjournment

EIS ADVISORY

ENVIRONMENTAL ASSESSMENTS AND NOTICES OF DETERMINATION

Agencies and applicants should be diligent in preparing environmental assessments to assure that they meet the letter and intent of the law.

Information should be contained in the documents which will substantiate statements and decisions. (i.e. There should be substantiating evidence to justify the statement that there will be no environmental impacts.)

Per Section 10, Chapter 200 of Title 11, Administrative Rules, Department of Health, environmental assessments shall contain:

(1) Identification of applicant or proposing agency;
(2) Identification of approving agency, if applicable;
(3) Identification of agencies consulted in making assessment;
(4) General description of the action's technical, economic, social, and environmental characteristics;
(5) Summary description of the affected environment, including suitable and adequate location and site maps;
(6) Identification and summary of major impacts and alternatives considered, if any;
(7) Proposed mitigation measures, if any;
(8) Determination;
(9) Findings and reasons supporting determination; and
(10) Agencies to be consulted in the preparation of the environmental impact statement, if applicable.

Projects should not be done on an incremental basis to avoid preparation of an environmental impact statement. Per Section 12, Chapter 200, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short and long-term effects of the action.

Please refer to Chapter 200 for more information or call OEQC at 548-6915.

United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Blvd., Suite 415
Honolulu, Hawaii 96813

RECEIVED JUL 19 1990

July 17, 1990

Mr. Mathew Grady
Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

Subject: Environmental Impact Report, Mahukona Lodge, North Kohala, Hawaii

VII-1 3 The Honolulu District Office, Water Resources Division, of the U. S. Geological Survey has reviewed the above report and has no additional comments. We found the EIR to be complete and very well done.

Thank you for the opportunity to review the document.

Sincerely,

William Meyer
District Chief

cc: Mr. James Leonard (Hilo)

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889 6257 • FAX: (808) 889-5252

August 16, 1990

Mr. William Meyer
District Chief
United States Department of Interior
Geological Survey
Water Resources Division
677 Ala Moana Blvd., Suite 415
Honolulu, Hawaii 96813

Dear Mr. Meyer:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of July 17, 1990, regarding your comments on the Mahukona Lodge Draft Environmental Impact Report.

We are pleased that you have found the DEIR to be complete and well done.

Thank you for participating in the Draft EIR review process. Your letter and this response will be appended to the Final EIR.

Sincerely,

Matthew Grady
Planner

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TAXATION
P.O. BOX 259
HONOLULU, HAWAII 96809

RICHARD H. KAWAI, JR.
DIRECTOR OF TAXATION

GARY S. HIJO
DEPUTY DIRECTOR

JOYCE T. OMINE
DEPUTY DIRECTOR

July 19, 1990

RECEIVED

Mr. Matthew Grady
Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, HI 96719

Dear Mr. Grady:

VII-14

This is in response to your letter dated July 6, 1990, regarding the Environmental Impact Report for the Mahukona Lodge project.

We have reviewed the report and have no comments since the information contained in the report does not appear to directly impact the taxes administered by the Department of Taxation.

We trust this satisfactorily complies with your request.

Very truly yours,

Ronald C. Choy
RONALD C. CHOY
Technical Review Officer

RCC-LK

cc: Mr. James Leonard

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889 6257 • FAX: (808) 889-5252

August 16, 1990

Mr. Ronald C. Choy
Technical Review Officer
State of Hawaii
Department of Taxation
P.O. Box 259
Honolulu, Hawaii 96809

Dear Mr. Choy:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of July 19, 1990, regarding your comments on the Mahukona Lodge Draft Environmental Impact Report.

Thank you for participating in the Draft EIR review process. Your letter and this response will be appended to the Final EIR.

Sincerely,

Matthew Grady
Matthew Grady
Planner

Larry S. Tanimoto
Mayor
Thomas J. Bello
Fire Chief
Edward Bumatay
Deputy Fire Chief

RECEIVED JUL 2 = 1990

Fire Department

466 Kinoole Street • Hilo, Hawaii 96720 • (808) 961-8297

July 20, 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

Subject: Environmental Impact Report
Mahukona Lodge

For your information, the primary fire protection services for your proposed community resort is located approximately 10 miles in Kapaau. The North Kohala Fire Station provides 24-hour fire and basic life support services with one (1) Fire Equipment Operator and two (2) Fire/Emergency Medical Technicians on each platoon (shift). Three platoons (nine persons) are assigned to the facility and are under the supervision of one (1) Fire Captain who is on 8-hour duty during the week days only. For this reason, the County Fire Department relies on the community's Volunteer Fire Fighters to co-respond with the under-staffed regulars.

A 1,500 gpm pumper carrying 1,000 gallons of water, one basic life support medical unit, and a reserve fire apparatus are maintained at the station. North Kohala should be fully staffed with regular fire persons by 1993.

Thank you for permitting the Fire Department the opportunity to comment on your proposal. We would be glad to assist you in providing the necessary services and information.

Sincerely,

THOMAS J. BELLO
FIRE CHIEF

TJB/mo

cc: Mr. James Leonard, Managing Director
PBR Hawaii
101 Aupuni Street, Suite 310
Hilo, Hawaii 96720

VII-15

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889 5252

August 17, 1990

Mr. Thomas J. Bello
Fire Chief
Fire Department
County of Hawaii
466 Kinoole Street
Hilo, Hawaii 96720

Dear Mr. Bello:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of July 20, 1990, regarding your comments on the Mahukona Lodge Draft Environmental Impact Report.

We will incorporate your informative letter in the appropriate locations of the EIR, which will then provide us with an accurate description of fire protection services in Kapaau.

Thank you for participating in the Draft EIR review process. Your letter and this response will be appended to the Final EIR.

Sincerely,

Matthew Grady
Planner

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. BOX 50004
HONOLULU, HAWAII
96850

RECEIVED JUL 2 3 1990

July 20, 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

Subject: Mahukona Lodge Environmental Impact Report

The above-mentioned report has been reviewed as requested. The following comments are offered for your consideration:

VII-16

A chief concern on this project is the possibility of silt being washed or blown into shoreline waters. Coral in these coastal waters has been damaged in the past, due to heavy loads of sediment from construction activities. The soils in this area, when disturbed or exposed, are highly susceptible to wind erosion. It is very important that construction dust be controlled by frequent sprinkling. Rapid revegetation of graded sites should be carried out immediately after land shaping has been completed, to prevent wind erosion.

Another concern is the loading of ground and coastal waters with fertilizers and pesticides that pass through the thin veneer of light textured soils in the area. This concern was addressed on Page IV-25; however, the degree of ground water pollution and its mobility to the near shore waters is uncertain without a monitoring program in place.

Sincerely,

ACTING
WARREN H. LEE
State Conservationist

cc:
James Leonard, Managing Director, PBR Hawaii, 101 Aupuni Street, Suite 310, Hilo, HI 96720

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

August 16, 1990

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

Dear Mr. Lee:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of July 20, 1990, regarding your comments on the Mahukona Lodge Draft Environmental Impact Report. The following is provided in response to your letter:

a. Our mitigation plan will be on-going, and the effects of construction dust will be mitigated through frequent spraying of water and planting of ground cover as soon as possible.

b. As mentioned on pages IV-24 and IV-25 of the Draft EIR we do not anticipate that fertilizers and biocides will enter the groundwater and/or surface water runoff streams, due to the relatively low rainfall levels (about 13.5 inches per year). In addition, the evapotranspiration rates generally preclude irrigation waters entering groundwater supplies.

   To detect potential groundwater pollution to the near shore waters we will intitiate an on-going water quality monitoring program.

Thank you for participating in the Draft EIR review process. Your letter and this response will be appended to the Final EIR.

Sincerely,
Matthew Grady
Matthew Grady
Planner

RECEIVED AUG 7 1990

Larry S. Tanimoto
Mayor
Bruce C. McClure
Chief Engineer
Richard H. Nishimura
Deputy Chief Engineer

Department of Public Works

25 Aupuni Street, Rm. 202 • Hilo, Hawaii 96720 • (808) 961-8321 • Fax (808) 969-7138

August 1, 1990

MR MATTHEW GRADY PLANNER
CHALON INTERNATIONAL OF HAWAII INC
P O BOX 249
HAWI HI 96719

SUBJECT: MAHUKONA LODGE: DRAFT ENVIRONMENTAL IMPACT STATEMENT
Mahukona, N. Kohala, HI

VII-17

We have reviewed the subject document and our comments are as follows:

SOLID WASTE

1. Impacts to transfer station operations must be considered unless mandatory commercial hauling of all refuse to a County Landfill is guaranteed in perpetuity. At a volume generation rate of 15 tpd this would require the County to haul 1 additional trailer per day. This is presently beyond our capabilities as we are barely able to meet present refuse loads.

2. Because all developments impact solid waste operations to some degree, a waste reduction program such as composting and/or recycling should be required. This would serve to reduce refuse volumes at all County facilities, renew resources, reduce refuse transportation/ disposal costs and will be an environmentally more acceptable means of solid disposal.

3. All wastes generated by construction including grubbing, excess and unsuitable excavation material is prohibited at the Kailua Landfill and all transfer stations islandwide until the new West Hawaii Landfill is completed and in operation. Until then construction wastes may be brought to the Hilo Landfill.

4. If a County Landfill is used, the contractor shall be responsible to provide all necessary labor, equipment materials and supplies to properly landfill his waste.

TRAFFIC

The frontage road is under State jurisdiction therefore their requirements have precedence over our suggestions, which are as follows:

1. Provide a fully channelized intersection.

2. The storage for the left-turn lane should be for at least 5 cars.

3. Install the conduits that will be needed for future traffic signals.

4. Provide adequate lighting of the intersection.

DRAINAGE

1. A drainage report shall be done and shall contain the following:

   a. Hydrologic study with the watershed clearly delineated.

   b. The drainage quantity shall be based on expected future development of the watershed.

   c. Address erosion and sedimentation.

2. Applicant shall be informed that if drywells are included in the subject subdivision improvements, Chapter 23, Underground Injection Control (UIC), Administrative Rules, Dept. of Health, prohibit any person from operating, constructing or modifying an injection well (drywell) unless authorized by a permit issued by the Director of Health, State of Hawaii. Furthermore, should dedication of roadways including drywells be contemplated, the Dept. of Public Works will not approve dedication roadways prior to compliance with Chapter 23, UIC, Administrative Rules.

ROADWAY

1. Provide sufficient connections to adjacent properties.

2. These connections are to be collector roads in the future. The minimum right-of-way is therefore 60' for these roads.

for Clifford Murakami
ROBERT K. YANABU, Division Chief
Engineering Division

DHM:sah

cc: Wastewater Management Division
Solid Waste Management Division
Traffic Division
Engineering Division
Planning Department
James Leonard, PBR Hawaii

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889 6257 • FAX: (808) 889-5252

August 17, 1990

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

Dear Mr. Yanabu:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 1, 1990, regarding your comments on the Mahukona Lodge Draft Environmental Impact Report. The following is provided in response to your letter:

VII-18

Solid Waste

1. Various alternatives for the collection and disposal of the refuse generated by the project will be considered during the design stage. Options available include: a) dedicated commercial hauling of refuse for all uses and activities to the proposed Puuanahulu Landfill which, we understand, will be operational by mid-1992; b) construction of a transfer station, on site, with dedication to and operation/maintenance by the County; and c) upgrade and expansion of the existing County transfer station located at Kaahuhu.

2. We have met with Mr. Shane Rohan of your department on the issue of composting and recycling and we will continue to formulate and implement a recycling/composting plan. We expect that our plan will be refined during the design stage of the project.

3. Items 3 and 4. Disposal of construction waste will be the responsibility of the contractor. We understand and appreciate the prohibition for disposal at the Kailua Landfill.

Traffic

1. The suggested improvements at the intersection with Akoni Pule Highway, including full channelization and provisions for future traffic signals, will be addressed during the design phase of the project. The traffic impact analysis conducted for the project (Appendix J, page 17) concluded that:
...."the access intersection should be fully

channelized and be provided with a separate left turn lane for safety. Based on the number of left turns forecast, the storage length of the left turn lane should accommodate two cars until 2010, after which storage for three cars will be required".

Drainage

1. A drainage report will be prepared during the design stage addressing the hydrologic and hydraulic requirements of the County, including erosion and sedimentation considerations.

2. The requirements of Chapter 23, Underground Injection Control, will be adhered to.

Roadway

1. Provisions for collector connections to adjacent properties will be provided and addressed during the design stage.

Thank you for participating in the Draft EIR review process. Your letter and this response will be appended to the Final EIR.

Sincerely,

Matthew Grady
Planner

RECEIVED AUG 13 1990

OFFICE OF STATE PLANNING
Office of the Governor
STATE CAPITOL HONOLULU HAWAII 96813 TELEPHONE (808) 548-3030

August 7, 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

VII-19

Subject: Mahukona Lodge Environmental Impact Report
Chalon International of Hawaii, Inc.
North Kohala, Hawaii

Thank you for transmitting a copy of the Mahukona Environmental Impact Report, June 1990 Draft to Governor Waihee. We note that the report concerns the proposed 490-acre Mahukona Lodge resort/recreation/residential project.

Since this report is not subject to Chapter 343, Hawaii Revised Statutes, we have no specific comments to offer at this time. We expect to be consulted when the petition for reclassification is submitted to the County of Hawaii Planning Department, as indicated in your EIR.

Please be aware that the West Hawaii Regional Plan prepared by this Office reflects the major areas of State concern in this region. Further, you should be aware that Senate Concurrent Resolution No. 179, adopted by the 1988 State Legislature, urges that State and County governments ensure that the public view and open space makai of the Kawaihae-Mahukona-Hawi Road be preserved. Senate Resolution No. 132, S.D. 1 and Senate Concurrent Resolution No. 146, S.D. 2, adopted by the 1990 Legislature, request a study for the development of a regional recreation plan for the Mahukona coastal area. Your project falls within this area. Copies of the Resolutions are enclosed.

Sincerely,

Harold S. Masumoto
Director

Enclosures

THE SENATE
FOURTEENTH LEGISLATURE, 1988
STATE OF HAWAII

S.C.R. NO. 179 H.D. 1

SENATE CONCURRENT RESOLUTION

URGING THE RETENTION OF VIEW AND OPEN SPACE MAKAI OF KAWAIHAE-MAHUKONA-HAWI ROAD FROM KAWAIHAE TO UPOLU POINT, HAWAII

WHEREAS, lands makai of the Kawaihae-Mahukona-Hawi Road are currently in a relatively undeveloped state; and

WHEREAS, the area contains Lapakahi State Historical Park, an ancient Hawaiian coastal settlement, and, Mookini Heiau State Monument, one of the most famous heiaus on the island; and

WHEREAS, the State Department of Transportation has previously recognized the value of makai views by requiring the location of all utility poles on the mauka side of Queen Kaahumanu Highway immediately south of the Kawaihae-Mahukona-Hawi Road; and

WHEREAS, existing State zoning does not provide for urban development on the vast majority of these lands; and

WHEREAS, the makai area lies in large measure within the Coastal Zone Management area administered by the State; and

WHEREAS, the makai area also lies within the Special Management Area administered by the County; now, therefore,

BE IT RESOLVED by the Senate of the Fourteenth Legislature of the State of Hawaii, Regular Session of 1988, the House of Representatives concurring, that the State and the County governments are urged to work together in a collaborative effort to ensure that the public view and open space currently existing makai of the Kawaihae-Mahukona-Hawi Road be preserved; and

BE IT FURTHER RESOLVED that the State and County governments work in close collaboration to discourage subdivision and building development makai of the Kawaihae-Mahukona-Hawi Road; and

RFS1217 SCR R0041

S.C.R. NO. 179 H.D. 1

BE IT FURTHER RESOLVED that certified copies of this Concurrent Resolution be transmitted to the Chairperson of the Board of Land and Natural Resources, the State Land Use Commission, the Chairperson of the Hawaii County Council, the Mayor of Hawaii County and the Director of the Hawaii County Planning Department.

STAND. COM. REP. NO. 1615-88

Honolulu, Hawaii
April 26, 1988

RE: S.C.R. No. 179
H.D. 1

Honorable Daniel J. Kihano
Speaker, House of Representatives
Fourteenth State Legislature
Regular Session of 1988
State of Hawaii

Sir:

Your Committee on Water, Land Use, Development and Hawaiian Affairs, to which was referred S.C.R. No. 179 entitled: "SENATE CONCURRENT RESOLUTION URGING THE RETENTION OF VIEW AND OPEN SPACE MAKAI OF KAWAIHAE MAHUKONA, HAWI ROAD FROM KAWAIHAU TO UPOLU POINT, HAWAII", begs leave to report as follows:

The purpose of this concurrent resolution is for the State of Hawaii and the County of Hawaii to work together in a collaborative effort to ensure that the public view and open space currently existing makai of the Kawaihae-Mahukona-Hawi Road be preserved by discouraging subdivision and building development in the area.

Your Committee received testimony from the Department of Land and Natural Resources and the Department of Transportation

Your Committee made a non-substantive amendment to correct punctuation and spelling in the term KAWAIHAE-MAHUKONA-HAWI.

Your Committee on Water, Land Use, Development and Hawaiian Affairs concurs with the intent and purpose of S.C.R. No. 179, as amended herein, and recommends its adoption in the form attached hereto as S.C.R. No. 179, H.D. 1.

Respectfully submitted,

ANDREW LEVIN, Chairman

DAVID IGE, Vice Chairman

ROBERT BUNDA, Member

MARK J. ANDREWS, Member

CAROL FUKUNAGA, Member

CLARICE HASHIMOTO, Member

KENNETH HIRAKI, Member

HERBERT HONDA, Member

VIRGINIA ISBELL, Member

EZRA KANOHO, Member

SAMUEL S.H. LEE, Member

CALVIN K.Y. SAY, Member

HARVEY TAJIRI, Member

MIKE O'KIEFFE, Member

BILL PFEIL, Member

HSCR WLH SCR179 HD1

THE SENATE
FIFTEENTH LEGISLATURE, 1990
STATE OF HAWAII

S.R. NO. 132 S.D. 1

SENATE RESOLUTION

REQUESTING A STUDY FOR THE DEVELOPMENT OF A REGIONAL RECREATION PLAN FOR THE MAHUKONA COASTAL AREA, NORTH KOHALA DISTRICT.

WHEREAS, the coastal area of Mahukona, beginning at the North Kohala district boundary to the town of Hawi, is at this time untouched by resort and other development; and

WHEREAS, the projected growth of this area and the surrounding region will irreversibly change the face of Mahukona; and

WHEREAS, we have the rare opportunity to plan and enhance the recreational features of this coastline before development encroaches; and

WHEREAS, a united planning approach for a regional recreation plan for the Mahukona area is a necessary prerequisite; and

WHEREAS, such planning should integrate existing recreation sites including natural and historic features; and

WHEREAS, the plan should incorporate sites of archaeological significance south of Lapakahi historical state park as the southern anchor of the recreational plan; and

WHEREAS, the old railroad right-of-way could be renovated for use in transporting residents and visitors along this scenic coastal corridor from Mahukona to Nishimura Bay, Kapu'a Park and ending at Hawi town; and

WHEREAS, the plan should include offshore recreational opportunities which contribute to the attractiveness of this coastal area; now, therefore,

BE IT RESOLVED by the Senate of the Fifteenth Legislature of the State of Hawaii, Regular Session of 1990, that the Department of Land and Natural Resources, in consultation with the Office of State Planning; the Department of Transportation; the Director of Parks and Recreation, County of Hawaii; the North Kohala Community Association; the North Kohala Business Association; the Citizens for Protection of the North Kohala Coast; the Hawaiian Civic Club; the Puerto Rican Social Club; and other civic and business organizations, is requested to coordinate and develop a regional recreation plan for the Mahukona coastal area to include

RFS1673 SR132 SD1 SMA

the area beginning at the district boundary between North and South Kohala to Hawi; and

BE IT FURTHER RESOLVED that the Department of Land and Natural Resources is requested to prepare and submit a report on its findings and recommendations to the Legislature no later than twenty days before the convening of the Regular Session of 1991; and

BE IT FURTHER RESOLVED that certified copies of this Resolution be transmitted to the Chairperson of the Board of Land and Natural Resources; the Director of the Department of Transportation; the Director of the Office of State Planning; the Director of the Department of Parks and Recreation, County of Hawaii; the North Kohala Community Association; the North Kohala Business Association; the Hawaiian Civic Club; the Puerto Rican Social Club; and the Citizens for Protection of the North Kohala Coast.

STANDING COMMITTEE REPORT NO. 3141

Honolulu, Hawaii

APR 12, 1990

Honorable Richard S. H. Wong
President of the Senate
Fifteenth State Legislature
Regular Session of 1990
State of Hawaii

Sir:

RE: S.C.R. No. 146

Your Committee on Tourism, Recreation and Planning, to which was referred S.C.R. No. 146 entitled:

"SENATE CONCURRENT RESOLUTION REQUESTING A STUDY FOR THE DEVELOPMENT OF A REGIONAL RECREATION PLAN FOR THE MAHUKONA COASTAL AREA, NORTH KOHALA DISTRICT,"

begs leave to report as follows:

The purpose of this Resolution is to request the Office of State Planning to develop a regional recreation plan for the Mahukona coastal area of the North Kohala District.

Your Committee received supporting testimony from the Department of Land and Natural Resources and the Office of State Planning, both of which requested that the Resolution be amended to make the Department the lead agency for preparation of the plan. Your Committee also received supporting testimony from the Department of Transportation, which requested that the Department be included as one of the participants in preparation of the plan.

Your Committee finds that development of a regional recreation plan for this area is appropriate and timely, and that this plan should be supportive of the West Hawaii Regional Plan.

Your Committee has amended the Resolution to incorporate the three departments' suggestions. Your Committee has also made several grammatical and technical amendments to the Resolution which have no substantive effect.

Your Committee on Tourism, Recreation and Planning concurs with the intent and purpose of S.C.R. No. 146, as amended herein, and recommends its adoption in the form attached hereto as S.C.R. No. 146, S.D. 1.

Respectfully submitted,

MILTON HOLT, Chairman

DONNA R. IKEDA, Vice Chairman

JAMES AKI, Member

ANTHONY K.U. CHANG, Member

STEVE COBB, Member

MIKE CROZIER, Member

RICHARD M. MATSUURA, Member

MIKE MCCARTNEY, Member

MARY-JANE MCMURDO, Member

DENNIS M. NAKASATO, Member

MARY GEORGE, Member

THE SENATE
FIFTEENTH LEGISLATURE, 1990
STATE OF HAWAII

S.C.R. NO. 146 S.D. 1

SENATE CONCURRENT RESOLUTION

REQUESTING A STUDY FOR THE DEVELOPMENT OF A REGIONAL RECREATION PLAN FOR THE MAHUKONA COASTAL AREA, NORTH KOHALA DISTRICT.

WHEREAS, the coastal area of Mahukona, beginning at the North Kohala district boundary to the town of Hawi, is at this time untouched by resort and other development; and

WHEREAS, the projected growth of this area and the surrounding region will irreversibly change the face of Mahukona; and

WHEREAS, we have the rare opportunity to plan and enhance the recreational features of this coastline before development encroaches; and

WHEREAS, a united planning approach for a regional recreation plan for the Mahukona area is a necessary prerequisite; and

WHEREAS, such planning should integrate existing recreation sites including natural and historic features; and

WHEREAS, the plan should incorporate sites of archaeological significance south of Lapakahi historical state park as the southern anchor of the recreational plan; and

WHEREAS, the old railroad right-of-way could be renovated for use in transporting residents and visitors along this scenic coastal corridor from Mahukona to Nishimura Bay, Kapu'a Park and ending at Hawi town; and

WHEREAS, the plan should include offshore recreational opportunities which contribute to the attractiveness of this coastal area; now, therefore,

BE IT RESOLVED by the Senate of the Fifteenth Legislature of the State of Hawaii, Regular Session of 1990, the House of Representatives concurring, that the Department of Land and Natural Resources, in consultation with the Office of State Planning; the Department of Transportation; the Director of Parks and Recreation, County of Hawaii; the North Kohala Community Association; the North Kohala Business Association; the Citizens

for Protection of the North Kohala Coast; the Hawaiian Civic Club; the Puerto Rican Social Club; and other civic and business organizations, is requested to coordinate and develop a regional recreation plan for the Mahukona coastal area to include the area beginning at the district boundary between North and South Kohala to Hawi; and

BE IT FURTHER RESOLVED that the Department of Land and Natural Resources is requested to prepare and submit a report on its findings and recommendations to the Legislature no later than twenty days before the convening of the Regular Session of 1991; and

BE IT FURTHER RESOLVED that certified copies of this Concurrent Resolution be transmitted to the Chairperson of the Board of Land and Natural Resources; the Director of the Department of Transportation; the Director of the Office of State Planning; the Director of the Department of Parks and Recreation, County of Hawaii; the North Kohala Community Association; the North Kohala Business Association; the Hawaiian Civic Club; the Puerto Rican Social Club; and the Citizens for Protection of the North Kohala Coast.

STANDING COMMITTEE REPORT NO. 3142

Honolulu, Hawaii

~~APR 12~~ 9, 1990

Honorable Richard S. H. Wong
President of the Senate
Fifteenth State Legislature
Regular Session of 1990
State of Hawaii

Sir:

RE: S.R. No. 132

Your Committee on Tourism, Recreation and Planning, to which was referred S.R. No. 132 entitled:

"SENATE RESOLUTION REQUESTING A STUDY FOR THE DEVELOPMENT OF A REGIONAL RECREATION PLAN FOR THE MAHUKONA COASTAL AREA, NORTH KOHALA DISTRICT,"

begs leave to report as follows:

The purpose of this Resolution is to request the Office of State Planning to develop a regional recreation plan for the Mahukona coastal area of the North Kohala District.

Your Committee received supporting testimony from the Department of Land and Natural Resources and the Office of State Planning, both of which requested that the Resolution be amended to make the Department the lead agency for preparation of the plan. Your Committee also received supporting testimony from the Department of Transportation, which requested that the Department be included as one of the participants in preparation of the plan.

Your Committee finds that development of a regional recreation plan for this area is appropriate and timely, and that this plan should be supportive of the West Hawaii Regional Plan.

Your Committee has amended the Resolution to incorporate the three departments' suggestions. Your Committee has also made several grammatical and technical amendments to the Resolution which have no substantive effect.

SSCR SR132 SD1 SMA

RFS1673

VII-25

Your Committee on Tourism, Recreation and Planning concurs with the intent and purpose of S.R. No. 132, as amended herein, and recommends its adoption in the form attached hereto as S.R. No. 132, S.D. 1.

Respectfully submitted,

MILTON HOLT, Chairman

DONNA R. IKEDA, Vice Chairman

JAMES AKI, Member

ANTHONY K.U. CHANG, Member

STEVE COBB, Member

MIKE CROZIER, Member

RICHARD M. MATSUURA, Member

SSCR SR132 SD1 SMA

RFS1673

MIKE MCCARTNEY, Member

MARY-JANE MCHURDO, Member

DENNIS M. NAKASATO, Member

MARY GEORGE, Member

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 - TELEPHONE: (808) 889 6257 - FAX: (808) 889-5252

August 17, 1990

Mr. Harold S. Masumoto
Director
State of Hawaii
Office of State Planning
State Capitol
Honolulu, Hawaii 96813

Dear Mr. Masumoto:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 7, 1990, regarding your comments on the Mahukona Lodge Draft Environmental Impact Report. Your office will be consulted through the Hawaii County Planning Department at the time when land use petitions are submitted to the County. We appreciate the attached Senate Concurrent Resolutions No.'s 179, 132 S.D. 1 and 146 S.D. 2. Further, we have contacted the State Parks Division of the Department of Land and Natural Resources to inquire about the status of and to give input to the regional recreation plan for the subject area.

Thank you for participating in the Draft EIR review process. Your letter and this response will be appended to the Final EIR.

Sincerely,

Matthew Grady
Planner

SSCR SR132 SD1 SMA

RPS1673

JOHN WAIHEE
GOVERNOR

CHARLES T. TOGUCHI
SUPERINTENDENT

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

RECEIVED AUG 1990

OFFICE OF THE SUPERINTENDENT

August 8, 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

VII-27

Dear Mr. Grady:

SUBJECT: Environmental Impact Report
Mahukona Lodge
Mahukona, North Kohala, Hawaii

Our review of the subject report indicates that it may have the following enrollment impact on Kohala High and Elementary School (grades K-12) based on 170 planned residential lots:

Grades	Enrollment Projection
K-5	15-20
6-8	5- 7
9-12	8-10

The school cannot accommodate the enrollment growth projected by the development until additional classrooms are built. The school has a shortage of classrooms. Additional legislative funding will be required to address the increased enrollment.

We request that the developer contribute to the cost of the additional classrooms required as well as pay a fair share of the added infrastructure costs.

Please keep us informed of any changes or updates in the development of the lodge. If there are any questions concerning our response, please call the Facilities Branch at 737-4743.

Sincerely,

Charles T. Toguchi

Charles T. Toguchi,
Superintendent

CTT:jl

cc: E. Imai
A. Garson
James Leonard, PBR Hawaii (Hilo)

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. Charles T. Toguchi, Superintendent
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Toguchi:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

VII-28

Thank you for your letter of August 8, 1990, concerning your review of the subject report and your analysis of the project's potential enrollment impacts on Kohala High and Elementary Schools.

As stated in the DEIR, our marketing analysis indicates that most of the planned homes would serve as "second" homes for the owners and/or be constructed by older persons whose children are of adult age and no longer attend school. Furthermore, the construction of these homes is expected to take place over the next 20 or more years. Using your projection of a maximum total impact for grades K-12 of 37 students, would mean that at a steady rate of development, less than two students per year would be added to Kohala High and Elementary Schools combined. Given this minimal impact, we do not feel that a special assessment of the developer for additional classrooms, as is requested in your letter, is justified.

In terms of added infrastructure costs, Chalon will itself provide improvements to the water storage and distribution systems and its own wastewater collection, storage, treatment and disposal systems. The County will receive a "fair share" of other infrastructure costs as a result of the increased property tax assessments resulting from the planned improvements.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS
830 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

MARIO R. RAMIL
DIRECTOR

SHARON T. HIRASHIRO
DEPUTY DIRECTOR

RECEIVED AUG 1 7 1990

August 9, 1990

Mr. Matthew Grady
Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

Thank you for providing us the opportunity to review the draft Environmental Impact Report for the Mahukona Lodge.

We have reviewed the subject report and, at this time, have no additional comments to offer.

The department would like to offer any assistance in recruiting job applicants to fill these demands through our various employment and training agencies.

Sincerely,

Mario R. Ramil
Director

cc: James Leonard

FROM: MR. BILL GRAHAM

RECEIVED AUG 27 1990

Chalon International
Hawi, HI 96719

August 18, 1990

Here are comments on the Mahukona Environmental Impact Report. These are my individual perceptions, reflecting personal knowledge and my participation in the CPC process. Comments from the Kohala Community Association will be forthcoming from the Planning Committee of the KCA.

Overall, the Report is comprehensive and well organized and of the quality one would expect of an Environmental Impact Statement. However, I do find many areas where the report is lacking, in my opinion.

Chapter III goes to more depth in analyzing alternatives than is common in EIS's, notwithstanding the mandate of the Department of Health's rules for EIS preparation.

On page III-2 it is stated that the selected proposal is less visually intrusive than the other alternatives. However, based on presentations made to the community, Alternative C appeared to be less visually obtrusive. Chalon has indicated their intention to provide a drawing of the view of the proposed project from Mahukona wharf, and the entry thereto. It would be helpful to include this drawing in the Report.

Alternative B, the Resort Hotel Concept, is categorized as an initial development objective on page III-5, but that was never indicated to the CPC groups meeting during 1989. All descriptions coming from Chalon during that period spoke of a "lodge".

The comparative evaluation table on page III-11 introduces the M and m symbols which undermine the value of the chart. If an impact is negative, it is certainly more useful to know that it is negative than to state that mitigation is planned. With regard to the content of the table, the value judgements of the reader could easily differ from those of the preparer.

Chapter IV, section 2.2, treats the issues of Surface Water and Runoff. It seems that the analysis is based on the project when developed. However, heavy rains (and winds) during construction could cause problems. We have seen marked siltation on the coral below Kohala Ranch, while the roadwork phase of that project was underway.

A small technical note: In section IV-3.1.1 the kiawe-buffel grass community is said to include kiawe trees 12 to 20 feet tall. However, in section 3.2.1 the canopy height of the kiawe is said to be approximately 20 to 30 feet.

In section IV-3.2 and Appendix C there is no mention of the mockingbird. However, from Mahukona to Puakea one frequently sees mockingbirds crossing the Akoni Pule highway. The area just mauka of the highway is habitat for more mockingbirds than I know of anywhere else on the island.

I have personally seen Hawaiian bats in the evening while at Mahukona Harbor.

In section IV-3.3.2 the presence of humpback whales in the area is treated in a cursory manner. In fact, the area is heavily frequented by humpbacks, and often at a distance of only 200-400 yards offshore from the point (Makaohule).

To state (page IV-25) that it appears unlikely that the proposed project would have any impact on the marine environment is not warranted in my opinion. Really, there are perhaps three factors to consider. First, construction impacts which don't appear to be thoroughly addressed. Second, operational impacts of a human nature, such as use by people and watercraft. Will Chalon make use of Nishimura Bay for catamarans, dive outings, etc.? Certainly human pressure on the ocean will be increased. This issue has not been addressed as far as I can tell. And thirdly, physical impacts from operation of the resort. Since mixing is good in the project's shoreline area, it does appear unlikely that nutrient loading of the groundwater would have any noticeable impact. Still it is unwarranted to state that fertilizers and biocides will not enter groundwater or surface runoff. Note Brock's work at Anaehoomalu Bay that has substantiated nutrient loading of groundwater.

I can't comment on the Historical and Archaeological impacts due to lack of expertise. However, Chalon is to be commended for their extensive attention to the archaeological richness of the site, and their willingness to alter plans accordingly.

The Socioeconomic section (IV-5) deals forthrightly with many of the issues facing North Kohala. However, section 5.2.2 claims the project will not displace the general public, instead increasing the facilities available. To the contrary, experience at other West Hawaii resorts has shown that the public is effectively displaced even though access is maintained and facilities are increased. This observation is also germane to the closing sentence of section 5.2.3.

Section 5.2.1 characterizes the last 15 years of Kohala as one of economic and physical stagnation. It is true that Kohala has kept its rural character in spite of the immense changes underway in Kailua and Waimea. By many, this is not seen as stagnation. Also, there have been two rapid rises in land and housing costs, one in the 78-80 period and more recently in the 87-90 period. This has resulted in a change in the socioeconomic mix of inmigrants to the district. Thru

VII-29

the 70's the prevailing influx was of people looking to adapt to the easy-going lifestyle here. Those arriving more recently have been more economically upscale. The character of the Caucasian community in North Kohala has changed accordingly.

Also neglected is a big increase in residential construction in Kohala in the last few years.

The thoroughness of the Report in its analysis of labor supply issues (section IV-5.4) is valuable and appreciated.

In section IV-5.7.1 the assertion that "The creation of a resort will have no direct impact on residential property values in the settled communities of North Kohala" goes against common sense, and is not adequately supported.

Section IV-5.7.3 identifies the concern of many that the project will be a catalyst for further development of the leeward coast. Yet the following analysis doesn't really address that likelihood. It speaks only of mitigating factors.

Section IV-5.8 correctly identifies the substantial benefit of a diminished commute time. However, the implication that resort employment no longer has disruptive effects on family life just because families have now "adapted to the new situation" doesn't follow logically.

The Public Safety (crime) section appears to balk at the link between tourism growth and crime. Note that Hawaii Island crime is up substantially in 1990, far beyond the growth in our population. This section also treats drug-use/abuse as some sort of independent variable. (As opposed to one's situation being causative of drug-abuse which is in turn causative of criminal activity.)

The fiscal impacts analysis in section IV-5.10.2 pops out with the usual positive benefit/cost ratio that is standard for all EIS's that I have seen. Nevertheless, the West Hawaii experience has shown that the true situation results in public revenues being unable to keep up with infrastructure costs. The detailed figures in the State's West Hawaii Plan show the magnitude of the problem.

Section IV-6.1 comes to a hasty conclusion that there will be no significant adverse traffic impacts from the project. It points to Appendix K (should be J) for substantiation. However, the admitted worsening of LOS levels are not insignificant in my estimation. Furthermore, where is the analysis of impacts elsewhere in Kohala, such as farther along the road towards Pololu, where the road is far from adequate for even moderate levels of traffic. What will happen at the rather unorthodox junction in central Hawi?

The Appendix on traffic impacts also describes the project as having "...44 units in the Main Lodge, 188 units in the Villas,". This is more in line with earlier community expectations, but differs from Chapter II.

Section IV-6.3 indicates additional noise will only come from vehicular traffic during operation of the resort. Can we be assured that Chalon will not bring in any helicopter services at Mahukona? Let's hope so.

Section IV-6.6 says that solid waste generation will increase by 12% in North Kohala as a result of the project. And that this represents no significant impact on the proposed landfill site at Puu Waawaa. Will all solid waste be trucked to Puu Waawaa? Are we assured that the new landfill site will be in operation before impacts begin?

Sections IV-6.8, 6.9, and 6.10 speak of minimal impacts to Police, Fire, Health Care and school systems. One understands that Chalon believes a large proportion of direct employees will already be North Kohala residents. However, all the secondary and induced growth will certainly have a substantial impact on facilities in the district. No attempt has been made to quantify the impact.

I will not attempt to comment on Chapters V, VI, and VII at this time. It's probably better to be more timely with the above comments which relate more directly to the substantive material of Chapter IV.

One major concern relates to the entire scope of the Report. The concern is the impact of the proposed resort taken in conjunction with a massive project proposed by Finance Factors and currently before the Planning Committee of the Hawaii County Council. The project is known as the Mahukona Resort and sprawls from 1 to 4 miles south of Mahukona. Clearly, the Chapter 343 rules and regulations require that the cumulative effects be considered in conjunction with other proposed developments. According to the Report, the Finance Factors proposal is still active, and the County Council appears reluctant to quash it. The present report has not been prepared under Chapter 343, but it clearly attempts to serve in a similar fashion. The lack of a cumulative analysis is therefore a deficiency in its 343 substitute role.

Bill Graham 889-5957

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. Bill Graham
P.O. Box 155
Hawi, Hawaii 96719

Dear Mr. Graham:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 18, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

To clarify the potential visual impacts of the preferred alternative, the architect is preparing to-scale renderings using a photomontage technique of the following views: 1) view from Heiau site on bluff towards lodge; 2) view from old government road and Akoni Pule highway junction, just north of the junction, looking south towards the lodge; 3) view from Mahukona Park to Makaohule Point; and 4) view to lodge area from Akoni Pule Highway just south of access road intersection, looking north. These figures will be included in the final EIR.

The Resort Hotel Concept, Alternative B, was considered in early stages of planning for the property. For the reasons expressed in the alternatives analysis, it was subsequently dropped from further consideration. This conclusion had been reached prior to the 1989 meetings of the CPC.

With regard to the symbols used in Table III-1 several clarifications can be made. First, to simply state that an alternative would have a significant (unmitigated) impact would be grossly misleading. The symbol "m" was used to indicate that in the absence of thoughtful planning and incorporation of mitigation measures, significant impacts would arise. For example, with respect to historical/archaeological resources, if siting of new facilities had not considered locations of cultural resources, significant damage to important sites could occur. The presence of the "m" indicates that this potential was recognized and the development of that alternative could be planned so as to avoid this potential impact. The symbol "M" was used to indicate that in the preferred alternative these potential mitigation measures have actually been incorporated. The filled circles indicate areas where, given the definition of the respective alternative, a

significant (unmitigatable) impact would occur. The reader remains free to impose his own value judgement on the presence and severity of the potential impact.

Regarding surface water runoff, during construction, measures would need to be provided to insure that silt and sedimentation would not enter the near-shore waters. An erosion and sedimentation plan would need to be provided and approved by the Department of Public Works as part of the permitting procedure for the grading work. Mitigation measures which could be employed include limiting exposed areas, dust control measures and immediate seeding of exposed areas.

The discrepancy you note between the two statements describing the canopy height of the kiawe-buffel grass community results from the fact that the botanist and the zoologist made separate estimates in their respective reports, and these two estimates were carried forward into the main body of the text when the respective reports were summarized. The absolute numbers do not affect the impact analysis and a range including both estimates (12-30 feet) may be accurate for the entire property.

You are correct regarding the presence of mockingbirds in the area. Our biologist was surprised not to see any during the field investigations. They should have been mentioned in Section IV-3.2, and will be in the final EIR.

The possibility of the presence of Hawaiian Hoary Bats in the area and potential impacts upon them are discussed in Section 3.2 of Chapter IV and in Appendix C.

The impact assessment process is designed to focus on those resources, usually identified in a "scoping" process, which are somehow at risk as a result of a proposed action. The humpback whale population offshore of Mahukona will not be impacted by this project. The project does not include any work in nearshore or offshore waters fronting the project site, nor are any offshore recreational activities planned by Chalon. Continued coastal development of West Maui, as well as intense exploitation of the presence of the humpbacks by whale-watching cruise operators, does not seem to have reduced the quality of the habitat for the whales.

The potential impacts of construction on the marine environment and mitigation measures are discussed above. It is true that better access to the shoreline coupled with added population (visitors, employees and residents) will result in greater shoreline usage. Chalon has no plans for offshore recreational activities, but Mahukona Harbor may receive added usage. The potential increase in fishing pressure has been noted in the DEIR.

The analysis in the DEIR concludes that it is unlikely excess nutrients or biocides will enter marine or groundwaters. In the event this does occur, however, numerous physical, chemical and biological processes will act to dilute, disperse and break down these substances. There is no practical impact to elevated concentrations of nutrients in non-potable groundwater as organisms capable of uptaking these nutrients (algae) require light to use the nutrients in photosynthesis. Nutrients discharged to coastal waters with groundwater will be rapidly diluted, dispersed and taken up by phytoplankton which in turn will be advected away by prevailing currents. It is most unlikely that in a coastal area with a short water residence time any impacts at primary or higher trophic levels would be observed.

Your commendation of Chalon's sensitivity to preservation of cultural resources is appreciated.

The approach taken by Chalon differs from that of many other developers, and we believe that public access will be improved.

Your insights into the changing lifestyle in Kohala in recent years are well taken, and perhaps indicative of a social environment becoming more capable of assimilating future changes.

Little or no property tax impact is expected because the project is at some distance from existing residential areas, and because it is not expected to create a significant amount of new demand for housing.

Property tax assessments increase in response to increasing demand for, and hence increasing value of, particular sorts of property. If tax rates are not adjusted, property taxes then rise as well.

As a resort property, Mahukona Lodge would not affect residential assessments. The residential lots proposed for Kapaanui would be about two miles from the nearest residential area, at Puakea Bay Ranch, and would differ in kind from existing North Kohala residential developments. Lots and homes in Kapaanui would be part of a resort and golf complex. There is no evidence that demand for homes at Kapaanui would measurably affect demand for homes elsewhere in North Kohala. Furthermore, it is normal tax assessment practice to distinguish resort-related residential areas from other residential areas for purposes of comparative valuation, unless market forces prove these areas to be comparable.

The analysis in section IV-5.7.3 focuses directly on the likelihood of the Mahukona Lodge stimulating further development of the North Kohala coast by first acknowledging the reasons why some additional development could result, and then providing reasons why this would

likely be restricted in scope and subject to limitations imposed by community concerns and government policies.

With respect to impacts on family life, it should be recognized that a project "impact" is the change produced by project development as compared to an alternative future (i.e., no development). On a nationwide basis, the transition from an industrial or agricultural to a service economy has been marked by rising female labor force participation, falling male wages, more female economic power (but continued family obligations), and child care concerns of the sort discussed in the EIR. However, it is difficult to say whether the construction of a resort lodge in North Kohala will contribute to these trends at a local level -- or whether the non-construction of the lodge will somehow slow or affect such trends.

The 1988 Statewide Tourism Impact Core Survey found that visitor industry workers were more likely to have to work at traditional "family times" (evenings and weekends), but that workers with children were less likely to work evenings/weekends and more likely to work set (as opposed to rotating or variable) hours than were workers with no children.

The analysis of the relationship between resort development and crime illustrates the complexity of the problem. In the specific case of the Mahukona Lodge, there are both inherent circumstances (i.e., drawing labor from the local resident population rather than importing transients) and deterrent measures (i.e., security systems, anti-drug programs, and neighborhood watch programs) which may be effective in minimizing crime impacts.

The fiscal impacts analysis concludes that the Mahukona Lodge will more than pay its own way as a result of increased tax revenues accruing to the county and state. In addition, included in the project are developer-funded improvements to roads, the water supply system, the sewage treatment system, and possibly the solid wastes disposal system. Furthermore, a portion of the revenues generated by this project will be used to fund other infrastructure and human services improvements in the North Kohala community.

Table 4 of the DEIR shows highway level of service (LOS) decreasing from C to D during the PM peak hour in the year 2015 as a result of including the traffic generated by the proposed project. This analysis was done for the highway section south of the project site, where most of the project generated traffic would be added. We note that LOS C is defined as having a volume/capacity ratio ranging from 0.27 to 0.42, and LOS D has a V/C ranging from 0.43 to 0.61. The 2015 PM peak hour ambient traffic forecast is at a V/C of 0.41, just at the threshold between LOS C and D. Hence, any

additional traffic (no matter how minimal) would cause a change in level of service. The term LOS C/D is often used to describe this borderline condition. The traffic forecast with the proposed project would increase the V/C ratio to 0.51, which is not significantly different from 0.41 in terms of traffic operations. In the professional opinion of our traffic engineers, the increase in traffic does not have an adverse traffic impact since there would not be significant changes in traffic operations between the ambient and with project forecast conditions. As we noted in the report, LOS D is still considered an acceptable traffic condition.

We further note that our methodology was conservative when adding all the project-generated traffic to the ambient traffic. With this project, workers from Hawi would not have to drive to the North Kona/South Kohala Coast resorts for work, but only to the project. There would be some reduction in the ambient traffic volumes on the highway south of the project site as a result of the project that was not accounted for in the analysis.

With respect to traffic impacts to Hawi, Figure 2 of the traffic report shows that the proposed project will add onlu 65 and 105 two way vehicle trips to the north of the project site in the AM and PM peak hours, respectively, in the year 2015. Much smaller volumes would be generated in the earlier years. Not all of these trips would pass through Hawi, and these volumes should not lhave a significant impact relative to the existing and future ambient traffic. As noted in the traffic report, State DOT traffic counts from 1988 show very low volumes on the highway in the center of Hawi town.

As discussed above, some of the trips generated by the proposed project would be made irrespective of the presence of the project. The proposed project will enable Hawi residents to enjoy a shorter commute trip to work.

The proposed project has evolved over a year's time. Consequently, consultant studies prepared for this EIR document have projected impacts using a range of lodge and villa units from 200 to 300, a worse case scenario. The number of units contemplated, after conducting more refined site design studies, is in the range of 180 to 210 units. This range will continue to be refined as more detailed studies are made for the project.

There are no plans for helicopter service to the Mahukona Lodge.

The solid waste volume quoted represents the quantity at project buildout, twenty or more years from now. Some reduction in this volume is possible with implementation of a source separation and recycling program. We do anticipate using the new landfill site

when it comes on line. It is presently uncertain when this facility will be built, but with project-related solid waste being minimal at first and gradually increasing over a twenty year period, impacts should be minimal.

The police station is located about 10 miles north of the project site in Kapaau. The North Kohala district is served by a nine-man police force that works on three shifts starting at 6:45 AM and ending at 11:00 PM. Between the hours of 11:00 PM to 6:45 AM, emergencies in the district must be handled by police outside of North Kohala. Security for the project and related facilities will be provided by a contracted service. As the resident population increases in the area, the need for additional county police personnel will require evaluation in the context of a county police department needs assessment.

The fire station is located approximately 10 miles north of the project site. The fire station provides 24-hour fire and basic life support services with one Fire Equipment Operator and two Fire/Emergency Medical Technicians on each platoon (shift). Three platoons (nine persons) are assigned to the facility and are under the supervision of one Fire Captain who is on 8-hour duty during the week days only. The fire department relies on the community's Volunteer Fire Fighters to co-respond with the under-staffed regulars. A 1,500 gpm pumper carrying 1,000 gallons of water, one basic life support medical unit, and a reserve fire apparatus are maintained at the station. It is planned that the fire station be fully staffed with regular fire persons by 1993.

The Kohala Hospital is located about 10 miles from the project site in the town of Kapaau. The facility is a joint State and Federal operation containing less than 30 beds, and provides both long-term and acute care as well as emergency service. The emergency services are provided around the clock by physicians contracted through the State of Hawaii. Patients with major injuries or illnesses are generally transferred from the Kohala Hospital to Kona, Hilo or Honolulu as quickly as possible.

Department of Education has indicated that the impact of the proposed project would increase the need for additional classroom space in the Kohala High and Elementary School. The projections at project buildout are as follows:

Grades	Enrollment Projections
K-5	15-20
6-8	5-7
9-12	8-10

Although there is no section entitled "Cumulative Impacts," consideration of cumulative impacts was essential in several of the analyses (i.e., in the social and economic assessment and the market assessment). Where data were available and relevant, they were incorporated into the analyses.

The proposals for a resort advanced by Finance Factors in 1981 were not considered in the EIR because Finance Factors has no permits to develop such a resort. As noted in the Social Impact Assessment for the EIR, Finance Factors remains interested in developing a resort according to their plan. Should they renew their requests for permits, as was announced in the September 14 edition of the Hawaii Tribune Herald, it is hoped that their application would reflect changes in North Kohala since 1981, including the Mahukona/Kapaanui project. Presumably, they would be required to submit a revised plan and possibly a revised EIS.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

P.O. Box 313
Hawi, HI 96719
August 18, 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, HI 96719

Subject: Mahukona Lodge Environmental Impact Report

Dear Mr. Grady:

Thank you for the opportunity to comment on this E.I.R. Draft.However,I believe it should be an E. I. S..

I found it very difficult to obtain a copy of this E.I.R. here in Hawi for the length of time that is required to make a good evaluation. Only one copy was available at the Bond Memorial Library and this copy was held on Reference status which meant it could not be checked out. Therefore my first comment is that Chalon should announce to the North Kohala Community that the time allowed for review of this E.I.R. should be extended another 45 days and that more copies should be made available at The Library and at Chalon's offices here in Hawi.My early requests for a copy of this E.I.R. to P.B.R. planners in Hilo (July 24th) and to Chalon in Hawi were refused. Mr. Grady, you did loan me your office copy for 2 days but that was inadequate time for proper evaluation. I feel certain there are many residents of North Kohala who would have comments on this document if it was truly available to them and they were informed of its publication. At considerable effort I did obtain a copy and wish to enter the following comments.

My home has been in Hawi for 27 years. I have lived in Hawaii for 36 years and have a BS Degree in Tropical Agriculture from The University of Hawaii. I was employed in the Hawaii Sugar Industry and have held a Real Estate license. My experience in planning and rezoning has evolved out of my efforts in the past to protect Hawi as a rural and historic village.

One overall comment is that there is not a <u>need</u> for the Mahukona Lodge Resort. The draft EIR states (Page IV 42) that a total of 31,624 units are proposed in the N/S Kohala and N. Kona Districts. Add this to the existing supply of 7,429 units and the grand total is 39,053 resort units in the region. The County's General Plan states that the projected market demand for resort units in the County is 10,500 (conservative Series A) by the year 2000 or on the high side (Series C) a demand for 22,000 additional resort units by the year 2000. In either case the already proposed resorts exceed the projected demand for resort units. Furthermore, existing resort units occupancy rates have been dangerously low due to an oversupply of units.

Furthermore,the West Hawaii Regional Plan concentrates resorts in the existing resort areas. Mahukona is not identified as one of the resort "nodes" or a resort area. Please see E.I.R. Draft page # V-39. This lack of need is not properly addressed in this Draft E.I.R.and should be in the final E.I.R.or preferrably an E.I.S..

I find it particularly repugnant that Chalon is using the less than 15 acre exemption to avoid having to seek approval from the State Land Use Commission. If Chalon truly wants all the impacts of this resort to be evaluated the State Land Use commission should be included in their rezoning permit process (E.I.R. Draft pages # 1-3, 1-16) There is a total of 490 acres in this project. It redesignates lands in the Agriculture district so therefore it must go through the SLUC. Certainly the 15 acre exemtion was not intended for resorts the size of Mahukona Lodge with 45 units, villas with 300 units, 170 one acre estates/residential lots, 18 hole golf course, clubhouse, spa, swimming lagoons and ten tennis courts. Certainly all this development will have an impact on the adjoining Conservation District. This 15 acre exemtion as opposed to the process of going through the SLUC does not include all the impacts and must be better addressed in the final EIR.or a true E.I.S..

I do not believe the impacts on the marine environment have been properly evaluated(pages IV 24, 25 and 26). The offshore water is extremely pristine which accounts for the high diversity of marine life. Construction mitigation efforts will not catch all soil runoff or wind blown soil from this very fragile environment as stated on page IV 26. A particular problem is the wind blown soil as has been witnessed by many local residents at other resorts or estate lot construction sites on this windy Kohala coastline. Also, the soils in this area are highly permeable with a high infiltration rate and the hydrological and drainage characteristics of the project site are typical of West Hawaii with no perenial streams and highly porous lava. The EIR states that due to low rainfall in the area and that because fertilizers are not to be applied during the rainy periods,"biocides and fertilizer leaching is not expected to enter the groundwater and/or surface water runoff streams". The highly porous lava will allow surface water and all the pollutants that they carry to infiltrate into the groundwater basal lense and/or the offshore coastal waters. This will surely impact the pristine marine environment through sedimentation. Having been in Agriculture in this area I am aware of how difficult it is to predict heavy rainfall or Kona storms that characterize the project area and consider the timing of fertilizers and biocide applications to be an inadequate mitigation proceedure and feel that this protection of the marine environment must be furthur addressed in the final EIR.or EIS.

The E.I.R. does not use "Decisions Action 90's, Strategies for a Stronger Community" as one of their community planning references. It was published on January 25, 1990 and covers the County of Hawaii and certainly includes topics that the Mahukona Lodge and Resort have a direct impact upon. This community document and its recommendations should be included in the final E.I.R..For instance, on page 6 of this study under General Recommendations - Development:

c."development to be discouraged, e.g., North Kona and Kohala: additional resort development."

Thank you for the opportunity to comment on this draft E.I.R.. My hope is that you will see fit to extend the time for comments on the Draft E.I.R.. I look forward to further reviewing and commenting on this Draft E.I.R. or preferrably a true E.I.S..

Sincerely yours,

J. F. Johnson

XC: Mr. James Leonard, PBR Hawaii

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. J.F. Johnson
P.O. Box 313
Hawi, Hawaii 96719

Dear Mr. Johnson:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 18, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

As noted in the Market Assessment conducted for this EIR (Appendix A, Exhibit IV-B), there are more than 8,000 hotel rooms proposed for development on the island of Hawaii. This figure includes those proposed projects which have County General Plan, County Zoning and State Land Use Commission approvals in place. Of these proposed hotel units approximately 1,760 units (Exhibit IV-I) would be targeted to the "luxury" class.

Chalon's Mahukona Lodge is seeking to penetrate this luxury class market segment. It is expected that the lodge market will create a niche serving (page IV-9):

- Free independent travelers - 65%
- Group Travelers - 10%
- Incentive and corporate - 20%
- Hawaii residents - 5%

Based on historical occupancy rates for the Big Island, full occupancy for the lodge is expected to level off at 70 percent in the year 2000 (page IV-10).

The residential/agricultural component of the concept plan is discussed in section V of the market assessment on page V-1. Existing inventory of "estate lots" includes 859 lots, with another 2,088 planned (Exhibit V-A). The market assessment states that "Absorption of estate lots on the island of Hawaii increased dramatically in 1987 as the supply of these lots began to increase..." (page V-5). Further, the largest market for the residential/agriculture lots is primarily Hawaii residents and visitors from the U.S. mainland as discussed on page V-8. Absorption of the 170 lots is expected to be complete in 1996, based upon initial absorption of 20 lots and from 35 to 40 lots per year subsequently (page V-9).

VII-36

Based upon this market assessment there appears to be sufficient demand to meet Chalon's expectations ensuring absorption and occupancy rates commensurate with their level of economic returns to sustain viable operation of the project.

The West Hawaii Regional Plan projects a Maximum Build-out Scenario of 39,029 existing and proposed units as well as a year 2005 Planning Scenario of 25,279 existing and proposed units including resort residential units. The Mahukona Lodge project would constitute approximately 1.2 percent of this maximum build-out scenario (assuming maximum numbers of units). It should also be pointed out that the plan is not a marketing report geared for specific market segments, nor does it disclose market absorption or occupancy rates as does the marketing report prepared for this EIR.

The DEIR recognizes that Mahukona is not within one of the four "resort destination nodes" identified in the State's West Hawaii Regional Plan. On the other hand, the County General Plan designates the area primarily as resort, alternate urban expansion and agriculture, all principal elements of the project. The need for the project is addressed in section II-3.3.

Chalon seeks to reclassify a 14.5 acre parcel from Agriculture to Urban, and intends to subsequently rezone the parcel for resort use to allow the development of the lodge, villas, golf club house and related resort components. The intended uses of other portions of the property conform to present land use designations. The State Land Use Commission (SLUC) will have the opportunity to review the impacts of the project in its consideration of the reclassification request. This process complies with both the letter and the intent of the state land use laws.

During construction, measures would be needed to insure that silt and sedimentation would not enter the near-shore waters. An erosion and sedimentation plan would need to be drafted and approved by the Department of Public Works as part of the permitting procedure for the grading work. Potential mitigation measures include limiting exposed areas, dust control measures, and immediate seeding of exposed areas.

The analysis in the DEIR concludes that it is unlikely excess nutrients or biocides will enter marine or groundwaters. In the event this does occur, however, numerous physical, chemical and biological processes will act to dilute, disperse and break down these substances. There is no practical impact to elevated concentrations of nutrients in non-potable groundwater as organisms capable of uptaking these nutrients (algae) require light to use

the nutrients in photosynthesis. Nutrients discharged to coastal waters with groundwater will be rapidly diluted, dispersed and taken up by phytoplankton which in turn will be advected away by prevailing currents. It is most unlikely that in a coastal area with a short water residence time any impacts at primary or higher trophic levels would be observed.

The final EIR will include a discussion of the report "Decisions Action 90's," as you requested.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

VII-37

P. O. Box 313
Hawi, HI 96719
RECEIVED AUG 2 0 1990
August 20, 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, HI 96719

Subject: Mahukona Resort EIR

Dear Mr. Grady:

Thank you for the opportunity to comment on this Mahukona Resort EIR. However, I believe it should be an EIS that covers Chalon's Kohala Master Plan including the proposed Mahukona Resort because the EIR frequently mentions the Kohala Master Plan as though they are interdependent. This EIR is therefore inadequate and does not provide a complete picture for adequate decision making in the community.

Under visual impacts I believe there are ommissions. On pages IV 9 & 10 there is no mention of the adverse visual impacts of the HELCo poles on the mauka side of Akoni Pule Highway from the Kohala Ranch Substation to the Projects Substation.

Because the current EIR does not take in the total Chalon Master Plan the unfavorable visual impact of the double story apartment buildings in Hawi has not been considered. Because these buildings are going to be credits toward the County required affordable housing for the resort zoning in Mahukona their visual impact on the existing desireable mauka view in Hawi should be included.

Chapter 2.4 Visual Attributes is incomplete as noted in the above 2 paragraphs (pages IV-9 and IV-10). It only takes into consideration the on-site visual impacts. This EIR does not disclose all visual impacts and is therefore inadequate and must be revised to reflect all visual impacts on off site but related projects.

Because the publication of this EIR was not announced and made readily available to me as well as other members of the community I do not feel we have had adequate time to appraise this EIR. Therefore I request that this EIR be rewritten into an EIS that covers Chalon's complete Master Plan for North Kohala and that the time for public input be extended. This current EIR Draft does not adequately disclose all impacts for decision-makers to make an informed decision on the project.

Thank you for the opportunity to comment on this Draft EIR. I trust that the impacts and inadequacies cited above will be addressed in a preferred EIS. I look forward to commenting on the preferred EIS.

Sincerely yours,

Marian Johnson

XC: James Leonard

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Ms. Marian Johnson
P.O. Box 313
Hawi, Hawaii 96719

Dear Ms. Johnson:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

Hawaii's EIS Law (Chapter 343, HRS), first promulgated nearly twenty years ago, establishes certain classes of actions which trigger an environmental assessment (EA). In the event an assessed project may have significant environmental impacts, a full environmental impact statement (EIS) is required. The Mahukona Lodge project, as presently envisioned, contains no trigger mechanism. That is, there is no requirement for either an EA or EIS. However, because of Chalon's continuing concern for the environment and desire to involve the community in the planning process, this environmental impact report (EIR) has been voluntarily prepared. It has been called an EIR to distinguish it from a document prepared pursuant to Chapter 343 which must be accepted by the appropriate government authority. The procedures, standards and format of an EIS have been used, and a public review period in excess of that granted under Chapter 343 was given. The availability of the EIR was publicly noticed in the OEQC Bulletins of July 23 and August 8, 1990.

Community input to Chalon's Master Plan has been and will continue to be actively sought and heeded. Once again, however, there is no requirement to prepare an EIS for the Master Plan.

To clarify the potential visual impacts of the preferred alternative, the architect is preparing to-scale renderings using a photomontage technique of the following views: 1) view from Heiau site on bluff towards lodge; 2) view from old government road and Akoni Pule Highway junction, just north of the junction, looking south towards the lodge; and 4) view to lodge area from Akoni Pule Highway just south of the access road intersection, looking north. These figures will be included in the final EIR.

Visual impacts of the poles associated with HELCO's transmission line into the area cannot be determined at this time. HELCO is in the process of obtaining easements, and until this is completed the alignment of the transmission line is uncertain. It should be

noted that the provision of these lines by HELCO will serve other aspects of the community besides Chalon's Mahukona Lodge project. Chalon will address visual impacts relating to its lands, and will work with HELCO to minimize these impacts.

Chalon's proposed Hawi apartment building is purely conceptual at this point and completely unrelated to the Mahukona Lodge project. At this point we do not know what the County will require of Chalon in terms of affordable housing, nor where it would be built.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

VII-39

HAWI EAST NEIGHBORHOOD

GENERAL DELIVERY HAWI HI 96719

August 20,1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, HI 96719

Subject: Mahukona Lodge Resort E.I.R.

Dear Mr. Grady:

Because Chalon's Kohala Master Plan has elements in it that are being used to justify the Mahukona Lodge Resort we feel our Hawi East Neighborhood has a right to be heard. Thank you for the opportunity to submit these comments even though we feel that the EIR should be an EIS.

In other words, if the Master Plan and the Mahukona Resort Plan are truly interdependent then the entire Master Plan should be the Plan and EIS that the community should be reviewing. Certainly, there are going to be major impacts on our Hawi East Neighborhood. The most obvious example is the proposed multifamily, rental housing project just mauka of Chalon's office buildings in Hawi. These low-cost or affordable units will be used as a credit on the County's requirement for affordable housing for the Mahukona Lodge Resort. Yet the many unfavorable environmental impacts of this Hawi Housing Project have not been presented in an EIS so we the residents can comment on them.

The elements in the Kohala Master Plan are tentative at the best.It should not be used as leverage for the resort. The EIR does not identify impacts in the context of the Master Plan, yet it identifies benefits of the resort in the context of the Master Plan.

We believe the EIR should be rejected and replaced with an EIS that covers the entire Chalon Kohala Master Plan including the Mahukona Lodge Resort because the current EIR does not adequately disclose all impacts in order for decision makers to make an informed decision on the Chalon plans for North Kohala.

Please include the Hawi East Neighborhood on the distribution list for your next environmental impact statement which we hope will be an all inclusive EIS.We look forward to reviewing and commenting on the impact statement. We trust that the major impacts on our Hawi Neighborhood will be addressed in the final statement.

Thank you for the opportunity to comment on this Draft EIR.

Sincerely,

Hawi East Zoning Committee

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. J.F. Johnson
Hawi East Zoning Committee
General Delivery
Hawi, Hawaii 96719

Dear Mr. Johnson:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

Hawaii's EIS Law (Chapter 343, HRS), first promulgated nearly twenty years ago, establishes certain classes of actions which trigger an environmental assessment (EA). In the event an assessed project may have significant environmental impacts, a full environmental impact statement (EIS) is required. The Mahukona Lodge project, as presently envisioned, contains no trigger mechanism. That is, there is no requirement for either an EA or EIS. However, because of Chalon's continuing concern for the environment and desire to involve the community in the planning process, this environmental impact report (EIR) has been voluntarily prepared. It has been called an EIR to distinguish it from a document prepared pursuant to Chapter 343 which must be accepted by the appropriate government authority. The procedures, standards and format of an EIS have been used, and a public review period in excess of that granted under Chapter 343 was given.

Community input to Chalon's Master Plan has been and will continue to be actively sought and heeded. Once again, however, there is no requirement to prepare an EIS for the Master Plan.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

Kohala Community Association
Planning Committee
P.O. Box 76
Hawi, HI 96719
Aug 20, 1990

Mr. Matthew Grady
Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady,

Thank you for the opportunity to respond to the Mahukona Environmental Impact Report (EIR). We are a standing committee of the Kohala Community Association. We have 14 regular members and meet every other month or as needed to stay aware of, discuss and recommend association action on matters regarding land use and planning issues affecting our distict. Our meetings are open to the community.

At our meeting of August 16 the committee concluded the following:

1. The EIR is not an Environmental Impact Statement. It has not been requested by a government agency. Response to the draft will not be seen by a government agency. There are three places in the land use permitting process required for the project where and EIS may be called for. It was the consensus of the committee that the association would encourage those agencies to require a full EIS at that time.

2. Not enough copies of the EIR were distributed or made available to the Kohala people. The report itself shows that while 84 copies of the EIR were sent out, only 13 copies were sent to Kohala people other than Chalon employees. One copy is available to be read in the Kohala Library during library hours on a reserve basis. Two copies were available to be read during office hours only at the Chalon office. At the request of this committee Chalon has agreed to allow overnight check-out of those two copies for the public. This committee asked that copies be made available, at least temporarily, to committee members prior to the Aug 16 meeting. No copies were provided. At the meeting of 17 people only two copies were present.

3. Not enough public notice of the EIR was given the community. Since the only community-wide publication, the Kamehameha Times, is only published from September to June, the mailing of copies on July 6 put the entire 45-day review period in the summer months where no public announcement, review or discussion of the EIR could take place in the community.

4. It was noted that there exists confusion in the Kohala community about the separation or interdependence of the Mahukona resort project and Chalon's Master Plan for North Kohala. Participants in the Community Planning Committee were led to believe they were discussing community-wide priorities, and yet the existance of the CPC is used in the EIR to imply community support for the resort. Interviewees for the Socio-Economic Impact Assessment done by Community Resources, Inc. were presented material and asked questions about the master plan as well as the resort development. The EIR states that affordable housing (and presumably employee housing) requirements will be met in projects proposed in the master plan, but those plans are not open to review of impact in this report.

Because of these findings the committee asks Chalon International of Hawaii, Inc. for an extension of the 45-day comment period in order that publication of the existance of the EIR be made in the September issue of the Kamehameha Times. This committee has scheduled its next meeting in September to discuss the EIR in detail and to publicize it as a public meeting to invite community comment. We will report the comments to you as soon as possible after that meeting.

Thank you for the opportunity to comment. I trust that the comments made here will be addressed in the final EIR and that further comments from the committee after its September meeting will be included as well.

Sincerely,

Toni Withington
Chairman

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Ms. Toni Withington, Chairman
Kohala Community Association
P.O. Box 76
Hawi, Hawaii 96719

Dear Ms. Withington:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

Hawaii's EIS Law (Chapter 343, HRS), first promulgated nearly twenty years ago, establishes certain classes of actions which trigger an environmental assessment (EA). In the event an assessed project may have significant environmental impacts, a full environmental impact statement (EIS) is required. The Mahukona Lodge project, as presently envisioned, contains no trigger mechanism. That is, there is no requirement for either an EA or EIS. However, because of Chalon's continuing concern for the environment and desire to involve the community in the planning process, this environmental impact report (EIR) has been voluntarily prepared. It has been called an EIR to distinguish it from a document prepared pursuant to Chapter 343 which must be accepted by the appropriate government authority. The procedures, standards and format of an EIS have been used, and a public review period in excess of that granted under Chapter 343 was given. The availability of the EIR was publicly noticed in the OEQC Bulletins of July 23 and August 8, 1990.

We believe the Association has had ample time to review the EIR. Reports were mailed between July 6 and July 10, 1990. The Association had copies of the report for about one month prior to the August 16 meeting. At your committee's request we have extended the review period by two weeks, one third again the time allowed to review EIS's. Further, we attended your Planning Committee's meeting on August 16 to directly address questions and concerns of the members.

As far as community notification, we believe notification of the community association should serve to notify the community it represents. Furthermore, we cannot agree that the Kamehameha Times

is the only available vehicle for public notice in the community, nor that planning and discussion of issues should be suspended during the summer months when the Times is not published.

Chalon's Master Plan for North Kohala is currently being revised to reflect inputs from the community and elsewhere. At this time it is uncertain what requirements the County will put on Chalon in terms of affordable housing or where it would be located.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

RECEIVED AUG 20 1990

Citizens for Protection of the
North Kohala Coastline
P.O. Box 76
Hawi, Hawaii 96719
August 20, 1990

Mr. Matthew Grady
Planner
Chalon International of Hawaii, Inc
P.O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady,

V11-42

Thank you for the opportunity to comment on the Mahukona resort Environmental Impact Report. We are a home-grown Kohala communtiy group with a dues paying membership of 161 families representing about 400 people, primarily North Kohala residents and Kohala-born people. Our steering committee is composed of six Kohala residents. Many of our members have been active members of your Community Participation Committee and subcommittees.

We do not recognise the Mahukona EIR as a valid Enviromental Impact Statement or as a substitute for one. Since it was not ordered by a government agency, comments to the report will not be seen by an agency. Since we see at least three places in the project's land uses permitting process where a proper EIS can be called for, we will be encouraging those agencies to require a full EIS not only for Mahukona but for at least those parts of the Chalon's Kohala Master Plan that are integral to the Mahukona resort.

Our overall impression of the EIR is that it is a tool of justification rather than a discovery and study of actual impacts. Significant omissions of social, environmental and infrastructure impacts have been made. Reporting of government regulations and plans is selective to the point of distorting governmental intent. A great deal is made of Chalon's efforts to get community input, yet none of their recommendations is reported leaving the false impression that the community supports the resort development. These conclusions will be supported in great detail as comments to a proper EIS is called for. In the mean time we will further outline some of these problems here.

We see the interpretation of the State Land Use Laws and the County General Plan as incorrect. We also see the reduction of the resort room area to 14.5 acres as a violation of not only the letter but the intent of State and County land use laws.

In citing the need for the project the report (page IV-42) says there is need for more hotel rooms, yet the West Hawaii Regional Plan, which is cited on page V-38 as supportive clearly says we must reduce the number of planned hotel rooms and keep them to the identified resort nodes further south.

The report also misinterprets the North Kohala Development Plan, the State Functional Plan and does not mention the State Ocean Marine Resource Development Plan or the Ocean Recreation Management Plan.

The biggest errors come in the reporting of the community participation in and response to the development plans. The report mentions the Community Participation Committee, but never mentions the names of its 15 members. This is because several members quit dissatisfied with the project. The CPCs drew up recommendations to Chalon, but these are not even mentioned in the EIR. This is because two subcommittees recommended against developement of Mahukona (see attached).

In addition to ignoring the CPC recommendations the report failed to identify other community efforts to at least hold off development of Mahukona until a planning assessment of the district's coastline can be made. Specifically Senate Concurrent Resolution 179 (1988), Hawaii County Council Planning Committee resolution of June 1989, and a resolution passed by the Hawaii County and State Democratic Party (1990) (see attached). Also ignored was a petition calling for a stop to all coastal development until studies of the area are complete, which was signed by 5,800 people on the Big Island including about 1,100 from North Kohala (see attached). The report neglected a major report prepared for the county called Decisions --Action 90s (jan. 1990) which has as it's primary land use recommendation: It is STRONGLY recommended that the State and County quickly and clearly establish areas in the County that are never to be developed.

Another area where community input was ignored is in the recommendation of economic alternatives to coastal resort development. Many recommendations for alternatives to resort were presented to Chalon by the CPC and this group. We ment with Chalon several times to present alternatives. These are not even mentioned in the report. Alternatives presented in section III only show other resort configurations at Mahukona. The "no action" alternative does not reflect the wide community support for this alternative over resort development. This leads us to believe that Chalon never explored the alternatives suggested by the community.

The report does not prove the economic need for the project. Indeed it states that resort jobs can't be filled at existing hotels. That labor will have to be imported. It says that a retreat resort will provide a stable economic environment,

but it does not analyse reports from Punaluu or Kahuku where resorts have proved to be unstable economic elements. The only economic benefit cited in the report is a shortening of the communting time of hotel employees. It does not adequately address the impact of the increased competition for housing, the rising cost of housing that will result.

The EIR ignores a housing survey that was compiled by our group and later reinforced by PBR (see attached). This survey shows that if housing projects already holding some form of government approval in our district were developed we could see 4,055 new units built in the next 15 years. This would represent at 310% increase in population in the district. But most alarming is that over 95% of the new units would be in the "rich housing" or resort /residential catagories. This tremendous impact, prepared by PBR for Chalon, is not included in the EIR.

The housing aspect of the study is completely intermeshed with Chalon's Kohala Master Plan, as is the agricultural and recreation promises made by the resort developer. Yet the master plan is not included in the EIR and thus not open for comment as to its impact. If any elements of the master plan are to be a part of permits granted for resort development, then those parts must be included in the EIR or an EIS for the master plan must be undertaken.

The identification of impacts from transportation are inadequate. The resort planned has 45 units in the lodge, 300 units in detached villas and 45 resprt units offered from the residences -- a total of 390 hotel units, larger than the Mauna Kea or Mauna Lani resorts. To say that the resort-generated traffic will have no impact on the Akoni Pule Highway or the Keahole Airport is ridiculous.

The section on coastal access ignores the information that the Circuit Court in Hilo has in three separate judgements granted perpetual pedestrian and vehicular access along the jeep road/ railroad bed. The developers can not claim that they will prohibit vehicle access along the shoreline, because they are required by the court to do so.

There are many other impacts that are not mentioned which include the persistant and strong winds, the large population of porpoises, the whales who come in close to the shore frequently during the winter months and the owl population whichis quite significant, particularly during period of tremendous mouse population explosions. While rainfall may average 13.5 inces a year, it never comes little at a time. The report doesn't take into account the periodic very heavy rainfall at Mahukona.

There are many other impacts that are not identified, not thoroughly addressed or wrongly assessed. We will address them in detail in a valid EIS.

In closing I would like to report on the treatment of this group by representatives of Chalon. While we are one of the largest and most active community groups in Kohala -- a Fourth of July party at Mahukona brought out more than 500 people -- Chalon does not mention our existance in the EIR. Though professing interest in shoreline preservation in this report Chalon has never asked to meet with our group or support our efforts. We have asked for and met with Chalon employees. There is no indication that any of our proposals for alternatives to coastline development has been looked at with any seriousness. Athough we have asked for and been promised a meeting with Chalon's sole owner, Soichi Kamon, for over a year, such a meeting has yet to take place.

Sincerely,

Toni Withington

Toni Withington
Chairman

6. Kohala High School should remain in its present location, but be expanded, possibly in the area makai of the school if land is available.

- Chalon should work with the government and the community to develop a solid waste master plan with top priority given to identifying and testing existing dump sites.

Subcommittee on Natural Resources/Environmental Quality

The Subcommittee on Natural Resources and Environmental Quality has agreed on the following preliminary recommendations.

- For the leeward shoreline south of Upolu: The natural and open space character and existing viewplanes along the makai side of Kawaihae Road should be maintained. Continuous lateral shoreline access should be guaranteed. The shoreline area presently located within the Special Management Area should be maintained free of development. There should be no degradation of water quality or marine life.

- For the windward coastline (Upolu and eastward): The natural and open character of the shoreline area should be maintained. Chalon should work with the community to provide additional mauka-makai access to the shoreline. Lateral access along the shoreline should not be restricted. The shoreline area presently located within the Special Management Area should be maintained free of development. No structures other than public facilities should be built in the conservation district.

- Access to the mauka rainforest area above Halaula and Hakapala should be made available for Kohala residents. There is potential for hiking, educational activities and family recreational activities. Control of the pig and cattle population in this area is essential for regeneration of native rainforest. This should be accomplished by well-maintained fencing and by hunting pressure. Although the problems of safety, liability and poaching are real, they can be overcome.

- Intrusion by tourist helicopters and aircraft should be controlled to protect the rural, tranquil nature of Kohala. This policy applies equally to residential areas and to the natural areas from Pololu to Waimanu Valley. It is important to avoid a situation like that which has developed on Kauai's north shore. The use of Upolu airport for tour helicopter landings is not welcomed.

- Those stretches of Akoni Pule Highway which offer mauka views of Kohala Mountain should be regarded as a natural asset. Any development should avoid encroachment into these viewplanes.

5. Restoration of old plantation camps.

If the resort and residential project is developed as planned, the subcommittee made the following recommendations:

1. The use of the "resort" land use designation be for a ryokan of not more than 50 rooms.

2. The 170 single-family units within the Mahukona-Kapaa area be located mauka of the old railroad right of way.

3. The proposed development not prevent or interfere with activities currently taking place in the shoreline area.

4. Viewplanes from public access areas be maintained free of visual obstructions.

5. The use of Kohala Ditch water for golf course irrigation should not jeopardize its availability for agricultural use.

Subcommittee on Historic/Cultural Resources

The CPC Subcommittee on Historic/Cultural Resources was assigned the task of locating important historic sites on Chalon properties and recommending possible treatments of these sites.

In addition to regular monthly meetings, the subcommittee planned excursions with the Kohala Hawaiian Civic Club to visit some of the more remote sites, and it set up a display at the Kohala Country Fair to gather information from North Kohala residents.

It also met with Ross Cordy, State archaeologist, who visited Kohala to speak to the subcommittee at a State Preservations Workshop held in August. Cordy discussed methods of gathering information about and documenting, protecting and preserving historic sites.

The subcommittee's final recommendations are based on the following facts it gathered from Kohala residents and other concerned experts:

- Of all the ancient historic sites in Kohala, only an estimated 4 percent have been surveyed by an archaeologist. Only Lapakahi, Pololu and Honokane have been adequately surveyed.

- Most of the historic sites in Kohala exist within a quarter mile of the ocean. Most Kohala residents want this land to be left open and free of development.

- Many of Kohala's sites are connected to families which still reside in the district.

THE SENATE
FOURTEENTH LEGISLATURE, 1988
STATE OF HAWAII

S.C.R. NO. 179
H.D. 1

SENATE CONCURRENT RESOLUTION

This passed both houses

URGING THE RETENTION OF VIEW AND OPEN SPACE MAKAI OF KAWAIHAE-MAHUKONA-HAWI ROAD FROM KAWAIHAE TO UPOLU POINT, HAWAII

WHEREAS, lands makai of the Kawaihae-Mahukona-Hawi Road are currently in a relatively undeveloped state; and

WHEREAS, the area contains Lapakahi State Historical Park, an ancient Hawaiian coastal settlement, and, Mookini Heiau State Monument, one of the most famous heiaus on the island; and

WHEREAS, the State Department of Transportation has previously recognized the value of makai views by requiring the location of all utility poles on the mauka side of Queen Kaahumanu Highway immediately south of the Kawaihae-Mahukona-Hawi Road; and

WHEREAS, existing State zoning does not provide for urban development on the vast majority of these lands; and

WHEREAS, the makai area lies in large measure within the Coastal Zone Management area administered by the State; and

WHEREAS, the makai area also lies within the Special Management Area administered by the County; now, therefore,

BE IT RESOLVED by the Senate of the Fourteenth Legislature of the State of Hawaii, Regular Session of 1988, the House of Representatives concurring, that the State and the County governments are urged to work together in a collaborative effort to ensure that the public view and open space currently existing makai of the Kawaihae-Mahukona-Hawi Road be preserved; and

BE IT FURTHER RESOLVED that the State and County governments work in close collaboration to discourage subdivision and building development makai of the Kawaihae-Mahukona-Hawi Road; and

RFS1217 SCR R0041

VII-45

prepared by PBR

NORTH KOHALA
RESIDENTIAL DEVELOPMENT STATUS REPORT

Development	Type of Unit Sales	Total No. of Units Planned	No. Units Currently Available	No. Units Sold to Date	No. Lots With Homes Built	Proposed Sales: Present to 1990	1991 to 1995	1996 to 2000	2001 to 2005+	Comments
1. Alaskea (Chalon)	Lots 10,000 sq.ft.	165	0	Phase I 100	44	Phase II 65				10 lots of Phase 1 and 7 lots of Phase 2 for self-help housing Price Range: $37,500-$53,000
2. [illegible] (Monty Richards)	[illegible]	566 (Est.)				Unknown				Project has not been approved for sales yet. Recently received GP approval.
3. Lapaanui (Chalon)	Lots 1 acre	170	0	0	0		170			Received zoning/subdivision. Extension requested by Chalon to revise development plans.
4. Kohala-by-the-Sea (Parcel Johnston)	Lots 1 acre	73	23	19	0	54				Waiting for infrastructure before homes can be built. Received zoning; yet to receive final approval.
5. Kohala Estates (Orford/First)	Lots 3-5 acres	105	0	105	35	Sales Completed				Project opened in mid-1970s; resales now. Sales dropped because of water shortage. Phase 1 of Kohala Ranch; changed name
6. Kahua Shores (Kohala Joint Venture)	32 acres Total	420 Multi-family				Unknown				Project has not yet been developed. Land is on market. No water commitment.
7. Kohala Ranch (Mike Prohoroff)	Lots	1,967	54	333	20	0	100	Unknown		Project expected to be built out in 2000.
Heathers I	3-10 acres	233				Sales Completed				
Meadows II	3 acres	154				60% sold				
Highlands II	5 acres	100				Being Planned				
Village IV	Mixed Use	1,480				Recently received GP approval for low/medium residential development				
8. Halu Ridge (Chalon)	Lots 1-6 acres	170	0	Phase I 57	16	Phase II 56	57			Phases 2 & 3 in planning process. Phase 1 complete. Price range: $50,000-$80,000
9. Puakea Ranch (George Isaacs, Jr.)	Lots 10 acres	40	0	40	8	Sales Completed				Project opened 3 years ago; sold out. Resale now of 10-acre lots. Price range: $250,000-$410,000.
10. Waiwailani (Clint Williams)	Lots 3-10 acres	89	0	46	0	43				Project is on hold pending litigation. Price range: $89,000-$147,000.
11. Kohala Makai (Dotty Dahlberg)	38.2 acres Total	416	0	0	0	Unknown				Retained resort zoning several years ago. Multi-family condos. Land currently on market.
12. Niuli (Malama Solomon)	Apt.	3				3				In planning process. No. of bedrooms not specified.
Totals		4,178	79	700	123					

minus units built -123
4,055 units planned
of these:
3,861 units projected to sell in excess of $300,000 or 97% of new units
194 units projected to sell below $300,000 — 5% of new units
N. Kohala now has 1,260 units. An increase of 4,055 units represents 310% increase

S.C.R. NO. 179 H.D. 1

BE IT FURTHER RESOLVED that certified copies of this Concurrent Resolution be transmitted to the Chairperson of the Board of Land and Natural Resources, the State Land Use Commission, the Chairperson of the Hawaii County Council, the Mayor of Hawaii County and the Director of the Hawaii County Planning Department.

COMMITTEE ON PLANNING
10th Session
Hilo, Hawaii
Wednesday, June 14, 1989

The meeting of the Committee on Planning was called to order at 10:02 a.m. in the Councilroom, Hawaii County Building, by Mr. Takashi Domingo, Chairman.

ATTENDANCE: Present:

Mr. Takashi Domingo, Chairman
Mr. Harry S. Ruddle, Vice Chairman
Mrs. Helene H. Hale, Member
Mrs. Lorraine R. Inouye, Member
Mr. Spencer K. Schutte, Member

Also present:

Mr. Russell S. Kokubun, Council Chairman (came in later)
Miss Merle K. Lai, Council Vice Chairwoman (came in later)
Mr. Duane Kanuha, Planning Director
Mr. Joseph Garcia Jr., Special Assistant to the Mayor
Mr. Bruce McClure, Deputy Chief Engineer (came in later)
Mr. Harry A. Takahashi, Legislative Auditor
Mr. Tadato Nagasako, Legislative Assistant
Mrs. Chizuko Harada, Council Services Assistant Supervisor
Mrs. Evelyn M. Fujii, Senior Clerk-Stenographer

STATEMENTS FROM THE PUBLIC: The Chair called for statements from the public.

The Chair called on Ms. Kelly Pomeroy, representing Friends of Kohala, who made the following statement regarding Petition 2 (A):

MR. SCHUTTE: That was my reason for asking. In other words, it involves a little more than just looking at what appears on the preface here of what the people's concerns are and just, in general, for general reasons, just saying, yes, we should protect this entire coastline without actually getting involved more intricately and finding out what we're actually talking about and how far the shoreline preservation under SMA, etc., etc., already deals with and how far back or inland that we're actually talking about within this preservation area.

MR. KANUHA: I think that's the key focus in this particular petition.

MR. SCHUTTE: Mr. Chairman, if that be the case, then we'll allow the Planning Department to review this proposal and take a better look at it, then I would have no problem in voting in favor of the motion on the floor.

CHR. DOMINGO: Any further discussion? It's a favorable recommendation for the preservation of the Kohala coastline and that the petition, with the letter, be sent to the Planning Director so they can follow up and report back to us with additional input.

The motion was carried by the following vote:

In Favor: Committee Members Hale, Inouye, Ruddle and Schutte
Opposed: None
Absent & Excused: None

Comm. 551: SENATE RESOLUTION NO. 143
From T. David Woo, Jr., Clerk of the Senate, dated May 15, 1989, transmitting a copy of Senate Resolution No. 143, requesting the County of Hawaii to examine its ordinances relating to zoning to develop a sound system to protect agricultural lands from condominium-style development of agricultural land and eliminate the ambiguity in the law, which was adopted by the Senate during the 1989 legislative session.

CHR. DOMINGO: The Chair would recommend close file.

Mr. Schutte moved to close the file on Communication 551. Seconded by Mr. Ruddle.

RESOLUTION URGING THE TAKING OF STEPS TO PRESERVE THE OPEN VIEW PLANE, HISTORIC SITES AND TRADITIONAL ACCESS ALONG THE COASTLINE OF THE NORTH KOHALA DISTRICT, HAWAII

Adopted by the Hawaii County Democratic Party -- 5/5/90
and by the State Democratic Party -- 5/26/90

WHEREAS, lands makai of the Kawaihae-Mahukona-Hawi Road to Upolu Point and the northern coast of the North Kohala District are in a relatively undeveloped state; and

WHEREAS, the area contains Lapakahi State Park, an ancient Hawaiian coastal settlement; Mookini Heiau State Monument, one of the most famous heiaus; Kamehameha's birthplace, and numerous other historical sites; and

WHEREAS, the State Office of Planning's West Hawaii Regional Plan (Nov. 1989) calls for clustering resort development in three nodes in South Kohala and North Kona and avoiding the "sprawl" of resorts and resort residential development along the rest of the coast; and

WHEREAS, the State Legislature (both houses, Res. #179) in 1988 called on the State and County governments to work together to preserve the public view and open space makai of the Kawaihae-Mahukona-Hawi Road and further called for collaboration to discourage subdivision and building development, despite which the governments have issued new development approvals; and

WHEREAS, a petition circulated on the island of Hawaii calling for the halt of all development along the North Kohala coastline until "a thorough study of the scenic, historic, recreational and biological values" of the coast can be studied was signed by 5,650 people -- 1,030 of them residents of North Kohala; and

WHEREAS, The Planning Committee of the County Council passed a resolution (June 14, 1989) calling for the preservation of the North Kohala coastline; and

WHEREAS, DECISIONS --Action 90's, a report to Hawaii County calls on the State and County to "quickly and clearly establish areas in the County that are never to be developed."

WHEREAS, a report of the North Kohala Citizen Participation Committee says the people of Kohala want to maintain "the natural and open space character and existing viewplanes" of the coastline, to retain continuous lateral access and traditional mauka-makai access and to preserve the historic sites "most of which exist within a quarter of a mile from the ocean;" and

WHEREAS, almost all of the land for which protection is sought lies within the Coastal Zone Management area administered by the State and the Special Management Area administered by the County. The area is defined by the land makai of the Akoni Pule Highway from the district boundary near Kawaihae to Upolu Point, including Puu Kehoni and including the Special Management Area along the north coast to the boundary in the Kohala valleys; and

WHEREAS, almost all of the coastline is owned by six major land owners including the State of Hawaii, and all of those owners have holdings mauka of the coastal area; and

WHEREAS, the ultimate economic future of West Hawaii may depend on having natural open areas; and

WHEREAS, the State of Hawaii has no other fully unspoiled view of coast on an existing highway immediately adjacent to seasonal whale activity; therefore now

BE IT RESOLVED that the Hawaii County Democratic Party urge the State and County governments to develop and implement a plan to protect the open nature of the coast, preserve it's valuable historic sites and promote non-exclusive enjoyment of it by residents and visitors alike; and

BE IT FURTHER RESOLVED that copies of this resolution be sent to the Hawaii County Council, the County Planning Department, the State Land Use Commission and the Office of State Planning.

To the Hawaii County Council, Mayor Akana and Governor Waihee

Because the North Kohala coast embodies unique scenic, historic and recreational values and

because it is encumbent upon us to preserve our precious coastline and pass it on to our children unharmed and

because the whole North Kohala area is relatively undeveloped, has special meaning to the Hawaiian people, and should be kept rural in nature and

because the state legislature has called upon the Big Island to take steps to protect the North Kohala coastal area and

because it is the stated objective of the State Office of Planning to encourage preservation of open spaces makai of the coast highway in West Hawaii and

because unabated development north of Kawaihae will ultimately add large infrastructure costs in North Kohala to the burden the taxpayers will already be carrying due to resort development in West Hawaii,

We therefore call upon you to stop all further development of the North Kohala coastal area until a plan can be implemented to preserve its scenic, historic, recreational and biological values for the present and future citizens of Hawaii.

Name	Address	Phone #
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Return to: Citizens for Protection of the North Kohala Coastline, P.O. Box 78, Hawi HI 96719 Phone 889-6737

Prepared by PBR

NORTH KOHALA
RESIDENTIAL DEVELOPMENT STATUS REPORT

Development	Type of Unit Sales	Total No. of Units Planned	No. Units Currently Available	No. Units Sold to Date	No. Lots With Homes Built	Proposed Sales: Present to 1990	1991 to 1995	1996 to 2000	2001 to 2005+	Comments
1. Aleakea (Chalon)	Lots 10,000 sq.ft.	105	0	Phase I 100	44	Phase II 65				10 lots of Phase I and 7 lots of Phase 2 for self-help housing. Price Range: $37,500-$53,000
2. [illegible] (Monty Richards)	[illegible]	222 (Est.)		-		Unknown				Project has not been approved for [illegible]. Recently received GP approval.
3. Lapakahi (Chalon)	Lots 1 acre	170	0	0	0		170			Received zoning/subdivision. Extension requested by Chalon to revise development plans.
4. Kohala-by-the-Sea (Parcel Johnston)	Lots 1 acre	73	23	19	0	54				Waiting for infrastructure before homes can be built. Received zoning; yet to receive final approval.
5. Kohala Estates (Oxford First)	Lots 3-5 acres	105	0	105	35	Sales Completed				Project opened in mid-1970s; resales now. Sales dropped because of water shortage. Phase I of Kohala Ranch; changed name
6. Kaiua Shores (Kohala Joint Venture)	32 acres Total	420 Multi-family				Unknown				Project has not yet been developed. Land is on market. No water commitment.
7. Kohala Ranch (Mike Fratoreff)	Lots	1,967	54	333	20	0	100	Unknown		Project expected to be built out in 2009.
Heathers I	3-10 acres	233				Sales Completed				
Meadows II	3 acres	154				60% sold				
Highlands II	5 acres	100				Being Planned				
Village IV	Mixed Use	1,480				Recently received GP approval for low/medium residential development				
8. Halu Ridge (Chalon)	Lots 1-6 acres	170	0	Phase I 57	16	Phase II 56	57			Phases 2 & 3 in planning process. Phase I complete. Price range: $50,000-180,000
9. Puakea Ranch (George Isaacs Jr.)	Lots 10 acres	40	0	40	8	Sales Completed				Project opened 3 years ago; sold out. Resale now of 10-acre lots. Price range: $250,000-$410,000.
10. Waiwaiani (Clint Williams)	Lots 3-10 acres	89	0	46	0	43				Project is on hold pending litigation. Price range: $89,000-$147,000.
11. Kohala Makai (Dotty Dahlberg)	38.2 acres Total	418	0	0	0	Unknown				Retained resort zoning several years ago. Multi-family condos. Land currently on market.
12. Niuli (Pikiane Solomon)	Apt.	3				3				In planning process. No. of bedrooms not specified.
Totals		4,178	79	700	123					

minus units built -123

4,055 units planned

of these:

3,861 units projected to sell in excess of $300,000 or 97% of new units

194 units projected to sell below $300,000 — 5% of new units

N. Kohala now has 1,260 units. An increase of 4,055 units represents 310% increase

·/=

6. Kohala High School should remain in its present location, but be expanded, possibly in the area makai of the school if land is available.

o Chalon should work with the government and the community to develop a solid waste master plan with top priority given to identifying and testing existing dump sites.

Subcommittee on Natural Resources/Environmental Quality

The Subcommittee on Natural Resources and Environmental Quality has agreed on the following preliminary recommendations.

o For the leeward shoreline south of Upolu: The natural and open space character and existing viewplanes along the makai side of Kawaihae Road should be maintained. Continuous lateral shoreline access should be guaranteed. The shoreline area presently located within the Special Management Area should be maintained free of development. There should be no degradation of water quality or marine life.

o For the windward coastline (Upolu and eastward): The natural and open character of the shoreline area should be maintained. Chalon should work with the community to provide additional mauka-makai access to the shoreline. Lateral access along the shoreline should not be restricted. The shoreline area presently located within the Special Management Area should be maintained free of development. No structures other than public facilities should be built in the conservation district.

o Access to the mauka rainforest area above Halaula and Hakapala should be made available for Kohala residents. There is potential for hiking, educational activities and family recreational activities. Control of the pig and cattle population in this area is essential for regeneration of native rainforest. This should be accomplished by well-maintained fencing and by hunting pressure. Although the problems of safety, liability and poaching are real, they can be overcome.

o Intrusion by tourist helicopters and aircraft should be controlled to protect the rural, tranquil nature of Kohala. This policy applies equally to residential areas and to the natural areas from Pololu to Waimanu Valley. It is important to avoid a situation like that which has developed on Kauai's north shore. The use of Upolu airport for tour helicopter landings is not welcomed.

o Those stretches of Akoni Pule Highway which offer mauka views of Kohala Mountain should be regarded as a natural asset. Any development should avoid encroachment into these viewplanes.

5. Restoration of old plantation camps.

If the resort and residential project is developed as planned, the subcommittee made the following recommendations:

1. The use of the "resort" land use designation be for a ryokan of not more than 50 rooms.

2. The 170 single-family units within the Mahukona-Kapaa area be located mauka of the old railroad right of way.

3. The proposed development not prevent or interfere with activities currently taking place in the shoreline area.

4. Viewplanes from public access areas be maintained free of visual obstructions.

5. The use of Kohala Ditch water for golf course irrigation should not jeopardize its availability for agricultural use.

Subcommittee on Historic/Cultural Resources

The CPC Subcommittee on Historic/Cultural Resources was assigned the task of locating important historic sites on Chalon properties and recommending possible treatments of these sites.

In addition to regular monthly meetings, the subcommittee planned excursions with the Kohala Hawaiian Civic Club to visit some of the more remote sites, and it set up a display at the Kohala Country Fair to gather information from North Kohala residents.

It also met with Ross Cordy, State archaeologist, who visited Kohala to speak to the subcommittee at a State Preservations Workshop held in August. Cordy discussed methods of gathering information about and documenting, protecting and preserving historic sites.

The subcommittee's final recommendations are based on the following facts it gathered from Kohala residents and other concerned experts:

- Of all the ancient historic sites in Kohala, only an estimated 4 percent have been surveyed by an archaeologist. Only Lapakahi, Pololu and Honokane have been adequately surveyed.
- Most of the historic sites in Kohala exist within a quarter mile of the ocean. Most Kohala residents want this land to be left open and free of development.
- Many of Kohala's sites are connected to families which still reside in the district.

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

August 22, 1990

Kohala Community Association
Planning Committee
P.O. Box 76
Hawi, Hawaii 96719

Dear Ms. Withington, Chairman:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, regarding comments on the Mahukona Lodge Draft Environmental Impact Report. This letter is responding to your committee's request for additional copies of the Draft EIR, and a time extension to formulate more complete comments.

Chalon is willing to be flexible in response to your request by offering additional copies of the report which have been returned to us. Today, we will deliver three copies to the Mr. Bill Graham, Kohala Community Association President and two copies to the Kapaau Library.

Chalon is also willing to increase the comment period for another two weeks from today, with a postmark date of September 6, 1990.

We appreciate your concerns about the project and look forward to further comments from you committee.

Sincerely,

Matthew Grady
Planner

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Ms. Toni Withington, Chairman
Citizens for Protection of the North Kohala Coastline
P.O. Box 76
Hawi, Hawaii 96719

Dear Ms. Withington:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

VII-5

Hawaii's EIS Law (Chapter 343, HRS), first promulgated nearly twenty years ago, establishes certain classes of actions which trigger an environmental assessment (EA). In the event an assessed project may have significant environmental impacts, a full environmental impact statement (EIS) is required. The Mahukona Lodge project, as presently envisioned, contains no trigger mechanism. That is, there is no requirement for either an EA or EIS. However, because of Chalon's continuing concern for the environment and desire to involve the community in the planning process, this environmental impact report (EIR) has been voluntarily prepared. It has been called an EIR to distinguish it from a document prepared pursuant to Chapter 343 which must be accepted by the appropriate government authority. The procedures, standards and format of an EIS have been used, and a public review period in excess of that granted under Chapter 343 was given. The availability of the EIR was publicly noticed in the OEQC Bulletins of July 23 and August 8, 1990.

We believe our consultants in the various disciplines have provided a thoughtful, sensitive and scholarly disclosure of the potential impacts of the Mahukona Lodge on the property and the surrounding community. The level of analysis included in the DEIR is equal to or better than that contained in any EIS for a similar project in the state of Hawaii. Labeling the document an EIS will neither change the analyses nor expand the distribution.

Chalon seeks to reclassify a 14.5 acre parcel from Agriculture to Urban, and intends to subsequently rezone the parcel for resort use to allow the development of the lodge, villas, golf club house and related resort components. The intended uses of other portions of the property conform to present land use designations. The State Land Use Commission (SLUC) will have the opportunity to review the

impacts of the project in its consideration of the reclassification request. This process complies with both the letter and the intent of the state land use laws.

As noted in the Market Assessment conducted for this EIR (Appendix A, Exhibit IV-B), there are more than 8,000 hotel rooms proposed for development on the island of Hawaii. This figure includes those proposed projects which have County General Plan, County Zoning and State Land Use Commission approvals in place. Of these proposed hotel units approximately 1,760 units (Exhibit IV-I) would be targeted to the "luxury" class.

Chalon's Mahukona Lodge is seeking to penetrate this luxury class market segment. It is expected that the lodge market will create a niche serving (page IV-9):

- Free independent travelers - 65%
- Group Travelers - 10%
- Incentive and corporate - 20%
- Hawaii residents - 5%

Based on historical occupancy rates for the Big Island, full occupancy for the lodge is expected to level off at 70 percent in the year 2000 (page IV-10).

The residential/agricultural component of the concept plan is discussed in section V of the market assessment on page V-1.

Existing inventory of "estate lots" includes 859 lots, with another 2,088 planned (Exhibit V-A). The market assessment states that "Absorption of estate lots on the island of Hawaii increased dramatically in 1987 as the supply of these lots began to increase..." (page V-5). Further, the largest market for the residential/agriculture lots is primarily Hawaii residents and visitors from the U.S. mainland as discussed on page V-8. Absorption of the 170 lots is expected to be complete in 1996, based upon initial absorption of 20 lots and from 35 to 40 lots per year subsequently (page V-9).

Based upon this market assessment there appears to be sufficient demand to meet Chalon's expectations ensuring absorption and occupancy rates commensurate with their level of economic returns to sustain viable operation of the project.

The West Hawaii Regional Plan projects a Maximum Build-out Scenario of 39,029 existing and proposed units as well as a year 2005 Planning Scenario of 25,279 existing and proposed units including resort residential units. The Mahukona Lodge project would constitute approximately 1.2 percent of this maximum build-out scenario (assuming maximum numbers of units). It should also be

pointed out that the plan is not a marketing report geared for specific market segments, nor does it disclose market absorption or occupancy rates as does the marketing report prepared for this EIR.

Without a more specific comment we cannot respond to your claim that the North Kohala Development Plan and "State Functional Plan" (which of the 14 considered in the DEIR?) were misinterpreted. Impacts to ocean resources and recreation will be minimal, however, we will include in the final EIR a discussion of the (presently still in draft form) state Ocean Recreation Management Rules which, for your information, will be the subject of a public hearing in Kona on October 11. There does not exist a document entitled "Ocean Marine Resource Development Plan." The Hawaii Ocean and Marine Resources Council is preparing an "Ocean Resources Management Plan" which is scheduled to be available for public review at the end of October. Public Hearings on that plan are planned for the first two weeks of November.

Failure to mention the names of the members of the Community Participation Committee was an oversight in the draft EIR. We apologize for this, and will include the names in the final EIR. We are not aware that anyone quit the committee dissatisfied with the project. The recommendations summary of the CPC will likewise be included in the final EIR. We note however, that there were inconsistencies and conflicts among the subcommittee interests. We attempted to determine the overall thrusts of the CPC's recommendations consistent with the goals of both the community and the property owner. All of the CPC's recommendations were given explicit consideration, but not all could be adopted for implementation.

We will include in the final EIR a discussion of the resolutions you mentioned as well as a discussion of the report entitled "Decisions Action 90's, Strategies For a Stronger community."

Alternatives disclosed in this EIR have been compared to Chalon's project objectives stated in Chapter II, Section 3.1 (page II-10):

- To provide an economic generator that would assist in the political and economic justification for additional public and private infrastructure and community services expenditures in the North Kohala area.
- To provide a low-rise, retreat-type lodge facility in the West Hawaii area for those who do not wish to experience the large-scale "destination resort" type vacation experience;
- To provide an additional residential product to those currently offered in the North Kohala/West Hawaii area, i.e.,

large agricultural oriented house lots with frontage onto garden features, the golf course and natural settings; and

- To provide additional public and private recreational opportunities (golf and tennis) in the North Kohala area to complement existing public facilities.

Chalon has considered six alternatives for the subject area which include: 1) no action; 2) alternative A - Kapaanui Subdivision; 3) alternative B - Resort Hotel Concept; 4) alternative C - Nishimura Bay Lodge Concept; 5) alternative use of the site for agriculture purposes, park uses and solely residential development; and 6) the preferred alternative. When these alternatives are compared to the objectives the preferred alternative meets the objectives most completely.

We agree that perhaps other alternatives could be entertained, however, we believe we have examined a broad range of land uses and that this section is not limited in its scope.

The market study establishes the economic environment and demonstrates the viability of the project. No project is guaranteed to be successful, but Chalon is confident that the risk is minimal for the Mahukona Lodge. You should realize that Chalon is an experienced, international business entity which would not invest in a project it did not have confidence in. Further, the project is planned to be completed over a twenty-year period, adding flexibility to the schedule for capital investments.
We are uncertain what you mean by a "stable economic environment," but to the extent that Chalon's plans will provide economic diversity, and diversity promotes stability, the impacts of the Lodge and other Chalon developments in the District will be beneficial.

Most of the Mahukona Lodge staff would likely be recruited from the North Kohala population. Potential workers include (a) people who now commute to South Kohala or North Kona for resort work, and who would presumably be interested in work closer to home; (b) people who are not now in the labor force, but would be interested in work, whether full- or part-time, if available in North Kohala; and (c) young people just entering the labor force. Some personnel could now be South Kohala residents, while a few would likely come from outside Hawaii.

As noted in the EIR, in-migration of labor to fill jobs at South Kohala resorts will be significant in the coming decade. The large majority of those new residents are expected to live in South Kohala and North Kona. The Mahukona Lodge could increase in-migration to South Kohala and North Kona by reducing the number

of people otherwise commuting from North Kohala.
Chalon International recognizes and shares North Kohala residents' concern that additional demand for housing will (a) add to an existing housing shortage, and (b) raise prices, making homeownership harder to attain for working families. The Mahukona Lodge project is expected to create little new demand for housing in North Kohala. Instead, it will help to fund Chalon's affordable housing program, which should reduce demand for housing among North Kohala residents.

Housing demand in North Kohala will depend in part on the creation of new housing elsewhere. Since the EIR was prepared, the State of Hawaii has published its Draft Environmental Impact Statement for the Kealakehe project in North Kona, and the County of Hawaii has issued a Request for Proposals for housing development at Waikoloa Village. Additional new housing developments in South Kohala, notably at Puako and Lalamilo, will do much to absorb demand from anticipated new South Kohala workers.

The PBR HAWAII housing study you refer to listed all potential projects planned for North Kohala. The list was updated by a Residential Development Status Report, which PBR prepared for a CPC meeting of November 20, 1989. The purpose of that CPC meeting was to address issues relating specifically to population growth and housing. PBR presented this reference sheet along with a sheet containing the North Kohala population projections. In presenting this information to the CPC group, Mr. James Leonard pointed out that many of the proposed projects listed in the Residential Development Status Report had the ;following characteristics:

1. Projects were predominately located near the North and South Kohala border and ;the Kawaihae area.

2. Many had received only partial land use approval and detailed development plans were not known.

3. Most projects listed were aimed at the vacation and retirement home markets, which historically have been subject to speculative buying.

Mr. Leonard stressed at the meeting that it would be misleading to use the total number of lots and units from the proposed projects listed on the Status Report as an indication of future housing and population growth.

Nevertheless, you continue to make the assumption that a proposed project equates to a specific population increase within a given time. This is erroneous because we don't know the following:

1. Which projects will receive land use approvals,
2. What their planned density will be at the time of approval,

3. The time frame for development within these projects, and

4. What the residential population will be within these projects, as many are aimed at the vacation home market.

Population projections for the study area are presented in Section IV-5.1.2 of the EIR and Section 2 of the Social Impact Assessment. Population projections for North Kohala are from the County's Series "A" Forecast, which the County uses as a basis for its infrastructure planning. The County's projections indicate that the North Kohala population will increase by approximately 45% by the year 2005. The assessment goes on to say that the projected population increase in North Kohala is likely due to :

1. Natural increases,
2. Movement into North Kohala by persons working to the south, and

3. Development of up-scale developments at the Southern edge of the district, such as Kohala Ranch.

The assessment points to the potential for the planned State and County projects at Kawaihae, Lalamilo, Puako and Waikaloa to provide affordable housing and direct population growth more to the resort areas rather than existing communities.

The growth trends and community concerns related to population growth are addressed in Sections 2.3 and 3 of the Social Impact Assessment and Section IV-5.1.2 of the EIR. The social tensions between different groups within the community, including long-time residents, new-comers, and affluent new-comers was noted as an issue of community concern within Section IV-5.1.2 (Page IV-42).

Table 4 of the DEIR shows highway level of service (LOS) decreasing from C to D during the PM peak hour in the year 2015 as a result of including the traffic generated by the proposed project. This analysis was done for the highway section south of the project site, where most of the project generated traffic would be added. We note that LOS C is defined as having a volume/capacity ratio ranging from 0.27 to 0.42, and LOS D has a V/C ranging from 0.43 to 0.61. The 2015 PM peak hour ambient traffic forecast is at a V/C of 0.41, just at the threshold between LOS C and D. Hence, any additional traffic (no matter how minimal) would cause a change in level of service. The term LOS C/D is often used to describe this

borderline condition. The traffic forecast with the proposed project would increase the V/C ratio to 0.51, which is not significantly different from 0.41 in terms of traffic operations. In the professional opinion of our traffic engineers, the increase in traffic does not have an adverse traffic impact since there would not be significant changes in traffic operations between the ambient and with project forecast conditions. As we noted in the report, LOS D is still considered an acceptable traffic condition.

We further note that our methodology was conservative when adding all the project-generated traffic to the ambient traffic. With this project, workers from Hawi would not have to drive to the North Kona/South Kohala Coast resorts for work, but only to the project. There would be some reduction in the ambient traffic volumes on the highway south of the project site as a result of the project that was not accounted for in the analysis.

With regard to shoreline access, Chalon intends to provide a form of vehicular access along the shoreline.

The potential impacts of heavy rainfall are primarily during construction. During construction, measures would need to be provided to insure that silt and sedimentation would not enter the near-shore waters. An erosion and sedimentation plan would need to be provided and approved by the Department of Public Works as part of the permitting procedure for the grading work. Mitigation measures which could be employed include limiting exposed areas, dust control measures and immediate seeding of exposed areas.

Impacts to marine mammals will be insignificant because the project has no marine component. An indirect impact may be increased use of Mahukona Harbor, but regulations prohibiting harassment of marine mammals would serve to insulate them from direct effects.

Potential impacts to the owl population are discussed in Section IV-3.2.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

KOHALA HAWAIIAN CIVIC CLUB
PO Box 719
Kapaau, Hawaii 96755

Mr. Matthew Grady
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, HI 96719

Aloha Mr. Grady:

In regards to Chalon International of Hawaii, Inc. Enviromental Impact Draft Report - Mahukona Lodge

Mahalo for giving the Kohala Hawaiian Civic Club the opportunity to respond. The purposes and goals of the Civic Club is to preserve the cultural and history of the Hawaiian people.

We have read Paul Rosendahl, Ph.D., Inc. report and Na Haka'ala O'Kohala report and findings. We found it interesting and some concerns. The greatest concern is the burial sites, shrines, kaubales, heiau and others that are very important to the Hawaiians. Who is going to take of these sites? Not only the proposed resort site but the residental houselots and golf course? Is Chalon willing to take care of these special sites? Does Chalon know or understand that they have an unique opportunity, what other resort project do not have?

The burial sites is a great concern as I mentioned. We feel the following is to be looked into. According to PHRI report, possible and known burials, and confirmed by Na Haka'ala O'Kohala. NO, archaeological is to be done. The Kupunas have confirmed it. There is no need to do any excavation. NO heavy equipment is to drive over these sites. If for unforseen reason a burial is uncovered, all work must be stopped and all officals of State and County, concerned Hawaiian organization, Na Haka'ala O'Kohala and Kohala Hawaiian Civic Club is to notified immediately before continuing. All sites is be "as is" no reconstruction, but maintenace of removing debris is acceptable. Also, a buffer zone around the sites, only maintenace personal or with Chalon's permission hawaiian ceremonies can be performed. Tourist is not to climb the sites. A guided tour through the park area and other area recommended by Na Haka'ala O'Kohala, the Civic Club agree so all understand the Hawaiians. NO desecration of any sites.

Also, along with the project archaeologist a Kupuna is to be hired to protect special sites and our interest.

All artifacts is to be returned to the original site, when Chalon provide security for them.

Kohala needs some kind of enconomy but not only tourism. How about an industry, aquacultural, agricultural, commerical retail areas? Housing for employees and for family members wanting to return to Kohala, is greatly needed.

Mahalo Ka'aina a me pó O'Kohala

me ke aloha pumehana,
Margaret Hoshida
Margaret Hoshida, Pelekikena
Hui Kiwila Hawai'i O'Kohala

II-55

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Ms. Margaret Hoshida
Kohala Hawaiian Civic Club
P.O. Box 719
Kapaau, Hawaii 96755

Dear Ms. Hoshida:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter summarizing your review of the subject report.

Chalon shares your great concern that the historical and archaeological resources of this site be preserved intact for appropriate uses in the future. We believe that the mitigation measures outlined in the draft will serve this purpose. If any burials are discovered all provisions of Section 43 of Chapter 6E, HRS (Historic Preservation) will be followed.

Chalon's intentions are to develop other properties in Kohala to provide housing and diversified economic opportunities for Kohala residents. It should also be noted that the employment opportunities at the Mahukona Lodge will be quite diverse, including opportunities for interpretive guides for the archaeological features, among others.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady
Matthew Grady
Planner

Larry S. Tanimoto
Mayor
George Yoshida
Director
Juliette M. Tulang
Deputy Director

Department of Parks and Recreation

25 Aupuni Street, Rm. 210 • Hilo, Hawaii 96720 • (808) 961-8311

August 20, 1990

RECEIVED AUG 23 1990

Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

Subject: Mahukona-Environmental Impact Report

Dear Mr. Grady:

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

We would, however, be interested in reviewing specific proposals for shoreline access when these are developed.

Thank you for the opportunity to review the document.

Sincerely,

George Yoshida
Director

cc: James Leonard, Managing Director
PBR Hawaii
101 Aupuni Street, Suite 310
Hilo, Hawaii 96720

VII-56

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. George Yoshida, Director
County of Hawaii
Department of Parks and Recreation
25 Aupuni Street, Rm. 210
Hilo, Hawaii 96720

Dear Mr. Yoshida:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, concerning your review of the subject report.

As specific proposals for shoreline access are developed, your department will be consulted.

We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady
Planner

LARRY S. TANIMOTO
Mayor
Duane Kanuha
Director
William L. Moore
Deputy Director

Planning Department
25 Aupuni Street, Rm. 109 • Hilo, Hawaii 96720 • (808) 961-8288

August 20, 1990

RECEIVED AUG 24 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, HI 96719

Dear Mr. Grady:

EIR - PROPOSED MAHUKONA LODGE PROJECT

Thank you for the opportunity to review the Environmental Impact Report (EIR) for the proposed Mahukona Lodge development project.

As we have not received any applications for land use changes nor for a Special Management Area (SMA) Use Permit, it would be premature at this time to review the EIR in depth and to evaluate whether the document adequately addresses environmental issues. However, we provide you with the following general comments:

1. The General Plan Extensive Agriculture designation needs to be included in the discussion throughout the text as the project area also includes lands north of the Urban Expansion designation.

2. On Page II-5, some of the County Zoning and General Plan designations listed in Table II-1 are incorrect and does not correspond with Figure II-4. In addition, being that the General Plan designation is broad-brushed, it is interesting to know how the acreages were calculated.

3. The relationship of the proposed project to the General Plan goals, policies and standards needs further discussion.

4. Since the exact location of the proposed shoreline access easement has not been determined, then mitigation measures on recreational impacts would be warranted.

5. Portion of the proposed project appears to be within the shoreline setback but is premature to evaluate as no certified shoreline survey has been determined.

6. Figure IV-6 shows an Old Government Road north of the entry road, traversing portion of parcel 10. Ownership of said right-of-way needs to be disclosed.

7. For the length of land involved, why is the proposed development channeled through only one access to Akoni Pule Highway?

Should you have any questions, please feel free to contact our office at 961-8288.

Sincerely,

DUANE KANUHA
Planning Director

AK

cc: James Leonard, PBR Hawaii

VII-57

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. Duane Kanuha, Planning Director
County of Hawaii
Planning Department
25 Aupuni Street, Rm. 109
Hilo, Hawaii 96720

Dear Mr. Kanuha:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your numbered comments.

1. Lands designated Extensive Agriculture are shown on Figure II-4 of the DEIR. The designation will be addressed in the text of the final EIR.

2. Table II-1 will be revised to correspond with Figure II-4. The acreages were generated by planimetering large maps, but the results should not have been expressed to three decimals as the boundaries were somewhat arbitrarily determined. This will be corrected in the final EIR.

3. The discussion of the relationship of the proposed project to the General Plan goals, policies and standards will be expanded in the final EIR.

4. The project concept has been developed to provide improved recreational amenities in North Kohala. This includes improved access to the shoreline and historic features. These are in effect mitigation measures which have become part of the project. The shoreline access easement will be finalized prior to commencement of the project.

5. The intention is to avoid development within the shoreline setback.

6. The right-of-way for the Old Government Road is part of Chalon's property.

7. In the interest of providing better emergency access, our engineers are examining the possibilities for adding an additional access to Akoni Pule Highway.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

MILILANI B. TRASK
KIA'ĀINA, KA LĀHUI HAWAI'I
152 B Koula Street
Hilo, Hawai'i 96720

August 20, 1990

RECEIVED AUG 24 1990

Mr. Matthew Grady
Planner
Chalon International of Hawai'i, Inc.
P. O. Box 249
Hawi, Hawai'i 96719

Dear Mr. Grady:

Find attached, comments on the draft Mahukona Environmental Impact Report (EIR) on behalf of Ka Lahui Hawai'i (the Hawaiian Nation), a native initiative for self-governance. Ka Lahui Hawai'i has a national (statewide) citizen base of over 5,000 citizens. Ka Lahui Hawai'i has a Big Island citizen base of over 1,800 citizens, of which 890 citizens reside in the North Kohala district.

We are very concerned about Chalon's plans for the Kohala district, including the proposed Mahukona Resort. Kohala is a district of historic and cultural significance. It is a unique rural community that has consistently voiced their concern for retaining a rural lifestyle--even your own community surveys validate this finding.

We feel that the proposed Resort is an incompatible land use for the North Kohala district. Other districts of South Kohala and North and South Kona are already booming with resort development that will already exceed resort demand projections. Furthermore, we are disturbed that while Chalon has a proposed Master Plan for North Kohala, this plan is not being subjected to the EIS process so that the public may comment on the future of Kohala in its entirety. Moreover, the resort is being justified in the context of the Master Plan, which again, is tentative at best, and has not been subject to the open public review process guaranteed by Chapter 343, HRS.

Chalon is proposing irreversible commitment of environmental resources and land use patterns; Chalon is proposing major, significant changes in Kohala. Ka Lahui Hawai'i is bound by its Constitution which calls for the monitoring and protection of natural, cultural, and community resources. As a result, we must present these comments and continue to monitor Chalon's proposals.

We look forward to your reply on our comments and your addressing our concerns in the final EIR. We thank you again for this opportunity to comment.

Sincerely,

Mililani B. Trask
Kia'aina, Ka Lahui Hawai'i

cc: Mr. James Leonard
Mr. Clarence Kauahi, Kohala District Chair

VII-59

KA LĀHUI HAWAI'I

COMMENTS ON THE DRAFT MAHUKONA RESORT EIR

1. Is the EIR an EIS? When will the EIS be submitted?
It is very confusing for the public when the developer and its consultants uses an unfamiliar term like an Environmental Impact Report. The community is just getting acquainted with the Environmental Impact Statement law and rules and regulations. They are aware that they are provided opportunities for public input and comment. When the community sees another term, EIR, they think that they do not need to comment since an EIS will be developed later. Please clarify the role of this EIR document and please identify the date when a draft EIS will be submitted. If it serves as an EIS, bound by Chapter 343, HRS, it should be resubmitted at a later date in order to afford an open 45-day public review and input period on the draft EIS. We look forward to the final EIR and subsequent draft EIS.

2. The EIR Does Not Demonstrate Project Need:
Project need, based on market demand has not been demonstrated in the EIR. For example, there are inconsistent numbers of proposed resort units that are identified in the social impact assessment, the market assessment, and other plans that are reviewed in the EIR. Sometimes the consultants discount projects because they are not currently approved, yet at other times, the consultants include projects that are not currently approved. Also, numbers of units are cited as "more than 18,000 units." Please be more consistent and exact in defining baseline unit counts in the final EIR. Use the same number of proposed resort units to generate the market assessment and the social impact assessment. If the baseline numbers of hotel units are discrepant, we cannot accept the findings as a true disclosure of impacts.

We support the Office of State Planning's findings in its West Hawai'i Regional Plan which identifies a total of 39,053 existing and proposed resort units in the North Kohala, South Kohala, and North Kona region. We also support the findings of the County of Hawai'i in their General Plan which identifies a projected demand for additional resort units in the range of 10,500 units to 22,000 units. In other words, we support the conclusion that existing and proposed resort units in the region already exceed the demand projected for the entire county, let alone the West Hawai'i region. The market assessment is providing inaccurate data and impressions to the developer, the community, and its decision-makers. The developer should seriously reconsider the development of a resort whose units cannot be supported by the market.

The primary justification for the Mahukona Resort is that it is needed to fund community elements (non-income generating elements) identified in Chalon's Kohala Master Plan. We will not tolerate this form of blackmail. Furthermore, the Master Plan has not been subjected to the open public review process guaranteed by Chapter 343, HRS. Before decisions are made on the resort, the Master Plan must be submitted in the form of an EIS so that the community may assess developments in Kohala as one entity. Tentative master plans should not and cannot serve as justification for a resort that will destroy the lifestyle of Kohala forever. Furthermore, this type of piecemeal planning, holding elements hostage to other elements can only escalate as Chalon proceeds to develop the North Kohala district. The community

deserves to comment on the "big picture." Please submit the Kohala Master Plan as an EIS before proceeding with the Resort development.

Another justification for the resort development is that it will provide jobs for Kohala's residents. The developer should note that there is a labor shortage in the region. Existing resorts have been developing innovative ways to attract labor to their hotels, special studies have been commissioned, buses have been hired, some developers have even considered the development of homes to house their in-migrant labor pool. Jobs can no longer be used as justification for the destruction of unique and pristine resources--there is an abundance of jobs--there is a shortage of people. More resort units which will generate more jobs will have the impact of bringing in more people to the region. Given the developer's own resident surveys, this is not desirable.

Where is the justification for the Mahukona Resort given the lack of market demand, the existing over-supply of resort units in the region, and the lack of a resident labor pool and housing to house the resultant in-migrant labor pool?

3. Approving Agencies:
The developer appears to be circumventing the approval of the State Land Use Commission by utilizing the 15-acre exemption. The proposed resort is a 490-acre project and should be subject to the review of the State Land Use Commission where the State, community organizations, and individuals may intervene in the case under strict quasi-judicial hearings afforded by law. In addition, Chalon's Master Plan encompasses 19,000 acres. If elements of the Master Plan are being held hostage to the approval of the Resort, the Master Plan should be submitted to the State Land Use Commission before proceeding with the Mahukona Resort.

For the record, we note that the Hawai'i County Planning Director was working with PBR before his appointment. Should he not be appointed after this fall's election, he will most likely return to his position in PBR. The developer is saying that agricultural district boundary amendment approvals will be sought through the County. This is a clear conflict of interest. We trust that this is an oversight that will be corrected in the final EIR. All State land use district boundary amendment approvals should be sought through the State Land Use Commission to dispel any perception of impropriety.

4. Inadequate Identification of Land Use Development Alternatives:
The alternatives considered are essentially variations of a resort development alternative, with the exception of the Kapa'anui Subdivision alternative. We trust that your planning consultants can be more creative in scenario building. We would hope that your planning consultants understand and recognize the truly unique elements of North Kohala that distinguish it from any other place in the world. Kohala's rich history, culture, and archaeological sites that are amazingly in tact are assets that have not been thoughtfully integrated in a "historical corridor" theme.

Furthermore, your project objectives lend themselves to many various land use alternatives. If Chalon truly believes in achieving its stated project objectives, identify distinctly different land use development alternatives in the final EIR.

5. Inadequate Disclosure of Visual Impacts:
On pages IV-9 and 10, visual impacts are identified only for views looking from the shoreline up to the mountains. There is no disclosure of visual impacts looking makai from mauka which will prove to be negative visual impacts. In addition, the pictures

provided are of existing views with no correlating graphics to show what those views would look like after the development of the project. In the absence of any graphics depicting visual impacts after the development of the project, visual impacts cannot be ascertained. Please address this inadequacy in your final EIR and subsequent EIS.

In addition, while the majority of the project is located below Akoni Pule Highway, the project does extend mauka of the highway. The mauka elements are the more visually obtrusive elements (the electric substation, sewage treatment plant and ponds); these visual impacts should be disclosed in the final EIR. Furthermore, visual impacts must be assessed from the vantage point of the viewer, i.e., from the mountain road looking down, from the Akoni Pule highway looking mauka and makai, as well as from the shoreline looking mauka.

Lastly, the EIR does not recognize the fact that the 1988 State Legislature passed Senate Concurrent Resolution No. 179 which urges the State and County governments to ensure that the public view and open space makai of the Akoni Pule highway be preserved. The resort development would be in violation of this resolution and this impact has not been identified in the draft EIR.

6. Groundwater and Water Supply:
Chalon is proposing that all water needs can be met through existing wells or the development of a private reservoir. The EIR states that there is an abundance of water in the district therefore, the water used to support the resort will have no adverse impacts on water supply, even with a projected average daily demand of 235,000 gallons per day and a maximum daily average of 352,000 gallons per day (and this does not include irrigation water uses). Certainly this magnitude of draw-down will have an impact on the groundwater supply.

The EIR does not consider the impact on the water supply in the context of other proposed water uses. For example, the EIR does not take into consideration other Kohala projects identified in Chalon's Master Plan, South Kohala projects, Kawaihae housing, commercial, and industrial developments, nor Waimea's developments--all of which will depend on the same water source. The water needs of all users must be considered in order to truly assess water supply impacts of the project.

7. Inadequate Provision of Public Access to the Shoreline:
Chalon is proposing two public access entry points at the North and South border of the Resort: 1) mauka of the Kapa'anui Historic Village; and 2) the Mahukona Beach Park. While Chalon proposes a shoreline easement, residents must park in one of the two entry points and walk into the other shoreline areas. This is unacceptable provision of public access since through the developer's own surveys, it is clear that Kohala residents enjoy picnicking and fishing which both require equipment. It is unacceptable for the kupuna and children to have to walk such long distances while carrying their supplies and provisions when the developer could provide direct access through the resort complex. We would also like to know the number of parking spaces that will be provided to the public. In addition, the developer should note that it is not good historic preservation technique to allow the public to trample over the Kapa'anui Historic Village in order to get to the shoreline. Please relocate this public parking lot and shoreline access entry point in order to protect the village complex. Also, please identify additional shoreline access entry points in the final EIR so that the public will be provided ease of access to the shoreline.

8. Inadequate Assessment of Archaeological Resources:
The EIR does not identify all sites which is acknowledged by the archaeological consultant. The consultant states in Appendix A that "at the time of the survey most of the project area was covered with dense tall grass that made location and identification of features less than 0.4 meters high difficult and, at times, impossible. There are, probably, low features in the project area that have not been located." If all features have not been identified all related impacts cannot be identified which renders the EIR inadequate. Further, the consultant assessed significance of sites on an individual, site-by-site basis. The significance of many of the sites must be assessed in the context of a village complex or complex of sites. Lastly, the determination of "significance" of a site, although guided by law, remains a subjective determination without clear evaluative criteria. We also note the coincidence that "significant" sites consistently fall outside of the proposed buildings.

9. Inadequate Disclosure of Social Impacts:
There is a severe labor shortage in the Kohala/West Hawai'i region. As a result, inmigrants are coming to West Hawai'i to work in the resorts. There is a severe shortage of affordable housing in the Kohala/West Hawai'i region. As a result, several families are forced to live under the same roof in crowded and substandard conditions. Visitor industry jobs, in particular, the jobs for which Kohala residents will be trained to receive (entry-level jobs) promise low wages. As a result, Kohala residents, like many other visitor industry employees, will have to seek additional work to supplement their meager wages; they will have to work longer hours simply to make a decent wage.

While the EIR generally acknowledges these facts, it does not identify the related social impacts as a result of the phenomena described above. For example, what are the social impacts of several families living under the same roof in crowded conditions? What are the social impacts of family members (mothers and fathers) having to work two or three jobs just to make ends meet? What are the social and cultural impacts of inmigrants coming to live in Kohala or the West Hawai'i region to take jobs that cannot be filled by current residents? These indirect social impacts have not been identified in the draft EIR and should be addressed in the final EIR and subsequent EIS.

10. Native Hawaiian Land and Water Rights:
Native Hawaiian rights to land and water resources have not been addressed in the draft EIR. Native Hawaiians have the right to gather and fish for a living. They have the right to access the shorelines and mountains. They have the right to access and worship at religious sites. They have water rights. They have kuleana rights. With 890 registered Ka Lahui Hawai'i citizens in the North Kohala district, Ka Lahui Hawai'i is responsible for the protection and assurance that inherent native Hawaiian rights and claims will be maintained. Please discuss in your final EIR, the impact of the resort on native Hawaiian rights.

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 749 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Ms. Mililani B. Trask
Kia'aina, Ka Lahui Hawai'i
152 B Koula Street
Hilo, Hawaii 96720

Dear Ms. Trask:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your numbered concerns.

1. Hawaii's EIS Law (Chapter 343, HRS), first promulgated nearly twenty years ago, establishes certain classes of actions which trigger an environmental assessment (EA). In the event an assessed project may have significant environmental impacts, a full environmental impact statement (EIS) is required. The Mahukona Lodge project, as presently envisioned, contains no trigger mechanism. That is, there is no requirement for either an EA or EIS. However, because of Chalon's continuing concern for the environment and desire to involve the community in the planning process, this environmental impact report (EIR) has been voluntarily prepared. It has been called an EIR to distinguish it from a document prepared pursuant to Chapter 343 which must be accepted by the appropriate government authority. The procedures, standards and format of an EIS have been used, and a public review period in excess of that granted under Chapter 343 was given.

2. The proposed project has evolved over a year's time. Consequently, consultant studies prepared for this EIR have assessed impacts using a range of lodge and villa units from 200 to 300 units. This provides a worst case scenario in terms of impacts because the number of units contemplated, after conducting more refined site design studies, is in the range of 180 to 210 units. This range will continue to be refined as more detailed studies are made for the project. We apologize for any confusion this may have created.

As noted in the Market Assessment conducted for this EIR (Appendix A, Exhibit IV-B), there are more than 8,000 hotel rooms proposed for development on the island of Hawaii. This figure includes those proposed projects which have County General Plan, County Zoning and State Land Use Commission

approvals in place. Of these proposed hotel units approximately 1,760 units (Exhibit IV-I) would be targeted to the "luxury" class.

Chalon's Mahukona Lodge is seeking to penetrate this luxury class market segment. It is expected that the lodge market will create a niche serving (page IV-9):

- o Free independent travelers - 65%
- o Group Travelers - 10%
- o Incentive and corporate - 20%
- o Hawaii residents - 5%

Based on historical occupancy rates for the Big Island, full occupancy for the lodge is expected to level off at 70 percent in the year 2000 (page IV-10).

The residential/agricultural component of the concept plan is discussed in section V of the market assessment on page V-1.

Existing inventory of "estate lots" includes 859 lots, with another 2,088 planned (Exhibit V-A). The market assessment states that "Absorption of estate lots on the island of Hawaii increased dramatically in 1987 as the supply of these lots began to increase..." (page V-5). Further, the largest market for the residential/agriculture lots is primarily Hawaii residents and visitors from the U.S. mainland as discussed on page V-8. Absorption of the 170 lots is expected to be complete in 1996, based upon initial absorption of 20 lots and from 35 to 40 lots per year subsequently (page V-9).

Based upon this market assessment there appears to be sufficient demand to meet Chalon's expectations ensuring absorption and occupancy rates commensurate with their level of economic returns to sustain viable operation of the project.

The West Hawaii Regional Plan projects a Maximum Build-out Scenario of 39,029 existing and proposed units as well as a year 2005 Planning Scenario of 25,279 existing and proposed units including resort residential units. The Mahukona Lodge project would constitute approximately 1.2 percent of this maximum build-out scenario (assuming maximum numbers of units). It should also be pointed out that the plan is not a marketing report geared for specific market segments, nor does it disclose market absorption or occupancy rates as does the marketing report prepared for this EIR.

Community input to Chalon's Master Plan has been and will continue to be actively sought and heeded. Once again, however, there is no requirement to prepare an EIS for the Master Plan. Furthermore, we do not consider it blackmail to propose to invest in needed improvements in our community.

Most of the Mahukona Lodge staff would likely be recruited from the North Kohala population. Potential workers include (a) people who now commute to South Kohala or North Kona for resort work, and who would presumably be interested in work closer to home; (b) people who are not now in the labor force, but would be interested in work, whether full- or part-time, if available in North Kohala; and (c) young people just entering the labor force. Some personnel could now be South Kohala residents, while a few would likely come from outside Hawaii.

As noted in the EIR, in-migration of labor to fill jobs at South Kohala resorts will be significant in the coming decade. The large majority of those new residents are expected to live in South Kohala and North Kona. The Mahukona Lodge could increase in-migration to South Kohala and North Kona by reducing the number of people otherwise commuting from North Kohala.

3. Chalon seeks to reclassify a 14.5 acre parcel from Agriculture to Urban, and intends to subsequently rezone the parcel for resort use to allow the development of the lodge, villas, golf club house and related resort components. The intended uses of other portions of the property conform to present land use designations. The State Land Use Commission (SLUC) will have the opportunity to review the impacts of the project in its consideration of the reclassification request.

4. We believe we have made every effort to identify a preferred land use scenario compatible with all aspects of the environment, including the rich social and cultural resources present, as well as with the overall objectives of the development. Other reviewers have expressed appreciation for Chalon's sensitivity to historic, cultural and archaeological resources.

5. To clarify the potential visual impacts of the preferred alternative, the architect is preparing to-scale renderings using a photomontage technique of the following views: 1) view from Heiau site on bluff towards lodge; 2) view from old government road and Akoni Pule highway junction, just north of the junction, looking south towards the lodge; 3) view from Mahukona Park to Makaohule Point; and 4) view to lodge area

from Akoni Pule Highway just south of access road intersection, looking north. These figures will be included in the final EIR.

A discussion of Senate Concurrent Resolution will be added to the final EIR. However, you should be aware that a resolution has no force of law, and in this case there was no money appropriated to purchase the affected lands. Our planners and architects have made every effort to preserve the viewplanes, including greatly reducing the density of development from original proposals.

6. The engineering report for the project (Appendix K) contains separate water budgets for both irrigation and potable water.

Chalon's overall North Kohala needs are addressed in the Kohala Ditch study by Michael Gomes. The report estimates a potential demand of approximately 7,000,000 gallons per day from agricultural production and 3,000,000 gallons per day for the Mahukona development. The historical average delivery of the Kohala Ditch is 27,000,000 gallons per day, well above the combined projected demand. More importantly, the higher value use at Mahukona will help pay for needed improvements to the ditch and water distribution system, thus ensuring a reliable supply of irrigation water for agriculture development throughout Chalon's land holdings in the area.

7. Access to the entire shoreline will be permitted, and present plans are to provide a transportation service for those desiring it. Ample parking will be provided at either end as well as in the main lodge parking lot. This will be clarified in the final EIR.

8. Subsequent to publication of the DEIR, additional archaeological work on the site was completed by Na Maka'ala 'O Kohala, and a number of specific recommendations included in their report. Chalon's intention is to preserve, enhance and maintain access to archaeological resources on the site. It is no "coincidence" that significant sites consistently fall outside of the proposed buildings. This is one of the purposes of the planning process we have engaged in.

9. The comment begins by making several assertions and then asking questions based on those assertions. Some of the assertions which merit analysis -- prior to answering the questions -- include the presumptions that visitor industry employees make low wages, must work long hours, and are more likely to share housing with other families.

The 1988 "Statewide Tourism Impact Core Survey" of 4,000 Hawaii residents by the Department of Business and Economic Development does suggest that people who consider themselves in the "visitor industry" have lower per capita incomes than workers who do not consider themselves in the visitor industry. Visitor industry workers do have more wage-earners per household; they do not usually work more hours or hold more jobs. All of this must be viewed in context:

- ILWU officials interviewed for this report indicated that hotel wages and benefits at least equal and sometimes exceed those for unionized agricultural workers.

- Higher-paying jobs in the economy (e.g., professional services) are usually secondary rather than primary in nature -- that is, they are indirectly supported by export jobs, whether in tourism or agriculture, which tend to be filled by less educated workers.

- Most critically, workers who would fill Mahukona Lodge jobs will not somehow earn higher wages if the Lodge is not built. Rather, North Kohala commuters to resort jobs elsewhere in West Hawaii will save commuting costs if they work closer to home. People willing to in-migrate to take resort jobs in Hawaii presumably have even lower wages or no jobs in their home areas. If the labor shortage continues, wages and benefits will continue to improve, as they have over the past year.

Thus, the questions about the social impacts of families having to share housing or work additional jobs "to make ends meet" are based in part on fallacious assumptions about practical economic alternatives for these families. To the extent that such conditions occur, they are due as much or more to the high cost of housing relative to wages. However, the overall Chalon plan includes increases in North Kohala affordable housing supply.

The final question about "social and cultural impacts of in-migrants" is legitimate but non-specific. There are many potential impact areas. The EIR does address questions such as crime, family life, and community life. Additionally, it may be noted that the 1988 Statewide Tourism Impact Core Survey asked residents to evaluate tourism impact on

"relations between long-time residents and newer people." Some 35% said the effect was positive; 31%, negative; and 33%, uncertain or no impact.

10. Chalon will respect what legal rights exist under the current law regarding Native Hawaiian land and water rights. Further, access will be maintained to the shoreline.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

FRED CACHOLA, JR.
86-062 Ho'aha Street
Wai'anae, Hawai'i 96792

August 20, 1990

RECEIVED AUG 24 1990

Mr. Matthew Grady
Planner
Chalon International of Hawai'i, Inc.
P. O. Box 249
Hawi, Hawai'i 96719

Dear Mr. Grady:

I would like to take this opportunity to comment on the draft Mahukona Environmental Impact Report (EIR). I was born and raised in Kohala; I have lived in Kohala as a full-time resident for 18 years (1935 to 1953) and have been a part-time resident, with my family living in Kohala since 1953. Since 1974, I have owned 12-acres of land in the Ka'auhuhu Homestead area, mauka of Hawi. I am very concerned about Chalon's plans for Kohala since it is a district with a very unique cultural history which should and can be preserved for the mutual benefit of all who care about Kohala, i.e., the State of Hawai'i, the County of Hawai'i, Chalon, the residents of Kohala, and Native Hawaiians throughout the State.

EIR VS. EIS:

In general, I feel the EIR is well organized in terms of Chapter 343, HRS requirements and related Administrative Rules. It is not clear, however, whether the EIR is serving the purpose of an EIS and whether the EIR document is bound by Chapter 343, HRS and related Administrative Rules. I feel that this type of development requires an EIS with all related opportunities for public input. The term EIR signals the public that there will be a related EIS in the future and that comment on the EIR is not needed. Please submit this information as an EIS, with appropriate comment periods and quality standards guaranteed by law.

THE NEED FOR AN INTEGRATED MASTER PLAN SUBJECT TO THE EIS PROCESS:

I am also concerned about Chalon's "Kohala Master Plan" which is used in the EIR to justify the development of the Mahukona Resort. The Master Plan has not been subject to the EIS or open public review process. Elements are tentative, at best, and should not be used as leverage for the resort. More importantly, if Master Plan elements are truly interdependent with Resort elements, then an EIS for the entire Master Plan should be developed for community review and input. The EIR does not identify impacts in the context of the Master Plan, while it is quick to identify the benefits of the resort in the context of the Master Plan.

1

The Master Plan should be reviewed in its entirety. Owners of the property can realize the full potential of their lands in Kohala if they consider historical and cultural resources as assets instead of liabilities. They could include these resources in their Master Plan. For example, the coastal villages of Ko'a'ie, Mahukona, and Kapa'a could be preserved as a complement to other developments in the region. The coastal landings used by ancient people of Kohala and the plantations of the 19th century which include: Mahukona, Honoipu, Kauhola, Hapu'u, and Keokea could also be preserved to complement other developments in West Hawai'i.

Furthermore, the developer seems to be "missing the boat" on the elements of Kohala which truly distinguish it from any other place in the world. Kohala has a rich association with Kamehameha I which already offers a unique opportunity to develop a plan around the theme of "Kamehameha's Country"--from his birthsite at Kapakai, Kokoiki, to his family ahupua'a at Halawa, to his sacred temple at Hapu'u (Hale o Ka'ili heiau), to the remains of his engineering feats (Waiapuka Tunnel and the canoe trail to Kapanai'a Bay), and to Awini, the inaccessible area where he was isolated after his birth; and there is much more. Collectively, all of these sites that are associated with Hawai'i's most historical significant personality and other remnants of ancient Hawaiian culture should be considered as one thematic entity that can be profitably planned, preserved, and developed in a manner which will have economic, social, and historical benefit for the owners of the property, the residents of Kohala, the tourism industry, and other visitors to the district. If the developers recognize the potential to plan Kohala in a thematic framework, rather than its current piecemeal economic planning approach, the development could have reciprocal benefits to all involved and would establish a model development pattern which could have significant impact on future developments in the State of Hawai'i as well as other parts of the world where native cultures are involved.

The challenge is to develop a plan that generates profit for the company and pride for the people. The way to do this is to view the district in its entirety; to develop a cohesive, integrated approach that preserves the integrity of Kohala. Plan Kohala as a historical district and not as a piecemeal commercial commodity.

COMMUNITY PARTICIPATION AND INPUT:

While I understand that Chalon has implemented a strategy for community input (Community Planning Committees), I also have been informed that residents question whether the Kohala community has really been represented. For example, there were community leaders that were initially a part of the committees who had later resigned from participating in the committees. In spite of this, their names still appear on stationery, indicating an endorsement or support of the recommendations proposed without the approval or involvement of the individuals in the process. These committee meetings should be monitored to determine the extent of participation of individuals in the planning process. Also meetings should be monitored so that minutes or meeting notes truly reflect the consensus of the committee.

RESORT DESIGNATION/APPROVING AGENCIES:

I am disturbed that the developer will not be seeking State Land Use District boundary amendment approval from the State Land Use Commission. The developer is exercising the 15-acre exemption clause which allows developments of less than 15-acres, the opportunity to seek approvals from the county. On Page I-1, the EIR states that the project is for a total of 490 acres which includes a 45-unit "lodge" or resort, 300 "accommodation" units (which is never really defined), 170 one-acre agricultural estates, a golf course, clubhouse, spa, swimming lagoons, 10 tennis courts, etc. Clearly, the resort project exceeds 15 acres. Clearly, the impacts associated with reclassifying agricultural lands and conservation lands in the project area should be subject to the highest level of public and agency scrutiny guaranteed by Chapter 205, HRS.

NEED FOR PROJECT/PROJECT FEASIBILITY:

The Office of State Planning's West Hawai'i Regional Plan (November, 1989) is the only document that has assessed cumulative impacts of all proposed resorts in the West Hawai'i region. In fact, the document was prompted by the boom of resort development proposals in the region and the State's concern for the protection of the environment, unique communities and their lifestyles, addressing the current labor and housing shortage, and the protection of existing developments, ensuring that a viable market will exist to support the resort units. The plan states that a total of 31,624 resort units are proposed in the North/South Kohala and North Kona region. This will add to the existing supply of 7,429 resort units for a grand total of 39,053 resort units in the region. The EIR market assessment is inadequate since it only considers the demand for the Mahukona resort and since its projections of proposed resorts in the region grossly underestimates the proposed supply of units at 8,075. The final EIR should reflect a more comprehensive market assessment which considers all proposed resort developments in the region.

The County's General Plan has identified the projected market demand for resort units in the county. On the conservative side (Series A), the County projects a demand for 10,500 additional resort units by the year 2000. On the high side (Series C), the County projects a demand for 22,000 additional resort units by the year 2000. In either case, the already proposed resorts exceed the projected demand for resort units. Furthermore, existing resorts have been experiencing dangerously low occupancy rates, due to the over-supply of units. That is why the State's West Hawai'i Regional Plan concentrates and supports the development of resorts in existing resort areas or "nodes." Mahukona is not identified as a resort "node" in the West Hawai'i Regional Plan. The Plan also states that the State will support projects that fall within the "nodes" and will not support projects that do not fall in the "nodes." Could this be another reason why the developer is not taking the project to the State Land Use Commission?

To put it in other economic terms, if the Mahukona Resort is approved by the County and when the market cannot absorb the resort units, Kohala's environment and lifestyle will be lost and the resort may have to be sold or might go bankrupt. The developer is claiming that the resort is needed to fund community

improvements in their Master Plan, but if the resort does not run a profit, Kohala will never see the "promised" community benefits. Benefits of the community should proceed because they are worthy of their own needs and merit their own process for fulfillment. Community needs should not be held hostage to a resort developer's promise for fulfillment.

CUMULATIVE IMPACTS:

The EIR does not consider socioeconomic, environmental, market demand, nor fiscal impacts on a cumulative basis; it only considers the impact of Mahukona Resort. In order for decision-makers to truly assess impacts of a project, they must consider the project impacts along with all other projects (both approved and proposed) in the region. The cumulative impacts, the impacts of all developments in the region, are what the residents and community will feel. For instance, the social impact assessment does not identify the impacts of several families having to live under the same roof due to the lack of affordable housing. The assessment does not identify the impacts of low-wages indicative of the visitor industry which force individuals to work several jobs. Just these two examples will have detrimental impacts on the nuclear family unit, psychology, crime, self-worth, etc. I trust that the final EIR and subsequent EIS will address cumulative impacts, both direct and indirect, which will be felt by the residents of Kohala.

VII-66

CONCLUSION:

There are many other comments that I could make, especially in regard to the archaeological assessment, fiscal impact assessment, and marine environment assessment. Suffice it to say that the resources in the Mahukona/Kapa'anui ahupua'a and the North Kohala district are too precious to be discounted by incomplete and cursory assessment. The historical and cultural resources of Kamehameha's Country, the Missionary Era, and Plantation Era could be put to much better use that would generate profit for the company while maintaining the strong pride of Kohala residents. I challenge you to develop a truly visionary plan that can meet all community and company objectives; one that proudly integrates the rich heritage of the special community called Kohala. If you desire to have assistance in developing this unique opportunity for a thematic cultural park, I can recommend several consultants for your consideration.

Thank you for this opportunity to comment. I look forward to your reply and revisions in the final EIR and subsequent EIS. Mahalo Nui Loa.

Me ka 'oia 'i'o,

Fred Cachola, Jr.

Fred Cachola; Jr.

cc: James Leonard, Managing Director, PBR
Duane Kanuha, Director, Hawai'i County Planning Department
Harold Masumoto, Director, Office of State Planning
Don Hibbard, State Historical Preservation Office
Margaret Hoshida, President, Kohala Hawaiian Civic Club
Clifford F.K. Anderson, Ali'i Nui, Royal Order of Kamehameha I
Jalna Keala, President, State Association of Hawaiian Civic Clubs
Toni Whithington, Citizens for the Protection of the North Kohala Coastline
Clyde Sproat, Citizens for the Protection of the North Kohala Coastline
Marlenajon Stafford, Director, Lapakahi State Park and President, Na Maka'ala o Kohala
Edward Ayau, Attorney, Native Hawaiian Legal Corporation

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. Fred Cachola, Jr.
86-062 Hoaha Street
Waianae, Hawaii 96792

Dear Mr Cachola:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

VII-67

Hawaii's EIS Law (Chapter 343, HRS), first promulgated nearly twenty years ago, establishes certain classes of actions which trigger an environmental assessment (EA). In the event an assessed project may have significant environmental impacts, a full environmental impact statement (EIS) is required. The Mahukona Lodge project, as presently envisioned, contains no trigger mechanism. That is, there is no requirement for either an EA or EIS. However, because of Chalon's continuing concern for the environment and desire to involve the community in the planning process, this environmental impact report (EIR) has been voluntarily prepared. It has been called an EIR to distinguish it from a document prepared pursuant to Chapter 343 which must be accepted by the appropriate government authority. The procedures, standards and format of an EIS have been used, and a public review period in excess of that granted under Chapter 343 was given.

Community input to Chalon's Master Plan has been and will continue to be actively sought and heeded. Once again, however, there is no requirement to prepare an EIS for the Master Plan. Your suggestions for a thematic approach and a cohesive, integrated plan as well as your specific recommendations are well taken, and will be considered at the appropriate time in development of the Master Plan.

The decision on whether or not to participate in community planning is an individual one. If one choses not to participate, then criticism of decisions made by those remaining is unwarranted. The fact that one's name appears on letterhead in no way implies acquiescence with all positions espoused by the organization.

Chalon seeks to reclassify a 14.5 acre parcel from Agriculture to Urban, and intends to subsequently rezone the parcel for resort use to allow the development of the lodge, villas, golf club house and

related resort components. The intended uses of other portions of the property conform to present land use designations. The State Land Use Commission (SLUC) will have the opportunity to review the impacts of the project in its consideration of the reclassification request.

As noted in the Market Assessment conducted for this EIR (Appendix A, Exhibit IV-B), there are more than 8,000 hotel rooms proposed for development on the island of Hawaii. This figure includes those proposed projects which have County General Plan, County Zoning and State Land Use Commission approvals in place. Of these proposed hotel units approximately 1,760 units (Exhibit IV-I) would be targeted to the "luxury" class.

Chalon's Mahukona Lodge is seeking to penetrate this luxury class market segment. It is expected that the lodge market will create a niche serving (page IV-9):

- Free independent travelers - 65%
- Group Travelers - 10%
- Incentive and corporate - 20%
- Hawaii residents - 5%

Based on historical occupancy rates for the Big Island, full occupancy for the lodge is expected to level off at 70 percent in the year 2000 (page IV-10).

The residential/agricultural component of the concept plan is discussed in section V of the market assessment on page V-1.

Existing inventory of "estate lots" includes 859 lots, with another 2,088 planned (Exhibit V-A). The market assessment states that "Absorption of estate lots on the island of Hawaii increased dramatically in 1987 as the supply of these lots began to increase..." (page V-5). Further, the largest market for the residential/agriculture lots is primarily Hawaii residents and visitors from the U.S. mainland as discussed on page V-8. Absorption of the 170 lots is expected to be complete in 1996, based upon initial absorption of 20 lots and from 35 to 40 lots per year subsequently (page V-9).

Based upon this market assessment there appears to be sufficient demand to meet Chalon's expectations ensuring absorption and occupancy rates commensurate with their level of economic returns to sustain viable operation of the project.

The West Hawaii Regional Plan projects a Maximum Build-out Scenario of 39,029 existing and proposed units as well as a year 2005 Planning Scenario of 25,279 existing and proposed units including resort residential units. The Mahukona Lodge project would

constitute approximately 1.2 percent of this maximum build-out scenario (assuming maximum numbers of units). It should also be pointed out that the plan is not a marketing report geared for specific market segments, nor does it disclose market absorption or occupancy rates as does the marketing report prepared for this EIR.

Although there is no section entitled "Cumulative Impacts," consideration of cumulative impacts was essential in several of the analyses (i.e., in the social and economic assessment and the market assessment). Where data were available and relevant, they were incorporated into the analyses.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

VII-6

JOHN WAIHEE
GOVERNOR

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

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

FAX: 548-6100

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

August 20, 1990

RECEIVED AUG 24 1990

Mr. Matthew Grady
Planner
Chalon International of Hawaii, Inc.
P. O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

Subject: Environmental Impact Report for
Mahukona Lodge
TMK: 5-7-02: 11
5-7-03: numerous parcels
Mahukona, North Kohala, Hawaii
Area: 14.5 of 490 acres

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

According to the report, Chalon International is proposing to develop the subject lodge which represents the initial development of the 490-acre site. Other proposed uses of the entire property include an eighteen-hole golf course, 300 "villas," 170 one-acre lots, and accessory facilities.

References to the Agricultural Lands of Importance to the State of Hawaii (ALISH) system, the Land Study Bureau Detailed Land Classification for Hawaii, and the Soil Conservation Service Soil Survey are correct.

170-Lot Agricultural Subdivision

The proposed 170, one-acre lots are described in the report as "rural/residential home sites" (page I-3) which will contain features similar to the agricultural/estate lots at Kohala Ranch and the resort lots at Mauna Kea North (page I-6). If these

lots are to remain in the State Agricultural District, Section 205-2 of the Hawaii Revised Statutes requires that any dwelling(s) constructed on them be accessory to an agricultural activity. There is no information on the potential agricultural uses of the lots. If the principal use of the lots is residential, such use would be violative of Section 205-2.

We suggest that if Chalon International is not seriously considering requiring agricultural use of its agricultural subdivision, then they should consider seeking a reclassification from the Agricultural to the Urban District for the 170-lot site so that it may properly reflect its residential orientation.

Irrigation Water

In our review of the Kapaanui Agricultural Subdivision which was proposed by Ahualoa Development, Inc. for TMK: 5-7-02: 11 in 1984, we noted that the 168-lot project would have required over 1,000 gallons per day to irrigate one-fourth of the proposed one-acre lots. The subject report should offer a separate irrigation water budget for the proposed agricultural lots.

We note that irrigation water (about 2.5 million gallons per day (MGD) after subtracting use of treated effluent) for the proposed golf course will be taken from the Kohala Ditch, which has a capacity of 26.7 MGD (Report, pages IV-89 to 90). This represents a 10 percent reduction in the irrigation water available to the remaining area serviced by the Ditch. The report should include information on what impact this withdrawal will have on existing agricultural users and what the approximate long-term irrigation water needs are for Chalon International properties in North Kohala.

Relationship of Proposal to West Hawaii Plan

The report states that the project, while not recognized as a "proposed development" in the West Hawaii Regional Plan, nevertheless "will preserve the best agricultural lands" (Report, page V-39). This "preservation" appears to be specific to North Kohala, and is conditional on Chalon International's other master planned activities for North Kohala being allowed. The report should give more emphasis to the State's West Hawaii Plan, as it takes a much broader view of the issues and problems relating to resort development in West Hawaii.

Thank you for the opportunity to comment.

Sincerely,

Yukio Kitagawa

YUKIO KITAGAWA
Chairperson, Board of Agriculture

c: Mr. James Leonard, PBR Hawaii
(101 Aupuni Street, Suite 310, Hilo 96720)
Office of State Planning (attention: Land Use Division)
Hawaii County Planning Department

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. Yukio Kitagawa
Chairperson, Board of Agriculture
State of Hawaii
P.O. Box 22159
Honolulu, Hawaii 96822-0159

Dear Mr. Kitagawa:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 20, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter.

VII-70

With respect to the agricultural/estate lots, the intention is to comply with the requirements of Section 205-2, HRS, i.e., to produce income from agriculture. At the County level, zoning would be RA (residential and agricultural). Among the permitted uses of RA districts are botanical gardens, nurseries and green houses, seed farms, and other uses dealing with the growing of plants, truck gardening, crop bush and tree farming, animal husbandry and commercial stables, among other uses. The text of the final EIR will be amended to more clearly specify the intended and permitted uses of these parcels.

The engineering report for the project (Appendix K) contains separate water budgets for both irrigation and potable water.

Chalon's overall North Kohala needs are addressed in the Kohala Ditch study by Michael Gomes. The report estimates a potential demand of approximately 7,000,000 gallons per day from agricultural production and 3,000,000 gallons per day for the Mahukona development. The historical average delivery of the Kohala Ditch is 27,000,000 gallons per day, well above the combined projected demand. More importantly, the higher value use at Mahukona will help pay for needed improvements to the ditch and water distribution system, thus ensuring a reliable supply of irrigation water for agriculture development throughout Chalon's land holdings in the area.

The West Hawaii Regional Plan was a consideration in the evolution of the concept for the development, as were the County General Plan and the North Kohala Community Development Plan. Perhaps

more importantly however, was the extensive interaction with the directly-affected community through the Citizens Participation Committee.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

JOHN WAIHEE
GOVERNOR

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
SEVEN WATERFRONT PLAZA, SUITE 300
500 ALA MOANA BOULEVARD
HONOLULU, HAWAII 96813
FAX (808) 543-6041

IN REPLY REFER TO:

90:PLNG/4029jt

August 27, 1990

RECEIVED AUG 28 1990

Mr. Matthew Grady
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

VII-71

Dear Mr. Grady:

Re: Environmental Impact Report for the Proposed Mahukona Lodge, North Kohala, Hawaii

We appreciate the opportunity to review the subject report and apologize for our late response. Our comments are as follows:

Reference is made to the West Hawaii Regional Plan (November 1989) which was prepared by the Office of State Planning. In order to mitigate negative impacts resulting from "ad hoc, spot development and urban sprawl", four "resort destination nodes" have been identified. We note that the proposed Mahukona Lodge is not within a resort destination node.

Policies A(3) and B(3) of the State Housing Functional Plan seeks to ensure that projects which impact housing provide an adequate amount of affordable homeownership opportunities, as well as affordable rental opportunities for employees. We therefore believe that should the project be developed, an adequate supply of affordable housing should be provided.

Sincerely,

Joseph K. Conant
Executive Director

JT:eks

c: Mr. James Leonard, PBR Hawaii

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

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

Dear Mr. Nagata:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 27, 1990 summarizing your review of the subject report.

It is true that the proposed Mahukona Lodge is not located in one of the "resort destination nodes" identified in the State's West Hawaii Regional Plan. However, County plans have identified the site as appropriate for a resort for the past twenty years. The intended use is consistent with the present County General Plan and the Land Use Pattern Allocation Guide (LUPAG) Maps.

Chalon is proceeding to develop affordable housing on other properties in the Kohala area. We are uncertain at this time what the specific requirements will be in terms of numbers and locations of units, but as this is one of our primary goals in the community, we don't anticipate any difficulty complying with policies of the State Housing Functional Plan.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

VII-72

RECEIVED AUG 30 1990

Kohala Community Association
Planning Committee
P.O. Box 76
Hawi, HI 96719
August 28, 1990

Mr. Matthew Grady
Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady,

In response to your letter of August 22 I would like to thank you for making the additional three copies of the Mahukona Environmental Impact Statement available to this committee. However the two weeks extension of time to respond to the EIR is not adequate.

As we said in our letter of August 20 this committee needs time to inform the community about the existance of the EIR, to hold our next meeting open to the public on the EIR and to compile the responses at the meeting into comments for you. We have squeezed that schedule as tight as is humanly possible and this is what we get:

--public notice will be published in the first edition since it closed down for the summer of the community's only newspaper, the Kamehameha Times, on September 7.

--our meeting to present the EIR to the public section by section and to discuss the impacts of the resort will be held on September 13 at 7 pm in the new courthouse. I hope you can come to this meeting.

--committee members have agreed to compile and digest the comments into a report for you on or before September 21.

We hope this schedule is suitable. It is the best we can do.

Sincerely,
Toni Withington
Toni Withington
Chairman

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 4, 1990

Kohala Community Association
Planning Committee
P.O. Box 76
Hawi, Hawaii 96719
Att: Ms. Toni Withington, Chairman

Dear Ms. Withington:

Thank you for your letter dated August 28, 1990 regarding our time extension for the Kohala Community Association Planning Committee to respond to the Mahukona Draft Environmental Impact Report. Apparently, the Committee still feels an additional two weeks is inadequate.

We believe the Association has had ample time to respond to the report. Reports were mailed between July 6, 1990 and July 10, 1990 which means the Association had the report for one month prior to holding their meeting on August 16, 1990. At your committee's request we have given the Association 59 days to respond to the EIR, which is 14 days (or an additional 33 percent) beyond the practiced procedures used in Draft Environmental Impact Statement reviews, permitting a 45-day review period. Further, we have respectfully attended your Planning Committee meeting on August 16, 1990 to answer questions.

The lack of time and public notice which is of your committee's concern appears to be a problem within your committee's communication network.

We will expect to receive your comments after the Kohala Community Association has made written comments on or about September 21, 1990.

Sincerely,
Matthew Grady
Matthew Grady
Planner

cc: Mr. Bill Graham

Hawaii Electric Light Company, Inc. • PO Box 1027 • Hilo, HI 96721-1027

August 28, 1990

RECEIVED AUG 29 1990

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

Subject: Environmental Impact Report (EIR)
Mahukona Lodge
Mahukona, North Kohala, Hawaii

Thank you for allowing us the opportunity to respond to the EIR for the proposed Mahukona Lodge project. Our comments regarding the electrical system described in Chapter IV, Section 6.7 are as follows:

1. The existing electrical transmission and distribution system needs to be upgraded to meet the future load growth in the North Kohala area. Electrical service to the development would require the installation of one 69KV transmission line from HELCO's existing 69KV system in the vicinity of Kohala Ranch to the project site. A new substation near the development would then be required to transform the voltage to a distribution voltage capable of serving the project's on-site system.

2. It should be emphasized that the routing of the proposed 69KV transmission line along the Akoni Pule Highway, will be dependent upon obtaining necessary private easements and governmental approvals.

3. Any extensions or improvements to HELCO's existing electrical system will be paid for by the developer in accordance with HELCO's Rule 13.

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

Very truly yours,

Clyde H. Nagata
Manager, Engineering Department

cc: Mr. James Leonard, PBR Hawaii

VII-73

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Mr. Clyde H. Nagata, Manager
Engineering Department
Hawaii Electric Light Company, Inc.
P.O. Box 1027
Hilo, Hawaii 96721-1027

Dear Mr. Nagata:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of August 28, 1990 summarizing your review of the subject report.

The information you have provided will be included in our final EIR. We understand that a new 69KV transmission line will be brought into the area and terminated at a substation near the project site. The route along Akoni Pule Highway will depend upon obtaining the necessary private easements. HELCO's Rule 13 will guide identification of those costs to be borne by the developer.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady
Planner

RECEIVED SEP 4 1990

P.O. Box 699 Kapaau, Hawaii 96755

01 September 1998

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

Re: Review of Environmental Impact Report (EIR)
Mahukona Lodge
Mahukona, Hawaii

VII-74

Dear Mr. Grady:

Thank you for giving me the opportunity to review the draft entitled MAHUKONA: ENVIRONMENTAL IMPACT REPORT prepared by PBR HAWAII in association with Chapman Consulting Services for Chalon International of Hawaii, Inc., dated June, 1998. It is commendable that Chalon has taken the initiative to follow the EIR process for the proposed project. In general, the report was well received by the majority of the people with whom I have had the opportunity to present and discuss the development and implementation of the proposed project. Most people are aware that the State of Hawaii and the County of Hawaii have rules and regulations that govern the growth and development process. They feel that Chalon will construct this project within governed and defined parameters.

Though the proposal addressed most of the interests and concerns of many individuals, it is felt that the project would be strengthened if a few ambiguities are clarified. These are:

1. I, like others, find it difficult to relate to objectives that are not founded on a sound philosophical basis. I know Chalon has a sound philosophy. Briefly stating Chalon's philosophy in the beginning of the report would give the reader an opportunity to better understand the goals of the project.
2. If one of Chalon's major project objectives is to generate an income that will contribute to the growth and development of North Kohala, then Chalon should reflect this concept throughout the proposal. For example: Chapter III, page 1, five (5) objectives are listed. Perhaps the sixth objective could be stated as follows: TO GENERATE A FINANCIAL CASH FLOW THAT WILL CONTRIBUTE AND PERPETUATE CONTINUAL POSITIVE GROWTH AND DEVELOPMENT IN THE DISTRICT OF NORTH KOHALA. (By the way, an "s" should be added to the word objectives.) It seems that the insertion of this statement would be consistent with the principle, "To provide an economic generator that would assist in the political and economic justification for additional public and private infrastructure and community services expenditures in the North Kohala area"---Chapter I, page 4.
3. The project description addressed six (6) elements. Throughout the report, five (5) of these six (6) elements were discussed in some detail. The one element that was poorly described and seemed to be conspicuously overlooked concerns "several freshwater swimming 'lagoons'". Some questions are: Where will Chalon obtain the fresh water for these lagoons? Approximately how many of these lagoons will be constructed? Where will these lagoons be constructed? How will these lagoons be drained, particularly when they need to be cleaned and rejuvenated? Who will be entitled to use these lagoons?
4. The write-up concerning the social impact assessment was difficult for many lay people to comprehend. People became confused. They did not seem to understand what information was pertinent to the North Kohala District, the South Kohala District, and/or the Kohala area in general.

Should you have any questions, please feel free to contact me.

Sincerely,

Kelii

Kelii Sine, Ph.D.

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Dr. Kelii Sine
P.O. Box 699
Kapaau, Hawaii 96755

Dear Dr. Sine:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of September 1, 1990 summarizing your review of the subject report. The paragraphs below respond to your numbered comments.

VII-75

1. Your suggestion to include a statement of Chalon's philosophy is well taken, and we will do so in the final EIR. We believe this will help people to better understand our motivations and objectives, and perhaps allay certain suspicions targeted at developers in general, whether or not well-founded.

2. Your second suggestion, that to include a sixth project objective of generating a cash flow to benefit future positive growth in North Kohala, is also well taken and this too will be included in the final EIR.

3. Current plans call for only one swimming lagoon, that near the Health Spa. There will also be an "ecosystem" lagoon near the Japanese restaurant. The remainder of the lagoons are intended for aesthetic purposes only and will be located at various places throughout the golf course and residential areas. When draining is necessary, this water would be used for golf course irrigation. The swimming lagoon will be available for use by lodge guests and users of the other recreational facilities.

4. Unfortunately, it is sometimes difficult to describe the social and economic impacts to a discrete area without also discussing relationships with the larger surrounding areas. We apologize for any confusion this may have caused among lay readers. Perhaps it would help if those people would read Appendix H for a more in-depth analysis of these impacts and the definitions and assumptions used in the analysis.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

JOHN WAIHEE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
EPHSD

RECEIVED SEP 20 1990

September 17, 1990

2-164

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

SUBJECT: Environmental Impact Report for the Mahukona Lodge
Mahukona, North Kohala, Hawaii
Kailua Kona, Hawaii
TMK: 5-7-02: 11; 5-7-03: 1, 2, 3, 7, 8, 10, 11, 12, 16, 17, & 18

Thank you for the opportunity to review and comment on the subject document. We have examined the Environmental Impact Report and have the following comments:

1) The report notes that the project will be served by the County's Hawi-Kokoiki water system. We believe that this refers to the Department of Water's North Kohala system (public water system no. 129 on the Safe Drinking Water Branch files). The developer will construct the required transmission lines and 500,000 gallon storage reservoir.

2) Because the water system serves 25 or more individuals at least 60 days per year or has a minimum of 15 service connections, the system improvements will require compliance with the Department's Administrative Rules, Title 11, Chapter 20, "Potable Water Systems."

3) Section 11-20-30 of Chapter 20 requires that new or substantially modified distribution systems for public water systems be approved by the Director. However, if the water system is under the jurisdiction of the County of Hawaii, the Department of Water Supply will be responsible for the review and approval of the plans.

4) The eastern portion of the proposed project site is situated above the Department's Underground Injection Control (UIC) line. Land areas located above the UIC line are generally considered to contain underground sources of drinking water. These

areas should therefore be protected against all sources of groundwater contamination.

5) The Conceptual Development Plan (Figure II-6) indicates that the Wastewater Treatment Facility will be situated east of the Akohi Pule Highway, above the UIC line. Thus, the waste stabilization ponds should be constructed with impervious bottom liners to prevent wastewater from infiltrating into the subsurface.

6) The standard golf course conditions (attached) apply to this project.

7) The report states that the golf course and landscaped areas will be irrigated with wastewater effluent combined with non-potable water from the Kohala Ditch system. The potable water systems in this area must be carefully designed and operated to prevent cross-connections and backflow conditions with any non-potable systems.

8) The effluent irrigation system must meet the requirements of Chapter 11-62, Wastewater Systems.

9) All wastewater treatment works must meet the applicable requirements of Chapter 11-62, Wastewater Systems.

10) Wastewater ponds used for irrigating golf courses usually create severe nuisance from midges to surrounding residential areas. We recommend that these ponds be located at a distance where midges cannot be attracted to lights from the residential area.

11) The resort will be in an agricultural zone and occasionally nuisances from flies may occur despite the best efforts of the farms to control them.

BRUCE S. ANDERSON, Ph.D.

Attachment

cc: Mr. James Leonard
Chief Sanitarian, Hawaii

STATE OF HAWAII
DEPARTMENT OF HEALTH

April, 1990 (Version 3)

EIGHT (8) CONDITIONS APPLICABLE TO THIS NEW GOLF COURSE DEVELOPMENT

1. The owner/developer and all subsequent owners shall establish a groundwater monitoring plan and system which shall be presented to the State Department of Health for its approval. The groundwater monitoring plan and system shall minimally describe the following components:

   a. A monitoring system tailored to fit site conditions and circumstances. The system shall include, and not be limited to, the use of monitoring wells, lysimeters and vadose zone monitoring technologies. If monitoring wells are used, the monitoring wells shall generally extend 10 to 15 feet below the water table.

   b. A routine groundwater monitoring schedule of at least once every six (6) months and more frequently, as required by the State Department of Health, in the event that the monitoring data indicates a need for more frequent monitoring.

   c. A list of compounds which shall be tested for as agreed to by the State Department of Health. This list may include, but not be limited to the following: total dissolved solids; chlorides; PH; nitrogen; phosphorus; or any other compounds associated with fertilizers, biocides or effluent irrigation.

2. Baseline groundwater/vadose zone water data shall be established as described in this paragraph. Once the monitoring system and list of compounds to be monitored for have been determined and approved by the State Department of Health, the owner/developer shall contract with an independent third-party professional (approved by the State Department of Health) to establish the baseline groundwater/vadose zone water quality and report the findings to the State Department of Health. Testing of the analyses of the groundwater shall be done by a certified laboratory.

3. If the data from the monitoring system indicate the presence of the measured compound and/or the increased level of such compound, the State Department of Health can require the owner/developer or subsequent owner to take immediate mitigating action to stop the cause of the contamination. Subsequently, the developer/owner or subsequent owner shall mitigate any adverse effects caused by the contamination.

4. Owner/developer shall provide sewage disposal by means of connection to the public sewer system; or by means of a wastewater treatment works providing treatment to a secondary level with chlorination. Effluent from this wastewater treatment works may be used for golf course irrigation, subject to Condition #3. The entire system shall be approved by the State Department of Health in conformance with Administrative Rules Title 11, Chapter 62, Wastewater Treatment Systems, effective December 10, 1988.

5. If a wastewater treatment works with effluent reuse becomes the choice of wastewater disposal, then the owner/developer and all subsequent owners shall develop and adhere to a Wastewater Reuse Plan which shall address as a minimum, the following items:

   a. Management Responsibility. The managers of the irrigation system using reclaiming wastewater shall be aware of the possible hazards and shall evaluate their system for public health, safety, and efficiency. They must recognize that contact with the reclaimed wastewater from treated domestic sewage poses potential exposure to pathogenic organisms which commonly cause infections diseases (bacteria, viruses, protozoa, and halminths or worms).

   b. General Recommendations

      1) Irrigated areas should be no closer than 500 feet from potable water wells and reservoirs.

      2) Irrigated areas should be no closer than 200 feet from any private residence.

      3) Application rates should be controlled to minimize ponding. Excess irrigation tailwater in the reclaimed wastewater irrigation area shall be contained and properly disposed. An assessment should be made of the acceptable time and rate of application based on factors such as type of vegetation, soil, topography, climate and seasonal variations.

      4) Effluent holding/mixing ponds shall be designed to prevent the infiltration of the wastewater into the subsurface. The holding/mixing ponds shall be made impervious.

      5) Irrigation shall be scheduled such that the public is not in the vicinity and the soil is sufficiently dry to accept the irrigation water.

      6) Permanent fencing or barriers shall be erected around polishing or holding ponds to prevent public entry or stray feral and tame animals from gaining access to the ponds.

7) Adequate irrigation records shall be maintained. Records should include dates when the fields are irrigated, rate of application, total application and climatic conditions. Records should also include any operational problems, diversions to emergency storage or safe disposal and corrective or preventive action taken.

8) The holding/mixing ponds shall be periodically monitored for the purpose of detecting leakage into the subsurface. If leakage is detected, corrective action shall be immediately taken.

c. Adequate Notice. Appropriate means of notification shall be provided to inform the employees and public that reclaimed wastewater is being used for irrigation on the site.

1) Posting of conspicuous signs with sufficient letter size for clear visibility with proper wording should be distributed around the use areas.

2) Signs shall be securely fastened. Periodic surveillance shall be conducted to assure permanent posting at all times. Immediate replacements shall be made when necessitated by deterioration, vandalism or misuse.

d. Adequate Employee Education. Employees or users should be cautioned and warned of the potential health hazards associated with the ingestion of reclaimed wastewater being used at the site.

1) Employees should be warned that the ingestion of reclaimed wastewater is unsafe.

2) Employees should be protected from direct contact of the reclaimed wastewater. If necessary, protective clothing should be provided.

3) Employees should be informed of the following:

- The irrigation water is unsafe for drinking or washing.
- Avoid contact of the water or soil with any open cuts or wounds.
- Avoid touching the mouth, nose, ear or eyes with soiled hands, clothes or any other contaminated objects.
- Be aware that inanimate objects such as clothes or tools can transport pathogenic organisms.
- Always wear shoes or boots to protect feet from the pathogenic organisms in the soil or irrigation water.

6. Releases from underground storage tanks (USTs) used to store petroleum products for fueling golf carts, maintenance vehicles, and emergency power generators pose potential risks to groundwater.

Should the owner/developer/operator plan to install USTs that contain petroleum or other regulated substances, the owner/developer/operator must comply with the federal UST technical and financial responsibility requirements set forth in Title 40 of the Code of Federal Regulations Part 280. These federal rules require, among other things, owners and operators of USTs to meet specific requirements in the detection, release response and corrective action. Also, the owner/developer/operator must comply with all State UST rules and regulations pursuant to Chapter 342-L 'Underground Storage Tanks' of the Hawaii Revised Statutes.

In consideration of the above-mentioned remarks, the Department of Health recommends that the owner/developer/operator implement facility plan alternatives that exclude the installation and operation of UST systems (e.g., the preferential use of electric golf carts, use of above-ground storage of fuel oil for emergency power generators, etc.), or, if USTs are utilized, that secondary containment be considered.

7. Buildings designated to house the fertilizer and biocides shall be bermed to a height sufficient to contain a catastrophic leak of all fluid containers. It is also recommended that the floor of this room be made waterproof so that all leaks can be contained within the structure for cleanup.

8. A golf course maintenance plan and program will be established based on "Best Management Practices (BMP)" in regards to utilization of fertilizers and biocides as well as the irrigation schedule. BMP's will be revised as an ongoing measure. The golf course maintenance plan will be reviewed by the State Department of Health prior to implementation.

If there are any questions regarding the eight (8) conditions mentioned here, please contact Mr. James K. Ikeda at 543-8304. We ask you cooperation in the protection of Hawaii's valuable groundwater resource.

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

September 24, 1990

Dr. Bruce S. Anderson
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Anderson:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

VII-79

Thank you for your letter of September 17, 1990 summarizing your review of the subject report. The paragraphs below respond to your numbered comments.

1. Your reference to the North Kohala water system is correct. Chalon will provide the necessary improvements to the system.

2. Water system improvements will be done in compliance with Department of Health Administrative Rules, Title 11, Chapter 20, "Potable Water Systems."

3. The County of Hawaii, Department of Water Supply, will be responsible for review and approval of the plans for improvements to the water system.

4. The necessary precautions will be taken to protect groundwaters above the UIC line from contamination.

5. Waste stabilization ponds will utilize impervious liners to prevent infiltration of wastewater.

6. We note receipt of the DOH "Conditions Applicable to This New Golf Course Development," and acknowledge that they will be complied with.

7. The potable and non-potable water systems will be designed and operated such as to prevent cross-connections or backflow conditions.

8. The effluent irrigation system will meet the requirements of Chapter 11-62, Wastewater Systems.

9. All wastewater treatment works will meet the applicable requirements of chapter 11-62, Wastewater Systems.

10. Wastewater ponds will be located on the opposite side of Akoni Pule Highway from residences and vegetative buffers will be provided along the highway.

11. We will make every effort to insure that activities of the proposed project will not contribute to any existing or future fly problem.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady

Matthew Grady
Planner

JOHN WAIHEE
GOVERNOR OF HAWAII

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

DEPUTIES
KEITH W. AHUE
MANABU TAGOMORI
RUSSELL N. FUKUMOTO

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

January 9, 1991

Mr. Matthew Grady, Planner
Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

Dear Mr. Grady:

SUBJECT: Mahukona EIR -- State Historic Preservation Division Comments
Mahukona, North Kohala, Hawaii

VII-80

This review responds to the EIR document which you sent to our office on October 19, 1990. It also follows-up on the phone conversation between you and Dr. Ross Cordy of our staff in late December. Our apologies for the delayed response.

In part our delayed response is a result of the complexity of the historic sites inventory of the proposed Mahukona Lodge. We have reviewed the EIR text, the two PHRI survey reports appended to the text (Dunn & Rosendahl 1989 on Kapaanui & Kou; Burgett & Rosendahl 1990 on Mahukona), and the 10 page preliminary report of Na Maka'ala o Kohala appended to the EIR. Additionally, we have reviewed the over 50 page-long final report of Na Maka'ala o Kohala (August 1990).

As a result of these reviews, we must conclude -- at least at this time -- that the PHRI inventory of historic sites is incomplete. The Na Maka'ala o Kohala final report appears to identify additional sites and features. Their report also provides some oral historical information directly related to a number of the sites, relevant to better determining the function of the sites. We have spoken with Paul Rosendahl of PHRI, and he wishes to make every effort to see that a full inventory of sites occurs, and he is quite willing to meet further with Na Maka'ala o Kohala to improve that inventory. Na Maka'ala o Kohala also has the expressed concern of cooperation to fully inventory the historic sites. There seems, however, to be miscommunication at this point between the groups. We believe that it is vital that the two groups sit down, with our office and your firm, to get the best inventory possible.

Until the historic sites inventory is adequately concluded -- identifying all historic sites and fully describing and interpreting each site (as best as possible), we believe that the significance of the sites cannot be easily evaluated. Thus, it is difficult to determine how many significant sites are present.

Most important, until the significant sites and their nature are identified, development of acceptable mitigation plans is premature. Na Maka'ala o Kohala is recommending near complete preservation and interpretation of historic sites, and

total preservation rarely occurs. However, their plan includes some excellent recommendations. Equally, the PHRI mitigation plan has some good points and some weak ones. Again, we believe that these points could easily be resolved through consultation.

Generally, we promote site preservation in three contexts: (1) long-term research contexts for sites that contain extremely important information relating to major research questions on Hawaiian history, (2) interpretation contexts for public education which focuses on excellent examples of site types and site patterns related to multiple themes in a district (e.g., different settlement patterns due to markedly differing terrain such as the large valleys of Kohala vs. the wet gulch lands vs. the dry leeward slopes; royal centers such as the Puuepa-Kokoiki lands with its remnant Mookini heiau; major religious structures such as Kukuipahu heiau; etc.), and (3) cultural significance (burials, major trail access routes, religious structures, etc.). Community input is important on aspects of these preservation concerns -- particularly in identifying themes and sites that the community feels are notably important.

With these points in mind, we can make some general comments at this time. One, there are intact prehistoric site patterns at either end of the project area, but in the center, the historic era Mahukona Harbor has altered the patterns. Two, the Mahukona Harbor area itself is clearly a significant historic district with multiple sites. This was the harbor for north Kohala and its plantations. It would seem desirable to document and interpret aspects of this harbor's history. This could be done by a combination of preservation of some sites (e.g., the railroad and perhaps a few sites in the harbor vicinity), displays (e.g., panels with maps of the harbor and old photographs), and written brochures or short booklets (combining pictures and more extensive text). Such actions would benefit the visitor and the residents alike by documenting the harbor and its history. Three, the prehistoric sites include some unusual and excellent site types -- particularly a set of sites to the north in Kamano & Kou ahupua'a. Here a large shrine or heiau exists on the brow of a hill -- an important shrine in the oral history of the area. Also, another shrine (called Haumalei) with known oral histories applying to it is close by. Several other shrines and sites are nearby. It would seem desirable to preserve this area and the open space connecting them, as Na Maka'ala o Kohala is recommending.

Beyond these general points, we would not wish to say much at this time. It is vital that the historic sites inventory be cleaned up in the near future, if Chalon is planning a permit submittal before long. Once that occurs and significant sites are clearly identified, then a mitigation plan needs to be devised.

In the phone conversation with Ross Cordy of our staff, you and he discussed the possibility of a meeting between PHRI, Na Maka'ala o Kohala, Chalon representatives, and our staff to work toward resolving the situation. A meeting during the week of January 14, 1991, was suggested. If possible, we would like to recommend a meeting on the evening of January 18th, a Friday. If this is not feasible, perhaps a meeting during the week of January 28, 1991, could be arranged. Please contact Ross on this matter (587-0012).

Sincerely,

DON HIBBARD, Director
Historic Preservation Program

cc: P. Rosendahl, PHRI
Na Maka'ala o Kohala
J. Leonard, PBR Hilo

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889-6257 • FAX: (808) 889-5252

January 18, 1991

Don Hibbard, Director
Historic Preservation Program
Department of Land and Natural Resources
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Hibbard:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of January 9, 1991 summarizing your review of the subject report. We have the following response:

Chalon welcomes the opportunity to work with the State Historic Preservation staff, Na Maka'ala O Kohala and Paul Rosendahl in further identification of archaeological sites in the Mahukona and Kapaanui lands.

We agree that significance determination and mitigation plans can not be conducted until all probable sites have been located and documented.

To facilitate this additional work we have scheduled a meeting on February 1, 1991 to take the next steps in expediting site identification. Ross Cordy of your office has been notified of this meeting and will be attending, as well as, Na maka'ala O Kohala and Paul Rosendahl.

In regard to your comments about the preservation of the harbor's history and the railroad, Chalon has a keen interest in capturing these historical aspects and disseminating this history through displays or perhaps a museum of some sort. We look forward to working with your staff and to obtain their guidance in creating interpretive areas/programs.

Thank you again for your comments. We will provide you a copy of the final EIR when it is completed.

Sincerely,

Matthew Grady
Planner

Kohala Community Association
Planning Committee
P.O. Box 76
Hawi, HI 96719
September 21, 1990

RECEIVED SEP 21 1990

Mr. Matthew Grady
Planner
Chalon International of Hawii, Inc.
P.O. Box 249
Hawi, HI 96719

Dear Mr. Grady,

Thank you for your letter of September 4, 1990 granting this committee a time extension to September 21 to comment on the Mahukona Draft Environmental Impact Report.

Public notice of the EIR was made in the first issue of the Kamehameha Times for the school year on September 7. This committee held an open meeting to allow for public comment on the EIR on the evening of September 13. At the time attendance was taken 35 people were in the courthouse. An additional 5-8 people left early or came late.

Discussion was lively especially on the public access issue, the social impact of imported labor, the squeeze on the housing situation and the environmental concerns for the ground water and marine life. Many people noted inadequacies in the infrastructure section particularly the traffic impact, sewage treatment and location of incoming power lines. The complete lack of mention of the railroad and plantation history was mentioned by many.

Several procedural matters were discussed. Chalon's attempts to circumvent approval by the State Land Use Commission by claiming that the resort is on 14.5 acres was the leading complaint. Also the omission of the CPC recommendations, the PBR housing survey and the coastline preservation efforts were brought up. There was confusion between information presented in the EIR that relates to Chalon's Master Plan for Kohala. If the housing projects proposed in the Master Plan are necessary to approval of the resort, the Master Plan should also be subject to environmental review.

The enclosed comments include 12 pages of paraphrased testimony from the almost three-hour meeting. We have tapes of the whole meeting, as I believe you do also. If you would like access to our tapes please let me know. Also attached are written comments submitted by several committee members that night.

I hope that the comments will be helpful in drawing up the final EIR. This committee will be looking for response to these comments.

FInally, I would like to repeat the first conclusion of this committee at its August 18 meeting: "The EIR is not and Enviromental Impact Statement. It has not been requested by a government agency. Responses to the draft will not be seen by a government agency. There are three places in the land use permitting process required for the project where an EIS may be called for. It was the consensus of the committee that the association would encourage those agencies to require a full EIS at that time." Hopefully when an EIS is called for the community will be better informed and more knowlegable about responding to these matters.

Sincerely,
Toni Withington
Toni Withington, Chairman

Physical Environment.

Kelly Pomeroy:
"Why is it necessary for the power poles to come from the Kawahae side instead of on existing poles that currently are in place from the Hawi side?"
The above question indicates that the EIR has not considered offsite view planes that will be impacted. This must be addressed in the final EIR.

Vicki Komotani:
"How does Chalon plan to control the application of fertilizers and pesticides by the 170 private homeowners to avoid water pollution?"
This is an ommission from the EIR and should be addressed in the final draft.

Martin Halbritter:
"Really concerned over the thoroughness of the environmental marine impact study because they only spent 20 hours for what would happen underwater which was not enough time to get a good baseline to know what is happening here.The only area they spent much time in was Nishimura Bay."
This statement indicates inadequate time and area coverage for the marine impact study data collection. A more thorough marine impact study should be done for the final EIR.

Barrie Moss :
"The whole attitude of this EIR in regard to pesticides is extremely lax. Just following instructions on the label use of pesticides and assuming that the soil will absorb pollutants especially those used on golf courses seems inadequate."
This statement indicates that the EIR should include more data on what pesticides will be used and specifically how proper mitigation methods will avoid ground water and marine water pollution at this particular site.

Frank Johnson:
" Speaking of ground water pollution, "Kona storms" cause heavy rainfall.That is not mentioned in the EIR which only refers to about 15 inches of rain per year as being a dry climate that does not cause excess leaching of fertilizer or pesticides. The EIR should show rainfall distribution especially noting storm rainfall."
This EIR should correlate rainfall records from the Upolu U.S.C.G. Loran Station with Kawaehae rainfall data to document how the average 15 inches occurs and provide better mitigation to control ground water and subsequent marine water pollution.

Paul Gomes:
"Chalon should be encouraged to use as enviormentally safe methods in their Horticultural efforts as possible"
The final EIR should be more specific about how

Physical Environment

Paul Gomes (cont.)
environmental protection will be achieved considering the site location and permiability of the soils and lava substrate.

Mike Luce:
" Historically base line marine water monitoring has been required of the developer at post public hearings or after rezoning but before construction with periodic monitoring and reporting and so far none of the projects monitoring has shown an adverse impact in West Hawaii. The projects would have to stop if an adverse impact is determined. I just wanted to share that with you concerning how it has been handled in the past."
The EIR has established some base line data on the off shore marine water but has not done so on the ground water. Chalon could set a good example by doing a ground water study and setting up a trust to be an unbiased, independent, 3rd party testing entity that would handle water pollution testing for the resorts in West Hawaii.This would allay any potential public distrust of the monitoring results.

Natural Environment

John Scovel:
" I differ with the statement that no Humpback whales have been observed in near shore waters or"there are no known incidents of Humpback Whales coming inshore at the project site" (pg. IV-23, 3.3.1.3). There is no mention of porposes which I see constantly .Only 3 Green Turtles are mentioned as being seen.The special limu that turtles eat, we call it "red leaves", the EIR states as being virtually absent in the study area. I can show at least 10 sites where this limu is in abundance. This EIR to me is inaccurate. There's a lot of turtles in that area. They only stay if there is food, so there is food in that area.Again on porposes, which they say nothing about, I hang my line out for Ulua and the porposes come so close in they cut my line.Whales have come in real close to shore. Some times I can smell them when they blow.If you can smell them they are close inshore."
These statements indicate that the Marine Impact Survey is inaccurate and that the EIR should be rejected or revised to accurately measure the impact of this development.on endangered species and the marine environment.

Paul Gomes:
"The owl might be affected and that concerns me. Some sort of mitigation effort should be taken to limit any affects on the owl.Hawk is a vide ranging species and I don't think there are any hawk nests. I think the bat and the owl should be studied . The plant study seems faily accurate. The one sentence in the plant section that bothered me was "Although none of the plants are considered threatened or endangered the plants should be protected because with continued development of Kohala Coast will diminish there populations and range in the future." (pg. IV-18, 3. 1.3.).

Paul Gomes (cont.)
"I'm not saying I am against this resort... "
The above statement indicates that the EIR does not thoroughly evaluate the impact on the owl and the bat.
Also the problem of this resort becoming an incubus for more resort expansion on this coastline (appendix B, pg. 6)should be dealt with in the final EIR.

Ken Boche
"I believe they did a good job on the natural history section and having the resort more mauka helps to protect and not infringe on native plants where they occur naturally."
This statement supports the planned evaluation of the Conservation District Zone by State Government Agencies which involves a request to move the Conservation Zone mauka in this area. This review of the Conservation Zone border is an ommission in this EIR and must be dealt with in the final EIR to fully measure the impact on native plants.

Joan Ellen McFee:
" Page 20 in Chapter 4, ...impacts could occur from use of pesticides on insects that birds feed on...so the EIR states an awareness of this problem."
This statement indicates a lack of adequate mitigation on the affects of pesticides and the EIR should be rejected or altered to adequately address this impact.

Barrie Moss:
" I want to back up the statements that the Humpback Whales do come in close to shore. A goup of us saw a Humpback not over 400 feet off shore; it breached and nearly blocked out the sun."
This statement again points out the inadequacy of the Marine survey(pg. IV-23, 3.3.1.3)

Barrie Moss:
" Concerning the fish, paragraph bottom of page IV-25, concerning appropriate conservation by increased number of people fishing, is debatable..."
"Also the statement on the bottom of pg. IV-24 and top of IV-25; ..fertilizers and biocides are generally not applied to golf courses and/or residential areas during rainy periods...is a problem of timing."
These statements indicate that inadequate mitigation measures have been taken to protect the near shore marine waters from fertilizer and biocide pollution that could damage the fish population. Enrichment of marine waters can cause dinodinoflagellate "blooms" which are associated with Ciguatera poisoning. The latest research data on this problem should be included in the final EIR.

Mr. Sing
"The ugly buildings will block the beauty of the shore when we drive by and the ugly golf course is only good for wealthy people not the people of Kohala. It should be built some place else in the "boondocks".
The EIR is inadequate in its evaluation of the social effect on Kohala residents in terms of how it affects the open space and viewplanes which they value highly.

Dave
"There is a contradiction in that the golf course has a greater chance to impact the fish than the reduced number of people that drive down there if they block vehicle access(IV-25)".
The EIR must more clearly address the vehicle access and include the Hui Hamalahoa judgement that vehicle access must be open on the old jeep road to the general public so decision makers will have sufficient information to evaluate this resorts impact on shoreline access.

Audrey Veloria:
" Flora and Fauna well done and Chalon cooperated with the hard working members of Maka ala O Kohala to identify historic archaeology sites;of Hawaiian importance. My only concern is this,I think basically Mahukona is a beautiful place, many people should be allowed to see it. But on the other hand I don't think they should keep out the people who love it best. I'm afraid that we the ones who love it most are going to be made to feel that we do not belong. Why should Chalon or anyone else be allowed to control who goes through our property to get to our ocean. This island has few enough parks and open water. We love seeing the whales jump, smelling the fresh ocean air and relaxing on the dock at night and letting my children swim. You can not have this kind of construction come up and not have a change.I am not against having people come and share but I think Mahukona is one of the few places left where the water is clean and the manta rays come by every evening for us to enjoy. Our kids need a place like this rather than hanging around in the wrong places. Have your resort; build it up mauka; but let that ocean front be accessible and do not demean us. We should not be indebted to any one one for use of what is our natural birth right"
The above statement indicates a desire to keep resort development mauka, above the Akoni Pule Highway, and this alternative land use was not considered in the EIR therefore this EIR is inadequate and should be rejected.
The above statement also indicates that this EIR does not properly address the social/emotional impact on local people of this resorts location and enchroachment on recreational areas that have been traditionally open and considered to belong to the public.Enchroachment on natural, open public areas of a resort's activities (sound,odors,lights) destroys the natural beauty.Impacts of such enchroachments and their effect have not been properly addressed so this EIR should be rejected.

Historical and Archaeological

Toni Withington:
"The empasis was on Hawaiian archaeological sites and no mention was made of the plantation historical aspects such as the railroad. Railroad was one of the most important ones in the state and important to understanding the sugar plantation history. No mention is made of the impact of having a hotel right next to the still existing railroad bed.No mention is made of any historical interpretation of the railroad."
The statement indicates that the EIR has failed to measure the impact on a historic railroad and should be rejected or revised.

Phil Hooten:
"Narrow Gage in the Kingdom" is a book on the railroad."
This reference book should have been included as a reference in this EIR and the Railroad history should be properly addressed in the final EIR.

Martin Halbritter:
"What is going to happen to the old railway building at Mahukona haybor?"
Again the EIR is incomplete because of this ommission.

Toni Withington:
"The warehouses and other buildings that played an important historical roll in the shipping of sugar and cattle out of the port are not mentioned."
These factors must be properly addressed in the final EIR.

Mike Gomes:
"As a point of information, the old Railroad office will be turned into a museum.Also an attempt will be made to acquire a locomotive."
These points are not mentioned in the EIR and should be included in the final draft.

Aurey Veloria:
" Chalon is to be complimented for allowing Haka ala O Kohala to locate the historic Hawaiian sites. I hope they continue to cooperate on the sites."
The EIR states that the recommendations of the consulting archaeologist will be followed and as many of the sites as possible will be incorporated into the resort.

Kelley Pomeroy:
" Deficiencies in the report or discrepancies;pg 19 says 127 sites on page 523 102 sites; etc.."The EIR has many inconsistencies in the number of sites as well as which sites need more study..."they don't quite have it all together".
This statement indicates that the impact on archaeological sites can not be determined until the study is complete therefore this EIR should be rejected.
"If no burials are found in the lower grade sites they are talking about wiping out 7/8ths of the sites"

Historical and Archaeological

John Scovel:
"What happens to sites after survey? My experience in the past has been that owners do what they want to; even wipe out sites.Who is going to police what happens to the sites?"
Audrey Veloria:
"This is what I was meaning when I said that I hoped Chalon would continue to care about the sites.Haka ala has worked very hard and they are beginning to believe that they are going to save these sites for the people of Kohala.Chalon should be the steward over these sites and make some sort of an covenate even a religious covenate that these sites will be protected. Haka ala has uncovered some really beautiful sites. The sites must be accessible. Haka ala has really worked hard with a lot of personal time. The stewardship must be continued."
The above statements indicate that there is no plan for future mitigation of unfavorable impacts on these most valuable historic sites in the EIR. The EIR should be rejected or revised to show how these sites will be protected.

Audrey Veloria:
"I am cocerned about how access will be provided to the Historic Hawaiian sites.This has not been adequately covered in this EIR."

Mike Gomes:
"The 1946 tsunami was not the reason for stopping the use of the Railroad at Mahukona."
The EIR in Appendix D, Introduction, pg. 1."The railroad.... was closed down following the tsunami of 1946 which destroyed sections of the railroad". If this statement is inaccurate it should be removed or furthur explained in the Final EIR.

Socio/Economic

Larry Neff:
"Socio/eco. looks at N. Kohala and S. Kohala as one but those of us that live here know that the impacts are different on the 2 districts."
"They don't really get scientific about labor requirements; there contention is that there is so much going on in S. Kohala that the Mahukona project is just a side issue concerning population growth, etc. so things will happen in N. Kohala irregardless of the Mahukona development."
"Citizen Participation Committee input was not a scientific poll where you can get a plus or minus degree of error so that is why I had a problem with some of the CPC input."
"They don't have a scientific poll of where the labor for Mahukona Resort will come from such as how many people now working in S. Kohala resorts will "jump ship" and move to Mahukona to be closer home in N. Kohala."
"Some of the data and graphs are very good on the future number of hotel rooms ,etc.; but as far as Mahukona and the N. Kohala community and how it is going to impact businesses and the people up here realistically it falls a little bit short there."
The above statement on the overall Socio/Eco. report indicates the need for more accurate scientific data collection and a better evaluation of the Mahukona resorts impact on N. Kohala. This EIR should be rejected or revised.

Mr. Sing:
" My friends from Japan state that Chalon and other Japanese developers in Hawaii have training programs in Japan and these Japanese will come here to buy the condos being built and take the resort jobs displacing local workers.This will lead to social conflict."
This statement indicates a need in the EIR to better address the importation of alien employees(particularly at the management level)and how they will be housed. The EIR does not properly evaluate that impact.

Marian Johnson:
"This EIR has not addressed many social impacts. For instance there are 3 that come to my mind. First: tourists in one's traditional recreation areas. For instance many N. Kohala people work in the tourist industry, yet when they go to Mahukona if the resort is built they won't "get away"even in their own traditional recreation area. This could be cause for resentment.Second: The tourist industry is very recession sensitive. With so many of our people in the tourist industry,recession layoffs will cause tremendous family stress.It will be a disproportionaly large stress in our community. Third: Tourism attracts transient workers. We now have a very stable community; with transients the community losses some of its stability as a result of Mahukona Resort."
The above social impacts have not been evaluated in the EIR and must be addressed in the final draft.

Access

"Parking is too far from the areas fishermen use and no mention of the number of parking stalls has been included in the EIR", local resident and shoreline fisherman.
This is a contradiction to the EIR statement(Chapt. 1, pg. 10, 3.4) Chalon will, "provide better public access to the shoreline", because vehicle access has been provided to this shoreline in the past. This incorrect data,"improved access" must be corrected and addressed in the Final EIR.

John Scovel:
"The old railroad bed or jeep road is still there and has been used for the 13 years I have lived here so why can't we fishermen continue to use it? We have to carry fishing and camping equipment and fish day or night.Is my car going to be safe in Chalon's parking lot?Chalon always mentions easy access. Just leave the old jeep road as it is . We should not have to walk this area.I have close to 200 signatures on a petition in a short time. As the former president of the local fishing club I made this petition simply asking for continued vehicle access on the old jeep road.This road is so good it does not even require a 4-wheel car.Locking the gate and requiring people to check out a key at Chalon's office is not free access especially since I fish day or night and on weekends also."
The above statement contradicts Chalon's claim that they will "provide better public access to the shoreline"(Chl,pg.10) and Chalon's claim that they will supply a shuttle in place of free vehicular access is not an adequate mitigation. The EIR did not adequately poll the users of this vehicular access and should be rejected.

Mr. Sing:
"If the public can't drive the jeep road then this project should be taken some where else."
Again the EIR is in contradiction on "better access" and the statement ,"vehicular access to the shore will be barred ...this could reduce access to the coast by a few current users." indicates inadequate data collection and again contradicts "better public access". This must be addressed in the final EIR.(see Appendix H, Socio-Eco. Impact, pg. 4-6)

Socio/Economic

Larry Neff:
"The EIR states that the N. Kohala School enrollment will not be impacted. This does not seem logical;it is really hard to believe."
This major impact on the already crowded Kohala High and Elementary School has not been properly evaluated and must be addressed with better data in the final EIR.

Joan Ellen McFee
"All data from Citizen Participation Committees and their recommendations and their surveys must be presented." (see attached written Omissions and/or Contradictions)

Larry Neff:
"Need more of an in depth interview of local businesses to get a good idea of the resorts impact for example as opposed to the "library study" type of EIR that PBR has done for Chalon. The interviews of some 50 people were informal(Appendix H, pg. 3-1) and not of a scientific nature."
The above statement indicates that this EIR has not truly measured the Socio/Economic impact and must be revised or rejected.

Infrastructure

Ken Boche :
" The traffic study used was done in 1988. It seems to me that ~~there has been no that~~ their assumption to extrapolate from that at +4%/year is not accurate. More recent data needs to be taken.The EIR needs more recent data on traffic. Impact data on air transportation at Ke-Ahole should be extrapolated from the experience datum when Mauna Kea and Mauna Lani were opened. It is not right without more data to say that no mitigation is needed because there will be no impact on Ke-Ahole Airport. The final EIR should address this."

Kelly Pomeroy:
" The harbors will not be adequate for owners of small boats when the residents at the Mahukona Resort are included. The EIR did not adequately consider this impact."

Ken Boche:
"Mahukona public park is going to be down wind from the wastewater treatment plant so odor could be a problem which is not addressed in the EIR."
Waste disposal; there should be some description of the sewage treatment plant from the standpoint of odor control as well as visual impact in the final EIR.

" The disposal of solid waste should be covered from the standpoint of recycling. Chalon has an opportunity to set an example on recycling and even make it an educational program. A waste stream analysis for a typical resort should be done to facilitate recycling."
The EIR does not properly cover the impact of solid waste disposal and should be revised.
"Energy conservation is not adequately covered and should be in the final EIR."

Infrastructure

Ken Boche

"Concerning police protection, there are studies that show a geometric increase in crime with a rise in population."
This data has not been adequately covered in the EIR which must be revised.
"Will there be fire insurance available on the resort residences because most insurance companies vont insure residences more than 5 miles from a fire station."
This question must be addressed in the final EIR.
"Health care, again the population data is not there so it is difficult to assess the impact. The same is true on school facilities and recreational facilities."
Population impact data must be developed in the Final EIR.
" How are the sewage waste waters from the 170 residential lots being dealt with- cesspools or what system? Can the grey water such as shower water be dealt with separately?"

Kelly Pomeroy:
" There should be a firm commitment in the EIR concerning energy conservation - not just statements like "We could do this or that"; something credible should be put in the EIR concerning solar water heating."
" Concerning grey water current building codes disallow separate grey water systems but they could lobby for an experimental permit to test this."
Conservation measures have not been properly addressed in this EIR and must be in the final draft.

Martin Halbritter:
"Concerning water, I'm the last meter in Kokoiki and there just isn't any water there at all."
The EIR is inaccurate about the potential for the present Hawi water system to provide adequate water for the resort and must be revised.

"Concerning fire protection; if there is a medical emergency the fire department would have to break off any fire fighting."
The EIR is inaccurate in stating that there is 24 hour fire protection (due to the lack of skilled fire engine operators) and must be revised or rejected.

John Scovel:
"Inadequate water pressue and delivery now in Kokoiki indicates inadequate pipe size or delivery to supply the resort on this antiquated system."
The revised EIR must address this problem.

Paul Gomes:
"The problem of increased traffic on the scenic Kohala Mountain Road (250) has not been properly addressed and should be."
? :
"Impact of increased traffic on the main intersections at Hawi and Kapaau has not been properly addressed. What sort of mitigation measures will be required?"

Infrastructure

Toni Withington:
"Concerning traffic the EIR conclusions are based on a lot smaller number of units than the current estimate. Channelized intersection at Mahukona is inadequate in that only a 2 car holding area is provided for Akoni Pull Highway traffic coming from the South and turning into the resort."

Paul Gomes:
"The risk of a stray golf ball hitting a car on the Akoni Puli Highway has not been properly addressed."

John Scovel:
"This traffic data was taken from a 1988 study. This study is out of date. My check at the Hawi intersection during the same rush hour period is as follows:

	1988	present
North bound	195	396
South bound	145	310

Hawi is the bottle neck for the Akoni Pull Highway (270). How can they bring more people into the area under these conditions?"

Toni Withington:
"This traffic report assumes a +4%/year which is low considering ~~the population~~ the population figures in the report."

All the above comments on traffic as an infrastructure ~~impact~~ impact indicate that the EIR does not accurately measure the traffic impact and should be rejected.

Kelly Pomeroy & Toni Withington:
"The impact of utility poles and lines coming from the Kohala Ranch substation to Mahukona has not been properly addressed from the vista standpoint and must be addressed in the final impact statement."

Socio/Economic

John Scovel:
"The EIR is full of promises to assure public access and increased recreation for the public but Chalon's present actions such as locked gates on formerly open access and barbed wire fences through the shoreline into the ocean have decreased public access and recreation so I can't believe their promises."
The final EIR must fully describe and guarantee how access and public recreation opportunities will be provided or this EIR will not provide decision makers with adequate information on recreational impacts and therefore should be rejected.

Vicki Komotani:
"Concerning the 170 residential lots, how is their impact addressed in the EIR and will there be C.C.&Rs to control adverse impacts of these lots and houses? The final EIR should address this impact."

Dan , :
"Their statement that local residence ~~land~~ taxes will not increase as a result of the resort does not agree with what has happened in Puako since resorts were built in that area."
The problem of residential ~~land~~ taxes increases and the resorts impact on them should better evaluated in the final EIR showing comparative data in the Puako area.

John Scovel:
"I want to compliment Chalon on their willingness to be open to discussion on access problems some of which are being worked out."

Mahukona Lodge EIR
Chapter IV
5. Socioeconomic Impacts

Frank Johnson

5.4 Employment and Labor Supply Impacts; 5.4.4 Mitigation Measures, pg. IV - 63, (5) "At present , in response to community desires, Chalon is planning to build only enough affordable housing to meet the existing needs of current community residents, with no regard to whether or not these residents will work at the Mahukona Resort." This statement omitted the fact that Chalon will get "affordable housing credits" to qualify them for County and State permits required for building future resorts such as Mahukona Resort. Again, this EIR should be an EIS covering all the impacts of Chalon's Master Plan so decision makers will have the "total picture" on community impact.

Appendix H, Socioeconomic Impact Assessment
4.7 Impact on Property Values and Development; 4.7.2 Property Taxes, Impacts of Chalon's new residential projects, pg. 4 - 38. "...new housing would slow the rate of increase of nearby property values..." pg. 4 - 39,"...could affect amenities...if views and/or noise levels change markedly." "Potential impacts on properties immediately adjacent to new multifamily housing projects could be partly mitigated through careful design and management of the site." Again, since these multifamily units in Havi will be part of the "affordable housing credits" for Mahukona Resort there should be an EIS covering all of Chalon's Master Plan. The mitigation for new housing impacts is inadequate and incomplete and this EIR should be rejected. For instance no evaluation of this Havi housing impact on inadequate infrastructure (highways, drainage,fire protection, water supply, etc.) is included.

Affordable and/or employee housing omission.
The EIR does not address the location of employee housing at Mahukona in conjunction with resort development. This would mitigate the adverse impacts of new housing developments on existing neighborhoods such as Havi. It would enable the housing to be used by employees only. This should be addressed in the Final EIR.

Appendix H Socioeconomic Impacts
3.0 Community Issues and Concerns,3.3.1, pg. 3 - 11
Three paragraphs on the bottom of page 3 - 11 refer to the Citizen Participation Committees. The members of these committees should be listed including the following:

1. How long they remained on a committee.
2. How long they have resided in Kohala.
3. Were they or are they now employees of Chalon or a paid consulting firm.
4. What projects associated with Chalon's Master Plan did they (CPC members)choose after lengthy discussion;actually choose. Which projects did PBR and Chalon actually choose and merely present as a "fate accompli" for their rubber stamp approval. Chalon's publication Highlights of the CPC Recommendations should be included. The final EIR must include more information on the CPCs or be rejected.

Mahukona EIR Draft

Frank Johnson

Chapter VI Infrastructure and Public Facilities, 6.7 Electrical Power and Communications, pg. IV-93
There is a major omission in the electrical power section. Who bears the cost of the long transmission of electric power from the existing Kohala Ranch Substation to the Mahukona project is not revealed or discussed. Do all the HELCo customers on Hawaii bear the cost or does the developer pay the cost. The people of Hawaii and decision makers must know the full impact of this major expense. This EIR should be rejected or revised to include the cost of electrical transmission lines.

Chapter III Natural Environment, 3.3 Marine Environment,3.3.1.3 Endangered/Threatened Species, pg. IV-23
"Algal species known to be important forage for green turtles, such as .....Pterocladia capillacea are vitually absent in the study area...." This statement is in direct conflict with the other Mahukona "resort" (Mahole,Inc.; Wellington Chu) EIR of September 1981, which states under Benthic algae,page V-32:"Pteorcladia capillacea....form dense algal fringe at zero tide level." This contradiction must be addressed in the final EIR or the EIR should be rejected.

Omission and/or Contradiction

Need: The North Kohala Residential Development Status Report prepared by PBR for Chalon is not included in Appendix A , V Residential Lot Market Assessment. This Status Report indicates that 95% of the 4,055 units planned are projected to sell in excess of $300,000.00. This is also a 310% increase of residential lots in N. Kohala. This data indicates that there is no need for the residential lots proposed by Chalon at Mahukona in this EIR. This EIR does not disclose all impacts on residential lot marketability and must be rejected or revised. (See attached copy of PBR status report.)

Need: "Hawaii Business" magazine on page 172, August 1990 states as follows,"...Hawaii's hotel inventory, particularly in the upscale segment, will dramatically increase, outdistancing demand for a time.....representing an annual increase of 20%. By comparison, in the last 14 years, this primary luxury category posted gains in demand of only 5% annually."
The EIR in Appendix A, IV Lodge Market Assessment, does not adequately assess the lack of need for more luxury hotel units such as the above data indicates and should be rejected or revised. Also, the socio/economic impact of failure or bankruptcy on the N. Kohala community has been omitted and should be included in the final EIR.

Mahukona Lodge EIR   Marian Johnson

Infrastructure

Appendix J: Traffic Impact Analysis Report, Existing Conditions, pg. 2

The existing conditions are out of date being based on a study done in 1988 with only a +4% / year increase in traffic. Also, the Traffic Forecasts, pg. 4 & 6 do not take into consideration the increased tourist traffic(generated by Lodge guests) impact on Hawi Hill Road, State Hgwy. 250, which is a substandard 40 ft. right of way with no pedestrian walkways. Two pedestrian/auto fatalities have already occurred there. The scenic aspects of the drive over the Kohala Mountain on 250 attract a heavy tourist traffic component. The combined increase traffic flow through the Hawi intersection onto hgwy. 250 by all the proposed S. Kohala resorts must be considered in conjunction with the Mahukona Lodge. This EIR Traffic Impact section is inaccurate, inadequate and out of date and therefore this EIR should be rejected or revised.

Chapter 1, Introduction and Summary

7. Summary of Compatibility of Land Use Policies and Controls, pg. 1-16. ".....the proposed project will be consistent with...the regional plans applicable to the project area." This project is not consistent with "The West Hawaii Regional Plan" which recommends confining all resorts to existing resort nodes. Mahukona is outside the existing resort nodes (see pg. 2 The Vision for West Hawaii, "Ensure the clustering of resorts in order to minimize public service costs.") This EIR does not properly address the location outside the resort nodes and should be rejected.

Also, this project is not consistent with the "Hawaii Coastal Zone Management Program." For example in the CZM Chapter IV, page 13; 3. The authority will seek to minimize, where reasonable:

C. Any development which would reduce or impose restrictions upon public access to....the mean high tide line." The Mahukona EIR states that vehicle access will not be allowed to the shore (App. H, 4.0 Socio-economic Impacts and Mitigation, 4.3 Shoreline Access and Recreation, pg. 4-6) "Vehicle access to the shore will be barred .....This could reduce access to the coast for a few current users." This EIR is in conflict with the CZM and should be rejected.

Also, in relation to the CZM; 3. D, pg 13;"Any development which would substantially interfere with or detract from the line of sight towards the sea from the State Highway nearest the coast." This EIR should be rejected for not complying with the CZM Program.

prepared by RBIC
for Chalon

NORTH KOHALA
RESIDENTIAL DEVELOPMENT STATUS REPORT

Development	Type of Unit Sales	Total No. of Units Planned	No. Units Currently Available	No. Units Sold to Date	No. Lots With Homes Built	Proposed Sales: Present to 1990	1991 to 1995	1996 to 2000	2001 to 2005+	Comments
1. Akeakes (Chalon)	Lots 10,000 sq.ft.	165	0	Phase I 108	44	Phase II 65				10 lots of Phase I and 7 lots of Phase 2 for self-help housing. Price Range: 137,500-155,000
2. [illegible] (Hardy Richards)	[illegible]	564 (Est.)				[illegible]				Project [illegible] Recently received GP approval
3. Lapaana (Chalon)	Lots 1 acre	170	0	0	0		170			Received zoning/subdivision. Extension requested by Chalon to revise development plans.
4. Kohala-by-the-Sea (Marci Johnston)	Lots 1 acre	73	25	18	0	54				Waiting for infrastructure before homes can be built. Received zoning; yet to receive final approval
5. Kohala Estates (Oxford First)	Lots 3-5 acres	105	0	105	35	Sales Completed				Project opened in mid-1970s, resales now. Sales dropped because of water shortage. Phase 1 of Kohala Ranch, changed name
6. Lahuia Shores (Kohala Joint Venture)	32 acres Total	420 Multi-family				Unknown				Project has not yet been developed. Land is on market. No water commitment
7. Kohala Ranch (Mike Pruhoroff)	Lots	1,967	54	333	30	0	100	Unknown		Project expected to be built out in 2009.
Heathers I	3-10 acres	233				Sales Completed				
Meadows II	3 acres	154				80% sold				
Highlands III	5 acres	100				Being Planned				
Village IV	Mixed Use	1,480				Recently received GP approval for low/medium residential development				
8. Maliu Ridge (Chalon)	Lots 1-4 acres	170	0	Phase I 57	16	Phase II 56	57			Phases 2 & 3 in planning process. Phase 1 complete. Price range: $50,000-180,000
9. Puakea Ranch (George Isaacs, Jr.)	Lots 10 acres	40	0	40	8	Sales Completed				Project opened 3 years ago, sold out. Resale now of 10-acre lots. Price range: $250,000-$410,000
10. Waiwailani (Clint Williams)	Lots 3-10 acres	89	0	46	0	43				Project is on hold pending litigation. Price range: $89,000-$147,000
11. Kohala Hawaii (Dolly Dahlberg)	34.2 acres Total	418	0	0	0	Unknown				Retained resort zoning several years ago. Multi-family condos. Land currently on market.
12. Niulii (Helene Solomon)	Apt.	3				3				In planning process. No. of bedrooms not specified
Totals		4,178	79	700	123					

minus units built -123

4,055 units planned

of these:

3,861 units projected to sell in excess of $300,000 or 95% of new units

194 units projected to sell below $300,000 — 5% of new units

Only 42 units projected to be "affordable" ——— 1%

N. Kohala now has 1,260 units. An increase of 4,055 units represents 310% increase

Mahukona Lodge EIR Marian Johnson

Chapter 1 Introduction and Summary, 1-5, pg. 1-3; "....Chalon has participated and worked with a Citizens Participation Committee (CPC), comprised of residents of the North Kohala area, in the development of its concept for the proposed project." The creditability of CPC input is questionable because:

1. The names of CPC members are not listed. We know nothing of the population of "said" committees.
2. CPC survey data (questions & responses)is not all inclusive therefore conclusions presented in the EIR can not be proved to be valid.

These CPC omissions in the EIR must be included in the Final Draft or rejected in order for decision makers to arrive at informed conclusions.

Chapter IV, 3. Natural Marine Environment 3.3 ,3.3.1.3, Endangered/threatened Species, pg. IV-23.

"There are no known incidences of humpback whales coming inshore at the project site." My students at school have often reported being in the ocean or on shore when the whales are close in to shore. They have been so close while spear fishing that they were frightened. They have heard the whales songs in the water. This EIR should be revised to reflect the fact that whales do come inshore at the project site.

VII-91

COMMENTS ON MAHUKONA EIR BY KELLY POMEROY 9/90

This EIR is a testament to the inappropriateness of having environmental impact documents contracted for by the developers whose projects they purport to evaluate. No report prepared by a competent and impartial body would seriously claim that a project which it estimates will add 1400 new residents to the island (p.I-10) would have no significant impacts on traffic (p.IV-85), present police and fire protection (p.IV-95), health care services (p.IV-96), educational facilities (p.IV-97), or landfill use (p.IV-93). The fact that this report makes such claims casts serious doubt on its favorable assessment of the ratio between public revenue and public expenditures.

Those examples are indicative of a general unwillingness on the part of the report's authors to acknowledge cumulative impacts. Along the same lines, they state that the population growth which this project would generate is compatible with goals set in the Community Design Plan of 1984 (p.IV-69)...as though Mahukona would be the only source of growth in North Kohala. This is, of course, very far from the truth.

The report repeatedly trivializes potential problems through unsubstantiated claims amounting to little more than window dressing. Platitudes such as "a meeting place where diverse cultures can gather to interact and communicate to foster greater international understanding" would be omitted from a truly impartial assessment of impacts, along with the the suggestion that "the project will aid in the development of better relations and mutual sensitivity between visitors to the lodge and residents of the project and nearby communities through the development of a mutual respect for each other's knowledge regarding boating, fishing, diving and other water oriented activities". Assertions like these should be supported by data from studies of comparable developments elsewhere, or left out.

The possibility of impacts to the fisheries are dismissed with the statement that "it is presumed that resident as well as visitor recreational fishermen would practice appropriate conservation measures and only take that which is required for their own use and enjoyment" (p.IV-25). It is proposed that marine resources could be protected through educational signs and displays directing the public's attention to the need to protect our natural resources (p.IV-26), but no evidence is cited for the effectiveness of such measures.

Various means of mitigation are suggested throughout the report which the developer has apparently made no commitment to, and where there is no way of knowing whether they will be implemented. These range from such things as a resort-supported child care center (p.IV-76) to engineering studies "to determine the possibility of utilizing solar and/or waste heat recovery systems to lessen electrical demands" (p.IV-94). It is not clear why engineering studies are needed to determine the possibility of utilizing such well-proven technologies. If energy conservation is a priority for this developer, why doesn't he simply state that these kinds of heating/cooling systems will be used in the hotel, and required by covenant in the private housing?

An area where the developer could make a meaningful commitment to mitigation measures but declines to do so is in the left-turn lanes that will be needed

to facilitate ingress and egress. The careful circumlocution on Page IV-84 gives the impression that Chalon will do only as much as it is required to by public agencies. Experience with Kohala Ranch, where the mauka entrance is not suited to the planned level of development, suggests that this is not necessarily adequate.

Other examples of the PR nature of this document include the contention that the project would increase the "agricultural" use of the property because it includes a golf course (p.V-4), the assertion that building yet another resort will serve the State's objective of a more diversified economic base (p.V-9), and that going ahead with the development would be maintaining open space (p.V-19).

More puzzling are assertions that the character of the development would "reinforce and extend the existing character of Kohala" (p.III-1), that it would "increase the opportunities to control the working conditions of the businesses that would service the project" (p.V-8), and that it would "expand an existing market and penetrate a new market for Hawaii's products and services" (p.V-8).

The report offers the questionable proposition that extensive landscaping will mitigate the visual impacts (p.IV-10), and totally ignores the visual impact of stringing overhead electrical wires the ten miles or so from Kohala Ranch. It doesn't even consider the possibility of a cluster or planned-unit development to lessen the overall extent of the project so that a visual buffer of natural landscape could be maintained along the highway.

The report views the project as an excellent opportunity to assist in supporting West Hawaii's forecast residential/recreational/educational/ commercial facility needs (p.III-10) without pointing out that it would generate its own demand for its housing product, thus merely adding to the projected population level, and would increase some of those needs.

The report repeatedly touts the increased recreational opportunities the project would entail. It sees them as a real boon to the community, and as freeing up public funds for other uses. But in fact, it's unlikely that many current North Kohala residents could afford to use the recreational facilities, even if they felt comfortable doing so. It's clear that the hotel will not want their luxury-resort guests and private owners to have to share their golf, tennis and swimming facilities with a lot of people of lower socioeconomic class. Indeed, such sentiments may be one of the motivations for their determination to cut off traditional vehicular access along the coast, in defiance of court decisions.

Despite this attempt to limit vehicular access, the report asserts that the project would increase public access. The apparent contradiction in this is not explained.

If residents outside the project are to benefit from the new recreational facilities, it will be from other upscale developments in the district. But most of these will be closer to the many facilities in South Kohala than to Mahukona. The largest such development, Kohala Ranch, will have far more recreational facilities of its own than this project will provide.

This is not to say that the more affluent residents of the disrict would not benefit from the new recreational opportunities and dining choices. But these advantages need to be viewed in their proper perspective, and not blown out of proportion.

Provision of new meeting rooms could be a real benefit to the present community, but the number, cost and future availability of such facilities are unknown.

The potential for the project to stimulate other development of the coastline and of the district in general--and in particular expensive development--has been underplayed. The fact is that urbanization begets urbanization, and this effect should not be shrugged off. In the absence of controls on further development, the project would be a major threat to the lifestyle of North Kohala.

The electrical lines referred to above would not only have significant visual impact, but would be a spur to development along much of the coast.

The greater the amount of expensive housing in North Kohala, the greater will be the pressure to add other similar developments, and the greater will be the increase in land prices and taxes on existing properties. The greater also will be the erosion of the rural character of the district which is so cherished by its residents. The potential for saturating the market is not the same in Hawaii as it is in less dynamic communities on the Mainland--especially with our greater proximity to the Japanese market.

The rosy scenario which the report paints of the community living together happily ever after masks the real and grimmer picture of increasing polarization between the affluent newcomers and the less advantaged local families which will serve them. This breakdown of present relationships will undoubtedly herald increases in racial tensions and crime.

Nor does the report address the possibly disruptive impacts of an influx of transient male construction workers and other outside labor into a settled, family-oriented community.

The report does not mention the discussions in its own CPC of alternatives to the Mahukona development which could provide a greater number of daytime jobs, or the potential economic advantages to themselves, the Big Island and the State of leaving an undeveloped coast in North Kohala.

Another consequence of the development which has been overlooked is the hemming in of Mahukona Park, such that there will no longer be an option of expanding it in response to future needs. This could be especially unfortunate if rising sea levels induced by global warming reach significant proportions in the coming decades.

Conflicting information is given on archaeological sites. The two maps following page IV-27, for example, do not quite agree. Note the relative placement of sites 77 and 79 on the two maps, or the location of site 1 with respect to the southwest boundary of the property. On page I-9 the report says there are 127 sites with 300 features. On page V-23 it says there are 102 sites with 223 features. On page V-26 it says only one site needs more study. On page V-23 it says 46 sites need more study. On page I-9 it says 56 sites need more study.

Part of this disparity probably stems from the fact that local residents

discovered a number of sites--including some rather significant ones--which Chalon's hired experts had missed. Since the local group indicated they had not had time to survey the Kapaanui portion of the project, it seems premature for Chalon to be discussing specific plans and presenting maps for that area.

One point that should be noted is that the project will destory 3/4 to 7/8 of all archaeological sites on the property. This can be derived from the figures, but it is never actually spelled out. Apparently this is considered an acceptable loss, given the quality of the sites. Nonetheless, it should be recognized that the project proposes to permanently alter a very rich archaeological area.

The report is extremely manipulative in its treatment of the relationship of the project to public documents and community sentiments. Not only are impacts ignored or distorted, but the objectives of the various policy documents are so interpreted as to make this project sound as though it was taylor-made to fill every public need and desire.

For example, on page III-9 the statement is made that agricultural use of the property would be inappropriate--among other reasons, because it would be inconsistent with the General Plan designations for the area. Yet agricultural usage would be consistent with the State land use classification, and resort usage would be inconsistent with it.

Chalon claims that it does not need any change in State land use classification, but this is clearly false. It can only avoid getting such a change if its project is less that 15 acres in size. But according to the General Plan, a resort cannot be less than 15 acres.

No mention is made of the fact that the State Legislature and the Planning Comittee of the County Council have both passed resolutions calling for protection of the North Kohala coastline. The State resolution specifically calls for efforts to stop development makai of the highway along the district's leeward coast. The State and County Democratic party conventions also unanimously adopted a resolution to protect this coastline, and about six thousand people have signed a petition to similar effect. None of this is even hinted at in the EIR.

The fact that Chalon met with members of the community is not proof that the community approves of this development. The CPC subcommittee on natural resources recommended against the project, but the EIR does not acknowledge this fact.

On page III-3 it is claimed that the community felt the density of the original Kapaanui subdivision was too high, and it would be better if the parcels were spread out over a larger area. This assertion is based on the most tenuous of evidence.

The announcement of the Kapaanui purchase was made after 10:00 p.m. at the end of a long CPC meeting, when everyone was tired, and some people had left. The news caught those present off guard. When Chalon asked the group if they didn't think it would be preferable to have the lots spread out more, two or three people responded that they supposed so--though one of them added, upon reflection, that maybe it would actually be better to have the project more compact so it wouldn't visually affect as long a stretch of highway. Everyone else was too numb by then to respond.

This is what Chalon takes as its mandate from the community to build its agricultural lots around a golf course. Again, they do not consider the possibility of going for a planned-unit or partially planned-unit development, so they could have their residence-surrounded golf course in a smaller area, possibly more out of sight of the highway, or in a more open, less cluttered configuration.

No discussion is included in the EIR of the possible effects of a recession in the economy.

Aside from these broader areas, the following comments could be made:

Page II-1 indicates that the conservation district is a band about 300 feet wide. This makes it sound more protective of the natural environment than it is, because it veers toward the coast in the hotel area, and the some of the facilities appear to be only about 75 feet from the water. This also raised questions about tsunami hazards, which may have been too hastily dismissed on page IV-8.

On page II-9 (and elsewhere) it is stated that this is to be a retreat-type resort. This is a poor choice of terms, as "retreat resort" is a General Plan designation which does not fit a development of this size.

The statement on page III-10 that alternatives to the proposed project would "have less expansion capabilities" should be explained. The references to "potential adverse...regional traffic patterns" and "construction phasing problems" of any alternative configuration of the site are also unclear.

Page IV-6 claims that storm water would be filtered as it passed through the soils, but the next page indicates that dry wells would be utilized throughout the residential areas to control heavy runoff. This raises the question of how effective the filtering effects would be in an underground injection system.

The reference to architectural style and visual blending on page IV-10 are reminiscent of the "Kohala Ranch Philosophy" of earth tones and low profiles. Yet this supposed philosophy has not prevented scarring of the visual landscape at Kohala Ranch with highly-obtrusive and claustrophobic white rail fences and massive structures. It would be more reassuring if this section included a stipulation that all structures, including fencing, would be of earth tones, and if a more definite height limitation from finished grade and/or relative to the highway were spelled out. (A planned-unit development might obviate the need for fencing, further enhancing the feeling of openness.)

Marine sedimentation is discussed on page IV-24, but the effects of wind-blown dust are not addressed. There have been some notable dust storms in the district as a result of construction activities, and some people feel this can be a significant source of deposition onto reef habitat. Because of this, it would be desirable to deal with the issue.

On page IV-25 there is a series of statements about the benign effects of golf courses. But in each case there is a caveat about the need for proper management. There is no estimate of the frequency with which lapses in

proper management are to be expected or what the results might be. (When ships and hoses are properly managed, we don't have oil spills, either!)

The discussion of labor doesn't provide a breakdown of managerial vs. low-echelon jobs, or day work vs. shift work. The admission is made on page IV-58 that managereal staff would come from outside the district, but this reality it not reflected in the glowing descriptions throughout the report of the job opportunities that the project would open up to North Kohala residents.

On page IV-75 there is a reference to Section 4.4--which does not exist.

The statement on page IV-86 that there would be no impact on small boat harbors is difficult to credit. If there are some 360 people on waiting lists for moorings in North Kona and South Kohala, and only 265 additional moorings planned, and a considerable number of affluent new residents to be expected in the area, a luxury residential project at Mahukona could not help but increase demand at Kawaihae, in spite of launch facilities at the project site. And demand is impact.

The promise on page IV-88 to regulat nighttime activities--which presumably would include both guests and residents--does not sound practicable.

On page IV-89 the figure of 26.7 million gallons per day is given as the capacity of the Kohala ditch. If significant repair work would be required to bring the ditch up to this yield, this should be specified.

The discussion of sewage treatment on page IV-91 does not address possible episodes of undesirable odors, and it does not deal with sludge disposal. The ensuing discussion of trash disposal does not specify where solid waste from the resort will be taken. If it is to the transfer station in Hawi, there will be traffic impacts on the one-lane residential road which the trucks will have to negotiate.

The reference to "future zoning requests" on page V-10 should be clarified.

The response at the bottom of page V-14 does not go with the objective above it.

It does not make sense, on page V-18, to speak of upgrading and improving the quality of facilities in an area where they are now lacking.

It is claimed on page V-20 that infrastructure for the project would be provided by Chalon at no cost to the state or county. This would be the case only if it were correct that 1400 people would have no impact on state and county services. Obviously this is not true.

Page V-21 states that this EIR will allow extensive review by governmental agencies and the general public. A project of this scope should have to go through the procedures for a regular EIS.

The report asserts on page V-25 that increasing the number of jobs improves the quality of life for workers and families. This is no longer true for West Hawaii as a general statement. The biggest adverse impacts the region will experience in the next decade or two will stem from the need to import thousands of new workers from off-island and out of state.

The statement on page V-31 that the project will add to the variety of primary job opportunities is not demonstrated.

The claim on page V-40 that few employees are likely to leave their jobs in South Kohala negates the main benefit claimed for the project: elimination of the half hour commute.

The report authors would be well advised to change the word "businessmen" on page VI-3 to "business people".

It seems strange that the Waimea Library didn't receive a copy of the EIR, per page VII-3.

"Citizens for Protection of the North Kohala Coastline" is the correct form for page VII-5.

Appendix A refers to 250-300 units, and villas of 4 to 8 units each. The main report speaks of approximately 345 units, but the map shows insufficient 4-to-8 unit villas to total this amount.

It seems as though the market for lots will be greatly affected by where they are marketed, and there is no discussion of this. It seems likely that they will be heavily marketed in Japan, and the report notes that the number of Japanese resort lot owners is increasing and Japanese tourism to the Big Island is increasing. One therefore wonders how accurate it is to say that Hawaii and the Mainland will be the largest market for lots in this project. Greater Japanese participation will further escalate land prices in the district.

The percentages in Exhibit V-J in Appendix A don't add up. In Exhibit IV-I, the figures for single-family residents are unclear. The first two columns are unlabeled and can't represent minimum and maximum values.

In Appendix B it is not clear how the researchers covered the terrain in the botanical survey. Some statement should be made as to how seasonal variations would be likely to affect the inventory, and how recently it had rained.

The statement on page 39 of Appendix D, that little recreational use of the project site was noted during the marine survey, should not be taken as an indication that Mahukona is not a popular recreation area for district residents. The field work took place on Thursday through Saturday, two weeks before Chirstmas weekend.

The marine survey gives the rainfall at Kawaihae as "250 millimters" or 0.98 inch per year". The drought situation at Kawaihae is not as dire as that; someone just got their decimal point in the wrong place when they converted from millimeters to inches.

In appnexdix F on page 2, the project area is described as encompassing approximately 625 acres. There is no explantaion for the discrepancy between this figure and the 490 acres in the main text (p.I-1).

* * *

I did not have enough time to finish reading the last two appendices, so I will end here. I would just like to reiterate that I feel an EIS should be initiated with respect to this project and the master plan it relates to. And I would hope to find in the revised document a more professional-sounding and impartial tone, with the impacts more fairly assessed. Only then will we be in a position to really weigh the pros and cons of the proposed development

MAHUKONA LODGE E.I.R.

CHAPTER IV

2 Physical Evironment

Pages IV 6&7

Scientific data on the ability of the on site "thin soils" (page IV-2) to absorb and retain sewage effluent, fertilizers and biocides must be presented to prove that this thin soil layer will actually absorb and retain those pollutants to protect the basal ground water lens and the pristine offshore marine waters.Base line data on the present condition of the basal lens water must also be developed. Until these data are developed the EIR is inadequate and must be revised or rejected.Also this thin soil layer will be removed and altered by site preparation excavation and grading.

On site storm rainfall data is not considered (IV-5). The weather data from Upolu Point Coast Guard Station and Kawaihae should be collated. The fact that heavy "Kona Storm" rainfall would affect the surface runoff and soil percolation has not been properly addressed. On site soil infiltration rates should be studied to facilitate adequate erosion control and to avoid water pollution. Until this data is developed the EIR is inadequate and should be rejected.

The EIR does not address the problem of "dry wells" penetrating the "thin soil" layer that is supposed to absorb pollutants from the effluent, fertilizers and biocides. " Dry wells" could actually add to basal lens and marine water pollution. "Dry wells" are not an adequate mitigation measure to avoid water pollution and this EIR is inadequate until a better solution is presented in the final EIR. Also "sand filters" (page IV-6) do not absorb dissolved pollutants such as nitates,etc. and are an inadequate mitigation for filtering storm waters.

2.3 Natural Hazards

Page IV-8

Tsunami runup information (1946 wave) should be obtained from local witnesses rather than assume it would be the same as at Kawaihae. This tsunami impact must be better evaluated in the final EIR.

J.T. Johnson

MAHUKONA LODGE D. I. R. Draft

CHAPTER IV

2.4 Visual Attributes

2.4.1. Graphics should be presented in view photographs (figures IV 3 A,B,C) to demonstrate what the views would be like after development of the project. Also views from areas most used by the general public (Mahukona Park, Mahukona Harbor and mauka from Akoni Puli Highway) should be included. The actual building heights must be stated and reflected in the graphics. This EIR is inadequate in demonstrating visual impacts so th>t decision-makers can make an informed decision.

This EIR omitted a resolution passed by State Legislators in 1988. This concurrent resolution #179 "urges the state and county government to ensure that the public view and open space makai of the Kawaihae-Mahukona-Hawi Road be preserved". The Mahukona Lodge Resort is in direct contravention to this resolution. The impact has not been properly addressed in this EIR and must be included in the final EIR in particularly with respect to the impact on tourists driving this highway.

3. Natural Evironment

Page IV-25

5. The EIR states ,"the weight of scientific evidence supports the use of properly treated effluents in the irrigation of golf courses". This statement fails to address health problems actually experienced on Oahu in the Hawaii Kai neighborhood from sewage effluent being used to irrigate the adjoining Hawaii Kai Golf Course. Therefore this EIR is inadequate until actual health problems such as the above addressed and included in the final EIR.

over

3. The "avoidance of watering will result in little or no risks to the surface and coastal waters contamination." is an impractical mitigation measure in an area with intense and unpredictable "Kona storm" rainfall. Until a better mitigation measure is developed to control irrigation prior to rainfall this EIR is inadequate and must be revised or rejected.

Not Addressed

A. A sewage effluent, basal groundwater and near shore marine water pollution monitoring system by an unbiased, independent third party must be established to protect the environment.

B. The potential environmental impact of Mahukona Properties development in this same general area must be combined with that of the Mahkona Lodge and addressed in this EIR. This is particularly important in relationship to the Lapakahi Marine Reserve which is in between these two developments.

This EIR is inadequate until the above measures are taken and should be revised or rejected.

A.F. Johnson

VII-96

Comments on the Mahukona EIR Draft Joan Ellen McFee

Omissions And/or Contradictions

1. A. Over and over throughout the EIR reference is made to the Citizen's Participation Committees (CPC) and recommendations of this group. No where in the document is a list of members. The make up of the membership should be broken down as to the group they were representing , how long they have lived in Kohala, etc..In Appendix A, under H Social Impact... the 50 key informants interviewed for community issues and concerns are listed, so there is a precedent set for this CPC list to be included.

B. Since the recommendations of the CPC are also cited numerous times throughout the EIR, the list of CPC recommendations should be included, along with the shorter form, edited by Chalon and titled"Highlights of the CPC Recommendations" These were made available at the Chalon office so copies should be easy to get. Appendix H 3-19 mentions the CPC at length.

2. In Chapter IV-50 two surveys done by the CPC are mentioned. Copies of the survey are not included in the EIR, only the evaluations of them. Any survey or document used or quoted should be a part of this document. There is a precedent in the EIR in Chapter V (5.4.3.1) Qualitative Analysis. "Kohala personnel, union reps., etc.were interviewed to determin probable answers to the following questions: Four questions page IV-58 thru IV-60 are listed including an interpretation of answers given.

3. The North Kohala Master plan is mentioned over and over. The EIR says essentially that this Mahukona project will provide economic returns that will enable Chalon to proceed with the Master Plan.Even though they say the Master Plan is not complete and final; what is known of this plan should be included in the EIR. Public presentations and brochures have been given by Chalon.

If the Master Plan and Mahukona resort are as intertwined as Chalon says then maybe the Mahukona Project approval should be held up until the entire plan can be reviewed. Statements from the EIR that substantuate this position are as follows:

Appendix H,4-1, pg. 4-2; Impacts Following from Implementation of the North Kohala Master Plan.

Appendix H, 4-1, page 4-2; "However, since many elements of the Master Plan do not generate income, according to Chalon the Mahukona Resort is necessary to pay for the various other community benefits...."

In summary on the above points this EIR does not measure all impacts and should be revised or rejected.

issio d/or radi s n El Fee

4. Golf and Recreation Facilities and Contradictions

Chapter I, 2-1,page 1-4: Project Description, Background and Objectives.
The proposed project has been planned....
(3rd on list) "To provide additional public and private recreational opportunities (golf & tennis) in N. Kohala area to complement existing facilities...."
Appendix A Market Assessment
Interrelationship of Resort Community Facility Elements page IV-8; "Golf and tennis and other recreational facilities would be available to Lodge guests and resort community members, and could be provided on a membership basis to regional residents."
Appendix A- Golf Course Market Assessment
Page VI-7; Off resort visitors are projected to represent about 20% of daily rounds from 1995 to 2002. It may become necessary to limit off-resort visitor play as club members and Mahukona visitors and residents play increases.
The contradictions on the public use of recreational facilities in this EIR must be clarified so decision makers can fully evaluate its impact on the community.

5. Appendix A,Golf and Recreation Facilities

•Opportunities exist for :
"an outstanding golf course as the predominate landscape element with a number of ocean front holes."
Throughout the EIR Chalon says they will not infringe on the Conservation area. How does this line of thinking fit in?
The EIR does not fully address the impact on the conservation zone and must be revised or rejected.

6. Omission of a Pertinant Fact

V-1, Exhibit V-A; Residential Lot Market Assessment
Maliu Ridge is mentioned along with several other projects but no mention is made that it is owned by Chalon. Surely, Maliu Ridge phase II & III are part of the Chalon Master Plan and it is also a probable competitor to Mahukona. In terms of Chalon's desire for economic return, Maliu Ridge II & III are surely part of that. Phase II & III's future is not mentioned and should be in the final EIR.

VII-97

Omissions and/or Contradictions Joan Ellen McFee

7. Shoreline Access

Important facts are left out and many contradictions exist in the EIR on Shoreline Access.

Example 1. Chapter 1, page 10....
under 3.4 Socio/Economic Factors
"The analysis also indicate, with specific regard to the proposed project, that the project would have a beneficial effect on Mahukona Park and Harbor by improving access and use of the facilities to the general public; provide better public access to the shoreline and improve lookouts and scenic points....

Example 2. Appendix H, Shoreline Access
Page 3-10; "Chalon has said it is commited to maintaining public access."
"Interviewees concerns about resort limiting public access through control of the roads and parking...limited parking at Mauna Kea was mentioned."
Figure II-6; The map of the project shows :
Proposed shoreline access easments - 3 places
Proposed beach access easements - 3 places
Beach parking - 1

Contradiction:

Appendix H, page 4-6, Shoreline Access
"The coastal area will be left open - all structures will be set back from the shoreline. To protect coastal areas, VEHICULAR ACCESS TO THE SHORE WILL NOT BE ALLOWED (except at the harbor).
also on page 4 - 6; "Pedestrian access will be possible from at least 3 points within the project site. VEHICULAR ACCESS TO THE SHORE WILL BE BARRED , except at the harbor, to preserve coastal areas. This could reduce access to the coast for a few current residents."
No mention is made of the 3 public vehicle access cases heard by the Hilo Circuit Court brought up by Hui Mamalahoa. These cases dictated that public vehicle access must be allowed along this shoreline. This EIR must be rejected or revised to clarify traditional vehicle access.

Appendix H, 4.2 Displacement, page 4-4:
"Currently, most of the project site is little used. However, Mahukona Park and Harbor are popular recreation areas... Also fishermen use the shore areas along the length of the project's ocean frontage."
"The project will not displace the general public . Instead, the facilities available to the public will increase."

If vehicle access is barred, the general public is being displaced. The final EIR must address this issue.

Contradiction

Chapter IV, page IV-53, 5.2.3 Shoreline Access & Recreation
"The project is likely to have immediate impacts on recreation at Mahukona Park and Harbor. Those impacts will be on balance beneficial. Available facilities will increase and access will improve....
.....public access to the shoreline will be provided. The coastal area will be left open. All structures will be set back from the shoreline."
Chapter IV, 5.3 Socioeconomic Mitigation Measures, page IV-54
"Public access to the shoreline will be guaranteed by Chalon."
Chapter IV, 5.1 Existing Socioeconomic Conditions, page IV-37.
A description of N. Kohala describes very well how the coastal areas at Mahukona-Kapaanui has been used in the past is as follows:
"...N. Kohala residents made ample use of the outdoor resources in the past. Family picnics, hunting, fishing and shoreline gathering brought residents to parks and open areas. In 1961 and 1971 surveys showed that one half the households in N. Kohala gained some of their food through fishing..."

Again, the EIR does not mention the vehicle access court cases by Hui Mamalahoa that have a direct impact on the above statements and contradictions and also on the tradition of overnight camping by families in the resort site area. The final EIR must address vehicle access so important to Kohala families.

Contradictions (continued)

Chapter V, 1.3, Hawaii State Plan, 226-11, Objectives and policies for the physical environment-land based, shoreline and marine resources.
Page V-12; "The proposed project would also promote increased accessibility and prudent uses of inland and shoreline areas for public recreational, educational and scientific purposes."
Chapter V, State Land Use Planning, page V-29, Access D (2)
"Promote the securing of public access to resources with recreational value."
Chapter V, 1.5, Coastal Zone Management Act,1. Recreation Resources, page V-33.
"As noted previously....the coastal resources found within the project resource boundaries will be retained for the use and enjoyment of the public."
The above statements are again in contradiction to the public's loss of a traditional vehicle access. The EIR has no adequate mitigation for the proposed loss of vehicle access and should be rejected.

VII-98

Omissions and/or Contradictions Joan Ellen McFee

8. Failure to show need- by their own words

Chapter II, 3.3 Need for Project, page II - 12
"The market studies prepared specifically for this project indicate, based on an analysis and forecast....that a high service luxury hotel, including a fine dining restaurant and other guest facilities could be appropriate --- etc.."
There are more examples that all say it would be appropriate or attractive or marketable, but nowhere does it mention NEED.
This EIR does not measure the impact of a failure due to inadequate need since the already proposed resorts exceed the County General Plan projection for resort units. Also existing luxury resorts in West Hawaii have been experiencing dangerously low occupation rates due to the oversupply of units. This EIR must be revised to evaluate the impact of failure on the community.

9. Quotes a study by PBR (preparers of this EIR) to prove a point.
Chapter IV, 5.7, Impacts on Property Values and Development, Impacts of Chalon's New Residential Projects, page IV-72
"....concern that a new affordable housing project especially a multi-family project in Hawi, could lower the value of nearby properties." Also quotes a study which says such new housing "...would tend to slow but not depress these values."
Slowing residential value appreciation is lowering their value. This EIR should be an EIS on the entire Chalon Master Plan so that impacts such as the above could properly be evaluated by decision makers.

10. Exhibit IV - E
This exhibit states that by 1995 the daily resort population will be 820 residents plus employees.
In the Traffic Impact Analysis (Appendix J) this total does not appear to have been included. At any rate 820 people should impact on Akoni Pule Highway. The final EIR must address this apparent omission.

11. Historic Oversight
No mention is made in the EIR about the historic railroad line which ran from Mahukona to Niulii from 1878 to 1945 when operation ceased.
The round house and turn tables were located at Mahukona. The "Jeep road" from Mahukona to Kapaa follows the old railroad track. Spikes, ties and other railroad artifacts are often found along it. Cement foundations still exist.
The Railroad played a significant part in the History of N. Kohala and the sugar industry.
This oversight should be corrected in the final EIR. See Narrow Gage in a Kingdom by J. C. Conde'

Thank you for the opportunity to comment on this EIR. I trust that the comments made above will be addressed in the final EIR.

Infrastructure Ron Becker

6.1 Highways
Since, "The actual size of the lodge has not yet been determined..." (page IV - 54) and since approximately 25% of the housing units will be rented, the probable traffic impacts cited in the EIR can not be accurate. The traffic surveys are based on less units than the report's number. (240 lodge + 25% rentals = 390)

6.1 - 2 Air Transportation
Ke-Ahole Airport will be impacted by the project as virtually all visitors and home owners will transit through this facility. This should be addressed in the final EIR.

6.4 Water Supply
Since,"The exact size of the Lodge has not been determined." (page IV - 54); the amount of daily potable water needed can not be accurate. Also the report does not consider other Kohala projects and their need for use of the same water supply. This total need must be addressed in the final EIR.
Development of new water transmission lines will only increase the probability for additional developments to use these new lines. The report does not adequately address this impact.

6.5 Wastewater Treatment
The adverse impact from equipment failure at the wastewater treatment facility has not been mentioned. All sewage treatment facilities have a bypass valve which allow untreated or partially treated waste to be "dumped" into the ocean, when the system is overloaded or because of mechanical malfunctions.This omission must be addressed in the final EIR.
"Because of the high permeability of the lavas along the coast"(3.1), intense irrigation of the golf course with its massive chemical fertilizers and herbicides will directly affect the quality of the ground water in the vacinity. Therefore, if on site wells are needed in the future as stated, the on site ground water may be contaminated as well as the off shore waters.The EIR does not state adequate mitigation measures to protect the ground water and must be rejected or revised.

VI-99

COMMENTS ON CHALON'S MAHUKONA ENVIRONMENTAL IMPACT REPORT(DRAFT) JUNE 1990

Richard McFee P.O. Box 989 Kapaau Hawaii 96755

COMMENTS ON THINGS THAT ARE IN THE EIR REPORT

Comments on things not in that report are given in the next section.

- The report refers to roughly 300 "low rise villa type accommodation units" and on p I-6 says that these units "could be marketed with success". It is assumed that these are hotel rooms. If they are actually condominiums the sense of the entire report is changed.
- On p.I-11 the report states " . . . the project would have a minor adverse impact on Akoni Pule Higway operations . ." . The proposed development will put about 1000 people in an area where there are now about 50. Many of these will be tourists spending much of the day driving to and from the hotel. The impact almost certainly will not be "minor".
- The report states on p.IV-5 that present fresh water outflow into the ocean from the land in the Mahukona area is about 1-2 million gallons per day. It also states that the golf course will use 2.7 mgpd of water from the Kohala ditch (p.I-13) plus 205,000 gpd of wastewater. This large addition is certain to increase coastal outflow, especially in cloudy or rainy weather and considering "the high permeability of the lavas along the coast"(p IV-5). Yet the report states on p. IV-6 that "the proposed project is not expected to effect the quantity or quality of the groundwater flow".
- The report states that engineering studies of the possibility of using solar(p.IV-94) and/or waste heat recovery systems will be made "during the final design of the proposed facilities". If such systems are to be used, they should be part of the initial design. Solar heating in particular should be required. They would work very well in the Mahukona area which is quite sunny with little rainfall. There is not better way to decrease Hawaii's dependence on oil.
- On p.II-1 it states "A strip of coastal land approximately 300 feet wide fronting the project site is designated "Conservation" by the SLUC". Then it says"Other than possible improvements for the public benefit to the harbor or Mahukona park facilities, the proposed project activities would be outside the Conservation district area". This statement is misleading. In that area the conservation zone lies between the jeep road and the shore. Where the hotel is to be built the width of the zone is about 80 feet. Fig. II-6 on p. II-11 shows that the hotel(with restaurants) will be located about 90 feet from the shore.
- The report states on p. IV-54 "Public access to the shoreline will be guaranteed by

Chalon". But Chalon has already stopped public vehicular traffic along the "jeep road" by placing locked gates across it. The public has been using this road for such traffic for decades. It has also placed two portions of barbed wire fence across the road that goes from Mahukona to Lapakahi(running inland from the lighthouse). Complaints have been made to Chalon but it has refused to remove these barriers. Almost certainly Chalon will do what it can to discourage vehicular traffic along the part of the jeep road directly in front of its hotel restaurants(see previous comment). If Chalon attempts to get permission to move this road inland much of its scenic attractiveness will be lost to those of the local residents who use it for walking and fisherman who park their cars on the roadside and carry the equipment to the shore will have much further to lug their rods, reels, bait boxes, etc.

- Parking access for local residents is shown in two places on the development plan map(pII-11, Fig. II-6). A small lot is shown near the Kapaa end of the development located about 600 feet from the shore. A large lot east of the hotel is shown and it is assumed here that area residents will also be able to use the lot. However it is not clear whether access will be restricted in terms of hours or the number of area residents that will be allowed in(as is the case, for example, with Mauna Kea), or if the area residents will have to park at the back of the lot. Furthermore to get to the shore the area residents using that lot will have to pass through the hotel. Many area residents would be intimidated by having to do this especially if they were treated in a less than friendly way by the hotel staff.
- The studies quoted on p. IV-25 indicate that the water quality of the ocean at the shore will not be injured when pesticides, fertilizer, and treated sewage water is placed in the golf course. However unusual features of the Mahukona area are not considered in this discussion. These features are the high permeability of lavas along the coast(p.IV-5), the lack of caprock there, and the closeness of parts of the golf course to the shore(map Fig. II-6). The report says "The high permeability of the lavas along most of the coast allows sea water to move freely underground resulting in groundwater with a salt content too high for potable purpuses". Thus contamination by leakage to the ocean of golf course water could endanger swimmers and kill fish and other shorelife. It is not a possibility to be dismissed by quoting references which very likely do not apply in this case.
- The report states on p.I-14 that "Because the majority of construction would be inland from the coastline, few impacts to the marine environment are expected to occur as a result of construction". But the hotel, the most major piece of construction, is to be built only 90 feet from the shore.

- The water department of Hawaii County is stated in the report to be supplying 125,000 gpd of potable water to the Havi area where there are about 2000 people, i.e. about 60 gpd per person. This water is used also for agricultural purposes which is why it exceeds the 33 gpd/person stated in the "Standard Handbook of Mechanical Engineers" as typical consumption for urban households. However the report says the project will need a maximum of 352,000 gpd for roughly 1000 people, i.e. about 3 times a much water for half the number of people. Furthermore agricultural water is being supplied separately to the Mahukona project by the Kohala ditch. Thus Chalon is requesting over ten times as much water per person as is now being consumed for non-agricultural purposes in typical U.S. households. Why so much? Does Chalon anticipate increasing the size of its hotel? Do they expect to have a great deal of Ohana construction on its 1 acre agricultural lots? It would seem almost certain that additional construction is anticipate. If so, what is it?
- The report states on p. IV-88 that the present County water system in Havi is capable of suppying 751,000 gpd. Yet the Kokoiki area of the town is even today having serious water shortages. What is the basis of the 751,000 gpd estimate? Is it correct? Is there a chance that a new well will have to be drilled to supply water to Chalon's Mahukona project? If so, will Chalon pay for it or will the taxpayers of the County be required to do so?
- Traffic within the shopping area of the village of Havi has already exceeded reasonable limits .The additional traffic generated by the Mahukona will make the problem even worse.A traffic light will be needed and the disjoint intersection in the middle of Havi dealt with in some way, probably by moving a road. Who will pay for this? To say that there will be a "lack of significant adverse traffic impacts" is unrealistic.

COMMENTS ON THINGS LEFT OUT OF THE CHALON ENVIRONMENTAL IMPACT REPORT

The many topics left out of the Chalon EIR report are of even greater concern than tlian those topics in it that contained inaccurate or inadequate information.

- Chalon owns most of the land between the Coast Guard Station and Pololu, about a dozen miles of coast. However the report says nothing about what Chalon intends to do with the rest of the shoreline. Mr. Paul Sennett has said at a public meeting that the coast is "too valuable not to develop". However he has said that Chalon has no specific plans for its development as of nov.

- Most of the area's residents are seriously concerned about this question. The coast has been used by them for centuries for fishing,boating, hiking,swimming, camping,picnicing,partying,opii picking,crabbing,lobstering and, more recently, surfboarding, kite flying and board sailing. It is the major recreational facility of northern N. Kohala. On the mainland most people think that a coast must have beaches to be of interest to the general public. But in N. Kohala, a rural place without nightclubs, bowling alleys, etc. everybody uses the coast for recreation whether they swim or not.

- Residents fear that the beautiful N. Kohala shore will be ruined by building houses and hotels and condominiums on it or near it and that their present access to it will either be cut-off or restricted so much that easy enjoyment of the coast becomes impossible. They fear that the ocean there will become polluted, that the fish population will be severely reduced, that many of the fish will contain the cig uatera poison as a result of coastal contamination and that swimming infections will become common. They fear that a great influx of people, many Caucasians from the mainland, will clog the roads and schools, require expensive expansion of roads/water/electric/fire/police etc facilities that will be paid for largely by taxing present residents rather than newcomers. They think that a change in the "ethnic mix" from its present multi-racial character to one dominated by Caucasians will replace the present easy going mutually helpful style of interpersonal interaction with the style of Southern California. They fear that "Kapu" signs will spring up all around like weeds so that eventually there will be no place for them to go except few parks and dangerous noisy roads filled with exhaust fumes. They fear that the people moving here will all be rich so that the price of property, houses, rentals will be driven so high that none of the present residents or their children will be able to afford living in N. Kohala. Then they will be forced to move to east Hawaii where, after a while, the same thing will happen all over again and they will be forced to move to the mainland. They fear the N. Kohala, the birthplace of King Kamehameha, the Northern end of the "road to Tahiti"(channel to Maui), the site of the Mookini heiau, the home of the Mahukona railroad and the world famous Luke's hotel, the soul of old Hawaii where the Kohala ditch is still functioning to prove it, they fear that all this and much more may go the way of Waikiki, Kaanapali, Kona, Banyan drive, Wailea leaving an empty space in their hearts that nothing will be able to fill. The Mahukona development by itself will not take this toll of the present residents of N. Kohala but its development and development of the rest of the coast is sure to do that.

- Chalon's EIR does not discuss an alternative suggested to it numerous times, that is,the location of the hotel and golf course and sub-division in the foothills just north and east of Mahukona in land that Chalon owns. There at an elevation of about 800 feet above the Puakea reservoir (into which the Kohala ditch empties) is a spectacularly beautiful area having a climate optimally balanced between the arid windiness of Mahukona and the vet humidness of the Hamakua coast. A golf course there would be far enough from the coast so that pollution by pesticides etc. would probably not be of concern. A separate beach, say a Nishimura Bay, could be provided for the hotel guests and sub-division dwellers, as well as residents of the area, the hotel and beach being linked by a bus or jitney cab as is done in Hana by the hotel there.

- Chalon does not consider the alternative of making all the land it owns in the "special management area" of the coast into a coastal park in which there was no development and where the coast was kept in its present unspoiled, rural state. Such a park would constitute a tourist attraction on a par with the Point Lobos and Point Reyes parks on the California coast. Here this coastal park linked to the similarly beautiful mountain areas also owned by Chalon, it would offer some of the best hiking in the U.S. Hotels, condos and sub-divisions located in the cooler, greener but mostly sunny hill looking down on the coast and over to Maui could house tourists and vacationers. The tourist industry could provide a good "bottom line" to Chalon and at the same time supply jobs not requiring

a long commute to the area's residents. At the same time the image of Japan as a good neighbor would be enhanced rather than tarnished.

- The EIR report does not mention that houses built at the southern end of the proposed Mahukona sub-division would overlook Lapakahi park and thereby detract a good deal from the rural appearance of that park.

- The EIR report does not discuss the possibility of a boat dock being built on the Chalon side of the Mahukona harbor opposite the town pier where everybody goes swimming. Boats are notorious for leaking gasoline and oil. It wouldn't take more than two or three good sized boats there to ruin the swimming at Mahukona. The boats that are launched there now are few in number and small and do not usually stay in the harbor more than a few minutes. Nevertheless they do substantially worsen the water quality. The smell of oil and gasoline lingers on the water for 10 or 15 minutes after the boats have gone out or been raised up to their trailers.

- An important omission in the EIR report is a reasonably detailed discussion of the reports of the "Citizen's Participation Committees" which Chalon asked, starting in February 1989, a number of Kohala citizens to serve on. What followed was about 55meetings,nearly all held at night, some lasting 3 or 4 hours, most attended by at least 5 and some by as many as 40 people. Approximately 1500 man-hours were spent at the meetings and at least that much outside of the meeting preparing for them. The total time spent amounted to about 1½ man years, most of it overtime. But where are the results of all these efforts, the recommendations of the committees, in the report? They are not there. In several presentations to the community, which Chalon presented its plans, some of the recommendations which it favored were stated. Those it did not favor were left out. Since then Chalon has apparently decided to avoid all references to the conclusions of these hard working committees.

CHALON INTERNATIONAL of Hawaii, Inc.
P.O. BOX 249 HAWI, HAWAII 96719 • TELEPHONE: (808) 889 4257 • FAX: (808) 889-5252

November 20, 1990

Ms. Toni Withington
Kohala Community Association
Planning Committee
P.O. Box 76
Hawi, Hawaii 96719

Dear Ms. Withington:

SUBJECT: MAHUKONA LODGE DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH KOHALA, HAWAII

Thank you for your letter of September 21, 1990, summarizing your review of the subject report. The following paragraphs respond to your concerns in the order in which they appear in your letter, first from your meeting which is paraphrased, and then from individual member letters.

Before beginning that, however, an issue raised in your cover letter merits comment. Your analysis and conclusion with respect to the appropriateness of the EIR instead of an EIS are incorrect. True, the document has not been requested by any government agency. That in itself is significant, as there exist very well defined (in statute) triggers for the EIS process. This project has no trigger. In keeping with Chalon's philosophy, however, we have voluntarily chosen to involve the community in our planning process and in the examination of the impacts of the project. The result is precisely what would occur if the name of the document were changed to an EIS. The purpose of an EIS is to <u>disclose</u> the impacts of an action and give the affected public an opportunity to examine its consequences. This has been done, and in fact as a result of the various extensions of review time you have been granted, the opportunity to review this document has been much greater than would have been the case for a true EIS. Furthermore, as is done in the EIS process, we intend to publish all comment letters received and our responses in the final EIR so that this exchange will be available for review by any government agencies so desiring.

<u>Meeting of September 13, 1990 Paraphrased Testimony</u>

A. Physical Environment

Visual impacts of the poles associated with HELCO's transmission line into the area cannot be determined at this time. HELCO is in the process of obtaining easements, and until this is completed the alignment of the transmission line is uncertain. It should be noted that the provision of these lines by HELCO will serve other

aspects of the community besides Chalon's Mahukona Lodge project. Chalon will address visual impacts relating to its lands, and will work with HELCO to minimize these impacts.

To clarify the potential visual impacts of the preferred alternative, the architect is preparing to-scale renderings using a photomontage technique of the following views: 1) view from Heiau site on bluff towards lodge; 2) view from old government road and Akoni Pule Highway junction, just north of the junction, looking south towards the lodge; and 4) view to lodge area from Akoni Pule Highway just south of the access road intersection, looking north. These figures include views of an existing state, and one with the proposed lodge and villas in their respective site locations. These exhibits will be included in the final EIR.

The EIR will also include to-scale drawings of site sections, which provide a cross-cut view in three locations of the site. These sections provide the viewer an opportunity to establish a perspective and relationship between the buildings to the land and to the Akoni Pule Highway.

The application of fertilizers and pesticides on the 170 residential/agriculture lots could be controlled by Chalon through protective covenants placed on each lot or through a landscape company which may be part of the golf course operation. The issue appears that more stringent controls on the use of fertilizers and pesticides should be imposed, and if not by the County then by Chalon. Given that the area in which the residential/agriculture lots are to be sited is State Agriculture designated land, and would be residential/agriculture county zoning, numerous land use activities are allowed as a principle use requiring no mitigative assurances as to the potential impact of fertilizers and pesticides on the groundwater. Such uses include nurseries, seed farms, botanical gardens, plant experiment stations, floriculture, truck gardening, raising and keeping of animals, and single family residences, to name a few. Chalon proposes to enact a coastal water quality monitoring system and could enact a groundwater monitoring system to detect any changes from ambient conditions.

The comment that the marine study is inadequate is misleading. Because a study expended a certain amount of time and covered a specific area does not mean it is necessarily inadequate. The study conducted by Dr. Richard E. Brock contained in appendix D of the EIR explains what he observed during the time frame of this study, however, he has conducted numerous other studies at locations all along the West Hawaii Coast giving him a comprehensive basis from which to evaluate the marine biota in this area. Statements that the report excludes the possibility of

humpback whales and porpoises frequenting the area are incorrect. The report (appendix D) on page 37 and 39 discloses, according to a dive charter captain who spends considerable time in the waters, "...that there is a pod of spinner porpoise,...occasionally one sees bottlenose dolphins as well as humpback whales well off shore of Mahukona Harbor;..." The perception of distance from the harbor is of concern. As you point out in your personal experience, humpback whales and porpoise have been seen quite close to the shoreline off Mahukona. Chalon is concerned about this issue and sensitive as well. The proposed concept does not plan any activities within the shoreline setback area or the state conservation district, thus creating a buffer zone. In regards to the siting of many turtles, we thank you for your verification that more than three turtles frequent the coastal area off of Mahukona.

The use of pesticides on the golf course is anticipated and references in the EIR are made on page VI-24 and 25. The types of pesticides, also known as biocides, and the frequency of application are unknown at this time. The Hawaii Real Estate Research and Education Center of the University of Hawaii published a report entitled "Analyzing the Market and Environmental Impacts of the Golf Industry in Hawaii" dated February 1990 which provides insight as to potential impacts caused by the application of pesticides:

> "Pesticides are broken down into three areas: 1) Herbicides, 2) Insecticides, and 3) Fungicides. Herbicides are applied primarily to the fairways and perimeter areas comprising an area of 93 percent of a typical golf course. Insecticides and fungicides are applied to primarily the greens and tees comprising the remaining 7 percent of the land on an as needed basis. The chemicals used are in such small quantities, and the constituents are rapidly absorbed and degraded in the upper one meter of the soil profile such that leaching into the groundwater aquifer appears to be of little likelihood. According to Murdock and Green, (experts in this field), "the most toxic pesticide, chlorphyrifos, highly toxic to birds, is strongly adsorbed on the thatch layer of turf and moves little from the site of application.(see, C. Murdock and R. Green, Environmental Impacts of Fertilizers & Pesticide Use on the Proposed Waikane Golf Course Project, April 5, 1988, p.6) The toxicity levels of the typical chemicals used on a golf course are ranked "low" with the exception of chlorpyrifos which is ranked "high" and is slowly degraded taking one week for 95 percent of the insecticide to-degrade".

The EIR does in fact reference various studies, including those

conducted by Murdock and Green, but does not describe the findings as stated above. Mitigation measures to reduce the usage of pesticides on an as needed basis for seven percent of the golf course area could include the importation of sterile soils, and the use of blow torches to burn weeds.

The concern of heavy "Kona" rainfall causing excess leaching of fertilizers and pesticides is not mentioned and we thank you for contributing this information.

Chalon welcomes safe methods of horticulture and will promote organic methods to cultivate various products. The specific methods are unknown at this time and will be further examined.

Chalon intends to conduct marine water quality monitoring along the coastal area fronting the subject property prior to construction and periodically during the construction process to identify adverse impacts. In addition, Chalon could conduct groundwater monitoring to identify potential lechates from the golf course and or residential/agriculture lots.

B. Natural Environment

The comments relating to humpback whales, porpoises, and turtles are addressed above in the paragraph discussing the marine study. Again we thank you for clarifying that the marine life does come in close proximity to the shoreline area of the Mahukona region.

The bird and mammal survey (appendix C) does in fact acknowledge that the Pueo (Asio flammeus):

> ..."may be affected by changing land use in the area..." The report goes on to acknowledge that an owl was sighted on the project lands in 1984 by Berger. The report concludes that "Thus, development of the area would probably adversely affect the population of owls in the immediate vicinity. Retention of some open areas would mitigate these impacts on Pueo populations to some extent, and may allow the maintenance of game bird populations in the site at the same time."

Chalon's concept plan retains generous portions of open space which includes the entire state conservation district, the golf course and open areas within the one-acre residential/agricultural lots. With regards to impacts on the Hoary Bat the report concludes that:

> "Residential development would be unlikely to significantly change the pattern of use of the area by the Hawaiian Hoary Bat. Bats are known to adapt to the presence of habitations in the vicinity of their feeding and roosting areas, and an increase in vegetative cover

> may increase roosting habitat for this species."

This information indicates that the residential component of the concept plan is not likely to alter the bat's habitat. It does not however reach any conclusions as to the impact caused by the lodge or villas.

The botanical survey included as Appendix B discloses that "...Of some concern, is the boulder covered slope which supports a small community of native plants. Although none are considered threatened or endangered, the plants should be preserved, if possible, as continued development of the Leeward Kohala coast will diminish their populations and range in the future." This statement is of concern to us and for that reason, the preliminary concept plan leaves this particular area as an open and undeveloped area, free of golf course and residential/ agriculture lots.

In reference to the Mahukona Lodge project becoming an incubus to more resort expansion on this coast line we have the following response. Chalon's proposed project is in agreement with the Hawaii County General Plan which has, for more than 20 years, designated the site as Resort, Alternate Urban Expansion, and Extensive Agriculture. In addition the site is designated in the North Kohala Community Development Plan as Coastal Resort, Open (State Conservation district) and Unplanned. Given the county land use designations, this particular area is the only location with these designations in the North Kohala district, which indicates that for another resort development to proceed, virtually all land uses would have to be changed. This is not to say that such action could never occur, however, the concept would be contrary to all existing land use policies.

The project concept is designed such that potential for further urbanization outside of the petitioned State Urban area of 14.5 acres is severely limited, nor is it Chalon's intent to ask for incremental urban phases. The development of golf courses, tennis courts, and residential lots precludes Chalon's opportunity to petition for more State Urban lands.

In reference to native plants and the 5-year State Land Use boundary review, which includes the State Conservation Boundary, Chalon has been in contact with the Office of State Planning and will continue to have dialogue over the next several months regarding refinements to various boundary lines to protect sensitive areas such as native plant habitats.

The impacts that could occur from the use of pesticides on insects that birds feed on is stated on page IV-20: "...by depleting the supply of insects that some of the birds feed upon." Mitigation

measures noted in the EIR are primarily that "Pesticide use will be minimized and in compliance with label instructions...". It should be noted that as previously stated, pesticides are applied to approximately 7 percent of an entire golf course on an as needed basis. In addition it makes no practical economic sense to be widely using pesticides due to the expense of such materials. Further the toxicity of commonly used pesticides is ranked "low" with the exception of chlorpyrifos. Currently there are other pesticides which can be used as an alternative to this.

In regards page IV-25 the EIR does acknowledge that:

> "Impacts to the fisheries of the area could occur with increased public access to the shoreline. It is presumed that resident as well as visitor recreational fishermen would practice appropriate conservation measures and only take that which is required for their own use and enjoyment."

This statement assumes that with increased shoreline usage impacts could potentially occur on the fisheries of the area.

Regarding the timing of the application of fertilizers and pesticides on the golf course the EIR does state on page IV-24 and IV-25 the application is generally not applied during rainy periods. Given the event of a "Kona" rain, which may be less predictable than weather resulting from a normal trade wind regime, there is a potential that fertilizers and or pesticides could be applied just prior to a downpour. As discussed previously impacts from pesticides would be negligible because of the small amounts applied and because of the tremendous extent of dilution that would occur. The following conclusions are reached in Analyzing The Market and Environmental Impacts of the Golf Industry, by the Hawaii Real Estate Research and Education Center, dated February 1990 (pgs. 169 - 170):

> "Typical fertilizers used for turfgrass include nitrogen (N), phosphorus (P), and potassium (K). Turfgrasses use more nitrogen than other elements. Based on turfgrass clipping composition, it has been shown that turfgrasses grown in Hawaii use about twice as much nitrogen as potassium and about four times as much nitrogen as phosphorous. Primary fertilizer elements of concern for contamination of ground waters are nitrogen and phosphorus. Phosphorus molecules attach very tightly to iron and aluminum hydroxides, which are abundant in most soil types. Phosphorus will therefore not cause any problems with contamination."
>
> "Nitrogen applied in the ammonium form is rapidly converted to nitrate which is bound to the elements in the soil and moves readily through the water. The turfgrasses absorb the nitrogen rapidly after application, leaving little if any nitrogen to leach into the groundwater. Should a heavy rainfall occur immediately after a fertilizer application, runoff conditions are more likely to occur, in which case, the fertilizer would be tremendously diluted, thus having little or no effect."

The report goes on to explain probable impacts caused:

> "In the event rain occurs after chemicals have been applied chemicals could leach into the water system or be transported to the offshore waters by drainage systems. Given this scenario, the heavy downpour would significantly dilute the chemicals to the extent that they would be rendered harmless and ineffective."(pg. 176)
>
> "Dr. C.L. Murdock and Dr. R.E. Green as part of the EIS for a proposed golf course in North Kona, Hawaii, evaluated the Dollar and Smith findings in a report entitled "Environmental Impact of Fertilizer and Pesticide Use on the Proposed Awake'e Resort Golf Course, North Kona, Hawaii." (June 7, 1988). They report:
>
> > "...the analysis by Dollar and Smith (1988) of the chemical composition of ground water and near-shore waters at six locations in West Hawaii, located between Kawaihae and Keauhou, suggests that normal fertilization of golf courses will not result in undesirable enrichment of pond or shoreline waters. Of particular interest are their results for the Waikoloa and Mauna Lani golf courses, which are located on rock lands similar to the Awake'e site. Neither anchialine ponds nor shoreline waters evidenced enrichment by inorganic nitrogen. (p.8)"

Lastly, on this topic we would like to point out the marine study, in Appendix D of the EIR, states (pg. 3 of introduction) "...studies conducted at other West Hawaii sites suggests that the standard fertigation/fertilization techniques used on West Hawaii golf courses will not impact nearshore waters." Chalon intends to manage their golf course operation to a level of standard commensurate and/or above other golf courses in West Hawaii.

In response to the comment that "...ugly buildings will block the beauty of the shore when we drive by and the ugly golf course is only good for wealthy people not the people of Kohala. It should

be built some place else in the 'boondocks'." We have the following response. The essence of the first part of the statement is that buildings will block the view from the road. Since the draft EIR has been produced and circulated, the site architect has conducted a photomontage which examines the visual impacts from the proposed lodge and villas with views from both the Akoni Pule Highway and Mahukona Park. In addition, site sections have been created to show the elevation changes and potential view impacts caused by creating structures in the area. These exhibits will be included in the final EIR. The second part of the statement assumes that both the golf course and the buildings will be ugly and this is a personal view. As to the golf course being for the wealthy, proposed green fees are unknown and will most likely be commensurate with others located along the West Hawaii coast, many of which are frequented by local residents.

The comment about the contradiction on page IV-25 between impacts from the golf course to fish as being greater than those imposed by a reduced number of people that drive down there if they block vehicle access is unclear. There appears to be no contradiction stated on this page. There may be a contradiction if one assumes that no one can access the shoreline, therefore no fishing is conducted consequently the fish are impacted less from the absence of fishermen. And following, one concludes that impacts from the golf course is the next possible source of impact to the fish. As stated previously impacts from the golf course operation appear to be negligible to the marine environment. In terms of blocking vehicular access along the shoreline, Chalon will abide by various court orders to provide access to and along the shoreline. Chalon will also provide a form of vehicular access along the shoreline. Gates erected along the jeep trail can be accessed by obtaining keys from the Chalon office in Hawi.

Comments to the effect that Chalon will control access to get to the ocean area are unfounded. The road to the Mahukona Park is a public roadway and Chalon will not obstruct ingress or egress of this road. Chalon proposes to widen and landscape the roadway. Consequently, people may enjoy swimming in the harbor, and relaxing on the pier as has been done in the past. The proposed development is mauka of the State Conservation district which will serve as a buffer and open area along the coast.

C. Historical and Archaeological

The concern of the impacts of the project on the railroad bed is appreciated. The EIR does in fact mention the railroad bed in the context of three reports contained in Appendices E, F and G. This

site feature appears not to be impacted by the proposed development, as indicated by Figure II-6 Conceptual Development Plan. The figure incorporates this feature as a potential proposed beach access easement. We will include information about the historical role of the railroad bed and will site the Narrow Gage in a Kingdom, by J.C. Conde in our references. The warehouses and other buildings did play an important role in facilitating the success of the sugar and cattle industry, however, no impacts are created to them from the proposed development.

Chalon will continue to work with Na Maka'ala 'O Kohala regarding research and proper preservation of sites within the project area.

The EIR discloses that 127 historical sites had been located on both Mahukona and Kapaanui parcels. What may be confusing to the reader who examines the corresponding appendices E and F, is that the 127 is the summation of sites found on both study areas. The Kapaanui parcel located 26 sites, and the Mahukona parcel located 101 sites. Throughout the text of the EIR in section 3.3 pg. I-9, section 4.1 pg. IV-27 and section 4.2 pg. IV-27 the number of sites is consistently mentioned as 127 sites. As to what is recommended for preservation, this is stated on page IV-27 in section 4.2. Further, figure IV-7 identifies sites to be preserved as is with no further work in addition to those sites to be preserved with some level of interpretive development.

Chalon does not intend to wipe out 7/8ths of the lower grade sites, and no such disclosure was made in the EIR. As to the stewardship and access to these sites we appreciate the comments that perhaps covenants be placed on parcels containing historic sites. Chalon intends to seriously consider recommendations put forth from Na Maka'ala 'O Kohala. An access program to the various sites will be one of the issues Chalon must discuss with Na Maka'ala 'O Kohala and members of the community.

The statement in Appendix D, page 1, stating that the railroad was closed down following the tsunami of 1946 which destroyed sections of the railroad may be misleading, but is not incorrect. The railroad did close but not as a result of the impacts from the tsunami. The railroad was closed completely in 1945 as a result of the sugar company converting cane hauling to trucks in place of the railroad. The truck hauling began in 1940 and the Mahukona port was closed by the military in 1942. This information does not impact the EIR in any manner nor does it impact the proposed project.

Historic sites which have been surveyed and are identified for preservation based upon established criteria used by the Office of

Historic Preservation will be preserved. Sites which do not have this status are sometimes retained and sometimes not. In some cases the sites are determined to be important for information content. We appreciate the concern as to who polices the preservation of sites, as Chalon feels they must take that responsibility under the guidance of a Kupuna.

D. Socio/Economic

We appreciate the comments regarding the social impact assessment. One of the reasons for the report lumping North and South Kohala together is because the study is taking a regional and comprehensive view. To focus solely on just North Kohala would provide an inaccurate description of impacts because of the interrelationships between the two districts. In regards to the impacts realized on North Kohala business, such impacts would be positive in that there would be an opportunity for those existing businesses to market their products and services to the proposed project. The project may also stimulate some expansion of existing businesses and or the creation of new businesses. Currently, there are approximately 23 acres of commercially zoned land in North Kohala. As of 1984 over one-third of these commercial lands were either vacant, contained vacant buildings, or contained residential uses. In terms of industrial zoned lands which permit business uses, there are about 56 acres of land located at the former Kohala Sugar Mill site. Only a small portion of this site is utilized. This would allow for future business expansion. Other businesses which could be impacted favorably are those out of residents' homes or various agriculture ventures such as Kohala Nursery.

Social impact statements are not "scientific". The impacts of a project must be judged in relation to the surrounding area at the time the project would take effect. Hence a project is considered in relation to probable future conditions, not just the situation existing at the time of the report.

Your comments are that importation of foreign labor displacing local workers is of concern because it will lead to social conflict. This phenomenon is discussed in the EIR in the context that labor may come from other parts of the Big Island and off island to fill job openings (Appendix H, page 4-24), but not foreign labor. The report goes on to state that:

> "As previously indicated, the source of these off-island workers cannot currently be predicted with accuracy."

Related to this topic historically, Hawaii has been a melting pot of immigrants settling in the islands to work on the plantations. This infusion and blending has lead to a state containing the

greatest diversity of individuals living harmoniously. Chalon will hire those local people seeking employment who have the skills required to fill the various positions.

Comments concerning tourists in one's traditional recreation area, imply that if local residents want to enjoy Mahukona harbor, they cannot because tourists will be enjoying the same facility thus disrupting the local ambiance. The reason for state ownership of all coastal land and laws guaranteeing access is so that everyone, resident and visitor alike, may enjoy the coast and shoreline. The alternative would be private ownership of all coast lands to the sea, and restricted access to everyone, at the discretion of the owner.

The second comment is related to the fact that the tourist industry is recession sensitive and recessions can cause layoffs thus causing stress on families. The North Kohala district has suffered its share of these stresses with the closure of the Kohala sugar operations. As a result of this the population level declined, stores closed, and people sought work in South Kohala in the resorts which are related to the tourist industry. The tourist industry has been the greatest economic generator and continues to increase. While any resort will be sensitive to economic conditions, Chalon, in its plans for development of other North Kohala properties, is attempting to diversify the economic base of the District so as to provide more long-term stability.

The third comment is that tourism attracts transient workers which will destabilize the Kohala Community. The proposed project is intended to be built-out over a twenty-year period. Preference will be given to hiring residents from the area and keeping them employed for the long-term through training and advancement programs.

E. Access

The EIR, on Figure II-6 identifies actually two parking areas; one on the northern border of the Kapaanui side and; one just mauka of the lodge and villas. A potential third parking area could be in the existing Mahukona Park or perhaps adjacent to Mahukona pier. The number of parking stalls has not been disclosed in the EIR because further site design work is required to determine this figure. Chalon will comply with all conditions imposed by the various governmental agencies regarding adequate number of parking stalls. In terms of the safety of cars parked in parking lots, the project proposes to have an internal security system for the entire grounds area. As part of the security system, regular patrolling

of the parking lots would take place to deter vandalism. As to locked gates along portions of the jeep trail, this is a temporary condition to assist archaeological reconnaissance in the area, ensuring that sites are not further disrupted while documentation is in progress. Keys to the gates are obtained from the Chalon office in Hawi, there is no charge. The keys can be signed out for several days including the weekend. We do not concur with the statement that if the public can't drive the jeep road then this project should be taken somewhere else. Chalon is willing to negotiate options on this topic.

The EIR is in error regarding access as stated in Appendix H page 4-6. This statement will be addressed in the text of the EIR.

F. Socio/Economic

The State Department of Education has provided student generation rates that would result from the proposed project. The Department of Education has also indicated that the proposed project would increase the need for additional classroom space in the Kohala High and Elementary School. The projections at project buildout are as follows:

Grades	Enrollment Projections
K-5	15-20
6-8	5-7
9-12	8-10

These enrollments are based on the 170 residential/agriculture lot component of the project. Using these projections of a maximum total impact for grades K-12 of 37 students, would mean that at a steady rate of development, less than two students per year would be added to Kohala High and Elementary Schools combined. This impact will be quite minimal, yet it will contribute to the existing school enrollment starting in late 1994, when the first lots are expected to be sold.

We respect the concern that scientific interviews were not conducted as part of the consultant's social impact study, however, the consultant, the leading expert in the state, did not feel it was appropriate at the time the study was undertaken. Regardless of the nature of the study, local businesses have the opportunity to market their services and products to the proposed project, thus benefitting both the project and the merchants.

G. Infrastructure

A 4% annual growth rate was selected by planners based upon their familiarity with the area. A 4% growth rate is considered a high annual growth rate. By comparison, PM peak hour traffic volumes on the Queen Kaahumanu Highway where traffic volumes are much higher were found to have a 5% annual growth rate south of the Keahole Airport. This information was obtained while doing a study for another project.

The comment that Keahole Airport will be impacted is true. And the second comment that the EIR cannot state that no impacts would occur is also true and we thank you for bringing this to our attention. We agree that this was far too broad a statement and that in fact the proposed project will contribute to increased air traffic, however, this contribution appears to be accounted for in future airport expansion plans. As to the exact numbers of enplanements and deplanements we have no sure method to extrapolate this from the existing data. The West Hawaii Regional Plan, by the Office of State Planning, dated November 1989, includes a pertinent section regarding the expected impacts of the total build-out scenario and what plans the State Department of Transportation Airports Division has to accommodate such growth. The following is quoted from the document to assist in clarifying the comment:

> "In the 2005 Keahole Master Plan, the Airports Division reexamined Keahole Airport to determine requirements to accommodate 4.16 million passenger enplanements and deplanements and 159,000 operations by 2005 as compared with 1.48 million passengers and 93,878 aircraft operations in 1985. The current plans calls for a 4,500 foot runway extension to allow for unrestricted overseas service of wide body aircraft, additional taxiways, terminal expansion, and the construction of additional support facilities."...."The Department has anticipated increased traffic to the airport and the need to separate commercial, general, itinerant and military aviation uses."

Comments related to the harbors not being adequate for owners of small boats when the residents at Mahukona are included are well received. Residents of the Mahukona project would be subjected to the same restrictions and or limitations as any other user of the winch system on the pier. Those vessels launched from the winch can be no more than 16 to 18 feet in length. There is a potential for increased harbor usage which could increase waiting time to launch and retrieve vessels.

As to the potential for odors generated from the wastewater treatment center emanating towards and affecting Mahukona Park users, the final design for the center has yet to be determined. We are aware of design options which eliminate open settling ponds, and actually cover them, thus eliminating odors. Such facilities are operating in other resorts along the West Hawaii coast. Chalon is actively pursuing this option because emanating odors is of concern to everyone.

Chalon is actively involved in recycling efforts and we have met with Shane Rohan of the County of Hawaii Department of Public Works to discuss various composting and recycling methods. We too believe that Chalon can set an example for the community and other resort developments by reducing the amount of solid waste actually hauled to a disposal site. For example, organic material such as leaves, grass clippings, and tree trimmings can be deposited in an organic landfill site which can compost back into the soils. Food wastes can be sold to pig farms and or be composted. Aluminum, glass, paper and plastics can be separated and hauled on a regular basis to a point of collection in Kona for mass recycling.

Concern is expressed as to what will happen to the railway building. Plans are to leave the structure intact. The use for the structure will remain a residence until such time as Chalon decides to turn the structure into a museum, or another use.

There is stated concern about the impacts to police protection vs. crime, will fire insurance be available, to health care, and to schools. The EIR discusses the anticipated impacts and mitigation measures in sections 6.8, 6.9, and 6.10. We have provided a more complete description below to be included in the final EIR. The police station is located about 10 miles north of the project site in Kapaau. The North Kohala district is served by a nine-man police force that works on three shifts starting at 6:45 AM and ending at 11:00 PM. Between the hours of 11:00 PM and 6:45 AM, emergencies in the district must be handled by police outside of North Kohala. Security for the project and related facilities will be provided by a contracted service. As the resident population increases in the area, the need for additional county police personnel will require evaluation in the context of a county police department needs assessment.

The fire station is located approximately 10 miles north of the project site. The fire station provides 24-hour fire and basic life support services with one Fire Equipment Operator and two Fire/Emergency Medical Technicians on each platoon (shift). Three platoons (nine persons) are assigned to the facility and are under the supervision of one Fire Captain who is on 8-hour duty during

the week days only. The fire department relies on the community's Volunteer Fire Fighters to co-respond with the under-staffed regulars. A 1,500 gpm pumper carrying 1,000 gallons of water, one basic life support medical unit, and a reserve fire apparatus are maintained at the station. It is planned that the fire station be fully staffed with regular fire persons by 1993.

The Kohala Hospital is located about 10 miles from the project site in the town of Kapaau. The facility is a joint State and Federal operation containing less than 30 beds, and provides both long-term and acute care as well as emergency service. The emergency services are provided around the clock by physicians contracted through the State of Hawaii. Patients with major injuries or illnesses are generally transferred from the Kohala Hospital to Kona, Hilo or Honolulu as quickly as possible.

For the three aforementioned services, impacts are believed to be realized from the proposed project. The impacts are generally a slight increase in frequency of use as compared to the conditions as they exist today.

The wastewater for the 170 residential/agriculture lots will be properly treated according to standards and procedures established by the state Department of Health in the centralized wastewater treatment center. This is stated in section 6.5, page IV-90 of the EIR and also contained in Appendix K on page 7 and 8. Gray water from showers would be channeled into the same wastewater treatment center and is not planned to be handled any differently than wastewater generated from the various components of the project.

Chalon shares your concern to be energy conscious and will endeavor to incorporate energy saving devices such as solar panels for hot water and electricity, water conservation plumbing fixtures, as well as natural cooling through well ventilated structures and proper landscaping.

Water supply and transmission is discussed in section 6.4 of the EIR on page IV-88. The concerns stated dwell on the fact that the existing Hawi-Kokoiki system is inadequate and the delivery system is antiquated. As stated in the EIR:

> "Potable water demands will be met by constructing approximately 16,000 lineal feet (LF) of 6- and 8-inch diameter water line to the proposed Kapaa Reservoir that will be located in a portion of State of Hawaii Kapaa lands. Chalon will acquire agreements from the state to construct a 500,000 gallon concrete reservoir site which will be dedicated to the County Department of Water Supply. Water to the reservoir will be supplied by the

> County's Hawi wells. Should negotiations with the state not be successful, Chalon will develop the reservoir site on their own land."

Chalon has had discussions with the County Department of Water Supply to utilize a public water system. Another option available to Chalon for potable water is the development of a totally private system.

Traffic impacts on the scenic Kohala Mountain Road were not identified as being an impact as a result of the development of the proposed project. We will convey this concern to the traffic analysts to calculate potential impacts to this roadway. The traffic impact assessment accounts for 232 lodge and villa units combined as well as the 170 residential/agriculture units. At the time when other consultant studies were conducted for this EIR it was envisioned that the project would contain between 200 to 300 units for the lodge and villas. Presently, refined site plans for the lodge and villas indicate a proposed number of units below 232, as stated and accounted for in the EIR. Chalon is working with both the State of Hawaii Department of Transportation Highways Division, and the County of Hawaii Public Works on the exact requirements for the intersection of Akoni Pule Highway and the Mahukona access road. We appreciate the recent intersection counts taken during rush period in Hawi and have forwarded them to the traffic analysts.

The traffic survey was conducted in 1990 using 1988 data. The data, which are part of a State Department of Transportation survey, were the latest available at the time of the study. Since that survey, there has not been significant development in the area that would affect our conclusion. Specifically, traffic counts taken by John Scovel were analyzed and our results and conclusions do not change as a result of using higher volumes.

In regards to the inclusion of public access, this issue is mentioned earlier in this letter.

Impacts of the HELCO lines has been previously addressed in this letter.

The impact of the 170 residential/agriculture lots are accounted for in virtually all sections of the report. Your suggestion for the provision and enforcement of Covenants Codes and Restrictions (CC and R's) is well taken and will probably be employed as a further protection to the land.

We thank you for your concern and information regarding property tax increases in the Puako area. Little or no property tax impact

is expected because the project is at some distance from existing residential areas, and because it is not expected to create a significant amount of new demand for housing.

Property tax assessments increase in response to increasing demand for, and hence increasing value of, particular sorts of property. If tax rates are not adjusted, property taxes then rise as well.

As a resort property, Mahukona Lodge would not affect residential assessments. The residential lots proposed for Kapaanui would be about two miles from the nearest residential area, at Puakea Bay Ranch, and would differ in kind from existing North Kohala residential developments. Lots and homes in Kapaanui would be part of a resort and golf complex. There is no evidence that demand for homes at Kapaanui would measurably affect demand for homes elsewhere in North Kohala. Furthermore, it is normal tax assessment practice to distinguish resort-related residential areas from other residential areas for purposes of comparative valuation, unless market forces prove these areas to be comparable.

Frank Johnson
Your comment on sections 5.4, and 5.4.4 of the EIR has no bearing on an environmental impact caused from the proposed project. The issue of receiving housing credits for some future project created by Chalon is a commonly used agreement with the county and the state. At this point in time the county and state have not indicated the amount of housing requirements or locational stipulations regarding the proposed project. Chalon will abide by the requirements placed on them and conduct appropriate studies to identify various impacts caused by such action.

In regards to possible property values increasing from the proposed project, this topic was discussed earlier in this response letter.

Chalon's proposed Hawi apartment building is purely conceptual at this point and completely unrelated to the Mahukona Lodge project. At this point we do not know what the County will require of Chalon in terms of affordable housing, nor where it would be built.

The county or state has not yet set forth any employee housing requirements as a result of the proposed project, therefore, the EIR is not lacking this component. Again, Chalon will abide by the requirements placed on them and conduct appropriate studies to identify various impacts caused by such action.

We thank you for your concern about the Citizens Participation Committee (CPC) member's background. The specific points you request about each member, items 1 through 4 do not appear to have

merit in disclosing impacts from the proposed project. The final EIR will list the various members as well as highlights of the CPC recommendations.

In regards to who bears the cost of extension of the electrical transmission line from the Kohala Ranch substation to the Mahukona area, HELCo has informed Chalon that Chalon shall be responsible for the costs.

The marine study conducted for this EIR did not rely on information dated back to the year September 1981 specifically related to Mahole, Inc.; Wellington Chu. At that time, 1981 (nine years ago) and at that geographical region in which the study was conducted, algal species known to be important forage for green turtles were identified. The marine study in Chalon's EIR reported what was observed. The report did not rule out the possibility that forage for the green turtles did exist, simply none was located.

The residential/agricultural component of the concept plan is discussed in section V of the market assessment on page V-1, in Appendix A.

Existing inventory of "estate lots" includes 859 lots, with another 2,088 planned (Exhibit V-A). The market assessment states that "Absorption of estate lots on the island of Hawaii increased dramatically in 1987 as the supply of these lots began to increase..." (page V-5). Further, the largest market for the residential/agriculture lots is primarily Hawaii residents and visitors from the U.S. mainland as discussed on page V-8. Absorption of the 170 lots is expected to be complete in 1996, based upon initial absorption of 20 lots and from 35 to 40 lots per year subsequently (page V-9).

Based upon this market assessment there appears to be sufficient demand to meet Chalon's expectations ensuring absorption and occupancy rates commensurate with their level of economic returns to sustain viable operation of the project.

The PBR HAWAII housing study you refer to listed all potential projects planned for North Kohala. The list was updated by a Residential Development Status Report, which PBR prepared for a CPC meeting of November 20, 1989. The purpose of that CPC meeting was to address issues relating specifically to population growth and housing. PBR presented this reference sheet along with a sheet containing the North Kohala population projections. In presenting this information to the CPC group, Mr. James Leonard pointed out that many of the proposed projects listed in the Residential Development Status Report had the following characteristics:

1. Projects were predominately located near the North and South Kohala border and the Kawaihae area.

2. Many had received only partial land use approval and detailed development plans were not known.

3. Most projects listed were aimed at the vacation and retirement home markets, which historically have been subject to speculative buying.

Mr. Leonard stressed at the meeting that it would be misleading to use the total number of lots and units from the proposed projects listed on the Status Report as an indication of future housing and population growth.

We appreciate the information you conveyed from "Hawaii Business" magazine dated August 1990. Chalon continues to monitor marketing trends in Hawaii and particularly those relating to this type of project.

As noted in the Market Assessment conducted for this EIR (Appendix A, Exhibit IV-B), there are more than 8,000 hotel rooms proposed for development on the island of Hawaii. This figure includes those proposed projects which have County General Plan, County Zoning and State Land Use Commission approvals in place. Of these proposed hotel units approximately 1,760 units (Exhibit IV-I) would be targeted to the "luxury" class.

Chalon's Mahukona Lodge is seeking to penetrate this luxury class market segment. It is expected that the lodge market will create a niche serving (page IV-9):

- Free independent travelers - 65%
- Group Travelers - 10%
- Incentive and corporate - 20%
- Hawaii residents - 5%

Based on historical occupancy rates for the Big Island, full occupancy for the lodge is expected to level off at 70 percent in the year 2000 (page IV-10).

The concern for impacts caused by bankruptcy or failure from the proposed project to the North Kohala community were omitted from the EIR and we will include the final. There is a remote possibility that this could happen, however, Chalon's track record is exceptional for managing and operating resorts, hotels, restaurants, and a golf course - none have ever failed or gone bankrupt.

Marian Johnson
The traffic survey was conducted in 1990 using 1988 data. The data, which are part of a State Department of Transportation survey, were the latest available at the time of the study. Since that survey, there has not been significant development in the area that would affect our conclusion. For example, as indicated in our response to John Scoval, our results and conclusions do not change as a result of using higher volumes.

A 4% annual growth rate was selected by planners based upon their familiarity with the area. A 4% growth rate is considered a high annual growth rate. By comparison, PM peak hour traffic volumes on the Queen Kaahumanu Highway where traffic volumes are much higher were found to have a 5% annual growth rate south of the Keahole Airport. This information was obtained while doing a study for another project.

The increase in visitor traffic through Hawi is part of the ambient traffic forecast of our study. This component of traffic will not change much with the opening of the Lodge. As discussed in our report, at build-out the proposed project will add only 65 and 105 two-way vehicle trips to the north of the project site in the AM and PM peak hours, respectively. More than half of these trips are expected to be worker commute trips which would be made irrespective of the presence of the Lodge. The proposed project will enable Hawi residents to enjoy a shorter work commute trip. Therefore, the proposed project is not expected to add significant traffic volumes in Hawi and cause an adverse traffic impact.

Thank you for correcting the statement in section 7. of the summary chapter that the proposed project upon adoption of the requested land use changes is inconsistent with the "West Hawaii Regional Plan". The EIR does in fact acknowledge on page V-38 in section 2.3 that the proposed project is not in one of the "resort nodes". It should be noted that not all the State and County plans are in agreement.

In regards to meeting consistency with the Hawaii Coastal Zone program concern is made that: "The authority will seek to minimize, where reasonable: C. Any development which would reduce or impose restrictions upon public access to....the mean high tide line". In relation to this statement you point out that the Social Economic Impact assessment states that vehicle access will be barred. We agree this statement is misleading and inaccurate. Chalon will comply with all shoreline access stipulations and plans to provide vehicular access to the shoreline, and a form of vehicular access along the shoreline.

In terms of visual impacts caused by this proposed development, it is believed that the line of sight from the Akoni Pule Highway towards the sea is not obstructed with any degree of significance. We will include an updated visual assessment section to include to scale photomontage and site sections. It is believed that the development does not "substantially interfere with or detract from line of sight towards the sea from the State Highway nearest the coast" as referenced in the CZM chapter.

Comments on Mahukona EIR by Kelly Pomeroy 9/90
Denigration of the EIR and its preparers is both unfair and inaccurate. First, as we have pointed out, there was no requirement that Chalon produce an environmental impact document of any type. Our concern about potential impacts should be obvious by our willingness to initiate (and extend) the process and its inherent dialogue. Second, the professional qualifications of our consultants are without exception beyond reproach. Their reputations have been built up over the years by production of fair and accurate impact assessments. No consultant in this position would jeopardize his or her reputation for the sake of one project.

Your confusion may be a result of a lack of understanding of the difference between "impacts" and "significant impacts." For example, the EIR acknowledges that there will be an increase in traffic as a result of the project. This increase however, when superimposed upon the background increase expected during the period of buildout, will not change the level of service on the roadway. The criterion of significance is in this case a change in the level of service. In the other areas of utilities and public services you mention, the EIR in each case indicates that minor impacts would occur and discusses potential mitigation measures where they exist. It is not the intention of the EIR to minimize the potential impacts of the project, but neither is it appropriate to exaggerate them. This project is appropriate in its scale, its location and its philosophy, and will provide significant net benefits to the surrounding community.

We strongly disagree with your assertion that cumulative impacts are not addressed. In every case, where relevant data were available, cumulative impacts were addressed. We did not include analyses of purely speculative projects for which no government approvals have been granted.

The "platitudes" to which you refer reflect the philosophy on which Chalon International was founded and continues to operate. (Another reviewer, by the way, suggested including more information on Chalon's philosophy, illustrating the difficulty of satisfying a diverse audience.) Chalon hopes that, is of the opinion that, and

is willing to work with the community to show that this resort can be a unifying rather than a divisive force in the community.

Chalon has no authority to manage fishing pressure in waters off the property. Access to the shoreline will be improved; population will increase. Fishing pressure will inevitable increase. The statement regarding conservation is an attempt, perhaps idealistic, to encourage in the community, newcomer and oldtimer alike, adoption of an appropriate conservation ethic. Looking at the depletion of marine resources in other areas in the state, however, perhaps your cynicism is justified. Nevertheless, with or without this project, North Kohala, its marine or any other kinds of resources, cannot survive in a protective bubble. North Kohala is now and will increasingly be impacted by population growth throughout the island and the state. It will fall to the state government to resolve issues of resource management and use conflict.

Chalon is committed to implementing those mitigation measures which will be practical and cost effective. Furthermore, because Chalon is committed to the long-range development of North Kohala rather than just "getting in and out" with a single, isolated project, the company is prepared to accept a longer economic "pay-back" period on these investments. Nevertheless, engineering studies are necessary, not to prove the concepts involved, but rather to examine the integration of such systems into the architectural and engineering plans. A "systems approach" is required. One could envision a bank of solar panels erected to mitigate electrical demands conflicting with parallel attempts to mitigate impacts on viewplanes, for example.

We have every reason to believe that the measures proposed to accommodate increased traffic volumes will function effectively.

Whether you agree or not, golf courses are permitted uses of the Agricultural District, by definition. Even if one dismisses this as an agricultural use, however, the project includes about 170 one-acre residential/agricultural lots. This <u>will</u> increase agricultural use of the property.

The statement on page V-9 does not claim that the project will diversify the "economic base" of the state. It says "...the project would provide a diverse range of employment opportunities within the region." And so it would.

Implementation of this project would involve a commitment to maintaining a very large amount of acreage in open space for various reasons including preservation of archaeological sites,

protection of coastal resources and others. Golf course development is generally seen as another way to maintain open space.

A low-rise, low-key lodge type resort such as is planned would certainly reinforce the character of the region, and extend it geographically. "Control of working conditions..." refers to the potential proximity of the lodge to businesses operating from other North Kohala locations. "Expansion of an existing market and penetration of a new market..." refers to expanding the visitor industry, but targeting a somewhat different type of traveler.

Visual buffers along the highway are planned where necessary such as to screen certain utilities. In other areas they would themselves negatively impact views. The visual impact of the overhead electrical lines cannot be addressed before the necessary rights-of-way are secured by HELCo.

The project would do much more than just add to the population level because of the action of what are called economic multipliers. For every on-site job generated by the project, several more opportunities would be generated throughout the economic spectrum in the community.

Whether or not someone chooses to avail himself of the recreational opportunities provided is a personal decision. All court decisions regarding vehicular access will be respected.

Coastal access will be enhanced by improved roads, additional parking and the possible provision of a shuttle service. Furthermore, perusal of the court documents to which you refer will show that the courts have not provided for continuous access along the entire shoreline of the property. This is being voluntarily provided by Chalon.

The fact that larger developments in South Kohala can perhaps provide more recreational amenities for residents than can this project is irrelevant to what is proposed to be provided by this project. This development is admittedly and purposefully limited in scale and scope.

It is yet to be determined how many meeting rooms will be available or what they will cost. Obviously the schedules are not yet known.

"In the absence of controls on further development..." perhaps this project would stimulate other nearby "expensive development." The fact is however, for almost 20 years the Hawaii County General Plan has designated this site as Resort, Alternate Urban Expansion and

Extensive Agriculture. This is the only location with these designations in North Kohala. Further, the site is designated Coastal Resort, Open (State Conservation District) and Unplanned in the North Kohala Community Development Plan. Thus, there are in fact controls on further development. Virtually all land use and zoning designations would have to be changed to permit it.

The additional electrical transmission capacity will be needed by this project and by other projects in the district, including some of Chalon's planned developments in Hawi.

Property tax assessments increase in response to increasing demand for, and hence increasing value of, particular sorts of property. If tax rates are not adjusted, property taxes then rise as well.

We would hope that your rather pessimistic view of future racial integration in the area is unfounded, and that the Mahukona Lodge might serve to bridge gaps in understanding through programs such as preservation of archaeologic sites and their interpretation by local Kupuna. There is an opportunity here to introduce newcomers to Hawaiian culture and history. We believe that extensions of the Aloha spirit will be reciprocated with respect for the land and her people.

If past experience is any indicator, potentially disruptive effects of construction workers would be felt at the project site, in areas frequented by tourists and where opportunities for after-hours drinking exist. It is more likely that recreational opportunities would be sought in South Kohala than in North Kohala.

The CPC discussions were quite broad and lengthy. It is not possible to transcribe them into the EIR. The final EIR will contain the highlights of the CPC recommendations.

There are numerous other suitable locations in the district for new and expanded parks, and Chalon is committed to such development. Our view is that if land at Mahukona Park is lost due to rising sea level changes resulting from global warming, that may be a relatively minor concern compared to the massive destruction that would accompany it.

The EIR discloses that 127 historical sites had been located on both Mahukona and Kapaanui parcels. What may be confusing to the reader who examines the corresponding appendices E and F, is that the 127 is the summation of sites found on both study areas. The Kapaanui parcel located 26 sites, and the Mahukona parcel located 101 sites. Throughout the text of the EIR in section 3.3 pg. I-9, section 4.1 pg. IV-27 and section 4.2 pg. IV-27 the number of sites

is consistently mentioned as 127 sites. As to what is recommended for preservation, this is stated on page IV-27 in section 4.2. Further, figure IV-7 identifies sites to be preserved as is with no further work in addition to those sites to be preserved with some level of interpretive development.

Chalon does not intend to wipe out 7/8ths of the lower grade sites, and no such disclosure was made in the EIR. Chalon intends to seriously consider recommendations put forth from Na Maka'ala 'O Kohala. An access program to the various sites will be one of the issues Chalon will discuss with Na Maka'ala 'O Kohala and the community in general.

Unfortunately, sometimes state and county planners have divergent views of the preferred future scenario, and these divergent views are expressed in various policy and land use documents and maps. In some cases, it is impossible to reconcile them. When this occurs, it is not unreasonable to expect that a developer will attempt to put his project in the best possible light. In this instance, we feel that the county is in a more appropriate position to provide the planning guidance.

The Hawaii County General Plan designates Mahukona as a "minor resort area." The resort retreat acreage is designated in the General Plan as 15 acres minimum, however, Mahukona is not restricted by acreage minimums or maximums with the minor resort designation. Based on Chalon's design and the community's desire to keep this development low-key and small, an area of less than 15 acres is all that is needed to accommodate the lodge uses.

The resolutions passed by the State Legislature will be addressed in the final EIR.

A resolution was passed by the County of Hawaii Planning Committee on June 14, 1989, yet no law has been enacted which would prohibit Chalon or any other coastal landowner from proceeding with land use actions and development which does not infringe on the shoreline area. The entire shoreline is contained within the State Conservation District.

All the CPC highlight recommendations will be included in the final EIR.

The CPC meeting held on July 5, 1989 was the first announcement that Chalon was considering the purchase of the Kapaanui lands. This announcement was made by PBR HAWAII president Frank Brandt. The meeting minutes read: "...After some discussion on the matter, the committee members generally favored the idea because it would

give the community a chance to make its input to make something better than what is now planned." The actual announcement of a completed sale came at the CPC meeting of August 4, 1989. the announcement was made by our Executive Director, Paul Sennett. It should be noted that both of these meetings adjourned at 10:45 in the evening.

The project is proposed to be built out over a twenty-year period. Inevitably, the cyclic swings of our economy will be present throughout, and perhaps will even necessitate changes to the form of the project or its development schedule. At this point we are confident that the project is feasible and desirable.

Figure II-4 on page II-6 shows the extent of the Conservation District. The wording in the final EIR will be changed to reflect the variable width along the shoreline. None of the proposed buildings would be in the VE flood hazard zone.

The General Plan defines a Retreat Resort as follows:

> A retreat resort area is 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.

Pending changes to the General Plan include changing the maximum number of units in such a resort designation from 100 to 500, and changing the acreage from 15 acres or less to 15 acres minimum.

The section comparing the various alternatives will be reworded in the final EIR to eliminate any confusing statements.

Lava would provide a very effective filter for storm water, although particulate matter entrained in storm flows would tend to clog the wells. The EIR states that these flows may be directed to retention basins on the golf course.

To clarify the potential visual impacts of the preferred alternative, the architect is preparing to-scale renderings using a photomontage technique of the following views: 1) view from Heiau site on bluff towards lodge; 2) view from old government road and Akoni Pule highway junction, just north of the junction, looking south towards the lodge; 3) view from Mahukona Park to Makaohule Point; and 4) view to lodge area from Akoni Pule Highway just south of access road intersection, looking north. These figures will be included in the final EIR.

As for the concerns of "highly-obtrusive and claustrophobic white rail fences and massive structures, Chalon intends to implement design guidelines to mitigate such concerns as yours.

During construction, measures would need to be provided to minimize wind-blown dust entering the near-shore waters. An erosion and sedimentation plan would need to be provided and approved by the Department of Public Works as part of the permitting procedure for the grading work. Mitigation measures which could be employed include limiting exposed areas, dust control measures and immediate seeding of exposed areas.

The Hawaii Real Estate Research and Education Center of the University of Hawaii published a report entitled "Analyzing the Market and Environmental Impacts of the Golf Industry in Hawaii" dated February 1990 which provides insight as to potential impacts caused by the application of pesticides:

> "Pesticides are broken down into three areas: 1) Herbicides, 2) Insecticides, and 3) Fungicides. Herbicides are applied primarily to the fairways and perimeter areas comprising an area of 93 percent of a typical golf course. Insecticides and fungicides are applied to primarily the greens and tees comprising the remaining 7 percent of the land on an as needed basis. The chemicals used are in such small quantities, and the constituents are rapidly absorbed and degraded in the upper one meter of the soil profile such that leaching into the groundwater aquifer appears to be of little likelihood. According to Murdock and Green, (experts in this field), "the most toxic pesticide, chlorphyrifos, highly toxic to birds, is strongly adsorbed on the thatch layer of turf and moves little from the site of application.(see, C. Murdock and R. Green, Environmental Impacts of Fertilizers & Pesticide Use on the Proposed Waikane Golf Course Project, April 5, 1988, p.6) The toxicity levels of the typical chemicals used on a golf course are ranked "low" with the exception of chlorpyrifos which is ranked "high" and is slowly degraded taking one week for 95 percent of the insecticide to degrade".

From the above, it doesn't appear that "lapses of proper management" will have significant effects. It should also be noted that pesticides are relatively expensive chemicals, and economic considerations argue that they be used as sparingly as possible.

Employment preferences will be given to local residents. If they are appropriately qualified, management positions will be available

on a competitive basis.

The reference to Section 4.4 should read Section 5.4.

The project would not have direct impacts on small boat harbors. There would be indirect impacts if moorings were available due to the increase in population, some of whom would rent mooring space. However, in this case, demand does not equate to impact. If there are already 360 people on a waiting list for 265 new moorings, what is the impact if more people add their names to the list?

At this time there are no specific plans for large, outside nighttime activities such as concerts, but the intent of the comment was that these types of activities can be regulated.

Chalon has evaluated the physical condition of the collection and distribution systems but has not yet determined precise improvements to the Kohala Ditch. Chalon intends to refurbish the various systems to establish a reliable system, and to incorporate distribution systems which can assist the proposed agriculture park. The amount of work and the timing are unknown at this time.

As to the potential for odors generated from the wastewater treatment center emanating towards and affecting Mahukona Park users, the final design for the center has yet to be determined. We are aware of design options which eliminate open settling ponds, and actually cover them, thus eliminating possible odors. Such facilities are operating in other resorts along the West Hawaii coast. Chalon is actively pursuing this option because emanating odors is of concern to everyone.

Sludge generated at the wastewater treatment plant will be disposed of in conformance with all State and County requirements. The exact location and methods of transfer will be determined at the design stages of the plant.
The location for solid waste disposal has not yet been determined, as it will depend somewhat on future county plans. We intend to work with the county to arrive at a satisfactory plan for solid waste disposal.

Approval of future rezoning requests will be essential for the project to move forward.

You are correct about the response on page V-14. This will be corrected in the final EIR.

Facilities include infrastructure. Chalon will be improving and upgrading roads, water systems and electrical systems. Your

comment about the cost of these improvements neglects the fact that taxes are paid to state and county agencies for services. Chalon is not asking that residents of the project be given a tax credit for improvements paid for by the development. These tax dollars will be used to fund maintenance and improvements elsewhere.

The purpose of an EIS is to disclose the impacts of an action and give the affected public an opportunity to examine its consequences. This has been done, and in fact as a result of the various extensions of review time you have been granted, the opportunity to review this document has been much greater than would have been the case for a true EIS.

The statement is being interpreted to mean that new jobs will improve the quality of North Kohala people who already have jobs, but the thrust of the comment is that people who do not now have jobs will find work and their lives will be improved.

A diversity of job descriptions will be available, including tennis and golf professionals, golf maintenance, turf management, sports therapists, nutritionists, entertainers, retail sales, food service, hotel management, engineering, utility plant management and Kupuna, to name just a few.

Over the next twenty years, there will be people growing up in North Kohala who would prefer to work closer to home. It must be kept in mind that this development will not spring fully-formed from the drawing board, but will be done in increments.

In the final EIR we will change the word "businessmen" to "business people."

The Waimea Library was not sent a copy of the DEIR because typically EISs are not sent to every library in a county. Generally copies are provided to the library in the district where the project is proposed and to the primary libraries in the county, i.e., Kona and Hilo. A copy of the final EIR will be sent to the Waimea Library.

The reference to "Citizens for Protection of the North Kohala Coastline" will be corrected in the final EIR.

The proposed project has evolved over one and a half year's time. Consequently, consultant studies prepared for this EIR have assessed impacts using a range of lodge and villa units from 200 to 300 units. This provides a worst case scenario in terms of impacts because the number of units contemplated, after conducting more refined site design studies, is in the range of 180 to 210

units. This range will continue to be refined as more detailed studies are made for the project. We apologize for any confusion this may have created.

Chalon believes that the majority of the lots will be sold to residents of Hawaii and of the mainland U.S. The fear that greater Japanese participation will further escalate land prices in the district is unfounded. The price of land is influenced by much more than the origin of the potential buyer.

The percentages in Exhibit V-J are ranges and are not intended to sum to 100 %. We don't understand your comment about Exhibit IV-I.

On page 2 of Appendix B it states "A walk-through survey method was employed." Seasonality is also addressed on page 2.

No representation is made that recreational use of the area is never greater than observed.

The corrected rainfall data will be included in the final EIR.

The reference to 625 acres in Appendix F is erroneous.

Infrastructure - Ron Backer
Highways. The traffic report was based on 44 units in the Lodge, 188 units in villas and 140-170 residential units. Present plans call for slightly fewer units: 45 in the Lodge, 150-165 units in villas and 170 residential units. Trip generation rates from residential units do not differ if units are rented or owner-occupied.

Air Transportation. The proposed project will contribute to increased air traffic, however, this contribution appears to be accounted for in future airport expansion plans. As to the exact numbers of enplanements and deplanements we have no sure method to extrapolate this from the existing data. The West Hawaii Regional Plan, by the Office of State Planning, dated November 1989, includes a pertinent section regarding the expected impacts of the total build-out scenario and what plans the State Department of Transportation Airports Division has to accommodate such growth. The following is quoted from the document to assist in clarifying the comment:

> "In the 2005 Keahole Master Plan, the Airports Division reexamined Keahole Airport to determine requirements to accommodate 4.16 million passenger enplanements and deplanements and 159,000 operations by 2005 as compared with 1.48 million passengers and 93,878 aircraft

> operations in 1985. The current plans calls for a 4,500 foot runway extension to allow for unrestricted overseas service of wide body aircraft, additional taxiways, terminal expansion, and the construction of additional support facilities."

Water Supply. The projected water demands were based on a larger resort than is presently planned and are therefore conservative. The proposed project will be served from the Hawi-Kokoiki system which is capable of supplying 751,000 gallons per day. Present demand is 125,000 gallons per day; the average demand for the proposed project is 235,000 gallons per day. This would leave 391,000 gallons per day, more than three times the present consumption rate, for other projects. The water transmission lines to which you refer are to be constructed by Chalon to feed into a storage reservoir for the proposed project, and would not provide excess capacity which could be used by other projects. Chalon is also considering the development of a completely private potable water system which would preclude others using this system except under Chalon's permission.

Wastewater Treatment. To minimize the potential for adverse impacts due to equipment failure, redundant equipment will be installed. Moreover, qualified wastewater treatment plant operators will be operating the plant in accordance with an operations and maintenance (O&M) manual specifically developed for this wastewater treatment facility which will include preventive maintenance requirements. Redundant equipment, qualified operators and programmed preventive maintenance, including having critical spare parts at the site, will minimize the occurrence of equipment down-time. Under emergency conditions, the irrigation holding ponds could be emptied and used as storage or equalization ponds. When the emergency condition has ended, the sewage held temporarily in the irrigation ponds can be recycled to the aerated stabilization ponds.

The wastewater treatment facility will not have an ocean outfall system to bypass partially treated sewage to the ocean. Bypassing of untreated sewage is not acceptable and a treatment plant with this design will not be allowed to be constructed.

It is anticipated that soil will be placed for landscaping including on the golf course fairways. The soil will lower overall infiltration at the project site and absorb a significant portion of nutrients and herbicides. In addition, good land management practices will minimize the application of fertilizers and biodegradable herbicides, thus minimizing their effect on the groundwaters.

Frank Johnson
Physical Environment. Scientific data on the impacts of golf courses in Hawaii were reviewed and summarized in the Hawaii Real Estate Research and Education Center (University of Hawaii) publication discussed earlier in this letter. If grading removes the soil, then additional topsoil will be required to support turf development. Leaching from the golf course into the water table would occur at relatively shallow depths where the water is brackish and flows toward the sea. Basal aquifers would not be impacted. Nitrate entering the ocean offshore of the proposed project site would have no noticeable impact on the marine ecosystem. Uptake by phytoplankton and their subsequent dilution, advection away from the area by currents, and consumption by herbivores would remove much of the excess nitrogen. Uptake and growth by benthic algae ("limu") would likely be compensated for by increased grazing by herbivorous fish and other primary consumers.

Natural Hazards. The tsunami runup height data from Kawaihae was

included for comparative purposes. The Flood Insurance Rate Map, from which the 100-year flood elevations for the project site were derived, is site-specific. The maps are generated by the Federal Emergency Management Agency for use by insurance underwriters. Numerous sources of data, including eyewitnesses, are used to determine runup heights.

Visual Attributes. Additional analyses of visual impacts, as described earlier in this letter, will be included in the final EIR, as will a discussion of the Senate Resolution.

Natural Environment. Irrigation of golf courses has been done safely at many locations on the Big Island and elsewhere. The Hawaii Kai example is not appropriate for several reasons. First, that particular wastewater treatment facility was permitted under the National Pollutant Discharge Elimination System (NPDES) for ocean discharge. Because of a loophole in then existing regulations, the Department of Health presumed that pollutant levels specified in the NPDES permit would be observed for any other discharge method. That was not the case. In addition, the Hawaii Kai plant has a (now notorious) record of failure to abide by established procedures and standards, and in fact, the operators have recently been indited by Federal prosecutors for violations of the provisions of the Clean Water Act. A 1984 study of the problem at Queen's Gate by the Department of Health and the Department of Agriculture found high concentrations of bacteria in

the irrigation waters. Department of Health regulations requiring at least secondary treatment and chlorination of the effluent prior to application on the golf course will result in 98-99% bacteria and virus removal, with the remainder being removed by interactions with elements of the turf and soil.

The effect of intense rainfall will be to greatly dilute fertilizers and biocides prior to their runoff into the marine environment. Of more concern would be transport and deposition of sediment onto corals, or in very extreme cases, the fresh water itself. Storm-related fresh water coral kills have been documented in Kaneohe Bay, Oahu. This area of coast, however, has much better circulation and fresh water runoff would be mixed and advected away much more efficiently than in an enclosed embayment.

Not Addressed. A water quality monitoring program is proposed. The details of that program including who would conduct it have not yet been established.

As plans are developed for other Chalon properties, their cumulative environmental impacts will be examined. At this time, other plans are not well enough defined to realistically determine cumulative impacts.

Joan Ellen McFee

1. A. The list of CPC members will be included in the final EIR.

   B. The highlights of the CPC recommendations will also be included in the final EIR.

2. The results of the surveys mentioned are summarized in Section 5.1.3.3 and in Table IV-3 of the EIR. The survey instruments are not necessary because the questions were straight forward and the results presented. The questions later in the Section were not part of the survey questionnaire. Interpretation of the answers to those questions was necessary because the questions were more subjective in nature.

3. Development of the Mahukona Lodge is an independent action and should be assessed in that manner. Chalon's Long Term Development Plan contains a number of projects which are conceptual in nature at this point in time. When those projects are sufficiently well defined to proceed with acquisition of necessary government approvals, then they will be assessed for their environmental impacts. The Development Plan is a flexible "living" document and we intend to maintain this plan by continued dialogue with the community concerning

future proposed developments in the district.

4. The quotations excerpted from Appendix A contain the qualifying phrases "... could be provided..." and "...may become necessary..." There is no contradiction there. The fact is not every detail can be foreseen precisely twenty years into the future. The authors were speculating on possible future scenarios which could develop. There are numerous other scenarios which could also be postulated, and lacking prescient knowledge of future recreational demands and alternatives, they would have equal validity at this time.

5. The Conservation district extends back from about 75 feet to about 300 feet. No part of the golf course is planned for this area. By "ocean front holes", the meaning was intended to mean unobstructed view of the ocean from the course at that point.

6. Maliu Ridge phases II and III are included in the analysis of the future residential lot projects on the island. The owners/developers on none of the potential developments are shown because that information is irrelevant to the analysis undertaken in that section.

7. Public access to the shoreline will be maintained and improved. Chalon's intention is to provide a form of vehicular access along the shoreline, including to areas not included in the court rulings as you mentioned.

8. At the present time (non-peak season) resort occupancy in Kohala (North and South) is running about 50 percent. This is not "dangerously low." Furthermore, the target market for the Lodge will be somewhat different from that sought by the other existing and planned resorts in the area.

9. The Section questioned begins by referencing what some residents have expressed as a concern and then by analyzing its likelihood. In this case, various studies indicate that a larger supply of residential properties in an area may result in a slowing of the property value appreciation, presumably due to satiation of demand for properties in that area. On the one hand, this would lessen growth in owners' equity. On the other hand, it would lessen growth in owners' property taxes and tend to stabilize rental prices. Whether these effects are perceived as positive or negative depends on an individual's circumstances.

10. Presumably the reference to Exhibit IV-E is that of Appendix A, as that's the only one in the EIR. This exhibit contains a summary of the projected visitor unit occupancy rates for the Island of Hawaii by five-year increments through 2010, not data on the daily resort population. In any event, the traffic study included trips generated by residents, visitors and employees.

11. Pertinent information from the Narrow Gage in a Kingdom will be included in the final EIR.

Richard McFee

- The villa units are hotel rooms.
- The traffic impact assessment examined existing, future without the project, and future with the project conditions, and concluded that the impacts in terms of level of service would not be significant.
- The figure quoted as being for the golf course is actually the total irrigation demand for the golf course, the residential/agricultural lots and Mahukona and Kapaa Parks. The bulk of the irrigation water will be taken up and transpired by the landscaping, crops and grasses. A significant amount will evaporate in this hot, dry windy area. Nutrients in wastewaters and fertilizers will be stripped by the plants to relatively low levels. Irrigation would be reduced or suspended during very rainy periods.
- Chalon is committed to the use of alternative energy systems where feasible.
- The wording regarding the width of the Conservation District lands along the shoreline will be amended to reflect its variable nature, as shown on Figure II-6.
- Chalon is committed to maintaining public access to the shoreline, and in fact intends to provide better access than required by the various court decisions. The intention at present is to provide a shuttle service along the shoreline. In the interim, keys to the gates can be picked up at Chalon's office in Hawi.
- It is not Chalon's intention to restrict parking by residents to unfavorable sections of the lots, or to allow intimidation of residents by staff. We would hope that our staff would treat residents as neighbors of the lodge and of themselves.

- The proposed coastal water quality monitoring program will be designed to detect the presence of pollutants in coastal waters. Feedback from this program will then allow adjustments to be made to the various application rates.

- By "majority of construction" is meant the majority of site work, or earth moving. While the Lodge would be the closest structure to the ocean, the bulk of the area subjected to grading would be further inland.

- All water calculations are based on those standards imposed by the County of Hawaii Department of Water. These standards do not reflect those indicated in the "Standard Handbook of Mechanical Engineers". As such, your calculations and those of this EIR do not correlate.

- Should Chalon utilize a public water system, the County Department of Water Supply has indicated to us that additional source wells will need to be constructed at Chalon's expense.

- With respect to traffic impacts to Hawi, Figure 2 of the traffic report shows that the proposed project will add only 65 and 105 two-way vehicle trips to the north of the project site in the AM and PM peak hours, respectively, in the year 2015. Much smaller volumes would be generated in the earlier years. Not all of these trips would pass through Hawi, and these volumes should not have a significant impact relative to the existing and future ambient traffic. As noted in the traffic report, State DOT traffic counts from 1988 show very low volumes on the highway in the center of Hawi town.

- Chalon is working with the community to formulate an appropriate master plan for its North Kohala lands. The purpose of the draft EIR was to disclose impacts resulting from the Mahukona Lodge project. When other projects are adequately defined, their impacts will be examined.

- We are confident that a fair and amicable solution can be reached to provide access to the shoreline.

- The small, low-rise development proposed is in harmony with the character of the setting and the community. The rights of residents to access the shoreline will be respected, and sources of potential pollution carefully controlled. No work in the shorewaters or immediately adjacent to the shoreline is contemplated. Ciguatera poisoning, a result of toxins produced by certain species of marine algae being concentrated

through the food chain and ultimately consumed by man, is often associated with dredging or other baring of the bottom surface which allows the algae in question to colonize the area. The proposed project would not affect the ocean bottom.

- We don't understand your concern that present residents will be taxed to pay for future infrastructure and public service improvements, but caucasians from the mainland would not. It is likely that, based on assessed property values, not to mention improvements associated directly with the project, the newcomers would be paying a disproportionately larger share of these costs. Your concerns about the general urbanization of the district are shared by Chalon, and form the basis for the size and style of the proposed project. In the future development of our other lands in the district, particular care will be taken to maintain an appropriate scale and style.

- The alternative of subdividing lands in the foothills is not feasible at present. The land is zoned for a 600-acre minimum lot size. In order to develop the Maliu Ridge properties, it was agreed that the makai lands would remain in agriculture.

- Maintaining the entire coastline in park lands would preclude the property owner from an economic return on investment. Many of the benefits of the proposed project would not occur, and fewer people would have the opportunity to enjoy the shoreline. Further, there already exist Mahukona, Lapakahi and Kapaa Parks in the area.

- The proposed subdivision will be of very low density and houses developed will be in compliance with CC & R's to mitigate such visual obstructions. Thus, the appearance will be quite compatible with the rural character of the area.

- There are no plans for construction of a boat dock in Mahukona Harbor.

- The recommendations of the CPC will be included in the final EIR. We apologize for the omission in the draft.

Thank you for participating in the Draft EIR review process. Your letter and this response will be appended to the Final EIR.

Sincerely,

Matthew Grady
Planner

cc: Mr. Bill Graham

Mahukona

Chapter VIII: *References Cited*

CHAPTER VIII

REFERENCES CITED

Alshire, I. and K. Smith. 1989. Isle Jobless Few and Far Between. Honolulu Advertiser, October 4, 1989.

Belt Collins & Associates. 1976. Final Environmental Impact Statement for South Kohala Resort. Prepared for Mauna Kea Properties.

Belt Collins & Associates. 1981. Revised Environmental Impact Statement for the Proposed Mahukona Resort. Prepared for Mahukona Properties.

Belt Collins & Associates. 1983. Environmental Impact Statement for the Proposed Princeville Phase Two development. Prep. for Princeville Development Corp.

Belt Collins & Associates. 1987a. Final Environmental Impact Statement, The Ritz-Carlton Mauna Lani, Mauna Lani Resort, South Kohala, Hawaii. Prepared for The Ritz-Carlton Hotel Company.

Belt Collins & Associates. 1987b. Final Environmental Impact Statement for South Kohala Resort. Prepared for Mauna Kea Properties.

Bienfang, P. K. 1977. Survey of aquatic biota and water quality characteristics of the anchialine ponds at Anaehoomalu, Hawaii. Unpublished report prepared for Boise Cascade Co., Honolulu, Hawaii. Oceanic Institute, Waimanalo, Hawaii.

Bienfang, P. K. 1980. Water quality characteristics of Honokohau Harbor: a subtropical embayment affected by groundwater intrusion. Pacif. Sci. 34:279-291.

Brock, R. E., J. E. Norris, D. A. Ziemann and M. T. Lee. 1987. Characteristics of water quality in anchialine ponds of the Kona, Hawaii coast. Pacif. Sci., Vol. 41, Nos. 1-4, pp 200-208.

Chang, S. Y. K and R. H. F. Young. 1977. An investigation into environmental effects of sewage effluent reuse at Kaneohe Marine Corps Air Station Klipper Golf Course. Water Resources Research Center, Univ. of Hawaii, Tech. Report No. 53.

Community Resources, Inc. 1985. Analysis of Surplus Job Applicants to Turtle Bay Hilton. Prepared for Kuilima Development Co.

Community Resources, Inc. 1988. Socio-Economic Impact Assessment for Proposed Waikane Golf Course. Prepared for Waikane Development Co.

REFERENCES CITED
(Continued)

Community Resources, Inc. 1989a. 1988 Statewide Tourism Impact Core Survey: Summary and Detailed Findings. Prep. for Hawaii State Department of Business and Economic Development, Tourism Branch.

Community Resources, Inc. 1989b. Socio-Economic Impact Assessment for the Country Courses at Kahuku, Oahu, Hawaii. Prepared for Kuilima Development Co.

Conde, J. C. 1971. Narrow Gauge in a Kingdom: The Hawaiian Railroad Company, 1878-1897. 2nd Printing, 1985. Railhead Publications. 96p.

Cottington, F. 1969. Socio-Psychiatric Effects of Luxury Hotel Growth and Development on a Rural Population. Unpub. ms at University of Hawaii Hamilton Library.

Cox, D. C., F. F. Peterson, W. M. Adams, C. Lau, J. F. Campbell and R. D. Huber. 1969. Coastal evidence of groundwater conditions in the vicinity of Anaehoomalu and Lalamilo, South Kohala, Hawaii. Water Resources Research Center, Univ. of Hawaii, Tech. Report No. 24.

Decision Analysts Hawaii, Inc. 1986. Employment Impacts of Resorts: Summary and Recommendations; and, West Hawaii: Cumulative Impacts of Approved Resort Developments. Prepared for the County of Hawaii.

First Hawaiian Bank. 1989. Maui County in 1989. Economic Indicators. July/August 1989.

Gomes, M. 1990. Kohala Ditch: Evaluation. Prepared for Chalon International, Inc.

Hawaii County. 1989. The General Plan.

Hawaii Department of Business and Economic Development. 1988. Revised Long-Range Economic and Population Projections to 2010, State of Hawaii (Series M-K).

Hawaii Department of Business and Economic Development. 1989. State of Hawaii Data Book: A Statistical Abstract. Honolulu.

Hawaii Department of Planning and Economic Development. 1972. Tourism in Hawaii: Hawaii Tourism Impact Plan, Vol. I.: Statewide.

Hawaii Office of State Planning. 1989. West Hawaii Regional Plan.

Hawaii Visitors Bureau. 1989. Visitor Unit Inventory, February 1989.

REFERENCES CITED
(Continued)

Hooper, S. 1989. Up in the Air. Hawaii Business, May 1989.

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, Univ. of Hawaii, Tech. Report No. 105.

Kwon, B. 1990. Golf's Gold Coast Adds New Glitter. Honolulu Star-Bulletin, January 31, p. D-1.

Land Study Bureau, University of Hawaii. 1967. Detailed Land Use Classification Island of Hawaii.

Locations, Inc. 1988. Market Study of Lihi-Lani Recreational Community. Honolulu, HI.

Locations, Inc. 1989. Market Study for Proposed Waikane Golf Course. Honolulu, HI.

Maciolek, J. A. and R. E. Brock. 1974. Aquatic Survey of the Kona Coastal Ponds, Hawaii Island. UNIHI-SEAGRANT-AR-74-04: Grant No. 04-3-158-29, NOAA, Office of Sea Grant.

Marsh, J. A., Jr. 1977. Terrestrial inputs of nitrogen and phosphorus on fringing reefs in Guam, pp. 332-336. In: Proceedings of the 2nd International Coral Reef Symposium, Vol. 1. Great Barrier Reef Committee, Brisbane, Australia.

Mullineaux, D. R., D. W. Patterson and D. R. Crandell. 1987. Volcanic Hazards in the Hawaiian Islands. US Geological Survey Prof. Paper No. 1350.

Murdoch, C. L. and R. E. Green. 1988. Environmental impact of fertilizer and pesticide use on the proposed Waikane Golf Course project. Appendix L. In: Draft Environmental Impact Statement for the Proposed Waikane Golf Course Project, Waikane, Koolaupoko District, Oahu, Hawaii. Prepared by Group 70 for Waikane Development Co.

Murdoch, C. L. and R. E. Green. 1989. Environmental impact of fertilizer, herbicide and pesticide use. In: W. E. Wanket, Inc., Final Environmental Impact Statement, Royal Kunia Phase II, Hoaeae, Ewa, Oahu.

Pang, G. 1990. Isle Real Estate Market Booming. West Hawaii Today. January 7, p. 1-A.

REFERENCES CITED
(Continued)

PBR HAWAII. 1988. Final Environmental Impact Statement, Punalu'u Resort, Punalu'u, Ka'u, Hawaii. Prepared for C. Brewer Properties, Inc.

PBR HAWAII. 1990. Final Environmental Impact Statement for Lahaina Master Planned Project. Prep. for State Housing and Finance Development Corporation.

Phillips, Brandt, Reddick and Associates (Hawaii), Inc. 1984. North Kohala Community Development Plan (Preliminary Draft). Prep. for Hawaii County.

R. M. Towill Corp. 1984. Environmental Assessment for Kapaanui Agricultural Subdivision, Kapaanui and Kou, North Kohala, Hawaii.

Sakoda, E. T. 1975. The Marine Geology and Sedimentology of Hawaii Kai and Adjacent Maunalua Bay. M.S. Thesis in Geology, Univ. of Hawaii.

Smith, M. H. 1972. Socioeconomic Transition in North Kohala. In R. W. Armstrong and H. T. Lewis (Eds.), Preliminary Research in Human Ecology. 1970: North Kohala Studies. University of Hawaii, Social Sciences Institute.

Smith, S. V., W. H. Kimmerer, E. A. Laws, R. E. Brock and T. W. Walsh. 1981. Kaneohe Bay sewage diversion experiment: Perspectives on ecosystem responses to nutritional perturbation. Pac. Sci. 35:279-402.

SMS Research and Marketing Services, Inc. 1989. North Kohala Survey. Prepared for the Housing Subcommittee of the Citizens Participation Committee.

Stearns, H. T. 1967. Geology of the Hawaiian Islands. Bull. 8, Department of Land and Natural Resources.

Sunn, Low, Tom and Hara. 1974. Final Report of the Investigation of Hawaii Kai Marina Waters. Prepared for Kaiser-Aetna, Corp.

U.S. Army Engineer District. 1975. Final Environmental Statement for Department of the Army Permit Action in the Hawaii Kai Marina, Oahu, Hawaii. Corps of Engineers, Pacific Ocean Division.

U.S. Department of Commerce, Weather Bureau. 1962. Rainfall Frequency Atlas of the Hawaiian Islands. Washington, D.C.

REFERENCES CITED
(Continued)

U.S. Fish and Wildlife Service (Department of the Interior). 1985. Endangered and threatened wildlife and plants; Review of plant taxa for listing as endangered and threatened species; Notice of Review. Fed. Reg. 50(188): 39526-39527 plus 57 pg. table of plants.

University of Hawaii, Real Estate Research and Education Center. 1990. Analyzing the Market and Environmental Impacts of the Golf Industry in Hawaii.

Young, B. C. and J. D. Kinzie. 1973. Psychiatric Consultation to a Rural Community in Hawaii. Unpublished ms.

Mahukona

Appendix A: *Market Assessment for the Mahukona Resort Community North Kohala, Hawaii*

KPMG Peat Marwick

Certified Public Accountants

Market Assessment for the Mahukona Resort Community North Kohala, Hawaii

Prepared for

CHALON INTERNATIONAL OF HAWAII, INC.

March 1990

KPMG Peat Marwick

Certified Public Accountants

PO Box 4150
Honolulu HI 96812 4150

Telephone 808 531 7286
Telex 7238615

Telecopier 808 536 8338

March 29, 1990

Mr. James Leonard
Managing Director
PBR Hawaii-Hilo
101 Aupuni Street, Suite 310
Hilo, Hawaii 96720

Dear Mr. Leonard:

KPMG Peat Marwick is pleased to present the attached report entitled "Market Assessment for the Mahukona Resort Community."

The report presents the market assessment for the proposed residential and resort community at Mahukona, and is organized into six chapters as follows:

I. Introduction and Executive Summary
II. Visitor Trends
III. Site Description and Regional Overview
IV. Lodge Market Assessment
V. Residential Lot Market Assessment
VI. Golf Course Market Assessment

Thank you for the opportunity to work with you in the planning of this exciting project.

Very truly yours,

KPMG Peat Marwick

Market Assessment
for the
Mahukona Resort Community
North Kohala, Hawaii

Prepared for

CHALON INTERNATIONAL OF HAWAII, INC.

March 1990

A-2

CHALON INTERNATIONAL OF HAWAII

Table of Contents

CHALON INTERNATIONAL OF HAWAII

Table of Contents, Continued

CHALON INTERNATIONAL OF HAWAII

Table of Contents, Continued

I - INTRODUCTION AND EXECUTIVE SUMMARY

Chalon International of Hawaii, Inc. (Chalon) engaged KPMG Peat Marwick (Peat Marwick) to conduct a market study for a resort residential and recreational community at Mahukona on the island of Hawaii. The preliminary concept for the property would create a relatively low-density community including a resort lodge, one-acre residential lots, a golf course and other resort recreational amenities.

BACKGROUND

Chalon owns a 254-acre site at Mahukona and an adjacent 233-acre site at Kapaanui in the district of North Kohala on the island of Hawaii. A master plan is being formulated to develop these two parcels into a resort residential and recreational community. Development of this community could require a number of government approvals. A portion of the property at Kapaanui has already been approved for subdivision into one-acre lots.

Peat Marwick was engaged to prepare a market assessment for potential resort community use of the property, and an assessment of economic and fiscal impacts of the planned development. This report summarizes the market assessment findings; economic and fiscal impact conclusions are presented in a separate report.

STUDY OBJECTIVE AND APPROACH

The objective of the Peat Marwick study was to assess the market potential of the planned uses at the proposed resort residential and recreational community.

To accomplish this objective, the study approach consisted of the following steps:

- Met with Chalon representatives and other planning consultants to review the preliminary development plans, obtain relevant data, and to visit the proposed development site.
- Reviewed the Hawaii hotel and visitor industries, identifying competitive and complementary facilities.
- Evaluated the market performance of existing and planned competitive facilities.
- Made recommendations for facility concepts and development.
- Reviewed existing and planned residential lot projects on the island of Hawaii.
- Assessed market support for a 250- to 300-room high-service luxury lodge.
- Projected potential market support for resort-residential lots at the proposed community.
- Assessed market support for an 18-hole golf course.

EXECUTIVE SUMMARY

This section presents key findings and conclusions of the market assessment.

Economic and Demographic Outlook

Hawaii County's economy is experiencing rapid growth. Gross business receipts increased by 12% to $2.1 billion in 1988, as reported by First Hawaiian Bank. The visitor and construction industries are leading the economic expansion. Visitor expenditures increased by 22% to $464 million in 1988, and construction put-in-place increased by 30% to $163 million.

This growth is continuing in 1989, with gross business receipts up 11% as of July. With over one billion dollars anticipated to be invested in the development of new hotels and resort areas in west Hawaii, this area is expected to lead the growth of the island of Hawaii. Major capital investment in existing and new resort areas could help future expansion exceed the historical growth rates for the island.

Visitor Trends

Statewide overnight visitors totaled 6.1 million in 1988 and are anticipated to reach about 6.7 million in 1989. Visitor arrival growth averaged 5.7% annual increases in the 1980s. For most of the decade, eastbound visitors (primarily from Japan) increased at a higher rate than westbound visitors. However, in 1989 westbound arrivals showed a greater increase.

Despite recent declines in market share, Oahu attracts the greatest number of westbound visitors of all the islands. The island of Hawaii attracts the lowest number of westbound visitors, however, it has shown the largest growth rates from 1988 to 1989, based upon annualized data. Eastbound visitor data by island is not available, but most Japanese visitors currently stay on Oahu.

Visitor arrivals to the island of Hawaii are projected to increase due to the rapid development of visitor facilities and amenities, increased and more effective marketing of the island and the increasing number of eastbound and westbound repeat visitors to the state, who seek the neighbor islands for new attractions and experiences.

Hawaii County, with 8,161 visitor rooms in 1989, represents 12% of the state's total. There are nearly 8,000 hotel rooms proposed for development on the island of Hawaii, which will almost double the number of visitor units on the island. Most of the development is planned in the North Kona and South Kohala districts, where a majority of the existing inventory is located.

Occupancy levels for the state and Oahu have remained relatively stable from 1986 to 1989 while neighbor island occupancies declined in 1987 and 1988. This declining occupancy trend continued for Maui in 1989, however, did not continue for Hawaii and Kauai: 1989 year-to-date occupancies increased 4.9% over 1988 occupancies for each of these neighbor islands. The average visitor unit occupancy rate on Hawaii is projected to increase from about 61% in 1989 to about 63% in 1995 and to 75% in 2005.

Hotels in Hawaii achieved an average room rate of $96 per room in 1989 and $88 in 1988. The most notable increase over 1988 room rates occurred on the island of Hawaii: the average islandwide rate increased 39%. This was primarily a result of increased rates in hotels located in the west Hawaii region.

Lodge Market Assessment

The state's hotel inventory is anticipated to grow substantially in the 1990s. Growth of the luxury-class inventory is the major trend occurring in market segmentation, with:

- Development of new luxury-class destination resorts.
- Greater differentiation of luxury hotels, including high-service, high-activity and retreat properties.
- Increased number of international and American luxury hotel operators represented in the Hawaii market.

A high-service luxury lodge hotel of 250 to 300 rooms is recommended for Mahukona. Based on the site's sloping topography and commanding ocean views, a low-rise development concept is considered appropriate. The lodge could include a fine-dining restaurant and other guest facilities within a main building, around which could be clustered villas containing 4 to 8 large, high-quality hotel units per building.

The resort lodge would be developed to provide the following:

- A complete resort experience for lodge guests, with personal service, an intimate scale, and a variety of services consistent with the size of the facility and a luxury market position.
- A social and recreational center for residential lot owners in the Mahukona resort community, and for residents of other estate lot and upscale communities in the west Hawaii region.
- An attraction to regional visitors venturing outside of resort destination areas.

In order to serve these markets, the following resort facilities and services are considered:

- Lodge units - The lodge could be developed to an ultimate size of from 250 to 300 units.
- Restaurants - A fine-dining restaurant could both complement facilities and attract regional residents and visitors. More casual dining could be provided in connection with recreational facilities. The restaurant could also be developed with loft space to be used for catered, group functions and corporate events.
- Recreation - An 18-hole resort golf course and tennis club on the property, along with a clubhouse and health spa, could serve guests, community and regional residents. Memberships could also be instituted to provide both facility support and patronage from regional part-time and full-time residents.

- Lodge guest services - In keeping with the intimate scale of the lodge, a number of guest services could be considered, such as:
  - Room service
  - Organized water sports and recreational activities
  - Concierge service
  - Limousine or shuttle transportation
  - Gift shop/newstand
  - Library
  - Beauty salon

The lodge is expected to develop a clientele centered on affluent free independent travelers (FITs). At stabilized occupancy, FIT visitors are projected to represent about 65% of guest-nights at the lodge. Incentive and corporate business travelers could represent about 20% and group visitors about 10% of occupancy. Kamaaina guests are expected to comprise the remaining 5% of guest-nights.

After an initial period of marketing, the Mahukona resort lodge could establish occupancy rates comparable to the islandwide rate, due to attractive facility concept, on-property golf and other recreational facilities, and growing numbers of repeat visitors to the region. A stabilized occupancy rate of 70% is anticipated in 2000, as shown:

Projected Occupancy Rates for
Mahukona Resort Lodge
1995 to 2005

Year	Projected occupancy rate: Island of Hawaii	Projected occupancy rate: Mahukona resort lodge
1995	63%	55%
1996	64	60
1997	65	64
1998	67	67
1999	68	70
2000	69	70

Based upon the facility concept and projected guest mix, the Mahukona resort lodge could achieve a daily room rate of $240 to $250.

Residential Lot Market Assessment

The residential lots planned for the Mahukona resort community are unique because they contain features of two types of residential lot projects: agricultural/estate lots, such as Kohala Ranch, and resort lots, such as Fairways at Mauna Kea North.

The residential lots planned for the Mahukona resort community are similar to the estate lot projects because they are all about one acre in size. However, since the lots will be located within a master-planned resort community, amenities generally associated with resort lot projects will be available. Chapter IV describes the attributes of estate lot and resort lot projects and further delineates estate lot projects into three types: equestrian-oriented, residential-oriented, and resort-oriented.

Mahukona is anticipated to emerge as a resort-oriented estate lot community because of its location and the planned resort facilities. However, due to the size of the lots and the experience at other Hawaii projects, it is also anticipated to have characteristics of a residential-oriented estate lot community.

Due to the resort/residential nature of this project and the high demand for housing on the island of Hawaii, it is anticipated that Hawaii and mainland U. S. residents will be the largest target market, as shown in Exhibit I-A. It is anticipated that the Japanese market will continue to become a larger percentage of the buyers of residential real estate on the island of Hawaii. This is based upon the trends in 1989 and due to the expectation that more Japanese will visit the island of Hawaii. Also, residential real estate purchasers tend to be repeat visitors.

Residential lots at Mahukona are considered to be attractive in terms of location, size and availability of resort amenities. Buyers from the mainland United States and from Hawaii are expected to represent key target markets, as shown in Exhibit I-A. All 170 planned lots could be absorbed within the first five years of marketing, as shown in Exhibit I-B. Buildout of improved lots is not expected to be completed until after 2010.

Sales prices are projected to range from $250,000 to $400,000 per one-acre lot, as shown in Exhibit I-B. Lots with golf course frontage are anticipated to command a premium, with prices ranging from $300,000 to $400,000. Other lot prices are projected to range from $250,000 to $300,000.

Prices of existing and planned estate lot projects were reviewed to determine the pricing structure. Kohala-by-the-Sea and Pu'u Lani Ranch are considered to be the most comparable projects, thus prices of these lots were considered in the pricing analysis. Kohala-by-the-Sea is comparable in terms of lot sizes and project location and Pu'u Lani Ranch is comparable in terms of lot sizes. The size of the lot is an important pricing criteria because per-acre prices generally decline significantly as the size of the lot increases.

Golf Course Assessment

The island of Hawaii currently has six resort golf courses and five off-resort courses. Most of the resort courses are located in the South Kohala district where the major resorts are located. The off-resort courses are primarily located on the east side of the island. An additional 18 golf courses are planned or proposed for the island, however, it is not anticipated that all of these will be developed.

Golf course usage may be measured in average rounds played per day. It is affected by a number of factors, including prevailing weather, difficulty of play, player familiarity with course conditions, the use of carts, and starting

Exhibit I-A

CHALON INTERNATIONAL OF HAWAII

Anticipated Estate Lot Buyer Characteristics at
Kapaanui-Mahukona Subdivision

	Projected range	
	Low	High
Buyer origin:		
Hawaii	25%	45%
Mainland U. S.	35	50
Japan	10	20
Other international	5	10
Purchase motivation:		
Investor	20	30
Second home residence	40	60
Primary residence	20	40

Exhibit I-B

CHALON INTERNATIONAL OF HAWAII

Projected Sales Absorption and Market Performance of
Kapaanui-Mahukona Estate Lots

Development characteristics:	
Number of lots	170
Average lot size	1 acre
Projected sales absorption:	
First year (1992) sales	20
1993 - 1996 annual sales	35 - 40
Average sales per year	34
Projected home completion:	
Percentage lots improved by 1997	24%
Percentage lots improved by 2000	45
Percentage lots improved by 2005	68
Project buildout	After 2010
Estimated lot pricing(1):	
Golf course frontage	$ 300,000 - 400,000
Other	$ 250,000 - 300,000

(1) In 1990 dollars.

time intervals. It is also affected by the seasonal character of Hawaii resort golf use. Peak season occurs from January through March, as U. S. Mainland visitors arrive for longer stays, while the slowest periods tend to be in summer. Peak and low season play levels may vary by almost 100%. On the Island of Hawaii, luxury resorts such as Mauna Kea, Mauna Lani and Kapalua have very high rates of play by hotel guests.

Fees charged to resort guests and nonresort guests approximate the statewide average. However, fees charged to Hawaii residents are significantly higher on the Island of Hawaii at $74 compared to the statewide average of $56. The only resort that offers competitive statewide rates to Hawaii residents is the Waikoloa Beach Resort.

The demand for golf at the Mahukona course is based upon the projected average daily population at the resort, the anticipated number of members of the golf club and a share of regional visitor golf demand. Demand for golf at the resort is projected to increase from an estimated 80 rounds per day in 1995 to about 150 rounds per day in 2010, as summarized in Exhibit I-C.

Demand for golf at the Mahukona course is anticipated to be derived from four primary sources, as listed below:

- Lodge hotel guests
- Single-family residents
- Golf club members
- Regional visitors

Each of these groups would be anticipated to generate varying amounts of demand for golf as shown in the exhibit. Lodge guests are anticipated to be avid golfers playing about 200 daily rounds of golf per 1,000 guests. Golf club members are also generally more frequent golfers than public golfers and are projected to play about 100 rounds per year. Single-family residents are anticipated to play the least amount of golf at about 25 rounds per year.

II - VISITOR TRENDS

This chapter presents an overview of the statewide and Hawaii County visitor industry.

VISITOR INDUSTRY TRENDS

Statewide and neighbor island visitor trends are discussed in this section.

Statewide Visitor Arrivals

Overnight visitor arrivals to Hawaii totaled 6.6 million in 1989, of which about 4.6 million were westbound visitors (traveling westward from the United States, Canada and Europe) and almost 2.0 million were eastbound travelers (primarily from Japan), as shown in Exhibit II-A. Arrivals in 1989 increased 7.3% over the previous year, with an 8.1% increase in the number of westbound visitors.

Visitor growth has been strong with average annual increases of 19.4% in the 1960s, 8.5% in the 1970s and 5.9% from 1980 to 1989. Over the past ten years, westbound travelers represented about 76% of visitors to Hawaii. Westbound arrivals increased at an average annual growth rate of 18.1% from 1960 to 1970, 8.7% from 1970 to 1980 and 4.7% from 1980 to 1988.

Although representing a significantly smaller (24%) segment of the visitor market, eastbound arrivals grew at a faster rate than westbound arrivals in the 1980's, increasing 9.3% per annum from 1980 to 1989. The increasing ratio of eastbound to westbound travelers is shown in Exhibit II-B.

Visitor Arrivals By Island

Despite recent declines in market share, Oahu attracts the greatest number of westbound visitors of all the islands, as shown in Exhibit II-C. In the 1970's, the number of Oahu westbound visitors increased about 5.2% annually, declining to 3% growth in the 1980s. Maui, the second most visited island, experienced 4.4% annual increases in the 1980s, and Kauai experienced 4.7%. The island of Hawaii experienced the lowest growth rate at 2.6% from 1980 to 1989. However, Hawaii arrivals grew by 23%, compared to 8% for the state as a whole.

In 1988, 71% of all westbound visitors visited Oahu while Maui attracted 44%, Kauai 25%, and Hawaii 18%, as shown in Exhibit II-D. Data for 1989 indicates that the island of Hawaii experienced the largest increase from 1988 to 1989, attracting 21% of westbound visitors as of September.

Eastbound visitor data by island is not available, but most Japanese visitors visit Oahu. An estimated 99% of the 1988 Japanese visitors stayed on Oahu. While 36% of the Japanese did visit a neighbor island in 1988, most were on day trips with only 22% staying overnight or longer on Maui, 12% on Kauai, and 7% on the island of Hawaii.

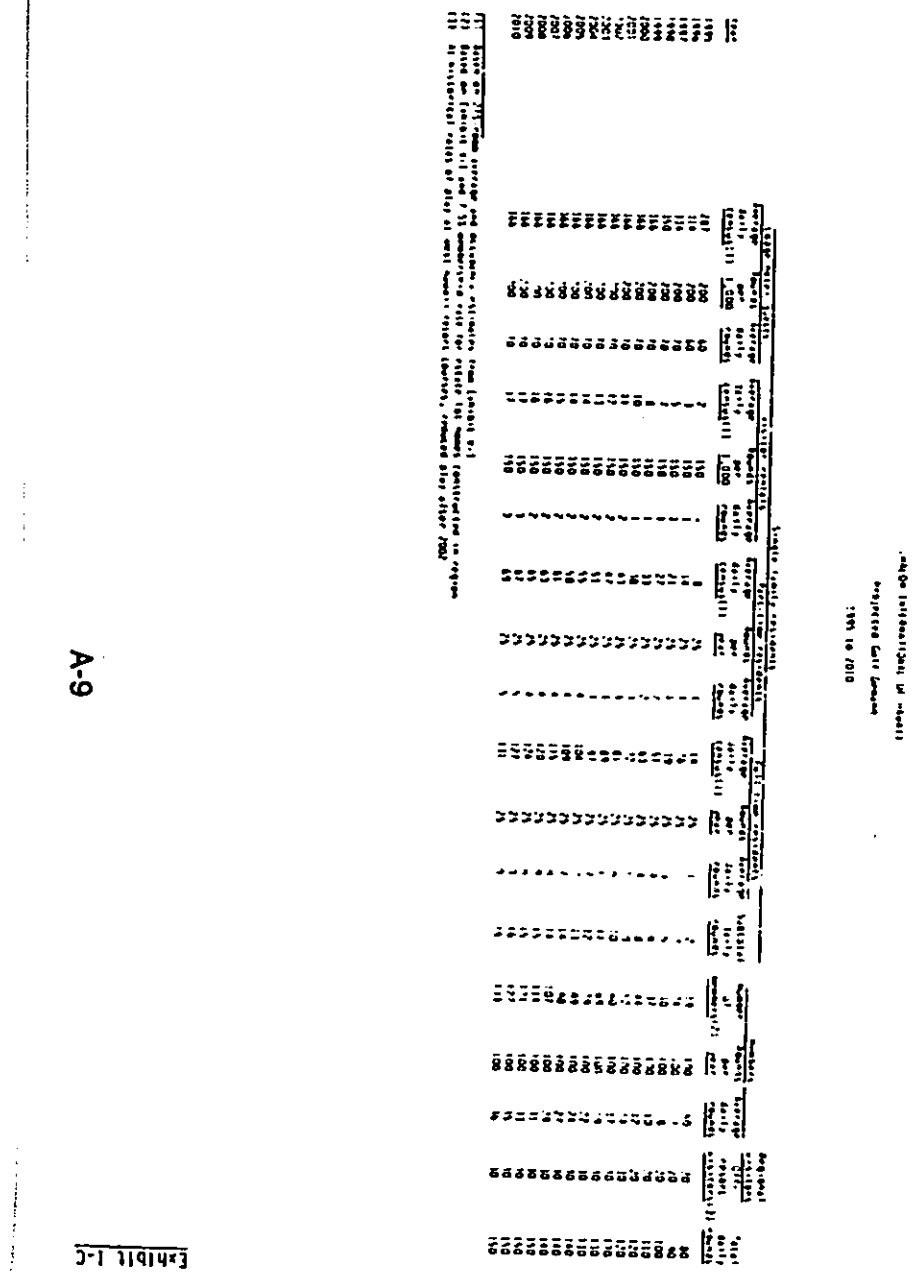


Exhibit II-C

CHALON INTERNATIONAL OF HAWAII

Overnight Visitors to the State of Hawaii

1960 to 1989

Year	Westbound Number	Westbound Annual percentage growth	Eastbound Number	Eastbound Annual percentage growth	Total Number	Total Annual percentage growth
1960	250,795	- %	45,722	- %	296,517	- %
1965	567,218	17.7	119,710	21.2	686,928	18.3
1970	1,326,135	18.5	420,835	28.6	1,746,970	20.5
1975	2,207,417	10.7	621,688	8.1	2,829,105	10.1
1976	2,551,601	15.6	668,550	7.5	3,220,151	13.8
1977	2,763,312	8.3	670,355	.3	3,433,667	6.6
1978	3,030,999	9.7	639,310	(4.6)	3,670,309	6.9
1979	3,139,455	3.6	821,076	28.4	3,960,531	7.9
1980	3,046,132	(3.0)	888,372	8.2	3,934,504	(0.7)
1981	2,974,791	(2.3)	959,832	8.0	3,934,623	-
1982	3,278,525	10.2	964,400	.5	4,242,919	7.8
1983	3,395,880	3.6	972,000	.8	4,367,880	2.9
1984	3,721,380	9.6	1,134,200	16.7	4,855,580	11.9
1985	3,708,610	(0.3)	1,175,500	3.6	4,884,110	.6
1986	4,256,390	14.8	1,350,590	14.9	5,606,980	14.8
1987	4,204,010	(1.2)	1,595,820	18.2	5,799,830	3.4
1988	4,264,730	1.4	1,877,690	17.7	6,142,420	5.9
1989	4,608,660	8.1	1,982,960	5.6	6,596,620	7.3
Compounded annual percentage increase:						
1960 to 1970		18.1		24.9		19.4
1970 to 1980		8.7		7.8		8.5
1980 to 1989		4.7		9.3		5.9

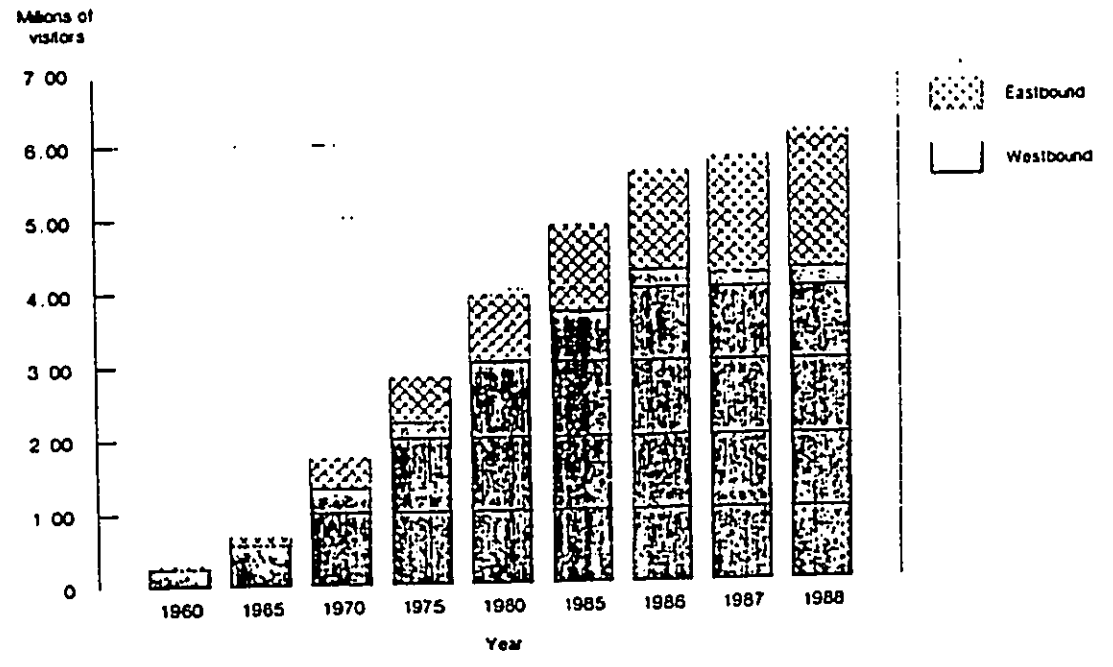
Source: Hawaii Visitors Bureau, annual and monthly reports.

Exhibit II-A

CHALON INTERNATIONAL OF HAWAII

Overnight Visitors to the State of Hawaii

1960 to 1988



Source: Hawaii Visitors Bureau, annual and monthly reports.

Exhibit II-B

Exhibit II-C

CHALON INTERNATIONAL OF HAWAII

Westbound Visitors To Neighbor Islands

1970 to 1989

	Oahu	Neighbor Island counties: Hawaii	Maui(1)	Kauai	Total
1970	1,200,493	446,370	449,763	412,102	1,308,235
1971	1,311,426	522,162	554,869	472,550	1,549,581
1972	1,572,380	637,562	710,050	565,386	1,912,998
1973	1,785,485	694,170	766,790	590,475	2,051,435
1974	1,877,845	742,839	852,204	601,703	2,196,746
1975	1,889,792	769,779	931,863	632,821	2,334,463
1976	2,169,849	817,514	1,110,726	699,275	2,627,515
1977	2,295,313	839,008	1,257,142	740,501	2,836,651
1978	2,494,893	908,983	1,403,054	837,712	3,149,749
1979	2,542,717	860,940	1,419,773	825,366	3,106,079
1980	2,398,737	761,103	1,378,189	781,409	2,920,701
1981	2,398,477	672,683	1,389,892	757,811	2,820,386
1982	2,589,190	678,170	1,550,080	733,295	2,961,545
1983	2,590,980	714,030	1,645,720	692,130	3,051,880
1984	2,901,320	760,940	1,854,690	814,590	3,430,220
1985	2,828,640	697,380	1,831,110	832,580	3,361,070
1986	3,146,030	786,930	2,001,870	1,014,650	3,803,450
1987	3,078,500	782,550	1,908,780	1,032,840	3,724,170
1988	3,013,850	782,360	1,884,050	1,043,710	3,710,120
1989	3,134,000	959,890	2,036,060	1,177,260	4,173,210
Compound annual percentage increase:					
1970 to 1989	5.2%	4.1%	8.3%	5.7%	6.3%
1980 to 1989	3.0	2.6	4.4	4.7	4.0

(1) Includes the island of Molokai.

Source: Hawaii Visitors Bureau, Annual Research Report, various.

Exhibit II-D

CHALON INTERNATIONAL OF HAWAII

Percentage of Westbound Visitors
Visiting the Major Hawaiian Islands

1970 to 1988

Year	Oahu	Hawaii	Maui(1)	Kauai
1970	90.5%	33.7%	33.9%	31.1%
1975	85.6	34.9	42.2	28.7
1976	85.0	32.0	43.5	27.4
1977	83.1	30.4	45.5	26.8
1978	82.3	30.0	46.3	27.6
1979	81.0	27.4	45.2	26.3
1980	78.7	25.0	45.2	25.7
1981	80.6	22.6	46.7	25.5
1982	79.0	20.7	47.3	22.4
1983	76.3	21.0	48.5	20.4
1984	78.0	20.4	49.8	21.9
1985	76.3	18.8	49.4	22.4
1986	73.9	18.5	47.0	23.8
1987	73.2	18.6	45.4	24.6
1988	70.7	18.3	44.2	24.5
1989(2)	67.9	20.8	44.7	26.3

(1) Includes the island of Molokai.
(2) Annualized nine-month data.

Sources: Hawaii Visitors Bureau, Westbound Visitors to Hawaii, 1988. Figures reported represent percentage of the state's visitors who intended to visit each island; most visit more than one island during their stay in Hawaii.

ISLAND OF HAWAII VISITOR TRENDS

This section summarizes visitor arrival trends to the island of Hawaii.

Historical Arrivals

Westbound arrivals to the island of Hawaii increased at an average 5.5% per annum between 1970 and 1980 but increased at a lower 2.7% annual rate between 1980 and 1989, as shown in Exhibit II-E. The last four years have shown improvement over the 1985 figures that were influenced by the United Airlines strike. From 1986 to 1988, the island's number of westbound visitors remained rather stable at about 780,000, and 1989 should be significantly higher based on the first nine months of the year.

Hawaii County's visitor growth has been slower than the other neighbor islands, as previously shown in Exhibit II-C. This is due to its relatively slower facility development, historically greater dependence on agriculture, and less prominent market image among westbound travelers. However, given the recent and imminent openings of major new hotels including the Hyatt Regency Waikoloa and Ritz Carlton Mauna Lani, the island is expected to gain market momentum.

Increased visitor arrivals on the island of Hawaii are anticipated to be driven by the following factors:

- Rapid development of visitor facilities and amenities.
- Diversification of visitor market segments.
- Increased and more effective marketing of the island and individual properties.
- Increasing number of repeat visitors to the state who seek the neighbor islands for new attractions and experiences.

Visitor Travel Patterns

- Place of origin - In 1988, about 62% of all visitors to the state resided in the continental United States and Canada, as shown in Exhibit II-F. About 22% of the state's visitors were from Japan and 3% were from Oceania and South Pacific countries.
- Purpose of trip - Visitors to the state tend to be primarily vacationers. In 1988, about 84% of westbound travel to the state was for pleasure, while 95% of Japanese travel was for pleasure, as shown in Exhibit II-G. About 85% of the visitors to the island of Hawaii was for pleasure.
- Accommodation usage - Hotels serve the majority of visitors:
  - In 1988, about 60% of westbound visitors to the state and about 55% of westbound visitors to the island of Hawaii stayed in hotels.
  - Japanese travelers use of hotels, at 92%, was higher than westbound visitors.

Exhibit II-E

CHALON INTERNATIONAL OF HAWAII

Summary of Westbound Visitor Arrivals
to the Island of Hawaii

Year	Percent of state westbound visitors	Visitor arrivals	Percentage increase (decrease)
1970	33.7%	446,370	- %
1975	34.9	769,779	11.5
1976	32.0	817,514	6.2
1977	30.4	839,008	2.6
1978	30.0	908,983	8.3
1979	27.4	860,940	(5.3)
1980	25.0	761,103	(11.6)
1981	22.6	672,683	(11.6)
1982	20.7	678,170	0.8
1983	21.0	714,030	5.3
1984	20.4	760,940	6.6
1985	18.8	697,380	(8.4)
1986	18.5	786,930	12.8
1987	18.6	782,550	(0.6)
1988	18.3	782,360	-
1989(1)	20.8	959,890	23.8
Compound annual percentage increase:			
1970 to 1980			5.5
1980 to 1989			2.7

(1) Annualized nine-month data.

Source: Hawaii Visitors Bureau, Annual Research Report, annual.

Exhibit II-G

CHALON INTERNATIONAL OF HAWAII

Visitor Travel Patterns
and Demographic Characteristics

1988

	Island of Hawaii westbound visitors	Visitors to the state of Hawaii	
		Westbound visitors	Japanese visitors
Pleasure trip (percent of total)	85.3%	84.0%	94.5%
Accommodation usage (percent of total):			
Hotel	54.6	59.4	91.9
Condominium	16.3	20.7	5.6
Hotel and condominium	12.2	10.2	1.5
Other	16.9	9.7	1.0
Length of stay (days)	5.0	9.9	6.0
Travel status (percentage distribution):			
Free independent traveler (FIT)	82.4%	85.9%	10.0%
Group inclusive tours (GIT)	17.6	14.1	45.4
Package visitors	-	-	44.6
Other	-	-	-
Total	100.0%	100.0%	100.0%
Average party size	1.9	1.8	2.5
Median age	45	40	31
Occupation (percent distribution):			
Professional and technical	40.2%	39.3%	24.0%
Business, managerial, official	24.4	25.8	20.0
Clerical, office, sales	7.0	8.7	28.0
Retired	18.7	13.9	4.0
Other	9.7	12.3	25.0
Total	100.0%	100.0%	100.0%
First-time visitors (percent of total)	44.1%	48.0%	77.4%

N/A Not available.

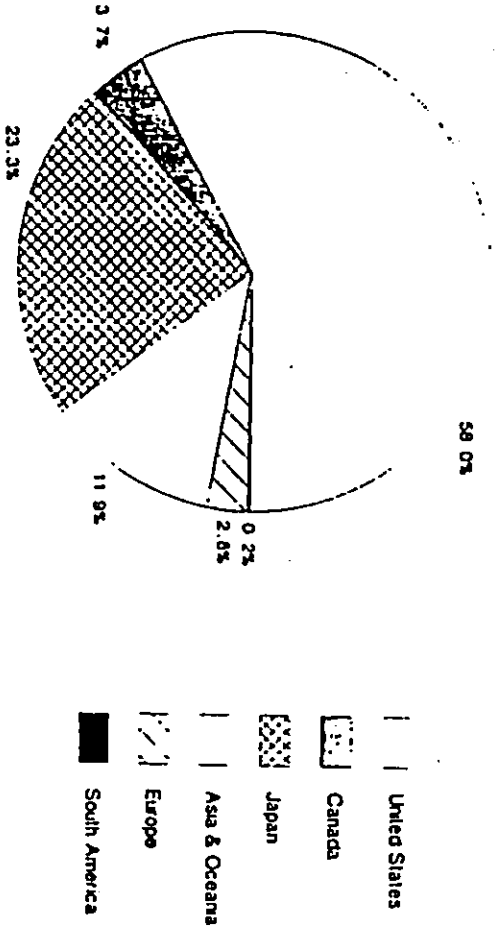
Sources: Hawaii Visitors Bureau, Study of Japanese Visitors to Hawaii 1988 (1989); "1988 Westbound Visitors to Hawaii by Island: Oahu, Maui, Kauai, The Big Island and Molokai" (September 1989); Hawaii Visitors Bureau, Westbound Visitors to Hawaii, 1988 and 1989.

Exhibit II-F

CHALON INTERNATIONAL OF HAWAII

Hawaii State Visitor Origins

1988



Source: Hawaii Visitors Bureau, Westbound Visitors to Hawaii, 1988 and 1989; Study of Japanese Visitors to Hawaii, 1988 and 1989.

- Travel status - Most westbound visitors (86%) were free independent travelers (FITs) while only 10% of the Japanese visitors were FITs in 1988. Most of the Japanese visitors (45%) were on group inclusive tours (GIT) and packages (45%). Island of Hawaii westbound visitors were primarily FITs at 82% and about 18% GIT visitors.

- Average length of stay - The average length of stay in the state was about 10 days for westbound travelers and 6 days for Japanese visitors in 1988:

  - Average length of stay varies per island, as shown for westbound visitors in Exhibit II-H.

  - Average length of stay is still longer on Oahu and Maui, however, stays on Hawaii and Kauai showed larger increases from 1987 to 1988.

Visitor Characteristics

Characteristics of visitors to the state are also shown in Exhibit II-G and summarized below:

- Average party size - On average, westbound visitors traveled in smaller groups (1.8 persons per party) than the Japanese visitors (2.5 persons). The island of Hawaii's westbound party size is slightly higher at 1.9.

- Age - The median age of westbound travelers to the state, about 40, has changed little in the last decade and a half. The island of Hawaii's westbound visitors are slightly older at 45. In 1988, the median age of the Japanese traveler was 31.

- Occupation - The state's visitors have shifted to higher salaried professional/technical and business/managerial occupations, representing 39% and 26% of all westbound visitors to the state, respectively.

  - In contrast, the distribution of Japanese visitors is more evenly spread between professional, executive, clerical and other occupational categories.

  - Another notable difference between westbound and Japanese travelers is the greater number of westbound travelers who are retired (14% as opposed to 4% of the Japanese). However, this segment of Japanese visitors is expected to increase in the future.

  - The Island of Hawaii generally attracts similar occupations as the state, except Hawaii tends to attract more retired westbound visitors.

- Number of visits - Slightly less than half of the state's westbound visitors and 44% of the Island of Hawaii's westbound visitors in 1988 were first-time visitors to the state. The share of Japanese travelers visiting the state for the first time was 77%.

CHALON INTERNATIONAL OF HAWAII

Average Length of Stay of Westbound Overnight and Longer Visitors by Island

1970 to 1988

(Days)

Year	Oahu	Hawaii	Maui	Kauai
1970	6.03	2.94	2.97	2.68
1975	5.97	3.08	3.42	2.85
1980	5.78	3.46	4.08	3.40
1981	5.91	3.56	4.13	3.48
1982	5.77	3.62	4.26	3.51
1983	6.96	4.52	5.61	4.22
1984	7.49	3.64	6.47	4.91
1985	7.24	4.21	6.20	5.03
1986	7.25	4.58	6.26	5.34
1987	7.25	4.76	6.48	5.48
1988	7.15	5.00	6.58	5.75
Compounded percentage increase from 1980 to 1988	2.69	4.71	6.16	6.79

Source: Hawaii Visitors Bureau, Westbound Visitors to Hawaii by Island, annual.

Visitor Expenditures

Visitor expenditures differ greatly between westbound visitors and Japanese visitors, as shown in Exhibit II-I. In 1988, statewide westbound daily visitor expenditures averaged $118.66 as compared to $586.00 for Japanese visitors. Japanese expenditures increased 16% from 1980 to 1988, whereas westbound visitor expenditures increased 7%.

Westbound visitor expenditures are significantly higher on the neighbor islands than on Oahu. Average daily expenditures on the neighbor islands were $159.45 versus the statewide average of $118.66 noted previously. Lodging represents the largest expenditure, as shown in Exhibit II-J.

A current detailed breakdown of Japanese expenditures is not available; however, based upon 1985 data, Japanese spend significantly more than westbound visitors on lodging, clothing, dining, entertainment, and gifts, as shown in Exhibit II-K.

- Japanese spending patterns that are noteworthy to this market study include lodging expenditures that are about 50% higher than westbound expenditures, dining expenditures that are about 50% higher and entertainment that is about 80% higher.

- The expenditures for neighbor island travel appear to be low for both groups of visitors, which may be because they are included in the overall travel package. Additionally, this study is based upon 1985 data and travel to the neighbor islands has increased since then.

The differences between spending patterns of westbound and Japanese visitors, as well as the growth rate of Japanese expenditures are significant observations. Possible factors to explain these are as follows:

- The Japanese visitors typically stay for a shorter period than the westbound visitors. As a result, the daily average spending figure is increased by fixed cost items such as transportation and tours which do not vary significantly with the length of stay.

- Japanese visitors spend heavily on gifts and souvenirs observing the custom of omiyage, wherein the traveler always returns with presents for family and friends.

- Japanese are exhibiting greater tendencies toward consumption of non-durable goods.

- High domestic prices in Japan and the additional purchasing power of the yen has made dollar prices in Hawaii increasingly attractive to Japanese visitors during recent years.

- A large percentage of Japanese visitor spending has been attributed to sales at duty free shops abroad, particularly for popular shopping items such as liquor, tobacco and candies.

Exhibit II-I

CHALON INTERNATIONAL OF HAWAII

Historical and Projected Average Daily Visitor Expenditures for the State of Hawaii

	Westbound visitors	Japanese visitors
Historical:		
1980	$ 71.24	185.00
1983	85.88	227.32
1986	95.40	N/A
1987	102.49	366.63
1988	118.66	586.00
Projected(1) -, 1989	126.47	676.84
Average annual percentage increase:		
1980 to 1988	6.6%	15.5%
1983 to 1988	6.7%	20.9%

N/A Not available.

(1) Based on the 1980 to 1988 average annual percentage increases of 15.5% and 6.6% for Japanese and westbound visitors, respectively.

Source: Hawaii Visitors Bureau, Visitor Expenditure Survey, annual and Study of Japanese Visitors to Hawaii, 1987 and 1988.

Exhibit II-J

CHALON INTERNATIONAL OF HAWAII

Westbound Visitor Expenditures by Type

1988

Expenditure type	Neighbor island expenditures
Restaurants	$ 24.04
Dinner shows	1.50
Night clubs	1.99
Groceries	3.39
Subtotal	30.92
Attractions	9.46
Other entertainment	2.62
Subtotal	12.08
Ground transportation	1.00
U-Drive cars	8.34
Interisland travel	20.50
Sightseeing tours	2.28
Subtotal	32.12
Clothing	7.07
Gifts and souvenirs	8.96
All other	4.94
Lodging	60.93
Adjustment factor amount(1)	2.43
	$ 159.45

(1) A per day estimate made by each visitor concerning the dollar amount that he or she may have neglected to include in the listed catagories.

Source: Hawaii Visitors Bureau, Visitor Expenditure Survey, 1988.

Exhibit II-K

CHALON INTERNATIONAL OF HAWAII

Statewide Visitor Expenditures by Type

1985

	Westbound	Japanese	Japanese as a percentage of westbound
Lodging	$ 36.71	$ 56.42	154%
Clothing	6.81	10.40	153
Food and beverage	24.07	60.46	251
Neighbor island travel	2.63	17.97	683
Entertainment	5.31	9.55	180
Transportation	8.70	4.90	56
Gifts and souvenirs	8.11	72.45	893
Other	5.83	18.18	312
Total(1)	$ 98.17	$ 250.33	255%

(1) Does not include air transportation to Hawaii.

Source: Hawaii Visitors Bureau, Highlights of Japanese Tourism to Hawaii, 1985, 1986.

CHALON INTERNATIONAL OF HAWAII

Historical and Projected Visitor Arrivals
to the State and Island of Hawaii

1985 to 2010

	Westbound			Eastbound			Total state arrivals(5)
	Total(1)	Island(2)	Percentage	Total	Island(3)	Percentage	
Historical:							
1985	3,708,610	697,380	18.8%	1,175,500	80,841	6.9%	4,884,110
1986	4,256,390	786,930	18.5	1,350,590	90,850	6.7	5,606,980
1987	4,204,010	782,550	18.6	1,595,820	90,444	5.7	5,799,830
1988	4,264,730	782,360	18.3	1,877,690	102,319	5.4	6,142,420
1989	4,608,660	959,890	20.8	1,982,960	110,678	5.6	6,591,620
Projected(4):							
1990	4,723,880	992,010	21.0	2,002,790	120,170	6.0	6,726,670
1995	5,476,270	1,365,860	24.9	2,464,950	284,760	11.6	7,746,000
2000	6,256,580	1,853,360	29.6	2,863,110	557,350	19.5	8,979,000
2005	7,078,750	2,430,890	34.3	3,161,100	785,370	24.8	10,159,000
2010	8,008,960	2,890,630	36.1	3,490,110	911,350	26.1	11,494,000

(1) Historical arrivals from Hawaii Visitors Bureau, annual reports; projected based on estimate of non-Japanese visitor growth in DBED, Population and Economic Projections for the State of Hawaii to 2010 (Series M-K), 1988.

(2) Hawaii Visitors Bureau, "Annual Research Report."

(3) Projected based on proportion of Japanese visitors to eastbound visitors for the state as a whole.

(4) 1990 projections from DBED testimony to State Senate Ways and Means Committee, January 4, 1990.

(5) DBED, ibid., 1988.

Exhibit II-L

Projected Visitor Arrivals

Substantial visitor arrivals growth is projected for the Island of Hawaii through the year 2010. Factors supporting growth include:

- Continuing increases in visitor arrivals to the state through expanded markets in continental North America, Japan, the Asian Pacific Rim, the South Pacific and Europe.
- Growth in visitor attractions and accommodations on the Island, centering in the west Hawaii region.
- Greater interest in the neighbor Islands among Japanese visitors, who in the early stages of market growth have stayed primarily at Waikiki accommodations.

Projected visitor arrivals on the Island of Hawaii are shown in Exhibit II-L. As shown in the exhibit:

- The percentage of westbound visitors to the state who traveled to the Island of Hawaii increased by more than 10% in 1989. As visitor attractions and accommodations increase, the percentage of westbound visitors going to the Island could grow by an annual rate of 2.7%, reaching 36% of westbound visitors by 2010. In that event, westbound visitors would increase from about 950,000 in 1989 to 1.8 million in 2000 and almost 2.9 million in 2010.
- Eastbound visitors have been far less likely to visit the Island of Hawaii, with 5% to 7% traveling to the Island from 1985 to 1989. Substantial growth in eastbound visitors is expected in the future, and the percentage could grow by an annual rate of 7.6% reaching 26%, as shown in the exhibit. In that case, eastbound visitor arrivals to the Island could increase from about 110,000 in 1989 to more than 550,000 in 2000 and more than 900,000 in 2010.

III - SITE DESCRIPTION AND REGIONAL OVERVIEW

This chapter describes the site planned for the Mahukona resort community and its environs. Trends are summarized for the region in which the development would be located.

SITE DESCRIPTION

Chalon International of Hawaii owns more than 17,000 acres in the district of North Kohala on the island of Hawaii. A parcel of about 254 acres at Mahukona and an adjacent 233-acre site at Kapaanui are planned for development of a resort community. This section describes salient features of the planned project site.

Site Location and Environs

As noted, the Mahukona resort community site is located at Mahukona in the district of North Kohala. Its general location is shown in Exhibit III-A. It is situated thus in relation to notable features in the area:

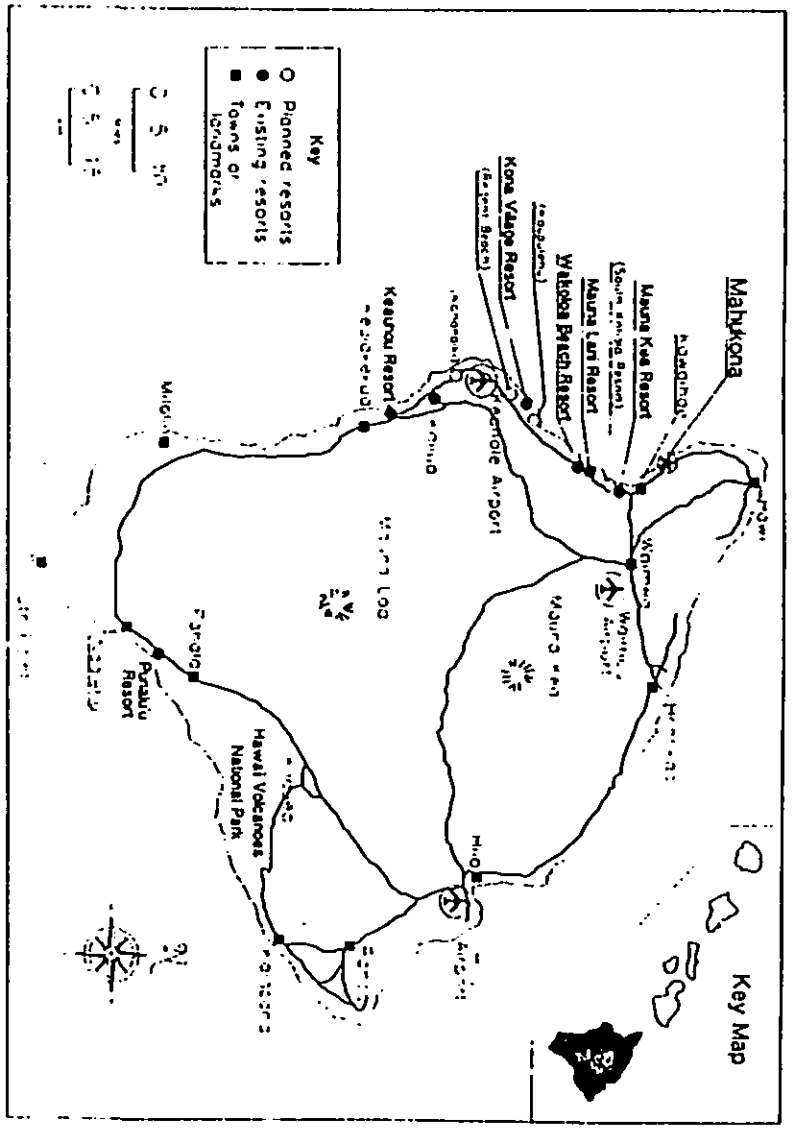
- Hawi, the nearest town, is about 6 miles from the project site.
- The resort community would be a 10- to 15-minute drive from the Mauna Kea Beach Hotel and South Kohala Resort.
- Other points of interest in the vicinity include:
  - Lapakahi State Historical Park
  - Puakea Bay Ranch and Kohala-by-the-Sea agricultural/estate lot subdivisions
  - Kawaihae harbor
  - Mahukona small boat harbor

Vehicular access could be provided from the adjacent Akoni Pule Highway (Highway 27), a two-lane state road capable of carrying buses and high-speed traffic.

Land Conditions

Most of the property is vacant. Points of interest include the original track bed for the historic sugar plantation railroad which terminated at Mahukona harbor. Many obsolete buildings and building pads are located near the harbor, as well as some structures still in use. Mahukona harbor is situated on the property, and is widely used by local boaters and fishermen.

Property characteristics of significance for potential resort community use include the following:



CHALON INTERNATIONAL OF HAWAII
Map of Hawaii

Exhibit III-A

- Topography - The land slopes gradually up from the shoreline to the property boundaries at the highway. Gentle ridges and knolls give the property an irregular topography, which could provide excellent and varied coastal views.

- Climate - The property is located in a dry microclimate typical of the region, providing widespread sunshine and brisk coastal wind patterns.

- Views - The site provides outstanding views of the open ocean, west Hawaii coast and the Maui coast with Haleakala.

- Vegetation - The property's past use as pasture land is reflected in the presence of many mature trees and a variety of tropical grasses.

Ocean Frontage

The property possesses a substantial linear ocean frontage, in addition to the Mahukona harbor. Significant attributes of the adjacent ocean conditions include:

- Coastal rocky outcroppings, several coves and cliffs separating the water from the beginnings of fast land.

- Walking access to the beach at a number of points.

- Numerous attractive settings for sunbathing, snorkeling and diving, provided by coves.

- Near-shore waters of varying depths containing richly-hued reefs and an active population of fish.

REGIONAL OVERVIEW

This section briefly describes trends in Hawaii County and the west Hawaii region to provide an overview of the regional setting for development of the Mahukona resort community.

Population Trends

Since 1980, the resident population of the region has increased at an annually compounded growth rate of 5.5% compared to an annual 3.1% growth rate for the county as a whole, as shown in Exhibit III-8. Growth rates for these districts also exceeded county growth rates from 1970 to 1980. The North Kohala district, however, has not grown as fast as the other two districts nor as fast as the county has grown. This has primarily been due to the lack of development in North Kohala and a reduction in agricultural employment.

Employment Patterns

Unemployment in Hawaii County dropped to 4.7% by the end of 1988 and has declined further in 1989. Relatively high job increases were noted in the areas of hotel, retail trade, finance, insurance and real estate.

Exhibit III-8

CHALON INTERNATIONAL OF HAWAII

Resident and De Facto Population of the
North Kohala, South Kohala and North Kona
Districts and County of Hawaii

1970 to 1988

	April 1 1970	April 1 1980	July 1, 1988	Average annual percent change 1970 - 1980	Average annual percent change 1980 - 1988
Resident population:					
North Kohala	3,326	3,249	3,[illegible]	[illegible]	[illegible]
South Kohala	2,310	4,607	7,900	7.1	7.0
North Kona	4,832	13,748	21,600	11.0	5.8
Total region	10,468	21,604	33,200	7.5 %	5.5%
County of Hawaii:					
Resident population	63,468	92,053	117,500	3.8	3.1
De facto population(1)	65,700	98,700	126,300	4.2	3.1

(1) Includes all persons physically present in area; includes visitors present but excludes residents who are temporarily absent.

Sources: State of Hawaii, Department of Business and Economic Development, Hawaii State Statistical Areas Committee, Estimated Population of Hawaii by Districts, 1984 (Report CIC-64), 1985; and de facto population by counties from 1970 to 1984, Data Book, 1985; U. S. Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Hawaii (PC 80-1-A13), 1981; and Hawaii State Development of Business and Economic Development, unpublished 1988 estimates.

In the latter part of the decade, development of various projects, including the Hyatt Regency Waikoloa Hotel, helped bolster the local construction industry. Development of planned hotel projects in the region should further strengthen the economy in coming years. Hotel employment will be a major component of this expansion with an estimated 5.8% annual growth rate in the next ten years, increasing hotel employment to 13,500 by the year 2000, as shown in Exhibit III-C. County of Hawaii employment projections reflect this overall strength with total job counts growing 4.7% annually from 1990 with 58,000 jobs to a total of 92,000 jobs projected for the County by the year 2000.

Economic and Demographic Outlook

In summary, Hawaii County's economy is booming. Gross business receipts, a measure of overall business activity, increased by 12% to about $2.1 billion in 1988, as shown in Exhibit III-D. The visitor and construction industries are leading the economic expansion. Visitor expenditures increased by 22% to $464 million in 1988, and construction put-in-place increased by 30% to $163 million. Agricultural production continues to decline and/or remain stable.

Economic growth is continuing in 1989, with gross business receipts up 11% as of July. With over one billion dollars anticipated to be invested in the development of new hotels and resort areas in West Hawaii, this area is expected to lead the growth of the island of Hawaii. Major capital investment in existing and new resort areas could help future expansion exceed the historical growth rates for the island.

Exhibit III-C

CHALON INTERNATIONAL OF HAWAII

Employment Projections for the
County of Hawaii

1990 to 2000

	Employment	
	Hotel Industry	Total Jobs
1990	7,700	58,000
1995	11,000	76,900
2000	13,500	92,000
Average annual growth rate	5.8%	4.7%

Source: County of Hawaii, Hawaii County General Plan, draft.

IV - LODGE MARKET ASSESSMENT

This chapter assesses market support for a lodge at the Mahukona resort community. Segments in the Hawaii visitor market are described, as well as facilities in selected hotels catering to the luxury market segment. Projected supply and demand for visitor accommodations are estimated for the island. The lodge concept and guest facilities are described, and target markets are identified for lodge guests. Future market support for the lodge is projected, including occupancy rates and achieved room rates.

VISITOR ACCOMMODATIONS REVIEW

This section reviews visitor unit inventory, occupancy levels and average room rates.

Visitor Unit Inventory

Oahu and Maui accounted for 78% of the state's visitor rooms in 1989, as shown in Exhibit IV-A. The island of Hawaii, with 8,161 units, represents 12% of the state's total. Visitor units on the island decreased in 1988, due to the conversion of condominium units to resident use and the closing of the Kona Lagoon Hotel for renovations. There are more than 8,000 hotel rooms proposed for development on the island of Hawaii, which would almost double the number of visitor units on that island, as shown in Exhibit IV-B. This exhibit is limited to projects that have state land use and/or county General Plan approvals; other projects are still in the approval process. Most of the development is planned in the North Kona and South Kohala districts, where a majority of the existing inventory is located.

Historical Occupancy Levels

In 1988 and year-to-date (October) 1989, the average annual occupancy level for visitor accommodations in the state was estimated to be 79% and 80% respectively, as shown in Exhibit IV-C. These rates are significantly higher than the 68% to 70% rates experienced between 1980 and 1983.

Occupancy levels for the state and Oahu have remained relatively stable from 1986 to 1989 while neighbor island occupancies declined in 1987 and 1988. This declining occupancy trend continued for Maui in 1989 but for Hawaii and Kauai 1989 occupancies increased 4.9% over the previous year.

Projected Occupancy Levels

Projected occupancy levels are based upon historical and projected visitor unit demand for the island of Hawaii, as shown in Exhibit IV-D. Total daily visitor unit demand is projected to increase 6.3% annually from 1990 to 2010, or from 5,830 rooms to 19,640 rooms, including both hotel and visitor condominium units. Demand is based upon projected westbound and eastbound visitor arrivals, percent utilization of commercial accommodations, average length of stay, and average persons per room. Additionally, resident demand is also estimated.

CHALON INTERNATIONAL OF HAWAII

Major Economic Indicators for Hawaii County
1984 to 1988

Exhibit III-D

	1984	1985	1986	1987	1988	Compounded annual percentage change 1984 to 1988
Gross business receipts (millions)	$ 1,570	1,595	1,642	1,862	2,082	7.3 %
Employment (number)	44,900	46,150	47,500	50,750	51,950	3.7
Unemployment (percent)	7.7%	8.5%	7.5%	5.5%	5.0%	(10.2)
Westbound visitors (thousands)	761	697	787	783	788	.9
Visitor expenditures (millions)	$ 249	286	344	382	464	11.3
Hotel occupancy rate (percent)	55.6%	57.6%	62.2%	60.8%	56.4%	.4
Unprocessed cane sugar (thousands of tons)	3,420	2,686	2,797	2,566	2,300	(9.4)
Coffee and macadamia nuts (thousands of pounds)	3,925	4,325	4,635	4,310	4,750	4.9
Other agricultural crops (thousands of pounds)	12,144	10,219	10,987	11,474	11,891	(.5)

Source: State of Hawaii, Department of Agriculture, Statistics of Hawaiian Agriculture, 1988 and First Hawaiian Bank, Economic Indicators, September/October 1989.

Exhibit IV-A

CHALON INTERNATIONAL OF HAWAII

Visitor Rooms in the State of Hawaii

1970 to 1989

	Oahu	Hawaii	Maui(1)	Kauai	State
1970	18,449	3,166	2,743	2,565	26,923
1975	25,352	5,348	5,830	3,102	39,632
1980	34,334	5,889	9,701	4,322	54,246
1985	38,600	7,511	14,152	5,656	65,919
1988	37,841	8,823	15,168	7,180	69,012
1989(2)	36,739	8,161	16,028	7,251	68,179
Share of state total:					
1970	68.5%	11.8%	10.2%	9.5%	100.0%
1989	53.9	12.0	23.5	10.6	100.0
Compound annual percentage increase - 1980 to 1989	0.8%	3.7%	5.7%	5.9%	2.6%

(1) Includes Molokai and Lanai.
(2) As of February 1989.

Source: Figures for 1970 to 1984 represent number of visitor units as of February of the year indicated, as reported by the Hawaii Visitors Bureau, Annual Research Report, 1984. Hawaii Visitors Bureau, Visitor Plant Inventory, February, annual, since 1985.

Exhibit IV-B

CHALON INTERNATIONAL OF HAWAII

Proposed Hotel Development on the Island of Hawaii

1989 to 2010

	Location	1989-1990	1991-1995	1996-2000	2001-2005	2006-2010	Total 1989-2010
Under construction:							
Ritz Carlton Mauna Lani	S. Kohala	540	-	-	-	-	540
South Kohala Resort	S. Kohala	-	350	-	-	-	350
Subtotal		540	350	-	-	-	890
With all land approvals(1), within existing resort:							
Waikoloa Beach Resort	S. Kohala	-	400	400	400	-	1,200
Mauna Lani Resort	S. Kohala	-	-	300	300	-	600
Keauhou Resort	N. Kona	-	-	500	500	700	1,700
Kona Village	N. Kona	-	50	-	-	-	50
Punalu'u	Ka'u	-	425	210	400	-	1,035
Subtotal		-	875	1,410	1,600	700	4,585
With all land approvals(1), within new resort:							
Kaupulehu Four Seasons	N. Kona	-	350	-	-	-	950
Kaupulehu Princess	N. Kona	-	600	-	-	-	-
Regent Beach Resort	N. Kona	-	400	-	-	-	400
Kohanaiki	N. Kona	-	400	350	500	-	1,250
Subtotal		-	1,750	350	500	-	2,600
Total		540	2,975	1,760	2,100	700	8,075

(1) County General Plan, County zoning and State Land Use Commission approvals in place.

CHALON INTERNATIONAL OF HAWAII

Occupancy Levels of Hawaii Visitor Accommodations

1980 to 1989

Location	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989(1)
Waikiki:										
On beach	73.9%	72.1%	72.7%	74.7%	81.6%	82.9%	84.2%	86.5%	85.6%	86.4%
Off beach (with restaurant)	73.2	73.8	80.6	79.1	85.7	83.8	86.0	87.1	85.8	89.8
Off beach (without restaurant)	66.5	76.1	80.1	74.4	80.4	79.4	86.9	88.0	86.3	88.4
Other Oahu	74.6	75.3	79.4	73.3	85.0	82.7	83.0	83.3	80.7	85.4
Island of Oahu	72.3%	74.1%	77.8%	75.8%	83.3%	81.9%	85.4%	86.8%	85.4%	87.7%
Hilo	34.4	35.3	37.7	39.2	58.2	57.8	54.6	55.3	49.8	55.6
Kona	59.0	49.5	46.9	47.0	54.9	58.7	64.6	62.5	58.4	62.4
Island of Hawaii	51.0%	44.9%	44.0%	44.7%	55.6%	58.5%	62.8%	60.8%	56.4	61.3%
West Maui	74.8	73.7	78.0	77.8	84.1	83.2	85.8	79.8	76.2	72.8
Other Maui	67.4	58.1	61.4	67.0	70.3	67.3	70.9	66.9	64.4	63.4
Island of Maui	73.0%	70.3%	73.9%	75.2%	80.5%	78.2%	81.5%	76.2%	73.2%	70.6%
East Kauai	75.1	68.5	63.4	59.3	63.0	64.1	75.4	71.8	65.4	68.7
South Kauai	52.5	46.2	44.2	50.2	63.0	73.5	82.1	80.6	71.9	79.5
Island of Kauai	69.6%	62.7%	57.5%	57.2%	63.0%	67.1%	77.6%	74.2%	67.5%	72.4%
State total	69.3%	68.3%	70.4%	69.7%	76.0%	77.6%	81.7%	81.1%	78.5%	80.1%

(1) For the ten-month period ended October 1989. Seasonality will effect the remainder of the year.

Source: Pannell Kerr Forster, Trends in the Hotel Industry, monthly.

EXHIBIT IV-C

CHALON INTERNATIONAL OF HAWAII

Historical and Projected Visitor Room Demand
for the Island of Hawaii

1985 to 2010

	Westbound					Eastbound						
	Visitors(1)	Percent utilizing commercial accommodations	Average length of stay	Average persons per room	Average daily visitor room nights	Visitors(2)	Percent utilizing commercial accommodations	Average length of stay	Average persons per room	Average daily visitor room nights	Residents(2)	Total daily visitor room demand
Historical:												
1985	697,380	90%	4.1	1.9	3,710	80,841	99%	1.5	2.0	160	440	4,310
1986	788,930	89	3.9	1.9	3,940	90,850	99	1.4	2.0	170	440	4,550
1987	782,550	89	3.8	1.9	3,920	90,444	99	1.4	2.0	170	450	4,540
1988	787,360	89	4.0	1.8	4,240	102,319	99	1.6	2.1	210	450	4,900
1989	959,890	87	3.8	1.9	4,580	110,678	99	1.5	2.1	210	460	5,250
Projected:												
1990	982,010	87	3.9	1.8	5,120	123,839	99	1.6	2.1	250	460	5,830
1995	1,365,860	85	4.2	1.8	7,420	217,542	99	1.9	2.1	700	500	8,620
2000	1,853,360	85	4.2	1.8	10,070	327,666	99	2.1	2.1	1,510	510	12,110
2005	2,430,890	85	4.3	1.8	13,520	463,899	99	2.1	2.1	2,130	530	16,200
2010	2,890,630	85	4.4	1.8	16,460	509,841	99	2.2	2.1	2,590	590	19,640
Compounded annual percentage increase (1990 - 2010)					6.0%					12.4%	1.3%	6.3%

(1) From Exhibit II-L.

(2) Projected to increase over historical levels at rate equivalent to DBED's projections for resident population growth.

EXHIBIT IV-D

The average occupancy rate on Hawaii is projected to increase from about 61% in 1989 to about 63% in 1995 and to 68% in 2010, as shown in Exhibit IV-E.

Separate occupancy rates are estimated for hotel and visitor condominium units. As shown in Exhibit IV-E, an estimated 68% hotel occupancy rate is anticipated to increase to 80% by 2000.

Average Room Rates

Hotels in Hawaii achieved an average room rate after discounts and commissions of $88 per room in 1988 and $80 in 1987, as shown in Exhibit IV-F. The 1989 average room rate for the ten months ending in October, increased to about $96. The most notable increase over 1988 room rates occurred on the island of Hawaii: the average island wide rate increased 39%. This was primarily a result of increased rates in hotels located in the west Hawaii region.

Room rates vary significantly by island and region, reflecting the relatively newer visitor plant on the neighbor islands, and the completion of several high-quality projects such as the Hyatt Regency Waikoloa on the island of Hawaii.

VISITOR MARKET SEGMENTS

This section describes broad segments of the Hawaii visitor market, and identifies trends in the growth of accommodations catering to different market segments.

Resort Classifications

Successful resort destinations are developed to appeal to certain types of visitors. In general, the degree of market targeting is in proportion to the size of the resort; while large destination areas such as Maui's Kaanapali Beach Resort can accommodate a number of market segments, smaller resorts usually must focus on particular kinds of visitors.

Hawaii resorts generally can be classified in one of three categories, based on the type of visitor sought. These classifications are shown in Exhibit IV-G, and described as follows:

- Luxury resorts, offering the highest standard of facilities to the most affluent clientele. In Hawaii, individual luxury resort hotels are referred to as high-service or high-activity, depending upon mix of guest services and facilities.
- Upscale resorts, providing high-quality accommodations to a market socioeconomically situated below the luxury market.
- First-class resorts, servicing the broadest range of visitor markets with above-average accommodations.

Market Segment Trends

Hawaii's hotel inventory is anticipated to grow substantially in the 1990s. Growth of the luxury-class inventory is the major trend occurring in market segmentation, with:

CHALON INTERNATIONAL OF HAWAII

Projected Visitor Unit Occupancy Rates
for the Island of Hawaii

1985 to 2010

Year	Daily room demand	Visitor unit room inventory(1)	Average occupancy rate: Total	Hotel	Condominium
Historical:					
1985	4,310	7,511	59%	75%	25%
1986	4,550	7,280	63	74	31
1987	4,540	7,328	61	71	40
1988	4,900	8,823	57	76	44
1989	5,250	8,161	61	68	37
Projected:					
1990	5,830	8,934	65	74	41
1995	8,620	13,688	63	72	42
2000	12,110	17,543	69	80	50
2005	16,200	21,523	75	87	55
2010	19,640	28,680	68	80	52

(1) Historical inventory from HVB, "Visitor Unit Inventory," annual; projected inventory includes planned resort hotels with development approvals, as shown in Exhibit IV-B and 50% of planned condominium units; 2010 inventory is estimated based on the compound annual percentage increase from 1985 to 2005.

Exhibit IV-G

CHALON INTERNATIONAL OF HAWAII

Resort Classifications

Types of resorts	Characteristics	Examples: Resort	Examples: Island
Luxury	Offer luxurious accommodations, excellent service, and consistently maintain an elegant ambiance. Services the affluent visitor.	Kapalua Mauna Kea Mauna Lani	Maui Hawaii Hawaii
Upscale	Provide quality services and amenities and serve an upper income market that is just below that served by the luxury resorts. Higher development densities are possible due to the broader guest market.	Ko Olina Wailea Kaanapali Waikoloa Beach	Oahu Maui Maui Hawaii
First-Class	Provide above-average accommodations at reasonable rates. Maintain a larger share of group travelers to appeal to the broadest range of guest markets.	Kuilima Makaha Keauhou	Oahu Oahu Hawaii

(CHALON INTERNATIONAL OF HAWAII)

Average Room Rates of Hawaii Visitor Accommodations

1980 to 1989

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989(1)	Per. compgr increase 1980-1989
Waikiki											
On Beach	$ 59.01	61.05	61.15	67.69	69.15	85.01	94.80	108.94	121.48	135.23	9.55
Off Beach (with restaurant)	34.78	33.90	35.69	36.37	39.56	46.84	49.74	53.36	62.01	69.52	7.5
Off Beach (without restaurant)	27.67	27.40	28.70	30.21	31.10	33.51	37.93	42.24	45.84	52.69	6.5
Other Oahu	45.15	49.76	51.89	56.47	55.26	58.01	64.65	71.20	65.39	68.33	4.72
Island of Oahu	$ 42.10	43.05	44.88	46.93	50.06	52.00	62.11	69.04	75.44	84.38	7.95
Hilo	33.71	30.53	30.01	30.41	32.30	34.80	37.23	36.14	41.36	49.87	2.7
Kona	49.96	52.81	53.49	55.42	65.22	71.24	87.02	94.24	99.00	133.08	8.9
Island of Hawaii	$ 46.40	47.16	47.25	48.84	58.13	65.35	74.19	87.21	87.15	121.29	8.28
West Maui	63.19	77.82	81.19	89.57	97.12	105.84	127.40	137.78	143.80	144.01	10.8
Other Maui	55.20	53.49	51.50	57.82	61.26	72.16	77.87	91.43	101.23	106.00	7.9
Island of Maui	$ 61.38	73.27	75.07	81.60	88.89	96.75	111.66	122.05	134.74	135.59	10.35
East Kauai	52.66	54.87	55.65	56.50	57.85	65.40	65.33	71.89	87.59	78.74	6.6
South Kauai	46.28	61.90	62.53	72.01	82.88	86.22	91.61	99.17	106.20	118.03	8.1
Island of Kauai	$ 53.16	56.06	58.51	59.78	65.09	69.51	75.32	81.65	96.00	94.10	5.92
State total	$ 47.37	49.72	51.82	54.78	59.84	65.46	71.20	80.09	87.94	96.74	8.05

(1) For the terminal period ended October 1989. Seasonality will affect the remainder of the year.

Source: Pannell Kerr Forster, Trends in the Hotel Industry, mainly.

Exhibit IV-F

- Development of new luxury-class destination resorts.
- Greater differentiation of luxury hotels, including high-service, high-activity and retreat properties.
- Increased number of international and American luxury hotel operators represented in the Hawaii market.

Exhibit IV-H indicates hotels planned in the 1990-1995 period. As shown in the exhibit:

- More than 40% of planned units could be located on the island of Oahu, with all but one hotel scheduled for the island's rural resorts.
- Each of the planned hotels on the neighbor islands could be developed within existing or to-be-developed master-planned resort destination areas.
- Five new hotels and two expansions of existing properties are planned on the island of Hawaii. Four of the hotels would bring new luxury-class operators to the island.

Exhibit IV-I indicates planned additions to the luxury-class hotel inventory by 1992. As shown in the exhibit:

- More than 8,000 new luxury hotel rooms are planned in the next three years.
- About 1,800 luxury rooms in four new hotels would be developed on the island of Hawaii, along with 50 additional rooms at the Kona Village Resort.

The planned growth in luxury hotels could have a dramatic effect on the types of market segments attracted to the island of Hawaii. As shown in Exhibit IV-J, the percentage of the island's hotel room inventory in the luxury category could increase from about 34% in 1990 to almost 43% in 1995.

The growth in luxury rooms on the island of Hawaii could pose significant challenges for current and new luxury property operators, possibly including greater competition for guests and some room rate discounting. Introduction of new properties and resort operators could also increase international recognition of west Hawaii as a high-quality destination.

Resort operators in this environment would be required to differentiate the visitor experience offered, so as to appeal to niches within the luxury market.

Market Segment Visitor Characteristics

Hawaii visitor market segments are distinguished by origin and visitor patterns, as well as by income. Differentiation in these categories are shown in Exhibits IV-K and IV-L, which indicate that:

- Visitors from Japan and Europe form a larger-than-average share of the luxury market. Japanese, in particular, represent a growing luxury segment, with 10% of first-class hotel guests and 40% in the high-activity luxury category.

CHALLENGE INTERNATIONAL OF HAWAII

Major Planned Hotel Projects in Hawaii

1990 To 1995

Island/hotel project	Location	Hotel class	Rooms	Estimated opening
Oahu:				
Hawaii Prince Hotel	Waikiki	High-service luxury	535	1990
Nikko Hotel (includes 150 condominiums)	Ko Olina	High-service luxury	600	1992
Loews Hotel	Ko Olina	High-activity luxury	850	1992
Unnamed Canadian hotel operator	Ko Olina	High-service luxury	450	1992
Three sites available	Ko Olina	First-class	1,400	-
One site available	Ko Olina	High-activity luxury	400	-
Kawela Bay site	Kuilima	High-service luxury	400	1992
Four sites available	Kuilima	First-class	2,114	-
Subtotal			6,749	
Maui:				
Kapalua Bay addition	Kapalua	High-service luxury	127	1992
Kapalua Village Hotel (Ritz Carlton)	Kapalua	High-service luxury	550	1992
Four Seasons	Wailea	High-service luxury	392	1990
Embassy Suites Wailea	Wailea	First-class	450	1991
Grand Hyatt	Wailea	High-activity luxury	830	1991
Subtotal			2,349	
Kauai:				
Hyatt Regency Kauai	Poipu	High-activity luxury	605	1990
Kauai Resort	Wailua	First-class	200	1990
Hanalei Plantation	Hanalei	High-service luxury	205	1993
Princeville Resort	Hanalei	High-service luxury	360	1993
Kauai Lagoons (second hotel)	Lihue	High-activity luxury	750	1995
Subtotal			2,120	

Exhibit IV-H

CHALON INTERNATIONAL OF HAWAII

Major Planned Hotel Projects in Hawaii, Continued

Island/hotel project	Location	Hotel class	Rooms	Estimated opening
Hawaii:				
Four Seasons	Kaupulehu	High-service luxury	358	1991
Kona Village addition	North Kona	High-service luxury	50	1991
Regent Hotel	Regent Beach	High-service luxury	450	1993
Hapuna Beach Hotel	South Kohala	High-service luxury	350	1992
Ritz Carlton Mauna Lani	Mauna Lani	High-service luxury	540	1990
Princess Hotel	Kaupulehu	High-activity luxury	600	1992
Royal Waikoloan addition	Waikoloa	First-class	400	-
Subtotal			2,748	
Lanai:				
The Lodge at Koele	Koele	High-service luxury	102	1990
Manele Bay Hotel	Manele Bay	High-service luxury	250	1990
Manele Bay Hotel addition	Manele Bay	High-service luxury	150	1995
Subtotal			502	
Molokai - Two sites available	Kalua Koi	First-class	-	-
Total			14,468	

Note: Room counts and completion dates are subject to some variation.

Exhibit IV-H, Cont.

CHALON INTERNATIONAL OF HAWAII

Major Proposed Luxury Hotels in Hawaii

1990 to 1992

Hotel type and name	Island	Location	Total number of rooms	Estimated date of completion 1990	1991	1992
High-personal service hotels:						
Kawela Bay Hotel	Oahu	Kuilima Resort	400	-	-	400
Nikko Hotel	Oahu	Ko Olina Resort	600	-	-	600
Ko Olina Hotel	Oahu	Ko Olina Resort	450	-	-	450
Hapuna Beach Hotel	Hawaii	South Kohala Resort	350	-	-	350
Ritz-Carlton Mauna Lani	Hawaii	Mauna Lani Resort	450	450	-	-
Four Seasons	Hawaii	Kaupulehu Resort	358	-	358	-
Four Seasons Hotel	Maui	Wailea Resort	392	392	-	-
Embassy Suites Wailea	Maui	Wailea Resort	350	350	-	-
Kapalua Bay Hotel addition	Maui	Kapalua Resort	127	-	-	127
Ritz-Carlton Kapalua	Maui	Kapalua Resort	550	-	-	550
Manele Bay Hotel	Lanai	Hulopoe Beach	250	-	250	-
Lodge at Koele	Lanai	Koele District	102	102	-	-
Subtotal			4,379	1,294	608	2,477
High-activity hotels:						
Hawaii Prince Hotel	Oahu	Waikiki	535	535	-	-
Loews Hotel	Oahu	Ko Olina Resort	850	-	-	850
Princess Hotel	Hawaii	Kaupulehu Resort	600	-	-	600
Grand Champions Resorts Hotel	Maui	Wailea Resort	482	-	482	-
Grand Hyatt Hotel	Maui	Wailea Resort	830	-	830	-
Hyatt Regency Kauai	Kauai	Poipu	605	605	-	-
Subtotal			3,902	1,140	1,312	1,450
Total			8,281	2,434	1,920	3,927

Source: KPMG Peat Marwick, based on discussions with project developers or other published sources.

Exhibit IV-I

Exhibit IV-K

CHALON INTERNATIONAL OF HAWAII

Visitor Origins at Selected Hotels

1989

Classification of hotel	United States and Hawaii	Canada	Japan	Europe	Other(1)
High-service luxury	85%	2%	10%	4%	-%
High-activity luxury	42	5	40	5	8
First-class	80	5	10	3	4

(1) Travelers from Australia and New Zealand represent a growing portion of this category.

Sources: Interviews with hotel operators or other published sources.

CHALON INTERNATIONAL OF HAWAII

Hawaii Hotel Inventory by Class of Property

1990 to 1995

	Percent of Inventory								
	Existing			Planned(2)			Total		
	Luxury	First-class	Budget	Luxury	First-class	Budget	Luxury	First-class	Budget
Oahu	2.7%	55.6%	41.7%	45.6%	54.4%	-%	10.3%	55.4%	34.3%
Maui(1)	35.5	48.5	16.0	83.2	16.8	-	48.1	40.1	11.8
Hawaii	33.9	48.5	17.7	62.4	37.6	-	42.6	45.1	12.2
Kauai	19.9	69.0	11.1	90.6	9.4	-	43.4	49.2	7.4
All islands	13.2%	54.8%	32.0%	62.7%	37.3%	-%	24.4%	50.8%	24.8%

(1) Excludes Molokai and Lanai.
(2) Planned for occupancy by 1995.

Sources: Based on information from the Hawaii Visitors Bureau, Visitor Plant Inventory, 1989 and discussions with developers of planned projects or other published sources.

Exhibit IV-L

Exhibit IV-L

CHALON INTERNATIONAL OF HAWAII

Average Travel Status and Length of Stay

1989

Classification of hotel	FIT	Group	Incentive	Average length of stay (days)
High-service luxury	76%	12%	16%	4.6
High-activity luxury	40	35	25	4.5
First-class	53	27	25	4.9

Sources: Interviews with hotel operators or other published sources.

- "Free independent travelers" (FITs) constitute the large majority of high-service luxury hotel guests, while group and incentive travelers make up more than half of the high-activity luxury hotel market.
- Luxury-class guests have a shorter length of hotel stay than guests at first-class properties.

Potential Growth in Luxury Visitor Market Segments

Growth in several market segments could add significantly to the depth of Hawaii's luxury resort demand. Potential growth is anticipated for:

- Japanese FIT travelers
- European travelers
- Corporate meeting and incentive travelers

Japanese visitors now represent about 40% of the market in the high-activity luxury category, as shown previously in Exhibit IV-K. This is considerably higher than their 10% share of the high-service luxury category. It is expected that market share in the high-service luxury market could increase due to:

- Greater numbers of repeat visitors, with:
  - first-hand knowledge of island recreational sites and visitor services.
  - increased desire to visit the neighbor islands.
  - greater confidence to explore on their own.
- Increasing numbers of mature adult and senior travelers seeking the amenities of a high-service resort.

European visitors now constitute less than 10% of luxury resort demand, as also shown previously in Exhibit IV-K. However, European travelers, who numbered more than 200,000 in 1989, have been targeted as a major potential growth market for Hawaii. Europeans could be attracted to a high-service luxury resort due to:

- Enjoyment of golf, tennis and water sports facilities.
- Wider opportunities to explore a neighbor island destination on their own.

Corporate meetings and employee incentive travel programs have been an important market segment for Hawaii luxury hotels, particularly those in the high-activity luxury category, as shown in Exhibit IV-L. Important niches may exist in this market for a high-service luxury resort with high-quality golf, tennis and marine sports facilities. Target markets include:

- Corporate retreats, especially for Japanese firms
- Smaller (less than 50) incentive travel groups

LUXURY HOTEL FACILITIES AND SERVICES

This section summarizes facilities and guest services at existing luxury hotels in Hawaii. Properties are grouped by size, including small (less than 200 rooms) and medium-sized (300 to 500 rooms) properties.

Luxury Hotel Project Concepts

The resort concept and physical setting of selected resort hotels are described in Exhibit IV-H. The selected properties include three with fewer than 200 rooms: the Hotel Hana-Maui, Kona Village Resort and Kapalua Bay Hotel. Four medium-sized hotels are also described - the Mauna Kea Beach, Mauna Lani Bay, Kahala Hilton and Halekulani. As shown in the exhibit:

- Two of the smaller hotels and the medium-sized Kahala Hilton are free-standing properties located outside of destination areas. The other hotels are within planned destination resorts.
- Most of the properties have a low-rise, low-density profile. Only the two Oahu hotels are taller than ten stories and have densities greater than 15 units per acre.
- Most guest rooms offer good ocean views, or views to other points of interest such as golf courses. Almost all front on excellent swimming beaches.

Facilities at the selected Hawaii luxury resorts are summarized in Exhibit IV-H. As shown in that exhibit:

- Hotels feature larger-than-average standard rooms, and all offer a number of suites. Rooms are generally fully appointed with guest conveniences.
- All properties maintain a variety of restaurants, bars and entertainment areas. Most have convention and group meeting facilities.
- Each of the resorts offer a variety of recreational amenities.

The selected Hawaii properties represent a range of facilities shown to appeal to luxury market visitors. As could be expected, such hotels offer facilities of the highest quality in all areas.

MAHUKONA RESORT LODGE MARKET CONCEPT

A small- to medium-sized resort lodge is proposed as the central facility for the Mahukona resort community. This section identifies relevant site factors and target markets for the lodge, describes potential facility and design attributes of the lodge and indicates the lodge's interrelation with other elements of the Mahukona resort community.

Site Factors

The Mahukona resort lodge concept is tied to features of the proposed development site, which include:

Exhibit IV-H

CHALON INTERNATIONAL OF HAWAII

Project Concept of Selected Hawaii Luxury Resort Hotels

	Mauna Kea Beach	Mauna Lani Bay	Kahala Hilton	Halekulani
Location	Mauna Kea Resort, Hawaii	Mauna Lani Resort, Hawaii	Honolulu, Oahu	Waikiki, Oahu
Management company	Westin Hotels	Emerald Hotels Corporation	Hilton International Corp.	Halekulani Corporation
Number of guest rooms	310	351	370	456
Hotel profile	Four- to seven-story facility with interior atrium.	Six-story, single-loaded facility with interior landscaped atrium, saltwater ponds and waterfalls.	Ten-story main building with two-story bungalows clustered around dolphin lagoon.	2- to 17-story E-shaped building oriented to the ocean.
Site description:				
Acres	N/A	28	8	8
Density	N/A	12.6	46.3	57.0
Property description	Tiered oceanfront property with a wide lawn area.	Generally level oceanfront property.	Level oceanfront property.	Level oceanfront property.
Scenic views	Full ocean views - 33% Partial ocean views - 33% Golf course views - 34%	Excellent ocean frontage with views from 92% of the rooms.	Ocean views - 50% Golf course views - 50%	Full or partial ocean views from over 90% of all rooms.
Beach access and condition	Excellent protected sandy crescent-shaped beach.	Good man-made sandy beach with a rocky lava bottom.	Excellent swimming beach.	Limited beach width; however, good swimming conditions.
Hotel success factors	Destination resort where guests can become part of the Mauna Kea Resort community and guest circle. Prestigious resort and golf course reputation. High-quality dining facilities and services. Beautiful beach and hotel grounds.	High-quality hotel and dining facilities and service. Excellent resort and golf course reputation. Excellent climate and good beaches. Access to Maunalua Bay Club tennis facilities. Meeting facilities to accommodate the incentive market.	Well-known hotel in quiet, upscale residential area. Out of Waikiki but near to entertainment and dining areas. Excellent beach area.	Luxury enclave in Waikiki. High-quality accommodations, food and beverage, and personal service. Historic beachfront estate hotel.

N/A Not available.

Sources: Discussions with representatives of the respective hotels and published information.

CHALOM INTERNATIONAL OF HAWAII

Project Concept of Selected Hawaii Luxury Resort Hotels, Continued

	Hotel Hana-Maui	Kona Village Resort	Kapalua Bay
Location	Hana, Maui	Hawaii, North Kona,	Kapalua Resort, Maui
Management company	Rosewood Hotels, Inc.	Clarion Resorts	Independent
Number of guest rooms	80	115	194
Hotel profile	Low-rise guest cottages located in 10 buildings with 10 unique building types (2 to 10 guest rooms per building).	Individual bungalows located in village clusters with 8 unique building types. Architecture and room furnishings are representative of various Polynesian villages.	Four- to nine-story tiered facility with several wings.
Site description:			
Acres	20	62	18
Density (units per acre)	4.0	1.9	11
Property description	Gradually sloping, mountainside property located one-fourth mile from Hana Bay.	Remote resort located on a guarded 2.3-mile road. Relatively level oceanfront property.	Sloping property located on a rocky promontory.
Scenic views	Partial ocean views available from about 75% of the rooms.	Excellent ocean or lagoon views available from 50% of the rooms.	Excellent ocean and/or garden views
Beach access and condition	Major beach activities held at two hotel-owned excellent beaches located 1 and 2-1/4 miles away.	Good sand beach and rocky lava coastline.	On a rocky point but adjacent to a sandy swimming beach.
Hotel success factors	Natural beauty and romance of Hana and the Hotel. Family orientation. Warm staff and personalized service. Peaceful and quiet atmosphere. Extensive activities for adults and children.	Privacy, peace and serenity. Sense of security, safeness and feeling of community. Polynesian beach village atmosphere. Warm staff and personalized service. Unique "holes," specific units requested on return visits. Extensive activities for adults and children.	Exclusive destination resort in remote location, with two spectacular golf courses. An award-winning restaurant. Dedication to personalized service and comfort.

Exhibit IV-M, Cont.

CHALOM INTERNATIONAL OF HAWAII

Facility Description of Selected Hawaii Luxury Resort Hotels

	Hotel Hana-Maui	Kona Village Resort	Kapalua Bay
Years of completion	1946 and 1986	1965 and 1980	1978
Guest rooms (size in square feet excluding lanais) (1)			
Standard rooms	70 (600)	90 (336 to 750)	191 (420)
One-bedroom suites	10 (N/A)	-	3 (N/A)
Two-bedroom suites	-	10 (1,484 to 1,575)	-
Total	80	100	194
Room features	Phones in living room; no radios or TVs; ceiling fans.	No room phones, TVs, clocks or radios, ceiling fans.	Phones and TVs in rooms, air conditioned.
Food and beverage facilities:			
Restaurants (seats)	Main dining room (210) Poolside snack bar (100)	Main dining room (160) Restaurant/function room (300)	Main dining room (140) Restaurant (120) Garden restaurant (165) Snack bar (80)
Bars (seats)	Lobby bar (60)	Main bar (190) Pool bar (60) Beach bar (28)	Main bar (100) Pool bar (100) Bar (10) Bar (10)
Average food and beverage seats per room	4.6	3.9	3.9
Retail shops (size in square feet)	1 (600)	2 (988 total)	1 (N/A)
Meeting rooms (seating capacity)	Limited facilities - utilize a guest suite (25)	Restaurant/function room (300) Main bar (130)	Ballroom (250) Two conference rooms (20 seats each)
Other amenities	Swimming pool, two tennis courts, library with lava rock fireplace, TV/hobby room, horseback riding, three-hole golf garden and croquet courts.	Swimming pool, three lighted tennis courts, sailing and other water sports.	Two swimming pools, tennis courts, two golf courses, horseback riding and water sports. Adjacent to resort shopping complex.

Exhibit IV-M

- Commanding views of the ocean and lagoons fronting the site
- Gentle sloping topography
- Private, serene character of the area
- Lower-density profile emphasizing residential and golf elements

Lodge Market Position

The lodge's market position must be assessed in terms of the evolution of the west Hawaii visitor market. Expansion of regional visitor accommodations will be driven in the short-term by development of luxury, upscale and high-activity resort hotels, primarily on oceanfront sites within master-planned resorts. However, secondary market impacts noted in comparable resort areas could include:

- Greater prominence of west Hawaii as a world-class destination area.
- Larger numbers of potential repeat visitors who are familiar with the area and more independent in meeting their needs.
- Growth of visitor attractions and activities outside of resort areas.

Mahukona is planned as a small, self-contained high-service luxury resort with high-quality recreational amenities. Several luxury market niches could be available, if the community is developed with a distinctive character.

Target Markets

Target guest markets for the resort lodge could include:

- Repeat independent travel visitors to the region seeking a different and more intimate scale environment.
- Independent travelers from the U. S., Japan and Europe desiring a base from which to pursue many regional attractions located away from planned resorts, such as equestrian activities, ocean recreation and hiking.
- Small corporate incentive groups which could be provided with a conducive meeting environment and high-quality on-property entertainment and recreation facilities.

Lodge Facility Attributes

The resort lodge would be developed to provide the following:

- A complete resort experience for lodge guests, with personal service, an intimate scale, and a variety of services consistent with the size of the facility and its luxury market position.
- A social and recreational center for residential lot owners in the Mahukona resort community, and for residents of other estate lot and upscale communities in the west Hawaii region.
- An attraction to regional visitors venturing outside of resort destination areas.

CHALON INTERNATIONAL OF HAWAII

Facility Description of Selected Hawaii Luxury Resort Hotels, Continued

	Mauna Kea Beach	Mauna Lani Bay	Kahala Hilton	Molokulani
Year(s) of completion	1965 and 1973	1983	1964	1983
Guest rooms (size, in square feet, excluding lanais)				
Standard rooms	298 (450)	339 (450 to 500)	327 (678)	412 (519 to 720)
One-bedroom suites	8 (550)	12 (800)	44 (1,256)	36 (720 to 1,098)
Two-bedroom suites	4 (900)	—	4 (N/A)	8 (1,670 to 3,120)
Total	310	351	370	456
Room features	Room phones, no TVs, air conditioned.	Room phones, TVs, air conditioned, ceiling fans.	Room phones, TVs, air conditioned, his/hers dressing areas.	Three room phones, TVs, air conditioned, pass-through closets (bedroom to bath).
Food and beverage facilities				
Restaurants (seats)	Terrace restaurant (300) Dining room (180) Dining room (175) Specialty restaurant (140) Informal specialty restaurant (40) Snack bar (80)	Fine dining room (136) Main dining room (304) Golf club restaurant (80) Poolside snack shop (30) Coffee shop (40)	Fine dining room (140) Informal restaurant (175) Coffee shop (260)	Fine dining room (100) Continental restaurant (210) Informal restaurant (140)
Bar (seats)	Bar (80)	Lobby bar (40) Main bar (N/A)	Bar (N/A) Dining room bar (N/A) Poolside bar (N/A)	Bar (70) Tea service/bar (74)
Average food and beverage seats per room	1.0	1.8	N/A	1.2
Retail shops (size in square feet)	6 (300 to 1,000 each)	7 (500 to 1,000 each)	7 (300 to 1,400 each)	7 (120 to 2,000 each)
Meeting rooms (seating capacity)	Auditorium (160) Meeting room (55)	Main ballroom (divisible into four - 470 seats) Three conference rooms (50 seats each) Lanai (550 standing)	Two banquet rooms (240)	Main ballroom (divisible into two - 380) Two meeting rooms (150 and 120) Two conference rooms (22 and 40)
Other amenities	Swimming pool, 13 tennis courts, 18-hole golf course, jogging path and health spa/sauna.	Swimming pool, ten tennis courts, 18-hole golf course, jogging path, ocean activities (childrens' programs	Saltwater ponds and lagoon, pursuits shops, shuffleboard, water sports, six tennis courts and exercise facilities.	Swimming pool, water sports, guest memberships at Honolulu Club.

N/A - Not available.

Sources: Discussions with representatives of the respective hotels and hotel headquarters

Exhibit IV-H, Cont.

In order to serve these markets, the following resort facilities and services are considered:

- Lodge units - The lodge could be developed to an ultimate size of from 250 to 300 units, with phasing dependent upon market support projected in this chapter.

- Restaurants - A fine-dining restaurant could both complement facilities and attract regional residents and visitors. More casual dining could be provided in connection with recreational facilities. The restaurant could also be developed with loft space to be used for catered, group functions and corporate events.

- Recreation - An 18-hole resort golf course and tennis club on the property, along with a clubhouse and health spa, could serve guests, community and regional residents. Memberships could also be instituted to both provide facility support and patronage from regional part-time and full-time residents.

- Lodge guest services - In keeping with the intimate scale of the lodge, a number of guest services could be considered, such as:

  - Room service
  - Organized water sports and recreational activities in suitable near-property and off-property locations
  - Concierge service
  - Limousine or shuttle transportation
  - Gift shop/newstand
  - Library
  - Beauty salon

Lodge Design Attributes

The concept of a lodge or inn preceded that of a modern hotel in the evolution of public accommodations. In contemporary practice, the lodge or inn concept differs from that of the resort hotel chiefly in terms of:

- Smaller scale, in number of rooms
- Frequently, a more rustic, less sophisticated character
- Narrower variety of guest services

The Mahukona resort lodge could be developed under the following physical design parameters:

- Location - The lodge could be the unifying element of the Mahukona resort community; a meeting place for residents, guests, club members and visitors. Therefore, the lodge could occupy a central site within the resort community, closely integrated with recreational facilities and the restaurant.

- Physical setting - Lodge siting could take advantage of prominent ocean views and the sloping topography of the Mahukona site. A dramatic setting could be created for the restaurant.

- Scale - The desired low-density character of the resort can be maintained by placing hotel units within a cluster of free-standing villas in proximity to the main lodge. Each villa structure could contain 4 to 8 units, with site planning and landscaping creating a variety of outdoor environments.

- Lodge structure - The lodge itself could include the restaurant, and entertainment areas, guest services and some hotel units.

- Building massing - A low-rise profile respecting the physical setting could introduce the proper note of intimacy for the lodge. Units could also be arranged in clusters.

- Architectural context - A natural motif consistent with Hawaiian or Pacific tropical design could serve properly at the Mahukona site.

- Room appointments - Guest rooms could be relatively large, attractive and functional with the highest standard of materials and finish.

- Management - Management of the lodge by an international luxury facility operator could allow occupancy levels to grow more rapidly, through greater marketing expertise and areas.

- Golf and recreation facilities - High-quality recreation is needed for a demanding market. At Mahukona, opportunities exist for:

  - an outstanding golf course as the predominant landscape element with a number of oceanfront holes.
  - excellent tennis facilities.
  - unique diving and other water sports activities, based at the resort's ocean frontage or at nearby Mahukona harbor.

Interrelation of Resort Community Facility Elements

The Mahukona resort lodge could be an integral part - in fact, the center - of the Mahukona resort community, and thus facilitate a synergy among the facilities provided to resident and guest alike. Interrelation of facility elements could be as follows:

- Lodge entertainment and dining facilities could serve guests, resort community residents and regional residents as well, although lodge guests could be expected to use facilities most frequently.

- Golf, tennis and other recreational facilities would be available to lodge guests and resort community residents, and could be provided on a membership basis to regional residents.

- Repeat visitors, larger parties and guests with particular needs could rent residences built on estate lots within the community. Operation of a rental pool or construction of specially-designed rental-pool units could permit extension of lodge services to these units, including room service and housekeeping.

- Availability of security, maintenance and other lodge-based services could provide greater enjoyment to part-time residents of the resort community estate lots.

LODGE MARKET ASSESSMENT

This section assesses market support for the planned Mahukona resort lodge. Guest mix, potential achieved room rates, and occupancy rates are projected for the lodge.

Guest Mix

As a high-service luxury facility, the Mahukona lodge is expected to develop a clientele centered on affluent free independent travelers (FITs). Travel status of guests at existing hotels was indicated previously in Exhibit IV-L, and showed that about 76% of high-service luxury hotel guests were FITs.

Projected lodge guest mix at stabilized occupancy would be as follows:

- Free independent travelers - 65%
- Group travelers - 10%
- Incentive and corporate - 20%
- Hawaii residents (kamaainas) - 5%

The Mahukona lodge is anticipated to draw more incentive and corporate travelers than other high-service luxury resorts, and a somewhat lower proportion of FITs.

Achieved Room Rates

Room rates for the Mahukona lodge have been estimated based on the lodge facility concept, anticipated guest mix and rates at comparable Hawaii luxury resorts. Published room rates are presented in Exhibit IV-O; as shown in the exhibit:

- Rates for standard rooms range from $185 to $325 per day at high-service luxury hotels.

- Published daily rates range from $215 to $400 for deluxe rooms.

- Suites range from $300 to $2,400 per day.

It is anticipated that published daily room rates for the Mahukona lodge could average $275. Based on the expected lodge guest mix, achieved rates could range from about $241 in 1995 to $248 in 2000, as estimated in current dollars in Exhibit IV-P.

Exhibit IV-O

CHALON INTERNATIONAL OF HAWAII

Published Room Rates of Selected Hawaii
First-Class and Luxury Resort Hotels

1989(1)

Hotel	Island	Standard	Deluxe	Suites
High-service luxury hotels:				
Kahala Hilton	Oahu	$ 185 - 265	295 - 400	495 - 1,700
Halekulani	Oahu	190 - 325	-	425 - 2,400
Royal Hawaiian	Oahu	195	280	300 - 1,650
Kapalua Bay	Maui	185 - 205	215 - 370	700 - 900
Mauna Kea Beach	Hawaii	220	365	691 - 891
Mauna Lani Bay(2)	Hawaii	295 - 325	360	500 - 600
Range		$ 185 - 325	215 - 400	300 - 2,400
High-activity luxury hotels:				
Hyatt Regency Waikiki	Oahu	115 - 185	160 - 235	325 - 1,500
Hyatt Regency Maui	Maui	195	355	750 - 2,000
Westin Maui	Maui	175	265	500 - 1,500
Hyatt Regency Waikoloa	Hawaii	195	360	425 - 2,500
Westin Kauai	Kauai	185	295	460 - 1,500
Range		$ 115 - 195	160 - 360	325 - 2,500
First-class hotels:				
Maui Marriott	Maui	195 - 230	195 - 280	400 - 1,000
Stouffers Wailea Beach	Maui	185 - 225	265 - 350	475 - 1,200
Maui Intercontinental Wailea	Maui	145 - 175	245 - 275	275
Royal Waikoloan	Hawaii	190 - 225	225 - 300	350
Stouffers Waiohai Beach	Kauai	135	230	450
Range		$ 135 - 230	195 - 350	275 - 1,200

(1) Rack room rates without discounts.
(2) American Plan hotel room rate includes breakfast, lunch and dinner.

Sources: Hawaii Visitors Bureau, Member Accommodations Guide (1989) and KPMG interviews with hotel management.

Exhibit IV-P

CHALON INTERNATIONAL OF HAWAII

Projected Resort Lodge Guest Mix and
Achieved Room Rates

1995 to 2000

	1995	1996	1997	1998	1999	2000
Guest mix:						
FIT	60%	60%	63%	63%	65%	65%
Group	18	15	13	12	10	10
Incentive and business	10	15	17	19	20	20
Kamaaina	12	10	7	6	5	5
Total	100%	100%	100%	100%	100%	100%
Average room rate by guest segment(1):						
FIT	$ 275	275	275	275	275	275
Group	190	190	190	190	190	190
Incentive and business	210	210	210	210	210	210
Kamaaina	170	170	170	170	170	170
Average achieved room rate	$ 241	242	246	246	248	248

(1) In 1990 dollars.

Projected Lodge Occupancy Rates

Occupancy rates are projected for the Mahukona resort lodge relative to anticipated islandwide occupancy rates from 1995 to 2000.

The lodge is expected to open in 1995. As shown previously in Exhibit IV-B, 1995 is anticipated to mark the end of a particularly rapid increase in luxury visitor rooms on the Island of Hawaii. For this reason, first-year occupancy of the Mahukona resort lodge is projected at about 55%.

Islandwide visitor unit occupancies are expected to improve from 1996 to 2000, as growing demand absorbs new rooms supplied through 1995. As shown in the table below, islandwide rates could rise from 63% in 1995 to about 69% in 2000.

The Mahukona resort lodge could require a period of marketing to establish an identity and clientele of repeat visitors to the region. The lodge's attractive facility concept and availability of on-property golf and other recreation are expected to support increasing occupancy rates from 1996 to 1999. A stabilized occupancy rate of 70% is anticipated in 1999. At 70%, the Mahukona resort lodge would obtain occupancies slightly above the islandwide average. Occupancy rates are projected as follows, with islandwide occupancy as shown previously in Exhibit IV-E:

Projected Occupancy Rates for
Island of Hawaii Visitor Units
and Mahukona Resort Lodge

1995 to 2000

Year	Projected occupancy rate: Island visitor units	Projected occupancy rate: Mahukona resort lodge
1995	63%	55%
1996	64	60
1997	65	64
1998	67	67
1999	68	70
2000	69	70

V - RESIDENTIAL LOT MARKET ASSESSMENT

The residential lots planned for the Mahukona resort community are unique because they contain features of two types of residential lot projects: agricultural/estate lots and resort lots. The residential lots planned for the Mahukona resort community are similar in size to estate lots. However, the lots location within a master-planned resort community could provide amenities similar to those available to resort lot buyers.

This chapter compares the proposed Mahukona development to existing and planned projects of both types.

ESTATE LOTS

Estate lots are typically larger agricultural-zoned lots of at least one acre located within a low-density, often rural, residential community.

Development of estate lot projects has been particularly active on the island of Hawaii in the 1980s. This section presents a review of existing and planned estate lot projects and identifies those that are considered to be the most comparable to the Mahukona development.

Existing Projects

Eight estate lot projects on the island of Hawaii are summarized in Exhibit V-A. The largest and best known is Kohala Ranch, which was first marketed in 1986. The first phase consisted of 223 acres with lot sizes of three, five, and ten acres. The Meadows, the second phase of Kohala Ranch began marketing efforts in 1988 and there are only 64 of the original 154 lots remaining. The roads and infrastructure of this phase were completed in 1989. The entire Kohala Ranch project is anticipated to consist of four phases on about 4,000 acres of land.

Four projects have sold out initial phases including Maliu Ridge, Puakea Bay Ranch, Mokuloa and Kohala Estates. Puakea Bay Ranch sold lots in 1985 and lots at Maliu Ridge and Mokuloa sold out in 1989, the first year that they were offered for sale. Kohala Estate lots sold several years ago.

Additional phases of these projects are planned due to the current limited inventory of available lots.

Planned Projects

Several of the planned projects are additional phases of existing projects, including Kohala Ranch, Maliu Ridge, Waiki'i Ranch, and Pu'u Lani Ranch.

In addition, several new projects are planned:

- Kohala-by-the-Sea is planned to be a two-phased project, with construction of the infrastructure just commencing. Reservations for Phase I which consists of 44 lots have been solicited, with about 70% of the lots already reserved. Lot sizes are anticipated to range from 43,821 to 61,637 square feet.

CHALON INTERNATIONAL OF HAWAII

Existing and Planned Estate Lot Subdivisions
on the Island of Hawaii

Project	Number of lots	Lot size range (acres)	Sales/approval status
Existing:			
Kohala Ranch	250	3 - 14	29 lots remaining for sale
Meadows(1)	154	3 - 5	64 lots remaining for sale
Maliu Ridge	57	1 - 3	Sold out (Phase I)
Puakea Bay Ranch	43	10	Sold out
Waiki'i Ranch	135	10 - 40	42 lots remaining in Phase I
Pu'u Lani Ranch	46	1 - 5	19 lots remaining in Phase I
Mokuloa	69	1	Sold out
Kohala Estates	105	3 - 5	Sold out
Total existing lots	859		
Planned:			
Mahukona(2)	170	1	Preliminary subdivision approval
Kohala Ranch	1,000	3 - 14	Master-planned project to be completed in 2009
Kohala-by-the-Sea	88	1	Reservations solicited for 44 lots in Phase I
Maliu Ridge	113	1 - 6	Phases II and III
Waiki'i Ranch	95	10 - 40	Phase II
Pu'u Lani Ranch	60	10	Phase II planned in 3 to 5 years
Waiwailani	85	3 - 10	Reservations solicited for 35 lots in Phase I
Sandlewood	45	1	Lots to be offered for sale by March 1990
Anekona Estates	36	5 - 6	Preliminary subdivision approval, 35 lots sold
Waikoloa Highlands	396	N/A	Scheduled for sales in 1992
Kahua Makai	N/A	N/A	Indefinite timetable
	2,088		

N/A Not available.
(1) Phase II of Kohala Ranch project.
(2) Subject property.

Source: Interviews with brokers and developers.

- Waiwailani is a multiphased project, with Phase I consisting of 35 three-acre lots. Construction of the infrastructure has not begun, while all 35 lots were reserved in 1988.

- Waikoloa Highlands, part of the master-planned Waikoloa Village community, is in the preliminary planning stage and is anticipated to be marketed within the next two years.

- Sandlewood, formerly known as the Estates at Waimea, is proposed to include about 45 one-acre lots. Final subdivision approval was granted in January 1990. No infrastructure construction has began, but marketing efforts are anticipated to start in March of 1990.

- Anekona Estates consists of 36 five- to six-acre lots. The project has preliminary subdivision approval, with final approval anticipated by May of 1990. All but one of the lots has been sold.

Types of Estate Lot Projects

Amenities and location differentiate the estate lot projects into three primary types: equestrian-oriented, resort-oriented, and residential-oriented. Each of these is discussed below.

Equestrian-oriented projects are generally located in upland areas and include amenities such as stables, riding trails, and polo fields. These were the first types of master-planned estate lot projects developed on the island of Hawaii and most of the existing projects are equestrian oriented, as shown in Exhibit V-B. Buyers of these lots generally prefer the cooler upland weather and privacy afforded by the large lots and low density of the projects.

- Kohala Ranch is a "gentleman's ranch" community, where the ranching environment has been created, but where not all of the residents participate in ranching activities. This project not only provides the equestrian related amenities, but is also planned to include an 18-hole golf course. The golf course differentiates this project from the other equestrian-oriented projects.

- Waiki'i Ranch is more of a "working ranch," where cattle and horses graze and show arenas are available for resident use. The smallest lot sizes available are ten-acre parcels, which are much larger than the smallest lots offered by the other projects. The master plan includes 12 miles of equestrian trails, a polo field, tennis courts, clubhouse, an 80-acre park, and other homeowner facilities.

- Pu'u Lani Ranch is also more of a "gentleman's ranch," where all livestock must be kept in a central area rather than on individual lots. Many equestrian-oriented amenities such as a riding arena, private bridle trails, and central horse stables, as well as picnic areas and tennis courts are planned.

- Waikoloa Highlands is the only estate lot project which is part of a planned community, where community facilities such as shopping and dining will be readily accessible. This project would offer equestrian and resort-oriented amenities including riding trails, stables, polo field, tennis courts and golf courses.

CHALON INTERNATIONAL OF HAWAII

Types of Estate Lots

Project by type	Setting	Location	Amenities
Equestrian oriented projects:			
Kohala Ranch and Meadows(1)	Upcountry	North Kohala	Stables, riding trails, tennis, gazebos, white picket fence, security gatehouse
Puakea Bay Ranch	Near ocean	North Kohala	Private park and picnic areas of about 14 acres, security gatehouse
Waiki'i Ranch	Upcountry	South Kohala	Polo field, 80-acre park, equestrian trails, tennis courts, clubhouse
Pu'u Lani Ranch	Upcountry	North Kona	Stables, riding arena, private trails, tennis courts, clubhouse, secured access
Waikoloa Highlands	Upcountry	South Kohala	Polo field, golf, tennis courts, near community facilities
Residential oriented projects:			
Mailiu Ridge	Upcountry	North Kohala	Underground utilities
Makuloa	Upcountry	Waimea	Underground utilities
Waiwailani	Upcountry	North Kohala	
Sandlewood	Upcountry	Waimea	Underground utilities
Anekona Estates	Upcountry	Near Waimea	Underground utilities
Kohala-by-the-Sea	Near ocean	North Kohala	Private security gate, underground utilities, ocean and coastal views
Resort oriented projects:			
Mahukona	Near ocean	North Kohala	Golf, tennis courts, nearby park and picnic areas, resort lodge

(1) Second phase of Kohala Ranch.

Residential-oriented projects also tend to be located upcountry and nearer to schools and established communities. Amenities currently offered include gated, secured access at some of the projects. These communities do not necessarily need to offer special amenities, but proximity to existing shopping areas, schools, and other community facilities is valued by lot buyers. Five projects are considered to be more residential-oriented: Sandlewood, Anekona Estates, Mailu Ridge, Waiwailani and Kohala-by-the-Sea.

- Sandlewood is conveniently located in Waimea and represents one of the last available sites that has water capacity in this area.
- Anekona Estates is also conveniently located at about six miles from Waimea and about five miles from the beach.
- Mailu Ridge is located near the town of Hawi.
- Waiwailani is anticipated to be more of a residential-oriented project even though some of the larger ten-acre lots may provide for gentleman's ranching activities and the raising of horses. No equestrian amenities have been included in the master plan. Waiwailani is the sole project planned to have overhead utility wires. The project is located just outside Hawi and Phase I consists of three-acre lots.
- Kohala-by-the Sea is located along the Kohala Coast about 2.5 miles from Kawaihae Harbor and is the most comparable project to Mahukona in terms of location. It is located near world-class resorts and golf courses, and the sailing, water skiing and fishing activities of Kawaihae Harbor. No equestrian amenities are planned and there are restrictions on raising and keeping livestock. Features of the project include the following:
  - Private security gate
  - Underground utilities
  - Ocean and coastline views
  - Low rainfall
  - Landscaping requirements

Resort-oriented projects are generally located on or near the coast and resort destination areas. Resort-oriented amenities include golf courses, tennis courts, picnic and park areas, lush landscaping and access to resort amenities. The only planned resort-oriented project with one-acre or larger lots is at Mahukona; however, there are two estate lot projects that have some of the qualities of resort-oriented projects: Kohala-by-the-Sea and Waikoloa Highlands.

- Kohala-by-the-Sea has a coastal location and is near to Kohala Coast resort areas.
- Waikoloa Highlands offers resort amenities, including golf courses and tennis courts.

Characteristics of Estate Lots

Existing and planned estate lots are characterized in terms of project size, lot size, views, frontage, and common area amenities.

Average lot size varies considerably, ranging from a low of about one acre to 40 acres, with the more equestrian-oriented projects having larger lots. Lot sizes of the new planned projects appear to be smaller than the existing projects.

Location is generally in the upland areas of North or South Kohala, although a few projects are planned to be located near the coast. Views vary with the premier lots having coastal views. The upcountry locations generally provide panoramic coastal and mountain views.

Proximity to good schools is particularly important for the residential-oriented projects because buyers tend to be to families who are purchasing primary residences. Location of nearby shopping, entertainment, and dining areas are also particularly important since these facilities are not usually included in the master plan in estate lot projects. Proximity to golf courses and other resort facilities are important when the project does not include these facilities.

Comparable Estate Lot Projects

The projects most comparable to Mahukona are reviewed in terms of project orientation, lot sizes, planned amenities, and project location.

Five projects have comparable lot sizes including Mailu Ridge, Pu'u Lani Ranch, Mokuloa, Kohala-by-the-Sea and Sandlewood. Because the one-acre lots are the smallest offered by the estate lot projects, these projects tend to be more residential- or resort-oriented than equestrian oriented.

Amenities of residential-oriented projects are varied and can include common park and picnic areas, a clubhouse, and security devices such as a gated community. The proposed amenities for Mahukona, including golf course and tennis facilities, should differentiate it from other planned and existing estate lot projects. Only Kohala Ranch and the Waikoloa Highlands currently have plans for these facilities.

Comparably located projects include Puakea Bay Ranch and Kohala-by-the-Sea since both are located near the coastline. The proposed project location of Mahukona could provide better views than most of the residential-oriented projects. Proximity to community facilities and schools, however, is not as favorable as for some of the existing and planned residential communities.

Prices

Prices of estate lots on the island of Hawaii continued to increase throughout 1989. Average prices on the island of Hawaii range from $196,944 to $316,667 per lot and from $61,889 to $116,000 per acre, as shown in Exhibit V-C.

- Per-acre prices are higher than estate lots on other islands, but the per-lot prices are lower.
- Prices at Kohala Ranch show a large range because lot size varies from 3 to 14 acres.
- The per-acre prices of the larger lots are not comparable to the smaller lots.

Exhibit V-C

CHALOM INTERNATIONAL OF HAWAII

Current Estate Lot Sales Prices

1989

Project	Average prices(1) Per lot Low	Per lot High	Per acre Low	Per acre High
Hawaii:				
Kohala Ranch	$ 100,000	300,000	20,000	80,000
Meadows	200,000	280,000	50,000	87,000
Mailu Ridge	100,000	165,000	52,000	89,000
Puakea Bay Ranch	310,000	495,000	30,000	50,000
Waiki'i Ranch	325,000	575,000	24,000	45,000
Pu'u Lani Ranch	227,500	300,000	114,000	210,000
Mokuloa	100,000	165,000	97,000	160,000
Anekona Estates	240,000	325,000	48,000	65,000
Kohala-by-the-Sea	150,000	245,000	122,000	258,000
Island of Hawaii average	196,944	316,667	61,889	116,000
Kauai:				
Kalihi Wai Ridge	345,000	400,000	35,000	50,000
Seacliff Plantation	500,000	800,000	70,000	90,000
Molokai:				
Kawela Plantation	75,000	90,000	35,000	45,000
Papohaku Ranch	300,000	850,000	50,000	70,000
Average, all projects	$ 230,192	383,846	57,462	99,923

(1) Sales prices from January 1989 to December 1989.

Source: MLS Hawaii and interviews with brokers and developers.

- Mailu Ridge, Pu'u Lani Ranch, Mokuloa, and Kohala-by-the-Sea offer one-acre lots, with per-lot prices ranging from $120,000 to $245,000.

Absorption

Absorption of estate lots on the island of Hawaii increased dramatically in 1987 as the supply of these lots began to increase, as shown in Exhibit V-D.

- 1987 reflected the sale of the majority of the Kohala Ranch lots, resulting in the absorption of 193 lots.
- 1988 reflected the sale of several new projects resulting in the absorption of 181 lots.
- 1989 reflected the continued absorption of existing projects as well as the development of two new projects, Kohala-by-the-Sea and Anekona Estates.

Construction of the infrastructure of Kohala-by-the Sea just started and over 70% of the lots offered were sold in 1989. Anekona Estates has preliminary subdivision approval, yet 31 of the 36 lots were reserved in 1989. Demand for two other projects has been healthy. Waiwailani and Sandlewood are not in the sales phase but have solicited reservations. Sandlewood collected about 150 names for 45 lots in 1989 and Waiwailani's 35 lots were reserved about one and a half years ago.

Buyer Profiles

Buyer profiles are analyzed based upon their primary place of residence, as shown in Exhibit V-E:

- Buyers of the more equestrian-oriented projects tend to be primarily from the U. S. mainland.
- Hawaii residents tend to be the primary buyers of the more residential-oriented lots such as Mailu Ridge and Anekona Estates. Potential buyers of Sandlewood lots also tend to be primarily local residents.
- Interviews indicate that Japanese buyers are becoming more interested in the estate lot projects. Buyer characteristics at some of the newer projects such as Meadows and Kohala-by-the-Sea are beginning to reflect this trend.

RESORT LOTS

This section presents comparable resort lot projects in terms of project characteristics and market data. Resort lots are typically residential lots of less than one acre located within a master-planned resort community.

Comparable Existing Projects

Most single-family resort lot subdivisions on the island of Hawaii offer significantly smaller lot sizes than the one-acre lots proposed for Mahukona.

Exhibit V-D

CHALON INTERNATIONAL OF HAWAII

Original Lot Sales for Estate Lot Subdivisions
on the Island of Hawaii

	1985	1986	1987	1988	1989	Total	Average per year(1)
Kohala Ranch	-	20	116	77	8	221	58
Meadows	-	-	-	16	59	75	20
Mailu Ridge	-	-	46	9	-	55	28
Puakea Bay Ranch	33	5	1	-	-	39	8
Waiki'i Ranch	-	24	24	20	-	68	18
Pu'u Lani Ranch	-	-	4	4	14	22	8
Mokuloa	-	-	-	52	13	65	36
Kohala-by-the-Sea	-	-	-	-	31	31	31
Kohala Estates	1	-	2	3	-	6	N/A
Anekona Estates(2)	-	-	-	-	31	31	31
Waiwaiani(3)	-	-	-	-	-	-	-
Sandlewood(3)	-	-	-	-	-	-	-
Total	34	49	193	181	156	613	

N/A Not available.
(1) Annual average based on project sales period.
(2) Buyers have submitted 5% nonrefundable deposits.
(3) Reservations only.

Source: MLS Hawaii and interviews with brokers and developers.

Exhibit V-E

CHALON INTERNATIONAL OF HAWAII

Buyer Origin at Selected Estate Lot Subdivisions
on the Island of Hawaii

Subdivision	Hawaii	Mainland U. S.	Foreign Japan	Foreign Other	Total
Equestrian oriented projects:					
Kohala Ranch	38%	56%	5%	1%	100%
Meadows	15	75	10	-	100
Puakea Bay Ranch	33	65	2	-	100
Waiki'i Ranch	65	30	15	-	100
Pu'u Lani Ranch(1)	N/A	N/A	N/A	N/A	
Residential oriented projects:					
Mailu Ridge	60	38	-	2	100
Mokuloa	70	29	1	-	100
Anekona Estates	80	20	-	-	100
Kohala-by-the-Sea	N/A	N/A	N/A	N/A	N/A
Weighted average	44%	49%	6%	1%	100%

N/A Not available.
(1) Buyers are primarily from the U. S. mainland West Coast.

Source: MLS Hawaii and interviews with brokers and developers.

However, there are a few luxury resort projects in the state that offer larger-sized lots, as shown below:

Project	Lot sizes (square feet)
Cape at Mauna Lani	37,000 to 80,900
Kapalua Place	26,000 to 74,000
Fairways at Mauna Kea North	22,000 to 33,000
Champion Ridge	20,170 to 33,970
Point Estates	16,000 to 27,000

All of these are located in luxury resorts on the island of Hawaii except for Kapalua Place, which is located on Maui.

Project Characteristics

Luxury resort lot projects are differentiated based upon lot sizes, location, view orientation and resort amenities.

Lot sizes at luxury resorts range from about 8,000 to 80,000 square feet, with the comparable projects representing the largest resort lots in the state. There has been a trend over the past five years to offer larger single-family lots at resort subdivisions that can offer premium locations and views, thus appealing to the affluent purchaser.

Location and view orientation of the lots within the project influence the sales prices of the lots, with ocean views, ocean frontage and golf frontage commanding premiums. At the three luxury resorts, Mauna Kea, Mauna Lani and Kapalua, existing single-family projects are either located on a golf course or have hillside/ocean/valley views, as shown in Exhibit V-F. Ocean frontage is extremely rare with only the Cape at Mauna Lani and Kapalua offering a few lots with ocean frontage.

Resort amenities such as golf courses, tennis courts, swimming pools, and lush landscaping differentiate the resort residential lots from the estate residential lots that were discussed earlier. Resort lot projects are generally located nearer to the coast, so that ocean views and water activities are readily accessible to resort guests. Additionally, dining, entertainment and resort shopping facilities are also available.

Current Resort Lot Prices

Pricing of resort lot projects is influenced by the prestige of the resort, view orientation and lot size, as shown in Exhibit V-G.

Lot prices range from $320,000 to $5,000,000 and from $15 to $125 per square foot, with the Cape at Mauna Lani and Kapalua Place commanding the highest prices. These are exclusive oceanfront communities, with lots that are larger than any previous luxury resort development. The lots range up to nearly two acres in size. Lot prices have exceeded $5.0 million, with prime oceanfront sites priced up to $125 per square foot.

Lots with golf course frontage have the next highest price range with Mauna Lani golf-front resort lot prices ranging from $320,000 at the Point Estates to

Exhibit V-F

CHALON INTERNATIONAL OF HAWAII

View Orientation of Comparable Resort Lots at Selected Hawaii Resorts

		Frontage		Primary view orientation	Views			
	Ocean	Golf course	Golf course		Hillside/ ocean/ valley views	Interior; limited or no views	Total lots
Mauna Kea - Mauna Kea Fairways North	-	17	Ocean		15	-	32
Mauna Lani:							
Cape at Mauna Lani	8	6	Ocean		-	-	14
The Point Estates	-	19	Golf course		-	-	19
Champion Ridge	-	25	Golf course		8	-	33
Kapalua:							
Kapalua Place	5	-	Ocean		3	-	8
Total	13	67			26	-	106
Percent of total	12%	63%			25%	-%	100%

Source: Interviews with developers and real estate brokers.

$1.3 million at Champion Ridge or from $15 to $38 per square foot for these golf-frontage lots. Frontage on a golf course commands a premium, as noted below:

- Lots with golf course frontage command premiums ranging from 10% to 70% over interior lots.
- Lots with golf course frontage and mountain and ocean views command premiums ranging from 15% to 95% over interior lots.

Resort Lot Absorption Trends

Absorption has been healthy, with all of the original lots sold as shown in Exhibit V-H. The recent, exclusive developments at Mauna Lani and Kapalua sold out almost immediately, primarily to persons who were already residents or owners of property at the respective resorts. Champion Ridge at Mauna Lani, a planned project consisting of 33 lots, was initially offered to existing resort owners in September of 1989 and a waiting list of 100 interested buyers was accumulated. Leasehold lots at Mauna Kea Fairways North did not experience significant sales until 1987 when statewide market conditions improved; the project sold out in 1988.

Buyer Profiles

Many luxury resort lot buyers are already property owners within the particular resort. This is especially true at the high end of the market. The number of lot buyers who already owned real estate within the various resorts were as follows:

Resort	Project	Buyers with resort property	Percent
Mauna Lani	The Cape	14 of 14	100%
Mauna Lani	The Point Estates	18 of 19	95
Kapalua	Kapalua Place	4 of 8	50

This suggests that the market for high-priced and better-located lots will develop as the resort matures and gains a broader existing ownership base.

California residents represent the largest percentage of buyers for all the projects, as shown in Exhibit V-I. Recent buyers, as described by the brokers are typically entrepreneurs ranging from 40 to 50 years of age, many of whom are real estate developers. Professionals appear to be declining as a percentage of the more recent buyers. To date, Japanese buyers generally represent less than 10% of the market, with the exception of Wailea Golf Estates and Kapalua Place. The primary purchase motivation is for second homes to be used as vacation or future retirement homes.

RESIDENTIAL LOT MARKET ASSESSMENT

This section presents a review of the development concept for the residential lot community and summarizes the analysis of projected target markets, sales prices and absorption.

CHALON INTERNATIONAL OF HAWAII

Selected Luxury Resort Lot Prices

1989

Primary view orientation	Lot sizes (square feet)	Current sales prices per square foot	Total (in $000s)	Approximate price per acre (in 000s)
Oceanfront:				
Cape at Mauna Lani	37,000 - 80,900	$ 47 - 85(1)	2,800 - 5,000(1)	$ 2,000 - 3,700
Kapalua Place	26,000 - 74,000	65 - 125	2,100 - 5,200	2,800 - 5,400
Golf course:				
Fairways at Mauna Kea North(2)	22,000 - 33,000	16 - 20(1)	390 - 450(1)	700 - 870
Champion Ridge(3)	20,170 - 33,970	30 - 38	600 - 1,400	1,300 - 1,600
Point Estates	16,000 - 27,000	15 - 26	320 - 550	650 - 1,100

(1) Estimated sales prices based on 1989 appraisals.
(2) Leasehold.
(3) Planned with a 1990 estimated completion date.

Source: John Child and Company, Inc.

Exhibit V-G

Exhibit V-I

CHALON INTERNATIONAL OF HAWAII

Resort Lot Buyer Characteristics at Luxury Hawaii Resorts

1989

	Origin		Residence/purpose	
	U. S. Citizens	Foreigners	Investors	Residents
Hauna Kea - Hauna Kea Fairways	Primarily California and other mainland U. S.	10% Japan	10%	90% (2nd home, retirement)
Hauna Lani - The Cape and Point Estates	93% U.S.	7% Foreign		100% residents
Kapalua - Pineapple Hill	30% California 10% Hawaii 30% Other U. S.	25% Japan 5% Other	30%	70% (25% FT, 45% 2nd home)
Kapalua Place	N/A	Majority Japan	N/A	Primarily 2nd home
Wailea - Wailea Golf Estates I	40% California	30% Japan	10%	90% (50% FT, 50% 2nd home)

Source: Interviews with brokers and developers.

CHALON INTERNATIONAL OF HAWAII

Annual Lot Sales at Selected Luxury Resorts

1982 - 1989

	Year offered	Total units	Annual lot sales/resales 1982	1983	1984	1985	1986	1987	1988	1989(1)	Total sales	Average annual sales/ project
Hauna Kea:												
Fairways at Hauna Kea North	1982	32	1	4	2	1	-	11	13	-	32	4
Hauna Lani:												
The Cape at Hauna Lani	1989	14	-	-	-	-	-	-	-	9	9(2)	9
The Point Estates	1988	19	-	-	-	-	-	-	19	-	19	19
Kapalua - Kapalua Place	1989	8	-	-	-	-	-	-	-	8	8	8
Total		73	1	4	2	1	-	11	32	17	68	8

(1) Sales figures as of May 1989.
(2) Five lots withheld by developer for later marketing.

Source: MLS Hawaii and interviews with brokers and developers.

Exhibit V-H

Development Concept

Makukona is anticipated to emerge as a resort-oriented community because of its location and the planned resort facilities. However, due to the size of the lots and the experience at other Hawaii projects, it is also anticipated to have characteristics of a residential-oriented community.

The one-acre residential lots should be configured to maximize golf course frontage and to provide ocean and coastal views where feasible. Additionally, utilities could be placed underground so that view planes are maximized and the quality image is maintained for the entire resort community. Design guidelines should be established to ensure high quality. Inclusion of secured access to the project could be considered, particularly since the project is resort-oriented and could include many part-time residents.

Target Market

Due to the resort/residential nature of this project and the high demand for housing on the island of Hawaii, it is anticipated that Hawaii residents and visitors from the U. S. mainland will be the largest target markets, as shown in Exhibit V-J. It is also anticipated that the Japanese market will continue to become a larger percentage of the buyers of residential real estate on the island of Hawaii. This is based upon the trends in 1989 and due to the fact that more Japanese visitors are projected to come to the island of Hawaii. Also, residential real estate purchasers tend to be repeat visitors.

Projected Sales Prices

Sales prices are projected to range from $250,000 to $400,000 per one-acre lot, as shown in Exhibit V-K. Lots with golf course frontage are anticipated to command a premium, with prices ranging from $300,000 to $400,000. Other lot prices are projected to range from $250,000 to 300,000.

Prices of existing and planned estate lot projects were reviewed to determine the pricing structure. Kohala-by-the-Sea and Pu'u Lani Ranch are considered to be the most comparable projects, thus prices of these lots were considered in the pricing analysis. Kohala-by-the-Sea is comparable in terms of lot sizes, and project location and Pu'u Lani Ranch is comparable in terms of lot sizes. The size of the lot is an important pricing criterion because per-acre prices generally decline significantly as the size of the lot increases.

Even though Kohala-by-the-Sea and Pu'u Lani Ranch are considered to be the most comparable estate lots, neither include the resort amenities that are planned for Mahukona. The golf course, tennis courts, dining and other resort facilities that will be located within the Mahukona resort community make it superior to the estate lot projects. Based upon analysis of large lot prices at established resorts on the island of Hawaii, a resort premium of about 50% was estimated. This premium was adjusted downward to about 20% because the comparable resorts are established visitor destinations and Mahukona will not have had time to reach this status by the time the lots are marketed.

Lots with golf course frontage are anticipated to command about a 20% to 30% premium over other lots based upon experience at other resorts.

Exhibit V-J

CHALON INTERNATIONAL OF HAWAII

Anticipated Estate Lot Buyer Characteristics at
Kapaanui-Mahukona Subdivision

	Projected range	
	Low	High
Buyer origin:		
Hawaii	25%	45%
Mainland U. S.	35	50
Japan	10	20
Other International	5	10
Purchase motivation:		
Investor	20	30
Second home residence	40	60
Primary residence	20	40

CHALON INTERNATIONAL OF HAWAII

Projected Sales Absorption and Market Performance of
Kapaanui-Mahukona Estate Lots

Development characteristics:	
Number of lots	170
Average lot size	1 acre
Projected sales absorption:	
First year (1992) sales	20
1993 - 1996 annual sales	35 - 40
Average sales per year	35
Projected home completion:	
Percentage lots improved by 1997	24%
Percentage lots improved by 2000	45
Percentage lots improved by 2005	68
Estimated lot pricing(1):	
Golf course frontage	$ 300,000 - 400,000
Other	$ 250,000 - 300,000

(1) In 1990 dollars.

Projected Absorption

It is anticipated that lots will be available for sale in 1992 and that sales will be completed by 1996, as shown in Exhibit V-L. This is based upon initial absorption of 20 lots and from 35 to 40 lots per year subsequently. This is comparable to the average sales rate experienced at Mokuloa, Kohala-by-the-Sea and Waiwallani. The sales rate experienced at Kohala Ranch and the Meadows is significantly higher with annual averages of 58 sales at Kohala Ranch and 59 sales at the Meadows in 1989, which was the first full year of sales activity.

VI - GOLF COURSE MARKET ASSESSMENT

This chapter reviews national and Hawaii golf market trends and presents the projected demand for golf at the proposed Mahukona course.

NATIONAL GOLF MARKET TRENDS

According to the National Golf Foundation, 23.4 million U. S. golfers played 487 million rounds of golf in 1988. This represents a 7.8% increase in golfers over the previous year and a 12.2% increase in the number of rounds played. The golf participation rate was estimated to be 10.4% of all U. S. residents age five and older.

The largest number of golfers are in the 20 to 29 age range, as shown in Exhibit VI-A. Additionally, this group's participation rate of 29.8% is higher than the national average. Although more people are taking up golf, golfers in the U. S. remain an upscale group of Americans. Golf participation is strongly related to income level as 25% of all golfers come from households with annual incomes of $50,000 to $74,999. Golfers tend to be well educated with about 40% being college graduates. Accordingly, golfers belong to high status occupations, with nearly half employed in professional or managerial positions, as shown in the table below:

Occupational Classification of
U. S. Golfers

1988

Occupation	Percent of golfers
Professional/managerial	45%
Blue Collar	28
Clerical/Sales	19
Other	8
Total	100%

Source: National Golf Foundation, August 1989.

The number of rounds played per year varies by type of golfer, as shown in Exhibit VI-B. Occasional golfers who play 3 to 7 rounds of golf a year are the largest percentage of all golfers. Frequent golfers play 25 or more rounds per year and represent 24% of all golfers.

HAWAII GOLF MARKET SEGMENTS

This section focuses on the Hawaii golf market and describes the major golf market segments.

Exhibit VI-1

Exhibit VI-A

CHALON INTERNATIONAL OF HAWAII

Age Profile of the U. S. Golf Market

1988

Age	Golfers (million)	Percent distri-bution	Golf partici-pation rate(1)
5 - 19	2.6	11%	11.7%
20 - 29	6.2	27	29.8
30 - 39	5.2	22	25.8
40 - 49	3.6	15	24.3
50 - 59	2.4	10	22.3
60+	3.4	15	18.0
Total	23.4	100%	10.4%

(1) Golfers as a percent of total U. S. population.

Source: National Golf Foundation, 1989.

Exhibit VI-B

CHALON INTERNATIONAL OF HAWAII

Frequency of Play of U. S. Golfers

Type of golfers	Annual rounds played	Percent of all golfers	Golfers (millions)
Infrequent	1 - 2	20.2	4.7
Occasional	3 - 7	29.8	7.0
Average	8 - 24	26.0	6.1
Frequent	25 or more	24.0	5.6
Total		100.0	23.4

Source: National Golf Foundation, 1989.

Resident Golfers

Golfers in Hawaii represent both local residents and visitors to the islands. The local resident golfer market can be segmented into two main categories:

- Local recreational players use daily fee and municipal courses, usually as small social golfing clubs or foursomes. These players tend to be flexible in time of play, often utilizing early morning tee-times, and tend to be more price-sensitive than other golfer segments.

- Country club players have memberships at a private club, thus, are willing to pay a premium for private facilities with their various amenities, convenience, and associated prestige. Currently, the island of Hawaii does not have any strictly private clubs; however, private memberships are available at some of the courses.

Visitor Golfers

The visitor golf market in Hawaii is viewed as four submarket segments:

- Resort guest golfers are those who stay at resorts with hotel or condominium accommodations located around an associated golf course. Preferential access to the course is typically a benefit of using the resort's room accommodations, and green and cart fees are charged according to usage. Currently, the major golf resort facilities on Hawaii are at Mauna Kea, Mauna Lani, Keauhou, and Waikoloa Beach resorts.

- Resort resident golfers are generally part-time residents of single- or multifamily homes in golf resorts. Such property owners are frequently avid golfers, and priority access to the golf course is often an important motivation in their purchase of resort real estate.

- Free and independent travel (FIT) golfers are those not staying at a golf resort, who independently arrange their own recreational itinerary. The FIT golfers generally reserve tee-times through guest services at their hotel or through a local golf tour operator.

  - The U. S. mainland FIT segment generally seeks total green, cart, equipment and transportation expenses of about $100 or less for a single round of play.

  - The Japanese FIT segment is much less price-sensitive than its U. S. counterpart, being accustomed to extraordinarily high costs in Japan.

- Golf tour players make their recreational as well as travel tour arrangements at the point of origin. Most are Japanese who book their golf tee-times in Japan through their respective tour agent, who in turn makes arrangements with one of several golf tour operators in Hawaii. This Japanese market is less price sensitive than others; however, current demand is primarily directed to Oahu rather than neighbor island golf destinations.

Existing and Planned Golf Courses

The Island of Hawaii currently has six resort golf courses and five off-resort courses, as shown in Exhibit VI-C. All of the resort courses are located in the South Kohala district except for Kona Country Club, located in North Kona, and the Sea Mountain Golf Course, located in Punalu'u. The off-resort courses are primarily located on the east side of the island.

An additional 18 courses are planned or proposed for the island, as shown in Exhibit VI-D. The courses are in various stages of planning and it is not anticipated that all of them will be completed. Only one of the planned courses is under construction. The Waikoloa Beach Golf Club, the second course at the Waikoloa Beach Resort, is anticipated to be completed in 1990. Five of the courses are planned which indicates that the project has major development approval such as state urban designation and/or county zoning. Also, these projects generally have a development timetable. The projects that are proposed are considered to be in the preliminary stages of planning and may still need government approvals and generally lack firm timetables.

All of the planned and proposed golf courses are resort courses except as noted below:

- Waikoloa Highlands course is planned as part of the master plan of the Waikoloa Village community. Waikoloa Highlands is an estate lot equestrian/resort-oriented project that was discussed in Chapter IV.

- ISA residential community course is planned for development by ISA International. Development plans including the type of course and timing of the project has not been announced. The use permit has been approved.

- Oneloa Golf Course is planned to be developed by A and O International in Puna. The grading permit approval is pending.

- Royal Vista Golf and Country Club is planned for development by Scott Turney in Puanahulu. The use permit application is pending.

- Kohala Ranch course is proposed as part of the master-planned Kohala Ranch estate lot equestrian-oriented residential project that was discussed in Chapter IV. Conceptual plans have been submitted.

- Signal Puako is proposed by Signal as part of a master-planned community and conceptual plans have been submitted.

RESORT GOLF COURSE OVERVIEW

This section reviews major characteristics of statewide resort golf courses.

Benefits of a Resort Golf Course

Of Hawaii's major resort areas, only the urban Waikiki area lacks a resort golf course. Golfing is a favored activity of more upscale hotel guests. Golf courses help to sell hotel room accommodations and resort real estate, draw day

Exhibit VI-C

CHALON INTERNATIONAL OF HAWAII

Golf Courses on the Island of Hawaii

1989

Courses	Location	Number of holes
Resort courses:		
Waikoloa Beach Golf Club	Waikoloa Beach	18
Waikoloa Village Golf Club	Waikoloa Village	18
Kona Country Club	Keauhou	27
Mauna Kea Beach Hotel Golf Course	Mauna Kea Resort	18
Francis I'i Brown	Mauna Lani Resort	18
See Mountain Golf Course	Punalu'u	18
Subtotal		117
Off-resort courses:		
Manilos Country Club	Hilo	9
Hilo Municipal Golf Course	Hilo	18
Volcano Golf and Country Club	Volcano	18
Discovery Harbour Golf Course	Naalehu	18
Hamakua Country Club	Honokaa	9
Subtotal		72
Total golf holes in operation		189

Source: Various published sources.

Exhibit VI-D

CHALON INTERNATIONAL OF HAWAII

Planned and Proposed Golf Courses on the Island of Hawaii

1989

Course	Location	Number of holes
Under construction - Waikoloa Beach Golf Club - second course (1990)	Waikoloa Beach	18
Subtotal		18
Planned:		
Mauna Kea Resort - second course (1991 - 1992)	Mauna Kea	18
Mauna Lani - second course (1991 - 1992)	Mauna Lani	18
Waikoloa Highlands course	Waikoloa Village	18
TSA residential community course	Kaloko	18
Oneloa	Puna	36
Subtotal		108
Proposed:		
Additional resort course	Waikoloa Beach	36
Hapuna Beach Resort - mauka course	Mauna Kea	18
Planned resort courses	Kaupulehu	36
Regent Beach Resort course	Regent Beach	18
Planned resort course	Awake'e	18
Planned resort course	Kohanaiki	18
Kona Country Club expansion	Keauhou	9
Hawaiian Palace resort course	Hawaiian Riviera	18
Ka'u Aina resort courses	Hawaiian Riviera	36
Royal Vista Golf and Country Club	North Kona	27
Kohala Ranch	North Kohala	18
Signal Puako	South Kohala	36
Subtotal		288
Total planned and proposed golf holes		414

Sources: Discussions with Hawaii County Planning Department and various published sources.

visitors who patronize restaurants, resort shops or other resort facilities, and provide open space and view orientations for the resort and its surrounding community.

Levels of Utilization

Hawaii resort courses vary widely in amount of hotel guest play. As Exhibit VI-E shows, luxury resorts such as Mauna Kea, Mauna Lani and Kapalua have very high rates of play for hotel guests. At the same time, some resorts with first-class or budget traveler clientele, such as Turtle Bay, also show above-average golf course use by hotel guests.

Golf course use may be measured in average rounds played per day. Usage is affected by a number of factors, including prevailing weather, difficulty of play, player familiarity with course conditions, the use of carts, and starting time intervals.

Achieving a desired level of play on a resort course requires balancing operational efficiency with golfers' preference for a more leisurely pace of play. It is also affected by the seasonal character of Hawaii resort golf use. Peak season occurs from January through March, as Mainland visitors arrive for longer stays, while the slowest periods tend to be in summer. Peak and low season play levels may vary by almost 100%.

Fees at Resort Courses

Green fees and cart rental charges assessed at selected Hawaii resorts are shown in Exhibit VI-F. Fees charged to resort guests on the island of Hawaii average $53, which is slightly lower than fees charged on Oahu and Maui. Kauai golf course fees are significantly higher at $74.

Fees charged to nonresort guests are higher than those charged to resort guests on all of the islands and average about $85. Average fees charged to Hawaii residents is significantly higher on the island of Hawaii at $74 compared to the statewide average of $56. The only resort on Hawaii that offers competitive statewide rates to Hawaii residents is the Waikoloa Beach Resort.

Some of the courses maintain lower rates in the nonpeak season. Resort courses generally do not offer memberships. Several resorts, however, make annual memberships available to resort lot or condominium owners; Mauna Kea, Wailea, Kapalua, Princeville and Keauhou-Kona all use this approach. Membership fees range from $450 to $3,000, represent a prepayment of green fees, and are subject to yearly adjustment.

Golf Markets

Resort golfers are comprised of five major market segments: resort hotel guests, resort condominium/single-family guests, resort residents, nonresort visitors and island residents. A description of these various markets in Hawaii is presented as follows:

- Resort guests and residents:
  - Represents between 20% and 90% of resort golf play.

Exhibit VI-E

CHALON INTERNATIONAL OF HAWAII

Rounds Played Per 1,000 Hotel Guests
at Selected Resort Golf Courses

	Estimated daily resort population(1)	Rounds per 1,000 guests per day
Oahu:		
Makaha	261	131
Turtle Bay	748	56
Maui:		
Kapalua	317	140
Wailea	1,401	48
Hawaii:		
Mauna Lani	400	158
Mauna Kea	406	263
Waikoloa Beach	696	46
Kauai - Princeville	712	45
Weighted average		85

(1) Calculated based on total hotel units, average occupancy rates and average number of guests per unit.

Source: Estimated based on historical data, based on discussions with directors or representatives of the respective courses.

Exhibit VI-F

CHALON INTERNATIONAL OF HAWAII

Total Green and Cart Fees at
Selected Resort Golf Courses in Hawaii

1989

	Resort guests	Nonresort guests	Hawaii residents
Oahu:			
Sheraton Makaha Resort and Country Club(1)	$ 45	95	55
Turtle Bay Golf Course(2)	65	80/90	40/45
Oahu average	$ 55	91	49
Maui:			
Wailea - Blue and Orange Courses			
Peak season (December - April)	45	90	45(3)
Low season (May - November)	30	60	30(3)
Royal Kaanapali - North and South Courses	74	74	74
Kapalua Golf Club - Bay Course and Village Course	55	85	40
Maui average	$ 56	78	51
Kauai:			
Princeville Golf Club:			
Peak season (December - March)	53	68	48(4)
Low season (April - November)	48	63	43(4)
Kiahuna Golf Club	52(5)	58	34
Kiele Golf Course	105	125	55
Kauai Lagoons Golf Course	85	105	45
Kauai average	$ 74	89	45
Hawaii:			
Mauna Kea Beach Golf Course	55	90	90
Mauna Lani:			
Peak season (December - March)	50	100	100
Low season (April - November)	50	70	70
Waikoloa Beach Resort and Golf Club:			
Peak season (January - March)	55	90	45
Low season (April - December)	55	90	45
Kona Country Club:			
Peak season (January - March)	53	75	75
Low season (April - December)	47	70	70
Hawaii average	$ 53	85	74

Exhibit VI-F, Cont.

CHALON INTERNATIONAL OF HAWAII

Total Green and Cart Fees at
Selected Resort Golf Courses in Hawaii, Continued

	Resort guests	Nonresort guests	Hawaii residents
All Islands:			
Range	$ 30 - 105	60 - 125	30 - 100
Average	$ 60	85	56

(1) Guests from other Sheraton hotels pay $85.

(2) Higher rates are charged for weekend play by nonresort guests and Hawaii residents.

(3) Rate offered only to Maui residents.

(4) Hawaii residents who do not live on Kauai pay $58 in peak season and $53 in low season.

(5) Rates paid by guests of Poipu area hotels.

Source: Compiled from discussions with course representatives and published information.

- Resorts with a low percentage of guest/resident play usually accommodate convention visitors or group visitors who do not have as much leisure time to devote to all-day golf play or have lower vacation budgets.

- Resort players are generally middle-aged and have a higher median income.

• Nonresort visitors:

- Tend to represent a greater proportion of total play at golf courses that do not have a large "captured" visitor market such as Makaha, Turtle Bay and Makena.

- Includes golf "course-hopping" visitors from neighboring resort areas such as Waikoloa Beach guests who play at Mauna Kea.

- Represents from 10% to 55% of total golf play.

• Island residents:

- Tend to represent a greater proportion of total play at resort courses which provide for a special rate to island residents or groups.

- Account for 10% to 45% of total play.

The golfer market mix at a resort course is influenced by several factors and can vary significantly by resort. As on-site resort population increases with residential lot and condominium development, the proportion of resident golfers will tend to increase. Proximity to residential communities, discount policies, and reservation procedures can affect resort visitor and local resident use.

OFF-RESORT COURSE OVERVIEW

Five off-resort courses are currently operated on the island of Hawaii. None of these courses are strictly private clubs; however, three offer memberships: Naniloa Country Club, Volcano Golf and Country Club and Hamakua Country Club. Even though these courses are considered to be off-resort golf courses, the Naniloa Country Club is located near visitor accommodations in Hilo.

Facilities of off-resort courses are generally not as elaborate as resort courses as shown in Exhibit VI-G.

Utilization of off-resort golf courses on the island of Hawaii varies considerably, as shown in Exhibit VI-H. The Hilo Municipal Golf Course experiences the highest number of rounds per day at 275 rounds. This level of play keeps the course very busy and interval start times average about six minutes. Additional demand cannot be accommodated during peak hours, especially on weekends and during the summer months. It was indicated that a more desirable level of play would be about 150 rounds per day. This course does not offer memberships, although, special monthly rates are available for residents who play frequently.

Exhibit VI-G

CHALON INTERNATIONAL OF HAWAII

Facilities at Nonresort Golf Courses
on the Island of Hawaii

	Naniloa Country Club	Hilo Municipal Golf Courses	Volcano Golf and Country Club	Discovery Harbour Golf Course	Hamakua Country Club
Number of holes	9	18	18	18	9
Property size (acres)	65	130	N/A	N/A	19
Offer memberships	X		X		X
Facilities:					
Clubhouse		X	X	X	
Restaurant		X	X		
Lounge/bar		X	X		X
Pro shop	X	X	X		
Locker room		X	X		
Driving range	X		X	X	
Practice green	X	X	X	X	
Resident golf pro					

Source: Interviews of golf professionals, directors of golf and club managers.

The remainder of the off-resort courses are either located in remote areas or do not offer the facilities to compete with the busier golf courses, which is reflected in average daily rounds of play.

GOLF COURSE MARKET ASSESSMENT

This section presents a projection of the demand for golf at the Mahukona course and presents the projected market mix of players.

Golf Demand

Assumptions utilized to project the demand for golf at the Mahukona course are summarized in Exhibit VI-I. Occupancy rates for the hotel range from 55% in 1995 to a stabilized level of 70% in 1999, based upon market data presented in Chapter III. Occupancy of single-family units is determined based upon usage of the unit and rates experienced at other resorts in Hawaii. The number of persons per unit ranges from 1.9 to 2.5, with the larger parties anticipated to stay in the single-family homes.

The demand for golf at the Mahukona course is based upon the projected average daily population at the resort and upon the anticipated number of members of the golf club, with provision for off-resort visitor play. Demand for golf at the Resort is projected to increase from an about 80 rounds per day in 1995 to about 150 rounds per day in 2010, as summarized in Exhibit VI-J. Demand is projected to be derived from four primary sources, as listed below:

- Lodge hotel guests
- Single family residents consisting of:
  - Visitors who stay in rental units
  - Part-time residents
  - Full-time residents
- Golf club members
- Off-resort visitors

Each of these groups would be anticipated to generate varying amounts of demand for golf, as reflected in the exhibit. Rounds of golf played by each of the four groups is summarized below.

- Lodge guest daily population is anticipated to stabilize at about 370 guests in 1999.
  - It is anticipated that lodge guests will play about 200 daily rounds of golf per 1,000 guests. This rate of play is greater than the rate of play projected at Mauna Lani where about 160 daily rounds of golf are played per 1,000 hotel guests. However, the estimated rate of play is less than estimated at Mauna Kea, where about 260 daily rounds of golf are played per 1,000 hotel guests.

CHALON INTERNATIONAL OF HAWAII

Utilization and Fees at Nonresort Golf Courses
on the Island of Hawaii

Exhibit VI-H

	Manioa Country Club	Hilo Municipal Golf Courses		Volcano Golf and Country Club	Discovery Harbour Golf Course	Hamakua Country Club
Average daily rounds of play	60	275		N/A	10	20
Daily fees for residents per round:						
Greens fees	$ 7.00 - 14.00	N/A	$ 6.00(1)	$ 21.00 - 24.00	$ 10.00	$ 10.00
Cart rental		14.50	9.00	9.00 - 10.00	14.00	None
Daily fees for visitors per round:						
Greens fees	7.00 - 14.00	N/A	6.00	35.00	10.00	10.00
Cart rental		14.00	14.50	9.00 - 10.00	14.00	None
Market mix:						
Hawaii residents and members	80%	95%		95%	100%	100%
Visitors	20	5		5	-	-

N/A Not available.
(1) Also offers senior citizen discount rate.

Source: Interviews of golf professionals, directors of golf and club managers.

CHALON INTERNATIONAL OF HAWAII

Assumptions for Projected On-Property Golf Demand at Mahukona

Facility types and expected unit usage	Number of units	Percent distribution	Occupancy rate	Persons per unit	Golf participation rate
Lodge guests	250 - 300		55% - 1995 60 - 1996 64 - 1997 67 - 1998 70 - 1999 70 - 2000 70 - 2001 70 - 2005	1.9	200 per day(1)
Single-family residents:					
Visitor rentals		20%	25%	2.5	150 per day(1)
Part-time residents		40	50	2.5	25 per year(2)
Full-time residents		40	90	2.5	25 per year(2)

(1) Rounds per day per 1,000 guests.
(2) Rounds per year per household.

Exhibit VI-I

Exhibit VI-J

- Single family resident population is projected to increase as lots are sold and improved.

  - Visitors staying in rental units are not anticipated to be a significant market segment compared to part-time and full-time residents in terms of average daily census. These visitors are, however, anticipated to play more golf than residents.

  - It is anticipated that visitors who stay in rental units will play about 150 daily rounds of golf per 1,000 guests, which is comparable to the rate of play estimated to occur at Hauna Kea Resort.

  - Part-time and full-time residents are anticipated to play about 25 rounds of golf per year, which is based upon the national average of 25 or more rounds per year played by "frequent" golfers in 1988, as previously shown in this chapter.

- Golf club members are anticipated to increase as recognition of the Mahukona community increases and as estate lots are developed and sold in the region. It is anticipated that there will be about 130 members in 2010. Golfers who purchase golf memberships generally golf more frequently than public golfers, therefore it is anticipated that each membership will result in about 100 rounds of play per year.

- Off-resort visitors are projected to represent about 20% of daily rounds from 1995 to 2002. It may become necessary to limit off-resort visitor play as club member and Mahukona visitor and resident play increases.

Market Mix

Lodge hotel guests and visitors are anticipated to be the primary markets initially, accounting for about 72% of total rounds of play in 1995, as shown in Exhibit VI-K. This market decreases to about 50% of total rounds of play in 2010, as more part-time and full-time residents move into the resort community. Golf club members are anticipated to be the second largest market, accounting for about 6% of total rounds of play in 1995 and 24% in 2010.

Exhibit VI-K

CHALOH INTERNATIONAL OF HAWAII

Projected Golf Market Mix

	1995	2000	2005	2010
Total rounds	80	120	140	150
Lodge hotel guests	72%	60%	51%	47%
Visitor rentals	-	1	1	2
Subtotal	72	62	52	49
Part-time residents	1	2	3	3
Full-time residents	1	4	5	6
Subtotal	2	6	8	9
Members	6	12	19	24
Off-resort visitors	20	20	21	18
Total	100%	100%	100%	100%

Mahukona

Appendix B: *Botanical Survey Kapaa/Kapaanui/ Mahukona Project Area, North Kohala District, Island of Hawaii*

B-1

BOTANICAL SURVEY
KAPA'A / KAPA'ANUI / MAHUKONA PROJECT AREA
NORTH KOHALA DISTRICT, ISLAND OF HAWAI'I

by

Winona P. Char
CHAR & ASSOCIATES
Botanical/Environmental Consultants
Honolulu, Hawaii

Prepared for: PBR HAWAII

January 1990

TABLE OF CONTENTS

B-2

BOTANICAL SURVEY
KAPA'A / KAPA'ANUI / MAHUKONA PROJECT AREA
NORTH KOHALA DISTRICT, ISLAND OF HAWA'I

INTRODUCTION

The Kapa'a / Kapa'anui / Mahukona project site consists of approximately 491 acres. It is bound to the north by pasturelands and the nearby Kapa'a Beach Park; to the east by the Akone Pule Highway (270) and pasturelands; to the south by the Kaoma pasturelands; and to the west by the ocean. Elevation on the site ranges from sea level along portions of the coastline to roughly 240 ft. on the inland (mauka) areas. Vegetation on the site consists of kiawe trees with a dense ground cover of grasses, primarily buffel grass; a very narrow band of coastal vegetation can usually be found along the rugged shoreline. Portions of the site are presently used for grazing cattle and fairly new barbed wire fencing can be found along the perimeter of most of the property.

Field studies to assess the botanical resources on the subject property were conducted in January 1990. The objectives of the survey were to (1) provide a general description of the major vegetation types, (2) inventory the flora, and (3) search for threatened and endangered plant species protected by Federal and/or State laws.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area.

Topographic maps were examined to determine access, boundaries and reference points, and terrain characteristics.

An abandoned narrow gauge railroad bed, now used as a 4-WD road, provided access to the coastal areas and to the lower slopes of the project site. The railroad linked the former Kohala Sugar Company with dockside facilities and warehouses at Mahukona Harbor. Mauka or inland portions of the project site are easily accessed from the Ahukone Puli Highway and the road down to the harbor and Coast Guard lighthouse.

A walk-through survey method was employed. Areas most likely to harbor native plant communities or rare species, as the coastal areas and the boulder covered slope areas, were more intensively examined. Notes were made on plant associations and distribution, substrate types, topography, exposure, etc. Species identification was made in the field. Plants which could not be positively identified were collected for later determination in the herbarium and for comparison with the taxonomic literature.

The species recorded are indicative of the season ("rainy" vs. "dry") and the 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 species list, especially of the weedy annual taxa.

DESCRIPTION OF THE VEGETATION

A brief description of the vegetation found on the Kapa'anui parcel (TMK: 5-7-02:11) prepared by R. M. Towill Corp. (in Ahualoa Development, Inc. 1984) for a proposed agricultural subdivision described kiawe as the predominant tree with various smaller shrubs and grasses also abundant. It was noted that the trees were scattered and short on the upper section of the parcel, becoming more numerous and taller as one approached the shoreline.

No rare, threatened or endangered plants are discussed in the report and no comprehensive species checklist was prepared.

For this report, two major vegetation types -- coastal strand and kiawe-buffel grass community -- are recognized on the project site and are described in detail below. All those vascular plant species inventoried during the field studies are presented in the checklist at the end of this report. While vegetation on the project site is dominated by introduced or alien species, a few pockets of native plants can still be found along the rocky shoreline and on boulder covered slopes.

Coastal Strand

The coastal strand forms a very narrow belt along the rocky coastline and is poorly developed, often with the kiawe-buffel grass community displacing it in many areas. It is best developed on boulder covered beaches and rocky points such as around Kauiliii Point. A number of native coastal species can be found in such areas. The most common being 'aki'aki or seashore rushgrass (Sporobolus virginicus) and pa'u-o-Hi'i-aka (Jacquemontia ovalifolia ssp. sandwicensis), both of which form extensive low-lying mats. Other natives found occasionally include the silver-leaved hinahina (Heliotropium anomalum var. argenteum), kipukai or nena (Heliotropium curassavicum), the orange-flowered 'ilima (Sida fallax), alena (Boerhavia repens), and pua-kala or the native white-flowered poppy (Argemone glauca).

Among the introduced or alien species which can be found in these coastal situations are Australian saltbush (Atriplex semibaccata), swollen finger grass (Chloris barbata), khaki weed (Alternanthera sessilis), the unpleasant puncture vine (Tribulus cistoides) with its spiny fruits, and pluchea shrubs (Pluchea symphytifolia) which form rounded, windswept clumps. A few small coconut palms (Cocos nucifera) can be found planted in sheltered areas where

fisherman frequent.

Kiawe-Buffel Grass Community

The kiawe-buffel grass community covers the majority of the project site. Typically it is composed of kiawe trees (Prosopis pallida), 12 to 20 ft. tall, which are open, that is, the trees are spaced so that their canopies do not touch. In some areas, the trees may be very widely spaced (30% cover) and the physiognomy is of an open parkland with scattered trees. Buffel grass (Cenchrus ciliaris), with upright clumps to 3 ft. tall, forms a dense ground cover which generally tends to exclude other species.

Three variants of this vegetation type can be observed in the field. These can usually be correlated with variations in the substrate types. On Hahukona very stony silty clay loam soil (Sato et al. 1973), located on the upper slopes of the Kapa'anui parcel, adjacent to the highway, pitted beardgrass (Bothriochloa pertusa) becomes locally abundant and forms extensive patches, especially near cattle watering troughs.

Where rocky outcroppings predominate on the lower half of the Kapa'anui parcel on Kawaihae soil, pili grass (Heteropogon contortus) is co-dominant with buffel grass. One large boulder covered slope, located about 1,000 ft. in from the northern boundary of the project site, supports a small community of native plants; these are 'ilima, nehe (Lipochaeta aff. subcordata), 'awikiwiki (Canavalia hawaiiensis), 'ilie'e (Plumbago zeylanica), koali-'awaniu (Ipomoea indica), Ipomoea littoralis, anunu (Sicyos aff. anunu), and kumu-niu (Doryopteris decipiens). The large boulders are encrusted with a dense covering of lichens, turning them a whitish-gray color. One plant of the native coastal sandalwood or 'ili-ahi-alo'e (Santalum ellipticum) is found on a rocky outcropping near the 4-WD road (old railroad bed).

On the Kau and Mahukona parcel, sisal plants (Agave sisalana) are locally common. These large rosette-forming plants have bluish-green leaves tipped with a dark brown to black spine making surveying rather difficult when the plants are growing close together. Sisal was first introduced into the Hawaiian Islands in 1893 and a small commercial fiber crop was started to provide cordage and twine. The tough fibers are obtained from the leaves of the sisal. High labor cost led to the demise of the sisal industry in the late 1920's and the plants have since spread and become locally naturalized in dry, often rocky sites, on all the main islands except Ni'ihau (Wagner et al. in press).

DISCUSSION AND RECOMMENDATIONS

Vegetation on the project site is dominated by introduced plants. Two introduced species, kiawe and buffel grass, form the bulk of the biomass on the project site and the dominant vegetation type. Of a total of 98 species inventoried during the field studies, 76 (78%) are introduced or alien; 20 (20%) are native; and 2 (2%) are originally of Polynesian introduction. Among the natives, 8 are endemic, i.e., native only to the Hawaiian islands, and 12 are indigenous, i.e., native to the islands and elsewhere.

None of the native species are officially listed threatened or endangered plants; nor are any proposed or candidate for such status (U. S. Fish and Wildlife Service 1985; Herbst 1987). While the 'awikiwiki (Canavalia hawaiiensis) is known from South Point, Hualalai, Mauna Loa, and the Ka'u Desert, it has not been recorded from the Kohala area before. A specimen will be deposited at the B. P. Bishop Museum herbarium.

The proposed development, golf course and house lots, is not expected to have a significant impact on the vegetation of the site as it is primarily vegetated with introduced species. Of some concern, is the boulder covered slope which supports a small

community of native plants. Although none are considered threatened or endangered, the plants should be preserved, if possible, as continued development of the leeward Kohala coast will diminish their populations and range in the future. As the plants are on a steep slope and a golf course is planned for the site, the boulder covered slope could be left undisturbed and incorporated into the landscape design. Both the 'awikiwiki and the nehe are attractive plants. The 'awikiwiki, a member of the pea family, has leaves covered with golden-brown hairs and dark magenta-colored flowers; it would make an impressive ground cover on stoney areas or climbing over rock walls. The nehe is related to wedelia, a commonly used ground cover, and with its bright yellow flowers could be similarly used. Native strand species such as 'ilima, pa'u-o-Hi'i-aka, and pu'a-kala should be considered for landscaping areas subject to salt-spray damage.

LITERATURE CITED

Ahualoa Development, Inc. 1984. Environmental assessment for Kapaa Nui agricultural subdivision, Kapaa and Kapaa Nui, North Kohala, Hawaii. Prepared by R. M. Towill Corp., Honolulu.

Herbst, D. 1987. Status of endangered Hawaiian plants. Hawaiian Botanical Society Newsletter 26(2): 44-45.

Lamoureux, C. H. 1984. Checklist of the Hawaiian Pteridophytes. Manuscript.

Porter, J. R. 1972. Hawaiian names for vascular plants. Coll. of Tropical Agriculture, Univ. of Hawaii, Manoa, Dept. Paper No. 1.

Sato, H. H., W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro, Jr. 1973. Soil survey of the island of Hawaii, State of Hawaii, U. S. Dept. of Agriculture, Soil Conservation Service, Washington, D.C.

St. John, H. 1972. List and summary of the flowering plants in the Hawaiian Islands. Pacific Tropical Botanical Garden Memoir No. 1, Lawai, Kauai.

U. S. Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants; Review of plant taxa for listing as Endangered and Threatened Species; Notice of review. Federal Register 50(188): 39526-39527 plus 57-page table of species.

Wagner, W. L., D. Herbst, and S. H. Sohmer. In press. Manual of the flowering plants of Hawaii. Univ. of Hawaii Press and B. P. Bishop Museum, Honolulu.

SPECIES CHECKLIST -- KAPA'A / KAPA'ANUI / MAHUKONA PROJECT AREA

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of three groups: Ferns, Monocots, and Dicots. Taxonomy and nomenclature of the Ferns follow Lamoureux (1984); Flowering Plants, Monocots and Dicots, are in accordance with Wagner et al. (in press) for most determinations. Common English and/or Hawaiian names given, in most cases, follow St. John (1973) or Porter (1972).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name, when known.
3. Biogeographic status. The following symbols are used:
   E = endemic = native only to the Hawaiian Islands
   I = indigenous = native to the islands and also to one or more other geographic area(s)
   P = Polynesian = plants of Polynesian introduction prior to Western contact (1778); not native
   X = introduced or alien = all those plants brought to the islands intentionally or accidentally after Western contact; not native.
4. Presence (+) or absence (-) of a particular species within each of two major vegetation types recognized on the project site (see text for discussion):
   cs = Coastal Strand
   k-bg = Kiawe-Buffel Grass Community

Scientific name	Common name	Status	Vegetation type: cs	Vegetation type: k-bg
FERNS				
SINOPTERIDACEAE (Cliff Brake Fern Family)				
Doryopteris decipiens (Hook.) J. Sm.	kumu-niu, 'iwa'iwa	E	-	+
Pellaea viridis (Forsk.) Prantl	pellaea	X	-	+
FLOWERING PLANTS -- MONOCOTS				
AGAVACEAE (Agave Family)				
Agave sisalana Perine	sisal	X	-	+
ARECACEAE (Palm Family)				
Cocos nucifera L.	coconut, niu	P	+	-
COMMELINACEAE (Spiderwort Family)				
Commelina benghalensis L.	hairy honohono	X	-	+
POACEAE (Grass Family)				
Bothriochloa pertusa (L.) A. Camus	pitted beardgrass	X	+	+
Cenchrus ciliaris L.	buffel grass	X	+	+
Chloris barbata (L.) Sw.	swollen finger grass	X	+	+
Chloris virgata Sw.	feather finger grass	X	-	+
Eleusine indica (L.) Gaertn.	wire grass, goose grass	X	+	+
Eragrostis tenella (L.) P. Beauv. ex Roem. & Schult.	love grass	X	-	+
Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.	pili, pili grass	I	-	+
Panicum maximum Jacq.	Guinea grass	X	-	+
Panicum maximum var. trichoglume Eyles ex Robyns	green panic grass	X	-	+
Pennisetum setaceum (Forssk.) Chiov.	fountain grass	X	-	+
Rhynchelytrum repens (Willd.) Hubb.	Natal redtop	X	-	+

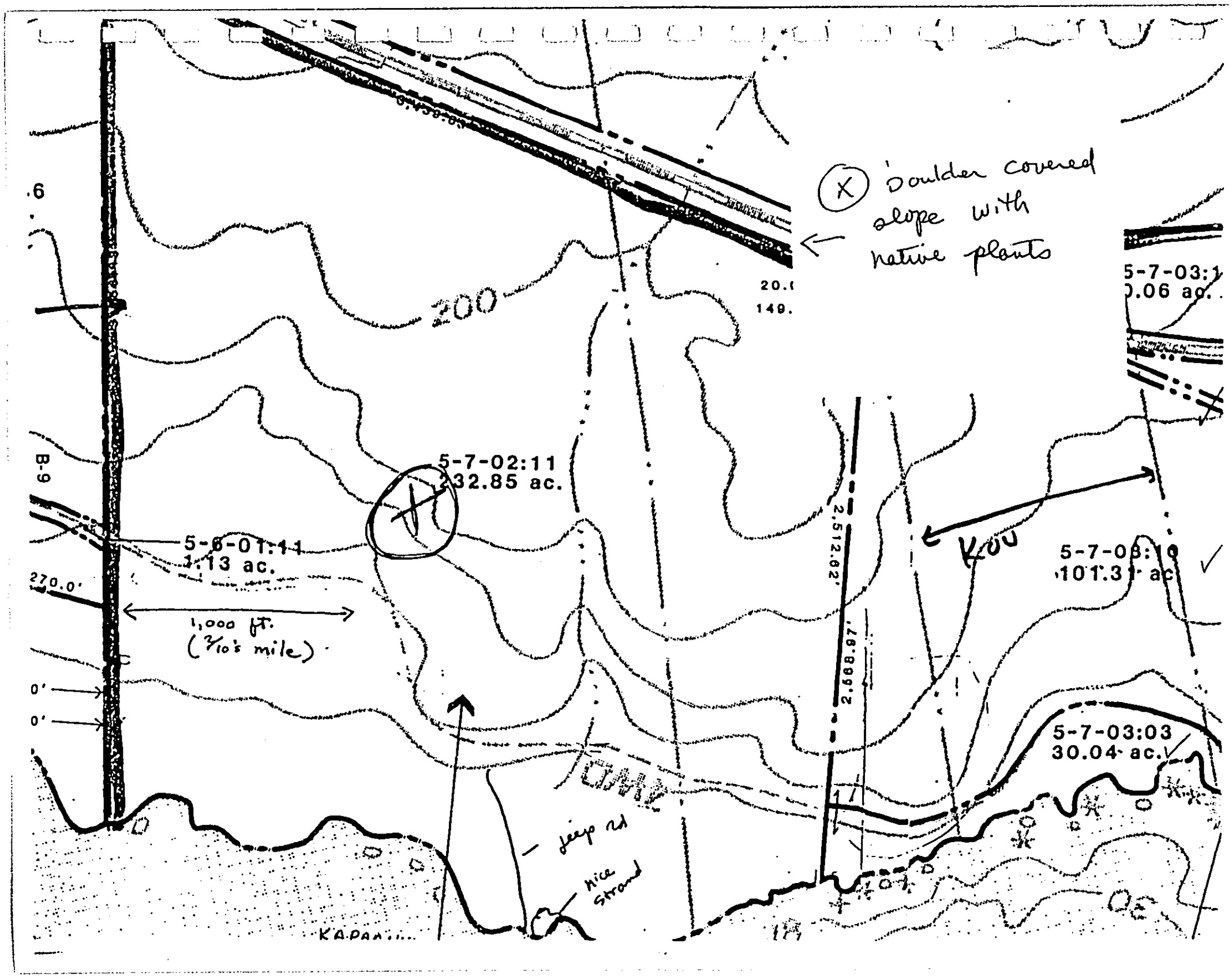
Scientific name	Common name	Status	Vegetation type: cs	Vegetation type: k-bg
Setaria verticillata (L.) P. Beauv.	bristly foxtail	X	+	+
Sporobolus virginicus (L.) Kunth	seashore rushgrass, 'aki'aki	I	+	-
FLOWERING PLANTS -- DICOTS				
AMARANTHACEAE (Amaranth Family)				
Alternanthera sessilis (L.) DC.	khaki weed	X	+	-
Amaranthus spinosus L.	spiny amaranth, pakai kuku	X	+	+
Amaranthus viridus L.	slender amaranth, pakai	X	-	+
ANACARDIACEAE (Mango Family)				
Mangifera indica L.	mango, manako	X	-	+
Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X	-	+
ASTERACEAE (Sunflower Family)				
Ageratum conyzoides L.	maile hohono	X	-	+
Bidens cynapiifolia Kunth	West Indian beggar's tick	X	-	+
Bidens pilosa L.	Spanish needle, ki, ki nehe	X	+	+
Conyza bonariensis (L.) Cronq.	hairy horseweed, ilioha	X	-	+
Conyza canadensis (L.) Cronq.	Canada fleabane, ilioha	X	+	+
Crassocephalum crepidioides (Benth.) Moore	crassocephalum	X	-	+
Emilia fosbergii Nicolson	Flora's paintbrush, red pualele	X	+	+
Gnaphalium purpureum L.	purple cudweed	X	-	-
Lipochaeta aff. subcordata A. Gray	nehe	E	-	+
? Osteospermum calendulaceum L. f.		X	+	+
Pluchea symphytifolia (Mill.) Gillis	pluchea, sourbush	X	+	+
Sigesbeckia orientalis L.	small yellow crownbeard	X	-	+
Sonchus oleraceus L.	sow thistle, pualele	X	+	+

Scientific name	Common name	Status	Vegetation type cs	k-bg
Synedrella nodiflora (L.) Gaertn.	synedrella, nodeweed	X	-	+
Vernonia cinerea var. parviflora (Reinw.) DC.	little ironweed	X	-	+
Zinnia peruviana (L.) L.	wild zinnia	X	-	+
BORAGINACEAE (Heliotrope Family)				
Heliotropium anomalum var. argenteum A. Gray	hinahina	E	+	-
Heliotropium curassavicum L.	kipukai, nena	I	+	-
BRASSICACEAE (Mustard Family)				
Coronopus didymus (L.) Sm.	swinecress	X	-	+
Lepidium virginicum L.	lepidium, peppergrass	X	+	+
Sisymbrium altissimum L.	Jim Hill mustard	X	-	+
CACTACEAE (Cactus Family)				
Opuntia ficus-indica (L.) Mill.	cactus, panini	X	-	+
CAPPARACEAE (Caper Family)				
Cleome gynandra L.	spider flower, honohina	X	+	+
CARICACEAE (Papaya Family)				
Carica papaya L.	papaya, mikana	X	-	+
CHENOPODIACEAE (Goosefoot Family)				
Atriplex semibaccata R. Br.	Australian saltbush	X	+	+
Atriplex suberecta Verd.	saltbush	X	+	-
Chenopodium murale L.	'aheahea	X	+	+
CONVOLVULACEAE (Morning-glory Family)				
Ipomoea cairica (L.) Sweet	koali	X?	-	+
Ipomoea indica (J. Burm.) Merr.	koali-'awania	I	-	+
Ipomoea littoralis Blume		I?	-	+
Jacquemontia ovalifolia (Choisy) H. Hallier	pa'u-o-Hi'i-aka	I	+	-
Jacquemontia ovalifolia ssp. sandwicensis (A. Gray) Robertson	pa'u-o-Hi'i-aka	E	+	-

Scientific name	Common name	Status	Vegetation type cs	k-bg
Merremia aegyptia (L.) Urb.	hairy merremia, koali kua hulu	X?	-	+
CUCURBITACEAE (Squash Family)				
Cucumis dipsaceus Ehrenb. ex Spach	wild cucumber	X	-	+
Momordica charantia L.	wild bittermelon	X	-	+
Sicyos aff. anunu (St. John) Telford	anunu	E	-	+
EUPHORBIACEAE (Spurge Family)				
Chamaesyce hirta (L.) Millsp.	hairy spurge, garden spurge	X	+	+
Chamaesyce prostrata (Aiton) Small	prostrate spurge	X	-	+
Euphorbia heterophylla L.	Mexican fireplant	X	-	+
Ricinus communis L.	castor bean, koli	X	-	+
FABACEAE (Pea Family)				
Acacia farnesiana (L.) Willd.	klu	X	-	+
Canavalia hawaiiensis Degener, I. Degener & J. Sauer	'awikiwiki, puakauhi	E	-	+
Chamaecrista nictitans (L.) Moench.	partridge pea, lauki	X	-	+
Crotalaria pallida Aiton	rattlepod	X	-	+
Desmanthus virgatus (L.) Willd.	virgate mimosa	X	-	+
Desmodium tortuosum (Sw.) DC.	Florida beggarweed	X	-	+
Indigofera suffruticosa Mill.	indigo, 'iniko	X	-	+
Leucaena leucocephala (Lam.) de Wit	koa-haole, ekoa	X	-	+
Macroptilium lathyroides (L.) Urb.	wild bean, cow pea	X	-	+
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe	X	+	+
LAMIACEAE (Mint Family)				
Leonotis nepetifolia (L.) R. Br.	lion's ear	X	-	+

Scientific name	Common name	Status	Vegetation type: cs	Vegetation type: k-bg
MALVACEAE (Mallow Family)				
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	X	-	+
Abutilon incanum (Link) Sweet	hoary abutilon, ma'o	I?	-	+
Gossypium barbadense L.	cotton	X	-	+
Malva parviflora L.	cheeseweed	X	-	+
Malvastrum coromandelianum (L.) Garcke	false mallow, hauuoi	X	-	+
Sida fallax Walp.	'ilima	I	+	+
Sida spinosa L.	prickly sida	X	-	+
MYRTACEAE (Myrtle Family)				
Psidium guajava L.	guava, kuava	X	-	+
Syzygium uniflora L.	Surinam cherry	X	-	+
NYCTAGINACEAE (Four-o'clock Family)				
Boerhavia coccinea Mill.	red-flowered boerhavia	X	+	-
Boerhavia repens L.	alena, anena	I	+	+
OXALIDACEAE (Wood Sorrel Family)				
Oxalis corniculata L.	yellow wood sorrel, 'ihi'ai	P?	-	+
PAPAVERACEAE (Poppy Family)				
Argemone glauca (Nutt. ex Prain) Pope	native poppy, pua-kala	E	+	-
PASSIFLORACEAE (Passion Flower Family)				
Passiflora foetida L.	pohapoha	X	-	+
PLUMBAGINACEAE (Leadwort Family)				
Plumbago zeylanica L.	'ilie'e	I	-	+
PORTULACACEAE (Purslane Family)				
Portulaca oleracea L.	common purslane, pigweed	X	+	+

Scientific name	Common name	Status	Vegetation type: cs	Vegetation type: k-bg
SANTALACEAE (Sandalwood Family)				
Santalum ellipticum Gaud.	'ili-ahi-a-lo'e	E	-	+
SOLANACEAE (Nightshade Family)				
Capsicum annuum L.	chili pepper, nioi	X	-	+
Lycopersicon pimpinellifolium (Jusl.) Mill..	currant tomato	X	+	+
Solanum americanum Mill.	popolo	I?	-	+
Solanum linnaeanum Hepper & P. Jaeger	apple-of-Sodom, kikania	X	-	+
STERCULIACEAE (Cacao Family)				
Waltheria indica L.	'uhaloa, hi'aloa	I?	+	+
VERBENACEAE (Verbena Family)				
Lantana camara L.	lantana, lakana	X	-	+
ZYGOPHYLLACEAE (Caltrop Family)				
Tribulus terrestris L.	puncture vine	X	+	-


X boulder covered slope with native plants
5-7-02:11
232.85 ac.
5-6-01:11
1.13 ac.
1,000 ft.
(3/10's mile)
5-7-03:03
30.04 ac.
5-7-03:1
0.06 ac.
5-7-08:10
101.31 ac
2,512.02'
2,668.97'
270.0'
0'
0'
B-9
200
jeep rd
nice strand
KAPAA

Mahukona

Appendix C: *Bird & Mammal Survey of Kapaa/ Kapaanui/Mahukona Coastal Site*

Bird and Mammal Survey of Kapaa/Kapaanui/Mahukona Coastal Site

April 10, 1990

Maile A. Kjargaard
P.O. Box 476
Volcano, Hawaii 96785

C-1

INTRODUCTION

The following report is based on a two day field survey of a 481 acre site between Kapa'a and Kaoma Point, North Kohala, Hawaii performed on 21 and 23 February, 1990. The primary purpose of the survey was to identify endangered species or unique communities in the area that could be adversely affected by development of the area.

The northern portion of the site has been previously surveyed for birds and mammals in 1984 (Berger 1984); the report lists seven mammal species and 24 bird species that may occur at the site. No endangered birds or mammals were discovered during the 1984 survey.

METHODS

The survey consisted of a total of 10 hours of observation, conducted between 0815 and 1700. Transect counts were conducted throughout the site (Figure 1). During these counts, I walked slowly through the area, noting vertebrates detected both by sight and by vocalizations. Roadside counts were performed along Highway 270 to supplement data collected during the transect counts; the purpose of the roadside counts was to gather additional information on species diversity at the site.

No specific trapping program was undertaken for mammal species; these were either directly detected during the bird censuses or by locating signs such as tracks or scat.

RESULTS

Site Description and Faunal Habitats

The site is located between Kapa'a Beach Park and Kaoma Point, North Kohala, Hawai'i. It extends from sea level to 240' elevation and is roughly 481 acres in area; all but a 43-acre section of the site lies west of Highway 270 (Figure 1).

The area has a mean temperature of 76 F, and a mean annual rainfall of about 13 inches (DLNR, 1970). Because of the sparse rainfall, vegetative cover consists primarily of xeric species that are able to withstand extremes of heat and aridity.

There are two major faunal habitats in the study area. The majority of the area consists of a kiawe (Prosopis pallida) savanna with an understory of mixed alien grasses and herbs (habitat 1 in Table 1). Canopy height is approximately 20 to 30 feet. There is considerable variation in the density of kiawe cover. In some places (particularly areas that receive more moisture such as along intermittent stream channels) it is dense enough to form a closed canopy. However, most of the area is typified by sparser canopy cover (values of between 10 and 60 percent). Dense stands of sisal (Agave) are present in a number of locations within the kiawe savanna habitat. Much of the northern portion of the site is presently being used for cattle grazing; grass and herbaceous cover is much less dense in these areas.

Small areas near Mahukona harbor (habitat 2 in Table 1) contain a more diverse assemblage of plant species. Many of these plants are ornamental species that have been planted in the immediate vicinity of buildings and roadways.

Shoreline habitats (habitat 3 in Table 1) occur along the entire western side of the site. The majority of this habitat consists of rocky intertidal areas, although there are a few localities that are relatively well protected and have small boulder or sandy beaches.

Faunal Communities:

The predominant avian community in the area consists of a complex of introduced species that are well adapted to arid habitats. These animals are present in relatively low numbers throughout the site. Among the commoner species included in this group are the game bird species (Grey and Black Francolins), Japanese White-eye, Common Myna, Northern Cardinal, and the two estrillid finch species (Warbling Silverbill and Nutmeg Mannikin).

A number of predominantly commensal bird species (i.e., those that are adapted to human structures and areas of activity) occur in somewhat higher numbers between Mahukona and Kaoma Point than elsewhere in the site. These species include two species of dove (Spotted and Zebra Doves), Yellow-billed Cardinal, and House Sparrow.

Relatively few shorebirds were found on the site; Wandering Tattler were found along rocky shorelines and Golden Plover occurred in grassy areas on the coast and along roadsides throughout the study area.

Mammals seen in the area were all introduced species that are typical inhabitants of dry lowland localities such as this one. No evidence of the native Hawaiian Hoary Bat (Lasiurus cinerius semotus) was seen in the area; the nocturnal censuses are necessary for the detection of this species were not conducted during the survey.

Endangered Species

There was no evidence found during the survey that any endangered species utilize the area. However, since detections of these species are sporadic, it is impossible to say with certainty that they are absent from the area. One endangered bird (the Hawaiian Hawk, Buteo solitarius) and one endangered mammal (the Hawaiian Hoary Bat, Lasiurus cinerius semotus) may utilize the site (Table 2). However, the area is marginal habitat for both species, and actually lies just outside the normal range of the Hawaiian Hawk (Griffin, 1984).

Annotated Species List

The following list includes information on the status, distribution, and relative abundance of the 15 bird species and 3 mammal species found during the survey. Scientific nomenclature and common names follow Pyle (1988) for birds and Tomich (1986) for mammals.

Notes on distribution, habitat preferences, and behavior are from H.A.S. (1989), Pratt et al. (1987), Berger (1981), Tomich (1986), and my field observations. The status of each species is indicated by the following abbreviations: RA=resident breeding species, alien (introduced); M=migratory species.

BIRDS

FAMILY PHASIANIDAE (Francolins, Pheasants, and Quail)

Black Francolin (Francolinus), RA, Common.

This species was introduced to the Hawaiian Islands in 1959, and has become quite common in the dry grassland habitats of the leeward Kohala district. Its loud, metallic-sounding vocalization is easily recognizable and carries long distances in such areas.

Black Francolin were the commoner of the two game bird species at the site. They were found throughout the savanna habitat, but were most abundant in the middle elevation sections of the site.

Gray Francolin (Francolinus pondicerianus), RA, Uncommon.

Like the Black Francolin, the Gray Francolin was introduced to Hawaii in 1959, and is well adapted to dry grassland habitats. It is easily seen along roadsides and is attracted to cultivated grassy areas such as lawns and golf courses.

Few gray Francolin were detected during the survey; all were found along the four-wheel drive road that crosses the lower elevation portion of the site.

FAMILY CHARADRIIDAE (Plovers)

Lesser Golden Plover, Kolea, (Pluvialis dominica), M, Uncommon.

The Plover is a familiar winter visitor to Hawaii, and may be found from sea level to above treeline in suitable open habitats. Plover generally arrive from their Arctic breeding grounds in late August, and remain until late April. A small number of individuals may remain in Hawaii through the winter in non-breeding condition.

Surprisingly few plover were found at the site. They were found in low numbers in all of the habitats but were most common along dirt roads, and in the northern portion of the site which was being grazed by cattle.

FAMILY SCOLOPACIDAE (Sandpipers and Waders)

Wandering Tattler, Ulili (Heteroscelus incanus), M, Uncommon.

The wandering Tattler is another migratory winter visitor to the Hawaiian Islands. Its habitat preferences are more specific than those of the Plover: It is found along rocky shorelines, in streambeds, and on mudflats.

Only one Tattler was seen during the survey, reflecting the relatively small amount of time spent censusing the coastal habitat. The rocky coastline of the study site is ideal Tattler habitat, and the numbers of this species are probably much greater than indicated by the census results.

FAMILY COLUMBIDAE (Doves)

Spotted Dove (Streptopelia chinensis), RA, Uncommon.

This is the larger of the two introduced dove species in Hawaii. It was introduces from asia in the nineteenth century and is common in many lowland habitats.

Spotted Doves were seen in low numbers in the vicinity of the abandoned Mahukona warehouses, as well as in the county park.

Zebra Dove (Geopelia striata), RA, Common.

This species was introduced to Oahu in 1922, and has become common in low elevation habitats throughout the Hawaiian Islands. It has readily adapted to developed habitats and is present to such areas in large numbers.

Zebra Doves were common in the vicinity of Mahukona harbor and the adjacent park.

FAMILY STURNIDAE (Starlings and Mynas)
Common Myna (Acridotheres tristis), RA, Common.

The Myna was an early introduction to Hawaii, and has become a common bird species in a wide variety of habitats. Mynas forage singly or in pairs during the day, but roost in large aggregations after dark. Myna roosts typically occur in large trees (such as Banyans), and may become significant nuisances in urban areas.

Small numbers of Mynas were present in the immediate vicinity of Mahukona, but most were seen scattered throughout the savanna habitat. They were especially common in corrals and pastures where livestock were present.

FAMILY ZOSTEROPIDAE (White-eyes)
Japanese White-eye, Mejiro (Zosterops japonicus), RA, Common.

This species was introduced to Hawaii in the 1930's, and has become one of the most widespread and abundant species in the State.

Individuals and small groups of White-eyes were common in the savanna habitat, particularly in areas with closed canopy kiawe forest.

FAMILY EMBERIZIDAE (Cardinals, Grosbeaks, Buntings)
Northern Cardinal (Cardinalis cardinalis), RA, Common.

This species, introduced in 1929, has become common in a wide range of habitats from sea level to tree line. It is abundant in residential and rural areas.

Cardinals were common both in the kiawe savanna as well as in and around Mahukona. Males were very vocal, suggesting that breeding activity was occurring in the area, although no nests were found.

Yellow-billed Cardinal (Paroaria capitata), RA, Uncommon.

This species was introduced to the Kona area in the 1930's, but was not common in the area until the 1970's. It is very abundant in the Honokohau area, and is easily found in dry lowland areas all along the Kona and Kohala coast.

Small numbers of Yellow-billed Cardinals were found in the vicinity of Mahukona, foraging in underbrush adjacent to the warehouse and other buildings.

FAMILY FRINGILLIDAE (Cardueline Finches)
House Finch (Carpodacus mexicanus), RA, Uncommon.

This species was introduced in the nineteenth century and is abundant in all of the main Hawaiian Islands. It is very common in open habitats, where it forages in small flocks on seeds and fruit.

Few House Finch were found during the survey. Most were seen in vegetation along the road between the harbor and the warehouse buildings. Only one individual was detected in the savanna habitat; this species is probably more abundant in this area than the census figures indicate.

FAMILY PASSERIDAE (Old World Sparrows)
House Sparrow (Passer domesticus), RA, Abundant.

The House Sparrow has been introduced to many parts of the world, and is common on all the main Hawaiian Islands. This species readily associates with man, and may become a nuisance in developed areas due to its frequent practice of constructing nests in and around buildings.

Sparrows were unevenly distributed in the site, being very common near Mahukona Park and rare elsewhere. A flock of 20 individuals was observed between the park and the lighthouse along the coastal road.

FAMILY ESTRILLIDAE (Waxbills and Mannikins)
Warbling Silverbill (Lonchura malabarica), RA, Abundant.

The Warbling Silverbill was first introduced to the Puu Waawaa area, and is becoming increasingly common in dry habitats throughout the State. It is abundant in the Kohala District.

This species was the most abundant bird in the area. Flocks of over thirty individuals were seen in the savanna habitat. They were somewhat less common in developed parts of the site but were still present in high numbers in these areas. This species was occasionally seen in mixed flocks with Nutmeg Mannikins.

Nutmeg Mannikin (Lonchura punctulata), RA, Abundant.

This species was introduced at the end of the nineteenth century, and is common in grassy areas throughout the State. Unlike the other introduced estrillid finch species, the Nutmeg Mannikin is not restricted to arid areas.

Nutmeg Mannikins were only slightly less common than the Warbling Silverbills, and showed a similar habitat preference. This species was occasionally seen in mixed flocks with the Warbling Silverbill.

MAMMALS
FAMILY MURIDAE (Old World Rats and Mice)
House Mouse (Mus domesticus), RA

Mice arrived in Hawaii with europeans, and have since become ubiquitous residents of developed and undeveloped areas alike. Populations of mice have been known to become extremely large in summer and fall months in dry habitats (one such infestation occurred in the Mahukona area in 1979).

A single individual was seen in the kiawe savanna habitat. This species and the other rodent species known from Hawaii (the Black and Polynesian Rats) are difficult to detect in an area without specific trapping programs. They are probably quite abundant in the study site.

FAMILY FELIDAE (Cats)
Feral Cat (Felus catus), RA

Cats have been present in Hawaii since soon after the initial european contact. Feral cats are common from sea level to tree line. They feed primarily on insects, reptiles, birds, and small mammals; feral cat predation has been implicated in the decline of a number of native Hawaiian ground nesting bird species.

A cat was observed between Mahukona Harbor and the park. It is likely that a number of individuals reside in the area.

FAMILY VIVERRIDAE (Civets and allies)
Small Indian Mongoose (Herpestes auropunctatus), RA

Mongooses were first released in Hawaii in 1883 in the Hamakua District. They have become abundant in a wide range of habitats; greatest concentrations of this species are in beach and lowland areas. Mongoose predation has been hypothesized as an important factor in the extinction of native bird species on all the main islands but Kauai (where they were not introduced). Mongooses are opportunistic feeders and are frequently attracted to areas such as parks and campgrounds where food may be easily scavenged.

Mongooses were seen in both the Mahukona area and in the kiawe savanna along Highway 270. They are undoubtedly abundant in the area.

IMPACTS AND MITIGATION MEASURES

Changes in land use of the project site will significantly alter the nature of its bird and mammal communities. The replacement of the present savanna habitat by wetter landscaped vegetation will decrease the abundance of game bird species but will greatly increase the density and diversity of perching birds. Changes in vegetation and increased development of the site will also increase the density of nuisance species such as the Common Myna, the House Sparrow, and the rodents.

The only native bird species that may be affected by changing land use in the area would be the Pueo (Asio flammeus). This native owl is known to occur in lowland habitats in the Kohala District, and was seen on the site by Berger (1984). This species is a diurnal predator on rodents and small birds, and favors open parkland or savanna habitats. Thus, development of the area would probably adversely affect the population of owls in the immediate vicinity. Retention of some open areas would mitigate these impacts on Pueo populations to some extent, and may allow the maintenance of game bird populations in the site at the same time.

Residential development would be unlikely to significantly change the pattern of use of the area by the Hawaiian Hoary Bat. Bats are known to adapt to the presence of habitations in the vicinity of their feeding and roosting areas, and an increase in vegetative cover may increase roosting habitat for this species. One potential negative impact may occur if heavy insecticide usage depletes insect food sources for the bat or results in secondary poisoning.

LITERATURE CITED

Berger, A. J. 1981. Hawaiian Birdlife. University of Hawaii Press, Honolulu.

Berger, A. J. 1984. Kauilii Faunal Survey. Unpublished Report, R. M. Towill, Honolulu.

Department of Land and Natural Resources, State of Hawaii. 1970. Basic Water Resources Data: Island of Hawaii. Report R34.

Griffin, C. 1984. Hawaiian Hawk Recovery Plan. U. S. Fish and Wildlife Service, Portland Oregon.

Pyle, R. 1988. Checkist of the Birds of Hawaii--1988. 'Elepaio 48:95-106.

Pratt, H. D., P. L. Bruner, and D. G. Berrett. 1987. The Birds of Hawaii and the Tropical Pacific. Princeton University Press, Princeton, N. J.

Tomich, P. Q. 1986. Mammals in Hawaii. Bishop Museum Press, Honolulu.

Table 1. Bird and Mammal species detected at Mahukona/Kapaa site during February 1990 survey. Numbered habitat types are as follows: 1=kiawe savanna, 2=Commensal scrub, 3=shoreline.

Species	Habitat Type 1	2	3
BIRDS			
Lesser Golden Plover *Pluvialis dominica*	2	2	1
Wandering Tattler *Heteroscelus incanus*	-	-	1
Black Francolin *Francolinus francolinus*	6	-	-
Gray Francolin *Francolinus pondicerianus*	1	-	-
Spotted Dove *Streptopelia chinensis*	-	2	-
Zebra Dove *Geopelia striata*	2	10	-
Common Myna *Acridotheres tristis*	17	3	-
Japanese White-eye *Zosterops japonicus*	16	2	-
Yellow-billed Cardinal *Paroaria capitata*	-	3	-
Northern Cardinal *Cardinalis cardinalis*	17	2	-
Nutmeg Mannikin *Lonchura punctulata*	42	2	-
Warbling Silverbill *Lonchura malabarica*	68	19	-
House Sparrow *Passer domesticus*	-	23	-
MAMMALS			
House Mouse *Mus domesticus*	1	-	-
Feral Cat *Felus catus*	-	1	-
Mongoose *Herpestes auropunctatus*	1	1	-

Table 2. List of Endangered Species that may occur at the Mahukona/Kapaa Site. Status is indicated as follows: E=Endangered, T=Threatened.

Species	Status
BIRDS	
Hawaiian Hawk, 'Io (*Buteo solitarius*) 'Io are relatively more abundant in windward than in leeward areas; leeward Kohala represents a gap in the distribution of this species. No recent sightings from the area, although birds may occasionally stray from wetter upland habitats east of the site.	E
MAMMALS	
Hawaiian Hoary Bat (*Lasiurus cinerius semotus*) Scattered populations of Bats occur along the leeward coast of Hawaii. This species is particularly common in South Kona.	E

Mahukona

Appendix D: *Predevelopment Reconnaissance of the Marine Macrobiota and Water Quality Conditions Affronting the Proposed Development at Mahukona, North Kohala, Hawaii*

D-1

PREDEVELOPMENT RECONNAISSANCE OF THE MARINE MACROBIOTA AND WATER QUALITY CONDITIONS AFFRONTING THE PROPOSED DEVELOPMENT AT MAHUKONA, NORTH KOHALA, HAWAII

Prepared For:

Chelon International of Hawaii Inc.
P.O. Box 249
Hawi, Hawaii 96719

By:

Richard E. Brock, Ph.D.
Environmental Assessment Co.
1804 Paula Drive
Honolulu, Hawaii 96816

January 1990

EXECUTIVE SUMMARY

This study was undertaken to establish baseline conditions for the marine communities and water chemistry characteristics along a 2.8km section of coastline affronting a proposed development of about 180ha (450 acres) at Mahukona, North Kohala, Hawaii. This development proposes to take the land from a primarily fallow state and placing it into golf course and housing. Identified environmental concerns include the potential impact of sediment on marine communities and changes in nearshore water quality due to development.

More than 73ha (180 acres) comprising the nearshore marine communities were examined in this study; this area extended from Lapakahi State Marine Life Conservation District on the south to Kapa'a Beach Park about 1.7 miles to the north and from the shoreline to approximately the 20m isobath that ranged from 150 to 450m offshore. Four major biotopes or zones were defined in this area; the shallow high energy biotope adjacent to shore, the biotope of high coral cover at greater depths seaward where the impact of wave energy is lessened, the biotope of deep low coral cover and biotope of sand. Both the shallow high energy biotope and the biotope of high coral cover occur as two near-continuous "bands" paralleling the shore through much of the study area. The biotope of deep low coral cover is restricted to one small area (about 16ha) at the north end of the study area and the biotope of sand lies principally seaward of the study site at depths greater than 20m. However, adffronting Mahukona landing the biotope of sand approaches the shore bisecting the study area.

In this area 15 stations were established to sample pertinent water quality parameters and 12 stations quantitatively assessed marine macrobiota. The water quality studies show an elevation of nitrate-nitrogen and silicate concentrations on the shore at the head of Mahukona landing; within a short distance seaward concentrations are low. The concentration of nitrate-nitrogen and silicate are elevated in groundwater thus serve as tracers for its diffuse input to oceanic settings where these and other nutrient levels are low. Other than this one small area of diffuse groundwater input, the waters affronting the project site are completely marine and typical of well flushed, open coasts. Using the Department of Health (DOH) "dry" water quality criteria which apply to this coastline, the geometric means of concentrations of chemical parameters as specified by the DOH and measured in this study easily meet the state standards with the exception of chlorophyll-a and ammonia-nitrogen. Interestingly, the ammonia-nitrogen concentrations measured here are those for the noted pristine ocean waters at the Natural Energy Laboratory of Hawaii at Keahole Point suggesting that the DOH standard for ammonia-nitrogen may be too low for West Hawaii coastal waters.

The biological studies found a diverse assemblage of fishes in

the biotope of high coral cover as well as in the shallow high energy biotope. The abundance of fish and invertebrate species of commercial and recreational interest (mu, omilu, uku, weke'ula, 'ula, etc.) suggests that fishing pressure through much of the study area must be low. Fish community development was less in the biotopes of sand and deep low coral cover. The coral community is well developed in areas protected from the ispact of waves at Mahukona, thus usually at depths greater than 6m. The low apparent diversity and abundance of motile invertebrates is probably due to the abundant shelter afforded by corals and the basalt substratum as well as to the cryptic and nocturnal habits of most motile macroinvertebrates.

During the construction phase when the soil is bared, the proposed development will increase the potential for sedimentation on nearshore reefs; sedimentation would probably result following a major rainfall event. Longterm studies of rainfall have shown Kawaihae and environs to be the most arid area in the entire state; thus the probability of a sedimentation problem is low. Other concerns focus on the potential for changes in nearshore water quality with development. Soil which serves to adsorb excess inorganic nutrients, occurs as a well developed horizon in the project site and would assist in controlling leaching of material to the watertable below. Additionally, studies conducted at other West Hawaii sites suggests that the standard fertigation/fertilization techniques used on West Hawaii golf courses will not impact nearshore waters.

INTRODUCTION

Chalon International of Hawaii Inc. is proposing a development at Mahukona, North Kohala, Hawaii. The proposed project will include a golf course, house lots, park improvements, harbor improvements and associated infrastructural components to serve the proposed project. The project site includes more than 180ha (450 acres) along the coast at Mahukona bordered by Kapa'a Beach Park on the north, south to Kaoma Point (south of Mahukona Harbor at the Lapakahi State Marine Life Conservation District boundary). There is approximately 2.8km (1.7 miles) of coastline in the project area.

Mahukona is the site of a harbor which once serviced North Kohala via railroad commencing in the 1860's. The railroad linked Kohala Sugar Company lands and operations with the shipping port; it was closed down following the tsunumi of 1946 which destroyed sections of the railroad. Mahukona Harbor was in use for more than 80 years; it had been dredged and modified to accomodate shipping (Clark 1985). Still present are remnants that point to its former importance to commerce in Kohala. In the harbor are cables, railroad wheels, a boiler and anchors; much of this is overgrown with corals. Along the shoreline numerous port structures still stand.

A consideration in the proposed development is the potential for impact with changes in the patterns of use and drainage to the marine communities and water quality of nearshore waters affronting the project site. Presently much of the proposed site is fallow, being covered by dry coastal vegetation (kiawe and a number of grass species). The topography may be altered changing runoff characteristics during periods of intense rainfall (a rare occurrence on this coast) and vegetation will be replaced by turf, trees and ornamental plantings; these will probably be irrigated using treated sewage effluent. These changes could result in possible erosion and silting on the reefs affronting the project site as well as changes to the chemistry of nearshore waters particularly with the practice of fertigation.

This study was undertaken (1) to provide quantitative baseline information on the marine communities and water quality characteristics in the coastal waters from Kapa'a Beach Park on the north to Lapakahi State Park on the south and (2) using available information, determine the potential for impact to the marine communities and nearshore waters with the proposed development.

MATERIALS AND METHODS

A. BENTHIC STUDIES

The fieldwork which provided the database for this baseline study of the marine macrobiota offshore of the Chelon International site at Mahukona was conducted on 7-9 December 1989. The area encompassed in this survey is given in Figure 1; it includes the nearshore region from the shore, seaward to approximately the 20m (60 foot) isobath up to 340m from shore and is bordered by the Lapakahi State Park and Marine Life Conservation District on the south to Kapa'a Park about 2.8km to the north.

The quantitative sampling of macrofauna of marine communities presents a number of problems; many of these are related to the scale on which one wishes to quantitatively enumerate organism abundance. Marine communities in the Mahukona region may be spatially defined in a range on the order of a few hundred square centimeters (such as the community residing in a Pocillopora meandrina coral head) to major biotopes covering many hectares. Recognizing this ecological characteristic, we designed a sampling program that attempted to delineate all major extant communities in the limits of the study area and to quantitatively describe these communities. Thus, a number of methods were used.

To obtain an overall perspective on the extent of the major communities or "zones" occurring in the study area, divers were slowly towed behind a skiff over most of the study site from shore seaward to the 20m isobath (the outer limits for this study). This exercise allowed the qualitative delineation of major biotopes based partially on the presence of large structural elements (e.g., amount of sand, hard substratum, fish abundance, coral coverage or dominant coral species). Within each of these a number of stations were established and quantitative studies were conducted, including visual enumeration of fish, counts along benthic transect lines and cover estimates in benthic quadrats. Besides these quantitative measures, a qualitative reconnaissance was made in the vicinity of each station by swimming and noting the presence of species not encountered in the transects. All assessments were carried out using SCUBA.

The location of stations were subjectively chosen as being representative of a given biotope and were also selected as to coincide with appropriate points for sampling in water quality studies. Immediately following site selection, a visual fish census was undertaken to estimate the abundance of fishes. These censuses were conducted over a 25 x 4m corridor and all fishes within this area to the water's surface were counted. Data collected included species and numbers of individuals. A single diver equipped with SCUBA, transect line , slate and pencil would

FIGURE 1. Overview of the nearshore area encompassed by this study. Scale: 1cm = .

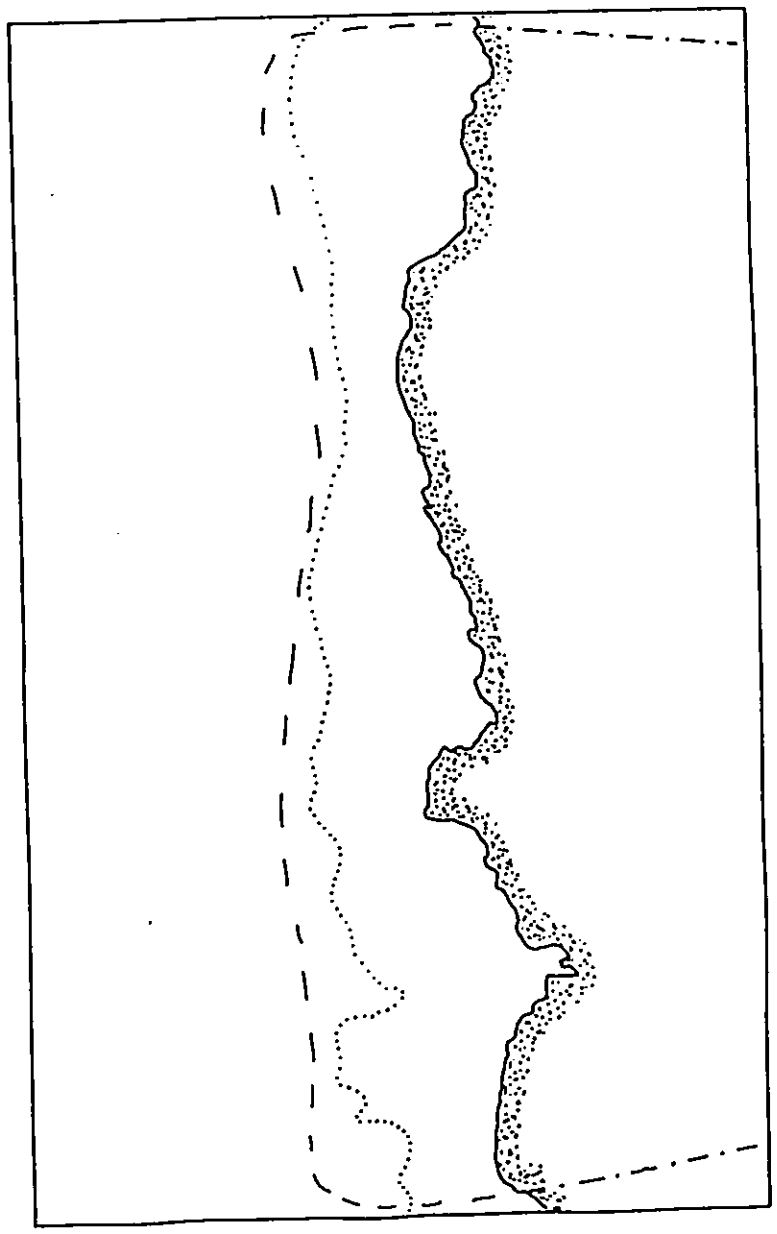


FIGURE 1. Overview of the nearshore area encompassed by this study; boundaries are given as a dashed line and range from the shore to 20m isobath. The shoreline is stippled and the 20m isobath is given as a dotted line. Scale 1cm is approximately 110m.

enter the water, count and note all fishes in the prescribed area (method modified from Brock 1954). The 25m transect line was paid out as the census progressed, thereby avoiding any previous underwater activity in the area which could frighten wary fishes.

Fish abundance and diversity is often related to small-scale topographical relief over short linear distances. A long transect may bisect a number of topographical features (e.g., coral mounds, sand flats, and algal beds), thus sampling more than one community and obscuring distinctive features of individual communities. To alleviate this problem, a short transect (25m in length) has proven adequate in sampling many Hawaiian benthic communities (Brock and Norris 1989).

Besides frightening wary fishes, other problems with the visual census technique include the underestimation of cryptic species such as moray eels (family Muraenidae) and nocturnal species, e.g., squirrelfishes (family Holocentridae), aweoweos or bigeyes (family Priacanthidae), etc. This problem is compounded in areas of high relief and coral coverage affording numerous shelter sites. Species lists and abundance estimates are more accurate for areas of low relief, although some fishes with cryptic habits or protective coloration (e.g., the nohus, family Scorpaenidae; the flatfishes, family Bothidae) might still be missed. Obviously, the effectiveness of the visual census technique is reduced in turbid water and species of fishes which move quickly and/or are very numerous may be difficult to count and to estimate sizes. Additionally, bias related to the experience of the diver conducting counts should be considered in making any comparisons between surveys. In spite of these drawbacks, the visual census technique probably provides the most accurate non-destructive method available for the assessment of diurnally active fishes (Brock 1982).

After the assessment of fishes, an enumeration of epibenthic invertebrates (excluding corals) was undertaken using the same transect line as established for fishes. Exposed invertebrates usually greater than 2cm in some dimension (without disturbing the substratum) were censused in a 4 x 25m area. As with the fish census technique, this sampling methodology is quantitative for only a few invertebrate groups, e.g., some of the echinoderms and holothurians. Most coral reef invertebrates (other than corals) are cryptic or nocturnal in their habits making accurate assessment of them in areas of topographical complexity very difficult. This, coupled with the fact that the majority of these cryptic invertebrates are small, necessitates the use of methodologies that are beyond the scope of this survey (e.g., see Brock and Brock 1977). Recognizing constraints on time and the scope of this survey, the invertebrate censusing technique used here attempted only to assess those few macroinvertebrate species that are diurnally exposed.

Exposed sessile benthic forms such as corals and macrothalloid algae were quantitatively surveyed by use of quadrats and the point-intersect method. The point-intersect technique only notes the species of organism or substratum type directly under a point. Along the previously set fish transect line, 50 such points were assessed (once every 50cm). These data have been converted to percentages. Quadrat sampling consisted of recording benthic organisms, algae and substratum type present as a percent cover in six one-meter square frames placed at five-meter intervals along the transect line established for fish censusing (at 0, 5, 10, 15, 20 and 25m).

If macrothalloid algae were encountered in the 1 x 1m quadrats or under one of the 50 points, they were quantitatively recorded as percent cover. Emphasis was placed on those species that are visually dominant and no attempt was made to quantitatively assess the multitude of microalgal species that constitute the "algal turf" so characteristic of many coral reef habitats.

During the course of the fieldwork, notes were taken on the number, size and location of green sea turtles and other threatened or endangered species seen within or near to the study area. Additionally, records were kept on recreational use patterns as observed within the study area while carrying out other field studies. Further information on threatened or endangered species was obtained by questioning knowledgeable residents.

B. WATER CHEMISTRY STUDIES

Water quality sampling was focused in nearshore waters affronting the project site because terrigenous inputs would be most apparent in this area. Stations were established from shore in a linear fashion seaward to at least the 20m isobath thus were in transects. Water quality parameters were measured at 15 locations (Station numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 16 and 17) at the surface (about 20cm below the air-water interface). Additionally, subsurface samples were taken about 1.5m above the substratum at Station numbers 11 and 14 to provide some insight into the water quality characteristics at depth. The location of these stations is presented in Figure 2. Water quality parameters that were evaluated are specific criteria designated for "open coastal waters" in Title 11, Chapter 54, Amended Administrative Rules for Water Quality Standards. These criteria include ammonia nitrogen, nitrate + nitrite nitrogen, total nitrogen, orthophosphate phorphorus, total phorphorus, chlorophyll-a and nephelometric turbidity. Also collected were samples for non-specific criteria, e.g., salinity, temperature, oxygen, pH as well as the nutrient, silica at each station. Although not on the list of specific criteria, orthophosphate (PO_4) is considered to be the biologically active form of phosphorus and silica (Si) is a conservative tracer for groundwater

and may be used to determine patterns of groundwater input.

Water samples for nutrient analyses were taken in 125ml acid-washed polyethylene bottles. These samples were filtered through glass fiber filters in the field, immediately placed on ice and subsequently frozen until analysis. Analyses for ammonium, nitrate + nitrite and orthophophate were carried out using standard techniques; inorganic and total (after oxidation) nutrient analyses were determined using manual spectrophotometric techniques on a fiber optic colorimeter. All samples were collected and measured in trplicate; data are presented as means. The analytical procedures followed those given in Standard Methods (1985) with modifications according to Strickland and Parsons (1972).

Turbidity samples were collected as unfiltered water and stored on ice in 250ml polyethylene bottles until measurements were made. Turbidity was measured on a Monitek Laboratory Nephelometer following the procedures as described in Standard Methods (1985). The instrument was calibrated as specified by the Environmental Protection Agency with standard formazin solutions prior to and after sample measurements. Prior to measurement, samples were throughly mixed to disperse particulate materials and measured in duplicate when all air bubbles disappeared.

Chlorophyll-a samples were collected by filtering known volumes of seawater through glass microfiber filters; filters were stored in acetone and the samples frozen until laboratory analyses were carried out. Laboratory procedures followed Standard Methods (1985) and pigments were extracted and determined fluorometrically. Salinity samples were collected in 250ml polyethylene bottles in the field, filled completely and capped tightly until measurement by tritration (EPA method 325.3) in the laboratory. In the field, oxygen was measured with a YSI Model 58 meter and ph was determined using a Cole-Parmer digisense millivolt meter.

RESULTS

WATER CHEMISTRY

Water quality parameters specified by the State Department of Health (DOH) Water Quality Standards were measured at the surface at each of 15 locations; at two of these sites (Stations 11 and 14) these parameters were also assessed at depth (about 1.5m above the bottom). The location of stations is given in Figure 2. The waters affronting the project site are classified as open coastal waters by the state (Chapter 11-54) and the standards for the measured parameters are given in Table 1 for comparative purposes.

FIGURE 2. Locations of quantitative stations established in this study. Water quality parameters were sampled at Station numbers 1-11, 14, 16 and 17; benthic studies were carried out at Station numbers 1, 2, 4-9, 11-13 and 15. Also shown are the four biotopes recognized in this study where A = the shallow high energy biotope, B = the biotope of high coral cover, C = the biotope of deep low coral cover and D = the biotope of sand. The shoreline is shown with stippling and the 20m isobath is given as a dotted line. Scale 1cm approximately equal to 110m.

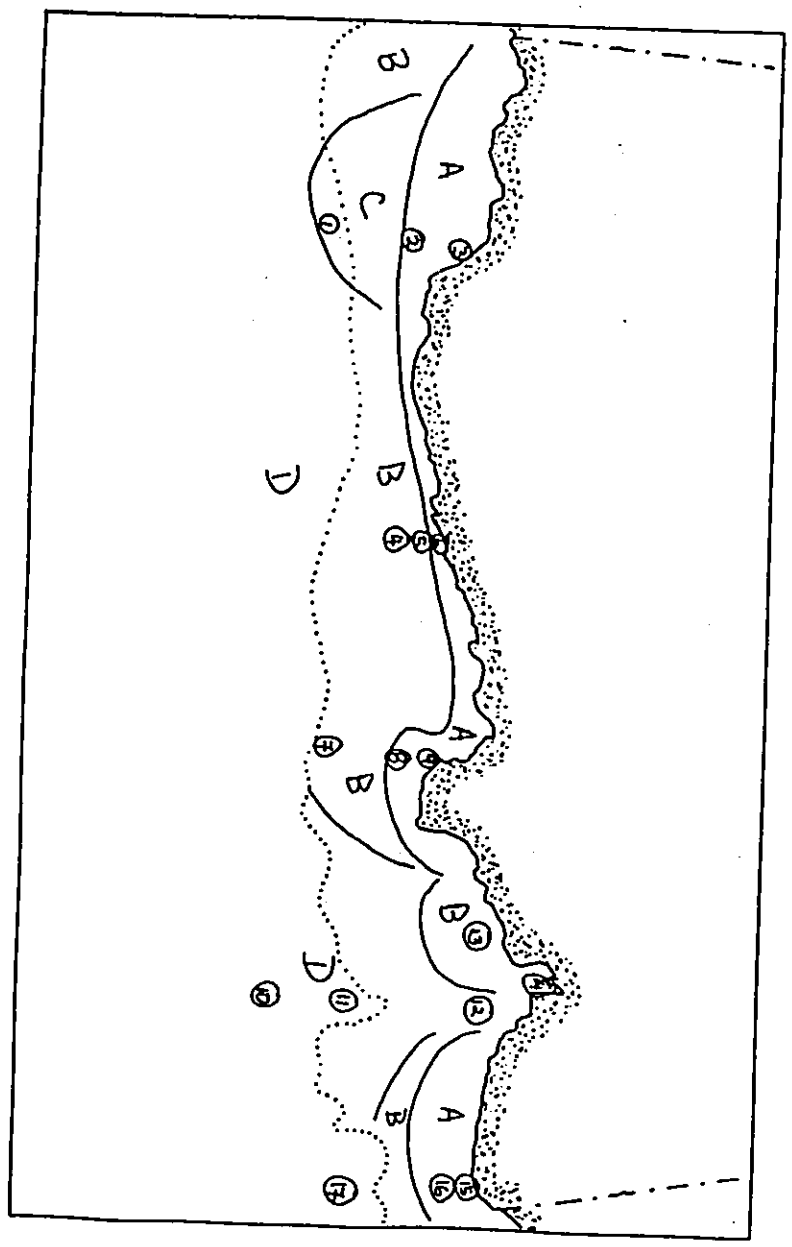


TABLE 1. Specific criteria specified by the Department of Health water quality standards for open coastal waters as amended in 1988.

Parameter	Geometric mean not to exceed the given value	Not to exceed the given value more than 10% of the time	Not to exceed the given value
Total Nitrogen (ug N/L)	150.00* 110.00**	250.00* 180.00**	350.00* 250.00**
Ammonia Nitrogen (ug NH_4-N/L)	3.50* 2.00**	8.50* 5.00**	15.00* 9.00**
Nitrate+Nitrite Nitrogen (ug[NO_3+NO_2]-N/L)	5.00* 3.50**	14.00* 10.00**	25.00* 20.00**
Total Phosphorus (ug P/L)	20.00* 16.00**	40.00* 30.00**	60.00* 45.00**
Chlorophyll-a (ug/L)	0.30* 0.15**	0.90* 0.50**	1.75* 1.00**
Turbidity (NTU)	0.50* 0.20**	1.25* 0.50**	2.00* 1.00**

* "Wet" criteria apply when the open coastal waters receive more than three million gallons per day of fresh water discharge per shoreline mile.

** "Dry" criteria apply when the open coastal waters receive less than three million gallons per day of fresh water discharge per shoreline mile.

The following is applicable to both "wet" and "dry" conditions:

Salinity - Shall not vary more than 10 percent from natural or seasonal changes considering hydrologic input and oceanographic factors.

Orthophosphate was eliminated from the list of requirements in the revised 1988 document but because of its biological importance, it was measured in this study. The old "wet" criteria was 7.00ug/L and "dry" standard was 5.00ug/L.

Table 2 presents a synopsis of the water chemistry parameters measured in this study. There are few apparent trends in these data; probably the most obvious is that the concentrations of nitrate + nitrite nitrogen as well as silica show an inverse relationship with distance from shore. Thus stations further from shore have lower nitrate nitrogen and silica concentrations than do stations closer to shore. These gradients could be related to probable diffuse inputs of groundwater along the coast (albiet the salinity data do not clearly support this). Both silica and nitrate nitrogen (NO_2 + NO_3) usually exist in relatively high concentration in groundwater owing to metabolism or organic material and mineral dissolution; these ions are in low concentration in open ocean waters and hence (along with salinity) may be used as tracers for groundwater input into oceanic settings. The nitrate, silicate and salinity data suggest an input of groundwater at the head of Mahukona Harbor (Station 14) which appears to be diluted and avected out of the harbor at the time of sampling to the north by Makaohule Point and Station 8.

The nutrient data and other water quality parameters measured in this study suggest a typical well-mixed, open coastal water situation. However, it should be noted that the DOH "dry" criteria geometric means for ammonia nitrogen (NH_4) and chlorophyll-a were exceeded; the reasons for this are unknown. The "wet" conditions "geometric means not to exceed" values for these two parameters were not exceeded.

BIOLOGICAL

The qualitative reconnaissance to define major biotopes affronting the project site extended from the shoreline to the 20m isobath which lies from 150 to 340m seaward and from Kaoma Point on the south (i.e., the boundary of Lapakahi State Park) to Kapa'a Park on the north (Figure 1). In total more than 73ha (180 acres) were surveyed in this effort and four biotopes were recognized. The physical extent of each is shown in Figure 2. It should be noted that the boundaries of each zone are not sharp but rather grade from one to another; these are ecotones or zones of transition. Biotopes were delimited by physical characteristics including water depth, relative exposure to wave and current action, and the major structural components present in the benthic communities. The latter include the amount of sand, hard substratum, and vertical relief present as well as the biological attributes of relative coral coverage, fish abundance and dominant species of the coral community. Biotopes were named for distinctive features of each as shown in Figure 2.

The shallow high energy biotope parallels the shore and is adjacent to it, not extending more than 125m from the beach. This biotope occurs as a near-continuous feature along the shoreline. The substratum of this biotope is a mix of old smooth

TABLE 2. Summary of the water quality parameters as measured at 15 sites in the study area. Surface samples are denoted with an "S" and bottom samples with a "B". In the body of the table concentrations of dissolved nutrients given in ug/L. Underlined geometric means are equal to or are in excess of Department of Health water quality standards for "dry" conditions. Table continued on next page.

Station	Nitrate N	Ammonia N	Total N	Ortho-P	Total P	Silicates
1-S	0.84	1.96	87.78	3.41	8.68	50.96
2-S	1.68	1.12	72.80	3.10	10.23	62.44
3-S	3.22	2.24	76.16	4.34	8.37	83.16
4-S	1.68	2.10	88.76	4.03	12.09	62.44
5-S	2.38	1.54	69.72	3.41	9.30	68.04
6-S	3.08	2.38	78.82	3.72	10.23	73.64
7-S	0.70	1.54	84.70	3.41	10.23	39.76
8-S	8.26	2.52	76.86	3.10	10.23	119.00
9-S	2.38	3.50	83.02	3.10	12.09	50.96
10-S	0.42	1.68	65.24	5.27	11.47	22.68
11-S	0.70	1.68	73.50	3.10	12.09	25.48
11-B	2.80	4.06	78.54	7.13	12.09	68.04
14-S	40.88	5.18	103.32	3.72	9.61	450.80
14-B	16.24	4.62	92.82	4.03	11.16	209.72
15-S	5.04	4.48	71.40	3.41	8.68	71.96
16-S	3.08	3.64	84.70	3.41	10.54	62.44
17-S	2.10	1.26	66.64	2.79	9.30	39.76
GEOMETRIC MEANS	2.63	<u>2.40</u>	79.12	3.69	10.30	67.72

TABLE 2 CONTINUED ON FOLLOWING PAGE

TABLE 2. Continued.

Station	Turbidity (NTU)	Chl-a (ug/L)	Salinity (°/oo)	Oxygen (% Sat)	Temp. (°C)	pH
1-S	0.08	0.29	33.6	100	25.5	8.1
2-S	0.07	0.31	33.9	100	25.5	8.1
3-S	0.08	0.35	35.0	101	25.0	8.1
4-S	0.07	0.28	34.4	100	25.5	8.1
5-S	0.08	0.31	35.4	100	25.5	8.0
6-S	0.08	0.42	34.5	101	25.5	8.1
7-S	0.07	0.18	35.7	100	25.5	8.1
8-S	0.08	0.28	34.4	100	25.5	8.0
9-S	0.09	0.41	35.3	101	25.5	8.1
10-S	0.07	0.17	34.6	100	25.5	8.1
11-S	0.07	0.19	34.6	100	25.4	8.1
11-B	0.10	0.34	35.0	99	25.5	8.1
14-S	0.16	0.39	33.6	100	25.4	8.1
14-B	0.18	0.39	34.8	99	25.5	8.1
15-S	0.09	0.35	35.0	102	25.5	8.1
16-S	0.10	0.29	35.1	100	25.5	8.1
17-S	0.12	0.19	35.5	100	25.5	8.1
GEOMETRIC MEANS	0.09	0.29	34.7	100	25.5	8.1

basalt (pahoehoe) with loose basalt boulders and cobble over it; on this substratum are a few corals including Pocillopora meandrina and prostrate growth forms of Porites lobata. The physical impact of waves is evident in this biotope with the scoured appearance of the substratum. Water motion may be also responsible for the ridge and channel formations seen in the substratum; these range in size from a few to many meters in width, length and height. Related to the relatively high cover afforded by the basalt boulders and channels is a reasonably diverse assemblage of fishes. Quantitative Station Numbers 2, 8 and 15 sampled the communities in this biotope and qualitative observations were made at Station Numbers 6 and 9.

Seaward of the shallow high energy biotope are the biotope of deep low coral cover and the biotope of high coral cover. The biotope of deep low coral cover is situated along the northern boundary of the study area adjacent to Kapa'a Park and encompasses an area ranging from about 6 to 20m. Again the substratum in this biotope is basalt with shallow channels cut through it oriented perpendicular to shore. As the name implies, corals do not make a large visual contribution to benthic communities in this biotope. Important speices include Pocillopora meandrina, Porites lobata and to a lesser extent, Porites compressa. Quantitative Station 1 sampled the communities in this biotope.

The biotope of high coral cover affronts most of the project site and is situated seaward of the shallow high energy biotope. Water depths in this biotope range from 6 to over 20m (the lower boundary of this study). The biotope of high coral cover flourishes on hard bottom substrates that are somewhat protected from the ravages of occasional high energy wave impact. The substratum in this biotope is primarily basalt; areas of ridge and channel formations are seen through parts of the biotope and small patches of sand occur particularly on the channel floors. Visually dominant in this biotope are corals; common species include Porites lobata, Porites compressa, Pocillopora meandrina, Pavona varians, Montipora verrucosa, Montipora patula, Montipora flabellata and Leptastrea purpurea. Quantitative Station Numbers 4, 5, 7 and 13 sampled this biotope.

The final biotope recognized in this study is the biotope of sand. Within the boundaries of this study, this biotope occurs seaward of the biotope of high coral cover affronting Mahukona Harbor. The biotope of sand is probably a near-continuous feature along the entire project site in waters greater than 20m, but at only one point does it extend shoreward into the study area. The substratum in this biotope is dominated by sand; few fishes or exposed macroinvertebrates are seen in this biotope except where a rock or coral outcrops are encountered. The biotope of sand is situated in waters from 16 to more than 20m. Quantitative Station 11 sampled the biotope of sand.

One quantitative station (Station 12) was established to sample the ecotone or zone of transition between the biotope of high coral cover and the shallow high energy biotope. This station was selected in Mahukona Harbor.

The quantitative stations were selected to be representative of a given biotope; some of them were also used to describe the extant water quality conditions and thus were placed to detect any possible onshore-offshore gradients in water quality characteristics that may exist along the project site. The locations of all sampling sites are given in Figure 2 and the results of the biological inventory of these biotopes are presented below.

Shallow High Energy Biotope

The shallow high energy biotope is a near-continuous feature affronting the project site. This biotope extends from the emergent basalt bench to depths of 6m. Characteristic features of the shallow high energy biotope include the shoreline basalt bench that drops abruptly into 2 to 5m of water along most of the shore and a continuation of the basalt substratum seaward. On the substratum are scattered basalt boulders and cobble. Boulders range in size from 0.5 to 3m in diameter and may be clustered in piles or dispersed. In the inner reaches of the biotope (i.e., within 25m of shore or less) potholes are frequently encountered; further offshore are small channels that are oriented perpendicular to shore. These channels range in width from 1 to 10m, 6 to 30m in length and are cut into the substrate from 10cm to 1.5m. Spacing between channels ranges from 2 to 30m.

The scoured nature of the substratum through much of this biotope suggests that wave impact must, on occasion, be severe. High water motion retards the development of coral communities (Grigg and Maragos 1974) and the prostrate or encrusting growth forms seen in Porites lobata in this biotope support this contention.

Three quantitative stations (Numbers 2, 8 and 15) were established to sample this biotope; additionally, two qualitative reconnaissances (Stations 6 and 9) were conducted to obtain further information on community structure. Station 2 was located about 150m offshore and 450m south of Kapa'a Beach Park in 9.1 to 10.3m of water. The substratum at Station 2 is basalt with basalt and coral cobble scattered across it; small channels 1 to 3m in width, 5 to 15m in length and up to 0.3m in depth are present with an orientation perpendicular to the shore. Table 3 presents the results of the quantitative survey carried out at Station 2. The quadrat survey noted five coral species with Porites lobata being the dominant species contributing more than

TABLE 3. Summary of the benthic survey conducted at Station 2 in the shallow high energy biotope approximately 150m from the shore and 450m south of Kapaa Beach Park at Mahukona, Hawaii on 7 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 9.1 to 10.3m; mean coral coverage is 30.9 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Coral						
Porites lobata	0.1	43	0.1	28	69.4	1.5
Porites compressa		0.1	0.3	36	0.5	0.1
Pocillopora meandrina		2.5		1.8	0.1	
Pavona varians				1		
Leptastrea purpurea		1				
Sand	7					
Rubble	69.9	12	99.6	11	21	98.4
Hard Substratum	23	41.4		22.2	9	

B. 50-Point Analysis

Species	Percent of the Total
Coral	
Porites lobata	14
Porites compressa	4
Montipora verrucosa	2
Rubble	58
Hard Substratum	22

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Drupa morum	2
Conus distans	1
Phylum Echinodermata	
Heterocentrotus mammillatus	54
Tripneustes gratilla	41
Echinometra mathaei	48
Echinothrix calamaris	1

TABLE 3. Continued.

D. Fish Census (4 x 25m)

31 Species
196 Individuals
See Appendix A for complete list

75 percent to the cover. Overall, mean coverage was 31 percent. Six macroinvertebrate species were found in the 4 x 25m census area; most abundant were the slate-pencil urchin (Heterocentrotus mammillatus), the green urchin (Echinometra mathaei) and the black urchin (Tripneustes gratilla). The results of the fish census are presented in Appendix A; thirty-one species of fishes (196 individuals) were encountered in the survey area. The most common fish species were the damselfish (Chromis vanderbilti), moano (Parupeneus multifasciatus), hinalea lauwili (Thalassoma duperrey), ma'i'i'i (Acanthurus nigrofuscus), maiko (Acanthurus nigroris) and the kole (Ctenochaetus strigosus). In the vicinity of Station 2 were seen the soft coral (Palythoa tuberculosa), coral (Montipora verrucosa), starfish (Linckia diplax), kihikihi (Zanclus cornutus), puhi'oni'o (Gymnothorax meleagris) and malamalama (Coris ballieui).

Station 8 sampled the shallow high energy biotope at a point approximately 60m offshore of Makaohule Point in 12.8m of water. This station was conducted on sand along the bottom of a large channel approximately 50m in greatest dimension. The substratum surrounding this station is comprised of basalt with large sand floor channels cut through it oriented perpendicular to shore. These channels range from 5 to 35m in width, 30 to 60m in length and up to 2.5m in depth. Table 4 presents the results of the quantitative survey conducted at Station 8; no corals were encountered in the quadrat survey. Two sand-dwelling macroinvertebrate species (the flea cone - Conus pulicaris and the spotted auger shell - Terebra maculata) were noted in the 4 x 25m census area as were four fish species (Appendix A). Fishes seen include humuhumu lei (Sufflamen bursa), uku (Aprion virescens), weke (Mulloides flavolineatus) and malu (Parupeneus pleurostigma). In the vicinity of this station was seen the auger (Terebra penicillata).

Station 15 sampled the shallow high energy biotope approximately 20m offshore and 50m north of the Lapakahi Marine Life Conservation District boundary in 3 to 5.5m of water. The substratum at this station is again basalt with occasional large basalt boulders present. These boulders range from 1 to 4m in largest dimensions and provide considerable cover for fishes. Table 5 presents the results of the survey conducted at Station 5. The quadrat survey at this station noted two species of corals (Porites lobata and Pocillopora meandrina) having a mean coverage of 0.4 percent. Four macroinvertebrate species were encountered and the most common was the green urchin (Echinometra mathaei). Of commercial interest, three spiny lobsters (Panulirus penicillatus) were also seen in the census area. Appendix A lists the fishes censused at this station; the most abundant were the ma'i'i'i (Acanthurus nigrofuscus), lau'ipala (Zebrasoma flavescens), kole (Ctenochaetus strigoeus), manini (Acanthurus triostegus), maikkoiko (Acanthurus leucoparieus) and na'ena'e (Acanthurus olivaceus). In the vicinity of this station

TABLE 4. Summary of the benthic survey conducted at Station 8 in the shallow high energy biotope approximately 60m offshore of Makaohule Point at Mahukona, Hawaii on 8 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 12.8m; mean coral coverage is 0 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Sand	82	85	92	88	93	81
Rubble	18	15	8	12	7	19

B. 50-Point Analysis

Species	Percent of the Total
Rubble	14
Sand	86

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Conus pulicaris	2
Terebra maculata	1
Phylum Echinodermata	
Echinometra mathaei	3

D. Fish Census (4 x 25m)

4 Species
10 Individuals
See Appendix A for complete list

TABLE 5. Summary of the benthic survey conducted at Station 15 in the shallow high energy biotope approximately 20m from the shore and 50m north of the Lapakahi Marine Life Conservation District boundary at Mahukona, Hawaii on 8 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 3 to 5.5m; mean coral coverage is 0.4 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Coral						
Porites lobata	0.5	0.3		0.4	0.3	0.1
Pocillopora meandrina			0.1	0.1		0.3
Soft Coral						
Palythoa tuberculosa	0.1					
Hard Substratum	99.4	99.7	99.9	99.5	99.7	99.6

B. 50-Point Analysis

Species	Percent of the Total
Hard Substratum	100

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Arthopoda	
Panulirus penicillatus	3
Phylum Echinodermata	
Echinometra mathaei	17
Echinostrephus aciculatum	1
Tripnuestes gratilla	3

D. Fish Census (4 x 25m)

32 Species
201 Individuals
See Appendix A for complete list

were seen the coral (Leptastrea purpurea), awela (Thalassoma trilobatum), ohua (Halichoeres ornatissimus) and two omilu (Caranx melampygus) each estimated at 6kg. On the emergent bench adjacent to Station 15 were seen the black rock urchin (Colobocentrotus atratus) and opihi (Cellana exarata). Little intertidal algae was apparent at this station.

Because of difficulty of conducting quantitative studies in shallow water adjacent to a shoreline with surf, only qualitative observations were made at Stations 6 and 9. Little coral was apparent at eith location; species seen include Porites lobata and Pocillopora meandrina and coverage was estimated to be less than one percent. Macroinvertebrates seen include sea urchins (Heterocentrotus mammillatus, Tripneustes gratilla, Echinometra mathaei and E. oblongata), coral eating starfish (Acanthaster planci), cowries (Cypraea mauritiana), sea cucumber (Actinopyga mauritiana), opihi (Cellana exarata), and spiny lobsters (Panulirus penicillatus). Fishes present include hinalea lauwili (Thalassoma duperrey), awela (T. trilobatum), nenue (Kyphosus bigibbus), maikoiko (Acanthurus leucopareius), api (A. guttatus), ma'i'i'i (A. nigrofuscus), palani (A. dussumieri), manini (A. triostegus), maiko (A. nigroris), pualu (A. mata), na'ena'e (A. olivaceus), paku'iku'i (A. achilles), surgeonfish (A. glacopareius), lau'ipala (Zebrasoma flavescens), umaumalei (Naso literatus), kala (N. unicornis), kole (Ctenochaetus strigosus), munu (Parupeneus bifasciatus), moano (P. multifasciatus), damselfishes (Stegastes fasciolatus, Plectroglyphidodon imparipennis, P johnstonianus, Chromis vanderbilti, Abudeduf sordidus), 'akilolo (Gomphosus varius), hinalea 'akilolo (Coris gaimard), opule (Anampses cuvier), humuhumu lei (Sufflamen bursa), humuhumu ele'ele (Melichthys niger), humuhumu nukunuku apua'a (Rhinecanthus rectangulus), lau hau (Chaetodon quadrimaculatus), lauwiliwili nukunuku'oi'oi (Forcipiger longirostris and F. flavissimus), po'opa'a (Cirrhitus pinnulatus), piliko'a (Cirrhitops fasciatus), uhu (Scarus sordidus), uhu'aha'ula and uhu ulului (S. perspicillatus), palukaluka (S. rubroviolaceus), kihikihi (Zanclus cornutus), sharpback puffer (Canthigaster jactator), iheihe (Hemiramphus depauperatus) and omilu (Caranx melampygus). At both stations on the intertidal rocks was seen a small amount of the alga, Pterocladia capillacea which is a species utilized by green sea turtles.

Biotope of Deep Low Coral Cover

In the study area, the biotope of deep low coral cover is situated near the northern boundary and offshore of the shallow high energy biotope. Water depths in this biotope range from about 7 to 18m and the area occupied by the biotope does not exceed 4.5ha. The substratum in this biotope is primarily basalt (pahoehoe) with large channels cut through it oriented perpendicular to shore. Channel floors are a mix of sand, coral

rubble and basalt. As the name implies, corals do not provide high coverage; for the most part, they are found on the intervening ridges between channels. The biotope is similar in appearance to the shallow high energy biotope. Abundant species in this biotope include the corals Porites lobata and Pocillopora meandrina as well as the moano (Parupeneus multifasciatus), damselfish (Chromis vanderbilti) and ma'i'i'i (Acanthurus nigrofuscus).

Station 1 was established to quantitatively sample the biotope of deep low coral cover at a depth of 16.8m. The substratum at this station was basalt with large ridges oriented perpendicular to shore and intervening sand and rubble between the ridges. Ridges are from 5 to 30m in width, 10 to 30m in length and are spaced from 4 to 20m apart. Heights of the ridges varies from 0.75 to 2.5m. The transect sampling this habitat was set parallel to shore and spanning two ridges. Table 6 presents the results of the quantitative survey carried out at Station 1. Six coral species were noted in the quadrat survey having a mean coverage of 12 percent. The dominant coral species was Porites lobata. The macroinvertebrate census noted five species including the coral eating starfish, Acanthaster planci; the most abundant species was the green urchin (Echinometra mathaei). Thirty-five fish species (127 individuals) were encountered in the census; the most common were the damselfish (Chromis vanderbilti), ma'i'i'i (Acanthurus nigrofuscus), aaiko (A. nigroris), hinalea lauwili (Thalassoma duperrey), kole (Ctenochaetus strigosus) and moano (Parupeneus multifasciatus). In the vicinity of this station were seen the coral (Fungia scutaria), sea cucumber (Actinopyga mauritiana), cushion starfish (Culcita novaeguineae), mantis shrimp (Gonadactylus sp.), helmet shell (Cassiua cornuta), damselfish (Stegastes fasciolatus), pualu (Acanthurus mata), au (Monotaxis grandoculis), hilu (Coris flavovittata), puhipaka (Gymnothorax flavimarginatus) and 'o'ililepa (Cantherhines sandwichiensis).

Biotope of High Coral Cover

Affronting the entire length of the project site and seaward of the biotope of low coral cover is the biotope of high coral cover. This biotope occurs where exposure to wave energy is lessened; thus it is encountered in deeper waters (greater than 6m) or in shallower areas that are otherwise usually protected from wave impact (i.e., along the northern shore of Mahukona Harbor). As the name implies, the biotope of high coral cover is dominated by corals; visually important species include Porites lobata, P. compressa, Pocillpora meandrina, Montipora verrucosa, M. patula, M. flabellata and Pavona varians. The substratum through most of the biotope is basalt sometimes overlain by basalt boulders or patches of sand. The substratum relief provided by corals and spur and groove formations serve as shelter

TABLE 6. Summary of the benthic survey conducted at Station 1 in the biotope of deep low coral cover approximately 340m from the shore and 450m south of Kapaa Beach Park at Mahukona, Hawaii on 7 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 16.8m; mean coral coverage is 12.1 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Corals						
Porites lobata	19	5	0.4	0.1		31
Porites compressa		1	0.1			
Pocillopora meandrina	4.8	2	2			4.5
Montipora verrucosa	0.5					
Leptastrea purpurea						1
Pavona variane	1					
Sand			18	60	50	
Rubble		30	79.5	39.9	50	
Hard Substratum	74.7	63				63.5

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	8
Pocillopora meandrina	2
Sand	26
Rubble	42
Hard Substratum	22

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Echibnodermata	
Heterocentrotus mammillatus	4
Tripneustes gratilla	2
Echinothrix diadema	4
Echinometra mathaei	16
Acanthaster planci	3

TABLE 6. Continued.

D. Fish Census (4 x 25m)

35 Species
127 Individuals
See Appendix A for complete list

for a number of fishes; many species were encountered in this biotope. Fish species frequently seen in this biotope include kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), ma'i'i'i (Acanthurus nigrofuscus), kikakapu (Chaetodon multicinctus), mempachi (Myripristes amaenus), hinalea lauwili (Thalassoma duperrey), weke'ula (Mulloides vanicolensis), moano (Parupeneus multifasciatus) and damselfishes (Chromis vanderbilti, C. hanui and C. agilis).

Four stations were established in the biotope of high coral cover to quantitatively assess the biota present. These stations were Station Numbers 4, 5 7 and 13. Station 4 was placed about 50m from shore in 15m of water. The basalt substratum drops steeply away from the shoreline at this station to about 15m depth; seaward the slope is more gradual. On the basalt are corals and protruding above these are outcrops of basalt blocks ranging in size from 2 x 3m to 5 x 5m that are spaced from 3 to 30m apart. Table 7 presents the results of the quantitative survey carried out at Station 4. Four coral species were encountered in the quadrat survey; Porites lobata made the greatest contribution to coverage. The mean coverage is 37.8 percent. Four sea urchin species were censused in the 4 x 25m transect area and the most abundant was the slate pencil urchin (Heterocentrotus mammillatus). The fish census enumerated 40 species (336 individuals) which are listed in Appendix A. Abundant species include kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), kikakapu (Chaetodon multicinctus), mempachi (Myripristes amaenus), hinalea lauwili (Thalassoma duperrey), damselfishes (Chromis hanui and C. agilis) and the much sought mu (Monotaxis grandoculis). Interestingly, the mu were in two small schools and had an estimated total biomass of more than 15kg. If much fishing pressure occurs in a given area this species usually is not common. In the vicinity of Station 4 were seen the corals Pavona varians, Montipora verrilli and M. patula, cowry (Cypraea maculifera), cone shells (Conus lividus and C. distans), 'ula or spiny lobster (Panulirus penicillatus), hermit crab (Dardanus sp.), taape (Lutjanus kasmira), weke (Mulloides flavolineatus), a'awa (Bodianus bilunulatus), na'ena'e (Acanthurus olivaceus), umaumalei (Naso literatus), humuhumu'ele'ele (Melichthys niger), omilu (Caranx melampygus), nohu (Scorpaenopsis cacopsis) and ala'ihi (Flammeo sammara).

Station 5 was established about 15m shoreward of Station 4 in the biotope of high coral cover. Again the substratum at Station 5 is basalt with small channels cut through it oriented perpendicular to shore. These channels are from 3 to 20 wide, up to 1m in depth, 35 to 50m long and are spaced from 35 to 50m apart. Channel floors are a mix of solid basalt, boulders, basalt and coral cobble and sand. Table 8 presents the results of the quantitative survey conducted at Station 5. Four coral species were noted in the quadrat survey having a mean coverage of 41.7 percent. The dominant species was Porites lobata. Five

TABLE 7. Summary of the benthic survey conducted at Station 4 in the biotope of high coral cover approximately 50m from the shore and 1.1km south of Kapaa Beach Park at Mahukona, Hawaii on 7 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 15.2m; mean coral coverage is 37.8 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Algae						
Cladymenia pacifica						0.1
Coral						
Porites lobata	53	42	3.5	32	11	16
Porites compressa	4		46	9	3	5
Montipora verrucosa			0.1			
Pocillopora meandrina					1.3	
Rubble						
Hard Substratum	43	58	50.4	59	84.7	50.9 28

B. 50-Point Analysis

Species	Percent of the Total
Coral	
Porites lobata	19
Porites compressa	11
Montipora flabellata	2
Pocillopora meandrina	4
Rubble	6
Hard Substratum	58

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Echinodermata	
Echinometra mathaei	17
Heterocentrotus mammillatus	76
Echinothrix diadema	1
Tripneustes gratilla	1

TABLE 7. Continued.

D. Fish Census (4 x 25m)

40 Species
336 Individuals
See Appendix A for complete list

TABLE 8. Summary of the benthic survey conducted at Station 5 in the biotope of high coral cover approximately 40m from the shore and 1.1km south of Kapaa Beach Park at Hahukona, Hawaii on 7 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 7 to 9.1m; mean coral coverage is 41.7 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Coral						
Porites lobata	39	87	67	42	0.5	
Porites compressa	4	1	0.5	2	3	
Montipora verrucosa					1	
Pocillopora meandrina		3				
Rubble						
Hard Substratum	57	9	32.5	56	95.5	100

B. 50-Point Analysis

Species	Percent of the Total
Coral	
Porites lobata	22
Porites compressa	4
Rubble	20
Hard Substratum	54

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Spondylus tenebrosus	1
Phylum Echinodermata	
Heterocentrotus mammillatus	110
Echinometra mathaei	40
Echinothrix diadema	1
Holothuria atra	1

TABLE 8. Continued.

D. Fish Census (4 x 25m)

36 Species
407 Individuals
See Appendix A for complete list

exposed macroinvertebrate species were encountered in the 4 x 25m census area including one rock oyster (Spondylus tenebrosus) and four echinoderm species. The most common macroinvertebrate species at this station was the slate-pencil sea urchin (Heterocentrotus mammillatus); 110 individuals were seen. The fish census resulted in 407 individuals counted amongst 36 species (Appendix A). Abundant fish species at this station include ma'i'i'i (Acanthurus nigrofuscus), kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), menpachi (Myripristes amaenus), hinalea lauwili (Thalassoma duperrey), weke'ula (Mulloides vanicolensis), damselfishes (Chromis vanderbilti, C. agilis, C. hanui, C. verator and C. ovalis) and the mamo (Abudefduf abdominalis). In the vicinity of Station 5 were seen the corals pavona varians and Montipora verrilli as well as humuhumu'ele'ele (Melichthys niger), the cornet fish (Fistularia commersoni) and the boring rock urchin (Echinostrephus aciculatum).

Station 7 was also established in the biotope of high coral cover approximately 300m offshore Makaohule Point in 16.7m of water. The substratum at this station is comprised of large coral covered basalt ridges with intervening channels of sand and rubble. The ridges are from 30 to 60m wide, up to 85m in length and are spaced from 5 to 30m apart. Their orientation is perpendicular to the shoreline. The results of the quantitative survey are presented in Table 9; two coral species were found in the quadrat survey and the coverage was 38.1 percent. Again the most important contributor to the coverage was Porites lobata. Seven macroinvertebrate species were noted in the survey and the most common were the slate-pencil sea urchin (Heterocentrotus mammillatus) and the green sea urchin (Echinometra mathaei). Forty-one species of fishes (462 individuals) were encountered in the 4 x 25m census area (Appendix A). The most abundant fish species include the maiko (Acanthurus nigroris), surgeonfish (Acanthurus thompsoni), kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), kikakapu (Chaetodon multicinctus), hinalea lauwili (Thalassoma duperrey), taape (Lutjanus kasmira), weke'ula (Mulloides flavolineatus), moano (Parupeneus multifasciatus), angelfish (Centropyge potteri), damselfishes (Chromis agilis, C. ovalis and Dascyllus albisella) and uhu (Scarus sordidus). In the vicinity of Station 7 were seen the corals Pocillopora meandrina and Pavona varians, coral eating starfish (Acanthaster plancii), lau hau (Chaetodon unimaculatus), kikakapu (Chaetodon lunula), wrasse (Labroides phthirophagus), 'aki lolo (Gomphosus varius), 'upapalu (Apogon kallopterus), menpachi (Myripristes amaenus), weke (Mulloides flavolineatus) and two omilu (Caranx melampygus).

The final station sampling the biotope of high coral cover was Station 13 located approximately 50m offshore of the rocky shoreline in Mahukona Harbor. Water depth at this station is shallow ranging from 2.4 to 5m. The basalt substratum at this

TABLE 9. Summary of the benthic survey conducted at Station 7 in the biotope of high coral cover approximately 300m offshore of Makaohule Point at Mahukona, Hawaii on 8 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 16.7m; mean coral coverage is 38.1 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Coral						
Porites lobata	68	4	28	38	21	28
Porites compressa		0.5	11	19	3	8
Rubble		29	9	12	15	19
Hard Substratum	32	66.5	52	31	61	45

B. 50-Point Analysis

Species	Percent of the Total
Coral	
Porites lobata	22
Porites compressa	8
Sand	2
Rubble	18
Hard Substratum	50

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Cnidaria	
Cirrhipathes anguina	2 colonies
Phylum Mollusca	
Spondylus tenebrosus	1
Phylum Echinodermata	
Echinothrix diadema	1
Tripneustes gratilla	1
Echinometra mathaei	23
Heterocentrotus mammillatus	56
Chrondrocidaris gigantea	3

TABLE 9. Continued.

D. Fish Census (4 x 25m)

41 Species
462 Individuals
See Appendix A for complete list

station is cut by small channels and intervening ridges oriented perpendicular to shore. The ridges are from 2 to 5m wide, up to 1m in height and 30m in length, and are spaced from 0.5 to 4m apart. A summary of the benthic survey carried out Station 13 is presented in Table 10. Four coral species comprised a mean coverage of 48.8 percent and Porites lobata was the dominant species. Four macrtoinvertebrate species were noted in the census area and the green sea urchin (Echinometra mathaei) was the most abundant (1.4 individuals/m^2). The results of the fish census are given in Appendix A; 28 species (241 individuals) were counted. The most common fish species were the ma'i'i'i (Acanthurus nigrofuscus), kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), hinalea lauwili (Thalassoma duperrey), moano (Parupeneus multifasciatus) and damselfishes (Chromis vanderbilti, C. ovalis and Stegastes fasciolatus). In the vicinity of Station 13 were seen the soft coral (Palythoa tuberculosa), corals (Pavona varians and Cyphastrea ocellina), kikakapu (Chaetodon ornatissimus), 'aki lolo (Gomphosus varius), moa (Ostracion meleagris), 'oili'uwi'uwi (Pervagor spilosoma) and blenny (Cirripectus vanderbilti).

Station 12 was established in the ecotone or zone of transition between the shallow high energy biotope and the biotope of high coral cover about 60m offshore in Mahukona Harbor at depths of 5.5 to 6.7m. The substratum at this station is a mix of basalt with small channels cut through it oriented perpendicular to shore. These channels are from 0.5 to 2m wide, up to 15m in length and no more than 20cm in depth. Some sand and rubble is present on channel floors. Spread over this substratum are basalt boulders ranging from ! to 3m in diameter and spaced from 0.5 to 8m apart. Corals are present on the hard natural substratum as well as on the old steel objects from an earlier era (i.e., railroad wheels, boiler, etc.). Table 11 presents the results of the survey carried out at Station 12. Three coral species were present in the quadrat survey having a mean coverage of 11.7 percent; the dominant species present was Porites lobata. One cone species (Conus distans) and four sea urchin species were noted; the most abundant macroinvertebrate was the green sea urchin (Echinometra mathaei). The results of the fish census are presented in Appendix A. Twenty-three species were noted (164 individuals) in the census; the most common fishes were the ma'i'i'i (Acanthurus nigrofuscus), na'ena'e (Acanthurus olivaceus), kole (Ctenochaetus strigosus), lau'ipala (Zebrasoma flavescens), hinalea lauwili (Thalassoma duperrey), weke'ula (Mulloides vanicolensis), moano (Parupeneus multifasciatus) and damselfish (Stegastes fasciolatus). In the vicinity of Station 12 were seen the corals (Montipora verrilli and Pavona varians), cone (Conus lividus), 'o'opu hue (Arothron meleagris), kihikihi (Zanclus cornutus), blenny (Cirripectus vanderbilti) and uku (Aprion virescens).

TABLE 10. Summary of the benthic survey conducted at Station 13 in the biotope of high coral cover approximately 50m from the shore in Mahukona Harbor at Mahukona, Hawaii on 8 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 2.4 to 4.6m; mean coral coverage is 48.8 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Coral						
Porites lobata	38	85	42	19	38	62
Porites compressa	0.5					
Montipora verrucosa	1				3	
Pocillopora meandrina			2			2
Hard Substratum	60.5	15	56	81	59	36

B. 50-Point Analysis

Species	Percent of the Total
Coral	
Porites lobata	38
Hard Substratum	62

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Echinodermata	
Heterocentrotus mammillatus	32
Tripneustes gratilla	5
Echinostrephus aciculatum	1
Echinometra mathaei	145

D. Fish Census (4 x 25m)

28 Species
241 Individuals
See Appendix A for complete list

TABLE 11. Summary of the benthic survey conducted at Station 12 in the ecotone or zone of transition between the biotope of high coral cover and shallow high energy biotope affronting Mahukona Harbor facility approximately 60m from the shore at Mahukona, Hawaii on 8 December 1989. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 5.5 to 6.7m; mean coral coverage is 11.7 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Coral						
Porites lobata	38	3	6.5	1.5	16	1.2
Montipora verrucosa	1	0.5			0.5	
Pocillopora meandrina				2.2		
Sand	9	18	8	17	4	6
Hard Substratum	52	78.5	85.5	79.3	79.5	92.8

B. 50-Point Analysis

Species	Percent of the Total
Coral	
Porites lobata	8
Sand	24
Hard Substratum	68

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Conus distans	1
Phylum Echinodermata	
Echinometra mathaei	68
Tripneustes gratilla	33
Heterocentrotus mammillatus	18
Echinometra oblongata	1

Table 11. Continued.

D. Fish Census (4 x 25m)

23 Species
164 Individuals
See Appendix A for complete list

Biotope of Sand

As noted above, the biotope of sand occurs seaward of the biotope of high coral cover. The biotope of sand is probably a near-continuous feature along the entire project site at depths in excess of 20m. At only one point affronting Mahukona Harbor does the biotope of sand extend shoreward and into the study area. The biopoe is dominated by sand and rubble. Species frequently seen in this biotope include the nabeta (Hemipteronotus umbrilatus), a number of small goby-like fishes (Gnatholepis anjerensis, Parapercis schauinslandi and Quisquilius spp.), garden eels (Callechelys luteus), kona crabs (Ranina serrata) and molluscs (Terebra maculata, T. crenulata, Cassius cornuta and Conus leopardus).

Station 11 was established about 530m offshore in the mouth of Mahukona Harbor at a depth of 17.7m to sample the biotope of sand. The substratum at this station was sand which appeared to continue unbroken in a seaward direction but about 30m inshore of Station 11 hard substratum with coral was encountered. The results of the quantitative survey conducted at Station 11 are presented in Table 12. Because of the shifting nature of the substratum, no corals were encountered at this station. Invertebrates seen in the 4 x 25m survey area include the auger shells (Terebra maculata and Terebra sp.) and the sea cucumber (Bohadschia argus). Two species of fishes were seen: a malu (Parupeneus pleurostigma) and a single garden eel (Callechelys luteus). In the vicinity of Station 11 were seen kona crabs (Ranina serrata), a small school of opelu (Decapterus macarellus) and a small rockmover wrasse (Novaculichthys taeniourus).

Three green turtles (Chelonia mydas) were seen during the course of the field work. The first individual was encountered adjacent to Station 2 on the surface on 7 December 1989. This turtle had an estimated straight line carapace length of 50cm. The second turtle was estimated to be the same size as the first and was seen about 50m offshore of Makaohule Point on the surface close to Station 8. The third turtle was encountered on the surface approximately 60m offshore of Mahukona Lighthouse near Station 15; this turtle was estimated to be about 75cm in straight-line carapace length. No deformities or tags were noted nor were any turtles seen resting on the bottom or in caves albiet considerable cover exists in the project area. Nowhere in the project site was any appreciable amount of macroalgae encountered which could be used as forage for turtles. Considerable effort was expended in attempting to locate potential food resources, particularly along the emergent basalt bench affronting the study area.

It was learned on interviewing a dive charter captain who spends a considerable amount of time along the coast from Kawai-

TABLE 12. Summary of the benthic survey conducted at Station 11 in the biotope of sand approximately 530m offshore of Mahukona Harbor at Mahukona, Hawaii on 8 December 1989. Results of the $6m^2$ quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 17.7m; mean coral coverage is 0 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Sand	100	100	100	100	100	100

B. 50-Point Analysis

Species	Percent of the Total
Sand	100

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Terebra maculata	1
Terebra sp. (juveniles)	2
Phylum Echinodermata	
Bohadschia argus	1

D. Fish Census (4 x 25m)

2 Species
2 Individuals
See Appendix A for complete list

hae to Mahukona that there is a pod of spinner porpoise (Stenella longirostris) apparently resident to the area between Kohala Estates and Kawaihae Harbor (Kohala Estates lies several miles south of Mahukona). This same captain also noted that occasionally one sees bottlenose dolphins (Tursiops gilli) as well as humpback whales (Megaptera novaeangliae) well offshore of Mahukona Harbor; the latter are encountered during the winter months.

Little recreational use of the project site was noted during the course of fieldwork. A total of 6 SCUBA divers were seen entering the water at Mahukona Landing (the old wharf) and three individuals were noted at Mahukona Beach Park fishing from shore. Two small boats (18 to 24 foot class) entered the harbor and anchored for about 2 hours on 8 December; three people from these boats swam in the area. No one was seen using Kapa'a Beach Park during the period of this study.

DISCUSSION

WATER QUALITY STUDIES

The water chemistry parameters measured in this study are indicative of well-flushed, open coastal waters. All parameters with the exception of chlorophyll-a and ammonia-nitrogen easily meet the stringent water quality standards as specified by the State Department of Health for open coastal waters (dry criteria). The geometric means for both chlorophyll-a and ammonia-nitrogen meet the values "not to exceed 10 percent of the time" as specified by the DOH guidelines. Previous water quality work in the same area by Marine Research Consultants (1989) also found that chlorophyll-a and ammonia-nitrogen exceeded the DOH standards. In that study chlorophyll-a was measured at 0.32ug/l (0.03ug/l higher than the geometric mean value in the present study and exceeded the state dry criteria by 0.17ug/l) and ammonia-nitrogen was 5.04ug/l (2.64ug/l higher than the geometric mean value in the present study and exceeded the state dry criteria by 3.04ug/l).

A weekly ocean water quality monitoring program has been in place at the Natural Energy Laboratory of Hawaii (NELH) at Keahole Point since 1982. Among the parameters routinely monitored is ammonia-nitrogen. The longterm mean for ammonia-nitrogen at Keahole Point is 5.04ug/l which again exceeds state dry criteria standards. The waters offshore of Keahole Point are considered to by pristine; the presence of high quality deep ocean water adjacent to shore was an important factor in locating the NELH facility there. The fact that pristine Kona waters exceed state standards for ammonia-nitrogen suggests that the standard may be too stringent for that coast. Other longterm means from NELH are similar to the concentrations of nutrient species at Mahukona:

nitrate: NELH = 2.80ug/l, Mahukona = 2.63ug/l; orthophosphate: NELH = 4.96ug/l, Mahukona = 3.69ug/l; ammonia-nitrogen: NELH = 5.04ug/l, Mahukona = 2.40ug/l. The NELH data are courtesy of the University of Hawaii Analytical Services Laboratory.

Like many other nearshore marine systems along the West Hawaii coast, there is some evidence of diffuse groundwater input at the head of Mahukona landing (Station 14); groundwater typically has lower salinity and high concentrations of nitrates and silicates. Because oceanic waters are low in these and other dissolved nutrient species, a concentration gradient is usually apparent if groundwater intrusion is occurring. Such a gradient is weakly evident between Stations 14 and 8 (to the north) for nitrate nitrogen and silicate; the salinity data do not track as closely. Salinity measurements were carried out using tritration methods which may not have been sensitive enough to pick up the gradient. Thus the concentrations of the measured dissolved nutrient species are a much more sensitive indicator of these gradients here than are measurements of salinity.

The "composite" nutrient parameters of total nitrogen and total phosphorus yield the least information about water quality of the nutrient species measured in this study. The lack of definitive information from these parameters is the result of the makeup of these two composite species. Total phosphorus and nitrogen include a myriad of unspecified groups of dissolved organic materials, some of which are not found in groundwater and are of unknown biological function.

BIOLOGICAL STUDIES

Four biotopes were defined in the area examined by this study. The results of the biological survey show that benthic and fish community development is greatest in the biotope of high coral cover and least in the biotope of sand. The important quantitative measures (i.e., number of coral species and cover, number of fish species and individuals) made in these communities are summarized in Table 13; in all, the biotope of high coral cover has the greatest biological development. This biotope has the presence of a stable, hard substratum at depths below which the impact of waves are lessened or are otherwise protected from storm surf. A stable substratum and an absence of scour due to high water motion are requisites to the success of corals. The hard substratum and coral development create shelter which is necessary for the success of many coral reef fish species. Fish species diversity and abundance is often linked to topographical relief (Risk 1972, Brock and Norris 1989). In this study, these parameters are best developed in the biotope of high coral cover.

Corals are a dominant element of the benthos at Mahukona in areas sheltered from wave impact. Coverage values often exceed

TABLE 13. Summary of the quantitative biological observations made at 9 stations sampling four biotopes recognized in this study.

Biotope	Station No.	Depth (m)	No. Coral Spp.	Mean Cover (%)	No. Fish Spp.	No. Fish Ind.
Shallow High Energy Biotope	2	10	5	31	31	196
	8	13	0	0	4	10
	15	4	2	0.4	32	201
Means		9	2	10.5	22	136
Biotope of High Coral Cover	4	15	4	38	40	336
	5	8	4	42	36	407
	7	17	2	38	41	462
	13	3	4	49	28	241
Means		11	4	42	36	362
Biotope of Deep Low Coral Cover	1	17	6	12	35	127
Biotope of Sand	11	18	0	0	2	2

60 percent and dominant species are Porites lobata and P. compressa. Most of the common Hawaiian corals were encountered at Mahukona; the coral communities at this location are very similar to those found elsewhere on the Kona coast.

The fish communities resident to the Mahukona area are similar to those found in other areas of the West Hawaii coast. Other studies (e.g., Hobson 1974, Brock and Norris 1988a, 1988b, Brock 1989a, 1989b) have noted similar species composition and abundances at other Kona localities. The presence of uku (Aprion virescens), au (Monotaxis grandoculis, moano kea (Parupeneus cyclostomus) and omilu (Caranx melaspygus) in the quantitative survey suggests that fishing pressure at Mahukona is less than at many other Kona sites. This is further supported by the presence of spiny lobsters.

Three green sea turtles were encountered during the course of this survey. None of the individual turtles were found resting on the bottom but rather were on the surface. Algal species known to be important forage for green turtles (such as Amansia glomerata and Pterocladia capillacea see Balaza 1980 and Balaza et al. 1987) are virtually absent in the study area albiet considerable effort was expended to locate potential algal forage.

A concern with any coastal development is the potential for impact on coral reefs due to sedimentation. Typically if high sedimentation occurs on a reef, motile species simply move away from the area of perturbation. Thus potential impacts from sedimentation would be greatest on sessile species such as corals. Many benthic species including corals are capable of removing sediment settling on them but there are threshold levels of deposition where cleaning mechanisms may be overwhelmed and the individual becomes buried. However the impact of sedimentation on Hawaiian reefs may be overstated. Dollar and Grigg (1981) studied the fate of benthic communities at French Frigate Shoals in the Northwest Hawaiian Islands following the accidental spill of 2000 tons of kaolin clay. These authors found after two weeks there was no damage to the reef corals and associated communities except where the organisms were actually buried by the clay deposits for a period of more than two weeks.

Transport of sediment to marine communities during or after any development when soil is exposed would probably be associated with a high rainfall event. In the Hawaiian Islands zones of low rainfall are found in leeward areas; the rainfall minima are usually attributed to the so-called "rain-shadow effect" in which air, desiccated by its uplift over an orographic barrier, subsides into a low leeward area as a warm, dry wind. The rainfall minimum that results from the rain-shadow effects of the Kohala Mountains and Mauna Kea makes Kawaihae and environs the driest area in the state. The longterm mean rainfall for Kawaihae (the closest guage) is 250mm or 0.98 inch per year (Giambelluca et al.

1986). Being part of the driest area in the state suggests a low probability of a rainstorm event coincident with exposed soil as during construction. Following project completion the soil should be covered and/or planted such that if a major rainfall event were to occur generation of sediment from the project should be negligible.

Other concerns focus on the potential for changes in nearshore water quality. Soil which serves to adsorb excess inorganic nturients occurs as a well developed horizon in the project site (relative to North Kona project sites) and would assist in controlling leaching of material to the watertable below. Studies conducted at other West Hawaii locations (e.g., Haikoloa) suggests that the fertigation/fertilization techniques used do not impact nearshore waters (Brock and Norris 1988c).

LITERATURE CITED

Balazs, G.H. 1980. Synopsis of biological data on the green sea turtle in the Hawaiian Islands. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-SWFC-7. 141p.

Balazs, G.H., R.G. Forsyth and A.K.H. Kam. 1987. Preliminary assessment of habitat utilization by Hawaiian green turtles in their resident foraging pastures. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-SWFC-71. 107p.

Brock, R.E. 1982. A critique on the visual census method for assessing coral reef fish populations. Bull. Mar. Sci. 32:269-276.

Brock, R.E. 1989a. Aquatic biological survey at Kapalaoa, North Kona, Hawaii: An assessment of impacts with proposed development. Prepared for PBR Hawaii, 1042 Fort Street Mall, Honolulu, Hawaii. 24p.

Brock, R.E. 1989b. Cooperative environmental monitoring program for the Hawaii Ocean Science and Technology Park and the Natural Energy Laboratory of Hawaii. I. Aquatic baseline study. Prepared for GK & Associates, Kailua, Hawaii. 63p.

Brock, R.E. and J.H. Brock. 1977. A method of quantitatively assessing the infaunal community residing in coral rock. Limnol. Oceanogr. 22:948-951.

Brock, R.E. and J.E. Norris. 1988a. The Natural Energy Laboratory of Hawaii biological monitoring program for pipeline installation at Keahole Point, Hawaii. Final Report. Prepared for R.H. Towill Corp., Honolulu, Hawaii. 71p.

Brock, R.E. and J.E. Norris. 1988b. Quantitative baseline survey of the marine communities at Waikoloa, Hawaii. Prepared for Transcontinental Development Co., Waikoloa, Hawaii. 53p.

Brock, R.E. and J.E. Norris. 1988c. The Waikoloa Anchialine Pond Program: Second annual report. July 1988. Mimeo report. Hawaii Institute of Marine Biology and the SeaGrant College Program, Univ. Hawaii, Honolulu. 65p.

Brock, R.E. and J.E. Norris. 1989. An analysis of the efficacy of artificial reef designs in tropical waters. Bull. Mar. Sci. 44:934-941.

Brock, V.E. 1954. A preliminary report on a method of estimating reef fish populations. J. Wildlife Mgmt. 18:297-308.

Clark, John R.K. 1985. Beaches of the Big Island. University of Hawaii Press, Honolulu. xiv+171p.

Gaimbelluca, T.W., M.A. Nullet and T.A. Schroeder. 1986. Rainfall atlas of Hawaii. Report R76. Water Resources Research Center and the Department of Meteorology, University of Hawaii. Published by the Division of Water and Land Development, Department of Land and Natural Resources, State of Hawaii. vi+276p.

Grigg, R.W. and J.E. Maragos. 1974. Recolonization of hermatypic corals on submerged lava flows in Hawaii. Ecology 55:387-395.

Hobson, E.S. 1974. Feeding relationships of teleostean fishes on coral reefs in Kona, Hawaii. Fish. Bull. 72:915-1031.

Marine Research Consultants. 1989. Results of the marine water quality monitoring program to assess the effects of Kapaanui Subdivision North Kohala, Hawaii. Report No. 1. Prepared for ? 7p.

Standard Methods. 1985. Standard methods for the examination of water and wastewater. Sixteenth Edition. American Health Assoc., Washington, D.C. Port City Press, Baltimore, Md. 1268p.

Strickland, J.D.H. and T.R. Parsons. 1972. A practical handbook of seawater analysis. Second edition. Bull. Fish. Res. Bd. Canada, 167. 310p.

APPENDIX A. Results of the quantitative visual censuses conducted at ten locations offshore of Mahukona and Kapaanui, North Kohala, Hawaii on 7-9 December 1989. Each entry in the body of the table represents the total number of individuals of each species seen; totals are presented at the foot of the table.

Family and Species	Station Number									
	1	2	4	5	7	8	11	12	13	15
ACANTHURIDAE										
Acanthurus triostegus										18
A. nigroris	8		8	8	10					
A. nigrofuscus	9	6	8	41				27	39	28
A. olivaceus	1	11			2			11		11
A. dussumieri	1									6
A. achilles				4						1
A. mata			2							
A. leucoparieus										13
A. thompsoni			1	3	12					
Ctenochaetus strigosus	8	8	85	58	83			14	63	19
C. hawaiiensis			1							6
Naso literatus	1	4		3	1			1	4	9
N. unicornis			4							1
Zebrasoma flavescens		7	29	29	48			20	30	28
APOGONIDAE										
Apogon kallopterus			3							
AULOSTOMIDAE										
Aulostomus chinensis			1	1	1			1		
BALISTIDAE										
Melichthys niger									3	2
M. vidua			1		1					
Sufflamen bursa	2	3	1	2	1	2		2	2	3
Xanthichthys ringens	6	1								
BLENNIDAE										
Runula ewaensis				1						
Cirripectus vanderbilti		1								
CANTHIGASTERIDAE										
Canthigaster jactator	2	4			2				1	3
CARANGIDAE										
Caranx melampygus	1									

APPENDIX A. Continued.

Family and Species	Station Number									
	1	2	4	5	7	8	11	12	13	15
CHAETODONTIDAE										
Chaetodon quadrimaculatus	2	1							1	1
C. lunula				6						
C. multicinctus	4	6	13	3	16			2	4	
C. ornatissimus	2	2						1		
C. miliaris	1				4					
C. fremblii					1			1		
Forcipiger flavissimus	3		3		4			2	1	2
F. longirostris			3							
CIRRHITIDAE										
Cirrhitops fasciolatus	1	1	5					1	1	
Paracirrhites forsteri	4		1	1	1					
P. arcatus	2	2			1				2	
HOLOCENTRIDAE										
Adioryx spinifer			4	1						
Adioryx xantherythrus						3				
Flammeo sammara						1				
Myripristes amaenus			15	21						
KYPHOSIDAE										
Kyphosus bigibbus										7
LABRIDAE										
Bodianus bilunulatus	2	1			1					
Thalassoma trilobatum		1								
T. duperrey	8	19	19	13	25			17	15	5
T. ballieui				1	3			1	2	
Stethojulis balteata								1		
Macropharyngodon geoffroy								1		
Gomphosus varius										1
Pseudojuloides cerasinus	6	2	8		1					
Pseudochelinus octotaenia	3	3		6					1	
P. tetrataenia				3						
Chelinus rhodochrous	1		1	2	2					
C.bimacula	1									
Coris flavovittata		2								
C. gaimard		1								
C. venusta								1		
Laborides phthirophagus			1							
Anampses cuvier										1

APPENDIX A. Continued.

Family and Species	Station Number									
	1	2	4	5	7	8	11	12	13	15
LUTJANIDAE										
Lutjanus kasmira					53					
L. fulvus			4							
Aprion virescens	1		1		1	1				
Alpharaus furcatus			1		1					1
MONACANTHIDAE										
Pervagor spilosoma								1		
MULLIDAE										
Mulloides flavolineatus						5		35	1	
M. vanicolensis			2	12	42					9
Parupeneus multifasciatus	9	14	8	5	12			13	10	8
P. cyclostomus		4	1	3				1		
P. bifasciatus		1	1	3					1	2
P. pleurostigma						2	1		1	
MURAENIDAE										
Gymnothorax flavimarginatus				1						
G. meleagris				1						
OPHICHTHIDAE										
Callechelys luteus							1			
OSTRACIONIDAE										
Ostracion meleagris								1		
PARAPERCIDAE										
Parapercis schauinslandi	1									
POMACANTHIDAE										
Centropyge potteri	1	6	8	4	19				1	
C. fisheri	2				2					
POMACENTRIDAE										
Chromis vanderbilti	23	75		17				9	28	
C. hanui		3	19	58	4				1	
C. agilis	1		30	29	30					
C. verator			9	12					4	3
C. ovalis			11	21	30				12	
Plectroglyphidodon johnstonianus	1	4		1	9				1	
P. imparipennis									1	
Number of Families	14	12	15	14	16	3	2	10	10	11
Number of Species	35	31	40	36	41	4	2	23	28	32
Number of Individuals	127	196	336	407	462	10	2	164	241	201

APPENDIX A. Continued.

Family and Species	Station Number									
	1	2	4	5	7	8	11	12	13	15
Stegastes fasciolatus									10	3
Abudefduf abdominalis				26						3
A. sordidus										1
Dascyllus albisella					18					
SCARIDAE										
Scarus rubroviolaceus	1	1	1		1					2
S. perspicillatus			1							1
S. sordidus	7		1		10				1	
S. psittaceus					2					2
Calotomus carolinus		1								
SCORPAENIDAE										
Scorpaenopsis cacopsis					1					
SERRANIDAE										
Cephalopholis argus				1	2					
SPARIDAE										
Monotaxis grandoculis			18	6	1					1
ZANCLIDAE										
Zanclus cornutus	1	1	3							
Number of Families	14	12	15	14	16	3	2	10	10	11
Number of Species	35	31	40	36	41	4	2	23	28	32
Number of Individuals	127	196	336	407	462	10	2	164	241	201

Mahukona

Appendix E: *Archaeological Inventory Survey*
Kapaanui Agricultural Subdivision,
Lands of Kapaanui and Kou,
North Kohala District, Island of Hawaii

Report 568-100289

Archaeological Inventory Survey
Kapaanui Agricultural Subdivision

Lands of Kapaanui and Kou
North Kohala District, Island of Hawaii

Archaeological Inventory Survey
Kapaanui Agricultural Subdivision

Lands of Kapaanui and Kou
North Kohala District, Island of Hawaii

by

Amy E. Dunn
Supervisory Field Archaeologist

and

Paul H. Rosendahl, Ph.D.
Principal Archaeologist

Prepared for

Ahualoa Development, Inc.
c/o RIIJ Associates
195 South King Street, 4th Floor
Honolulu, Hawaii 96813

November 1989

PHRI
Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services
305 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-8998

PHRI
Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services
305 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-8998

SUMMARY

At the request of Mr. Robert H. Johnson of RJH Associates, on behalf of their client, Ahualoa Development, Inc., Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological inventory survey at the Kapaanui Agricultural Subdivision project area, situated in the Lands of Kapaanui and Kau, North Kohala District, Island of Hawaii (TMK 3-5-7-12 11). Specifically, the inventory survey project area was defined as that portion of the development parcel situated inland (and outside) of the State Land Use Conservation District. The overall objective of the survey was to provide information appropriate to and sufficient for compliance with Hawaii County Ordinance No 86-82 and SMA Permit No 230.

The survey field work was conducted June 5-July 7, 1989, under the supervision of Supervisory Field Archaeologist Amy Dunn. During the field work, 26 sites consisting of 66+ features were identified. The sites ranged in physical condition from poor to good and consisted of both single and multiple features. The features consisted of the following formal types: wall, cairn, trail, modified outcrop, enclosure, terrace, platform, C-shape, alignment, mound, and bi-level platform with adjoining terrace. Functional types present included boundary marker, habitation, agriculture, railroad bed, burial and possible burial, water catchment, transportation, and marker.

As part of the field work, 47 test units (c. 25.4 sq m in surface area) were excavated in the project area. The units were placed at 41 features in order to ascertain whether the features contained cultural deposits, and in order to collect dating material samples. The units yielded a variety of cultural remains including portable artifacts, midden, and dating samples.

Of the 26 sites identified, 18 are assessed as significant solely for information content. No further work is recommended for 15 of the 18 sites; for the three remaining sites, further data collection (detailed recording of sites and features, surface collection, and selected limited excavations) is recommended. Of the remaining eight sites, five are assessed as culturally significant and valuable for information content and are recommended for preservation "as is." Test excavations at these five sites encountered human burials, and additional burials are suspected at all five sites. One of the remaining eight sites is assessed as significant for information content and is tentatively evaluated as culturally significant, pending further data collection. It is suspected that this site contains one or more burials. The remaining two sites are assessed as significant for information content and as excellent examples of site types. One of the sites is recommended for preservation with some level of interpretative development, and the other site is recommended for preservation "as is."

CONTENTS

ILLUSTRATIONS

Figure

TABLES

Table

INTRODUCTION

BACKGROUND

At the request of Mr. Robert H. Johnson of RJH Associates, on behalf of their client, Ahualoa Development, Inc., Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological inventory survey at the Kapaanui Agricultural Subdivision project area, situated in the Lands of Kapaanui and Kou, North Kohala District, Island of Hawaii (TMK: 3-5-7-02:11). More specifically, the inventory survey project area consisted of the portion of the development parcel situated inland (and outside) of the State Land Use Conservation District. The overall objective of the survey was to provide information appropriate to and sufficient for compliance with Hawaii County Ordinance No 86-82 and SMA Permit Nu 230

The survey field work was conducted June 5-July 7, 1989, under the supervision of Assistant Supervisory Archaeologist Amy Dunn, assisted by Supervisory Archaeologist Alan T. Walker, who reviewed sites and records in the field. The work was conducted under the overall direction of Principal Archaeologist Dr. Paul H. Rosendahl. Crew members included Field Archaeologists Keala Kaaihi, Eric Pearthree, and Jack Harris. Approximately 91 man-days of labor were expended in conducting the field work. Upon completion of the work, a preliminary oral summary of findings—including tentative conclusions and recommendations—was provided to client representatives (July 6, 1989), and an oral briefing was given to Ms. Virginia Goldstein, staff planner and historic sites specialist in the Hawaii County Planning Department (HCPD)(July 12, 1989)

SCOPE OF WORK

The basic purpose of the inventory survey was to identify—to discover and locate on available maps—all sites and features of potential archaeological significance present within the specified project area. An inventory survey comprises an initial level of archaeological investigation. It is extensive rather than intensive in scope, and is conducted basically to determine the presence or absence of archaeological resources within a specified project area. This level of survey indicates both the general nature and variety of archaeological remains present, and the general distribution and density of such remains. It permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for any subsequent mitigation work as might be necessary or appropriate. Such work could include further data collection involving detailed recording of sites and features, and limited excavations; and possibly subsequent data recovery research excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

The basic objectives of the inventory survey were fourfold: (a) to identify (find and locate) all sites and site complexes present within the project area; (b) to evaluate the potential general significance of all identified archaeological remains; (c) to determine the possible impacts of proposed development upon the identified remains; and (d) to define the general scope of any subsequent further data collection and/or other mitigation work that might be necessary or appropriate.

Based on a review of available background literature and on familiarity with both the general project area and the current requirements of pertinent review authorities, and based on discussions with Ms. Virginia Goldstein and with Dr. Ross Cordy, chief archaeologist with the Hawaii State Department of Land and Natural Resources-Historic Sites Section/State Historic Preservation Office (DLNR-HSS/SHPO), the following specific tasks were determined to constitute an adequate and appropriate scope of work for the proposed inventory survey:

1. Conduct limited archaeological and historical documentary background research involving review and evaluation of readily available archaeological and historical literature, historic documents and records, and cartographic sources relevant to the immediate project area;

2. Conduct variable coverage (partial to 100%), variable intensity (30-90 ft intervals) ground survey of the previously unsurveyed portion of the project area situated between the old railroad bed (Site KK-1 [SIHP Site 12431*]) and the State Land Use Conservation District;

* State Inventory of Historic Places (SIHP) site designation system: all five-digit site numbers prefixed by 50-10-01- (50=State of Hawaii, 10=Island of Hawaii, 01=USGS 7.5' series quad map ["Mahukona, Hawaii"]).

3. Conduct detailed data collection, as appropriate, at all identified sites within the project area (written descriptions, scaled maps, photographs, and surface collections of portable remains);

4. Conduct limited subsurface excavations at selected sites and features identified within the project area to (a) determine the presence or absence of potentially significant buried cultural features or deposits, (b) obtain suitable samples for age determination analyses, and (c) determine the presence or absence of human skeletal remains within possible burial features; and

5. Analyze background and field data, and prepare appropriate reports.

The inventory survey was to be carried out in accordance with the draft standards for inventory-level survey recommended by DLNR-HSS/SHPO. The significance of all identified remains were to be assessed in terms of (a) the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60), and (b) the criteria for evaluation of traditional cultural values prepared by the national Advisory Council on Historic Preservation (ACHP). DLNR-HHS/SHPO uses these criteria to evaluate eligibility for both the Hawai'i State and National Register of Historic Places.

PROJECT AREA DESCRIPTION

The Kapaanui Agricultural Subdivision project area consists of approximately 208 acres located in the Lands of Kapaanui and Kou, North Kohala District, Island of Hawai'i (TMK 3-5-7-02 11)(Figure 1). It is bounded on the north by Kapaa Park, on the west by the State Land Use Conservation District, on the south by undeveloped land within the ahupua'a of Kou, and on the east by Akoni Pule Highway. The project area ranges in elevation from 24-200 feet AMSL (above mean sea level). Average annual rainfall within the area is estimated at 5-20 inches (Armstrong 1983).

The project area lies at the northwest base of the Kohala Mountains and is characterized by two lava flows from those mountains—the Pololu Volcanic Series, potassium-argon dated to 330-450,000 years old, and the Hawi Volcanic Series, potassium-argon dated to 60-250,000 years old. The basalt flows in the project area are of the Pololu series, and the cinder cones in the area—which are part of a larger series which extends from the summit of the Kohala Mountains to Mahukona—are of the Hawi series (Stearns 1966).

The north and west flanks of the Kohala Mountains have remained virtually unchanged since their time of deposition due to the lack of erosional agents such as heavy rainfall and sea erosion. The topography is characterized by 6 to 10 percent slopes, from the summit to the coast, with stream-cut gulches less than 30 m deep and sea cliffs less than 15 m high. Terrain within the project area generally consists of undulating rocky slopes of exposed Pololu series bedrock, with occasional linear ridges of bedrock outcrops, and bedrock over which lies a deposit of silty loam up to 13 inches thick. Drainages in the area are generally wide and meander gently from east to west (Site 12454, however, a steep gulch, is an exception). At the time of the present survey, the drainages were dry.

Vegetation in most of the project area consists primarily of thick grasses, with more or less concentrated areas of kiawe (*Prosopis pallida* [Humb. and Bonpl. ex Willd.] HBK), 'ilima (*Sida fallax* Walp.), and koa-haole (*Leucaena leucocephala* [Lam.] de Wit). The section of the project area near the coast, along the State Land Use Conservation District boundary, differs in vegetation in that it is characterized by a sparse yet well established kiawe forest.

PREVIOUS ARCHAEOLOGICAL WORK

Archaeological work conducted on the leeward side of North Kohala (which is where the present project area is located) has been most extensive at Lapakahi and land units near Lapakahi (Pearson 1969; Griffin et al. 1971; Tuggle and Griffin 1973; Rosendahl 1972; and Schilt and Simoto 1980). The general Lapakahi area consists of three settlement zones (a) coastal to short distance inland - a densely populated settlement zone consisting of habitation and burial features; (b) one to two kilometers inland - a zone consisting of barren land over which are trails; the land is unsuitable for extended habitation or agriculture; and (c) two to four kilometers inland - an intensive dryland agricultural zone that supported a number of crops, including sweet potato, which were cultivated increasingly intensively from AD 1450-1800 (Rosendahl 1972). Within these zones, a variety of sites have been identified. Permanent residential sites, burial platforms, fishing shrines, and canoe houses have been identified in the coastal area. Trails with associated cairns have been identified in the barren zone. Within the upland zone, where there are elaborate field systems dividing the land into elongated rectangular units, many small features exist—agricultural windbreaks, stone mounds, low stone alignments, planting circles, small clearings, simple terraces, C- and L-shaped structures, and animal enclosures.

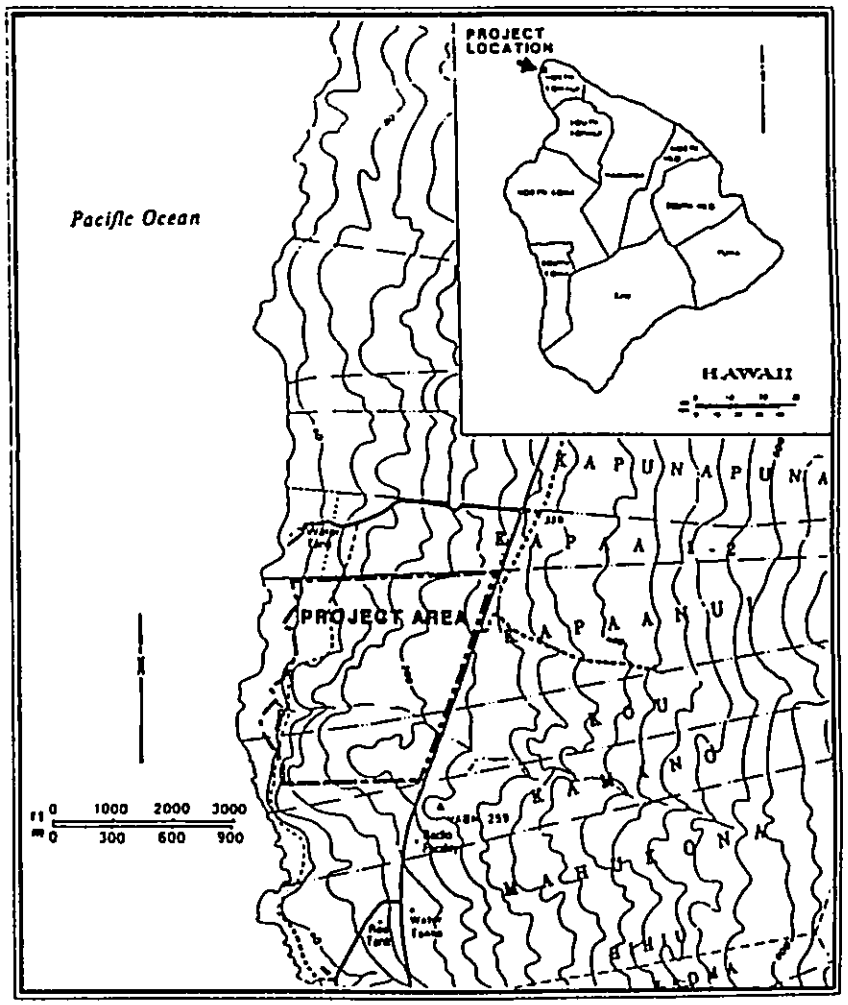


Figure 1. PROJECT LOCATION MAP

ARCHAEOLOGICAL INVENTORY SURVEY
KAPAANUI AGRICULTURAL SUBDIVISION
Lands of Kapaanui and Kou
N. Kona District, Island of Hawai'i
(TMK:3-5-7-02:11)
PHRI Project 89-568 *November 1989*

The Lapakahi area appears to have been first settled c. AD 1300, at Kou'e. Settlement expanded into the upland zone from AD 1450-1500 with the development of dryland field cropping. Then, c. AD 1825, based on radiocarbon and hydration-rind dates derived by Tuggle and Griffin (1973), the area was abandoned.

A summary of previous archaeological work relevant to the specific project area is included in Tomonari-Tuggle's cultural resource management study of North Kohala (1981:60-61). According to this summary, the Tomonari-Tuggle (1981) study is the earliest archaeological work conducted within the project area. During that survey, eight sites were identified within the bounds of the present project area. Six of the eight sites (K-142, -145, -149, -151, -155, and -158) were reidentified during the present survey; two sites (K-144 and K-163) were not relocated.

During the spring of 1984, PHRI conducted an archaeological reconnaissance survey which included the current project area (Kaschko 1984). During the survey, Tuggle's sites were reidentified and eight sites were newly identified (KK-2, -3, -4, -5, -6, -9, -10, -11, and -12). All eight sites were located inland of the old railroad bed.

All previous archaeological work within the project area has consisted of identifying and briefly recording sites. Until the present inventory survey, no subsurface testing for cultural remains has been conducted within the project area.

SUMMARY OF LIMITED HISTORICAL DOCUMENTARY RESEARCH

The project area lies within the ahupua'a of Kapaanui and Kou, on the windward side of Kohala. These ahupua'a have been only rarely documented, and very briefly at that. Kohala, however, is mentioned in a number of Hawaiian legends. Appendix A, the complete historical documentary research, briefly recounts two of them.

History indicates that Kohala was often the scene of warfare between chiefs of the island of Hawaii and Maui. It was on the Kohala coast that Kamehameha was born to the wife of one of the war leaders while an attack on Maui was being prepared (Tomonari-Tuggle 1981:57*). Kamakau (1964:67) relates that the war fleet was "encamped at Kohala, from Kou'e to Pu'uwepa." Handy and Handy note that from "this feudal seat he (Kamehameha) gradually extended his power to embrace the whole of the island, eventually gaining the suzerainty of all the Hawaiian Islands" (1972:528).

Early historic references to the Kohala area in Appendix A include those by Lt. King, one of Cook's officers in 1779, and Reverend William Ellis. Also included is much information from a late primary source of documentary research on the area—Tomonari-Tuggle's (1981) study. Appendix A includes population information in relation to land units, and information on settlement patterns and other land use data. It concludes with detailed land use information derived from studies of LCA awards and land grants.

FIELD METHODS AND PROCEDURES

The overall survey work was conducted June 5-July 7, 1989, under supervision of Supervisory Field Archaeologist Amy Dunn. The ground survey portion of the work was conducted June 8-9, 1989. The area subjected to ground survey is that situated between the old railroad bed (Site KK-1) and the State Land Use Conservation District. Pedestrian sweeps were oriented west-to-east. Intervals between sweeping crewmembers were 30-90 ft, depending on vegetation and terrain encountered. As sites were identified they were marked with pink-and-blue flagging tape, and their locations were plotted on a blueline map (scale 1 in = 200 ft) furnished by the client. All sites were recorded on standard PHRI site survey record forms and were photographed using 35 mm black-and-white film (PHRI Temp. Roll No. 568-1). The recording included written descriptions, measurements, and plan maps. Each site was mapped using a 1:50 or 1:100 scale. Each site, or the primary feature within each site complex, was marked with an aluminum tag bearing the site number, date, letters "PHRI", and PHRI project number (89-568). In addition, flagging tape with the site number was wrapped around a rock and placed on the structure as an aid to future site reidentification.

Sites identified during ground survey, in the previously unsurveyed portion of the project area situated between Site KK-1 and the State Land Use Conservation District, were assigned temporary field numbers prefixed with "T-", beginning with "T-1". Original numbers for sites previously identified in areas that had been previously surveyed (areas inland of KK-1, the railroad bed) were retained. Two sites were identified while conducting detailed recording of previously identified sites; these sites were designated T-14 and -15. Subsequently, all sites, both newly identified and reidentified, were assigned permanent State Inventory of Historic Places (SIHP) site numbers (see Table 1 - Correlation of Site Numbers).

All test units excavated during the present project were plotted on site maps. Units were dug by arbitrary levels within layers, and all excavated fill was processed through 1/8-in mesh to facilitate recovery of portable artifacts and midden. As part of the test excavation units, portions of structural features were dismantled and selected cross sections were recorded. Soil samples were described in detail using standard procedures and terminology as set forth in the Soil Survey Manual (Soil Survey Staff 1962).

As part of the inventory survey, surface collection of portable artifacts and midden was conducted and numerous radiocarbon samples were collected.

Table 1.

CORRELATION OF SITE NUMBERS

SIHP Site No. 50-10-27-	PHRI Temp. Site No.	Kaschko (1984) Site No.	Tom.-Tugg. (1981) Site No.
12431	-	KK-1	K-1
12432	-	KK-2	-
12433	-	KK-3	-
12434	-	KK-4	K-172
12435	-	KK-5	-
12436	-	KK-6	-
12437	-	KK-9	-
12438	-	KK-10	-
12439	-	KK-11	-
12440	-	KK-12	-
12441	T-1	-	K-158
12442	T-2	-	K-155
12443	T-3	-	-
12444	T-4	-	-
12445	T-5	-	-
12446	T-6	-	-
12447	T-7	-	-
12448	T-8	-	-
12449	T-9	-	K-151
12450	T-10	-	K-149
12451	T-11	-	K-145
12452	T-12	-	K-142
12453	T-13	-	-
12454	T-14	-	-
12455	T-15	-	-
12456	T-16	-	-

E-5

FINDINGS

SURFACE SURVEY

Twenty-six sites consisting of sixty-six+ component features were identified within the project area. These sites are summarized in Table 2 and their approximate locations are shown on Figure 2. Ten of the sites (thirty-five+ component features) had been previously identified by PHRI in 1984 ("KK-" prefix number series) (Kaschko 1984). Of the 16 remaining sites, ten ("K-" prefix number series) appeared to be sites or features previously noted during a cultural resource management study done in 1981 (Tomonari-Tuggle 1981). During the present survey, a number of sites located in 1981 were relocated—K-142, -145, -149, -151, -155, -158; only Site K-144 (c. 10 m in diameter shell scatter) and Site K-163 (8.0 m long stone alignment) could not be relocated.

The identified sites constituted eighteen complexes (multiple feature sites), and eight single-feature sites. The sites consisted of fifteen formal feature types—modified outcrop (N=21, 32.8%), mound (N=7, 10.9%), cairn (N=6, 9.4%), terrace (N=5, 7.8%), C-shape (N=4, 6.3%), enclosure (N=4, 6.3%), L-shape alignment (N=3, 4.7%), platform (N=3, 4.7%), wall segment (N=3, 4.7%), alignment (N=2, 3.1%), cupboard (N=2, 3.1%), paved area (N=1, 1.6%), rubble concentration (N=1, 1.6%), trail-road (N=1, 1.6%), and wall (N=1, 1.6%)(Table 3). Modified outcrops (N=21, 32.8%), mounds (N=7, 10.9%), and cairns (N=6, 9.4%) constituted one-third of the total features. The outcrops were present along ridges and small knolls throughout the project area; the mounds were generally present in flat areas throughout the project area. The cairns were found in the relatively barren zone inland and east of the old railroad, and seemed to occur in pairs or more.

Probable functional interpretations were determined for all sites but two, and three sites were given more than one functional type (Tables 4 and 5). Functional interpretations include habitation, burial, agriculture, marker, burial-ceremonial, habitation-agriculture, indeterminate, indeterminate (agriculture?), marker-transportation, possible burial, railroad bed, transportation, and water catchment. The sites, their distribution and functional interpretations, are discussed further in the Conclusion section.

SUBSURFACE FINDINGS

One or more component features at twenty-three of the twenty-six identified sites were subjected to test excavations. Sites KK-1, KK-2, and T-16 were excluded from the testing due to the lack of testable cultural deposits. Excavation findings are summarized in Table 6 and detailed stratigraphies of selected backhoe trenches are presented in Appendix C. A total of forty-seven test units (c. 25.42 sq m in surface area) were dug at forty-one features to determine the presence or absence of cultural remains and to attempt recovery of dating material samples. Indigenous portable artifacts collected from the project area included abraders (vesicular basalt, coral, and echinoid spine), limpet shell scrapers, volcanic glass and basalt flakes, fish hooks, worked bone, a chert flake, an octopus lure, a reworked adze, and beads. In addition, forty-four radiocarbon samples were collected.

SUMMARY OF SITE AND TEST UNIT DESCRIPTIONS

Detailed descriptions for all identified sites, and summary descriptions for all test units excavated, are presented in Appendix B. Detailed descriptions for selected test units are presented in Appendix C.

Appendix B includes for each site:

1. Site number - State Inventory of Historic Places (SIHP) numbers. SIHP numbers are five-digit numbers prefixed by 50-10-01 (50=State of Hawai; 10=Island of Hawai; 10 = USGS 7.5' series quad map ["Mahukona, Hawaii"]);

2. A site type designation - provides formal feature type for sites consisting of a single feature, or designates the site as a complex if site is comprised of more than one feature. Also lists total number of features present;

3. A description of site topography - a brief description of the terrain in the area of the site;

4. A listing of site vegetation - lists principal components of the vegetation within and in the vicinity of the site;

5. A statement of site condition - overall state of preservation of the site (poor, fair, good, or excellent);

6. An assessment of site integrity - degree of post abandonment modification by human agencies (unaltered, partially altered, and completely altered) and nature of modifications, if any;

Table 2.

SUMMARY OF IDENTIFIED SITES AND FEATURES

SIHP Site/Fea. Designation	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
12431	Wall	Railroad Bed	M	H	L	.	.	.
12432	Complex (4)	Marker-Transportation	L	L	L	.	.	.
A	Cairn							
B	Cairn							
C	Cairn							
D	Trail-road							
12433	Complex (2)	Marker	L	L	L	.	.	.
A	Cairn							
B	Cairn							
12434	Complex (4)	Habitation-Agriculture	M	L	L	.	.	.
A	Modified outcrop							
B	Enclosure							
C	Cupboard							
D	Cupboard							
12435	Modified Outcrop	Water Catchment	L	M	L	.	.	.
12436	Complex (5)	Habitation	M	L	L	.	.	.
A	L-shaped alignment							
B	Modified outcrop							
C	Modified outcrop							
D	C-shape							
E	Alignment							

KEY:

CRM Value Mode Assess. = Cultural Resource Management value mode assessment:

Nature: R = scientific research; I = interpretive; C = cultural
Degree: H = high; M = moderate; L = low

Field Work Tasks = Recommended further data collection field work tasks:

DR = detailed recording (scaled drawings, photographs, and written descriptions)
SC = surface collections
EX = limited excavations

(#) = Number of component features

Table 2. (cont.)

SIHP Site/Fea. Designation	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
12437	Complex (3)	Burial	H	L	H	•	-	•
A	Platform							
B	Mound							
C	Mound							
12438	Complex (2)	Habitation	M	L	L	-	-	-
A	C-shape							
B	Wall segment							
12439	Complex (5)	Burial-Ceremonial	H	L	H	•	-	•
A	Mound							
B	Modified outcrop							
C	Modified outcrop							
D	Modified outcrop							
E	Modified outcrop							
12440	Complex (2)	Burial	H	L	H	•	-	•
A	Modified outcrop							
B	Mound							
12441	Complex (2)	Habitation	H	L	L	•	•	•
A	Enclosure							
B	Wall segment							
12442	Complex (3)	Indeterminate (Agricultural?)	M	L	L	-	-	-
A	Paved area							
B	Mound							
C	Wall segment							
12443	Modified outcrop	Indeterminate	L	L	L	-	-	-
12444	Complex (4)	Habitation	M	L	L	•	•	•
A	Enclosure							
B	L-shaped alignment							
C	Modified outcrop							
D	Modified outcrop							
12445	Complex (2)	Agricultural	L	L	L	-	-	-
A	Mound							
B	Mound							
12446	Modified outcrop	Agricultural	M	L	L	-	-	-
12447	Complex (2)	Habitation	M	L	L	-	-	-
A	Rubble concentration							
B	C-shape							

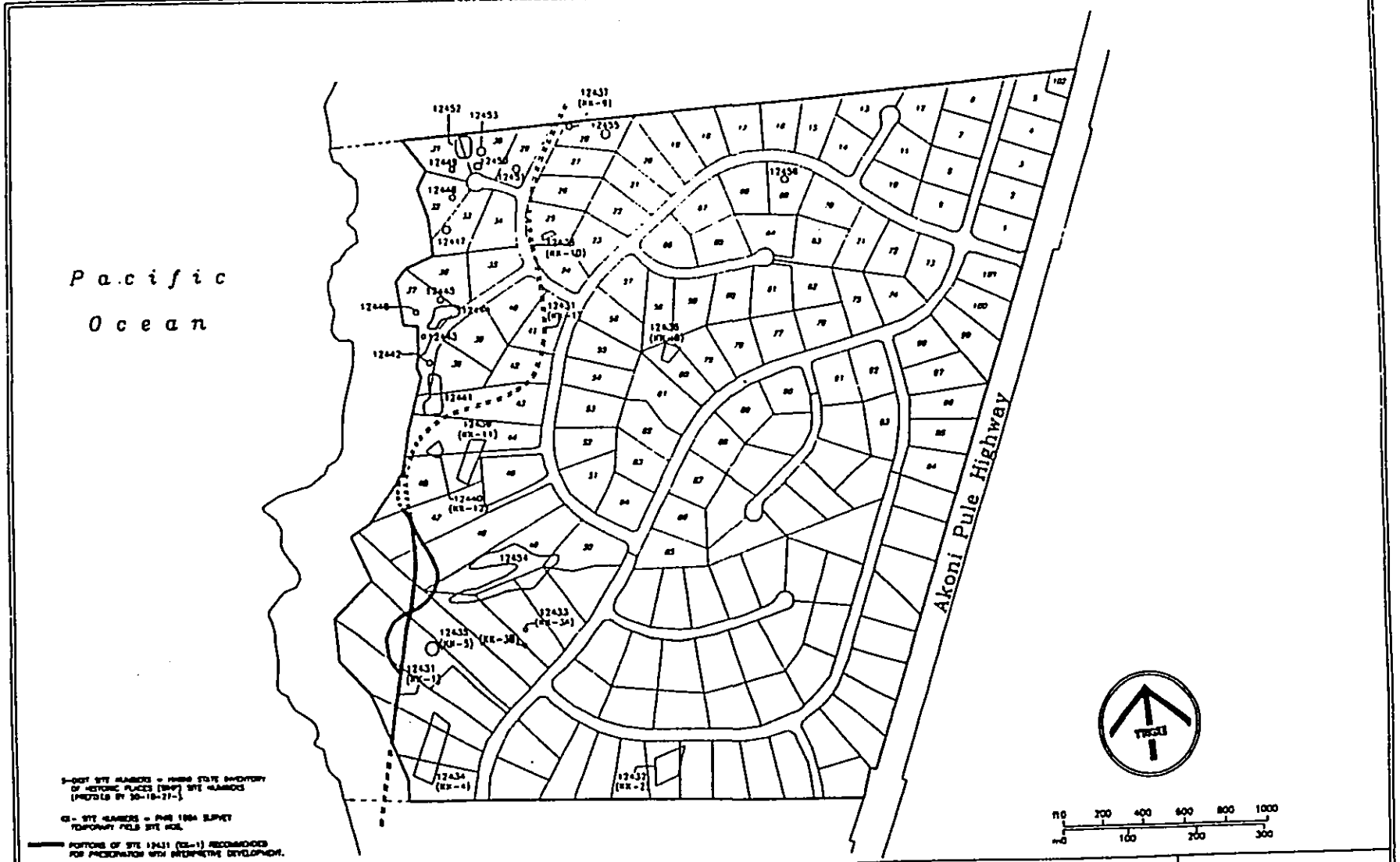
Table 2. (cont.)

SIHP Site/Fea. Designation	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
12448	Modified outcrop	Marker	L	L	L	-	-	-
12449	Terrace	Habitation	M	L	L	-	-	-
12450	Complex (2)	Burial	H	L	H	•	-	•
A	Platform with adjoining terrace							
B	Modified outcrop							
12451	Complex (2)	Habitation	M	L	L	-	-	-
A	C-shape							
B	Modified outcrop							
12452	Complex (4)	Burial	H	L	H	•	-	•
A	Modified outcrop							
B	Modified outcrop							
C	Terrace							
D	Terrace							
12453	Platform	Possible Burial	L/H	L	L/H	•	-	•
12454	Complex (4+)	Agricultural	H	L	L	•	-	•
A	Enclosure							
B	Modified outcrop							
C	Modified outcrop							
D	Modified outcrop							
-	Numerous other features							
12455	Complex (4)	Habitation	M	L	L	-	-	-
A	Terrace							
B	L-shape alignment							
C	Alignment							
D	Terrace							
12456	Cairn	Marker	L	L	L	-	-	-

E-8

SAR-100239

10



5-DIGIT SITE NUMBERS = HAWAII STATE INVENTORY OF HISTORIC PLACES (SIHP) SITE NUMBERS (PROVIDED BY 50-10-27-)

KK- SITE NUMBERS = PHRI 1984 SURVEY TEMPORARY FIELD SITE NOS.

PORTIONS OF SITE 12431 (KK-1) RECOMMENDED FOR PRESERVATION WITH INTERPRETIVE DEVELOPMENT.

PHRI PAUL H. ROSENDAHL, Ph.D., INC
ARCHAEOLOGICAL • HISTORICAL • CULTURAL
RESOURCE MANAGEMENT STUDIES & SERVICES

308 KIOKOLAU STREET
HILO, HAWAII 96720
(808) 969-1703, 961-0999(FAX)

PROJECT AREA BOUNDARY
AHUPUAA BOUNDARY

Archaeological Inventory Survey
Kapaanui Agricultural Subdivision
PHRI Project No. 89-568

FIGURE 2.
Site Location Map

Table 3.

FREQUENCIES OF FORMAL FEATURE TYPES

Formal Type	Number	%
Modified outcrop	21	32.8
Mound	7	10.9
Cairn	6	9.4
Terrace	5	7.8
C-shape	4	6.3
Enclosure	4	6.3
L-shape alignment	3	4.7
Platform	3	4.7
Wall segment	3	4.7
Alignment	2	3.1
Cupboard	2	3.1
Paved area	1	1.6
Rubble concentration	1	1.6
Trail-road	1	1.6
Wall	1	1.6
TOTAL:	64	100.2

Table 4.

FREQUENCIES OF FUNCTIONAL FEATURE TYPES

Functional Type	Number	%
Habitation	23	35.9
Burial	8	12.5
Possible burial	8	12.5
Agriculture	7	10.9
Marker	7	10.9
Indeterminate (Agriculture?)	3	4.7
Indeterminate	2	3.1
Boundary	1	1.6
Ceremonial	1	1.6
Habitation-agriculture	1	1.6
Railroad bed	1	1.6
Transportation	1	1.6
Water catchment	1	1.6
TOTAL:	64	100.1

Table 5.

FREQUENCIES OF FUNCTIONAL SITE TYPES

Functional Type	Number	%
Habitation	8	30.8
Burial	4	15.9
Agriculture	3	11.5
Marker	3	11.5
Burial-ceremonial	1	3.9
Habitation-agriculture	1	3.9
Indeterminate	1	3.9
Indeterminate (Agriculture?)	1	3.9
Marker-transportation	1	3.9
Possible burial	1	3.9
Railroad bed	1	3.9
Water catchment	1	3.9
TOTAL:	26	100.4

7. A probable age - indicates probable/possible (?) age of the site (i.e., historic or prehistoric);

8. A functional interpretation - probable or possible (?) functions for each site; or, if function cannot be determined, assigns indeterminate function. For sites with multiple functions, functions separated by "/";

9. A site description - a brief overall description of the site listing types of constituent features, portable remains present, if any, and other site data; and

10. Feature dimensions - maximum length, width, and height or depth. Dimensions immediately followed by a description of feature construction, associated portable remains, and other descriptive information.

Table 6.

SUMMARY OF TEST EXCAVATIONS

Site/ Feature Designation	Formal Site Type	Tentative Functional Interpretation	Test Excav. Test Units	Test Excav. Area (sq m)	Immediate Action Recommended	Comments
12433 B	Complex (2) Cairn	Marker	1	1 00	None	Contained 75 cm of basalt cobbles on bedrock, no cult. material
12434 B	Complex (4) Enclosure	Habitation-Agriculture	1	0 25	None	Feat. B contained 4-13 cm of cult deposit, midden. Feat. C contained 30-34 cm of cult
C	Cupboard		1	0 56		deposit, midden, charcoal, indigenous artifacts; Feat D contained 18 cm of cult deposit, midden
D	Cupboard		1	0 25		and charcoal
12435	Modified Outcrop	Water Catchment	1	0 50	Preserve	Contained 5-12 cm of cult. deposit, high density of midden, 6 volcanic glass flakes, and 1 echinoid abrader
12436 B	Complex (5) Modified outcrop	Habitation	1	0 25	None	Feat. B contained no cult. deposit; Feat. D contained c. 2 cm of cult. deposit, midden
D	C-shape		1	0 25		
12437 A	Complex (3) Platform	Burial	1	1 00	Further testing, preserve or disinter	Contained 45 cm of angular basalt cobbles on 47 cm of cult deposit; burial revealed at 106 cmbs; pitfill contained dateable charcoal sample

Table 6. (cont.)

Site/ Feature Designation	Formal Site Type	Tentative Functional Interpretation	Test Excav. Test Units	Test Excav. Area (sq m)	Immediate Action Recommended	Comments
12438 A	Complex (2) C-shape	Habitation	1	0 25	None	No cult. deposit
12439 A	Complex (5) Mound	Burial-Ceremonial	1	0.25	Further testing, preserve or disinter	Feat. A contained no cult. deposit; Feat B contained 38 cm of angular basalt cobbles on 22 cm of cult. deposit, charcoal and coral. Feat. C contained no cult. deposit; Feat. D contained burial at 30 cmbs; Feat E contained 35 cm of angular basalt cobbles on 8 cm of cult. deposit
B	Modified outcrop		1	0.50		
C	Modified outcrop		1	1 00		
D	Modified outcrop		2	0.55		
E	Modified outcrop		1	0 50		
12440 A	Complex (2) Modified outcrop	Burial	1	0.25	Further testing, preserve or disinter	Feat. A contained 45-55 cm of angular basalt cobbles, burial revealed at 65 cmbs; Feat B burial revealed at 79 cmbs
B	Mound		1	0.25		
12441 A	Complex (2) Enclosure	Habitation	2	0.50	Data recovery	Contained c. 17-20 cm of rich cult. deposit, midden, charcoal, volcanic glass, and indigenous artifacts
12442 A	Complex (3) Paved area	Indeterminate (Agriculture?)	1	0.50	None	Contained 30 cm cult. deposit, historic glass fragments
12443	Modified Outcrop	Indeterminate	1	0.42	None	Contained 20 cm of angular basalt cobbles, no cult. materials

Table 6. (cont.)

Site/ Feature Designation	Formal Site Type	Tentative Functional Interpretation	Test Units	Excav. Area (sq m)	Immediate Action Recommended	Comments
12444	Complex (4)	Habitation			Data recovery	Feat. A and B contained 18 cm of cult. deposit, charcoal, volcanic glass, indigenous artifacts, midden, and ash lenses. Feat. D contained 20 cm of cult. deposit, charcoal, midden, and indigenous artifacts
A	Enclosure		1	0.25		
B	L-shaped alignment		1	0.25		
D	Modified outcrop		3	2.70		
12445	Complex (2)	Agriculture			None	Few weathered shell fragments in soil beneath features; no definite cult. deposit
A	Mound		1	0.50		
B	Mound		1	0.50		
12446	Modified Outcrop	Agricultural	2	0.75	None	No cult. deposit
12447	Complex (2)	Habitation			None	Feat. A contained 25-40 cm of cult. deposit, charcoal, and midden
A	Rubble concentration		2	1.80		
12448	Modified Outcrop	Marker	1	0.25	None	Contained 41 cm of angular basalt cobbles
12449	Terrace	Habitation	1	1.00	None	Contained 45 cm of angular basalt cobbles on 36 cm of cult. deposit, ash lens, and midden
12450	Complex (2)	Burial			Further testing, preserve or disinter	Feat. A contained 50 cm of angular basalt cobbles on 23 cm of cult. deposit, charcoal. Feat. B revealed burial at 28 cmbs
A	Platform with adjoining terrace		1	0.50		
B	Modified outcrop		1	0.50		

Table 6. (cont.)

Site/ Feature Designation	Formal Site Type	Tentative Functional Interpretation	Test Units	Excav. Area (sq m)	Immediate Action Recommended	Comments
12451	Complex (2)	Habitation			None	Contained 12-38 cm of cult. deposit, midden, ash lens, and historic artifact materials
A	C-shape		1	0.25		
12452	Complex (4)	Burial			Further testing, preserve or disinter	Feat. A contained 125 cm of cult. deposit; Feat. B, C, and D revealed burials at depths of 69-74 cmbs
A	Modified outcrop		1	1.00		
B	Modified outcrop		1	1.00		
C	Terrace		1	1.00		
D	Terrace		1	0.50		
12453	Platform	Possible Burial	1	1.00	Further testing, or preserve	Contained 108 cm of cult. deposit, suspected burial
12454	Complex (4)	Agricultural			Data recovery	Feat. A had no cult. materials; Feat. B contained 45 cm of angular basalt cobbles
A	Enclosure		1	0.64		
B	Modified outcrop		1	0.25		
12455	Complex (4)	Habitation			None	Feats. A and D contained 16-20 cm of cult. deposit, paved surface; Feat C contained 12-18 cm of cult. deposit, midden
A	Terrace		1	0.50		
C	Alignment		1	0.25		
D	Terrace		1	1.00		
Total:	23 sites/41 features		47	25.42 sq m		

DATA ANALYSES

AGE DETERMINATIONS

Eleven (11) carbon samples collected during the field work were submitted to Beta Analytic, Inc. for radiocarbon age determination analysis. Ten samples consisted of charcoal, and one was a bulk soil sample. At Beta Analytic, one sample (RC-610, from Site 12444) was found to have insufficient carbon after pretreatment. The charcoal samples were first examined for rootlets, then were given alternate acid and alkali soakings to remove carbonates and humic acids. Three of the samples were small, so they were given extended counting time (four times the normal amount) to reduce statistical errors. The bulk soil sample was examined for rootlets and was then treated with hot acid to eliminate carbonates. The samples were then processed using the benzene method. C-13/C-12 stable isotope ratios were determined for all samples.

Results of the age determination analysis are presented in Table 7. The results are reported as date ranges based on two sigma statistics. The dates were calibrated according to tables presented in Stuiver and Pearson (1986).

Sample RC-599, collected from Site 12434, Feature C, TU-1, Layer I-3 (0.2-0.3 meters below surface (mbs)) produced a range of AD 610-1210.

Sample RC-606, from Site 12437, Feature A, TU-1, Layer II-4 (0.75-0.85 mbs) produced four ranges, the earliest covering a period of 250 years (AD 1450-1700). The other three samples produced the following ranges: AD 1720-1820, AD 1831-1879, and AD 1916-1954.

A sample from Site 12439, Feature B, TU-2, Layer II-1 (0.48-0.60 mbs) (RC-608) also produced multiple ranges—AD 1430-1670 (240-year span), AD 1775-1793 (18-year span), and AD 1948-1953 (five-year span).

Sample RC-600, from Site 12441, Feature A, TU-1, Layer 1-2 (0.10-0.17 mbs) produced a percent modern range. Percent modern ranges indicate the samples are statistically indistinguishable from modern ones.

Sample RC-601, from Site 12444, Feature B, TU-2, HF-2 (a possible hearth), Layer 1-2/3 (0.10-0.26 mbs) produced two ranges—AD 461-479 (18-year span), and AD 520-1170 (650-year span).

Sample RC-609, from Site 12447, TU-1, Layer II-2 (0.5-0.6 mbs) yielded a 260-year range—AD 1400 to 1660

Sample RC 605 was derived from Site 12450, Feature A, TU-2, Layer II-2, 0.60-0.73 mbs. The date range covered a 250-year period from AD 1410 to 1660.

The bulk soil sample (RC-602) from Site 12451, from TU-1, Layer I-1/2, at 0.11-0.16 mbs, produced a 290-year date range—AD 1660-1950.

Sample RC-603, recovered from Site 12452, Feature D, TU-1, Layer III, at 0.65-0.74 mbs, yielded a 300-year span—AD 1650-1950.

Carbon sample RC-607 from Site 12452, Feature B, TU-3, Layer IV-1, 0.66-0.76 mbs, yielded three ranges—AD 1450-1670 (220-year span), AD 1775-1793 (18-year span), and AD 1948-1953 (five-year span).

The radiocarbon age determination ranges indicate that cultural activity or habitation in the project area took place AD 461-1955, i.e., over a span of 1,494 years. Excepting a 190-year period from AD 1210-1400, the results show fairly constant occupation throughout the area. Further excavation may yield radiocarbon dates within the 190-year period.

Based on the radiocarbon ranges, it is probable that Site 12444 (AD 461-479, AD 520-1170), and 12434 (AD 610-1210) were occupied the earliest. Sites 12434, 12437, 12439, 12441, 12447, and 12450 show occupation ranging between AD 1400-1700, with short periods of occupation from AD 1720-present. The dates from Sites 12451 and 12452 indicate cultural activity at the sites took place AD 1650-1950. The longest period of occupation seems to have occurred at Site 12444 (AD 520-1170. Overall, the radiocarbon ranges indicate that the majority of habitation and cultural activity took place during prehistoric times.

PORTABLE ARTIFACTS

Indigenous Artifacts

One hundred twenty-one (121) indigenous artifacts were recovered. Indigenous artifacts are those fabricated using traditional Hawaiian manufacturing techniques and locally available raw materials. The artifacts include fishing gear, tools, domestic implements, ornaments, flaked stone, and modified bone and shell. Artifacts were collected from the surface and from test excavations. The distribution of indigenous artifacts is presented in Table 8.

Table 7.

SUMMARY OF RADIOCARBON AGE DETERMINATIONS

PHRI Lab No. RC-	Lab. No. + BETA-	Provenience	C-14 Age Yrs. B.P (one sigma)	C-13/ C-12 Ratio	C-13 Adjusted C-14 Age Yrs. B.P.	*Calendric Range Yrs. AD
12434 599	32082	Feature C, TU-1, Layer I, Level 3, 20-30 cmbs	1130±150	-23.9	1150±150	610-1210
12437 606	32089	Feature A, TU-1, Layer I, Level 4, 75-85 cmbs	310±80	-27.4	270±80	1450-1700 1720-1820 1831-1879 1916-1954
12439 608	32091	Feature B, TU-2, Layer II, Level 1, 48-60 cmbs	410±70	-29.8	330±70	1430-1670 1775-1793 1948-1953
12441 600	32083 TU-1, Layer I, Level 2, 10-17 cmbs	Feature A,	101.5±1.0% modern	-22.3	100.9±1.0% modern	—
12444 601	32084	Feature B, TU-2, HF-2, Layer I, Level 2/3, 10-26 cmbs	1200±170	-23.5	1220±170	461-479
610		Feature D, TU-4, Layer II, Level 2, 15-25 cmbs	—	—	—	Insufficient carbon

* Calibrated according to Stuiver and Pearson (1986). Range at two sigmas.

Table 7. (cont.)

PHRI Lab.No. RC-	Lab. No. BETA-	Provenience	C-14 Age Yrs B P (one sigma)	C-13/ C-12 Ratio	C 13 Adjusted C-14 Age Yrs B P.	Calendric Range Yrs AD
12447 609	32092	TU-1, Layer II, Level 2, 50-60 cmbs	360±80	-23.6	390±80	1400-1660
12450 605	32088	Feature A, TU-2, Layer II, Level 2, 60-73 cmbs	410±80	-28.0	370±80	1410-1660
12451 602	32085	TU-1, Layer I, Level 1/2, 11-16 cmbs	100.0±0.7	-17.3	120±50	1660-1950
12452 603	32086	Feature D, TU-1, Layer III, 65-74 cmbs	190±50	-27.2	150±50	1650-1950
607	32090	Feature B, TU-3, Layer IV, Level 1 66-76 cmbs	340±60	-26.9	310±60	1450-1670 1775-1793 1948-1953

Eighty-eight flaked stone artifacts (polished basalt, basalt, chert, and volcanic glass) were recovered (73% of the indigenous artifact assemblage). Tools comprised of abraders and an adze totalled twenty-one items (17%). Fishing gear comprised of hooks and a lure totalled six items (5%). Modified/other comprised of cut bone and shell totalled three items (2%). The domestic implement category was represented by a single bone pick (1%).

Overall, the indigenous portable artifact assemblage is not fully representative of the range of traditional Hawaiian artifacts. Conspicuously absent from the collection are domestic implements such as awls, stone pounders, grindstones, and shell scrapers.

Fishing Gear - Fishing gear includes four shell fishhooks, one bone fishhook fragment, and one octopus lure. The octopus lure, *Cypraea* spp., has one portion broken along the top, near the perforated hole. The lure measures 33.7 mm long by 67.0 mm wide by 5.36 mm thick and weighs 16.55 grams. The bone fishhook fragment consists of the bend portion only and measures 11.0 mm long by 11.9 mm wide by 0.29 mm thick and weighs 0.16 grams. Of the four one-piece shell fishhooks, three are complete except for the tips, which appear to have broken off. The three hooks are of the rotating type with HT1a and HT1b heads. They range in size from 18.1-23.1 mm long by 12.3-17.2 mm wide by 2.3-3.8 mm thick and weigh 0.54-1.14 grams. The shell fishhook consists of the shank and bend portions of the hook, and appears to be of the jabbing type. The hook measures 22.7 mm long by 17.3 mm wide by 2.8 mm thick, and weighs 1.17 grams.

Tools - Tools consist of twenty abraders (coral, echinoid, and basalt), and a basalt adze. The adze consists of a fine-grained basalt blank that appears to have been roughed-out or reworked. It has three slightly polished surfaces, the blade end appears unfinished and tapers to a point, and it appears to be quadrangular in typology. The specimen measures 66.1 mm long by 21.8 mm wide by 20.7 mm thick, and weighs 59.82 grams.

The abraders consist of one scoria basalt abrader, eight echinoidea spine abraders, and eleven coral abraders. The scoria basalt abrader has abraded surfaces and shows signs of hammerstone and pestle activity. The specimen measures 90.4 mm long by 83.2 mm wide by 50.9 mm thick, and weighs 390.1 grams. The echinoidea abraders consist of two complete abraders and six fragments. The two complete specimens are abraded, one on the lateral side and one on the proximal end. These two specimens measure 23.2/32.9 mm long by 6.1/6.8 mm wide by 3.2 mm thick. The remaining six fragments consist of (a) one proximal end fragment with a lateral abraded surface, which measures 27.78 mm long by 8.7 mm wide by 6.92 mm thick and which weighs 1.41 grams; (b) three distal ends with lateral abraded surfaces, which range in size from 14.4-23.2 mm long by 5.3-7.88 mm wide by 2.4-6.2 mm thick, and which weigh 0.11-0.64 grams; and (c) two medial fragments with lateral abraded surfaces, which range from 7.7-11.2 mm long by 6.2-9.1 mm wide by 2.8-3.4 mm thick, and which weigh 0.12-0.32 grams.

The coral abraders each have one to five abraded facets, and range in size from 22.2-54.0 mm long by 12.9-45.6 mm wide by 8.1-28.8 mm thick, and weigh 4.1-20.21 grams. The specimens vary in size and shape, and are generally soft and decomposing to firm. One specimen appears burned on one end, and another has a blade-like cutting edge.

Domestic Implements - The single domestic implement recovered, a bone pick, is small and is sharpened on one end. The pick measures 21.9 mm long by 3.42 mm wide by 0.6 mm thick and weighs 0.04 grams.

Ornaments - One ornament was recovered. The specimen consists of a *Cypraea* spp. shell with two punched holes, and measures 27.2 mm long by 19.8 mm wide by 12.8 mm thick and weighs 3.64 grams.

Flaked Stone - Eighty-eight pieces of flaked stone were recovered; the stone consisted of chert, volcanic glass, basalt, and polished basalt. Thirty-one of the pieces were collected from the surface of the project area.

One piece of chert was collected; it weighed 0.39 grams. Thirty-five volcanic glass flakes were recovered; one was diagnostic with a bulb of percussion and a platform. The flakes were all small, weighing a total of 10.4 grams.

Eight polished basalt flakes were recovered; all had one to three polished facets; one had a platform. The flakes ranged from 12.3-29.8 mm long by 6.2-24.5 mm wide by 3.0-12.8 mm thick, and weighed 0.30-11.97 grams.

Forty-five basalt flakes were recovered. Three were primary flakes with platforms and bulbs of percussion, and another flake had a platform. These four flakes ranged from 14.5-57.4 mm long by 8.5-33.4 mm wide by 2.4-6.4 mm thick, and weighed 0.30-8.96 grams. The remaining flakes (total weight 47.53 grams) were waste flakes with no diagnostic value.

Table 8.

DETAILED DISTRIBUTION OF ARTIFACTUAL REMAINS

CATEGORY	12434 FEATURE C TU:1 I:2	12434 FEATURE C TU:1 I:3	12434 SITE TOTAL	12435 FEATURE A TU:1 I:1	12435 FEATURE A TU:1 II:1	12435 SITE TOTAL	11441 SURFACE	11441 FEATURE A TU:1 I:1	11441 FEATURE A TU:1 I:2	11441 FEATURE A TU:1 II:1	11441 FEATURE A TU:2 I:1	11441 FEATURE A TU:2 II	11441 SITE TOTAL
INDIGENOUS													
FISHING GEAR													
HOOK			0			0				1			1
Bone			0			0			1				1
Shell			0			0							0
Octopus lure		1	1			0							0
SUBTOTAL:	0	1	1	0	0	0	0	0	1	1	0	0	2
TOOLS													
ABRADERS			0			0	1						1
Coral			0	1		1		4	1				5
Echinoid			0			0							0
Basalt													
ADZE			0			0							0
Basalt			0			1	1	4	1	0	0	0	6
SUBTOTAL:	0	0	0	1	0								
DOMESTIC IMPLEMENTS													
Pick (Bone)			0			0							0
ORNAMENTS													
Perforated shell			0			0							0
FLAKED STONE													
Polish Basalt	1		1			0	1						1
Basalt			0			0		5	1		1		9
Chert			0	6	1	7		23	2	1		2	0
Volcanic glass			0			0							28
SUBTOTAL:	1	0	1	6	1	7	0	28	3	1	1	2	37
MODIFIED/OTHER													
CUT			0			0				1			1
Bone			0			0							0
Shell		1	1			0							1
SUBTOTAL:	0	1	1	0	0	0	0	0	0	1	0	0	1
TOTAL INDIGENOUS:	1	2	3	7	1	8	2	32	5	3	1	2	47
NON-INDIGENOUS													
GLASSWARE			0			0		1					1
Fragments													
METAL			0			0							0
Iron fragment			0	0	0	0	0	1	0	0	0	0	1
TOTAL NON-INDIGENOUS:	0	0	0	0	0	0	0	1	0	0	0	0	1
TOTAL ARTIFACTS:	1	2	3	7	1	8	2	33	5	3	1	2	48

Table 8. (cont.)

CATEGORY	11442 FEATURE A TU:1 I:1	11442 FEATURE A TU:1 I:2	11442 FEATURE A TU:1 I:3	11442 SITE TOTAL	FEA A TU:1 I:2	11444 FEATURE B TU:2 I:1	11444 FEATURE B TU:2 I:1-2	SURFACE	SITE SUB-TOTAL
INDIGENOUS									
FISHING GEAR									
HOOK				0					0
Bone				0					0
Shell				0					0
Octopus lure									
SUBTOTAL:	0	0	0	0	0	0	0	0	0
TOOLS									
ABRADERS				0	1				1
Coral				0		2			2
Echinoid				0					0
Basalt									
ADZE				0					0
Basalt				0	1	2	0	0	3
SUBTOTAL:	0	0	0	0	1	2	0	0	
DOMESTIC IMPLEMENTS									
Pick (Bone)				0		1			1
ORNAMENTS									
Perforated shell				0					0
FLAKED STONE									
Polish Basalt				0					0
Basalt				0				1	1
Chert				0					0
Volcanic glass				0	1	2			3
SUBTOTAL:	0	0	0	0	1	3	0	1	4
MODIFIED/OTHER									
CUT				0			1		1
Bone				0					0
Shell				0					0
SUBTOTAL:	0	0	0	0	0	0	1	0	1
TOTAL INDIGENOUS:	0	0	0	0	2	5	1	1	9
NON-INDIGENOUS									
GLASSWARE									
Fragments	3	25	4	32					0
METAL									
Iron fragment				0					0
TOTAL NON-INDIGENOUS:	3	25	4	32	0	0	0	0	0
TOTAL ARTIFACTS:	3	25	4	32	2	5	1	1	9

Modified/Other - Three modified items were recovered. Two are pieces of bone with cut and abraded surfaces, and numerous striations. These two pieces measure 14.0/14.46 mm long by 7.9/28.02 mm wide by 2.5/2.62 mm thick, and weigh 0.29/1.31 grams. The third item is a piece of cut marine shell measuring 7.8 mm long by 8.3 mm wide by 3.3 mm thick and weighing 0.36 grams.

Non-Indigenous Artifacts - Historic artifacts recovered include thirty glassware fragments and one tapered iron spike. These were collected at Sites 12441, TU-1 Layer 1-2; 12442, TU-1, Layers 1-1, -2, and -3; and 12451, TU-1, Layer 1-1. The total weight for these items is 159.93 grams. The glassware fragments consist of clear and light green bottle glass, one of which is diagnostic. This specimen is a flat base piece embossed with "1425" and "41."

ECOFACTUAL REMAINS

The variety and distribution of ecofactual remains recovered from test unit excavations are summarized in Table 9.

A total of 4,382.10 g of midden was sorted—2156.52 g of marine gastropod remains, 13.32 g of bivalvia remains, 520.35 g of other (Echinoidea and Crustacea) remains, 50.36 g of vertebrate remains, and 80.12 g of vegetal remains, which include charcoal and kukui (*A. moluccana*). Most species of marine invertebrate remains represent common marine fauna.

Marine gastropods represent the majority of recovered midden (2,156.52 g; 49% total midden). The most common gastropods were *Nerita picea* (550.72 g), *Cypraeidae* (1,009.69 g), and *Thaididae* (367.27 g), which together represent 44% of the total midden recovered.

The greatest amount of midden recovered through excavation was recovered at Sites 12441 (TU-1 and TU-2) and 12444 (TU-1 through TU-3). At Site 12441 two test units (total of c. 0.15 cubic meters) were excavated and 1,186.52 g of ecofactual remains were recovered. At Site 12444, five test units were excavated (totaling c. 0.95 cubic meters) and 2,043.18 g of ecofactual remains were recovered. The two sites account for 74% of the total ecofactual remains recovered during the present project.

Table 8. (cont.)

CATEGORY	12444 FEATURE D TU-1 II-2	TU-3 II-1	SITE TOTAL	12441 TU-1 II-2	TU-4 I-2	SITE TOTAL	12442 FEA.B TU-3 IV-1	FEA.C TU-2 III-1	FEA.D TU-1 1	SITE TOTAL	12451 SC-1 SURF.	SURF. TOTAL	SITE TOTAL	GRAND TOTAL
INDIGENOUS														
FISHING GEAR														
HOOK														
Bone														
Shell	2	1	3											3
Octopus lure														
SUBTOTAL	2	1	3											3
TOOLS														
ABRADERS														
Coral														
Basalt	5	2	7											7
Echinoid														
Basalt	2	2	4											4
ADZE														
Basalt	10*		10*											10*
SUBTOTAL	17	5	22											22
DOMESTIC IMPLEMENTS														
Pick (Bone)														
ORNAMENTS														
Perforated shell	1		1											1
FLAKED STONE														
Basalt	1		1											1
Basalt	1		1											1
Obsidian														
Other	2		2											2
Volcanic glass	8		8											8
SUBTOTAL	12		12											12
MODIFIED/OTHER														
CUT														
Bone	1		1											1
Shell														
SUBTOTAL	1		1											1
TOTAL INDIGENOUS	32	6	38	1	1	2	1	1	1	3	1	1	2	45
NON-INDIGENOUS														
GLASSWARE														
Fragments	29	2	31	1		1								32
METAL														
Iron (spikes)	2		2											2
TOTAL NON-INDIGENOUS	31	2	33	1		1								34
TOTAL ARTIFACTS	63	8	71	2	1	3	1	1	1	3	1	1	2	79

Table 9.

DISTRIBUTION OF ECOFACTUAL REMAINS

MIDDEN MATERIAL	12434 B TU-3 1-1	12434 B TU-3 1-3	12434 C TU-3 1-1	12434 C TU-3 1-3	12434 D TU-2 1-1	TOTAL (grams)	12435 TU-1 1-1	12436 TU-2 1-1	
INVERTEBRATES									
GASTROPODS									
Cellana spp	.	0 11	.	1 63	1 80	3 54	18 41		
Trochus vanicorus	.	.	.	.	.	0 00			
Nerea picea	0 46	.	.	.	1 52	1 98	252 93	.	
Thalassia carinata	.	.	.	.	.	0 00	.		
Latirona pentada	.	.	.	.	.	0 00	.		
Planaxis labiosa	.	.	.	.	.	0 00	.		
Cerithidea	.	.	.	0 41	.	0 41	.		
Strombus macolatus	.	.	.	.	.	0 00	.		
Hipponicidae	.	.	.	.	.	0 00	.		
Cypraeidae	47 43	2 01	.	31 11	2 99	83 54	181 61		
Thaididae	14 24	0 45	.	.	2 65	17 34	176 46		
Anachis miser	.	.	.	.	.	0 00	.		
Conidae	.	.	5 93	4 50	.	10 43	.		
Operculo	.	.	.	.	.	0 00	.		
Undetermined gastropods	.	.	.	.	.	0 00	.	3	
SUBTOTAL GASTROPODS:	62 13	2 57	5 93	37 65	8 96	117 24	629 41	0 00	
BIVALVES									
Isognomonidae	.					0 00	.		
Chamacea	.	.		.	.	0 00	.		
Tellinidae	.	.		.	.	0 00	.		
Veneridae	.	.				0 00	.		
Periglypta reticulata	.	.		.	.	0 00	.		
SUBTOTAL BIVALVES:	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	
OTHER									
Echinoidea	0 10	0 29	.	.	.	0 39	4 85		
Crustacea	.	.	.	.	.	0 00	.		
SUBTOTAL OTHER:	0 10	0 29	0 00	0 00	0 00	0 39	4 85	0 00	
TOTAL INVERTEBRATES:	62 23	2 86	5 93	37 65	8 96	117 63	634 26	0 00	
VERTEBRATES									
Bone	.	.	0 00	0 01		0 01			
VEGETAL REMAINS									
Algarrobo malaccense	.	.	.	.	.	0 00			
Charcoal	.	.	.	.	.	0 00	.		
TOTAL VEGETAL REMAINS	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	
TOTAL NON-ECO. REMAINS:	1 70	0 12	0 00	6 28	0 00	9 10	3 68	0 00	
GRAND TOTAL:	64 93	2 98	5 93	43 94	8 96	126 76	637 94	0 00	

Table 9. (cont.)

MIDDEN MATERIAL	12439 B TU-2 10-1	12439 D TU-6 1-2	TOTAL (grams)	12441 A TU-1 1-1	12441 A TU-1 1-2	12441 A TU-1 11-1	12441 A TU-3 1-1	12441 A TU-3 11-1	12441 A TU-3 11-2	TOTAL (grams)
INVERTEBRATES										
GASTROPODS										
Cellana spp			0 00	2 24	3 06	0 04	0 78	0 52		6 64
Trochus vanicorus			0 00	0 16	.			.		0 16
Nerea picea			0 00	12 73	61 94	4 59	0 15	3 21	0 84	83 26
Thalassia carinata			0 00	.	.					0 00
Latirona pentada			0 00	0 74	2 94	.	.	.	.	3 68
Planaxis labiosa			0 00		.	0 01			.	0 01
Cerithidea			0 00		.	.	.	.	.	0 00
Strombus macolatus			0 00		.	.			.	0 00
Hipponicidae			0 00	.	.	.	.	.	.	0 00
Cypraeidae			0 00	84 44	67 99	17 28	10 23	107 76	2 86	319 56
Thaididae			0 00	12 52	28 28	5 70	3 10	12 70	2 25	64 55
Anachis miser			0 00		.	.	.	.	.	0 00
Conidae			0 00	.	.	.	3 86	26 86	.	30 72
Operculo			0 00	0 18	.	.	.	.	.	0 18
Undetermined gastropods			0 00	18 62	30 31	1 67	.	.	10 62	61 22
SUBTOTAL GASTROPODS:	0 00	0 00	0 00	131 63	194 32	29 09	47 12	153 05	16 57	571 98
BIVALVES										
Isognomonidae			0 00		2 38	0 67	.	.	.	3 05
Chamacea			0 00		.	2 08	.			2 08
Tellinidae			0 00	.	.	.	.	.		0 00
Veneridae			0 00		.	0 35	.	.	.	0 35
Periglypta reticulata	.	.	0 00	.	.		.	.	.	0 00
SUBTOTAL BIVALVES:	0 00	0 00	0 00	0 00	2 38	3 10	0 00	0 00	0 00	5 48
OTHER										
Echinoidea		.	0 00	64 89	147 36	23 77	12 65	104 02	34 08	396 77
Crustacea		.	0 00	0 62	0 92	0 36	.			1 90
SUBTOTAL OTHER:	0 00	0 00	0 00	65 51	148 28	24 13	12 65	104 02	34 08	398 67
TOTAL INVERTEBRATES:	0 00	0 00	0 00	197 14	345 18	56 32	65 77	257 07	52 65	976 13
VERTEBRATES										
Bone		15 83	15 83	4 21	5 92	1 09	.	0 02	.	11 24
VEGETAL REMAINS										
Algarrobo malaccense	.	.	0 00	.	.	.	.	.	.	0 00
Charcoal	0 02	1 52	10 54	.	.	.	.	6 05	.	6 05
TOTAL VEGETAL REMAINS:	0 02	17 35	26 37	4 21	5 92	1 09	0 00	6 05	0 00	17 29
TOTAL NON-ECO. REMAINS:	90 87	0 00	90 87	11 57	15 85	4 50	43 92	117 28	0 00	193 12
GRAND TOTAL:	90 89	17 35	117 24	212 92	366 95	63 91	109 69	380 40	52 65	1186 32

E-16

Table 9. (cont.)

MIDDEN MATERIAL	12444 A TU-1 I-1	B TU-1 I-5	B TU-1 I-2	B TU-1 SLUMP	B TU-1 I-2,3	D TU-2 I	D TU-2 II-1	D TU-2 II-2	D TU-2 II-3	TU-4 I	TOTAL (grams)
INVERTEBRATES											
GASTROPODS											
Cerithidea spp	3 60	3 85	12 42	0 67	1 08	-	1 48	0 35		0 81	23 36
Trochus unicatus		6 14			1 10	-	1 92	0 32			9 57
Nerita picea	1 66	91 96	86 65	5 71	20 64		1 41	1 51		0 52	210 25
Thalassia tortuosa							0 72	1 27			1 99
Latirus pseudo	-	1 83	-		1 36	-	0 81	0 87			4 87
Planaxis lubanus	-	-									0 00
Cerithidea		-						-			0 00
Strombus maculatus		0 70	-	-	-			-			0 70
Hipponicidae			-		-	0 18		-			0 18
Cypraeidae	38 92	74 94	65 22	12 95	35 55	13 58	44 13	28 26	0 66	19 01	333 20
Thaididae	6 60	17 78	23 29	3 77	9 05	1 94	7 40	8 51	1 54	1 02	80 70
Anachis miser	-	-	-	-	-	-	-	-	0 67	-	0 67
Conidae	0 48	-	-				8 91	-			9 39
Operculs	-	-	-					-		-	0 00
Undetermined gastropods	-	23 46	-	-	16 49	-	-	-	-	-	39 95
SUBTOTAL GASTROPODS:	51 26	220 66	187 58	23 10	85 14	15 70	67 18	41 09	2 87	20 84	715 24
BIVALVES											
Isognomonidae	-	1 13	-	-	-	-	2 94	2 95			7 01
Chamacea	-	-	-		-	-		-		-	0 00
Tellinidae	-	-	-		-	-		0 27		-	0 27
Veneridae	-	-	-					0 54		-	0 54
Pseudoglypta rectaculata	-	-						-			0 00
SUBTOTAL BIVALVES:	0 00	1 13	0 00	0 00	0 00	0 00	2 94	3 76	0 00	0 00	7 84
OTHER											
Echinoidea	12 30	5 83	16 86	5 42	9 98		6 94	10 72	1 49	0 52	70 06
Crustacea		24 76	-		16 06		2 36	-			43 18
SUBTOTAL OTHER:	12 30	30 59	16 86	5 42	26 04	0 00	9 30	10 72	1 49	0 52	113 24
TOTAL INVERTEBRATES:	63 56	252 37	204 44	28 52	111 40	15 70	79 44	55 57	4 36	21 36	836 34
VERTEBRATES											
Bone	0 71	0 61	2 75	-	-	-	4 17	2 69			15 88
VEGETAL REMAINS	-	-	-				0 03	-	-	-	0 03
Alcurites moluccana	-	-	-	-	-	-		-	-	-	0 00
Charcoal	-	-	-	-	-	-		-	-	-	0 00
TOTAL VEGETAL REMAINS:	0 71	0 61	2 75	0 00	0 00	0 00	4 20	2 69	0 00	0 00	15 91
TOTAL NON-ECO. REMAINS:	70 53	4 82	2 46	0 50	2 64	137 98	531 80	302 30	34 00	114 09	1190 93
GRAND TOTAL:	134 79	257 80	209 67	29 02	113 84	143 68	615 39	360 56	38 36	135 27	2043 18

Table 9. (cont.)

MIDDEN MATERIAL	12445 A TU-2 II	12445 B TU-1 II-3	12445 TOTAL (grams)	12447 TU-1 II-1	12447 II-2	12447 TOTAL (grams)	12449 TU-1 II-1	12449 II-2	12449 TOTAL (grams)	12451 TU-1 I-1
INVERTEBRATES										
GASTROPODS										
Cerithidea spp			0 00	-	-	0 00	-	-	0 00	-
Trochus unicatus		-	0 00	-	-	0 00	-	-	0 00	-
Nerita picea			0 00	-	-	0 00	-	-	0 00	
Thalassia tortuosa			0 00	-	-	0 00	-	-	0 00	
Latirus pseudo			0 00	-	-	0 00	-	-	0 00	-
Planaxis lubanus		-	0 00	-	-	0 00	-	-	0 00	-
Cerithidea			0 00	-	-	0 00	-	-	0 00	-
Strombus maculatus			0 00	-	-	0 00	-	-	0 00	-
Hipponicidae			0 00	-	-	0 00	-	-	0 00	-
Cypraeidae	0 24	0 87	1 11	2 97	2 30	5 27	-	-	0 00	-
Thaididae	1 86	-	1 86	-	-	0 00	-	-	0 00	-
Anachis miser		-	0 00	-	-	0 00	-	-	0 00	-
Conidae	-	-	0 00	-	-	0 00	-	-	0 00	-
Operculs	-	-	0 00	-	-	0 00	-	-	0 00	-
Undetermined gastropods	-	-	0 00	-	-	0 00	-	-	0 00	-
SUBTOTAL GASTROPODS:	2 10	0 87	2 97	2 97	2 30	5 27	0 00	0 00	0 00	0 00
BIVALVES										
Isognomonidae	-	-	0 00	-	-	0 00	-	-	0 00	-
Chamacea	-	-	0 00	-	-	0 00	-	-	0 00	-
Tellinidae	-	-	0 00	-	-	0 00	-	-	0 00	-
Veneridae		-	0 00	-	-	0 00	-	-	0 00	-
Pseudoglypta rectaculata	-	-	0 00	-	-	0 00	-	-	0 00	-
SUBTOTAL BIVALVES:	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
OTHER										
Echinoidea			0 00	-	-	0 00	-	-	0 00	-
Crustacea		-	0 00	-	0 31	0 31	-	-	0 00	-
SUBTOTAL OTHER:	0 00	0 00	0 00	0 00	0 31	0 31	0 00	0 00	0 00	0 00
TOTAL INVERTEBRATES:	2 10	0 87	2 97	2 97	3 01	5 98	0 00	0 00	0 00	0 00
VERTEBRATES										
Bone		-	0 00	-	-	0 00	-	-	0 00	-
VEGETAL REMAINS	-	-	0 00			0 00			0 00	
Alcurites moluccana	-	-	0 00	-	-	0 00	-	-	0 00	-
Charcoal	-	-	0 00	-	-	0 00	-	-	0 00	-
TOTAL VEGETAL REMAINS:	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
TOTAL NON-ECO. REMAINS:	4 31	0 12	4 43	0 00	0 00	0 00	2 89	1 86	4 75	1 02
GRAND TOTAL:	6 41	0 99	7 40	2 97	3 01	5 98	2 89	1 86	4 75	1 02

Table 9. (cont.)

MIDDEN MATERIAL	12453 A TU-4 II-1	TU-3 II	B III-1	FH FH	TU-2 I	C II-1	II-2	III	D TU-1 II	TOTAL (grams)	12453 TU-1 I
INVERTEBRATES											
GASTROPODS											
Cellana spp	.	.	.			1 60		.	.	1 60	
Trochus worsleyi	.	.	.					.		0 01	
Nerita picea	.	0 27								0 27	
Thalotia conica	.	.	.							0 00	
Lunella granulata	.	.	.	.						0 00	
Planaxis labiosa	.	.	.	.		.	.	.	.	0 00	
Cerithidea	.	.	.	.		.	.	.		0 00	
Strombus maculatus	.	.	.	.	.	.	.	.		0 00	
Hipponicidae	.	.	.	.	.	.	.	.		0 00	
Cypraeidae	1 23	3 52	4 88	17 58	.	46 59		0 70		74 50	
Thaididae	0 05	0 69	3 62	0 99	.	10 62		8 49		24 46	
Anachis miser	.	.	.	.	.	.	.	.	.	0 01	
Conidae	.	.	.	.	.	.	.	.		0 00	
Opercula	.	.	.	.	.	.				0 00	
Undetermined gastropods	.	.	.	.	.	.				0 00	
SUBTOTAL GASTROPODS:	1 28	4 48	8 50	18 57	0 00	58 81	0 00	9 19	0 01	101 83	0 00
BIVALVES											
Isognomonidae	.	.	.	.	.	.	.	.	.	0 00	
Chamacea	.	.	.	.	.	.	.	.		0 00	
Tellinidae	.	.	.	.	.	.	.	.		0 00	
Veneridae	.	.	.	.	.	.	.	.		0 00	
Periglypta reticulata	.	.	.	.	.	.	.	.		0 00	
SUBTOTAL BIVALVES:	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
OTHER											
Echinoidea	.	0 18	.	.	.	1 53	.	.	.	1 71	
Crustacea	.	.	.	.	.	.	.	.	.	0 00	
SUBTOTAL OTHER:	0 00	0 18	0 00	0 00	0 00	1 53	0 00	0 00	0 00	1 71	0 00
TOTAL INVERTEBRATES:	1 28	4 66	8 50	18 57	0 00	60 34	0 00	9 19	0 00	103 54	0 00
VERTEBRATES											
Bone	.	.	.	.	.	.	2 40	.	.	2 40	
VEGETAL REMAINS										0 00	
Alaria sp.	0 40	3 10	4 72	1 18	.	1 84	.	1 70	.	12 94	
Charcoal	.	.	.	.	.	0 23	.	.	.	0 23	
TOTAL VEGETAL REMAINS:	0 40	3 10	4 72	1 18	0 00	2 07	2 40	1 70	0 00	20 57	0 00
TOTAL NON-ECO. REMAINS:	3 31	6 98	18 99	4 80	41 34	33 72	0 00	0 00	2 54	113 68	14 83
GRAND TOTAL:	5 19	14 74	32 21	24 55	41 34	98 13	2 40	10 89	2 54	234 99	14 83

Table 9. (cont.)

MIDDEN MATERIAL	12455 A TU-1 I-1	I-3	C TU-3 I-1	D SURFACE COLLECT.	TOTAL (grams)	GRAND TOTAL (grams)
INVERTEBRATES						
GASTROPODS						
Cellana spp	.	.	.	.	0 01	53 95
Trochus worsleyi	.	.	.	.	0 01	9 31
Nerita picea	.	.	.	.	0 01	350 72
Thalotia conica	.	.	.	.	0 01	1 99
Lunella granulata	.	.	.	.	0 00	8 55
Planaxis labiosa	.	.	.	.	0 00	0 01
Cerithidea	.	.	.	.	0 00	0 41
Strombus maculatus	.	.	.	.	0 00	0 70
Hipponicidae	.	.	.	0 13	0 13	0 31
Cypraeidae	.	1 74	.	10 90	12 64	1011 43
Thaididae	.	2 24	.	1 90	4 14	369 51
Anachis miser	.	.	.	.	0 00	0 67
Conidae	.	.	.	.	0 00	50 54
Opercula	.	.	.	.	0 00	0 18
Undetermined gastropods	0 24	.	.	0 63	0 87	102 04
SUBTOTAL GASTROPODS:	0 24	3 98	0 00	13 56	17 78	2160 74
BIVALVES						
Isognomonidae	.	.	.	.	0 00	10 08
Chamacea	.	.	.	.	0 00	2 08
Tellinidae	.	.	.	.	0 00	0 27
Veneridae	.	.	.	.	0 00	0 89
Periglypta reticulata	.	.	.	.	0 00	0 00
SUBTOTAL BIVALVES	0 00	0 00	0 00	0 00	0 00	13 32
OTHER						
Echinoidea	.	.	.	0 78	0 78	474 56
Crustacea	.	.	.	.	0 00	45 79
SUBTOTAL OTHER:	0 00	0 00	0 00	0 78	0 78	520 35
TOTAL INVERTEBRATES:	0 24	3 98	0 00	13 56	18 56	2694 41
VERTEBRATES						
Bone	.	.	.	.	0 00	50 36
VEGETAL REMAINS					0 00	12 94
Alaria sp.	.	.	.	.	0 00	16 80
Charcoal	.	.	.	.	0 00	80 12
TOTAL VEGETAL REMAINS:	0 00	0 00	0 00	0 00	0 00	109 86
TOTAL NON-ECO. REMAINS:	0 00	0 00	0 00	0 00	0 00	1326 68
GRAND TOTAL:	0 24	3 98	0 00	13 56	18 56	4166 32

CONCLUSION

DISCUSSION

During the inventory survey, twenty-six sites consisting of sixty-nine features were identified. Eight of the 26 sites are interpreted as habitation sites (Sites 12436, 12438, 12441, 12444, 12447, 12449, 12451, and 12455). The interpretations are based generally on structure type, size, and construction, and the presence at the site of cultural materials such as food remains (marine shells, fish bone, kukui, etc.), hearths, and portable artifacts. The eight sites are comprised of eight shelters (consisting of modified bedrock and C-shapes), four stone alignments, two enclosures, three terraces, and one rubble concentration.

Sites 12441, 12444, 12447, 12449, 12451, and 12455, due to their substantial cultural deposits, their size, and the construction methods used, are considered to have been permanent habitations. These sites are located within c. 400 meters of the coast, which is well within the coastal zone of the settlement pattern described by Kirch (1985). Five of the sites (12441, 12444, 12447, 12449, and 12451) are clustered near the east boundary of the State Land Use Conservation District, in the north west portion of the project area. The remaining site (12455) is located directly east of the old railroad bed.

Sites 12436 and 12438 are interpreted as probable temporary habitation sites. The cultural deposits at the sites are sparse, and their constructions are relatively unsophisticated. Site 12438 is located directly east of the old railroad bed (12438); Site 12436 is located c. 462 meters inland of the coast. Radiocarbon age determination ranges from habitation and temporary habitation sites span AD 461-present (AD 1950).

Site 12434, a relatively isolated site at the south end of the project area, c. 185 meters inland of the coast, was determined to have a dual habitation-agriculture function. This was based on the presence of a cultural deposit and evidence of agricultural planting areas, and type and methods of site construction. A C-14 sample from the site yielded a calibrated range of AD 610-1210.

Six sites (12437, 12440, 12450, 12452, 12453, and 12439) were assigned burial functions. The assignations were based variously on structure type, construction, location, and the presence of waterworn coral and basalt cobbles, and human skeletal remains. Test units at Sites 12437, 12440, 12450, and 12452 contained human skeletal remains. C-14 samples from burial pits at Sites 123437 and 12452 yielded an overall range of AD 1450-1954. Site 12453, based on the subsurface findings at the site and the site's general appearance and construction, is believed to contain human skeletal remains and is assigned a possible burial function. Site 12439 was determined to have a dual burial-ceremonial function. This was based on the presence of human skeletal remains and small shrine areas containing upright basalt cobble/boulders and concentrated areas of waterworn basalt cobbles and coral (both waterworn and branch). Four of the sites with burials/possible burials are located along a ridge of outcropped bedrock which extends perpendicular to the coast from about 185 meters from the coast to 369 meters from the coast. The other two burial sites are located next to each other, directly east of the old railroad bed on a knoll overlooking the coastline, c. 123-215 meters inland.

The two site functions discussed above, habitation and burial, represent 57.7% of the total identified sites. In light of the previous archaeological work conducted in the adjacent area, particularly in Lapakahi, this figure is not surprising. In general, the project area is located within what has been referred to in previous studies as the Coastal Zone. Previous studies have indicated that features in this zone have predominantly habitation or burial functions.

Three sites (12445, 12446, and 12454) consisting of two clearing mounds, and multiple terraces with planting and storage areas, were determined to have agricultural functions. These interpretations were based on site type, construction, and test excavations findings. Sites 12445 and 12446 are located along the west boundary of the project area near the Conservation District east boundary. Site 12454 is located directly inland of the old railroad bed. This site in particular appears to represent an established agricultural area. Extensive clearing, mapping, and subsurface testing is needed to further understand the extent and nature of this site.

Two sites, 12442 and 12443, were determined to have indeterminate functions. These sites, located near each other just east of the Conservation District boundary, consists of a modified outcrop, a paved area, a mound, and a wall segment. Site 12442, based on a test unit excavated at the site, may have an agricultural function.

Four sites were interpreted as markers (12432, 12433, 12448, and 12456). The sites consist of six cairns, a trail/road, and a modified outcrop, and represent 15.39% of the identified sites. Site 12432 consists of three cairns and the trail/road. The cairns were atop a rise and were visible from all directions; the trail/road consists of a former footpath running inland from the coast. The footpath has been altered by bulldozer activity and in some places is road-like. All but one of the marker sites are located far inland, c. 369-646 meters inland. Site 12433 consists of two well-built cairns adjacent to each other atop a ridge. Even though a trail associated with the cairns was not observed, the positions and locations of the cairns are typical of trail markers. Sites 12448 and 12456 consist of single cairns, not well built. What they are marking was not determined.

Site 12431, a site which had been previously identified, is the old railroad bed which meanders along the east boundary of the project area.

One site, 12435, is a modified outcrop interpreted as a water catchment. The site consists of a small wall, which abuts bedrock and creates a windbreak, and two holes in bedrock which are sheltered by the windbreak. The holes are 0.48-0.50 m deep and do not appear natural. This site is located c. 246 meters inland of the coast.

When comparing the sites identified during the inventory survey with known sites in the vicinity of the project area, no new patterns were discernible. As in previous studies, most of the sites were found to be for habitation and agriculture. In contrast to previous studies, however, large habitation complexes are absent in the project area. Two factors may explain this: the proximity of Kapaanui Complex, and modification or destruction of features in the project area.

Kapaanui Complex is a habitation complex located outside and near the southwest corner of the project area. The complex contains a possible holua slide; slides such as these are usually associated with residences of chiefs, so the project area could have been restricted to use by chiefs. Site 12441 of the present study, an enclosure and wall segment, may be associated with this complex. The complex, however, does appear to comprise many more enclosures located both north and south of the main portion of the complex—the main area of occupation may have been restricted to the coastal area.

Modification in the project area is considerable. A railroad bed runs through the project area from north to south. Many sites, especially those close to the bed (12441, 12437, and 12451) appear to have been altered. Perhaps stones from prehistoric features were used in construction of the railroad bed—the stones in the bed are the same size as used in construction of the features.

In general, the sites identified during the present inventory survey are concentrated along the west boundary of the project area. Occupation of the sites appears to have taken place during two spans—AD 461-1210 and between AD 1400-1950. The former span corresponds with the date ranges calibrated from carbon samples from Sites 12434 and 12444. The latter span is derived from all other samples combined. The 1950 date may have been influenced by burning. The ranges also suggest that the project area was not occupied between AD 1210-1400. This may be true, or the lack of dates in this period could be due to the small project size or other factors having to do with the proximity of Kapaanui Complex. More study should be conducted on this topic, as well as on the late prehistoric/early historic occupation patterns in the project area in general.

GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

General significance assessments and recommended general treatments for all identified sites are summarized in Table 10. Specific field work tasks for sites requiring further work are presented in Table 2. Significance categories used in the site evaluation process are based on the National Register criteria for evaluation, as outlined in the Code of Federal Regulations (36 CFR Part 60). The DLNR-HSS/SHPO and the Hawaii County Planning Department use these criteria for evaluating cultural resources. Sites determined to be potentially significant for information content fall under Criterion D, which defines significant resources as ones which "...have yielded, or may be likely to yield, information important in prehistory or history." Sites potentially significant as representative examples of site types are evaluated under Criterion C, which defines significant resources as those which "...embody the distinctive characteristics of a type, period, or method of construction...or that represent a significant and distinguishable entity whose components may lack individual distinction."

Sites with potential cultural significance are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values in Historic

Preservation Review" (Draft Report, August 1985). The guidelines define cultural value as "...the contribution made by an historic property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historical depth." The guidelines further specify that "[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value."

Of the twenty-six sites identified within the Kapaanui Agricultural Subdivision project area, eighteen are assessed as significant solely for information content. No further work is recommended for fifteen these eighteen sites. These fifteen sites—generally consisting of walls, mounds, enclosures, C-shapes, terraces, cairns, rock alignments, paved area, and modified outcrops, and usually having little or no associated deposits and portable remains—have been measured, described, photographed, plotted, and tested. The data collected from them during the present inventory survey are considered sufficient; preservation of the sites is not essential, although some sites could perhaps be considered for inclusion into development landscaping. The other three sites (12441, 12444, and 12454) are recommended for further data collection (detailed recording of sites and features, surface collections, and selected limited excavations). After further data collection is completed, data recovery excavations at specific sites—if warranted by the data collection findings—would be implemented for sites not recommended for preservation or interpretation. Because they are not good examples of site types, preservation of these sites subsequent to data recovery excavations would not be essential.

Five of the remaining eight sites (12437, 12439, 12440, 12450, and 12452) are assessed as culturally significant and valuable for information content. Test excavations at these sites have revealed the presence of eight human burials—one or more at each site, and the presence of additional burials is suspected at all five sites. For these sites, preservation "as is" has been recommended as the most desirable form of mitigation. If this alternative is not possible or preferred, further testing to determine more accurately the total number of burials present would have to be done. Then disinterments, in accordance with existing laws, regulations, and procedures, could be undertaken.

Disinterments must comply with Chapter 6E - Historic Preservation, Section 43 (Haw. Rev. Stat., as amended). The DLNR-HSS would be notified and would contact the Office of Hawaiian Affairs (OHA). A treatment plan for the burials would be worked out with DLNR-HSS. A search for direct lineal descendants—consisting of publishing in a newspaper of general circulation a public notice to notify possible direct lineal descendants—would be required. If direct lineal descendants are found, any osteological studies done in conjunction with any disinterments would be subject to their wishes. Lastly, a plan for final disposition of the remains would be developed. Prior to disinterment, a disinterment permit would have to be obtained from the State Department of Health. It is recommended that any disinterred remains eventually be reinterred at an appropriate facility either within the project area or in a nearby cemetery.

Two sites are assessed as valuable for information content and as good examples of site types. These sites are the old historic railroad bed (12431), for which a preservation commitment has already been made, and a water catchment feature (12435). Preservation with some level of interpretive development is recommended for representative portions of the railroad bed, and preservation "as is" is recommended for the water catchment feature.

One site (12453) is assessed as significant for information content, and because it may contain a burial or burials, is tentatively evaluated as culturally significant. Further data collection is recommended for this site. If burials are confirmed, then the same recommendations for the five sites above with confirmed burial remains would apply.

To further facilitate client management decisions regarding the subsequent treatment of resources, the general significance of the archaeological sites identified during the inventory survey was also evaluated in terms of PHRI CRM (Cultural Resource Management) value modes—potential scientific research, interpretive, and/or cultural values—which are derived from the above federal criteria. CRM value mode assessments for individual sites are presented in Table 2.

As an important initial step prior to further work in the project area, it is recommended that all identified sites be accurately located and plotted by professional surveyors, with the aid of an archaeologist, on an appropriate scale topographic map of the project area. This locational plotting, which was previously done for all sites identified during the 1984 PHRI survey ("KK-" sites), would greatly aid development planning by allowing further archaeological work determinations (further data collection, data recovery and/or preservation) to be more accurately considered on a site-by-site basis.

The assessments and recommendations presented here have been based on the findings of a variable coverage surface and limited subsurface inventory survey of the project area. There is always the possibility, however remote, that potentially significant, unidentified cultural remains could be encountered in the course of future archaeological investigations or subsequent development activities. In such situations, archaeological consultation should be sought immediately.

Table 10.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

Site Number	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
12432	-	+	-	-	-	+	-	-
12433	-	+	-	-	-	+	-	-
12434	-	+	-	-	-	+	-	-
12436	-	+	-	-	-	+	-	-
12438	-	+	-	-	-	+	-	-
12442	-	+	-	-	-	+	-	-
12443	-	+	-	-	-	+	-	-
12445	-	+	-	-	-	+	-	-
12446	-	+	-	-	-	+	-	-
12447	-	+	-	-	-	+	-	-
12448	-	+	-	-	-	+	-	-
12449	-	+	-	-	-	+	-	-
12451	-	+	-	-	-	+	-	-
12455	-	+	-	-	-	+	-	-
12456	-	+	-	-	-	+	-	-
Subtotal:	0	15	0	0	0	15	0	0

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, DLNR-HSS=not significant).
- B = Excellent example of site type at local, region, island, State, or National level (PHRI=interpretive value); and
- C = Culturally significant (PHRI=cultural value).

Recommended General Treatments:

- FDC = Further data collection necessary (further 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;
- PID = Preservation with some level of interpretive development recommended (including appropriate related data recovery work); and
- PAI = Preservation "as is," with minimal further work (and possible inclusion into landscaping), or appropriate data recovery/disinterments.

Table 10. (cont.)

Site Number	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
12441	•	-	-	-	•	-	-	-
12444	•	-	-	-	•	-	-	-
12454	•	-	-	-	•	-	-	-
Subtotal:	3	0	0	0	3	0	0	0
12437	•	-	-	•	•	-	-	•
12439	•	-	-	•	•	-	-	•
12440	•	-	-	•	•	-	-	•
12450	•	-	-	•	•	-	-	•
12452	•	-	-	•	•	-	-	•
Subtotal:	5	0	0	5	5	0	0	5
12431	-	•	•	-	-	•	•	-
12435	-	•	•	-	-	•	-	•
Subtotal:	0	2	2	0	0	2	1	1
12453	•	-	-	•	•	-	-	•
Subtotal:	1	0	0	1	1	0	0	1
Total:	9	17	2	6	9	17	1	7

* Provisional assessment; definite assessment pending further data collection (i.e., testing features for presence or absence of skeletal remains).

REFERENCES CITED

ACHP (Advisory Council on Historic Preservation)

1985 Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review. Washington, D.C.: Advisory Council on Historic Preservation. (Draft report, August)

Armstrong, R.W. (ed.)

1983 Atlas of Hawaii. Honolulu: University Press of Hawaii. (Second edition)

CFR (Code of Federal Regulations)

36 CFR Part 60 National Register of Historic Places. Washington, D.C.: Dept. Interior, National Park Service.

Kaschko, M.W.

1984 Archaeological Reconnaissance Survey, Kohala Coastal Parcel, Kapaanui and Kou, North Kohala, Island of Hawaii (TMK:3-5-7-02:11). PHRI Report 100-030184. Prepared for Ahualoa Development, Inc.

Kirch, P.V.

1985 Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory. Honolulu: University of Hawaii Press.

Pearson, R.J. (ed.)

1969 . Excavations at Lapakahi: Selected papers. Hawaii State Archaeological Journal 69-2. Department of Land and Natural Resources, Honolulu.

Griffin, P.B., T. Riley, P. Rosendahl, and H.D. Tuggle

1971 Archaeology of Halawa and Lapakahi: Windward Valley and Leeward Slope. New Zealand Archaeological Association Newsletter 14:101-112.

Rosendahl, P.

1972 Aboriginal Agriculture and Domestic Residence Patterning in Upland Lapakahi, Island of Hawaii. Ph.D. dissertation, University of Hawaii at Manoa.

Schilt, A.R., and A. Sinoto

1980 Limited Phase I Archaeological Survey of Mahukona Properties, North Kohala, Island of Hawai'i. Typescript in library, B.P. Bishop Museum, Honolulu.

Soil Conservation Service

1973 Soil Survey of Island of Hawaii, State of Hawaii. U.S. Department of Agriculture Soil Conservation Service and University of Hawaii Agricultural Experiment Station.

Soil Survey Staff

1962 Soil Survey Manual U.S. Dept. Agriculture-Soil Conservation Service Handbook No. 18 Washington, D.C.: Govt. Printing Office.

Stearns, H.T.

1966 Geology of the State of Hawaii. Palo Alto: Pacific Books, Publishers

Stuiver, M., and G.W. Pearson

1986 High-Precision Calibration of Radiocarbon Time Scale, AD 1950 to 500 BC. Radiocarbon, 28, pp R05-R38

Tomonari-Tuggle, M.J.

1981 North Kohala: Perception of a Changing Community. A Cultural Resource Management Study. Prepared for Hawaii State Department of Land and Natural Resources-Division of State Parks, Outdoor Recreation, and Historic Sites.

Tuggle, H., and B. Griffin (eds.)

1973 Lapakahi, Hawaii: Archaeological Studies. Asian and Pacific Archaeology Series No. 5. Social Science Research Institute, University of Hawaii, Honolulu.

APPENDIX A

LIMITED HISTORICAL DOCUMENTARY RESEARCH

by Helen Wong Smith, B.A.

The ahupua'a of Kapaanui and Kou on the leeward side of North Kohala are rather obscure, and have few historical references. The windward side of Kohala, with its numerous watercourses, was the more preferred area for settlement, both in prehistoric and modern times. The leeward side is characterized by long, gradual slopes of typical kula lands, some intermittent streams, and a dry climate along the coast (Loo and Bonk 1970:28). In early times, the shoreline was populated with fishing villages, scattered house sites, and shelters. The upland regions show evidence of agricultural land use in prehistoric times, but most of this has been destroyed by ranching activities (ibid).

Although these two ahupua'a are not listed in Place Names of Hawaii (Pukui et al. 1974), the adjoining ahupua'a, Kapaa, is. Kapaa is listed as literally meaning "the solid" or "the closing" (the nui ending makes it "big Kapaa" or perhaps "the big closing"). The community-written anthology, Kohala Kea, adds "...'the closing' is a good place to watch a sunset, and the name may reflect that" (McDonald and McPeek 1977:107). The same source notes for Kou: "...a land division near Mahukona gets its name from a tree named Kou which was grown along the leeward coast for shade and hard wood for bowls." Also cited in this report are two chants that mention Kohala. The chant "No Kohala Kamakani" tells of the winds of Kohala. The first verse describes the winds:

No Kohala Kamakani	The winds of Kohala
Kamakani apa'apa'a	They blow (from all directions
Oni ana oni ana kou kino	(or collide with each other)
Oni ana oni oni iho no	They will shake, shake your body

The other chant is "E Kamehameha Ekahi":

No keia	This child who comes from
Keiki kupa hanau no na Kohala	(or was born in) Kohala

Kohala is often mentioned in Hawaiian legends. Kalakaua's book of legends mentions Kohala 61 times. Even so, there is no complete story which could be considered to belong to Kohala alone (Loo and Keawe 1977:111). Fornander appears to have compiled the most comprehensive collection of legends regarding Kohala. Legends of Pupukea and of Punui speak of Kohala in general. The legend of Halemano, whose beautiful wife Kamalalawalu was often unfaithful, mentions Puu o Nale, which is in the subject ahupua'a. Here is an excerpt:

> Being lonely, Halemano began courting Kikekaala, the daughter of Nunulu, one of the high chiefs of Kohala. Kamalalawalu heard of Halemano's chanting and when she heard him she longed to return to him because he looked so handsome. But she had not reckoned with the high chief's daughter!
>
> Kikekaala sponsored a kilu contest. [A player chanted as he tossed a quoit towards an object placed in front of one of the opposite sex; if he hit the goal he claimed a kiss.] This contest was held at a popular kilu place, on the hill looking to the west, close to Puuonale and Hokukekii, with the winner to get the other as prize (Loo and Keawe 1977:111).

Tomonari-Tuggle, in her extensive report on North Kohala, cites several legends, but they all have ties to the windward side. The defeat of Kukuipahu is presented here because it is the name of an ahupua'a which is just north of Kapaanui.

> Unification within the district is suggested in the legendary account of Kapunohu, which is genealogically calculated (7 generations at 25 years per generation) to approximately AD 1600. A battle was waged between the chiefs of Kukuipahu and Niuli'i, the former's domain extending from Wainaia Gulch to Kahua, and the latter's domain from Wainaia south to Waini. Meeting on the battlefield of Hinakahua at Kapa'au, the forces of Kukuipahu were vanquished and the "whole of Kohala thus came under the charge of Niuli'i" (Fornander 1916: 215-220).

Other traditions indicate that Kohala was often the scene of warfare between chiefs of the island of Hawaii and those of Maui. It was on the leeward coast that Kamehameha was born to the wife of one of the war leaders while an attack on Maui was being prepared (Tomonari-Tuggle 1981:57). Kamakau (1964:67) relates that the war fleet was "encamped

at Kohala, from Koai'e to Pu'uwepa". Handy and Handy note that from "this feudal seat he (Kamehameha) gradually extended his power to embrace the whole of the island, eventually gaining the suzerainty of all the Hawaiian Islands" (1972.528).

The first reference by an early historic writer dates from the time of Cook's visit to the Kohala coast.

> ...the ships traded first at North Kohala where the people watched the sailors on the ships eat watermelon and were struck with how ferocious they were devouring the flesh of men. Here the sailors began to strip their uniforms of buttons to sew on pieces of red cloth as dazzling gifts for the girls (DLNR 1972.19).

Lt. King, one of Cook's officers in 1779, explored Kohala and wrote:

> The country, as far as the eye could reach, seemed fruitful and well inhabited...[three and four miles inland, plantations of taro and potatoes and wauke] neatly set out in rows. The walls that separate them are made of the loose burnt stone, which are got in clearing the ground; and being entirely concealed by sugar-canes planted close on each side, make the most beautiful fences that can be conceived .... To the left a continuous range of villages, interspersed with groves of coconut trees spreading along the sea-shore; a thick wood behind this; and to the right, an extent of ground laid out in regular and well-cultivated plantations, as far as the eye could reach (Tomonari-Tuggle 1981).

While traveling from Kapa'au on the windward side of North Kohala to Kawaihae, south of the project area, the Rev. William Ellis made these observations:

> In this part of the island there is another tradition very generally received by the natives...These traditions respect several visits, which in remote times some of the natives made to Nuuhiva and Tahuata, two islands in the Marquesan group, and to Tahiti, the principal of the Society Islands.
>
> One of these accounts the natives call, "The Voyage of Kamapuhaa," in which they state that Kamapuhau (child running or climbing the sea-from Kama, a child, pii, to run or climb, and kai, the sea) was priest of a temple in Kohala, dedicated to Kanenuiakea. This priest had journeyed to Tahiti in four double canoes and after 15 years returned, then made 3 subsequent voyages.
>
> About three p.m. we reached Owawarua, a considerable village on the north-west coast, inhabited mostly by fishermen. Here we tried to collect a congregation, but only three women and two small children remained in the place, the rest having gone to Waimea to fetch sandal wood for Karaiomoku.
>
> From Owawarua we passed on to Hihiu, where we had an opportunity of speaking to a small party of natives.
>
> In these villages we saw numbers of canoes and many large fishing nets, which are generally made with a native kind of flax, very strong and durable....
>
> ...we procured a canoe to take us to Towahihae, from which we were distant about twenty miles.
>
> Though we had numbered, in our journey today, 600 houses, we had not seen any thing like four hundred people, almost the whole population being employed in the mountains cutting sandal wood.
>
> Before daylight on the 22nd we were roused by vast multitudes of people passing through the district from Waimea with sandal wood, which had been cut in the adjacent mountains for Karaimoku, by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach, for the purpose of its being shipped to Oahu.
>
> There were between two and three thousand men, carrying each from one to six pieces of sandal wood, according to their size and weight (Ellis 1963.284-286).

An 1833 letter from missionaries at Waimea, Hawaii to the Board of Commissioners for Foreign Missions informs us as follows:

> The population as enumerated in 1832 was 8,014—many of these live along the western shore where there is a good fishing ground, a still greater number along the line of cultivation which commences two or three miles inland. Over all the interior and also the eastern part of the district, the population is more uniformly scattered (American Board of Commissioners for Foreign Missions circular of March 15, 1833; copy in the Hawaii Mission Children's Society Library.)

In another missionary census taken in 1835, the population of North Kohala was enumerated as 6,175; this was the first accounting of population by named land units (Kumu Hawaii 1835.98). The census showed an even distribution among the ahupua'a of the district, with a slightly higher population on the leeward side.

During the mid-1800s, settlements and agricultural areas gravitated toward the windward side of the district. "The windward side, especially the kula gulches which had been a focal point of settlement in earlier periods, became even more so as the leeward side was gradually abandoned" (Tomonari-Tuggle 1981:33).

Tomonari-Tuggle is again cited for land use in the area:

> In the 1840s, herds of wild cattle, derived from the few head introduced by Vancouver in 1793, were creating havoc in the native gardens on the leeward slopes of Kohala and Waimea. Cattle hunting, a lucrative profession in the mid-19th century, evolved into the ranching business which required defined pasture lands and facilities (Wellmon 1973). Large parcels on the leeward side of Kohala were purchased or leased for this purpose. Among significant cattle operations of this period were Kohala Ranch, part of the James Woods estate, Puakea Ranch, started in 1885 by James Wight but later leased to Kohala Ranch...(1981:35).

The ahupua'a of Kou is listed as government land by Tomonari-Tuggle. A 1910 composite of Registered Maps 1704, 1705 and 1706 indicates that Grants 3405 and 3406 belonged to the James Woods estate, with a parcel of 145.50 acres to Kalimalena, Gr. 2765. The map also shows the 895 acres of the ahupua'a of Kapaanui belonging to S. Davis, as Land Court Award 8522-B Apana 2 (State Survey Office). S. Davis was also known as Kale Davis, and was one of the few chiefs who bothered to acquire land on the leeward side (Royal Patent 2236), most opting for land on the windward side. Few kuleana claims were made on the leeward side, and thus the usual source for land use information is not available for the two ahupua'a that make up the project area. Registration for Davis' land gives no more insight than the fact that it was "The Inherited Lands...". Lacking specific native testimony for these lands, it might be of interest to include testimonies from claims made in Kukuipahu, which is north of the project area:

LCA 8709 to Kaea for 35 acres [largest] Native Test. 4:104

Kahiko sworn and stated: "I have seen in the Kukui ahupuaa - 1 section. All of the ili lands are in this section, Pohakuopaka, Mahukona, Haleana, Kaluokailio, Kaluakauaka and Nahulauaina. All of the boundaries are for the konohiki. It has been cultivated and there are 2 houses for him and his people. This is an old land received from his grandfolks at the time of Kamehameha I, no one has objected. Moku (konohiki), sworn and stated, I have known [what] Kahiko has related here."

LCA 8697 to Kainoa for 22.45 acres Native Test. 4:127

Haupu sworn and stated: "I have seen in the ili land of Kalahuinui of the Kukuipahu ahupuaa, 4 sections. Section 1 (makai) idle land. It has been cultivated; no house. Section 2 (Kapahu) idle land. It has been cultivated, no house. Section 3 [ibid], Section 4 [ibid]...Kioloa had given him his interest during the time of Kamehameha II; no one has objected."

LCA 9912 to Piha for 8.25 acres Native Test. 4:122

Ope sworn & stated: "I have seen in the ili land of Maolooha of Kukuipahu ahupuaa in Kohala, 5 sections. Sec. 1, half of it has been cultivated, no house. Sec. 2 half of it has been cultivated, no house. Sec. 3 [ibid]. Sec. 4 this has been cultivated. Sec. 5 (makai) includes a street. Sec. 6, Paehala ili land. It has a fence with 3 houses for him and his people. The surrounding boundaries are all for the konohiki. I had given him this interest during the time of Kamehameha I."

The following is listed under Kamano, which is south of the project area:

LCA 10679 TO Palua Native Test. 4:114

Nakapalaau sworn & stated: "I have seen the ili lands Iliioa and Kamuku; [He states that some land was idle and some cultivated, but doesn't say in what.] Cultivation has been done and 2 houses are there for himself. Hoapili had given this land at the time of Kamehameha I to his parents; no one has objected to this day.

A large percentage of government land was made available through grants, and most of this was sold in the early 1850s. Thus, by 1860, most of the leeward coast was

held as private property with the government retaining only a small parcel in Kokoiki-Puuepa, a parcel in Kapaa, and a section of the uplands (Tomonari-Tuggle 1981:58).

The North Kohala Tax Book for 1855 (Hawaii State Archives) lists only 12 names under the land of Kapaa (presumably including Kapaanui), and 18 names under the lands of Kou and Kamano. The persons named are adult males (aged 15 years and older), and for the most part, these can reasonably be assumed to represent individual family households. It can also be assumed that some of these people were probably residents of the coast (Kaschko 1984:7).

A drawing showing plantations in North Kohala indicates that the leeward side of the district fell under the jurisdiction of the Kohala Ranch Co., Ltd. (Char and Char 1983:96). The Hawaiian Railroad Co. is given major credit in the success of the Kohala sugar industry, which thrived on the windward side, and in the development and maintenance of a tie between Kohala and the modernizing world (Tomonari-Tuggle 1981:75). The railroad ran from Mahukona to Niulii, crossing through Kapaanui and Kou. The original roadbed was built in the early 1880s. Use of the entire railway was abandoned in the early 1940s, when Mahukona Harbor was closed by the U.S. military (ibid).

Various sites are found along the coastline in these ahupua'a. They are discussed in the main body of this report. Mention should be made here, however, of a purported heiau. The Hawaii State Survey Division (DAGS) has on file Certificate of Boundaries #148 (dated 1882) to a James Woods in Kapaanui, the owner. It refers to an "...old heiau or wall of stones on sea shore..." at the boundary between Kapaanui and Kou.

REFERENCES CITED

Char, T., and W.J. Char

1983 Chinese Historic Sites and Pioneer Families of the Island of Hawaii. Honolulu: University of Hawaii Press

DLNR (Department of Land and Natural Resources)

1972 North Kohala: Preservation Master Plan for Historical Resources. Division of State Parks, Outdoor Recreation and Historic Sites. Preliminary draft for public review.

Ellis, W.

1963 Journal of William Ellis. Honolulu: Advertiser Publishing Co., Ltd.

Fornander, A.

1916 IN Tomonari-Tuggle 1981.

Handy, E.S.C., and E.G. Handy

1972 Native Planters in Old Hawaii. B.P. Bishop Museum Bulletin 233. B.P. Bishop Museum Press, Honolulu.

Hawaii State Archives

Native Register and Testimony.

Kamakau, S.M.

1964 Ka Po'e Kahiko: The People of Old. B.P. Bishop Museum Special Publication 51. B.P. Bishop Museum, Honolulu.

Kaschko, M.W.

1984 Archaeological Reconnaissance Survey, Kohala Coastal Parcel, Kapaanui and Kou, North Kohala, Island of Hawaii (TMK: 3-5-7-02:11). PHRI Report 83-100. Prepared for Ahualoa Development, Inc.

Loo, V.H., and W.J. Bonk

1970 A Historical Site Study and Evaluation of North Hawaii. Anthropological Research International. Prepared for the Department of Planning, County of Hawaii.

Loo, D., and C. Keawe

1977 IN Stephenson 1977.

McDonald, M., and F. McPeek

1977 IN Stephenson 1977.

Stephenson, L.K.

1977 Kohala Keia (This is Kohala): A Collection of Community Expressions. Center for Continuing Education and Community Services, University of Hawaii at Hilo.

Tomonari-Tuggle, M.J.

1981 North Kohala: Perception of a Changing Community, A Cultural Resource Management Study. Prepared for Hawaii State Department of Land and Natural Resources, Division of State Parks. (Uncirculated report)

Wellmon, B.

1981 IN Tomonari-Tuggle 1981.

APPENDIX B

SITE AND TEST UNIT DESCRIPTIONS

SITE NO.: State: 12431 PHRI: KK-1
SITE TYPE: Wall
TOPOGRAPHY: Moderate to steep slope.
VEGETATION: Grasses, kiawe, 'ilima and koa-haole.
CONDITION: Good-excellent
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Railroad Bed
DIMENSIONS: 304.00 m by 4.20 m by 6.10 m (approx.)
DESCRIPTION: According to Kaschko (1984:8), "This old railroad bed (3.8 to 4.2 m wide) is associated with constructed stone causeways, cuts through knolls and ridges, and curving sections of an earlier railroad bed alignment. Both historic and prehistoric artifacts and midden are present in spots. The midden materials may indicate that a coastal site deposit was cut into and used as part of the roadbed fill. The impressive boulder-faced causeway crossing the mouth of a small gulch is 3.5 m wide at the top, and rises up to 6 m high. A steel blasting drill bit still stands stuck in the bedrock on the inland side of this large causeway. The old railroad bed is Tomonari-Tuggle's (1981) Site K-1."

SITE NO.: State: 12432 PHRI: KK-2
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Undulating, rocky terrain consisting of exposed bedrock, and sloping downward on all sides of the knoll.
VEGETATION: Grasses, kiawe and 'ilima
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate—possibly historic
FUNCTIONAL INTERPRETATION: Marker-transportation
DESCRIPTION: Overall complex area measures c. 58 m (NE-SW) by 14 m (NW-SE).

FEATURE A: Cairn
FUNCTION: Marker
DIMENSIONS: 2.00 m by 1.90 m by 1.00 m (approx.)
DESCRIPTION: Amorphous in plan view. It consists of small basalt boulders and large angular basalt cobbles stacked and piled on a bedrock outcropping. This may be one of three markers for a recent historic trail/road. There is a portion of the trail/road to the north of this cairn which is lined with basalt boulders. To the northwest is evidence of bulldozer activity.

FEATURE B: Cairn
FUNCTION: Marker
DIMENSIONS: 1.80 m by 1.70 m by 0.75 m (approx.)
DESCRIPTION: Roughly circular in plan view, it consists of large angular basalt cobbles stacked and piled on a bedrock outcropping. This may be the second of three markers for a trail/road. There is a portion of the trail/road to the south of the Feature B cairn which is lined with basalt boulders. To the W-SW is evidence of bulldozer activity.

FEATURE C: Cairn *(Figure B-1)*
FUNCTION: Marker
DIMENSIONS: 0.70 m by 0.50 m by 0.45 m (approx.)
DESCRIPTION: Generally amorphous in plan view. It is a small pile of angular basalt cobbles stacked on a large bedrock outcrop. Feature C consists of c. ten cobbles. This may be the third of three cairns on this particular knoll that mark a trail/road.

FEATURE D: Trail/road
FUNCTION: Transportation
DIMENSIONS: 8.00 m by 1.50 m (approx.)
DESCRIPTION: A trail/road segment extending c. northwest from the knoll where Feature A to C cairns are located. It is situated in the low area between the two peaks of the knoll. The trail/road is predominantly a worn path roughly faced with large angular basalt boulders. This may have been a prehistoric-historic foot path extending inland from the coast. At present, it is used as a jeep road. Bulldozer activity has affected the area.

SITE NO.: State: 12433 PHRI: KK-3
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: At the top of a hill overlooking Site 12431, Railroad Bed situated within the ravine. The terrain is rocky.
VEGETATION: Grasses, kiawe and 'ilima.
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Marker
DESCRIPTION: According to Kaschko (1984:8), "The two rock cairns are located c. 20 m apart at the top of a rocky slope overlooking the shoreline. The southern cairn (60 cm high, 120+ cm wide) may possibly be a collapsed burial platform. The northern cairn (95 cm high, 115 cm wide) could be a boundary marker between the lands of Kapaanui and Kou."

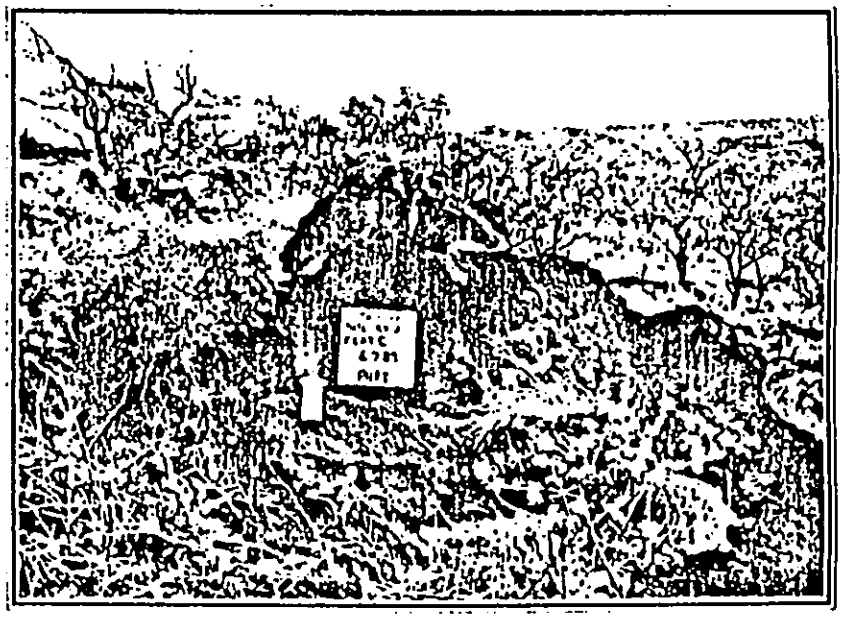


Figure B-1. SITE 12432, FEATURE C. View to West. (PHRI Neg.1205-5a)

FEATURE A: Cairn (Figure B-2)
FUNCTION: Marker
DIMENSIONS: 1.90 m by 1.70 m by 0.95 m (approx.)
DESCRIPTION: A partially collapsed cairn consisting of piled weathered cobbles and boulders on top of a bedrock outcrop. One waterworn basalt cobble was noted.

FEATURE B: Cairn
FUNCTION: Marker
DIMENSIONS: 1.80 m by 1.80 m by 0.90 m (approx.)
DESCRIPTION: Generally circular in plan view, it is partially collapsed at present. The cairn has a crudely-stacked circular face, three courses high, with piled cobble fill.

A 1 m by 1 m test unit (TU-1) was excavated within Feature B. The excavation revealed 0.75 m of stacked basalt cobbles above a thin soil deposit. This soil was sterile and appeared to be aeolian silt. At 11 cmbs excavation was terminated on bedrock.

Based on the excavated findings and lack of a cultural deposit, except stacked cobbles, it was determined the features were probably boundary markers between the lands of Kapaanui and Kou.

SITE NO.: State: 12434 PHRI: KK-4
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Undulating rocky surface located at the top of the steep slope.
VEGETATION: Grasses, kiawe, 'ilima and koa-haole.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/agriculture
DESCRIPTION: Overall complex area measures c. 90 m by 30 m.

FEATURE A: Modified outcrop
FUNCTION: Habitation/agriculture
DIMENSIONS: 19.00 m by 13.00 m by 1.30 m (approx.)
DESCRIPTION: Situated on the west side of a prominent bedrock outcrop, and modified with a series of small terraces and planting pits extending downslope along the south side. Waterworn cobbles, coral and shell midden are present.

FEATURE B: Enclosure
FUNCTION: Habitation
DIMENSIONS: 13.00 m by 10.00 m by 1.60 m (approx.)
DESCRIPTION: Enclosure is a low wall abutting the west (leeward) side of a high bedrock outcrop. It consists of stacked cobbles and boulders, c. three to seven courses and c. 0.35-0.85 m high. A portion of the wall stands on top of the bedrock outcropping for a maximum height of c. 1.60 m. The wall width averages c. 0.50-0.80 m.

A possible planting area within a natural depression is situated c. 5 m west of the enclosure. It measures c. 1.50 m by 1.25 m and 0.40 m in depth. A possible agricultural plot is c. 7 m N-NW of the enclosure. It is a level area measuring c. 1.25 m by 1.25 m, with a possible cobble retainment on the downslope edges.

A 0.5 m by 0.5 m test unit (TU-3) was excavated in the NW quadrant of the enclosure. This excavation revealed a cultural layer, Layer I, a c. 13 cm-thick deposit of medium brown, loose fine silty clay containing a small amount of shell midden (*Nerita picea, Cypraeidae* and *Thaididae*). Excavation was terminated at c. 18 cmbs, with a reddish-brown fine compact silt which was determined to be sterile (13+ cm thick).

FEATURE C: Cupboard *(Figure B-3)*
FUNCTION: Habitation
DIMENSIONS: 2.40 m by 2.20 m by 1.30 m (approx.)
DESCRIPTION: A roughly rectangular terrace abutting the leeward side of a bedrock outcrop. There is a cupboard/storage area built into it with an opening on the west (seaward) side. The cupboard consists of stacked cobbles and boulders, with a corbelled, vaulted chamber inside.

The wall is c. four courses high, and the roof has c. four courses of smaller stones and slabs. There is a pile of boulders at the entrance which may be the remains of the wall that fronted the cupboard. The interior dimensions of the cupboard are c. 2.20 m (E-W) by 1.20 m (N-S) and 0.75 m high.

A .75 m by .75 m test unit (TU-1) was excavated in the NW corner of the chamber. This excavation revealed Layer I, a c. 0.34 m-thick deposit of dark brown, loose silty loam with a small amount of clay, containing a small amount of shell midden (*Cellana, Cerithidea, Cypraeidae*, and *Conidae*), charcoal, one octopus lure and one cut shell. Layer I was excavated in four arbitrary levels: Layer I-1, c. 0-0.10 m thick; Layer I-2, c. 0.10-0.20 m thick; Layer I-3, c. 0.20-0.30 m thick; and Layer I-4, c. 0.30-0.34 m thick. Excavation was terminated 6 cm into Layer II, a medium brown, loamy silt containing a high density of decomposing bedrock, which was determined to be sterile. A sample of charcoal from Layer I-3 (PHRI# RC-599) was submitted for age analysis, and it yielded a calibrated range of AD 610-1210.

Figure B-2. SITE 12433, FEATURE A. View to South. (PHRI Neg.1204-29)

Figure B-3. SITE 12434, FEATURE C. View to Southeast. (PHRI Neg.1204-17)

FEATURE D: Cupboard
FUNCTION: Habitation
DIMENSIONS: 2.40 m by 2.30 m by 0.85 m (approx.)
DESCRIPTION: There is a roughly rectangular terrace abutting the leeward side of a bedrock outcrop. Built into it is this cupboard/storage area, with an opening on the west (seaward) side. It consists of stacked cobbles and boulders. The interior measures c. 1.70 m (E-W) by 0.90 m (N-S), and 0.60 m in height.

A 0.5 m by 0.5 m test unit (TU-2) was excavated in the center of the cupboard area. Layer I, excavated in two arbitrary levels (Layer I-1, c. 0-0.10 m thick, and Layer I-2, c. 0.10-0.18 m thick), consisted of slightly compact, medium-brown silty clay. This layer contained a small amount of shell midden (*Cellana, Nerita picea, Cypraeidae,* and *Thaididae*), and small flecks of charcoal. Excavation was terminated in Layer II at 0.28 m below surface, a compact, medium reddish-brown, moist silty clay 0.18+ m thick. This layer contained no cultural material, and was therefore determined sterile.

Based on the additional information gathered through excavation, it was determined this site had a dual function, both habitational and agricultural.

SITE NO.: State: 12435 *(Figures B-4 and B-5)*
PHRI: KK-5
SITE TYPE: Modified outcrop
TOPOGRAPHY: The terrain is a rocky, moderate slope.
VEGETATION: Grasses, kiawe, and 'ilima
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Water catchment
DIMENSIONS: 1.95 m by 1.80 m by 1.80 m (approx.)
DESCRIPTION: According to Kaschko (1984:11), "[a] roughly stacked-stone wall (c. 2.1 m. wide, 75 cm. high) of small water-worn boulders encircles two depressions—c. 30 cm. dia. 35-40 cm. deep, and holding water at the time of the survey—in the top of a bedrock outcrop. Surface shell midden and flaked volcanic glass are visible both on the bedrock outcrop itself and to the sheltered leeward side of it. The presence of a prehistoric habitation deposit is indicated, apparently in association with a small water catchment feature."

During the present survey it was noted that the area around the water catchment appears to be collapsed. Two water catchment areas were present. One to the southwest measures c. 0.30 m (N-S) by 0.25 m (E-W), and is c. 0.50 m deep. Sediment has accumulated at the bottom. The other hole to the northeast measures c. 0.23 m (N-S) by 0.24 m (E-W), and is c. 0.48 m deep. This hole also contains sediment at the bottom. Both holes are situated within the bedrock and do not appear to be of natural origin. The surface of the depressions are abraded.

A 1.0 m by 0.5 m test unit (TU-1) was excavated in the center of the shell midden scatter area. Most of the surface appeared to be exposed bedrock, with a thin soil deposit and shell midden. Layer I, 0.08-0.12 m thick, consisted of mottled soil, ranging from medium reddish-brown to dark, blackish-brown silty clay, and contained a high density of cultural materials. This deposit contained a large amount of marine shell midden (*Cellana, Nerita picea, Cypraeidae, Thaididae,* and *Echinoidea*), and several portable artifacts, including one echinoid spine abrader and six volcanic glass flakes. At 0.05-0.12 m below surface, excavation was terminated on exposed bedrock in the west two-thirds of the test unit.

Layer II, reddish-brown, compact silty clay with a high density of decomposing bedrock, was found in the east third of the test unit, and was excavated to a maximum depth of 0.15 m below surface, where excavation was terminated on exposed bedrock surface. This layer contained one volcanic glass flake, which probably filtered down from the previous layer, and the layer was therefore determined sterile.

Based on the results of the excavation, this site's function was determined to be water catchment, with some level of temporary habitation activity.

SITE NO.: State: 12436 PHRI: KK-6
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: It is situated at the top of a rocky, steep slope, with a good view of the coast.
VEGETATION: Grasses, kiawe, and 'ilima.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overall complex area measures c. 44 m (E-W) by 20 m (N-S).

FEATURE A: L-shaped alignment
(Figures B-6 and B-7)
FUNCTION: Habitation
DIMENSIONS: 5.00 m by 4.50 m by 1.60 m (approx.)
DESCRIPTION: Feature A is an L-shaped wall built on the surface of bedrock. The north wall is double-stacked and is c. 0.9 m wide, with an exterior height of 1.6 m and an

Figure B-4. SITE 12435, CLOSEUP; View to East-Southeast. (PHRI Neg.1205-11a)

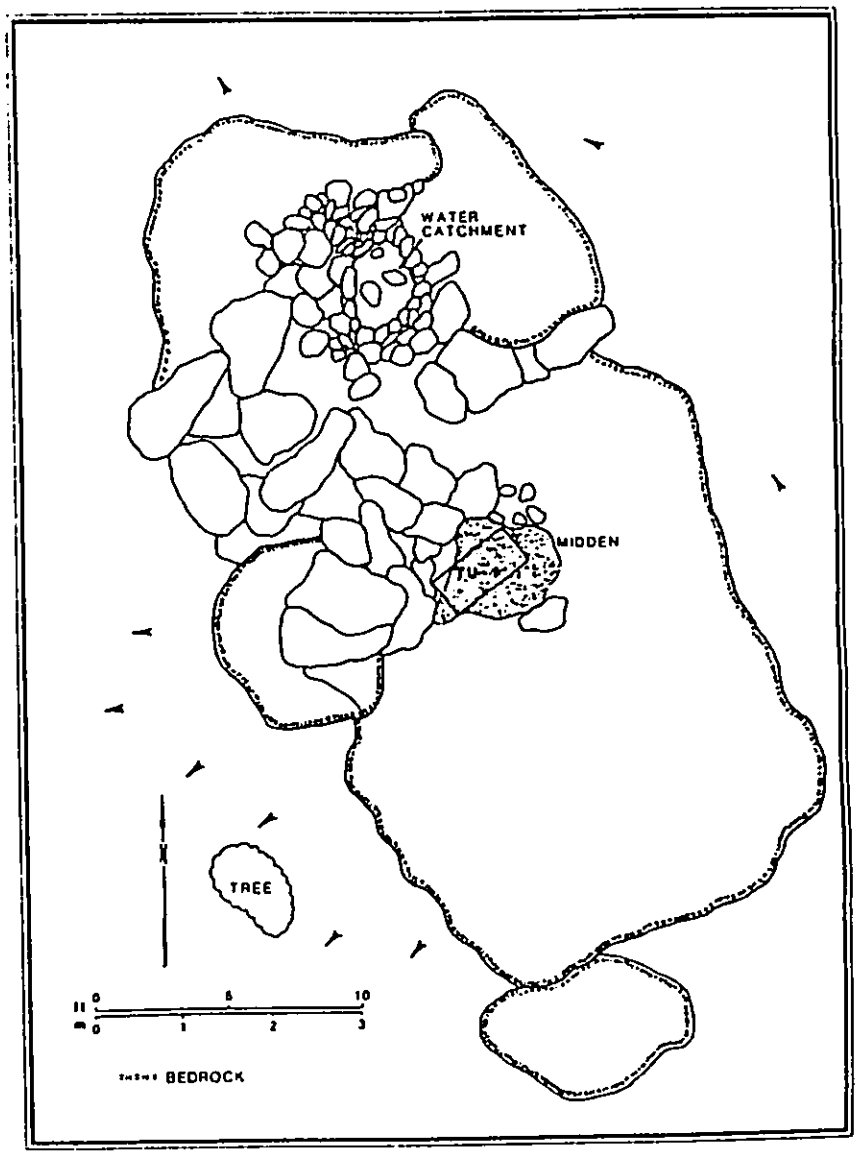


Figure B-5. SITE 12435, PLAN MAP.

Figure B-6. SITE 12436, FEATURE A View to North-Northeast.
(PHRI Neg.1209-6)

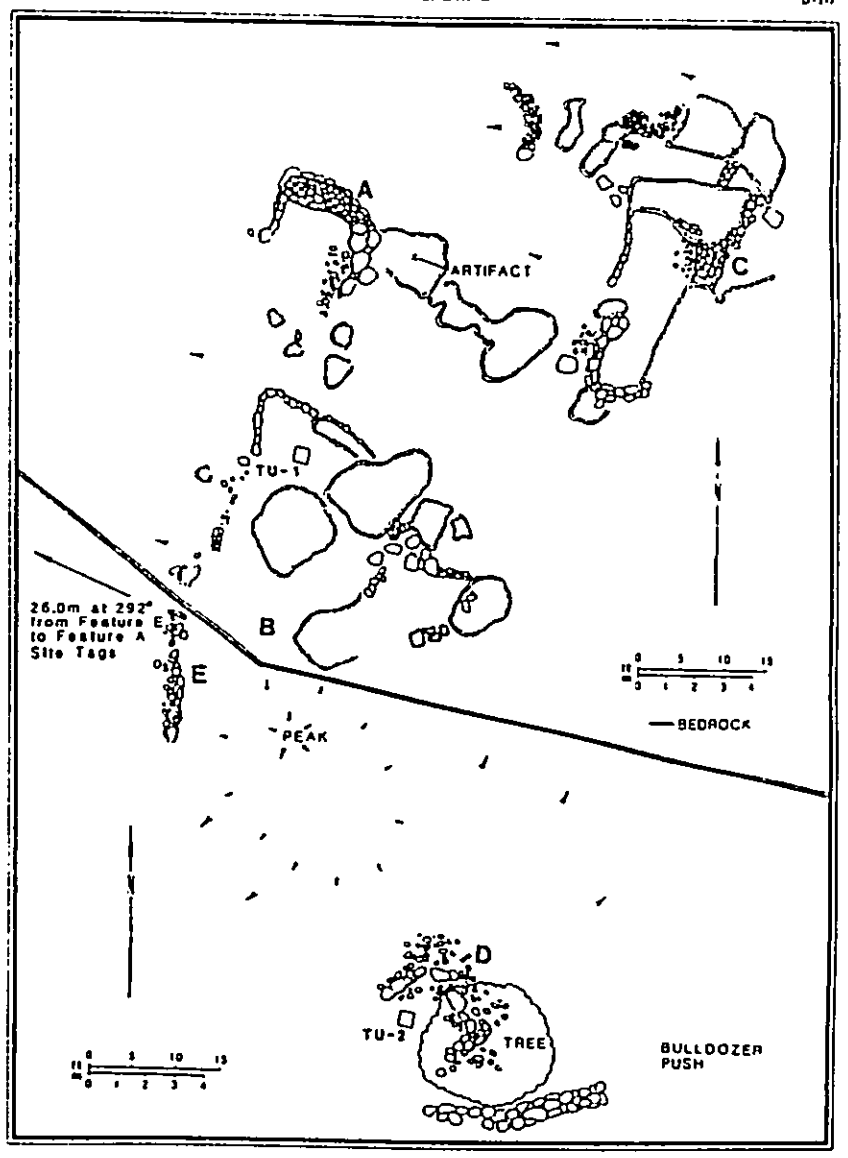


Figure B-7. SITE 12436, PLAN MAP

interior height of c. 1.1 m. The east wall is mostly single-stacked and consists of large boulders, c. 0.7 m in diameter. The west side contains a retaining wall that defines a level, soil-surface interior floor.

FEATURE B: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 11.50 m by 10.00 m by 1.50 m (approx.)
DESCRIPTION: Two large bedrock outcrops situated near the top of a ridge. They are modified with walls and stone alignments, creating level terraced areas along the westward and downhill side. Single-boulder alignments to low bifaced walls are utilized to define and retain level areas for terraces.

A bifaced, stacked wall built of seven courses of basalt boulders is situated at the NW corner of Feature B. It measures c. 2.50 m (NE-SW) long and 0.90 m wide, with heights ranging from 0.95-1.40 m. This wall appears to function as a windbreak, and defines a flat, level area to the south. Another alignment extends from the base of this wall, and may have continued to Feature A, which is c. 3 m north of Feature B.

Boulders and cobbles fill a crack between the outcrops, possibly functioning as a storage area. The bedrock outcropping itself also functions as a protective overhang.

A 0.5 m by 0.5 m test unit (TU-1) was excavated in the middle of the feature. Layer I was excavated in two arbitrary levels, containing medium-brown, loose aeolian silt. Layer I-1 (0-0.10 mbs) and Layer I-2 (0.10-0.18 mbs) contained no cultural material.

Layer II (0.18-0.30 mbs) consisted of reddish-brown, compact silty clay, with a high density of decomposing basalt bedrock. This layer was also culturally sterile, and excavation was terminated at c. 0.30 m below surface.

FEATURE C: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 9 m by 6 m by 1 m (approx.)
DESCRIPTION: Two large bedrock outcrops, which have been modified with walls forming a windbreak on the windward side of a flat, level area. The north side consists of a vertical bedrock outcrop, with what may be a collapsed wall with cobbles at the top. The space between the outcrops is filled with a partially-collapsed wall of stacked boulders and cobbles.

To the southeast is a vertical bedrock outcrop c. 1.6 m high. This outcrop has a slightly curving wall of stacked boulders, extending the natural face westward for c. 1.5 m. Situated c. 3 m west of the vertical face is a single-rock alignment. It is c. 0.10-0.15 m high, oriented c. N-S, and functions as a retaining wall. The area within the outcrops is a slightly-sloping, level terrace floor measuring c. 6.0 m (N-S) by 2.5 m (E-W).

FEATURE D: C-shape
FUNCTION: Habitation
DIMENSIONS: 5.00 m by 3.50 m by 0.30 m (approx.)
DESCRIPTION: Feature D is a square-cornered, double-stacked wall utilizing several upright slabs. The wall is c. 0.7 m wide. It encloses what appears to be a paved living area measuring c. 2.5 m by 1.8 m.

A 0.5 m by 0.5 m test unit (TU-2) was excavated within the C-shape structure on the leeward side. Layer I, c. 0-0.07 m below surface, consisted of a rocky medium-brown silt with a less than 0.01 m thick deposit of organic staining on its surface, and contained two small marine shell fragments, (unidentified gastropod). Excavation was terminated at 0.03-0.07 m below surface on solid bedrock.

Excavated findings helped to further confirm the function of this was very temporary habitation.

FEATURE E: Alignment
FUNCTION: Indeterminate
DIMENSIONS: 5.00 m by 2.00 m by 3.80 m (approx.)
DESCRIPTION: Oriented c. N-S, it is a linear wall section of what was probably a stacked wall. It now appears to be mostly collapsed rubble.

SITE NO.: State: 12437 PHRI: KK-9 *(Figure B-8)*
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Near the base of a rocky slope and situated on a linear outcrop.
VEGETATION: Grasses and kiawe
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial
DESCRIPTION: Overall complex area measures c. 12 m (NE-SW) by 3 m (NW-SE). These features may have had their stones removed for the railroad.

FEATURE A: Platform
FUNCTION: Burial
DIMENSIONS: 2.80 m by 2.40 m by 0.80 m (approx.)
DESCRIPTION: According to Kaschko (1984:13), "This feature appears to be the collapsed remains of a small, roughly rectangular platform (c. 2.4 m long, 1.9 m wide, 60 cm. high) constructed adjacent to a low bedrock exposure.

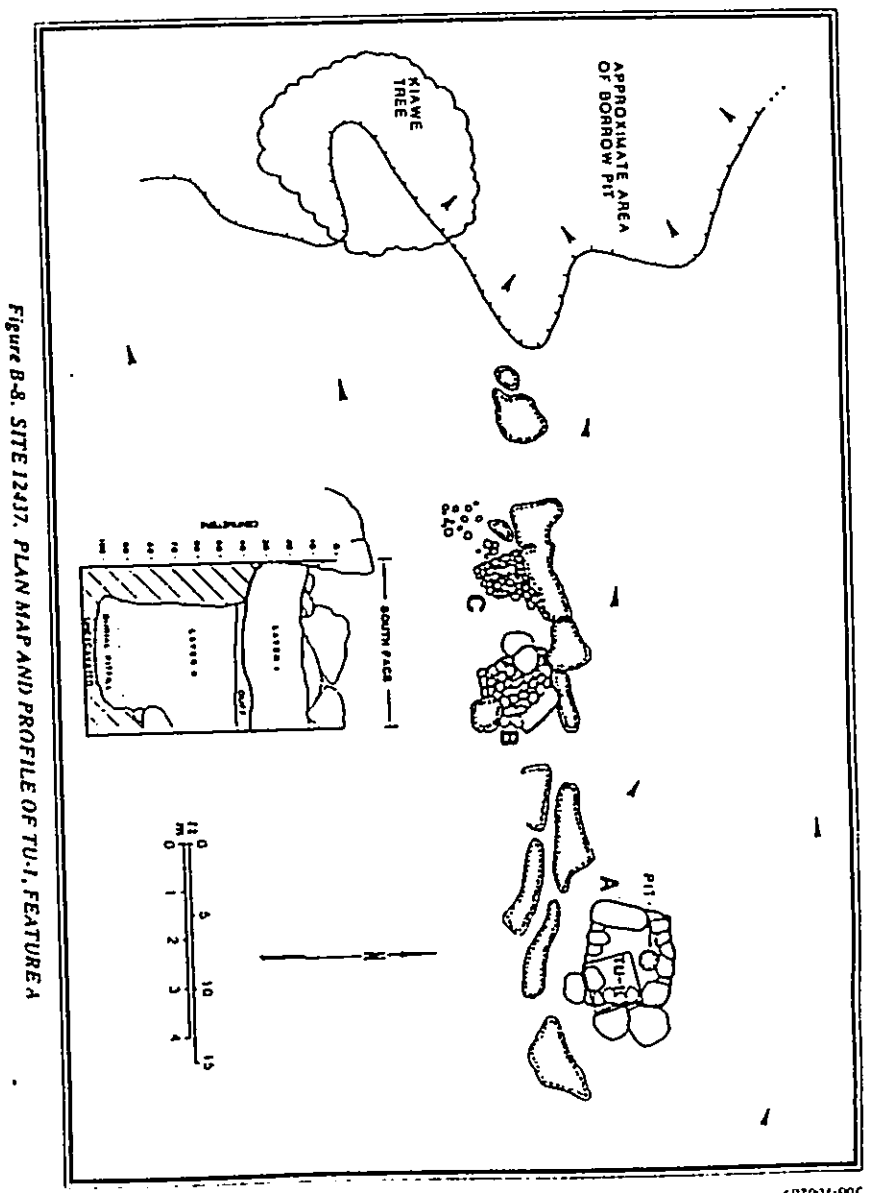


Figure B-8. SITE 12437, PLAN MAP AND PROFILE OF TU-1, FEATURE A

A partial perimeter facing is formed by large boulder slab uprights, which contain an interior fill of cobbles and boulders. The size and structural appearance of this feature suggest that it is a burial feature in poor condition."

Generally rectangular in plan view, this is a collapsed platform situated on the north side of a bedrock outcrop. It consists of small-to-medium boulders and medium-to-large cobbles stacked two to four courses high. The larger boulders make up the perimeter, with several upright boulder slabs along the north and west sides. The interior is filled with small boulders and cobbles and is roughly level, with a slightly depressed area on the surface.

A 1 m by 1 m test unit (TU-1) was excavated on the south portion of the platform surface. Layer I, c. 0.45 m thick, consisted of small, medium, and large angular basalt cobbles, and contained no cultural deposit except the basalt cobbles.

Layer II was excavated in arbitrary levels at 0.10 m intervals. The matrix consisted of light- to medium-brown, mottled, loose, fine silt with some organic material. There was a high density of fine roots, and a 20% density of small, angular basalt cobbles and gravels. Layer II-1, c. 0.45-0.55 m below surface, contained a small amount of charcoal and one partial rodent cranium.

Layer II-2, c. 0.55-0.65 m below surface, had a decrease in root density, and contained a few bits of charcoal.

Layer II-3, c. 0.65-0.75 m below surface, had an increase in moisture content of the soil, and contained a slightly higher amount of charcoal.

Layer II-4, c. 0.75-0.85 m below surface, had a further decrease in root density, and contained a large sample of charcoal, which was submitted for radiocarbon age-determination analysis. The sample (PHRI# RC-606) yielded calibrated ranges of AD 1450-1700, 1720-1820, 1831-1879, and 1916-1954.

Layer II-5, c. 0.85-0.92 m below surface, showed no change in soil until 0.92 m below surface. At this point a small area of grayish-brown, loose, fine silty loam with a high content of fine roots and organic material appeared in the south 15 cm of the unit. This was designated as Layer III, and was excavated and screened separately from 0.92-1.06 m below surface. Layer III contained a large amount of charcoal and several small human bone fragments. At c. 1.06 m below surface, what appeared to be the distal end of a human tibia was uncovered. Excavation was terminated at this point, a soil sample was taken of the burial pitfill, the south wall containing the burial pit was profiled, and a photograph was taken of the opened test unit.

The excavation revealed further evidence that this was a burial site. The presence of a human burial in Feature A suggests additional human burials may exist at Features A and/or B.

FEATURE B: Mound
FUNCTION: Possible burial
DIMENSIONS: 1.60 m by 1.30 m by 0.40 m (approx.)
DESCRIPTION: Roughly rectangular in plan view, it consists of bedrock outcrops to the north and the south, and is bounded by upright slabs to the east and the west. The interior surface is roughly paved with weathered basalt cobbles.

FEATURE C: Mound
FUNCTION: Possible burial
DIMENSIONS: 1.00 m by 0.80 m by 0.25 m (approx.)
DESCRIPTION: Generally square in plan view, it presently resembles a small terrace. The mound abuts bedrock to the north. It is partially collapsed, with a level, cobble-surfaced interior.

SITE NO.: State: 12438 PHRI: KK-10
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Located on a low bedrock rise, c. 20 m inland of the railroad bed. The terrain is a nearly flat area consisting of a rolling, rocky surface.
VEGETATION: Open kiawe forest with grass and 'ilima.
CONDITION: Poor-fair
INTEGRITY: Unaltered-possibly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overall complex area measures c. 17 m (E-W) by 13 m (N-S).

FEATURE A: C-shape
FUNCTION: Habitation
DIMENSIONS: 2.50 m by 1.40 m by 0.70 m (approx.)
DESCRIPTION: According to Kaschko (1984:13), "About 10 m further inland [of Feature B] is a small, collapsed C-shaped shelter (c. 2.3 m. long, 60 cm. high). Waterworn basalt cobbles and coral fragments are present, indicating the possibility of a subsurface cultural deposit, especially in the area of the C-shaped shelter."

Feature A is a C-shaped wall of stacked cobbles and boulders. The interior of the wall is partially collapsed, but it is evident the wall was once vertical and well-faced. The

wall has a maximum thickness of c. 0.75 m. It is stacked on the northeast side, and there is a low (two-course) alignment, partially closing off the open SW side of the C-shape.

A 0.5 m by 0.5 m test unit (TU-1) was excavated inside the C-shape structure. The surface of the test unit had several collapsed wall stones embedded as much as 0.06 m into the soil, indicating the rate of soil accumulation since original construction. Layer I was excavated in two arbitrary levels, Layer I-1 (0-0.1 mbs), and Layer I-2 (0.10-0.21 mbs).

The soil matrix consisted of a medium reddish-brown, slightly compact silt. At 0.08 mbs, a large bedrock boulder was encountered in the SE quadrant. The remaining portion of the test unit was terminated at 0.21 mbs, at which point there was an increase in compactness of soil, and no indication of a cultural deposit.

From excavation findings, it was concluded this feature may have been used as a temporary habitation site.

FEATURE B: Wall segment
FUNCTION: Habitation
DIMENSIONS: 5.50 m by 1.30 m by 0.35 m (approx.)
DESCRIPTION: "A low, rough, linear windbreak wall (c. 1.3 m. wide, 6.2 m. long, 35 cm. high) shelters a level bedrock surface (c. 6 by 5 m. in area) on its leeward side, and is located on a low bedrock rise." (Kaschko 1984:13).

Feature B consists of small basalt boulders and large cobbles, placed on a low, flat area of bedrock. The wall may have originally been a section of an enclosure or U-shaped shelter, opening to the west as a bifaced, core-filled wall. Two N-S alignments are apparent along the edges of the wall, with two possible corners at the ends leading to the west on the flat area of bedrock. Stones may have been removed during the construction of the railroad bed, c. 20 m to the northwest. There is coral scatter on the bedrock flat, and coral is visible within the wall.

SITE NO.: State: 12439 PHRI: KK-11 *(Figure B-9)*
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Rocky knoll area, consisting of exposed bedrock overlooking the coast line.
VEGETATION: Grasses, 'ilima and kiawe
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial/ceremonial
DESCRIPTION: Overall complex area measures c. 45 m (N-S) by 36 m (N-W).

A 0.5 m by 0.5 m test unit (TU-3) was excavated in an area of piled boulders and cobbles, where there appeared to be rough facing on the north and east sides. After removing a large upright slab on the surface, 0.04-0.08 m of soil was excavated; this appeared to be aeolian silt, and was sterile. Excavation was terminated at 0.14 mbs, at a crack in the exposed bedrock.

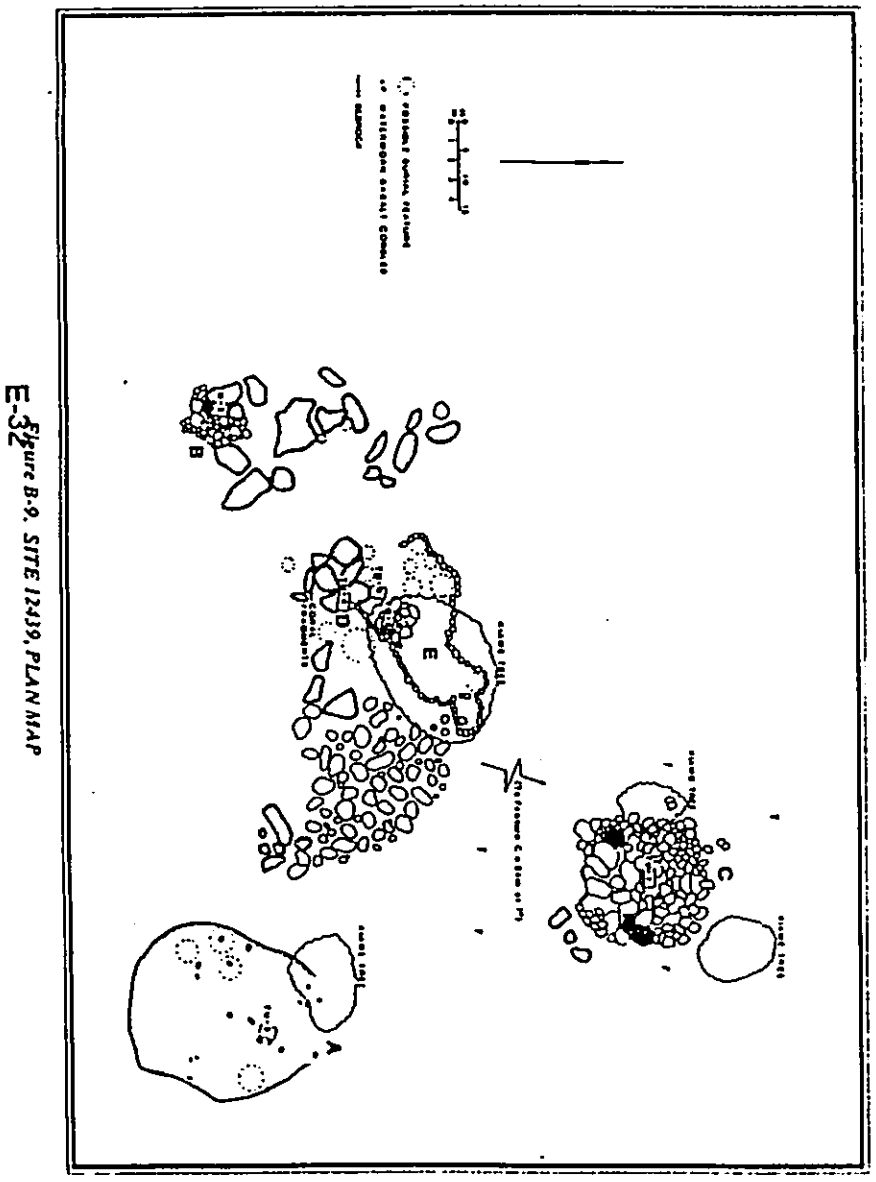
FEATURE A: Mound
FUNCTION: Possible burial
DIMENSIONS: 12.00 m by 8.00 m by 0.90 m (approx.)
DESCRIPTION: Roughly rectangular in plan view; it consists of angular basalt cobbles and small boulders, loosely piled between and on top of a bedrock outcropping. A possible alignment, short and stacked, is present near the northeast corner. It measures c. 1.75 m in length, and is two to three courses high. Also noted were c. 17 waterworn basalt cobbles.

FEATURE B: Modified outcrop
FUNCTION: Ceremonial
DIMENSIONS: 2.70 m by 2.10 m by 0.40 m (approx.)
DESCRIPTION: This feature is situated in an area between large bedrock outcrops. Roughly rectangular shape in plan view, it resembles a low platform. It consists of piled angular basalt cobbles, with a concentration of weathered coral and a few waterworn basalt cobbles.

"The southwestern structure—a possible shrine, is c. 4.6 m. long and 4.2 m. wide. It is a rough mound with a central cavity among bedrock boulders, which includes abundant coral fragments and waterworn basalt cobbles and boulders. The structure is situated at the high point of the hill." (Kaschko 1984:14).

A 1.0 m by .50 m test unit (TU-2) was excavated on the surface of the mound, next to a bedrock boulder. Layer I, 0-0.38 mbs, consisted of small-to-medium, angular basalt cobbles, twenty-one coral fragments, and two waterworn basalt cobbles.

A floor of soil was designated Layer II, which was excavated in two arbitrary levels, Layer II-1 (0.38-0.48 mbs), and Layer II-2 (0.48-0.60 mbs). The Layer II matrix consists of light- to medium-brown, loose, very fine silt with a high density of fine roots, and 10% density of gravels. Layer II-1 contained 15 small, angular basalt stones, a small amount of charcoal, and several tiny coral fragments. The charcoal (PHRI# 608) was submitted for radiocarbon age-determination analysis. The sample yielded calibrated ranges of AD 1430-1670, 1775-1793, and 1948-1953. Layer II-2 was very similar in content to Layer II-1.



E-32 Figure B-9. SITE 12439, PLAN MAP

Excavation was terminated at 0.6 mbs, after uncovering Layer III, a sterile, reddish-brown, compact silt.

FEATURE C: Modified outcrop
FUNCTION: Possible burial
DIMENSIONS: 7.50 m by 7.10 m by 1.20 m (approx.)
DESCRIPTION: A bedrock outcrop with roughly-piled boulders on the surface. "The northern platform (c. 6.23 m. wide, 6.7 m long, 85 cm. high) consists of roughly-placed boulders, piled around and upon several larger bedrock boulders." (Kaschko 1984:14).

A 1 m by 1 m test unit (TU-1) was placed and excavated in the center of the piled cobbles. Layer I consisted of 0.55 m of angular cobbles and boulders, with no other cultural deposit except stones. Layer II appeared under a cobble deposit, and consisted of aeolian silt. This layer was 0.08 m thick, and culturally sterile.

Layer III consisted of compact reddish-brown, silty clay, and was excavated in three arbitrary levels: Layer III-1 (0.63-0.73 mbs), Layer III-2 (0.73-0.83 mbs), and Layer III-3 (0.83-0.87 mbs). All three levels were sterile; no cultural material was recovered.

FEATURE D: Modified outcrop
FUNCTION: Burial
DIMENSIONS: 1.20 m by 1.10 m by 0.50 m (approx.)
DESCRIPTION: A roughly-level pile of weathered basalt cobbles and boulders. It is built within a triangular cleft between three large bedrock boulders. Feature D has one side crudely-faced, one upright slab, and a low, stacked wall measuring c. 0.5 m. There are several waterworn cobbles incorporated in the fill, along with a scattering of coral fragments.

Two test units were excavated in this feature: TU-4 (0.6 m by 0.5 m), and TU-6 (0.5 m by 0.5 m). TU-4 was located on the southeast side of a large bedrock boulder. Layer I consisted of 0.25 m of small-to-medium, angular basalt cobbles and waterworn coral fragments. Layer II consisted almost entirely of small waterworn fragments, with a small amount of aeolian silt, and was excavated in three arbitrary levels. Layer II-1 (0.25-0.35 mbs) contained numerous small waterworn coral fragments, and many small bird and fish bones. Layer II-2 (0.35-0.42 mbs) contained somewhat larger waterworn coral fragments, and the same density of bird and fish bone, some of which appear to be burned. Layer III (0.42-0.49 mbs) consisted of medium-brown, slightly compact silt, which was culturally sterile, and excavation was terminated at 0.49 m below suface on solid bedrock.

TU-6 (0.5 m by 0.5 m) was located on the north side of the same large bedrock boulder as TU-4, and was excavated in three arbitrary levels. Layer I-1 (0-0.10 mbs) consisted of medium- to grayish-brown, loose silt, with a high density of small- to medium-sized waterworn coral fragments, and small waterworn basalt cobbles. This level contained bone fragments, including bird, fish, and rodent bones. Layer I-2 (0.10-0.20 mbs) was similar to the previous level, but there was a decrease in both waterworn coral and basalts, and several chunks of charcoal were collected from the screen. Layer I-3 (0.20-0.32 mbs) showed no change in soil or coral density from the previous level. At 0.3 m below surface, a human burial was encountered. Another two centimeters were excavated to confirm articulation, and the test unit was then photographed and backfilled.

FEATURE E: Modified outcrop
FUNCTION: Possible burial
DIMENSIONS: 1.80 m by 1.60 m by 0.55 m (approx.)
DESCRIPTION: Roughly oval in plan view, Feature E consists of piled boulders, and has several slabs which are possibly fallen uprights. Underneath the surface boulders is a cobble-boulder fill, incorporating waterworn cobbles and coral fragments. The bedrock area around Feature E has similar areas of piled cobbles and boulders.

A 1.0 m by 0.5 m test unit (TU-5) was excavated in the northeast portion of the feature. The surface was covered with small-to-large angular basalt stones, as well as coral and waterworn basalt cobbles. Layer I (0-0.35 mbs) consisted of basalt cobbles, seven coral fragments, and a few waterwon basalt cobbles. Layer II (0.35-0.43 mbs) consisted of light- to medium-brown, loose, fine silty clay with a high density of fine roots. It also contained sixty-plus waterworn coral fragments, and a few specks of charcoal which were discarded. At c. 0.43 mbs, bedrock was exposed in the west half of the test unit, and sterile soil in the east half. Layer III (0.43-0.50 mbs) consisted of slightly compact, reddish-brown silty clay, with a moderate density of gravels, and was determined to be sterile. Bedrock was encountered at c. 0.5 mbs, and the excavation was terminated at this point, where the entire floor consists of exposed bedrock.

Excavation findings yielded further evidence for the determination that the site function was burial-ceremonial.

SITE NO.: State: 12440 PHRI: KK-12
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Situated on a fairly steep and rocky slope.
VEGETATION: Grasses and kiawe
CONDITION: Poor-fair

INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial
DESCRIPTION: Overall complex area measures c. 18 m (E-W) by 15 m (N-S).

FEATURE A: Modified outcrop
FUNCTION: Burial
DIMENSIONS: 18.50 m by 10.20 m by 1.00 m (approx.)
DESCRIPTION: According to Kaschko (1984:14), "The main feature [Feature A] (c. 18.5 m. long, 10.2 m. wide, and up to 1.0 m. high) consists of roughly stacked basalt boulders and cobbles adjacent to and/or surrounding large, bedrock boulders. It is situated on a fairly steep rocky slope. Some waterworn basalt boulders are present on the surface of the structure, and it has the appearance of several collapsed, abutting, rough platforms or terraces. The form and size of this feature suggest it is probably a multiple burial structure, containing perhaps as many as a dozen or more individual burials."

A c. 0.5 m by 0.5 m test unit (TU-2) was excavated in the northwest portion of the feature. Layer I (0-0.55 mbs) consisted of angular basalt cobbles, and contained no other cultural materials. Layer II (0.55-0.68 mbs) was determined to be burial pitfill. At c. 0.68 mbs, human bone fragments were exposed, and three human teeth were recovered from the screen. The burial was badly deteriorated. A photograph and soil sample were taken, and the test unit was backfilled to protect the burial.

FEATURE B: Mound
FUNCTION: Burial
DIMENSIONS: 2.60 m by 2.00 m by 1.30 m (approx.)
DESCRIPTION: "One small, collapsed platform (c. 2.0 m. by 2.0 m. square, 50 cm high) is located separately, a few meters on the inland side of the large feature [Feature A]." (Kaschko 1984:14). Roughly rectangular in plan view, it consists of piled to crudely stacked cobbles on the northwest side of a slight slope. Waterworn basalt cobbles were noted.

A 0.5 m by 0.5 m test unit (TU-1) was excavated in the center of the feature. Layer I (0-0.75 mbs) consisted of small boulders and medium-to-large angular and waterworn cobbles; no other cultural materials were recovered. Layer II (0.75-0.84 mbs) consisted of medium-brown, silty loam, and at c. 0.79 mbs, fragmented human bone was exposed. After proper identification, the test unit was backfilled to protect skeletal remains.

Excavation findings yielded further evidence supporting the functional interpretation of this feature as a burial.

SITE NO.: State: 12441 PHRI: T-1 *(Figure B-10)*
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of exposed bedrock that is fairly steep to the S-SE, and gentle to the NW, beyond the complex.
VEGETATION: Thick grasses and moderate density of kiawe trees.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overall complex area measures c. 44 m (N-S) by 18 m (E-W).

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 17.00 m by 16.00 m by 0.70 m (approx.)
DESCRIPTION: Generally U-shaped in plan view, the enclosure incorporates bedrock outcrops and boulders into walls. Portions of the walls contain stacked, angular basalt boulders and cobbles. A natural bedrock terrace divides the structure roughly in two, so it appears to have upper and lower halves. Portions of the structure may have had boulders and cobbles removed for the construction of Site 12431, the Old Historic Railroad Bed Wall.

Midden scatter is present throughout the interior of the structure, with a high density in the NE corner of the upper half, near two uprights. A cultural deposit appears in both the upper and lower halves within the structure, but seems to be thicker in the upper half.

Two 0.5 m by 0.5 m test units (TU-1 and TU-2) were excavated within the structure. Both revealed a thick, rich cultural deposit.

TU-1 (0.5 m by 0.5 m) was excavated in the northeast corner on the upper half of the structure. Surface collection of this unit yielded one coral abrader, and one polished basalt flake. Layer I was excavated in two arbitrary levels, consisting of a very dark-brown, loose, fine silty loam, with a gravel density of c. 30%. Layer I-1 (0-0.10 mbs) contained a large deposit of marine shell midden (*Cellana, Trochus intextus, Nerita picea, Littorina pintado, Cypraeidae, Thaididae, Operula*, Echinoidea and Crustacea), charcoal, and non-human bone. Indigenous portable artifacts recovered from TU-1, Layer I-1 include a bone fishhook discovered in situ, four echinoid abraders, five basalt and twenty-three volcanic glass flakes, and one historic glass fragment.

Layer I-2 (0.10-0.17 mbs) consisted of a matrix similar to the previous level, except the color of the soil gradually changed to a dark grayish-brown, which apparently was caused by leaching. This level contained a large deposit

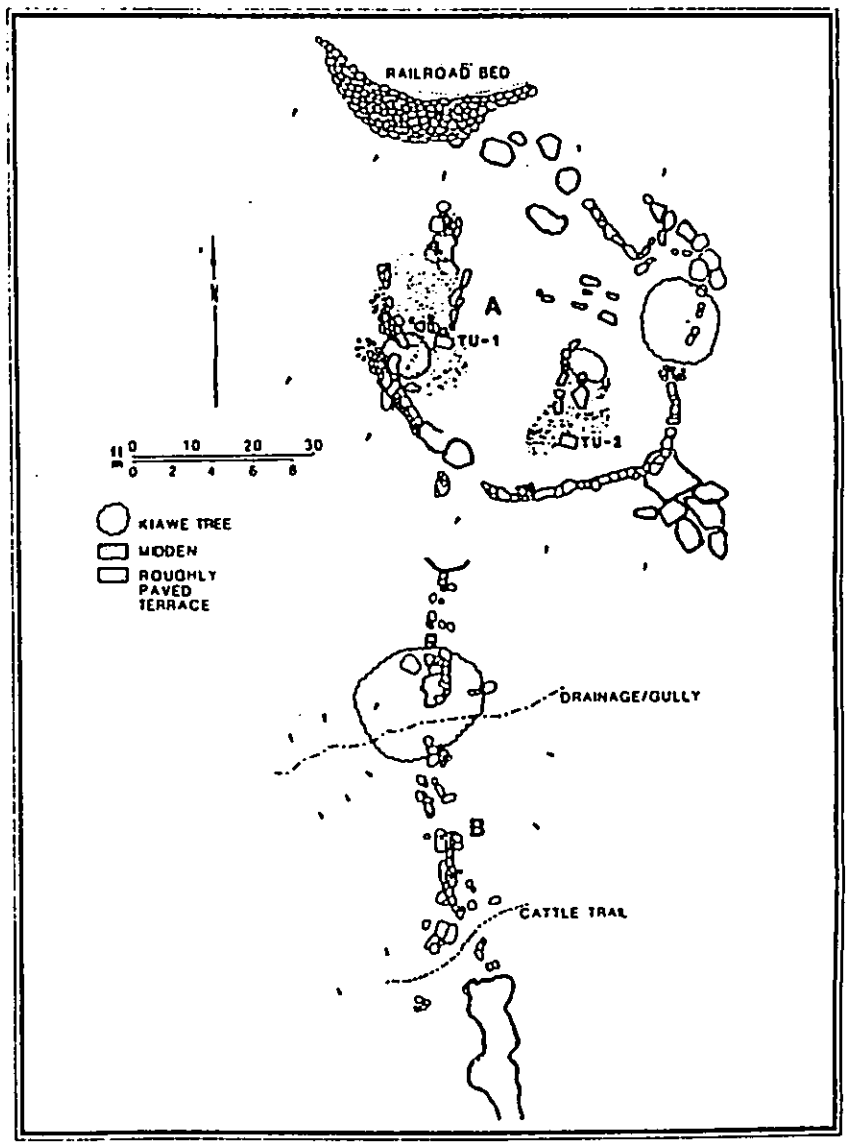


Figure B-10, SITE 12441, PLAN MAP

of marine shell midden (*Cellana, Nerita picea, Lutorina punctata, Cypraeidae, Thaididae*, an unidentified gastropod, Isognomonidae, Echinoidea, and Crustacea), charcoal, and non-human bone. The sample of charcoal (PHRI# 600) was submitted for radiocarbon age-determination analysis. The calibrated range yielded was modern. Indigenous portable artifacts include one shell fishhook, one echinoid abrader, and one basalt and two volcanic glass flakes.

Layer II (0.17-0.26 mbs) consisted of slightly compact, reddish-brown silty clay, with a high density of small, angular cobbles and gravel. A small amount of marine shell midden was recovered (*Cellana, Nerita picea, Planaxis labiosa, Cypraeidae, Thaididae*, Isognomonidae, Chamacea, Veneridae, and an unidentified gastropod), and a small amount of non-human bone. These cultural remains are attributed to natural leaching of the soil, since they appear to have been recovered in the top portion of the level. Excavation was terminated at c. 0.26 mbs.

TU-2 (0.5 m by 0.5 m) was excavated on the lower half of the enclosure, within the structure. As in TU-1, a cultural layer was evident, but not as rich in content. Layer I (0-0.08 mbs) consisted of loose, medium-brown organic duff, and contained marine shell midden (*Cellana, Nerita picea, Cypraeidae, Thaididae, Conidae*, and Echinoidea). Indigenous portable artifacts found include three basalt flakes.

Layer II was excavated in two arbitrary levels, consisting of blackish-brown, loose and powdery, silty loam. Layer II-1 (0.08-0.15/0.18 mbs) contained a large amount of marine shell midden (*Cellana, Nerita picea, Cypraeidae, Thaididae, Conidae*, and Echinoidea), and a very small amount of non-human bone. Indigenous portable artifacts found include two volcanic glass flakes. Layer III was exposed at c. 0.15 mbs in the south quadrant, and at c. 0.18 m in the remaining three quadrants of the test unit.

Layer II-2 (0.18-0.28 mbs) contains small to medium sized cobbles embedded within the layer. These cobbles appear to be possible paving, but further mitigation of the surrounding area is recommended for a better understanding of the deposit. This layer ended at c. 0.28 mbs on reddish-brown, compact soil, and was sterile. Excavation was terminated at this point.

Excavation findings further support the functional interpretation of this site as habitation.

FEATURE B: Wall segment
FUNCTION: Boundary
DIMENSIONS: 25.00 m by 0.70 m by 0.70 m (approx.)
DESCRIPTION: This feature extends from the NW corner of Feature A, and roughly N-NW to the Site 12442 Complex. The portion of the wall closest to Feature A is low, but beyond c. 20-25 meters it becomes a boulder alignment, intermittent at times. The wall consists of small, angular basalt boulders and large cobbles stacked on top of and between natural outcrops. The seaward end is very discontinuous, which could be attributed to the terrain, or cattle and ranching activities.

SITE NO.: State: 12442 PHRI: T-2
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Situated on a flat grass terrace adjacent to a gully.
VEGETATION: Thick grasses and open kiawe forest.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Indeterminate (Agriculture?)
DESCRIPTION: Overall complex area measures c. 30 m (N-S) by 19 m (E-W).

FEATURE A: Paved area
FUNCTION: Indeterminate (Agriculture?)
DIMENSIONS: 6.30 m by 3.50 m by 0.20 m (approx.)
DESCRIPTION: Feature A is a roughly level and paved area, with weathered basalt cobbles. The paved area is bounded by rock alignments along the north, west, and east sides. These alignments are well-bedded, and may be the basal portions of removed walls. A small, recently constructed pile of rocks is located along the east side.

A 1.0 m by 0.50 m test unit (TU-1) was excavated in the center of the roughly paved area. Layer I was excavated in three arbitrary levels, and consisted of slightly compact, medium reddish-brown silt. Layer I-1 (0-0.10 mbs) contained three historic glass fragments. Layer I-2 (0.10-0.20 mbs) contained twenty-five historic glass fragments. Layer I-3 (0.20-0.23/0.37 mbs) contained four glass fragments. This layer terminated onto Layer II at 0.23 m below surface in the east portion of the unit, and at 0.37 m below suface in the west portion of the unit. Layer II (0.23/0.37 mbs) consists of reddish-brown silty clay with a high density of decomposing basalt pebbles. No cultural material was recovered in this layer, and excavation was terminated at c. 0.37 m below surface.

Excavation findings yielded further evidence of the functional interpretation of this site as having possible agricultural applications.

FEATURE B: Mound
FUNCTION: Indeterminate (Agriculture?)
DIMENSIONS: 5.00 m by 4.00 m by 0.40 m (approx.)
DESCRIPTION: A scattered pile of basalt cobbles and small boulders lying on semi-exposed bedrock outcropping. Some waterworn cobbles were noted.

FEATURE C: Wall segment
FUNCTION: Indeterminate (Agriculture?)
DIMENSIONS: 8.00 m by 0.70 m by 0.45 m (approx.)
DESCRIPTION: Feature C is in very poor condition, but appears to have been a double-stacked wall, c. three courses high, without rubble fill. The wall stones are large, angular cobbles and small boulders.

SITE NO.: State: 12443 PHRI: T-3
SITE TYPE: Modified outcrop
TOPOGRAPHY: Terrain consists of a rocky slope with an adjacent drainage.
VEGETATION: Kiawe, grasses, and 'ilima
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 2.30 m by 1.10 m by 0.55 m (approx.)
DESCRIPTION: Generally linear in plan view between large bedrock boulders, it is abuts bedrock outcrops along the east end. The pile is fairly level, with two upright slabs at the western end that function as retainers. One waterworn cobble was noted.

A c. 0.6 m by 0.7 m test unit (TU-1) was excavated along the east portion of the feature. Layer I (0-0.20 mbs) consisted of angular basalt cobbles and one waterworn cobble, with no other cultural material recovered. Layer II was excavated in two 0.10 m arbitrary levels, consisting of reddish-brown, very compact, silty clay with a high density of weathered basalt gravels. Layer II-1 (0.20-0.30 mbs) and Layer II-2 (0.30-0.40 mbs) contained no cultural material. Excavation was terminated at 0.40 m below surface.

Lacking cultural material, the functional interpretation of this site remains indeterminate.

SITE NO.: State: 12444 PHRI: T-4
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Situated on a flat, gently sloping grassy area in an open kiawe forest, c. 120 m inland from the coast.
VEGETATION: Grasses, kiawe and sparse 'ilima
CONDITION: Poor-fair
INTEGRITY: Possibly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overall complex area measures c. 38 m (E-W) by 21 m (N-S).

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 5.50 m by 5.00 m by 0.40 m (approx.)
DESCRIPTION: Generally rectangular in plan view, it lies partially on bedrock. It is bifaced and core-filled. The corners are square, portions of the walls are collapsed, and the interior is paved where the floor is visible.

A 0.5 m by 0.5 m test unit (TU-1) was excavated roughly in the center of the structure, in two arbitrary levels. Layer I-1 (0-0.08 mbs) consisted of dark reddish-brown silt, with many small basalt cobbles which may represent paving, and contained a sparse midden deposit (*Cellana, Nerita picea, Cypraeidae, Thaididae, Conidae*, and Echinoidea), and a small amount of non-human bone. At c. 0.03 m below suface, a small ash lens was encountered measuring 0.10 m by 0.10 m and 0.03 m thick, and a bulk soil sample was taken. The shallow depth and thickness of this deposit suggest that it is associated with modern activity.

Layer I-2 (0.08-0.18 mbs) consisted of reddish-brown, sandy silt, and contained a high density of weathered basalt gravels. At 0.13 m below surface, a coral abrader was found in situ, and one volcanic glass flake was recovered in the screen. As the excavation continued, this layer began to increase in rock density and compactness so the excavation was terminated at c. 0.18 m below surface.

FEATURE B: L-shaped alignment
FUNCTION: Habitation
DIMENSIONS: 10.00 m by 7.00 m by 0.60 m (approx.)
DESCRIPTION: Feature B consists of several boulder/cobble alignments, in conjuction with some natural bedrock outcropping. The main alignment is oriented roughly NW-SE as a possible windbreak, and a smaller alignment is oriented roughly NE-SW. The NW-SE alignment appears to be the base of a double-stacked wall. The surface interior suggests paving, but wall collapse makes this difficult to ascertain. This feature may have been three-sided, or an enclosure. A possible hearth was noted at the NE corner, with fallen uprights and one waterworn cobble present.

A 0.5 m by 0.5 m test unit (TU-2) was excavated in the northeast portion of the feature. Prior to excavation, one basalt flake was collected from the surface. Layer I was excavated in two arbitrary levels consisting of dark reddish-brown, loose, silty clay. Layer I-1 (0-0.10 mbs) contained

a moderate deposit of marine shell midden (*Cellana, Trochus intextus, Nerita picea, Littorina pintado, Strombus maculatus, Cypraeidae, Thaididae*, Isognomonidae, Echinoidea, Crustacea, and unidentified gastropods), and a small amount of non-human bone. At c. 0.07 m below surface, the excavation uncovered an ash lens, designated as Horizontal Feature 1 (HF-1), measuring c. 0.30 m by 0.17 m by 0.07 m thick. A bulk soil sample was taken and a profile drawn. Indigenous portable artifacts include two echinoid abraders, one bone pick, and two volcanic glass flakes.

Layer I-2 (0.10-0.18 mbs) contained some marine shell midden (*Cellana, Nerita picea, Cypraeidae, Thaididae*, and Echinoidea), and some non-human bone. At c. 0.10 m below surface, a possible hearth was uncovered in the west third of the unit, designated Horizontal Feature 2 (HF-2), measuring c. 0.50 m by 0.18 m by 0.16 m thick. This was excavated and screened separately, and contained shell midden and charcoal. The charcoal sample (PHRI# RC-601) was submitted for radiocarbon age-determination analysis. This sample yielded a calibrated range of AD 461-479 and 520-1170. HF-2 terminated at c. 0.26 m below surface, and the bottom was lined with small basalt cobbles. A bulk soil sample was taken and a profile drawn of HF-2.

FEATURE C: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 5.50 m by 4.00 m by 0.45 m (approx.)
DESCRIPTION: Two stone alignments oriented NW-SE, abutting an outcrop to the northwest. These alignments are possibly collapsed walls. The lower NW-SE alignment is 3.35 m by 1.60 m wide, and the upper NW-SE alignment is 1.60 m and 0.90 m wide. A smaller section oriented NE-SW and measuring c. 1.4 m by 0.7 m in width, abuts a large boulder at the east corner. Boulder and cobble rubble is present along the perimeter of Feature C, and may be associated with the feature. Stones may have been stacked as a windbreak, or removed from the level area southwest (leeward) of the feature. Also noted were piled cobbles and small boulders around the kiawe trees in the area.

FEATURE D: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 7.00 m by 5.00 m by 0.75 m (approx.)
DESCRIPTION: A stacked boulder and cobble alignment is oriented E-W. It abuts the north edge of a natural outcrop. In addition, the area to the south and west has natural bedrock which slopes westward.

Three test units (TU-3, TU-4, and TU-5) measuring 1.00 m by 1.00 m, 1.70 m by 1.70 m, and 1.00 m by 1.00 m respectively, were excavated on the northeast side and abutting the feature. TU-3 was situated directly between TU-4 (to the south) and TU-5 (to the north).

TU-3 Layer I (0-0.27 mbs) consisted of two large basalt cobbles and many small angular basalt cobbles, containing a small amount of marine shell midden (*Hipponicidae, Cypraeidae*, and *Thaididae*).

Layer II was excavated in three arbitrary levels, consisting of blackish-brown, loose, silty loam, and a 45% density of small, angular basalt cobbles and gravels. Layer II-1 (0-0.10 mbs) contained a large deposit of marine shell midden (*Cellana, Trochus intextus, Nerita picea, Theodoxus, Littorina pintado, Cypraeidae, Thaididae, Conidae*, Isognomonidae, Echinoidea, and Crustacea), coral, non-human bone, and charcoal. Indigenous portable artifacts include five coral abraders and three basalt flakes.

Layer II-2 (0.10-0.20 mbs) exhibited a decrease in small angular basalt cobble density to 35-40%. This level contained a marine shell midden deposit approximately half the size of that found in the previous level (*Cellana, Trochus intextus, Nerita picea, Theodoxus, Littorina pintado, Cypraeidae, Thaididae*, Isognomonidae, Tellinidae, Veneridae, and Echinoidea), non-human bone (fish, rodent, and pig), and charcoal. Indigenous portable artifacts include two shell fishhooks, two coral abraders, one basalt flake, and one polished basalt flake.

Layer II-3 (0.20-0.27 mbs) had soil mottled by a reddish-brown, silty clay, and contained a drastic decrease in marine shell midden (*Cypraeidae, Thaididae, Anachis miser*, and Echinoidea). The mottled soil and small deposit of marine shell midden are probably results of natural leaching in the soil. Layer III was encountered at 0.27 m below surface, where the soil became reddish-brown, compact, silty clay, which appeared to be culturally sterile. Excavation was terminated at c. 0.3 m below surface.

TU-4 extended TU-3 by 0.70 m, and was excavated in four layers. Layer I (0-0.05 mbs) consisted of light brown, loose, loamy silt, with a high density of fine roots and a few small angular basalt cobbles, and contained a small amount of marine shell midden (*Cellana, Nerita picea, Cypraeidae, Thaididae*, and Echinoidea).

Layer II (0.05-0.32 mbs) was excavated in three 0.10 m arbitrary levels, and consisted of blackish-brown, loose, silty loam, with a moderate density of small angular basalt cobbles and gravels. This layer coresponds with Layer II in TU-3 in content and consistency, and terminates at c. 0.32 m below surface.

Layer III (0.05-0.35 mbs) appeared in the southwest corner of the test unit at 0.05 m below surface, and appeared to be a possible burial pit outline, but terminated at c. 0.35 m below surface with no burial present. This layer was excavated in three 0.10 m arbitrary levels, consisting of light to medium-brown, loose, powdery silt. The entire layer contained a trace of marine shell midden and a few bits of charcoal.

Layer IV (0.35-0.45 mbs) consisted of reddish-brown, compact clay, with a high density of decomposing bedrock, and was culturally sterile. This layer was present throughout the unit at c. 0.35 m below surface. It was excavated to 0.45 m below surface, where the unit was terminated.

TU-5 (1 m by 1 m) is located directly north of TU-3, and was excavated in three layers. Layer I (0.09-0.12 mbs) consisted of small, angular basalt cobbles on the surface; there was no cultural recovery.

Layer II (0.12-0.22 mbs) exists only in the south 0.30 m of the test unit. This layer consists of blackish-brown, loose, silty loam, as in Layer II of TU-3. It contained a large deposit of marine shell midden, charcoal, and bone fragments (pig, rodent, and fish). Indigenous portable artifacts include one shell fishhook, two coral abraders, one basalt adze, and two basalt flakes. This layer was terminated at c. 0.22 m below the surface within reddish-brown, sterile, compact silty clay.

Layer III (0.12-0.24 mbs) exists in the north portion of the unit, and consists of light to medium-brown, silty loam. This layer terminated at c. 0.24 m below the surface on bedrock.

SITE NO.: State: 12445 PHRI: T-5
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Generally level terrain, with small, rolling knoll.
VEGETATION: Thick grasses, moderate density of kiawe trees and 'ilima.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DESCRIPTION: Overall complex area measures c. 7.0 m (N-S) by 3.7 m (E-W).

FEATURE A: Mound
FUNCTION: Agriculture
DIMENSIONS: 3.20 m by 2.90 m by 0.35 m (approx.)
DESCRIPTION: Roughly circular to ovoid in plan view, it is a low pile of small-to-large, angular basalt cobbles.

A 1.00 m by 0.50 m test unit (TU-2) was excavated, approximately in the center of the feature. Layer I (0-0.27 mbs) consisted of small, medium, and large angular basalt cobbles, and contained no cultural material.

Layer II was excavated in two arbitrary levels, consisting of mottled light and medium-brown, loose silt, with a high density of fine roots, and a 30% density of small, angular basalt cobbles and gravels. Layer II-1 (0.27-0.37 mbs) contained a small amount of midden (*Cypraeidae*, and *Thaididae*). Layer II-2 (0.37-0.44 mbs) contained no cultural material. Excavation was terminated at c. 0.44 m below surface on Layer III, a reddish-brown, silty clay with a very high density of small, angular basalt cobbles and gravels, determined to be sterile.

FEATURE B: Mound
FUNCTION: Agriculture
DIMENSIONS: 2.50 m by 2.10 m by 0.38 m (approx.)
DESCRIPTION: Roughly circular in plan view, it is a low pile of small-to-medium angular basalt boulders and cobbles. In most places it is 1-2 cobbles high, but in general it is randomly piled.

A 1.00 m by 0.50 m test unit (TU-1) was excavated in the approximate center of the feature. Layer I (0-0.20 mbs) consisted of small-to-medium angular basalt cobbles, containing no cultural material. Layer II (0.20-0.33 mbs) consisted of mottled light to medium-brown and grayish-brown, loose silt, with a high fine-root density, and a few small angular basalt cobbles. This layer contained a very small amount of marine shell midden (*Cypraeidae*). Layer III (0.33-0.40 mbs) consisted of reddish-brown, compact, silty clay, with a high density of small, angular basalt cobbles and gravels. No cultural material was recovered in this layer. Excavation was terminated at c. 0.40 m below surface, and 0.07 m into Layer III, which was sterile.

Excavation findings at this site, particularly the absence of a habitation deposit, helped to determine its functional interpretation as agricultural clearing mounds.

SITE NO.: State: 12446 PHRI: T-6
SITE TYPE: Modified outcrop
TOPOGRAPHY: Terrain consists of a fairly level to gently sloping surface, consisting of exposed bedrock outcropping with a thin soil cover.
VEGETATION: Moderate density of kiawe trees, 'ilima and thick grasses
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 8.00 m by 3.40 m by 0.50 m (approx.)
DESCRIPTION: A rough terrace incorporating the natural, exposed alignment of bedrock outcropping with small, angular basalt cobbles stacked and placed between the bedrock. Remnants of what appear to be small agricultural planting areas, measuring c. 1.0 m by 0.75 m, are situated west of the feature, toward the bottom of the outcrop. They are shielded from the wind, and are located for catching rainfall runoff from upslope.

Two test units were excavated in this feature. Test Unit 1 (TU-1, 1.00 m by 0.50 m) was located in the center of the terraced portion of the feature. Layer I (0-0.31 mbs) consisted of small, medium, and large angular basalt cobbles, containing no cultural material. Layer II (0.31-0.37 mbs) consisted of medium-brown, loose, loamy silt, with a high density of fine roots and a 15-20% density of small, angular basalt cobbles and gravels. No cultural material was recovered. Layer III (0.37-0.40 mbs) consisted of reddish-brown, slightly compact, silty clay, with a 50-60% density of small angular basalt cobbles and gravels. No cultural material was recovered, and excavation was terminated at this point.

A 0.5 m by 0.5 m test unit (TU-2) was excavated directly west of the south half of TU-1, located inside one of the agriculture planting areas. Layer I was excavated in two abitrary levels. Layer I-1 (0-0.10 mbs) consisted of mottled light and medium-brown, loamy silt, and contained three marine shell fragments. At 0.04 m below surface, a mottled, fine ash deposit was encountered, and designated Horizontal Feature 1 (HF-1). The test unit was bisected north and south at this point for a profile, and excavated separately.

Layer I-2 (0.10-0.23 mbs) contained the above ash deposit, with no cultural recovery. Layer II (0.23-0.33 mbs) consisted of reddish-brown, compact, fine silt, with a high density of small, angular basalt cobbles, with the deposit of cobbles increasing toward the bottom of the level, but no cultural recovery. Excavation was terminated at 0.33 m below surface, in sterile Layer II.

Excavation findings further confirmed the functional interpretation of this site as agricultural.

SITE NO.: State: 12447 PHRI: T-7 *(Figure B-11)*
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Drainage area to the south. Terrain is of exposed bedrock outcropping that consists of a gentle slope to the ocean, with a small, flat knoll to the northeast.
VEGETATION: Thick grasses, moderate to dense 'ilima and kiawe.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overall complex measures c. 13.5 m (N-S) by 11.0 m (E-W).

FEATURE A: Rubble concentration
FUNCTION: Habitation
DIMENSIONS: 11.00 m by 5.50 m by 0.55 m (approx.)
DESCRIPTIONS: Feature A is constructed by the random placement of angular basalt cobbles, but seems to be contained within a concentrated area. Portions are built on bedrock. Two waterworn basalt cobbles were noted.

Two test units were excavated in Feature A, one on the north end, and one on the south end.

A 1.00 m by 0.80 m test unit (TU-1) was excavated at the south end of the feature. Layer I (0-0.45 mbs) consisted of loosely piled, angular basalt cobbles above a soil deposit; this layer contained no cultural material.

Layer II was excavated in three arbitrary levels, consisting of a dark reddish-brown silt. Layer II-1 (0.45-0.50 mbs) contained a 0.02 m thick deposit of organic duff, and a very small amount of marine shell midden (*Cypraeidae*). Layer II-2 (0.50-0.60 mbs) contained a small amount of marine shell midden (*Cypraeidae*, and Crustacea), and charcoal. The charcoal sample (PHRI# RC-609) was submitted for radiocarbon age-determination analysis. The sample yielded a calibrated range of AD 1400-1660. Indigenous portable artifacts include 1 perforated shell. Layer II-3 (0.60-0.70 mbs) was culturally sterile, and terminated on Layer III, a reddish-brown, sandy silt, with decomposing basalt. Excavation was terminated at this point.

A 1 m by 1 m test unit (TU-2) was excavated at the north end of Feature A, adjacent to a bedrock outcrop. Layer I (0-0.30 mbs) consisted of small-to-medium angular basalt cobbles; no cultural material was recovered. Layer II was excavated in four 0.1 m arbitrary levels (0.3-0.4, 0.4-0.5, 0.5-0.6, and 0.6-0.7 mbs, respectively), consisting of small, angular cobbles with brown, mottled silt. This layer contained no cultural material, with the exception of a few small coral fragments less than 0.01 m in diameter. This layer terminated on Layer III, a reddish-brown, compact, silty clay determined to be culturally sterile. Excavation terminated at this point.

Excavation findings helped to determine this site's function as a temporary habitation.

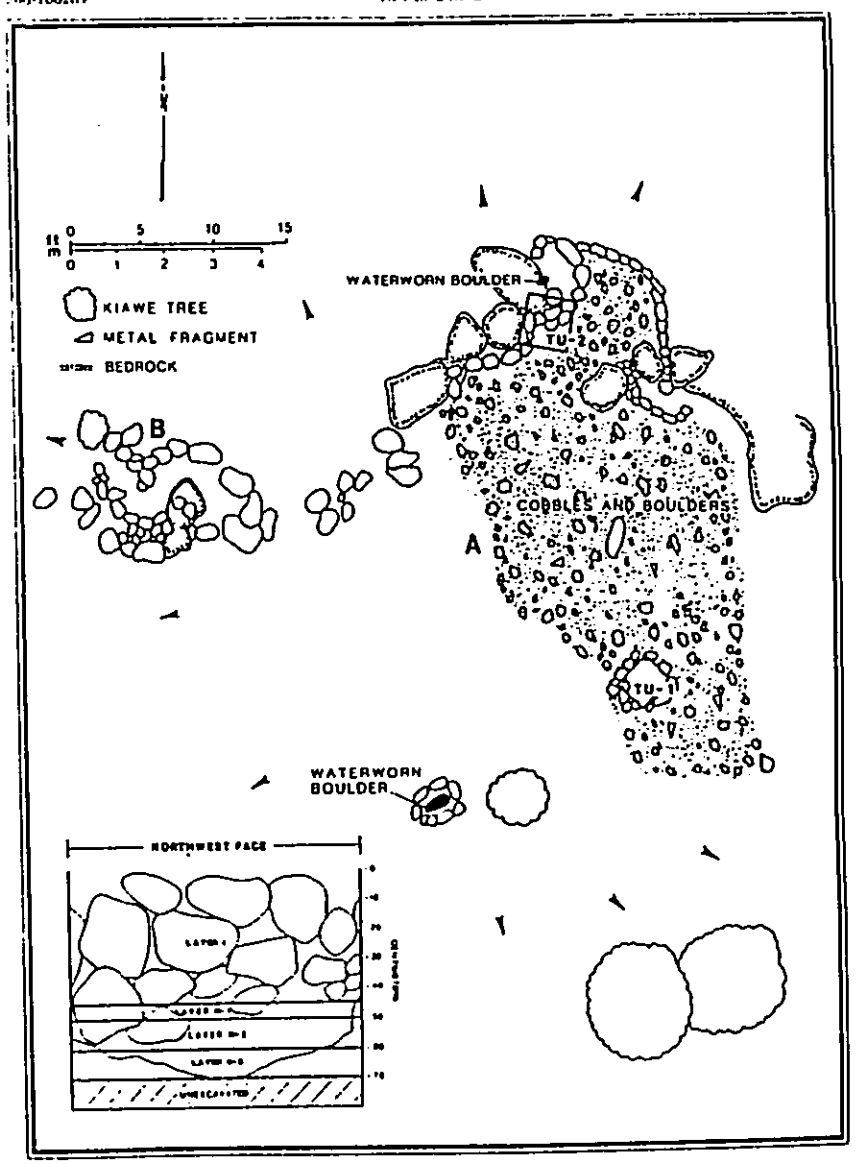


Figure B-11. SITE 12447, PLAN MAP AND PROFILE OF TU-2

FEATURE B: C-shape
FUNCTION: Habitation
DIMENSIONS: 4.00 m by 2.75 m by 0.60 m (approx.)
DESCRIPTION: Open to the W-SW, it consists of stacked, angular basalt cobbles, incorporating bedrock outcropping. A very small, semicircular alignment consisting of large, angular basalt boulders is situated immediately E-NE of Feature B.

SITE NO.: State 12448 PHRI: T-8
SITE TYPE: Modified outcrop
TOPOGRAPHY: Gently sloping hills toward the coast, consisting of exposed bedrock outcropping.
VEGETATION: Thick grasses, moderate density of 'ilima and kiawe
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 2.00 m by 1.40 m by 0.30 m (approx.)
DESCRIPTION: Angular basalt cobbles stacked and piled on top of and around several bedrock outcroppings, to a height of c. 0.30 m.

A 0.5 m by 0.5 m test unit (TU-1) was excavated along the east base of a large bedrock boulder. The surface consisted of small angular basalt cobbles, constituting a fairly level pile. Layer I (0-0.41 mbs) consisted of small and medium-sized angular basalt cobbles, containing no cultural material. Layer II was excavated in two arbitrary levels (0.41-0.51, and 0.51-0.60 mbs), consisting of light- to medium-brown, loose, silty clay, with a high density of roots, and 15% density of small, angular basalt cobbles and gravels. In Level 2 (0.51-0.60 mbs), the rock and gravel density increased to 30%. This layer was culturally sterile. At 0.60 m below surface, Layer III was exposed, and consisted of reddish-brown, compact, silty clay with a high density of decomposing bedrock; it was also culturally sterile. Excavation was terminated at c. 0.75 m below surface.

Through the findings of the excavation, this site was determined to function as a marker.

SITE NO.: State: 12449 PHRI: T-9 *(Figure B-12)*
SITE TYPE: Terrace
TOPOGRAPHY: There is a gentle downward slope to the west, a slight rise to the east and a steep high ridge to the northeast.
VEGETATION: Thick grasses, moderate density of kiawe trees and 'ilima
CONDITION: Poor
INTEGRITY: Possibly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DIMENSIONS: 9.00 m by 6.00 m by 0.40 m (approx.)
DESCRIPTION: Angular basalt boulders and waterworns are stacked and placed to form a roughly D-shaped, slightly raised terrace. The south side of the structure lies mostly on bedrock. A smaller portion, to the north, is built on c. 0.15 m of soil. The larger basalt boulders which seem to border the terrace are still in place, but many of the cobbles within the terrace seem to be missing. There appear to be many basalt cobbles outside the terrace boundaries. The surface interior is unevenly paved.

A 1 m by 1 m test unit (TU-1) was excavated on the south portion of the feature. Layer I (0-0.45 mbs) consisted of small and medium sized angular basalt cobbles, containing no cultural material. Layer II was excavated in four arbitrary .10 m levels (0.45-0.55, 0.55-0.65, 0.65-0.75, and 0.75-0.81 mbs, respectively), consisting of medium-brown, loose, fine-grained silt, with a high density of fine to small roots, and a 20% density of small, angular basalt cobbles. Only Level 1 (0.45-0.55 mbs) contained five marine shell fragments. At 0.57 m below surface, Layer IV, consisting of reddish-brown, compact, sterile silty clay, was exposed in the southwest quadrant of the unit, at 0.59 m below surface in the southeast quadrant, and at 0.81 m below surface in the northwest quadrant. An ash deposit was uncovered at 0.57 m below surface in the northeast quadrant, measuring c. 0.60 by 0.30 m and 0.19 m thick. This was excavated separately and designated Horizontal Feature 1 (HF-1). This deposit consisted of grayish-brown, loose, powdery ash, and contained no cultural material. HF-1 terminated at c. 0.74 m below surface onto Layer IV. Excavation was terminated at this point. No cultural materials were recovered.

Through the excavation findings, the functional interpretation of habitation was further confirmed.

SITE NO.: State 12450 PHRI: T-10 *(Figure B-13)*
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: A high ridge is to the northeast, and a gently sloping drainage is to the southwest.
VEGETATION: Thick grasses, some 'ilima, and moderate density of kiawe
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial
DESCRIPTION: Overall complex area measures c. 8.6 m (E-W) by 7.0 m (N-S).

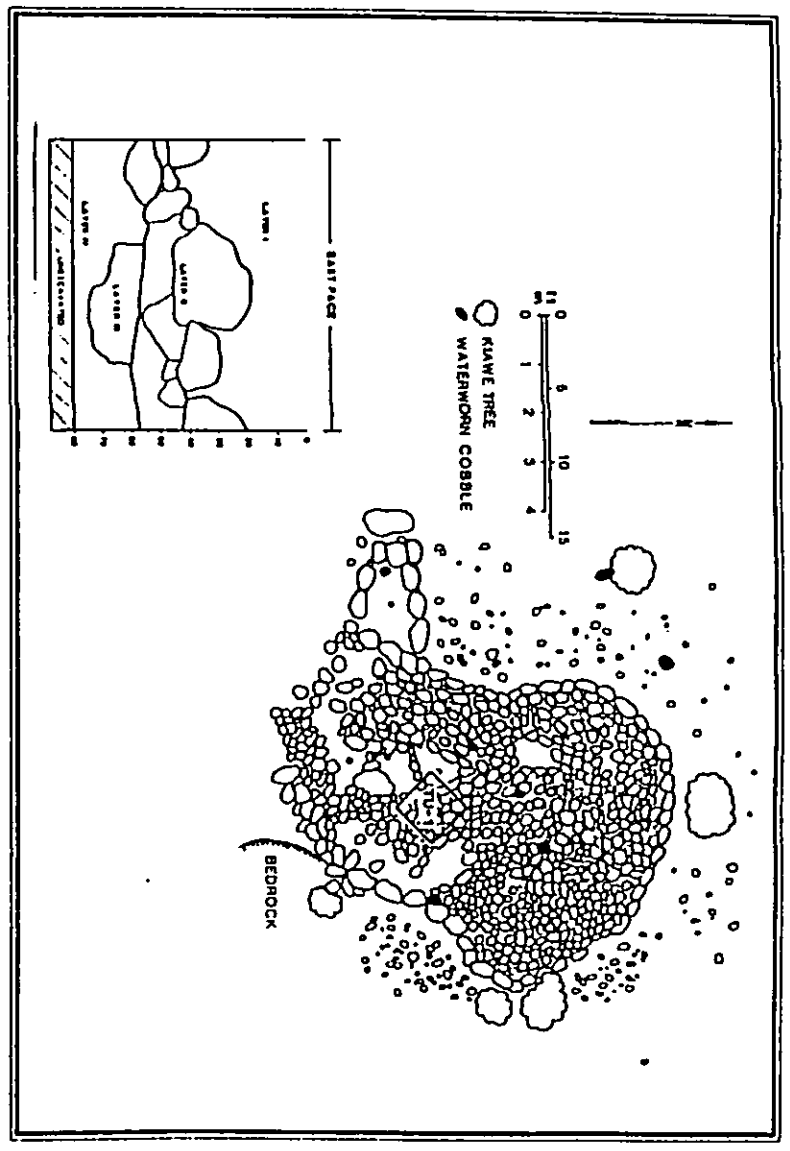


Figure B-12. SITE 12449, PLAN MAP AND PROFILE OF TU-1

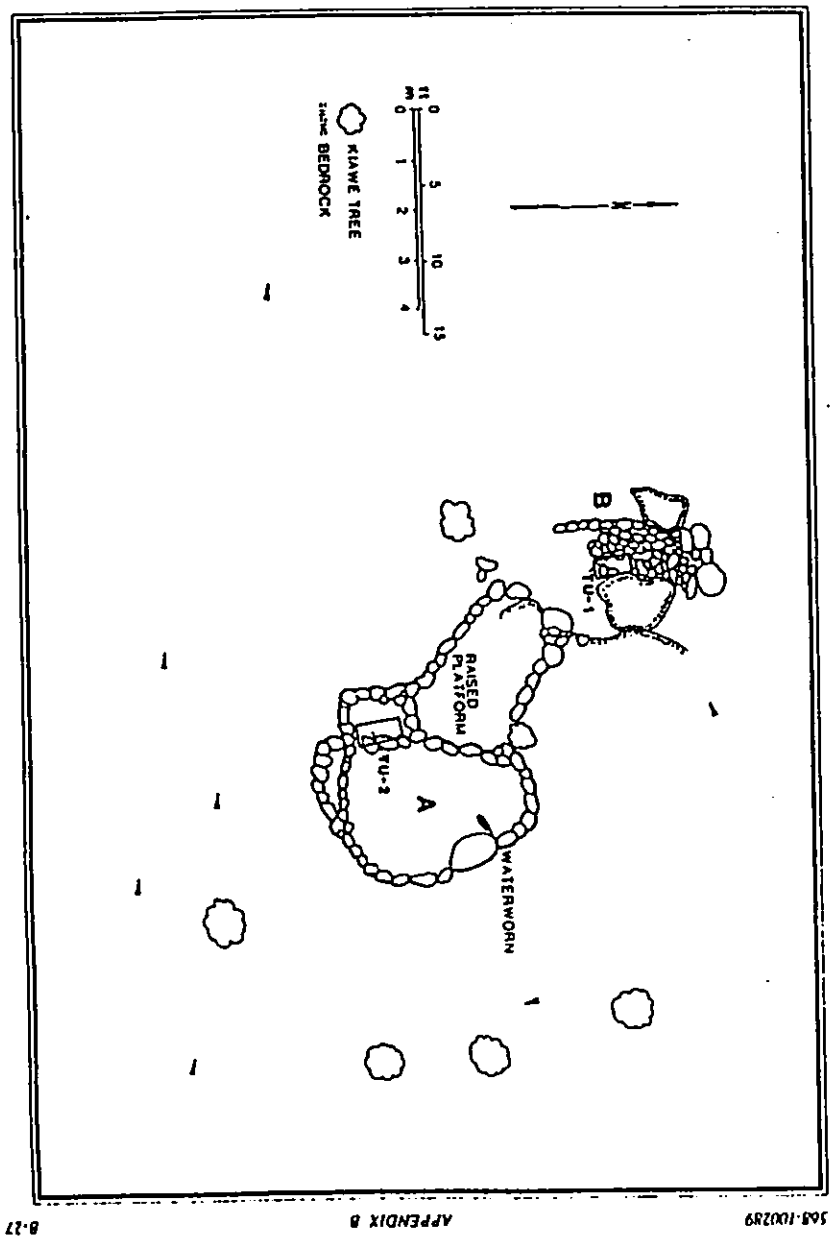


Figure B-13. SITE 12450, PLAN MAP

FEATURE A: Platform
FUNCTION: Possible burial
DIMENSIONS: 5.60 m by 4.00 m by 0.50 m (approx.)
DESCRIPTION: An L-shaped, bi-level platform with faced corners, and an easily identifiable boundary. It consists of stacked, small-to-large angular basalt cobbles, with two distinct levels of fairly even paving. At least 0.30 m of cobble paving is present on partially exposed bedrock, and at least 0.10 m of reddish-brown rocky soil is present in the area to the southwest. An adjoining terrace, measuring c. 3.5 m (NW-SE) by 2.0 m (NE-SW), abuts the platform along the west side.

A 1.0 m by .50 m test unit (TU-2) was excavated in the southwest corner of the platform, above the terrace. Layer I (0-0.50 mbs) consisted of stacked angular cobbles making up the platform, but contained no other cultural materials. Layer II was excavated in two arbitrary levels (0.50-0.60 and 0.60-0.73 mbs), consisting of medium-brown, loose, fine-grained silty clay, with many fine roots and a 30% density of small, angular basalt cobbles. A few tiny bits of charcoal and four tiny coral fragments were recovered. The charcoal sample collected from II-2 (PHRI# RC-605) was submitted for radiocarbon age-determination analysis. The sample yielded a calibrated range of AD 1410-1660. Excavation was terminated at c. 0.73 m below surface on Layer III, reddish-brown, compact, sterile, silty clay.

FEATURE B: Modified outcrop
FUNCTION: Burial
DIMENSIONS: 2.10 m by 0.90 m by 0.45 m (approx.)
DESCRIPTION: A modified bedrock mound lies against and between natural bedrock outcrop. It consists of small-to-medium angular basalt cobbles, piled between the bedrock outcropping. There is a deposit of angular basalt cobbles, c. 20-45 cm thick, on the bedrock, and at least 15 cm of reddish-brown soil.

A 1.0 m by 0.5 m test unit (TU-1) was excavated in the the south half of Feature B. Layer I (0-0.21 mbs) consisted of small-to-medium-sized, angular basalt cobbles above the soil surface, and contained no other cultural materials. Layer II (0.21-0.29 mbs) consisted of light-to medium-brown, loose silt, with a high density of organic duff and fine roots, and a 20% density of small, angular basalt cobbles. At c. 0.28 m below surface, a deteriorated human cranium was uncovered, and the burial pit boundary was identified at 0.29 m below the surface. The burial seems to be lying perpendicular to a large bedrock boulder in the east portion of the unit. Excavation was terminated at this point.

Through the findings of excavation, the functional interpretation was further confirmed as burial.

SITE NO.: State: 12451 PHRI: T-11
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: A linear outcrop, oriented c. NW-SE, and situated on the northeast side of a broad ridge.
VEGETATION: Sparse kiawe forest with grasses and 'ilima.
CONDITION: Fair
INTEGRITY: Possibly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overall complex area measures c. 12 m (N-S) by 6 m (E-W). The site complex is situated on a linear outcrop located c. 35 m northwest of the Site 12431 Wall (Railroad Bed).

FEATURE A: C-shape
FUNCTION: Habitation
DIMENSIONS: 2.75 m by 1.80 m by 0.75 m (approx.)
DESCRIPTION: Open to the southwest, the C-shape is located c. 6 m from the SE corner of an outcrop. It consists of stacked stones, and faced along the interior of the C-shape and a portion of the exterior side.

Approximately five waterworn cobbles were noted on a flat area c. 5 m by 5 m west of Feature A. Directly northwest and adjacent to the C-shape is Feature B.

A 0.5 m by 0.5 m test unit (TU-1) was excavated in the center of the feature. Layer I was excavated in four arbitrary levels (0-0.10, 0.10-0.20, 0.20-0.30, and 0.30-0.38 mbs, respectively), consisting of dark-brown silt. One iron fragment was recovered from Level I (0-0.10 mbs). An ash layer, uncovered from 0.10-0.18 m below the surface, was excavated, screened separately, photographed, and a soil sample was collected. This sample (PHRI# RC-602) was submitted for radiocarbon age-determination analysis. The sample yielded a calibrated range of AD 1660-1950. No other cultural material was uncovered. Layer II, consisting of reddish-brown, compact, silty clay was uncovered at 0.12 m below the surface in the southeast portion of the unit, and at 0.38 m below the surface throughout the remaining portion of the unit. This layer was determined to be sterile and excavation was terminated at this point.

Excavated findings helped to determine the functional interpretation of temporary habitation.

FEATURE B: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 9.00 m by 3.00 m by 1.45 m (approx.)
DESCRIPTION: Three areas of a linear outcrop are modified into possible cupboards. One of the cupboards is an alignment, L-shaped in plan view, and measures c. 2.5 m

(NE-SW) by 1.7 m (NW-SE). It consists of stacked stones oriented (NW-SE), and uprights oriented (NE-SW). It is situated c. 9 m south of the northwest corner of the linear outcrop.

At c. 2.5 m northwest of the L-shaped alignment is a collapsed, circular stacked wall, abutting bedrock boulders to the north and the east. It is stacked c. two courses high to a height of 0.55 m, with internal dimensions of 0.9 m (E-W) by 0.6 m (N-S).

The last of these possible cupboards is c. 2.5 m south of the NW corner of the linear outcrop, situated within a crevice between the bedrock boulders. Two sides of the crevice, east and west, have small stacked boulders, four courses high, to a height of c. 0.65 m. The interior measures c. 1.1 m (E-W) by 0.9 m (N-S).

SITE NO.: State: 12452 PHRI: T-12
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Flat-topped ridge, with gently sloping drainages on both sides.
VEGETATION: Thick grasses, moderate kiawe trees and a few 'ilima.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Burial
DESCRIPTION: Additional mounds and terraces, associated with coral, appear along this ridge.

FEATURE A: Modified outcrop
FUNCTION: Possible burial
DIMENSIONS: 1.90 m by 0.75 m by 0.70 m (approx.)
DESCRIPTION: Feature A is amorphous in plan view. It consists of small-to-medium, angular basalt cobbles, crudely stacked and piled against a large bedrock boulder.

A 1 m by 1 m test unit (TU-4) was excavated in the pile of basalt cobbles, at the base of a large basalt boulder. Layer I (0-0.85 mbs) consisted of small to medium sized angular basalt cobbles and one large boulder, overlying a soil deposit. No cultural material was recovered. Layer II was excavated in four arbitrary 0.10 m levels, consisting of mottled dark and medium-brown, loose, fine-grained silty clay, with a moderate density of small, angular basalt cobbles and gravels. Layer II-1 (0.85-0.95 mbs) contained one kukui nut shell fragment, and seven plus marine shell fragments (*Cypraeidae*, and *Thaididae*). Layers II-2 (0.95-1.05 mbs), II-3 (1.05-1.15 mbs), and II-4 (1.15-1.25 mbs) contained no cultural material. At 1.15 m below surface, a possible burial pit outline appeared along the north wall, but by 1.27 m below the surface, Layer III, a reddish-brown, compact sterile silty clay, was uncovered and excavation was terminated. A burial site is still believed to exist to the south and southwest of the test unit.

FEATURE B: Modified outcrop
FUNCTION: Burial
DIMENSIONS: 1.60 m by 1.35 m by 0.55 m (approx.)
DESCRIPTION: Feature B is amorphous in plan view, and is centrally raised. It consists of crudely stacked and piled, small-to-large angular basalt cobbles.

A 1 m by 1 m test unit (TU-3) was excavated in the center of Feature B. Layer I (0-0.36/0.46 mbs) consisted of small to medium sized angular basalt cobbles, piled on the soil surface. Three waterworn basalt cobbles were noted. Layer II (0.36/0.46-0.50 mbs) consisted of light- to medium-brown, loose, organic silt, and contained a few kukui nut shell fragments, and a small amount of marine shell midden (*Nerita picea*, *Cypraeidae*, *Thaididae*, and Echinoidea).

Layer II was excavated in two arbitrary levels (0.50-0.60 and 0.60-0.66 mbs), consisting of medium-brown, loose, fine-grained silty clay, with a high density of fine to small roots, and a 35-40% density of small, angular basalt cobbles. Each of these levels contained a small amount of marine shell midden (*Cypraeidae* and *Thaididae*), and Level 1 also contained a few kukui nut shell fragments. Layer III, a reddish-brown, compact, sterile, silty clay, was uncovered at c. 0.62 m below the surface, in the north portion of the unit, and at 0.69 m bs, a burial pit outline was observed in the south portion of the unit, in Layer IV (0.66-0.71 mbs). A human burial, exposed at c. 0.71 m below the surface (proximal end of humorus), was photographed, after which the unit was backfilled. The pitfill contained a small amount of marine shell midden (*Cypraeidae* and *Thaididae*), a few kukui nut shell fragments, charcoal, and one volcanic glass flake. The charcoal sample (PHRI# RC-607) was submitted for radiocarbon age-determination analysis. It yielded a calibrated range of AD 1450-1670, 1775-1793, and 1948-1953.

FEATURE C: Terrace
FUNCTION: Burial
DIMENSIONS: 4.70 m by 2.20 m by 0.65 m (approx.)
DESCRIPTION: A low, roughly-paved terrace. It is long and narrow, with a fairly flat surface. The feature abuts a bedrock outcropping, and is slightly raised on the south and west sides. It is faced along portions of the northwest side.

A 1 m by 1 m test unit (TU-2) was excavated in the southwest portion of the feature. Layer I (0-0.28/0.32 mbs) consisted of small and medium sized angular basalt cobbles, which make up the terrace, and it contained one waterworn basalt cobble and one piece of coral. Layer II was excavated in two arbitrary levels, consisting of light- to medium-brown, loose, fine-grained silty clay, with a high density of fine roots, and a 20-30% density of small, angular basalt cobbles. Layer II-1 (0.28/0.32-0.40/0.45 mbs) contained a small amount of marine shell midden (*Cellana*, *Cypraeidae*, *Thaididae*, and Echinoidea), a few kukui nut shell fragments, and charcoal. Indigenous portable artifacts include four basalt flakes. At c. 0.40 m below the surface in the south portion of the unit, a deposit of grayish-brown, slightly compact, silty clay 0.07 m thick appeared. This was designated Layer III, and it contained one kukui nut shell fragment, charcoal, and a sparse amount of marine shell midden (*Cypraeidae* and *Thaididae*). This layer terminated at c. 0.47 m below the surface, onto a light- to medium-brown, compact, sterile silty clay.

Layer II-2 (0.45-0.69 mbs) was excavated in the north portion of the unit, and is a possible burial pit. The soil consisted of light- to medium-brown, loose, fine-grained, silty clay, with a high fine to small root density, and a 30-40% density of small, angular basalt cobbles. Material recovered included charcoal, two kukui nut shell fragments, twenty-six marine shells (*Cypraeidae* and *Thaididae*), and two human bones (one tarsal and one carpal). Excavation was terminated at this point, although no actual articulated burial was uncovered.

FEATURE D: Terrace
FUNCTION: Burial
DIMENSIONS: 2.20 m by 1.60 m by 0.75 m (approx.)
DESCRIPTION: Generally square in plan view, it abuts a natural bedrock outcrop along the north side. The terrace is stacked and faced with angular basalt cobbles, three courses high, on the south, west and east sides.

A 1.0 m by 0.50 m test unit (TU-1) was excavated in the center of the feature. Layer I (0-0.52/0.60 mbs) consisted of small to medium angular basalt cobbles, which make up the terrace, and it also contained one waterworn basalt cobble, and one basalt abrader.

Layer II (0.52/0.60-0.65 mbs) consisted of light- to medium-brown, organic duff, and was virtually sterile. Layer III (0.65-0.74 mbs) consisted of medium-brown, loose, powdery, fine-grained silt, and contained tiny flecks of charcoal, three marine shell fragments, and several human bone fragments. The charcoal sample (PHRI# RC-603) was submitted for radiocarbon age-determination analysis. The sample yielded a calibrated range of AD 1650-1950. At c. 0.72 m below the surface, bedrock was exposed in the south portion of the unit, and excavation was terminated at this point. At c. 0.74 m below the surface, a burial pit area was exposed in the northeast corner of the unit, and a very deteriorated human burial was discovered. Excavation was terminated at this point, and the unit was photographed and backfilled to protect the burial.

The presence of three human burials further confirmed the functional interpretation of this site as a burial area.

SITE NO.: State: 12453 PHRI: T-13 (*Figure B-14*)
SITE TYPE: Platform
TOPOGRAPHY: Site is situated toward the top of a ridge, on the south face, with gently sloping drainage below.
VEGETATION: Thick grasses, some 'ilima, moderate kiawe trees
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible burial
DIMENSIONS: 3.60 m by 2.90 m by 1.10 m (approx.)
DESCRIPTION: Generally square in plan view, it consists of stacked, small and medium sized angular basalt boulders and cobbles. Bedrock outcropping is utilized for the corners and borders. The surface interior is paved, with the middle area slightly concave.

A 1 m by 1 m test unit (TU-1) was excavated in the east side of the structure. Layer I (0-0.56 mbs) consisted of small and medium angular basalt cobbles and boulders, which make up the platform, and contained two pieces of coral.

Layer II was excavated in five arbitrary 0.10 m levels, consisting of light to medium-brown, loose, silty clay, with a high density of fine roots, and a 10-15% density of small, angular basalt cobbles and gravels. Layers II-1 through II-4 (0.56-0.66, 0.66-0.76, 0.76-0.86, and 0.86-0.96 mbs) contained a trace of marine shell midden, a few flecks of charcoal, and a few small rodent bone fragments. Layer II-5 (0.96-1.08 mbs) contained two bits of charcoal, but bedrock was exposed in most of the unit. Where bedrock was not exposed, the angular basalt cobble and gravel density was so high that no cultural layer was evident, and excavation was terminated at c. 1.08 m below the surface. A human burial may still be present, although excavation findings were negative.

SITE NO.: State: 12454 PHRI: T-14
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: In a steep canyon, primarily on the steeper northwest-facing slopes, from the south rim extending

E-40

Figure B-14. SITE 1245J, OVERVIEW. View to West. (PHRI Neg.1206-30)

almost to the bottom of the drainage.
VEGETATION: Kiawe, 'ilima, koa-haole, grasses, Solanaceae and Euphorbiaceae families.
CONDITION: Fair-good
INTEGRITY: Unaltered-possibly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DESCRIPTION: Overall complex area measures c. 200 m (NE-SW) by 40 m (NW-SE).

FEATURE A: Enclosure
FUNCTION: Agriculture
DIMENSIONS: 3.10 m by 1.20 m by 1.35 m (approx.)
DESCRIPTION: A well-built enclosure, constructed around a vertically-standing face of bedrock, forming a deep, sheltered area against the outcrop. The enclosure is bounded on the southeast side by a bedrock outcrop measuring c. 3 m high. The southwest side consists of a large, upright slab retaining wall. The northwest side is a slightly curved, well-built double-stacked wall of weathered basalt cobbles and boulders. The double-stacked wall is c. 0.80 m wide. It has an interior height of 1.0 m and an exterior height of 1.35 m. The northeast side is partially collapsed, but appears to have been two-three boulders piled on a piece of bedrock 0.70 m high. There is c. 0.40 m of soil on the interior floor surface of the enclosure.

A 0.8 m by 0.8 m test unit (TU-1) was excavated inside the south portion of the enclosure. Layer I was excavated in four arbitrary 0.10 m levels, consisting of reddish-brown, slightly compact, silty clay. The upper 0.05-0.07 m contained some organic staining. Excavation was terminated at c. 0.40 m below the surface, where there was an increase in decomposing bedrock. No cultural material was recovered.

FEATURE B: Modified outcrop
FUNCTION: Agriculture
DIMENSIONS: 5.25 m by 1.00 m by 1.25 m (approx.)
DESCRIPTION: A linear alignment consists of large cobbles, small basalt boulders and slabs, stacked within a large crevice between bedrock and large fallen bedrock boulders. The alignment is oriented c. NE-SW. Most of the interior of the alignment is hollow, with flat boulders and slabs used as uprights and capstones. There is a chamber at the northeast end of the alignment. It measures c. 1.25 m by 0.40 m, and is situated within large bedrock boulders, with an opening at the top of the wedged boulders. The alignment partially fills the surface opening of the chamber. The area immediately west of the alignment and within the bedrock crevice is cleared, with a very shallow soil deposit. This feature may have possibly functioned as a storage area.

FEATURE C: Modified outcrop
FUNCTION: Agriculture
DIMENSIONS: 0.50 m by 0.50 m by 0.35 m (approx.)
DESCRIPTION: Feature C is a modified outcrop, consisting of c. nineteen pit features. Many are partially-bounded by bedrock outcrops, with short retaining walls and several rocks stacked around the soil as possible windbreaks.

A single pit was chosen as a representative sample. The pit consists of stacked boulders and cobbles on the downslope side, and typically has several single-stacked boulders as windbreaks on the upslope (windward) side. There are other similar features of this type on both the northwest and south-facing sides of the gully. The heavy vegetation obscures the additional features from view.

FEATURE D: Modified outcrop
FUNCTION: Agriculture
DIMENSIONS: 3.80 m by 3.40 m by 0.95 m (approx.)
DESCRIPTION: A short wall section of roughly-stacked boulders is situated on the highest point of a bedrock outcrop. Another probable wall section of partially-collapsed slabs is located at a right angle to the first section. The surface floor interior consists of a leveled soil area.

Downslope of Feature D is a walled-in cleft within the bedrock, which functions as a retaining wall to hold in the soil deposit.

A 0.5 m by 0.5 m test unit (TU-2) was excavated in the center of the feature. Layer I consisted of 0.45 m of angular basalt cobbles, roughly stacked above the surface, containing no cultural material. Layer II was excavated in four arbitrary 0.10 m levels, consisting of reddish-brown, slightly compact, silty clay, containing no cultural material. Excavation was terminated at c. 0.41 m below the surface.

Excavation findings supported further the functional interpretation of this site as agricultural.

SITE NO.: State: 12455 PHRI: T-15 *(Figure B-15)*
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Slight downward slope to the west, consisting of rocky terrain
VEGETATION: Kiawe, grasses and 'ilima.
CONDITION: Poor-fair
INTEGRITY: Unaltered-possibly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: Overall complex area measures c. 55 m (E-W) by 50 m (N-S)

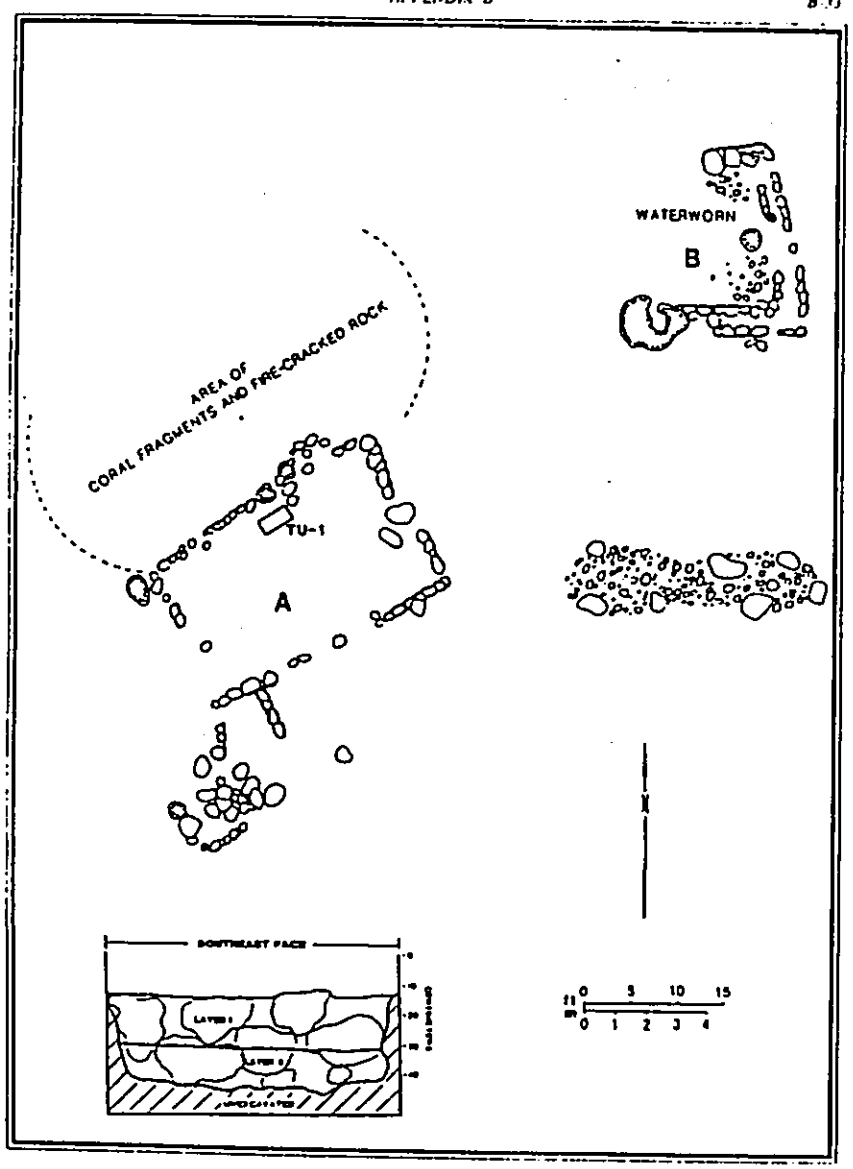


Figure B-15. SITE 12455, PLAN MAP AND PROFILE OF TU-1 AT FEATURE A

FEATURE A: Terrace
FUNCTION: Habitation
DIMENSIONS: 12.00 m by 10.00 m by 0.40 m (approx.)
DESCRIPTION: A low, rectangular terrace bounded by single-rock alignments on the northeast, southeast, and southwest sides. The northwest side is a low, two-course wall. The terrace consists of small basalt boulders and large cobbles placed in a rectangular alignment.

The floor interior is partly natural bedrock outcropping. In places, the interior appears paved with small-to-large waterworn cobbles, and there are numerous coral fragments visible.

There is a cobble-filled boulder pile at the south corner of the terrace. Neither coral nor waterworn basalt were noted in this pile.

A 1.0 m by 0.5 m test unit (TU-1) was excavated through a paved area in the northeast portion of the feature. Layer I was excavated in two arbitrary 0.10 m levels, consisting of small basalt cobble paving with even smaller waterworn basalt pebbles and coral, and reddish-brown silt, and containing a trace of marine shell midden (unidentified gastropods). Layer II (0.20-0.29 mbs) consisted of reddish-brown, silty clay deposited in pockets of bedrock, containing no cultural material. Excavation was terminated at c. 0.29 m below surface on bedrock.

FEATURE B: L-shaped alignment
FUNCTION: Habitation
DIMENSIONS: 5.50 m by 4.50 m by 0.50 m (approx.)
DESCRIPTION: Generally L-shaped in plan view, the longer alignment is oriented c. NW-SE, with the shorter alignment beginning at the southeast end and extending to the west. Both alignments appear to be bifaced. Measuring c. 1.0 m wide, it may have been a standing wall which is presently collapsed. It consists mostly of small basalt boulders and large cobbles. There is a short spur extending c. 2 m west from the northwest end of the alignment.

FEATURE C: Alignment
FUNCTION: Habitation
DIMENSIONS: 7.00 m by 4.20 m by 0.45 m (approx.)
DESCRIPTION: Two short, parallel rock alignments facing each other, c. 3.8 m apart, with a concentration of waterworn coral fragments extending downslope from the southern alignment. Adjacent to the coral concentration is an upright, and also a small pecked area, 0.25 m in diameter, on a flat bedrock exposure. The feature is extensively collapsed and scattered. It appears the well bedded southern alignment may have been part of a structure which included the upright as a structural element.

A 0.5 m by 0.5 m test unit (TU-3) was excavated in the center, between the two rock alignments. Layer I was excavated in two arbitrary 0.10 m levels, consisting of dark reddish-brown silt, with a high density of waterworn coral fragments and basalt cobbles and pebbles, containing three Echinoidea spine fragments. Layer I-2 (0.10-0.18 mbs) contained no cultural material, and the coral and basalt cobble density decreased in density. Excavation was terminated at c. 0.18 m below the surface on Layer II, a reddish-brown, compact, sandy silt, with much decomposing bedrock.

FEATURE D: Terrace
FUNCTION: Habitation
DIMENSIONS: 11.00 m by 9.60 m by 0.43 m (approx.)
DESCRIPTION: A leveled and paved terrace, bounded on the southwest and northwest sides by a single-rock alignment up to 0.40 m high. The northeast face is the remains of a collapsed double-stacked wall. The wall measures c. 3.80 m in length by 0.70 m in width, and 0.35 m in height. The surface interior is leveled with basalt boulders and slabs, with waterworn beach pebbles and coral fragments filling in spaces.

A 1 m by 1 m test unit (TU-2) was excavated in the north corner of the feature. Layer I was excavated in two arbitrary 0.10 m levels, consisting of small basalt paving stones with an associated fill of waterworn basalt pebbles, coral, and reddish-brown aeolian silt. Bedrock and reddish-brown sterile silt was uncovered at c. 0.17 m below the surface. This layer contained no other cultural material, and excavation was terminated at this point.

Excavation findings helped determine the functional interpretation of this site as habitation.

SITE NO.: State: 12456 PIRI: T-16
SITE TYPE: Cairn
TOPOGRAPHY: Situated along the top edge of a small bluff. The surrounding terrain consists of a rocky, sloping and rolling plain.
VEGETATION: Kiawe, grasses, and 'ilima
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 1.10 m by 0.75 m by 0.45 m (approx.)
DESCRIPTION: A small cairn, built of small basalt boulders and large-to-medium cobbles, on top of bedrock. These are stacked one to three courses high. The cairn is hollow and partially collapsed. A large waterworn boulder was noted c. 1.25 m to the northwest, in addition to several pieces of coral and waterworn cobbles in a narrow cleft in the bedrock.

APPENDIX C

DETAILED TEST UNIT DESCRIPTIONS

SITE 12434
FEATURE B, TU-3, SOUTH FACE

LAYER	DESCRIPTION
I	13 cm thick; dark reddish-brown (5YR 2.5/2 moist); silty clay loam; weak, fine, crumb structure; soft when dry, very friable when moist, slightly sticky when wet, and of nonplastic consistence; many roots; abrupt and wavy lower boundary
II	dark reddish-brown (5YR 3/3 moist); silty clay and gravel; strong, fine crumb structure; soft when dry, friable when moist, slightly sticky when wet, and of nonplastic consistence; few roots

FEATURE C, TU-1, NORTH AND EAST FACES

LAYER	DESCRIPTION
I	30-34 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; weak, fine, crumb structure; soft when dry, very friable when moist, slightly sticky when wet, and of nonplastic consistence; roots common; gradual and broken lower boundary
Lens	2 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt loam and gravel; weak, fine, crumb structure; loose when dry, friable when moist, nonsticky when wet, and of nonplastic consistence; many roots; abrupt and irregular lower boundary
II	6-10 cm thick; dark reddish-brown (5YR 3/3 moist); silty clay and gravel; strong, fine, crumb structure; soft when dry, friable when moist, slightly sticky when wet, and of nonplastic consistence; few roots

FEATURE D, TU-2, NORTH FACE

LAYER	DESCRIPTION
I	18 cm thick; dark reddish-brown (5YR 3/2 moist); sandy clay loam; structureless, fine, crumb structure; loose when dry, loose when moist, nonsticky when wet, and of nonplastic consistence; many roots; clear and wavy lower boundary
II	dark reddish-brown (5YR 3/3 moist); silty clay and gravel; weak, fine, crumb structure; soft when dry, friable when moist, slightly sticky when wet, and of nonplastic consistence; roots common

SITE 12435
FEATURE A, TU-1, EAST FACE

LAYER	DESCRIPTION
I	12 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam and gravel; structureless, fine, single grain structure; loose when dry, very friable when moist, slightly sticky when wet, and of nonplastic consistence; many roots; clear and wavy lower boundary
II	4 cm thick; dark reddish-brown (5YR 3/3 moist); silty clay and gravel; strong, fine, crumb structure; soft when dry, friable when moist, slightly sticky when wet, and of nonplastic consistence, few roots

SITE 12436
FEATURE B, TU-1, WEST FACE

LAYER	DESCRIPTION
I	30 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; few roots

FEATURE D, TU-2, WEST FACE

LAYER	DESCRIPTION
I	7 cm thick; silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; very few to few roots

SITE 12437
FEATURE A, TU-1, SOUTHWEST FACE

LAYER	DESCRIPTION
I	45 cm thick; angular basalt cobbles; very few roots; very abrupt and smooth lower boundary
II	47 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt loam and clay; weak, fine, crumb structure; soft when dry, friable when moist, nonsticky when wet, and of nonplastic consistence; many roots; clear and wavy lower boundary
III	14 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; structureless, very fine, single grain structure; loose when dry, very friable when moist, slightly sticky when wet, and of slightly plastic consistence; many roots

SITE 12438
FEATURE A, TU-1, EAST FACE

LAYER	DESCRIPTION
I	21 cm thick; silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; few to common roots; clear lower boundary

SITE 12439
FEATURE B, TU-2, WEST FACE

LAYER	DESCRIPTION
I	38 cm thick; angular basalt and coral; very few roots; very abrupt and smooth lower boundary
II	22 cm thick; dark reddish-brown (5YR 3/2 moist); silty clay; structureless, fine, single grain structure; loose when dry, very friable when moist, slightly sticky when wet and of nonplastic consistence; many roots; clear and wavy lower boundary
III	dark reddish-brown (5YR 2.5/2 moist); silty clay and gravel; weak, fine, crumb structure; loose when dry, friable when moist, slightly sticky when wet, of slightly plastic consistence; many roots

FEATURE D, TU-6, SOUTH FACE

LAYER	DESCRIPTION
I	32 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt; structureless, very fine, single grain structure; loose when dry, loose when moist, slightly sticky when wet and of nonplastic consistence; roots common

FEATURE E, TU-5, EAST FACE

LAYER	DESCRIPTION
I	35 cm thick; angular basalt and coral; very few roots; very abrupt and smooth lower boundary
II	8 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; structureless, fine, crumb structure; loose when dry, very friable when moist, slightly sticky when wet, and of nonplastic consistence; roots common; abrupt and irregular lower boundary
III	7 cm thick; dark reddish-brown (5YR 2.5/2 moist); silty clay; weak, very fine, crumb structure; soft when dry, very friable when moist, slightly sticky when wet, and of nonplastic consistence; roots common

SITE 12440
FEATURE A, TU-2, EAST FACE

LAYER	DESCRIPTION
I	20 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt loam; structureless to weak, very fine, granular structure; loose when dry, very friable when moist, non sticky when wet, and of nonplastic consistence; few roots

FEATURE B, TU-1, EAST FACE

LAYER	DESCRIPTION
I	9 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; few roots

SITE 12441
FEATURE A, TU-1, SOUTH FACE

LAYER	DESCRIPTION
I	17 cm thick; very dark brown (10YR 2/2 moist); silt and gravel; structureless, fine, single grain structure; loose when dry, loose when moist, nonsticky, and of nonplastic consistence; few roots; very abrupt and wavy lower boundary
II	dark reddish-brown (5YR 3/3 moist); silty clay; weak, very fine, crumb structure; soft when dry, friable when moist, slightly sticky, and of slightly plastic consistence; few roots

FEATURE A, TU-2, WEST FACE

LAYER	DESCRIPTION
I	8 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt loam; structureless, fine, crumb structure; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; roots common; abrupt and wavy lower boundary
II	3-20 cm thick; black (10YR 2/1 moist); silt; structureless, fine, crumb structure; loose when dry, very friable when moist; slightly sticky when wet, and of nonplastic consistence; few roots; very abrupt and wavy lower boundary
III	dark reddish-brown (5YR 3/2 moist); silty clay; weak, very fine, crumb structure; soft when dry, friable when moist, slightly sticky when wet, and of slightly plastic consistence; few roots

SITE 12442

FEATURE A, TU-1, EAST FACE

LAYER	DESCRIPTION
I	20 cm thick; stacked basalt boulders and cobbles; subangular blocky structure; wavy lower boundary
II	30 cm thick; dark reddish-brown (5YR 3/3 moist); silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; few roots; irregular lower boundary
III	17+ cm thick; silty clay; weak, very fine, single grain structure; soft when dry, friable when moist, sticky when wet, and of slightly plastic consistence, few roots

SITE 12443
FEATURE A, TU-1, WEST FACE

LAYER	DESCRIPTION
I	20 cm thick; stones; very few roots; smooth and irregular lower boundary
II	20 cm thick; silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; few roots; clear and irregular lower boundary
III	silty clay; weak, very fine, single grain structure; soft when dry, friable when moist, sticky, and of slightly plastic consistence; few roots

SITE 12444
FEATURE A, TU-1, NORTH FACE

LAYER	DESCRIPTION
I	18 cm thick; very dark brown (10YR 2/2 moist); silt loam; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; very few roots; gradual and wavy lower boundary
II	clay; soft when dry, friable when moist, sticky when wet, and on slightly plastic consistence

FEATURE B, TU-2, EAST FACE

LAYER	DESCRIPTION
I	18 cm thick; dark reddish-brown (10YR 2.5/2 moist); silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; few roots, clear and irregular lower boundary
II	silty clay; weak, very fine, single grain structure; soft when dry, friable when moist, sticky when wet, and of slightly plastic consistence; few roots

FEATURE D, TU-3, EAST FACE

LAYER	DESCRIPTION
I	27 cm thick; angular basalt cobbles; very few roots
II	20 cm thick; black (10YR 2/1 moist); silt loam; structureless, very fine, single grain structure; loose when dry, very friable when moist, slightly sticky when wet, and of nonplastic consistence; many roots
III	dark reddish-brown (5YR 2.5/2 moist); silty clay and gravel; weak, fine, crumb structure; loose when dry, friable when moist; slightly sticky when wet, and of slightly plastic consistence; many roots

FEATURE D, TU-5, EAST FACE

LAYER	DESCRIPTION
I	21 cm thick; angular basalt cobbles; very few roots; very abrupt and wavy lower boundary
II	12 cm thick; black (10YR 2/1 moist); silt loam; structureless, very fine, single grain structure; loose when dry, very friable when moist, slightly sticky when wet, and of nonplastic consistence; many roots
III	dark reddish-brown (5YR 2.5/2 moist); silty clay and gravel; weak, fine, crumb structure; loose when dry, friable when moist; slightly sticky when wet, and of slightly plastic consistence; many roots

SITE 12445
FEATURE A, TU-2, WEST FACE

LAYER	DESCRIPTION
I	27 cm thick; angular basalt cobbles; very few roots
II	17 cm thick; very dark brown (10YR 2/2 moist); silt loam and clay; structureless, very fine, crumb structure; loose when dry, firm when moist, nonsticky when wet, and of slightly plastic consistence, roots common; clear and wavy lower boundary

SITE 12446
FEATURE A, TU-1, EAST FACE

LAYER	DESCRIPTION
I	31 cm thick; angular basalt cobbles; very few roots; very abrupt and smooth lower boundary
II	6 cm thick; very dark brown (10YR 2/2 moist); silt loam; weak, very fine, crumb structure; soft when dry, very friable when moist, slightly sticky when wet, and of slightly plastic consistence; many roots

FEATURE A, TU-2, EAST FACE

LAYER	DESCRIPTION
I	23 cm thick; very dark brown (10YR 2/2 moist); silt; structureless, very fine, single grain structure; loose when dry, loose when moist, nonsticky, and of nonplastic consistence; roots common
II	9+ cm thick; dark brown (7.5YR 3/4 moist); silt and clay; moderate, very fine, single grain structure; slightly hard when dry, firm when moist, slightly sticky when wet, and of slightly plastic consistence; many roots

SITE 12447
FEATURE A, TU-1, NORTHWEST FACE

LAYER	DESCRIPTION
I	45 cm thick; stones; clear and wavy lower boundary
II	35 cm thick; very dark brown (10YR 2/2 moist); silt loam; weak, very fine, single grain; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; roots are few to common, fine and tubular; clear and wavy lower boundary
III	silty clay, weak, very fine, single grain structure; soft when dry, friable when moist, sticky when wet, and of slightly plastic consistence; few fine tubular roots

FEATURE A, TU-2, NORTH FACE

LAYER	DESCRIPTION
I	30 cm thick; stones; no roots; clear and wavy lower boundary
II	40 cm thick; silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; few to many, fine to medium, tubular roots; clear and wavy lower boundary
III	silty clay loam; weak, very fine, single grain structure; soft when dry, friable when moist, sticky when wet, and of slightly plastic consistence; few fine tubular roots

SITE 12448
FEATRE A, TU-1, NORTHEST FACE

LAYER	DESCRIPTION
I	41 cm thick; angular basalt cobbles; very few roots; very abrupt and smooth lower boundary
II	19 cm thick; very dark brown (10YR 2/2 moist); silt loam; structureless, very fine, single grain structure; loose when dry; very friable when moist

SITE 12449
FEATURE A, TU-1, NORTHEAST FACE

LAYER	DESCRIPTION
I	45 cm thick; angular basalt cobbles; very few roots; very abrupt and smooth lower boundary
II	36 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; weak, very fine, single grain; soft when dry, friable when moist, slightly sticky when wet, and of slighly plastic consistence; many roots; clear and irregular lower boundary
III	19 cm thick; dark reddish-brown (5YR 3/3 moist); silt; weak, very fine, single grain structure; loose when dry, loose when moist, nonsticky when wet, and of slighly plastic consistence; many roots; clear and irregular lower boundary

SITE 12450
FEATURE A, TU-2, NORTHEAST FACE

LAYER	DESCRIPTION
I	50 cm thick; angular basalt cobbles; very abrupt and smooth lower boundary
II	23 cm thick; silt loam; structureless, fine, crumb structure, loose when dry, very friable when moist, slighly sucky when wet, and of nonplastic consistence; many roots; clear and wavy lower boundary
III	dark reddish-brown (5YR 3/2 moist); silty clay; structureless, very fine, crumb structure; loose when dry, friable when moist, slighly sucky when wet, and of nonplastic consistence; very few roots

FEATURE B, TU-1, EAST FACE

LAYER	DESCRIPTION
I	21 cm thick; large angular basalt cobbles; very abrupt and smooth lower boundary
II	dark reddish-brown (5YR 2.5/2 moist); silt loam; structureless, fine, single grain; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; many roots

SITE 12451
FEATURE D, TU-1, NORTH FACE

LAYER	DESCRIPTION
I	12-38 cm thick; black (10YR 2/2 moist); silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; roots common; clear and irregular lower boundary
II	dark brown (7.5YR 3/2 moist); silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, slighly sucky when wet, and of slighly plastic consistence; few roots

SITE 12452
FEATURE A, TU-4, SOUTH FACE

LAYER	DESCRIPTION
I	85 cm thick; angular basalt cobbles; very abrupt and smooth lower boundary
II	40 cm thick; dark brown (7.5YR 3/2 moist); silt loam; structureless, very fine, single grain structure; loose when dry, very friable when moist, slighly sucky when wet, and of nonplastic consistence; many roots, clear and wavy lower boundary
III	dark reddish-brown (5YR 3/2 moist); silty clay; weak, very fine, single grain; loose when dry, very friable when moist, slighly sucky, and of slighly plastic consistence; roots common

FEATURE B, TU-3, SOUTH FACE

LAYER	DESCRIPTION
I	36-46 cm thick; angular basalt cobbles; very few roots, very abrupt and smooth lower boundary
II	4-10 cm thick; dark reddish-brown (5YR 2.5/2 moist); silty loam; structureless, fine, single grain; loose when dry, very friable when moist, slighly sticky when wet, and of slighly plastic consistence; many roots; clear and wavy lower boundary
III	16-20 cm thick; black (10YR 2/2 moist); silty clay; structureless, very fine, crumb structure; loose when dry, very friable when moist, slighly suck when wet, and of nonplastic consistence; roots common; clear and smooth lower boundary
IV	5 cm thick; dark reddish-brown (5YR 2.5/2 moist); silty loam; structureless, fine, crumb structure; loose when dry, very friable when moist, slighly sticky when wet, and of nonplastic consistence; many roots

FEATURE C, TU-2, EAST FACE

LAYER	DESCRIPTION
I	28-32 cm thick; stones; very few roots; very abrupt lower boundary
II	37 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; structureless, very fine, single grain structure; loose when dry, loose when moist, nonsticky and of nonplastic consistence; many roots; very abrupt lower boundary
III	7 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt; structureless, very fine, single grain; loose when dry, loose when moist, slighly sticky when wet, and of nonplastic consistence; many roots

FEATURE D, TU-1, NORTH-NORTHEAST FACE

LAYER	DESCRIPTION
I	52-60 cm thick; stones; very few roots; very abrupt lower boundary
II	5-13 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; structureless, very fine, single grain structure; loose when dry, very friable when moist; nonsticky, and of nonplastic consistence; roots common; very abrupt lower boundary
III	9 cm thick; dark reddish-brown (5YR 3/3 moist); silt loam; structureless, very fine, single grain structure; loose when dry, very friable when moist; nonsticky when wet, and of nonplastic consistence; many roots

SITE 12453
FEATURE A, TU-1, SOUTHWEST FACE

LAYER	DESCRIPTION
I	56 cm thick; angular basalt cobbles; very few roots; very abrupt and smooth lower boundary
II	52 cm thick; dark brown (7.5YR 3/2 moist); silty clay loam; structureless, fine, crumb structure; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; many roots

SITE 12454
FEATURE A, TU-1, NORTHWEST FACE

LAYER	DESCRIPTION
I	40 cm thick; dark reddish-brown (5YR 3/2 moist); silt loam; weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky, and of nonplastic consistence; few roots

FEATURE D, TU-2, EAST FACE

LAYER	DESCRIPTION
I	45 cm thick, stones, wavy and irregular lower boundary
II	reddish-brown silty loam, weak, very fine, single grain structure, loose when dry, very friable when moist, nonsticky, and of nonplastic consistence, few roots

SITE 12455
FEATURE A, TU-1, SOUTHEAST FACE

LAYER	DESCRIPTION
I	16-20 cm thick; dark reddish-brown (5YR 2.5/2 moist); silt loam; weak, very fine, single grain structure, loose when dry, very friable when moist, nonsticky, and of nonplastic consistence, roots are very fine, and few to common, clear lower boundary
II	dark reddish-brown (5YR 3/4 moist), silty clay, weak, very fine, single grain; soft when dry, friable when moist, nonsticky when wet, and of nonplastic consistence; few to many very fine roots

FEATURE C, TU-3, EAST FACE

LAYER	DESCRIPTION
I	18 cm thick, dark reddish-brown (5YR 3/2 moist); loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; few to common, fine, tubular roots; clear and wavy lower boundary

FEATURE D, TU-2, WEST FACE

LAYER	DESCRIPTION
I	17 cm thick; dark reddish-brown (5YR 3/3 moist); silt loam, weak, very fine, single grain structure; loose when dry, very friable when moist, nonsticky when wet, and of nonplastic consistence; fine, tubular roots common; clear and wavy lower boundary.

Mahukona

Appendix F: *Archaeological Inventory Survey Mahukona Property, Lands of Kou, Kamano, Mahukona 1st and 2nd, Hihiu and Kaomo, North Kohala District, Island of Hawaii*

F-1

Archaeological Inventory Survey
Mahukona Property

Lands of Kou, Kamano,
Mahukona 1st and 2nd, Hihiu, and Kaoma
North Kohala District, Island of Hawaii

PHRI
Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services
365 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-6998
P.O. Box 12835 • Tamuning, Guam 96911 • (671) 649-3845 • FAX (671) 649-2611

Report 672-051290

Archaeological Inventory Survey
Mahukona Property

Lands of Kou, Kamano,
Mahukona 1st and 2nd, Hihiu, and Kaoma
North Kohala District, Island of Hawaii

(TMK:31-3,10-14,16-18)

by

Berdena D. Burgett, B.A.
Supervisory Archaeologist

and

Paul H. Rosendahl, Ph.D.
Principal Archaeologist

Prepared for

Chalon International of Hawaii, Inc.
P.O. Box 249
Hawi, Hawaii 96719

May 1990

PHRI
Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services
365 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-6998
P.O. Box 12835 • Tamuning, Guam 96911 • (671) 649-3845 • FAX (671) 649-2611

SUMMARY

At the request of PBR Hawaii, on behalf of their client, Chalon International of Hawaii, Inc., Paul H Rosendahl, Ph.D., Inc. (PHRI) conducted a two-phased archaeological inventory survey of the approximately 259-acre Mahukona Property project area, situated in the Lands of Kou, Kamano, Mahukona 1st and 2nd, Hihiu, and Kaoma, North Kohala District, Island of Hawaii (TMK:31-3,10-14,16-18). The survey consisted of a 100% aerial survey, a 100%-coverage surface survey, and limited subsurface testing. The overall objective of the survey was to provide a level of information appropriate to and sufficient for the preparation of an Environmental Impact Statement (EIS), or similar planning document, such document to be submitted in conjunction with anticipated Change of Zone and Special Management Area (SMA) Use Permit applications to be made to the County of Hawaii.

During the survey, 101 sites consisting of 246 features were identified within, or immediately adjacent to, the project area. Thirty-nine of the sites had been previously identified. The sites consisted of both single and multiple features. Twenty-six formal feature types and 27 functional feature types are represented in the project area. About fifty percent of the functional feature types (N=13) represent habitation (permanent and temporary) and agricultural features occurring singly or in combinations of feature types.

Of the 101 sites located during the present survey, 73 sites are assessed as important solely for information content. Twenty of the 73 sites have been documented to the extent that no further work is recommended. For 53 of the 73 sites, further data collection is recommended. Seven of the 28 remaining sites are assessed as important for information content and as excellent examples of site types at local, regional, island, state, or national level. These sites are recommended for further data recovery and preservation with some level of interpretive development. Nine sites have been assessed as important for information content, as culturally significant, and as excellent examples of site types at the local, regional, island, state, or national levels. Preservation with some level of interpretive development is recommended for all nine sites. The remaining 12 sites are important for information content and are assessed as potentially culturally significant because they are possible burials, or contain features that may hold burials. Further data collection, with limited excavations to determine the presence or absence of burials is recommended for all possible burial sites. If burials are located, preservation "as is," with no further work, is recommended.

CONTENTS

ILLUSTRATIONS

Figure

ILLUSTRATIONS (cont.)

TABLES

INTRODUCTION

BACKGROUND

At the request of PBR Hawaii, on behalf of their client, Chalon International of Hawaii, Inc., Paul H Rosendahl, Ph D., Inc. (PHRI) conducted a two-phased archaeological inventory survey of the approximately 259-acre Mahukona Property project area, situated in the Lands of Kou, Kamano, Mahukona 1st and 2nd, Hihiu, and Kaoma, North Kohala District, Island of Hawaii (TMK:31-3,10-14,16-18). The survey consisted of a 100% aerial survey, a 100%-coverage surface survey, and limited subsurface testing. The overall objective of the survey was to provide a level of information appropriate to and sufficient for the preparation of an Environmental Impact Statement (EIS), or similar planning document, such document to be submitted in conjunction with anticipated Change of Zone and Special Management Area (SMA) Use Permit applications to be made to the County of Hawaii. The specific objective of the Phase I work was to identify (presence/absence determination) any sites of such obvious significance as to seriously constrain or prevent future development. The specific objective of Phase II work was to conduct detailed recording (and surface collections, if necessary) at all sites identified during the Phase I field work.

Phase I field work was conducted September 27-29, 1989 by a crew of five under the supervision of Supervisory Archaeologist Alan T. Walker, B.A., and under the overall direction of Principal Archaeologist Dr. Paul H. Rosendahl. Crew members included Supervisory Archaeologist Berdena D. Burgett, B.A., and Field Archaeologists Brenda Kauhi, Nick Kaaipaka, Jack Harris, and Robert Noah. Approximately 18 man-days of labor were expended conducting the Phase I field work. Phase II field work was conducted December 18-29, 1989 and January 2-11, 1990 by two to six crew members under the supervision of Supervisory Archaeologist Berdena D. Burgett, B.A., and under the overall direction of Principal Archaeologist Dr. Paul H. Rosendahl. Crew members included Field Archaeologists Mikele Fager, Ranae Ganske, Jack Harris, Brenda Kauhi, Robert Noah, and Steven Tachera. Approximately 99 man-days of labor were expended conducting Phase II field work.

A Preliminary Report of Phase I findings, and general significance assessments and recommended treatments, was submitted in October of 1989 (Walker and Rosendahl 1989). An Interim Report (after Phase II field work) presenting background information, a summary of findings, and general significance assessments and recommended treatments was submitted to the client in February 1990 (Burgett and Rosendahl 1990). The present document constitutes the final report for the two-phased survey.

SCOPE OF WORK

The basic purpose of the inventory survey was to identify—to discover and locate on available maps—all sites and features of potential archaeological significance present within the specified project area. An *inventory survey* comprises an initial level of archaeological investigation. It is extensive rather than intensive in scope, and is conducted basically to determine the presence or absence of archaeological resources within a specified project area. This level of survey indicates both the general nature and variety of archaeological remains present, and the general distribution and density of such remains. It permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for any subsequent *mitigation* work as might be necessary or appropriate. Such work could include further data collection involving detailed recording of sites and features, and limited excavations; and possibly subsequent data recovery research excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

The basic objectives of the inventory survey were fourfold: (a) to identify (find and locate) all sites and site complexes present within the project area, (b) to evaluate the potential general significance of all identified archaeological remains, (c) to determine the possible impacts of proposed development upon the identified remains, and (d) to define the general scope of any subsequent further data collection and/or other mitigation work that might be necessary or appropriate.

Based on a review of available background literature, on familiarity with both the general project area and the current requirements of pertinent State and County review authorities, and based on discussions with representatives of PBR Hawaii, the following specific tasks were determined to constitute an adequate and appropriate scope of work for the present survey:

Phase I - Site Identification

1. Conduct limited archaeological and historical documentary background research involving review and evaluation of readily available archaeological and historical literature, historic documents and records, and cartographic sources relevant to the immediate project area;

2. Conduct a 100% coverage, low-level (30-50 ft. altitude) aerial survey (helicopter) of the entire project area, with special emphasis on (a) following out any foot trails present and plotting them on aerial photographs and/or maps, (b) identifying all sites observed, and (c) identifying areas devoid of sites (e.g., mechanically altered lands;

3. Conduct variable coverage (partial to 100%), variable intensity (30-90 ft intervals) ground survey, with the actual extent and intensity of coverage determined on the basis of the aerial survey, and identify and plot the locations of all sites in the project area; and

4. Prepare a Preliminary Report summarizing (a) all identified sites and (b) tentative general significance assessments and recommended general treatments for all sites.

Phase II - Inventory Data Collection

1. Conduct more detailed historical documentary research, as appropriate, on the basis of Phase I findings, including interviews with available and knowledgeable local informants;

2. Conduct detailed recording (written descriptions, maps, and photographs) and surface collections at all sites;

3. Conduct limited subsurface testing of selected sites and features identified within the project area (a) to determine the presence or absence of potentially significant buried cultural features or deposits, and (b) to obtain suitable samples for age determination analyses; and

4. Analyze background and field data, and prepare appropriate reports.

The inventory survey was carried out in accordance with guidelines currently used by Hawaii State Department of Land and Natural Resources-Historic Sites Section/State Historic Preservation Office (DLNR-HSS/SHPO) for the review and evaluation of archaeological inventory survey reports submitted in conjunction with various development permit applications. The significance of all archaeological remains identified within the project area was to be assessed in terms of the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60) and criteria for evaluation of traditional cultural values prepared by the national Advisory Council on Historic Preservation. These criteria are used by the DLNR-HHS/SHPO for the evaluation of cultural resources. The significance of all remains was also to be assessed in terms of PHRI Cultural Resource Management (CRM) value modes, which are defined further in the Conclusion section of this report.

PROJECT AREA DESCRIPTION

The Mahukona Property project area encompasses approximately 625 acres located in the Lands of Kau, Kamano, Mahukona 1st and 2nd, Hihiu, and Kaoma, North Kohala District, Island of Hawaii (TMK: 3-5-7-03:1-3, 10 -14,16-18) (Figure 1). The project area is bounded by the shoreline on the west, Lapakahi on the south, on the east by a boundary fence positioned 25 to 155 m east of the Kawaihae-Mahukona Highway, and on the north by a boundary fence extending east from the shoreline to the Akoni Pule Highway.

The project area is located on the arid, northwestern coastal slope of the Kohala Mountains. The terrain in the area generally slopes 6-10 degrees and is interrupted by numerous, small gullies, which meander east to west, and intermittent bedrock outcrops. The weathered volcanic substrate (Hawi Pololu Volcanic Series) is overlain with aa boulders and cobbles, and a soil cover of Kawaihae Series Aridsols (Baker et al. 1965:15,17). The area ranges in elevation from 10 to 250 ft AMSL (above mean sea level) and has an average annual rainfall estimated at 5-20 inches (Armstrong 1983).

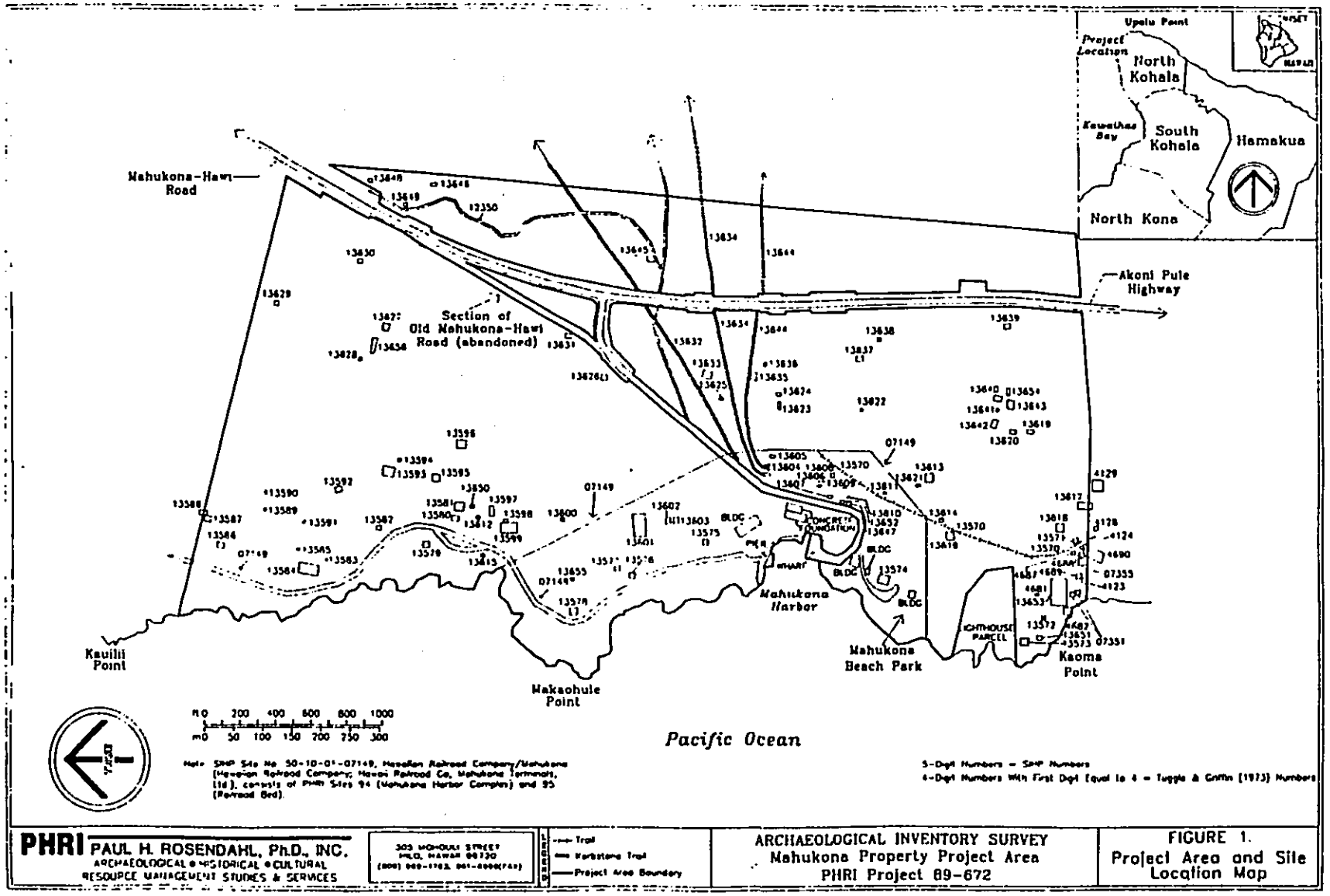
The shoreline is formed by projections and outcrops of the lava substrate and has occasional beaches of basalt and coral cobbles and boulders. Height at the shoreline varies from sea level on the low boulder and cobble beach at the south project boundary, to c. 10 m outcrops near the north boundary.

Vegetation in the project area is dominated by various thick grasses, and kiawe trees (*Prosopis pallida* [Humb. and Bonpl. ex Willd.] HBK). Koa-haole (*Leucaena leucocephala* [Lam.] de Wit), and 'ilima (*Sida fallax* Walp.) are also present. Sisal (*Agave sisalana* [Englem.] Perrine), in medium to dense concentrations, is found in the northern portion of the project area, growing most profusely in the open areas.

Much of the project area evidences land modification related to road building and clearing. A section of the area immediately west of the old Mahukona-Hawi Highway appears to have been leveled and has beach fill (composed of sand, beach gravel, marine shells, and waterworn coral) deposited on the surface. The beach fill covers an area

F-4

F-5



Note: SIHP Site No. 50-10-01-07149, Hawaiian Railroad Company/Mahukona (Hawaiian Railroad Company; Hawaii Railroad Co, Mahukona Terminal, Ltd.), consists of PHRI Sites 94 (Mahukona Harbor Complex) and 95 (Railroad Bed).

PHRI PAUL H. ROSENDAHL, Ph.D., INC.
ARCHAEOLOGICAL • HISTORICAL • CULTURAL
RESOURCE MANAGEMENT STUDIES & SERVICES

305 HOHOULI STREET
HILO, HAWAII 96720
(808) 969-1703, 961-6998(FAX)

ARCHAEOLOGICAL INVENTORY SURVEY
Mahukona Property Project Area
PHRI Project 89-672

FIGURE 1.
Project Area and Site Location Map

approximately 60.0 m east-west and c. 75.0 m north-south (beginning at a narrow drainage ditch at the base of an outcrop and extending southward). The terrain in the immediate vicinity of the fill is relatively level, with few boulders and a covering of grass, scattered small kiawe trees, and numerous sisal plants.

Bulldozing in the project area has left numerous dozer push piles, scars on the terrain, and roads, some overgrown and others still in use. That archaeological sites have been disturbed by this activity is apparent, the path of one road can be traced through a section of kerbstone trail, and another can be traced through a platform near the shore. During the course of the present survey, fences were erected in much of the project area, and the area is now used for cattle grazing. Other sites will, presumably, be disturbed as cattle wander through the the area.

PREVIOUS ARCHAEOLOGICAL WORK

A summary of archaeological investigations on the leeward coast of North Kohala, prior to 1980, is presented by Tomonari-Tuggle in her cultural resources management study of North Kohala (1981:60-61). Most of the earlier work, including a 1970 cultural resource inventory for the County of Hawaii (Loo and Bonk 1970), a 1972 survey by the Historic Sites Section, Division of State Parks (Statewide Inventory of Historic Places), and a 1972 survey for the Department of Land and Natural Resources (DLNR 1972), focused on relocating and describing known archaeological and historic sites in the coastal region.

A large portion of the archaeological work conducted in leeward north Kohala has been directed toward the Lapakahi site, immediately south of the present project area, with emphasis on the Koai'e village (Newman 1968, Pearson 1968, Tuggle and Griffin 1973). An archaeological survey by Schilt and Sinoto (1980) covered approximately 1,000 acres of the coastal area south of Lapakahi. Research on upland prehistoric agriculture in North Kohala was conducted by Rosendahl (1972).

A PHRI survey of Kapaanui and Kou (Kaschko 1984) identified 12 previously unrecorded sites north of the present project boundary. An inventory survey of Kapaanui and Kou, conducted by PHRI in 1989 (Dunn and Rosendahl 1989), relocated all 12 sites; however, two of the sites were located outside of the project area. The survey also located 16 previously unrecorded sites, comprised of 31 component features.

A number of archaeological investigations have included portions of the present project area. During the archaeological survey of the Mahukona-Kawaihae Highway Corridor, Soehren (1964) located 14 prehistoric sites including campsites, a burial cave, and graves; none of the sites, however, were located within the present project boundary.

A 1968 survey by Bonk (Bonk 1968), covering a 12-mile-long strip of leeward coast, from Kawaihae to Upolu, identified seven previously unrecorded sites. One site, although not described, is identified on the archaeological site map as "site No 1 in section F11." The site is shown in the same location as Tomonori-Tuggle (1981) Site K-174 (SIHP Site 13584 of the present survey).

Peterson's work on trails in north Kohala was conducted, in part, within the boundaries of the present project. Ten trail sections numbered 3, 8, 9, 10, 11, 12, 13, 14, 15, and 16 were described within the project area (Peterson 1968). During the current project, seven of the trail sections, and three others not previously located, were followed-out and were recorded and assigned SIHP numbers. Three short trail sections were not relocated.

Kaschko's survey of the Lapakahi trail system included a portion of Kaoma Ahupua'a. He suggests that the long mauka-makai (seaward-inland) trails could have functioned, in part, as boundaries between specific land-social units (Kaschko 1973:127). Trail number 1 is shown as passing through the southern portion of the project area, but it was not located during the present survey.

Surveys conducted during the course of the Lapakahi project (Tuggle and Griffin 1973) extended into the present project area. The northern boundary of the grid system employed by the project extended 5-6 km east from Mahukona Lighthouse at Kaoma Point. The southern boundary of the grid system was positioned 2.5 km south of the lighthouse. Twenty-seven sites were identified between the lighthouse and the southern boundary of the present survey area. On the Tuggle and Griffin (1973) map, two of the sites were assigned the number 4124, and during the present review it could not be determined which site is actually 4124, and what the number of the other site actually is. During the current survey, 24 of the sites were relocated. Previously identified site clusters (Tuggle and Griffin 1973) were reassigned one SIHP site number during the present survey. Three previously identified sites were not relocated during the present survey. Considerable machine activity has taken place in the area during the c. 20 year interval between surveys, and the sites may have been disturbed or destroyed.

A survey by Connor of sites north and south of Koaie village included the portion of the current survey area south of the lighthouse at Kaoma Point (Connor 1968). Connor identified ten sites within this portion; all the sites were relocated during the present survey. Site types included walls, which were components of multiple feature sites, platforms, and possible burials. Connor's sites are correlated with SIHP site numbers assigned during the current project in Table 1.

As part of a series of excavations associated with the Lapakahi project, excavations were conducted by Rosendahl (1971) at Site 4724, which is in the present project area c. 200 m east of Mahukona Lighthouse. Excavations were conducted at a habitation structure, a fire pit, and a rock mound at the site. A burial uncovered during excavation of the rock mound was recorded and disinterred by McKenzie (1973).

Tomonari-Tuggle identified and mapped 193 sites during a survey of the north portion of the leeward coast, from Upolu to Lapakahi State Park (Tomonari-Tuggle 1981:69). Nine sites in the present project area were identified during this survey. During the current project, seven of the nine sites were relocated and were assigned SIHP numbers (Table 1).

SUMMARY OF LIMITED HISTORICAL DOCUMENTARY RESEARCH (APPENDIX B)

Because windward North Kohala was chosen as the center of Kohala in prehistoric and modern times, historical references to the leeward side are rare. The windward side, with its deep fertile valleys and long watercourses, provided ample subsistence resources by which to sustain a large population. The drier leeward side, characterized by long gradual slopes, or kula lands, with intermittent streams and gullies, was a less hospitable environment (Loo and Bonk 1970). The historical documentary research (Appendix B, by Helen Wong Smith, B.A.), recounts some of the chants and legends that mention Kohala.

Tradition describes Kohala as the scene of warfare between the chiefs of Maui and Hawaii islands. It is the site of Kamehameha's birth during preparations for an attack on Maui; from Kohala, Kamehameha gradually extended his power, eventually gaining control of all of the islands of Hawaii.

The first historic reference to Kohala was made by Lt. King of Capt. Cook's crew during Cook's visit to North Kohala in 1779. Lt. King explored Kohala and noted the many villages, plantations, field walls, and coconut palms. King described the country as "fruitful and well inhabited" (Tomonari-Tuggle 1981).

The Reverend William Ellis traveled around the island of Hawaii and described his experiences and impressions while traveling the coast between Kapa'au, on the windward side of North Kohala, and Kawaihae, south of the present project area. Ellis noted in his journal the thousands of people from Waimea and Kohala carrying sandalwood to the beach for shipment to Oahu (Ellis 1963:284-286 [Appendix B]).

Settlement along the leeward coast grew during the early 1880s, but by the mid 1880s agricultural areas and settlements gradually shifted to the windward side of the district. By the late 1880s hunting of the herds of wild cattle, descendants of the cattle left by Vancouver in 1793, had evolved into cattle ranching. Large tracts of land on the leeward side of Kohala were purchased or leased for grazing (Tomonari-Tuggle 1981:33-35).

Appendix B also cites Tomonari-Tuggle (1981), writing on land grants in the Mahukona area, the role of the Hawaiian Railroad in the district, and population decrease after closure of the Kohala Sugar Company and Mahukona Harbor.

FIELD METHODS AND PROCEDURES

On September 26, 1989, Supervisory Archaeologists Alan T. Walker and Berdena Burgett conducted a 100% aerial survey of the project area by way of a helicopter piloted by Mr. Fred Morrall of Papillon Helicopters. For orientation, the archaeologists first flew over the boundaries of the entire project area. Next, the entire project area was examined by way of a series of overlapping aerial sweeps oriented c. north-south. Sweeps averaged 3 to 15 m above ground, depending on terrain and vegetation. Visibility in inland areas was excellent—the terrain was open and contained only scattered trees. Visibility in coastal areas, due to a moderate cover of trees, was fair to good. The aerial reconnaissance identified 38. As sites were identified, flagging was done from the air, by attaching a flag to a stone and dropping it on the site. Sites were assigned sequential number designations beginning with "1" and prefixed by "AS-" (Aerial Survey), and the designation was marked on

Table I.

CORRELATION OF SITE NUMBERS

SIHP	Tuggle & Griffin [1973]	Connor [1968]	Tomonari-Tuggle [1981]	Peterson [1968]	PHRI	SIHP	Tuggle & Griffin [1973]	Tomonari-Tuggle [1981]	PHRI
-	4123	-	-		672-1	13595	-	-	672 40
-	4124	-	-	-	672-8	13596	-	-	672 41
-	4128	-	-	-	672-11	13597	-	-	672-42
-	4129	-	-	-	672 63	13598	-	K 178	672 43 A
-	4681	1	-	-	672 16	13599	-	K-178	672 44
-	4682	2	-	-	672-15	13600	-	-	672 45
-	4687	7	-	-	672-12	13601	-	-	672 46
-	4688	8	-	-	672-7	13602	-	-	672-47
-	4689	9	-	-	672-4	13603	-	-	672 48
-	4690	10	-	-	672-6	13604	-	-	672 49
7149*	-	-	K-1	-	672-95	13605	-	-	672 50
7149*	-	-	K-179	-	672 94	13606	-	-	672-51
7351	-	-	-	-	672 2,3	13607	-	-	672 52
7355	-	-	-	-	672-5	13608	-	-	672 53
123500	-	-	-	3	672-92	13609	-	-	672 54
13570	-	-	-	13	672-9,57,60	13610	-	-	672 55
13571	-	-	-	-	672-10	13611	-	-	672 56
13572	-	-		-	672-17	13612	-	-	672 99
13573	-	-	-	-	672-18	13613		-	672-58
13574	-	-	-	-	672-19	13614		K-181	672 59
13575	-	-	-	-	672-20	13615	-	-	672 100
13576	-		-	-	672 21	13616	-	-	672 61
13577	-		-	-	672 22	13617	4130	-	672 62 A
13578	-		-	-	672-23	13617		-	672 62 B,C,F,H,J
13579	-	-	K-175	-	672-24	13617	4131	-	672 62 D or E
13580	-	-	K-176	-	672-25	13617	4132	-	672 62 G
13581	-	-	K-176	-	672-26	13618	4031	-	672-13 C,D
13582	-	-	-	-	672-27	13618	4032	-	672-13 A,B
13583	-	-	-	-	672-28	13618	4033	-	672-13 E
13584	-	-	K-174	-	672-29	13619	4724	-	672 64 A,B
13585	-	-	-	-	672-30	13619	-	-	672-64 C,D,E
13586	-	-	-	-	672-31	13620	-	-	672 65
13587	-		-	-	672-32	13621	-	-	672 66
13588	-		K-173	-	672 33	13622	-	-	672-67
13589			-	-	672-34	13623	-	-	672 68
13590	-	-	-		672-35	13624	-	-	672 69
13591	-	-	-	-	672 36	13625	-	-	672 70
13592	-		K-177	-	672-37	13626	-	-	672 71
13593	-	-	-	-	672-38	13627	-	-	672-72
13594	-	-	-	-	672 39	13628	-	-	672-73
						13629	-	-	672-64

* Previously identified site (HRHP n.d.)
# Previously identified site (Rosendahl 1989)

Table I. (cont.)

SIHP	Peterson [1968]	PHRI	SIHP	Tuggle & Griffin [1973]	Connor [1968]	PHRI
13630	-	672-75	13645	-	-	672-90
13631	-	672-76	13646	-	-	672-91
13632	9	672-77	13647	-	-	672-102
13633	-	672-78	13648	-	-	672-93
13634	10,12	672-79	13649	-	-	672-101
13635	-	672-80	13650	-	-	672-98
13636	-	672-81	13651	4022*	-	672-96
13637	-	672-82	13652	-	-	672-97
13638	-	672-83	13653	4683	3	672-14 A
13639	-	672-84	13653	4684	4	672-14 B
13640	-	672-85	13653	4685	5	672-14 C
13641	-	672-86	13653	4686	6	672-14 D
13642	-	672-87	13654	-	-	672-103
13643	-	672 88	13655	-	-	672-104
13644	11	672-89	13656	-	-	672-105

* Possibly

the site flag and recorded in a field notebook (e.g., AS-1). Later, sites with "AS-" numbers were reassigned PHRI temporary numbers (prefixed by "672-"). All identified sites were plotted on 1"=200' scale aerial photographs (Air Survey Hawaii, 1987: Photo No.1-23 H).

During Phase I of the present survey, a pedestrian reconnaissance of the project area was conducted (between September 27 and 29, 1989). The area was covered by way of a series of parallel transects, oriented north-south, with intervals between crew members maintained at a maximum of 30 m (intervals varied with the terrain and density of vegetation). The outside sweep lines and the end points of each series of transects were marked with striped flagging tape.

All crew members were notified and sweeps were halted when archaeological features were encountered. The identified feature was marked with pink-and-blue flagging tape bearing the PHRI project number, a temporary site number, and the date. The approximate site location was plotted on a large-scale aerial map of the survey area, and the transect line number, site type, function, size, and presence/absence of portable remains was recorded.

Phase II of the survey, data collection, was conducted December 18-29, 1989 and January 2-11, 1990 by a crew of two to six persons. For each site, a scaled plan map was made, complete measurements were taken, black-and-white photographs taken of individual features, and standard PHRI site and feature forms were completed. A metal tag bearing the project number, temporary site number, and the date was placed at each site, and the tag location was marked on the site map. A flag-wrapped stone was positioned near each tag to aid in future relocation and identification.

All sites, including those previously identified, were assigned PHRI temporary site numbers with the three-digit prefix "672-". Permanent State Inventory of Historic Places (SIHP) numbers were later assigned to all newly identified sites and those relocated sites bearing numbers prefixed by the letter "K" (Tomonari-Tuggle sites). Three relocated site complexes bearing multiple SIHP numbers were assigned a single SIHP number for each site. As indicated previously, Table 1 correlates site numbers in the project area.

Subsurface testing was conducted at four sites. Five test units (totaling 1.5 sq m) were dug. All test units were excavated by arbitrary levels within stratigraphic layers. Excavated material was processed through 1/8" and 1/4" dry screens, and artifacts and midden were collected. Soil samples were taken from each test unit and radiocarbon samples were obtained. Stratigraphic information recorded for each unit include soil descriptions and profile maps.

At the time of the survey most of the project area was covered with dense tall grass that made location and identification of features less than 0.4 meters high difficult and, at times, impossible. There are, probably, low features in the project area that have not been located. A grass fire, south and east of Mahukona Lighthouse, had left the ground surface in that area exposed during the survey. However, during the interval between site location and site recording, the grass had returned and formed a dense growth covering many of the features. Moreover, grass cover on the remaining portion of the survey area had grown taller, further obscuring low sites and others as well. There was excellent ground visibility in the southern one-third of the project area due to a recent fire that had burned off the grass

FINDINGS

During the current survey, 101 sites consisting of 246 features were identified within, or immediately adjacent to, the project area. Thirty-nine of the sites had been previously identified, 24 sites had been initially located by Tuggle and Griffin (1973) during a survey conducted as part of the Lapakahi project; ten sites were located by Tomonari-Tuggle (1981) during the course of a cultural resources survey of leeward North Kohala; and six sites were located, in part, by Peterson (1968) during a study of trails in North Kohala. (Sites add to more than 39 due to duplicate numbers.) The sites are summarized in Table 2 in terms of site number, formal and functional types, CRM (Cultural Resource Management) value mode assessments, and recommended field work tasks, and their approximate locations are shown on Figure 1.

The majority of sites (N=53) are complexes consisting of multiple features. Many complexes contain several formal feature types and functions. The remaining sites (N=48) are single-feature sites assigned a single formal feature type and function. Twenty-six formal feature types and 27 functional feature types are represented in the project area. About fifty percent of the functional feature types (N=13) represent habitation (permanent and temporary) and agricultural features occurring singly or in combinations of feature types. The frequencies of formal feature types is presented in Table 3, and Table 4 presents the frequencies of functional feature types. Table 5 presents the frequencies of functional site types.

In addition to the prehistoric sites located within the project area, various structures and structural remnants associated with the Mahukona Harbor complex were noted (concrete building foundations, tanks and pipes that were part of the harbor complex itself, and evidence of various houses and camps). Those features which could be identified as recent historic constructions of the complex were noted, but were not recorded. Features of the complex determined to represent recent historic (late 1800s-early 1900s) use of pre-contact or early-contact Hawaiian features were recorded as such, and the presence of historic materials at the sites were noted. Assessments of age (pre-contact, early contact, recent historic, etc.) were made based on methods used in construction, feature types, and relationships to other known sites in the area. Ten sites with evidence of recent historic use were tentatively determined to be of pre-contact or early-contact Hawaiian origin. These features include enclosures, terraces, walled outcrops, and alignments. All contained evidence of historic occupation and/or alteration; historic building materials, household articles, and in some cases, large accumulations of bottles and cans, were present at these sites. It should be noted that accurate age determinations for these sites can only be provided by testing datable materials from the features. The ten sites are listed here and are discussed in the Conclusion section of this report:

13576 Walls, alignment, modified outcrop
13602 Enclosure
13603 Wall, platform
13604 Enclosure
13606 Modified outcrop, wall
13607 Enclosure
13608 Terrace, platform
13609 Terrace
13652 Platform, modified outcrop, wall, terrace, alignment
13647 Modified outcrop, wall, terrace, platform

SUBSURFACE TESTING

Five test excavations totaling of c. 1.5 sq m in surface area were dug within the project area. The purpose of the excavations was to determine the presence or absence of cultural remains and to attempt recovery of datable material. Excavations were placed at Sites 13573-A, 13620-B, 13620-C, 13639-C, and 13651-F. The units yielded sparse midden and carbon samples. Because the midden material was sparse, midden from only two test units (at Site 13620-B and 13620-C) were collected and processed quantitatively. The remaining three test units (at Sites 13573-A, 13639-C, and 13651-F) were done qualitatively. Analysis revealed that the material from units done quantitatively did not differ from that recovered from units done qualitatively. The midden material collected is discussed further in the Data Analyses section of this report.

Thirteen radiocarbon samples were recovered during excavation of the test units. Of the 13, six (one each from Sites 13573-A, 13620-C, 13639-C, and 13651-F, and three from Site 13620-B and -C) were submitted for age determination analyses. All test units contained a cultural deposit measuring from c. 0.4-0.28 m thick.

Table 2.

SUMMARY OF IDENTIFIED SITES AND FEATURES

*SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	#CRM Value Mode Assess. R	I	C	+Field Work Tasks DR	SC	EX
4123	Modified outcrop	Habitation-salt collection	M	M	L	+	-	+
4124	C-shape	Temporary habitation	L/M	L	L	-	-	-
4128	Terrace	Temporary habitation	M	L	L	+	+	+
4129	Complex (3)**	Temporary habitation-possible burial	M	M	L/H	+	+	+
A	Walled terrace							
B	Platform							
C	Terrace							
4681	C-shape	Temporary habitation	M	L	L	+	+	-
4682	Complex (3)	Habitation	M	M	L	+	+	+
A	Walled terrace							
B	Terrace							
C	Walled terrace							
4687	Platform	Possible burial	M	L	L/H	+	-	+

Table 2. (cont.)

*State Inventory of Historic Places (SIHP) numbers. SIHP numbers are four- to five-digit numbers prefixed by 50-10-01 (50=State of Hawaii; 10=Island of Hawaii, 10=USGS 7.5' series quad map ["Mahukona," Hawaii"]).

#Cultural Resource Management Value Mode Assessment
—Nature: R = scientific research
I = interpretive
C = cultural
—Degree H = high
M = moderate
L = low

+Field Work Tasks:
DR = detailed recording (scaled drawings, photographs, and written descriptions)
SC = surface collections
EX = test excavations

**Number of component features within complex

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
4688	C-shape	Temporary habitation	M	L	L	+	+	+
4689	Terrace	Habitation	M	L	L	+	+	+
4690	Complex (4)	Habitation	M	L	L	+	+	+
A	Walled terrace							
B	Enclosure							
C	C-shape							
D	Terrace							
7149	Hawaiian Railroad Company Mahukona Terminals and Harbor Complex	Agriculture-harbor-transportation	M/H	M/H	M/H	+	+	+
7351	Complex (2)	Habitation	M	L	L	+	+	+
A	Terrace							
B	Terrace							
7355	Complex (2)	Temporary habitation	M	L	L	+	+	+
A	C-shape							
B	C-shape							
12350	Road	Transportation	M	M	M/H	+	-	-
13570	Trail	Transportation	M	M	H	+	-	-
13571	Complex (2)	Indeterminate	M	L	L	+	+	+
A	Circular boulder wall							
B	Circular boulder wall							
13572	C-shape	W.W.II military	L	L	L	-	-	-
13573	Complex (2)	Possible ceremonial	M	M	H	+	-	+
A	Terrace							
B	Terrace							
13574	Complex (3)	Habitation	M	L	L	+	-	+
A	Enclosure							
B	Wall							
C	Wall							
13575	Enclosure	Indeterminate	M	L	L	+	-	+

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13576	Complex (2)	Habitation	M	L	L	+	+	+
A	L-shape wall							
B	Modified outcrop							
13577	Complex (2)	Temporary habitation	M	L	L	+	-	+
A	Terrace							
B	Terrace							
13578	Complex (5)	Habitation	M	L	L	+	+	+
A	Wall							
B-D	Mound (3)							
E	Midden scatter							
13579	Complex (6)	Habitation-agriculture	M	L	L	+	+	+
A	Enclosure							
B	Terrace							
C-F	Platform (4)							
13580	Enclosure	Habitation-possible ceremonial	M	M	L	+	+	+
13581	Complex (4)	Habitation	M	M	L	+	+	+
A	Walled terrace							
B	Walled terrace							
C	Terrace							
D	Wall							
13582	Enclosure	Temporary habitation	M	L	L	+	-	+
13583	Complex (2)	Temporary habitation-probable W.W.II military	M	L	L	+	-	+
A	C-shape							
B	Modified outcrop							
13584	Complex (6)	Ceremonial-indeterminate/possible burial	M/H	H	H	+	+	+
A	Platform							
B	Platform							
C	Modified outcrop							
D	Modified outcrop							
E	Mound							
F	Mound							
13585	Mound	Possible burial	M	L	L/H	+	-	+

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13586	Complex (5)	Agriculture/habitation-possible ceremonial/possible burial	M	L	L/H	+	+	+
A	Terrace							
B	Modified outcrop							
C	Alignment							
D	Terrace							
E	Mound							
13587	Complex (3)	Habitation-possible burial	M	L	L/H	+	-	+
A	Enclosure							
B	Terraced slope							
C	Cupboard							
13588	Mound	Marker	L	L	L	-	-	-
13589	Cairn	Marker	L	L	L	-	-	-
13590	Modified outcrop	W.W.II military	L	L	L	-	-	-
13591	C-shape	Temporary habitation	M	L	L	+	+	-
13592	Complex (3)	Temporary habitation	M	L	L	+	+	+
A	Double C-shape							
B	Modified outcrop							
C	Modified outcrop							
13593	Complex (7)	Possible burial-possible marker	M/H	L	L/H	+	-	+
A	Platform							
B	Mound							
C-E	Platform (3)							
F	Terrace							
G	Upright							
13594	C-shape	Temporary habitation	L	L	L	-	-	-
13595	Complex (3)	Habitation-possible burial	M/H	L	L/H	+	-	+
A	Platform							
B	Enclosure							
C	C-shape							
13596	Complex (5)	Habitation	M	L	L	+	-	+
A	Enclosure							
B	Enclosure							
C	Terrace							
D	Enclosure							
E	Cairn							

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13607	Enclosure	Agriculture	M	L	L	+	-	+
13608 A B	Complex (2) Terrace Platform	Habitation	M	L	L	+	-	+
13609	Terrace	Temporary habitation	M	L	L	+	-	+
13610	C-shape	Temporary habitation	M	L	L	+	-	+
13612 A B	Complex (2) Wall Terrace	Temporary habitation-boundary	M	L	L	+	-	+
13613 A B	Complex (2) Enclosure Alignment	Agriculture	M	L	L	+	-	+
13614	Machine gun	W.W.II military emplacement	L	L	L	-	-	-
13615 A B C-O	Complex (15) Wall Fueptl Platform (13)	Habitation-agriculture	M	L	L	+	-	+
13616	L-shape	Temporary habitation	M	L	L	+	-	+
13617 A B C D E F G H-J	Complex (10) C-shape Mound Terrace Terrace Mound Mound Terrace Mound (3)	Temporary habitation	M	L	L	+	+	+

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13597 A B C D E F	Complex (6) Wall Enclosure Terrace Wall Overhang Overhang	Habitation -agriculture	M	L	L	+	-	+
13598 A B	Complex (2) Overhang Wall	Temporary habitation	M	L	L	+	+	+
13599 A B C	Complex (3) Enclosure Platform Wall	Habitation/ possible burial/ possible ceremonial-agriculture	M/H	H	L/H	+	+	+
13600	C-shape	Temporary habitation	M	L	L	+	-	+
13601 A B C D E	Complex (5) Enclosure Wall Enclosure Enclosure Terrace	Temporary habitation	M	L	L	+	-	+
13602	Enclosure	Temporary habitation	M	L	L	+	-	+
13603 A B C D	Complex (4) U-shape wall Mound Mound Platform	Habitation-indeterminate/ possible burial	M/H	L	L/H	+	+	+
13604 A B	Complex (2) Enclosure Enclosure	Temporary habitation-	M	L	L	+	-	+
13605	Enclosure	Temporary habitation	M	L	L	+	-	+
13606 A B C	Complex (3) U-shape wall Modified outcrop C-shape	Habitation	M	L	L	+	-	+

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13618	Complex (5)	Habitation	M	L	L	+	+	+
A	Wall							
B	Modified outcrop							
C	Terrace							
D	Enclosure							
E	Modified outcrop							
13619	Complex (5)	Temporary habitation-agriculture	M	L	L	+	+	+
A	Walled terrace							
B	Mound							
C	C-shape							
D	Terrace							
E	Terrace							
13620	Complex (3)	Temporary habitation	M	L	L	+	+	+
A	Platform							
B	Firepit							
C	Firepit							
13621	Complex (3)	Temporary habitation	M	L	L	+	-	+
A	C-shape							
B	Cairn							
C	C-shape							
13622	Complex (2)	Possible burial	M	L	L/H	+	+	+
A	Platform							
B	Platform							
13623	Complex (3)	Habitation	M	L	L	+	+	+
A	Enclosure							
B	Terrace							
C	Terrace							
13624	Enclosure	Habitation	M	L	L	+	-	+
13625	Mound	Possible burial	M	L	L/H	+	-	+
13626	Enclosure	Possible temporary habitation	M	L	L	+	-	+
13627	Complex (3)	Temporary habitation	M	L	L	+	-	+
A	C-shape							
B	C-shape							
C	Modified outcrop							
13628	Cairn	Water catchment	L	L	L	-	-	-

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13629	Cairn	Marker	L	L	L	-	-	-
13630	Wall section	Indeterminate	L	L	L	-	-	-
13631	Mound	Agriculture	L	L	L	-	-	-
13632	Kerbstone trail	Transportation	M	M	M/H	+	-	+
13633	Complex (3)	Habitation	M	L	L	+	-	+
A-C	Enclosure							
13634	Kerbstone trail	Transportation	M	M	M/H	+	-	+
13635	Complex (2)	Habitation-possible burial	M	L	L/H	+	+	+
A	Platform							
B	Enclosure							
13636	Cairn	Marker	L	L	L	-	-	-
13637	Enclosure	Temporary habitation	M	L	L	+	+	+
13638	C-shape	Temporary habitation	L	L	L	-	-	-
13639	Complex (3)	Habitation	M	M	L	+	+	+
A	Terrace							
B	L-shape wall							
C	Firepit							
13640	Complex (2)	Habitation	M	M	L	+	+	+
A	Platform							
B	C-shape							
13641	Wall section	Indeterminate	L	L	L	-	-	-
13642	Enclosure	Agriculture	L	L	L	-	-	-
13643	Complex (2)	Habitation	M	L	L	+	+	+
A	Enclosure							
B	Terrace							
13644	Kerbstone trail	Transportation	M	M	M/H	+	-	+

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13645	Complex (2)	Agriculture	L	L	L	-	-	-
A	Mound							
B	Mound							
13646	Complex (4)	Agriculture-	L	L	L	-	-	-
A	Wall section	temp. habitation						
B	Modified outcrop							
C	Wall section							
D	C-shape							
13647	Complex (3)	Habitation	M	L	L	+	-	+
A	Modified outcrop							
B	Wall section							
C	Platform							
13648	Cairn	Marker	L	L	L	-	-	-
13649	Complex (2)	Possible	L	L	L	-	-	-
A	Wall section	agriculture						
B	C-shape							
13650	Complex (4)	Habitation/	M	L	L	+	-	+
A	Terrace	agriculture-boundary-						
B	Platform	indeterminate						
C	Alignment							
D	Wall							
13651	Complex (7)	Habitation-	M	M	L/H	+	-	+
A	Platform	poss. burial-poss. ceremonial-						
B	Terrace	W.W.II military-indeterminate						
C	Mound							
D	Terrace							
E	Upright (2)							
F	Enclosure							
G	C-shape							
13652	Complex (6)	Habitation	M	L	L	+	-	+
A	Platform							
B	Wall							
C	Terrace							
D	Modified outcrop							
E	Modified outcrop							
F	Alignment							

Table 2. (cont.)

SIHP Site Number	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
13653	Complex (4)	Habitation	M	M	L	+	+	+
A	Enclosure							
B	C-shape							
C	Enclosure							
D	Mound							
13654	Modified outcrop	Temporary habitation	L	L	L	-	-	-
13655	Enclosure	Habitation	M	L	L	+	-	+
13656	Enclosure	Agriculture/ temporary habitation	M	L	L	+	-	+

SUMMARY OF SITE DESCRIPTIONS

Detailed descriptions for all identified sites are presented in Appendix A, which includes for each site:

1. Site number - State Inventory of Historic Places (SIHP) numbers. SIHP numbers are five-digit numbers prefixed by 50-10-10 (50=State of Hawaii; 10=Island of Hawaii; 10 = USGS 7.5' series quad map ["Mahukona, Hawaii"]);
2. A site type designation - provides formal feature type for sites consisting of a single feature, or designates the site as a complex if site is comprised of more than one feature. Also lists total number of features present.
3. A description of site topography - a brief description of the terrain in the area of the site;
4. A listing of site vegetation - lists principal components of the vegetation within and in the vicinity of the site;
5. A statement of site condition - overall state of preservation of the site (poor, fair, good, or excellent);
6. An assessment of site integrity - degree of post abandonment modification by human agencies (unaltered, partially altered, and completely altered) and nature of modifications, if any;

Table 3.

FREQUENCIES OF FORMAL FEATURE TYPES

Formal Type	Number	Percent
Enclosure	38	15.5
Platform	38	15.5
Terrace	36	14.6
C-shape	26	10.6
Mound	25	10.2
Modified outcrop	18	7.3
Wall	14	5.7
Walled terrace	7	2.9
Cairn	7	2.9
Wall section	6	2.4
Alignment	4	1.6
Fwepi	4	1.6
Overhang	4	1.6
Kerbstone trail	3	1.2
L-shape wall	3	1.2
Circular boulder wall	2	0.8
U-shape wall	2	0.8
Double C-shape	1	0.4
Machine gun emplacement	1	0.4
Mahukona Harbor Complex	1	0.4
Midden scatter	1	0.4
Road	1	0.4
Terraced slope	1	0.4
Trail	1	0.4
Upright	1	0.4
Upright (2)	1	0.4
TOTAL	246	100.0

7. A probable age - indicates probable/possible (?) age of the site (i.e., historic or prehistoric);
8. A functional interpretation - probable or possible (?) functions for each site; or, if function cannot be determined, assigns indeterminate function. For sites with multiple functions, functions separated by "/";
9. A site description - a brief overall description of the site listing types of constituent features, description of feature construction, associated portable remains, if any, and other descriptive information.
10. Feature dimensions - maximum length, width, and height or depth.

Table 4.

FREQUENCIES OF FUNCTIONAL FEATURE TYPES

Functional Type	Number	Percent
Habitation	84	34.2
Temporary habitation	57	23.2
Agriculture	28	11.4
Possible burial	14	5.7
Indeterminate	12	4.9
Possible ceremonial	8	3.3
Agriculture/habitation	7	2.9
Transportation	5	2.0
W.W.II military	3	1.2
Marker	3	1.2
Possible agriculture	3	1.2
Possible marker	3	1.2
Habitation/possible burial	2	0.8
Indeterminate/possible burial	2	0.8
Possible temporary habitation	2	0.8
Boundary	2	0.8
Water catchment	1	0.4
Ceremonial	1	0.4
Disinterred burial	1	0.4
Habitation (cupboard)	1	0.4
Habitation-possible ceremonial	1	0.4
Habitation-salt collection	1	0.4
Habitation/agriculture	1	0.4
Harbor	1	0.4
Possible ceremonial/possible burial	1	0.4
Temporary habitation/possible burial	1	0.4
Temporary habitation/probable W.W.II	1	0.4
TOTAL	246	100.0

Table 5.

FREQUENCIES OF FUNCTIONAL SITE TYPES

Functional Type	Number	Percent
Temporary habitation	27	26.7
Habitation	22	21.8
Agriculture	5	5.0
Marker	5	5.0
Transportation	5	5.0
Indeterminate	4	4.0
Possible burial	4	4.0
Habitation-agriculture	3	3.0
Habitation-possible burial	3	3.0
W.W.II military	3	3.0
Agriculture-temporary habitation	2	2.0
Agriculture/habitation-possible ceremonial/possible burial	1	1.0
Agriculture-harbor-transportation	1	1.0
Agriculture/tempoary habitation	1	1.0
Ceremonial-indeterminate/possible burial	1	1.0
Habitation/possible burial/possible ceremonial-agriculture	1	1.0
Habitation-indeterminate/possible burial	1	1.0
Habitation-possible burial-possible ceremonial-W.W.II military-indeterminate	1	1.0
Habitation-possible ceremonial	1	1.0
Habitation-salt collection	1	1.0
Habitation/agriculture-boundary-indeterminate	1	1.0
Possible agriculture	1	1.0
Possible burial-possible marker	1	1.0
Possible ceremonial	1	1.0
Possible temporary habitation	1	1.0
Temporary habitation-boundary	1	1.0
Temporary habitation-possible burial	1	1.0
Temporary habitation-probable W.W.II	1	1.0
Water catchment	1	1.0
TOTAL	101	100.5

DATA ANALYSES

AGE DETERMINATIONS

Sites tested were selected on the basis of surface evidence indicating that datable materials might be recovered. Dates were obtained for six of the 246 features identified within the project area. Six (N=6) samples were collected from six test units excavated at four sites; the samples were submitted to Beta-Analytic, Inc. for radiocarbon age determination analysis. Results of the analysis are presented in Table 6. The results are reported as date ranges based on two sigma statistics. The ranges were calibrated according to tables presented in Stuiver and Pearson (1986).

Of the six samples submitted, three produced dates ranging from AD 1280 to the first half of the present century. The remaining three samples yielded a percent modern range, indicating they are statistically indistinguishable from the present. The percent modern ranges may be due to the recent fire in the southern one-third of the project area.

The dated sites are located in the southern portion of the project area, in a c. 150 meter wide strip extending from the shoreline to the Mahukona-Kawaihae Highway. Two of the sites are located near the shoreline, one in the central portion of the strip, and the other near the highway. Although located in the southern portion, the date ranges yielded by the sites are in accord with those from adjoining Lapakahi and, with three exceptions, with those from Kapaanui to the north (AD 1300 to the first half of the 20th century at Lapakahi [Tuggle and Griffin 1973:57]), an AD 469 to the present at Kapaanui). The three exceptions are AD 461-469 and AD 520-1170 at Site 12444, and AD 610-1200 at Site 12434 (Dunn and Rosendahl 1989:17-18).

Site 13573, near the shoreline, produced three date ranges: AD 1440-1700, AD 1726-1818, and AD 1921-1954. Site 13620, in the south central region, yielded a similar series of date ranges: AD 1450-1680, AD 1747-1799, and AD 1942-1954. These ranges coincide with Tuggle and Griffin's schedule for colonization and subsequent abandonment of many coastal sites (Tuggle and Griffin 1973:65). Site 13639, in the southeast portion of the project area, produced a single date range of AD 1280-1420 spanning 140 years. Dating material from Site 13651, located near the shoreline south of Site 13573, produced only a modern date range. Further testing at the site may produce dates in accord with others in the area.

PORTABLE ARTIFACTS

Fifty-one (N=51) indigenous artifacts were recovered during the survey. Forty-three were from surface collections at various sites, and eight were recovered during excavation of test units. The distribution of artifacts is presented in Table 7. The majority of artifacts collected were flakes of volcanic glass and basalt. Also represented in the collection were abraders, scrapers, a shell fishing lure, modified shell, and modified mammal bone.

Surface collections were conducted at only seven of the 101 sites in the survey area and test units were excavated at five sites (of which two yielded portable artifacts) (Table 7). It should be noted that the artifacts recovered are not representative of the project area as a whole, or of indigenous artifacts found in nearby areas. Further testing and surface collections should represent all regions of the project area and provide artifacts covering a broader range of functional categories.

ECOFACTUAL REMAINS

Ecofactual remains were present in all five test excavation units but were collected and processed quantitatively from only two (at Site 13620-B and 13620-C) because remains were sparse. Remains from the remaining three test units (at Sites 13573-A, 13639-C, and 13651-F) were processed qualitatively. Analysis revealed that the material from units done quantitatively did not differ from that recovered from units done qualitatively. With the exception of one small piece of vegetal matter, the collected samples consisted of marine shells and fish bone. The small, limited samples allow no comparison of the utilization of marine and vegetable food resources. Table 8 shows the distribution of ecofactual remains.

Table 6.

SUMMARY OF RADIOCARBON AGE DETERMINATIONS

PHRI Lab.No. RC-	Lab. No. BETA-	Provenience	C-14 Age Yrs. B.P. (one sigma)	C-13/ C-12 Ratio	C-13 Adjusted C-14 Age Yrs. B.P.	*Calendric Range Yrs. AD
SITE 13573						
670	36022	TU-1, Feature A, Layer II, Level 2, 14-17 cmbs	230±80	-22.2	280±80	1440-1700 1726-1818 1921-1954
SITE 13620						
672	36024	Feature B, TU-1, Layer II, Level 1, 3-4/10 cmbs	104.7±0.9% Modern	-20.2	103.7±0.9% Modern	—
673	36025	Feature B, TU-1, Layer III, Level 1, 5-10 cmbs	101.1±0.7% Modern	-19.8	100.1±0.7% Modern	—
674	36026	Feature C, TU-1, Layer II, Level 1, 4/6-13 cmbs	230±60	-21.0	290±60	1450-1680 1747-1799 1942-1954
SITE 13639						
671	36023	Feature C, TU-1, Layer II, Level 2, HF-1, 15-20 cmbs	570±50	-22.1	610±50	1280-1420
SITE 13651						
675	36027	Feature F, TU-1, Layer II, Level 1, 1/3-5/9 cmbs	100.2±0.6% Modern	-26.6	100.6±0.6% Modern	—

* Calibrated according to Stuiver and Pearson (1986). Range at two sigmas.

SUMMARY OF ARTIFACT DISTRIBUTION

Table 7

CATEGORY	13571 Feat.A Surf	13572 Feat.A TU-1 Surf	13572 Feat.A TU-1 Lt-2	13572 Sub Total	13582 Feat.B Surf	13583 Feat.C Surf	13681 Feat.C Surf	13637 Surf	13639 Feat.C TU-1 Surf	13639 Feat.C TU-1 Lt-2	13639 Sub Total	13632 Surf	13639 Surf	GRAND TOTAL
FISHING GEAR														
Octopus lure	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sinker	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
SUBTOTAL FISHING GEAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOOLS														
Abrader (coral)	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Polished Basalt	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
SUBTOTAL TOOLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMESTIC IMPLEMENTS														
Scraper	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cellana sp.	- -	1 -	1 -	1 -	- -	- -	- -	- -	- -	- -	- -	- -	- -	1 -
Cypraea sp.	- -	1 -	1 -	1 -	- -	- -	- -	- -	- -	- -	- -	- -	- -	1 -
SUBTOTAL DOMESTIC IMPLEMENTS	0	2	2	2	0	0	0	0	0	0	0	0	0	2
FLAKED STONE														
Basalt	1 -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Volcanic glass	35 -	5 -	5 -	5 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	5 -
SUBTOTAL FLAKED STONE	36 -	5 -	5 -	5 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	5 -
UNCERTAIN FUNCTION														
Modified Coralline sp.	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Mammal Bone	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
SUBTOTAL UNCERTAIN FUNCTION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL ARTIFACTS	36 2	5 3	5 3	5 3	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	5 3

Table. 8

DETAILED DISTRIBUTION OF ECOFACTUAL REMAINS

CATEGORY	13620 Fea.B TU-1 I	Fea.B TU-1 II	Fea.B TU-1 III	Sub Total	Fea.C TU-1 II	GRAND TOTAL
INVERTEBRATES						
GASTROPODS						
Cellana sp.	-	-	1.49	1.49	-	1.49
Trochus intextus	-	0.59	0.39	0.98	0.21	1.19
Nerita picea	0.32	1.16	5.09	6.57	-	6.57
Hipponicidae	-	0.23	0.32	0.55	-	0.55
Cypraeaidae	-	20.10	17.96	38.06	44.75	82.81
Cymatiidae	-	0.58	-	0.58	-	0.58
Thaididae	0.40	1.72	5.26	7.38	5.91	13.29
Conidae	-	-	8.65	8.65	5.30	13.95
Opercula	-	0.68	-	0.68	-	0.68
SUBTOTAL GASTROPODS	0.72	25.06	39.16	64.94	56.17	121.11
BIVALVES						
Brachidontes crebristriatus	-	0.11	0.33	0.44	-	0.44
Isognomonidae	-	2.28	1.22	3.50	1.06	4.56
Veneridae	-	0.48	0.16	0.64	1.27	1.91
SUBTOTAL BIVALVE	0.00	2.87	1.71	4.58	2.33	6.91
OTHER						
Echinoid	-	2.36	6.46	8.82	7.93	16.75
TOTAL INVERTEBRATES	0.72	30.29	47.33	78.34	66.43	144.77
VERTEBRATES						
Fish bone	-	-	-	-	0.47	0.47
VEGETAL REMAINS	-	-	-	-	0.04	0.04
GRAND TOTAL	0.72	30.29	47.33	78.34	66.94	145.28

NOTE: All weights are in grams.

CONCLUSION

DISCUSSION

The Mahukona Harbor Complex (Site 7149) and railroad facilities in the project area were constructed during the latter part of the 19th century. In the course of constructing them, pre-contact and early-contact Hawaiian sites were undoubtedly destroyed. The number and types of sites destroyed is a matter of conjecture, but it is probable some were habitation and, possibly, shrine sites. Existing within the boundaries of the complex today are a number of possible prehistoric Hawaiian sites. These sites evidence relatively recent historic use and/or alteration. Rubbish of historic origin is present in their vicinity, and nearby are building materials and concrete foundations associated with Hawaii Railway Company, Ltd. (Figure 2).

On the railroad bed leading to Mahukona is a jeep road that provides campers and fishermen access to the shoreline north of the harbor. Campers have disturbed at least one site near the shoreline by removing stones to construct fireplaces. Aside from the railroad and harbor facilities areas, modifications are most apparent in the area extending south from the Mahukona turn-off in the southern boundaries of the harbor complex, and in the eastern portion of the project area. Excepting trails, no sites were located in a c. 30-50 meter wide strip adjoining the seaward side of the Mahukona-Kawaihae Highway right-of-way and, other than the kerbstone trails, only five sites were identified east of the highway. Bulldozer scars and push piles are found east of the highway and in the section south of the road leading from the highway to Mahukona Harbor. Also in this section are a number of apparently abandoned roads as well as some still occasionally used. One of the roads cuts through a section of kerbstone trail (Site 13632); elsewhere this trail has been interrupted by highway construction.

The most frequently identified site types represent habitations, including, but not limited to, enclosures, platforms, terraces, C-shapes, and outcrop shelters. Enclosures were found in all regions of the project area, except the portion located east of Mahukona-Kawaihae Highway. Located there, and in much of the eastern portion of the survey area, were a number of small features associated with temporary habitation and probable small-scale agriculture—short wall sections, C-shapes, small modified outcrops, and clearing rock piles.

Although sites were identified in all regions of the survey area except the extreme southeast portion, most sites were found within 150 meters of the shoreline. Clustered sites were found primarily in the southern portion, where road construction was minimal, mauka (inland) of the railroad bed north of the harbor and within the harbor complex east of the road leading to the pier.

In addition to three previously identified kerbstone trails and a foot trail that were relocated and recorded, portions of a trail system leading to and/or connecting the various workers' camps were noted. Some sections of the trail system have been damaged by water erosion and other sections have been eradicated by road construction. Features of Site 13604, used as part of one of the workers' camps, have stones from two kerbstone trails (Sites 13634 and 13644) used in their construction. Site 13634 stops at a terrace constructed across its path. A jeep road, several small concrete building foundations, and the road to the pier lie a few meters southwest of the terrace; construction of these features have obliterated all traces of the remainder of the trail. Although the kerbstones apparently were removed, where Site 13644 passes between two camp structures, the trail can be traced to the jeep road where kerbstones can be seen continuing for another two meters on the other side. This trail ends at a fence bordering the road to the pier. A third kerbstone trail (Site 13632) also ends at the fence a few meters to the north.

No large complexes, such as those described at Lapakahi (Tuggle and Griffin 1973) and (K-157/SHIP 2308) at Kapaanui (Tomonari-Tuggle 1981), or major heiau were located during the present survey. Feature A, Site 13584 (platform), on a bluff overlooking Nishimura Bay, was located by Tomonari-Tuggle in 1981 (K-174) and was described as a possible ahupua'a shrine. Tomonari-Tuggle reported 18 elongated, upright beach boulders, up to a meter tall, distributed over the feature. At the time of the present survey, 11 stones were upright and another seven stones of similar size and shape were lying on the platform surface. Feature A is a component of a complex that includes another platform, two possible burial mounds, and modified outcrop terracing on the seaward slope. A human figure petroglyph, described with shallow, faint lines, has been carved into a massive bedrock boulder immediately to the north. The figure appears to have been abraded into the surface, but the outlines of the figure are only slightly less than 1 cm wide and are so shallow that the method of manufacture is uncertain. Feature A appears to have been only historically disturbed; this disturbance is ascribed to both USGS and WWII military use (ibid). Metal and wooden posts, rusted wire, broken glass, and concrete

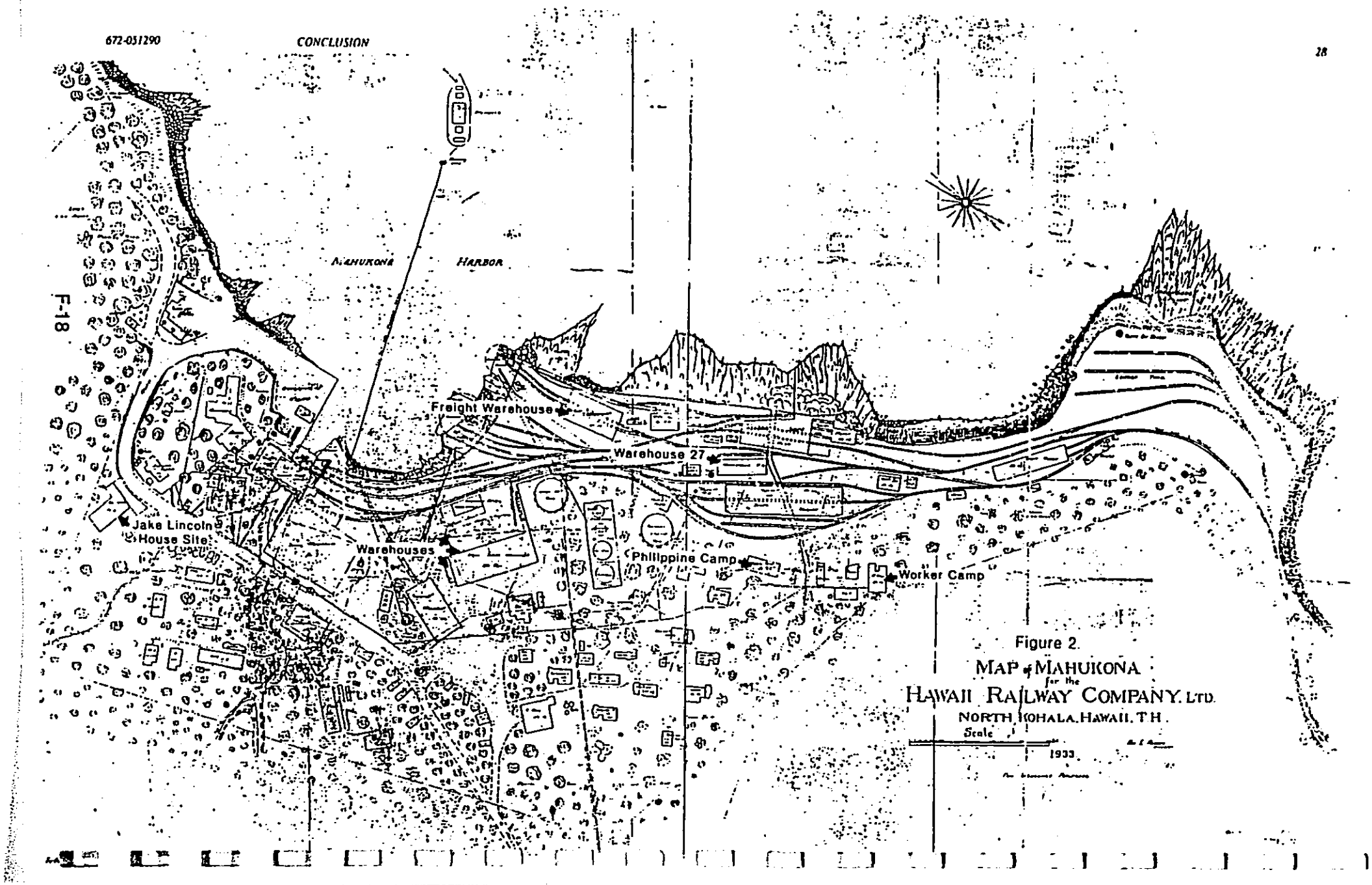


Figure 2.
MAP of MAHUKONA
for the
HAWAII RAILWAY COMPANY, LTD.
NORTH KOHALA, HAWAII, T.H.
Scale
1933

with "MAHUKONA" impressed into the surface are found on the platform. Coils of barbed wire and a small rock wall shelter, of probable U.S. military construction, are located to the southeast.

Five sites related to each other are located within 150 meters of the railroad bed in the northwestern portion of the project area (Sites 13597, 13599, 13598, 13581, and 13580). Four of these sites are located north and south of a shallow gully running approximately east-west. The fourth site is located within the gully. The site in the gully is a large agricultural-habitation complex (Site 13597) occupying the sides and bottom of the gully. Site 13597 is best described as trapezoidal in shape and covers approximately 1,197 square meters of the gully sides and floor. Beginning a short distance beyond the east end of the site, the terrain rises in a series of outcrops and becomes part of the gently sloping adjoining ground surface. The complex consists of shelters, filled cracks in the outcrop, short walls, and terraces forming contiguous features positioned along the north and south sides of the gully. A low stone wall, extending 28.5 m across the gully floor at the western end of the site, terminates at a modified outcrop, Site 13598. The gully's narrow eastern end, 13.5 meters wide, is partially closed by naturally occurring bedrock boulders and a short, 5.75 meter-long section of low wall extending north from an overhang shelter at the southeast limit of the site. The gully does not appear to be an active watercourse, thus the floor of it could be used for cultivation of dryland taro, or as small garden plots, by residents of the nearby habitation sites located to the north and south.

Site 13599 (K-178 Tomonori-Tuggle 1981), a multi-function complex on the south side of the gully, has as its primary feature an anomalous enclosure with a small internal platform. The enclosure measures 24 meters north-south and is 13.8 meters at the widest point. The south portion of the enclosure consists of an irregularly shaped rectangle that opens to a narrow space created by the long west wall as it bends and curves south to meet the short north wall of the rectangular section. A 6.0 meter section extends 1.8 meters from the east wall, creating a shallow niche or alcove at the interior junction of the east and north walls. A low, paved platform, c. 5 meters long by 3.5 meters wide, is positioned in front of the niche. The platform has a waterworn upright basalt boulder placed near the center. Tomonari-Tuggle (1981) describes this as a possible household shrine.

Site 13598, a modified outcrop containing an overhang shelter and wall sections, has also been described as a feature of K-178 (Tomonari-Tuggle 1981). The site is on the south side of the gully adjacent to the enclosure. The low wall extending across the gully from the north side of Site 13597 ends at Site 13598. Two nearby 50 gallon drums, one with the stencil "U.S ARMY", and nailed boards and an unreadable sign placed over a crevice on the outcrop, indicate use by or the presence of U.S. military.

A boulder alignment/wall extends 20.2 meters south to the gully from Site 13650, a habitation complex comprised of a terrace, platform, wall, and alignment. An extensive surface scatter, of midden and small pieces of waterworn coral, is visible 40+ meters to the west of the habitation site; it continues south to the edge of the gully, and c. 9.0 meters northwest to Sites 13580 and 13581.

Site 13581, a habitation complex, includes two walled terraces and a small open terrace constructed on a high outcrop. The east terrace has 'ili 'ili paving, small pieces of waterworn coral, and an upright waterworn stone positioned near the south edge. Rubble from a collapsed portion of the north wall lies below exposed bedrock on the soil and cobble surface of the west terrace. 'ili'ili and coral are present near the south edge. Midden is scattered on both terraces. A third terrace, smaller and paved with small cobbles, is located on the south side of the outcrop, slightly below a low wall separating the upper terraces. This site was designated as a feature of K-176 by Tomonori-Tuggle (1981).

Habitation site 13580, located at the western base of the outcrop holding Site 13581, was also designated a feature of K-176 (Tomonari-Tuggle 1981). Three pairs of parallel boulder alignments extend c. 11.0 to 15.0 meters from the outcrop and bedrock boulders to the northeast. The interval between the central pair of alignments has small cobble and pebble paving. An opening is located in the northeast section of the alignments but may have resulted from the displacement of three boulders now lying on the surface to the east and west of the opening. The central pair of alignments is closed by two boulders at each end. The series of alignments are not connected by a wall or alignments at the southern end although a number of irregularly spaced boulders suggest that a wall or alignment could have been present at one time. Two small possible shrines are located close to the northwestern end of the site, both in the area between the western and central pairs of alignments. One of the shrine areas is positioned less than half a meter east of an opening in the central alignments. A small, low platform of pebbles, confined by one linear boulder across the front edge, has been constructed in front of a curved, upright boulder incorporated into the alignment. The second possible shrine area, located less than one meter to the northeast, has been constructed using an upright stone at the rear, one linear stone on the west side, and two large, angular cobbles

on the east. The space between the stones contains coral and marine shell midden.

Although 17 possible burials were identified as discrete sites or features of sites during this survey, Site 13593 is the single identified site consisting of possible burial features only. A probable marker, a single upright stone supported by two boulders, sits on a low, bedrock outcrop at the seaward edge of the site. Six possible burial features (platforms, a mound, and a terrace) each with one or two upright stones on the surface, are located within a 384 square meter area north and east of the marker. This site, approximately 120 meters inland of the railroad bed, is surrounded by habitation sites.

Ten sites tentatively identified as being of prehistoric Hawaiian origin, located within the boundary of the Mahukona Harbor Complex, show evidence of historic use. These sites functioned as shelters or habitations associated with the various workers' camps shown in Figure 2. These sites include platforms, enclosures, modified outcrops, terraces, and wall sections. All have historic materials present; lumber, wire, roofing and other assorted rusted metal items, broken pottery, and in many instances, large piles of bottles and rusted cans.

Two of the sites, 13647 and 13652, are located immediately east of the road-cut overlooking the wharf area of the harbor and probably represent part of the Jake Lincoln house site (Figure 2). Four sites a short distance to the north are clustered on the north side of a gully ending at the culvert running under the roadway leading to the pier. Sites 13606, 13607, 13608, and 13609 appear to have been used as part of one of the harbor camps whose name is indecipherable as it appears on Figure 2. To the north and west of the sites are concrete building foundations, rusted machinery parts, and remnants of a stone and timber structure with a large deposit of cans and bottles inside and around the outside walls. A trail or roadway is still discernible leading from the camp to the harbor road.

Sites 13602 and 13603, located northeast of a Mahukona warehouse (see Figures 1 and 2) are, respectively, a walled shelter constructed against an outcrop, and a U-shaped wall open at the west end. Both sites have historic building materials and cans and bottles present. A small platform west of the U-shaped wall opening is interpreted as a possible burial feature. Clearing platforms have been built around trees nearby leaving the ground surface fairly level. On the surfaces of occasional patches of sandy soil, exposed in the heavy grass cover between Site 13603 and the warehouse, are small pieces of waterworn coral and marine shells.

Site 13576 is constructed at the east edge of the railroad cut at Makaohule Point. This site has a large amount of coral on and around the walls of the primary feature, and on the interior surface. There is also a large quantity of historic rubbish at the site (glass, broken pottery, household utensils, and lumber). A surface concentration of 'ili'ili and coral is visible between the north end of the feature and a terrace that exhibits many waterworn stones and coral on its surface. Midden and waterworn coral are visible on the surface between the west wall of Site 13576 and the railroad cut. Marine shells and coral exposed in the face of the cut indicate that a subsurface deposit had extended from the site to a point beyond the present edge of the cut. A concrete building foundation and a collapsed wooden structure are located less than three meters south of Site 13576.

Site 13604, mentioned earlier, has at least one feature that can be placed within the historic period. Feature B, an enclosure and terrace positioned at the southwest end of Site 13634, an historic kerbstone trail, incorporates part of the flat trail surface in a rectangular enclosure. The enclosure appears to have been constructed using kerbstones to create the offset side walls and higher retaining wall at the west end. Concrete foundations, household articles, and building materials are scattered through the area northwest of the feature to Site 13632 (another kerbstone trail). Feature A of Site 13604, a triangular enclosure bordering the west edge of a shallow gully, appears to be of unique construction. Single boulder alignments form the north and east walls. A kerbstone trail passing the west side of the feature may constitute portions of the west wall. Cowrie and opihi shells are visible on the trail surface near the northwest end of the wall, and a large Conus sp. shell is on the wall top. It was difficult to judge whether the enclosure was constructed before the trail, or after. Kerbstones continue past the south end of the feature, disappear at the jeep road, and are visible again on the south side of the road.

The above ten sites are the only ones noted that show clear indications of relatively recent historic use. However, Site 13605 (long C-shaped wall), located on the north side of a gully east of Site 13604, is in an area with at least one historic building foundation, a short distance to the west of the site, and other historic structures in the general vicinity. Most of Site 13605 appears to have been altered; only a section at the northeast end seems to be original. One pottery shard was noted on a collapsed portion of the original wall although other historic materials could be present in the tall dense grass and soil deposit inside the wall.

Prehistoric settlement patterns within this area of North Kohala, as described within prior archaeological investigations

and summarized in Kirch (1985), are characterized by three primary zones: (a) a narrow, arid coastal habitation zone (100-200 m inland of the shoreline) associated principally with the exploitation of various marine resources, (b) a largely uninhabited, dry, barren middle zone extending c. 2.5 km inland, and (c) an upland habitation zone associated with agricultural exploitation. Sites within the coastal zone include both permanent and temporary habitation residential sites, burials, shrines, heiau, agricultural features, and other structures. Sites commonly found within the barren middle zone are generally confined to trails, cairns (possibly marking the trails), and temporary habitation sites (predominately C-shapes).

Prior archaeological work has indicated that sites appear to be concentrated within both the coastal habitation zone and the upland habitation and agriculture zone. Sites interpreted as achieving a higher degree of permanence (permanent habitation sites) were found more common within the coastal habitation zone; permanent habitation sites were found to possibly exist within the upland zone, but probably less frequently. Temporary habitation sites were commonly found within both the coastal and upland zones. The most common site reported within the upland zone was comprised of agricultural features followed in frequency by temporary habitation structures. In contrast with both the coastal and upland zones, site density within the barren middle zone was appreciably less than both, but appeared to increase toward its inland edge.

The present project area is situated within the coastal habitation zone and the lower limits of the barren middle zone. With the exception of walled complexes, the types and distribution of sites identified during the present survey, outside of Mahukona Harbor Complex, are in accord with those reported by previous investigations. The majority of sites represent habitations, both temporary and permanent, and most are located within 250 meters of the shoreline.

Although dates representing all of the present project area were not obtained, those reported for the southern coastal portion show that initial occupation took place during the 15th century and abandonment took place near the beginning of the 19th century. Cultural activity again took place at those sites during the first half of the 20th century. An absence of historic materials at most of the sites east of the railroad bed, in the northern coastal portion, would suggest a similar pattern of settlement and abandonment for that area.

Radiocarbon age determination results from sites within the present and adjacent project area (Rosendahl 1972, Tuggle and Griffin 1973, Dunn and Rosendahl 1989) indicate the general Mahukona area was occupied from AD 461 to the present. This date range generally correlates with all four prehistoric Hawaiian periods developed by Kirch (1985) The Colonization Period (AD 300-600), the Developmental Period (AD 600-1100), the Expansion Period (AD 1100-1650), and the Proto-Historic Period (AD 1650-1795)(Kirch 1985:298-308).

GENERAL RESEARCH TOPICS

With regard to the scientific research value of sites and features within the Mahukona Property project area, the general goal of future research should be concerned with obtaining information on the culture history and lifeways of the prehistoric Hawaiian population which occupied the Lands of Kou, Kamano, Mahukona 1st and 2nd, Hihiu, and Kaoma, and general North Kohala District. Possible future archaeological research that might be conducted should include, but should not be necessarily limited to, the following (modified from Tomonari-Tuggle [1985:66-81]):

1. Refinement of settlement pattern dimensions through duration, continuity (nature), and intensity of occupation;
2. Defining the archaeological manifestation of the ahupua'a as the postulated socio-economic local community group;
3. Examination of nucleation and dispersal of settlements, in terms of their growth and correlation with the development of the ahupua'a as socio-economic units;
4. Defining marine resource exploitation resources, methods, techniques, and technologies;
5. Development of agricultural systems and the relationship with such variables as population pressures, ecological constraints, and political demands on food production;
6. Evolution of complex chiefdoms and the archaeological expression of status differentiation;
7. Examination and analyses of archaeological data with traditional and historic references; and
8. Development and formation of historic archaeological studies focusing upon acculturation during the contact period (especially the 19th and 20th centuries).

GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

General significance assessments and recommended general treatments for all identified sites are summarized in Table 9. Significance categories used in the site evaluation process are based on the National Register criteria for evaluation, as outlined in the Code of Federal Regulations (36 CFR Part 60). The DLNR-HSS/SHPO and the Hawaii County Planning Department use these criteria for evaluating cultural resources. Sites determined to be potentially significant for information content fall under Criterion D, which defines significant resources as ones which "...have yielded, or may be likely to yield, information important in prehistory or history." Sites potentially significant as representative examples of site types are evaluated under Criterion C, which defines significant resources as those which "...embody the distinctive characteristics of a type, period, or method of construction...or that represent a significant and distinguishable entity whose components may lack individual distinction."

Sites with potential cultural significance are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (Draft Report, August 1985). The guidelines define cultural value as "...the contribution made by an historic property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historical depth." The guidelines further specify that "[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value."

To further facilitate client management decisions regarding the subsequent treatment of resources, the general significance of the archaeological resources identified during the inventory survey was also evaluated in terms of potential scientific research, interpretive, and/or cultural values (PHRI Cultural Resource Management [CRM] Value Modes; see Table 2 for individual assessments of sites). These three value modes are derived from the above state and federal criteria. Research value refers to the potential of archaeological resources or producing information useful in the understanding of culture history, past lifeways, 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 significant evaluation used here, refers to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and values.

Based on the above federal/state evaluation criteria, of the 101 sites located during the present survey, 73 sites are assessed as important solely for information content. Twenty of the 73 sites have been documented to the extent that no further work is recommended. The sites have no cultural deposits or remains and include WWII sites, C-shapes, cairns, clearing mounds, stone alignments, and small modified outcrops. For 53 of the 73 sites, further data collection, including surface collections, detailed mapping, and test excavations, is recommended. Present at all sites are one or more of the following: coral, marine shell midden, waterworn stones, artifacts, substantial soil deposits. Further data collection could reveal subsurface cultural deposits or materials that could aid in placing them within a certain time frame, or disclose functions in addition to those tentatively assigned. These sites represent habitations and agricultural sites in the form of C-shapes, terraces, enclosures, and walls.

Twelve of the remaining 28 sites are important for information content and are assessed as potentially culturally significant because they are possible burials, or contain features that may hold burials. These burial features are distributed along the northern coastal area, the southern project boundary, and the south central portion of the project area. Seven of the possible burial features are platforms, two are stone mounds, two are modified outcrops, and one is a terrace. Two sites contain multiple burial features: Site 13593 includes four platforms, a mound, and a terrace, all of which are possible burial features; Site 13622 includes two possible burial platforms. Many of the possible burial features have upright stones, coral, and/or waterworn stones on the surface. Further data collection, with limited excavations to determine the presence or absence of burials is recommended for all possible burial sites. If burials are located, preservation "as is," with no further work, is recommended.

If the burials are not preserved "as is," it is required that the procedures of Section 43 of Chapter 6E (Historic Preservation, Haw. Rev. Stat., as amended) be followed. The DLNR/SHPO would be notified and would contact the Office of Hawaiian Affairs (OHA). A mitigation plan for burials, with osteological analyses, would be prepared in consultation with the DLNR-HSS/SHPO. At least, a search for direct lineal descendants —consisting of publishing in a newspaper of general circulation, a public notice to notify possible direct lineal descendants—must be conducted. If direct lineal descendants are found, the osteological analyses shall be subject to their wishes. Lastly, a plan for final

Table 9.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

*SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
4124	-	+	-	-	-	+	-	-
13572	-	+	-	-	-	+	-	-
13588	-	+	-	-	-	+	-	-
13589	-	+	-	-	-	+	-	-
13590	-	+	-	-	-	+	-	-
13594	-	+	-	-	-	+	-	-
13614	-	+	-	-	-	+	-	-
13628	-	+	-	-	-	+	-	-
13629	-	+	-	-	-	+	-	-
13630	-	+	-	-	-	+	-	-
13631	-	+	-	-	-	+	-	-
13636	-	+	-	-	-	+	-	-
13638	-	+	-	-	-	+	-	-
13641	-	+	-	-	-	+	-	-
13642	-	+	-	-	-	+	-	-
13645	-	+	-	-	-	+	-	-
13646	-	+	-	-	-	+	-	-
13648	-	+	-	-	-	+	-	-
13649	-	+	-	-	-	+	-	-
13654	-	+	-	-	-	+	-	-
Subtotal: 20	0	20	0	0	0	20	0	0

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, SHPD=not significant);
B = Excellent example of site type at local, region, island, state, or national level (PHRI=interpretive value), and
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), and
PAI = Preservation "as is," with no further work (and possible inclusion into landscaping), or minimal further data collection necessary.

*State Inventory of Historic Places (SIHP) numbers. SIHP numbers are four- to five-digit numbers prefixed by 50-10-01 (50=State of Hawai'i; 10=Island of Hawai'i, 01=USGS 7.5' series quad map ["Makahuna, Hawai'i"]).

Table 9. (cont.)

SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
4128	+	-	-	-	+	-	-	-
4681	+	-	-	-	+	-	-	-
4688	+	-	-	-	+	-	-	-
4689	+	-	-	-	+	-	-	-
4690	+	-	-	-	+	-	-	-
7351	+	-	-	-	+	-	-	-
7355	+	-	-	-	+	-	-	-
13571	+	-	-	-	+	-	-	-
13574	+	-	-	-	+	-	-	-
13575	+	-	-	-	+	-	-	-
13576	+	-	-	-	+	-	-	-
13577	+	-	-	-	+	-	-	-
13578	+	-	-	-	+	-	-	-
13579	+	-	-	-	+	-	-	-
13582	+	-	-	-	+	-	-	-
13583	+	-	-	-	+	-	-	-
13591	+	-	-	-	+	-	-	-
13592	+	-	-	-	+	-	-	-
13596	+	-	-	-	+	-	-	-
13597	+	-	-	-	+	-	-	-
13598	+	-	-	-	+	-	-	-
13600	+	-	-	-	+	-	-	-
13601	+	-	-	-	+	-	-	-
13602	+	-	-	-	+	-	-	-
13604	+	-	-	-	+	-	-	-
13605	+	-	-	-	+	-	-	-
13606	+	-	-	-	+	-	-	-
13607	+	-	-	-	+	-	-	-
13608	+	-	-	-	+	-	-	-
13609	+	-	-	-	+	-	-	-
13610	+	-	-	-	+	-	-	-
13611	+	-	-	-	+	-	-	-
13612	+	-	-	-	+	-	-	-
13613	+	-	-	-	+	-	-	-
13615	+	-	-	-	+	-	-	-
13616	+	-	-	-	+	-	-	-
13617	+	-	-	-	+	-	-	-
13618	+	-	-	-	+	-	-	-
13619	+	-	-	-	+	-	-	-
13620	+	-	-	-	+	-	-	-
13621	+	-	-	-	+	-	-	-
13623	+	-	-	-	+	-	-	-
13624	+	-	-	-	+	-	-	-
13626	+	-	-	-	+	-	-	-
13627	+	-	-	-	+	-	-	-
13633	+	-	-	-	+	-	-	-
13637	+	-	-	-	+	-	-	-

Table 9. (cont.)

SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAT
13643	+	-	-	-	+	-	-	-
13647	+	-	-	-	+	-	-	-
13650	+	-	-	-	+	-	-	-
13652	+	-	-	-	+	-	-	-
13655	+	-	-	-	+	-	-	-
13656	+	-	-	-	+	-	-	-
Subtotal: 53	53	0	0	0	53	0	0	0
4129	+	-	-	•	+	-	-	•
4687	+	-	-	•	+	-	-	•
13585	+	-	-	•	+	-	-	•
13586	+	-	-	•	+	-	-	•
13587	+	-	-	•	+	-	-	•
13593	+	-	-	•	+	-	-	•
13595	+	-	-	•	+	-	-	•
13603	+	-	-	•	+	-	-	•
13622	+	-	-	•	+	-	-	•
13625	+	-	-	•	+	-	-	•
13635	+	-	-	•	+	-	-	•
13651	+	-	-	•	+	-	-	•
Subtotal: 12	12	0	0	12	12	0	0	12
7149	+	-	+	+	+	-	+	-
12350	+	-	+	+	+	-	+	-
13570	+	-	+	+	+	-	+	-
13573	+	-	+	+	+	-	+	-
13584	+	-	+	+	+	-	+	-
13599	+	-	+	+	+	-	+	-
13632	+	-	+	+	+	-	+	-
13634	+	-	+	+	+	-	+	-
13644	+	-	+	+	+	-	+	-
Subtotal: 9	9	0	9	9	9	0	9	0
4123	+	-	+	-	+	-	+	-
4682	+	-	+	-	+	-	+	-
13580	+	-	+	-	+	-	+	-
13581	+	-	+	-	+	-	+	-
13639	+	-	+	-	+	-	+	-
13640	+	-	+	-	+	-	+	-
13653	+	-	+	-	+	-	+	-
Subtotal: 7	7	0	7	0	7	0	7	0
Total: 101	81	20	15	21	81	20	15	13

disposition of the remains should be developed in accordance with Section 43 of Chapter 6E. It is recommended that any remains found be reinterred within the project area. If this is not possible, they should be reinterred in a nearby cemetery. A disinterment permit may be required from the State Department of Health.

The Hawaii State Legislature has recently approved and passed on to the governor a bill which creates island burial councils to oversee reinterment of human burial remains. The implications of this bill, with regard to its date of effective enactment, the present project, and the role of an island burial council, cannot be presently determined.

Subsequent to completion of the present archaeological inventory survey field work, a local community advisory group, Na Maka'ala O Kohala (NMOK), made available a preliminary manuscript (NMOK 1990). The manuscript contains their assessements of cultural and historical values, a discussion of site relationships, additional site discoveries, and recommendations for development and interpretation from a community perspective. Because only a preliminary manuscript (NMOK 1990) is available at present, those concerns could not be addressed within this report. Once a final manuscript by NMOK is submitted, its concerns could be addressed and included within an addendum to the present report.

During Phase I of the present survey, Sites 13631 and 13645 (mounds) were assessed as possible burials. During Phase II, upon closer inspection of the sites, it was determined that the mounds were actually agricultural clearing mounds and required no further work. The mounds are similar to other agricultural mounds tested at Keahuolu, North Kona. Also, both sites are located near roadways: Site 13631 is seaward from the Old Mahukona-Hawi Road, and Site 13645 is located near Site 12350 (road), near a water tank and in an area that appears to have been mechanically leveled. The areas in which the two mounds are situated indicates it is highly unlikely they represent burials.

Nine sites have been assessed as important for information content, as culturally significant, and as excellent examples of site types at the local, regional, island, state, or national levels. Further data collection and preservation with some level of interpretive development is recommended for all nine sites. Six sites have transportation functions (Site 7149, the Mahukona Railroad and Mahukona Harbor Complex, which includes agricultural and harbor features; Site 12350, a roadbed running east from the harbor area (this site may have been a primary historic route between Mahukona Harbor and Hawi); Site 13570, a foot trail entering the project area at the Lapakahi boundary (this trail has occasional sections of kerbstones, as well as several cairns marking its location as it travels northward through the area); Sites 13644, 13632, and 13634 (three kerbstone trails that lead east from the harbor area; these trails are interrupted by the Mahukona-Kawaihae Highway, then continue east and northeast, extending beyond the project boundary). Site 13573 consists of a platform remnant and fishing shrine positioned on the edge of the boulder beach southwest of the lighthouse. The shrine occupies the top of a high outcrop on the boulder beach. The coral paved top of the outcrop holds three aligned, waterworn beach stones. Site 13584 is a ceremonial complex on the bluff overlooking Nishimura Bay. The complex includes two platforms, two mounds, two modified outcrops, one of which may hold a burial, a faint petroglyph on a large bedrock boulder, and boulder alignments on the west slope. The large platform has nine elongated basalt beach boulders and two weathered basalt boulders set upright on the surface. Seven additional elongated boulders, that may have been set upright at one time, are lying on the platform surface. Areas of the platform have been altered and historic materials are present on the surface.

Seven sites are assessed as important for information content and as excellent examples of site types at local, regional, island, state, or national level. These sites are recommended for further data collection and preservation with some level of interpretive development. Site 4123, a habitation site near the southwest boundary of the project area, has a level habitation area on the east side of a modified outcrop. The west side of the outcrop holds 23 salt basins. The basins have been arranged in three levels, with some supported by cobbles and waterworn stones. Site 4682 is a complex of terraces and walled terraces situated at the edge of a boulder beach at the southwestern end of the project area. Site 13580, located in the northwestern coastal region, is a habitation enclosure constructed with multiple boulder alignments and contains two small possible shrines. Site 13581, a few meters northeast of Site 13580, includes a terrace and two walled terraces. One walled terrace, paved with 'iliʻili and small pieces of waterworn coral, displays a small waterworn upright stone near the south edge. Site 13639, a habitation complex in the southeastern region of the survey area, features a terrace, an L-shaped wall, and a stone-lined firepit. Site 13640, a platform with faced walls located in the south central area, has numerous upright stones, waterworn stones, a C-shape, coral, and marine shell midden on the surface. Site 13653 is a habitation complex that includes a stone-walled enclosure and terrace, a C-shape, a walled enclosure constructed against an outcrop, and a modified outcrop with two shallow salt basins in the bedrock surface, five portable salt basins, pieces of waterworn coral, and waterworn stones on the leveled surface.

The evaluations and recommendations presented in this report have been based on a 100% aerial survey, a 100% surface survey, and limited subsurface testing. There is always the possibility, however remote, that potentially significant, unidentified surface and/or subsurface cultural remains will be encountered in the course of future archaeological investigations or subsequent development activities. In such situations, archaeological consultation should be sought immediately.

REFERENCES CITED

ACHP (Advisory Council on Historic Preservation

1985 Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review. Washington, D.C.: Advisory Council on Historic Preservation. (Draft report, August)

Armstrong, R.W (ed.)

1983 Atlas of Hawaii. Honolulu: University Press of Hawaii. (Second edition)

Baker, H.L., T. Sahara, F.T. Murabayashi, A.Y. Ching, F.N. Fujimura, E.L. Awai, and I. Kawahara

1965 Detailed Land Classification - Island of Hawaii. Land Study Bulletin No. 6. Land Study Bureau, University of Hawaii, Honolulu.

Bonk, W.J.

1968 The Archaeology of North and South Kohala - from the Ahupua'a of Kawaihae to the Ahupua'a of Upolu: Coastal Archaeology Surface Survey. Hawaii State Archaeological Journal 68-3. Div. State Parks, Dept. Land and Natural Resources.

Burgett, B., and P.H. Rosendahl

1990 Interim Report: Summary of Findings, and General Significance Assessments and Recommended General Treatments, Archaeological Inventory Survey, Mahukona Property, Lands of Kou, Kamano, Mahukona 1st and 2nd, Hihiu, and Kaoma, North Kohala District, Island of Hawaii (TMK:3-5-7-03: 1-3,10-14,16-18). PHRI Report 672-013090. Prepared for Chalon International of Hawaii, Inc.

Connor, D.R.

1968 A Surface Survey of the Area Near the Kosie Village Nucleus, Lapakahi. IN Pearson (1968).

CFR (Code of Federal Regulations)

36 CFR Part 60. National Register of Historic Places. Washington, D.C.: Dept. Interior, National Park Service.

Dunn, A., and P.H. Rosendahl

1989 Archaeological Inventory Survey, Kapaanui Agricultural Subdivision, Lands of Kapaanui and Kou, North Kohala District, Island of Hawaii. PHRI Report 568-100289. Prepared for Ahualoa Development, Inc.

HRHP (Hawaii Register of Historic Places)

n.d. Hawaii Register of Historic Places Inventory - Nomination Form. On file in Hawaii State Historic Preservation Office.

Kaschko, M.W.

1973 Functional Analysis of the Trail System of the Lapakahi Area. IN Tuggle and Griffin (1973).

1984 Archaeological Reconnaissance Survey, Kohala Coastal Parcel, Kapaanui and Kou, North Kohala, Island of Hawaii. PHRI Report Ms. 100-030184. Prepared for Ahualoa Development, Inc.

Kirch, P.V.

1985 Feathered Gods and Fishhooks. Honolulu: University of Hawaii Press.

Loo, V.H., and W.J. Bonk

1970 A Historical Site Study and Evaluation of North Hawaii. Anthropological Research International. Prepared for Hawaii County Planning Dept.

McKenzie, P.

1973 Excavation of Two Rock Shelters and a Burial Mound. IN Tuggle and Griffin (1973:5,pp.201-212).

Newman, T.S.

1968 The Lapakahi Project: Possible Analyses of the Field Data. IN Pearson 1968.

NMOK (Na Maka'ala O Kohala)

1990 Preliminary Report: Assessment of Cultural and Historical Values, Discussion of Site Relationships, Disclosure of Additional Site Discoveries, Recommendations for Development and Interpretation.

Pearson, R.J. (ed.)

1968 The Archaeology of North Kohala: The ahupua'a of Lapakahi: Excavations at Lapakahi - Selected Papers. State Archaeological Journal 69-2. Dept. Land and Natural Resources, Div. State Parks, Outdoor Recreation, and Historic Sites.

Peterson, J.E.

1968 A Study of Trails in North Kohala. IN Pearson 1968:69-2, pp. 65-89.

Rosendahl, P.H.

1971 Archaeological Research in the Agricultural Uplands of Lapakahi, Hawaii Island. Dept. Land and Natural Resources, Div. State Parks, Outdoor Recreation, and Historic Sites.

1972 Aboriginal Agriculture and Domestic Residence Patterning in Upland Lapakahi, Island of Hawaii. Ph.D. dissertation (Anthropology), University of Hawaii at Manoa.

1989 Archaeological Inventory Survey, Kapaanui Agricultural Subdivision Reservoir Site. Lands of Kapaa 1st and 2nd, North Kohala District, Island of Hawaii (TMK:3-5-6-01:Por.35). PHRI Letter Report 668-072589. Prepared for Ahualoa Development, Inc.

Schilt, A.R., and A. Sinoto

1980 Limited Phase I Archaeological Survey of Mahukona Properties, North Kohala, Island of Hawaii. Typescript in library, B.P. Bishop Museum.

Stuiver, M., and G.W. Pearson

1986 High-Precision Calibration of Radiocarbon Time Scale, AD 1950 to 500 BC. Radiocarbon, 28, pp. 805-838.

Soehren, L.J.

1964 An Archaeological Reconnaissance of the Mahukona-Kawaihae Highway, Kohala, Hawaii. Dept. Anthro., B.P. Bishop Museum.

Tomonari-Tuggle, M.J.

1981 North Kohala: Perception of a Changing Community, A Cultural Resource Management Study. Prepared for Dept. Land and Natural Resources, Div. State Parks. (Uncirculated report)

1985 Cultural Resources Management Plan, Cultural Resource Management at the Keauhou Resort. PHRI Report 89-060185. Prepared for Kamehameha Investment Corp.

Tuggle, H., and B. Griffin (eds.)

1973 Lapakahi, Hawaii: Archaeological Studies. Asian and Pacific Archaeology Series No.5. Social Science Research Institute, University of Hawaii.

Walker, A.T., and P.H. Rosendahl

1989 Preliminary Report: Summary of Findings, and General Significance Assessments and Recommended General Treatments, Phase I - Site Identification, Phased Archaeological Inventory Survey, Mahukona Property, Lands of Kou, Kamano, Mahukona 1st and 2nd, Hihiu, and Kaoma, North Kohala District, Island of Hawaii (TMK:3-5-7-03: 1-3,10-14,16-18). PHRI Report 672-100389. Prepared for Chalon International of Hawaii, Inc.

APPENDIX A

SITE DESCRIPTIONS

SITE NO.: State: 4123 PHRI: 672-1 *(Figure A-1 and Appendix C)*
SITE TYPE: Modified outcrop
TOPOGRAPHY: Undulaung and sloping terrain consisting of a soil cover with loose boulders and exposed bedrock outcrops.
VEGETATION: Dense grasses that are c. 0.6 m high over the burned area; the area also consists of burned kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation - salt collecuon
DIMENSIONS: 12.50 m by 8.50 m by 0.73 m (approx.)
DESCRIPTION: A large bedrock outcrop has been modified with a low wall along its northern end. The wall measures c. 1.62 m by 0.35-0.64 m wide, and c. 0.37 m in maximum height. In addition, there are c. 23 salt basins placed on the outcrop that are supported by cobbles. Waterworn cobbles and boulders have been placed on two levels of bedrock outcropping; some of these stones support the salt basins. Seven of the basins are rectangular or nearly rectangular, and have been manufactured. The others appear to be natural depressions that have been enlarged and/or deepened.

The flat and generally unmodified areas have soil deposits and many pieces of waterworn coral. The outcrop at the west edge of the site has many 'ili'ili, in addition to coral, waterworn shells, and sparse midden.

No trace was found of the basalt pestle mentioned by Tuggle and Griffin (1973).

SITE NO.: State: 4124 PHRI: 672-8
SITE TYPE: C-shape
TOPOGRAPHY: Undulating coastal plain consisting of bedrock outcrops and boulders.
VEGETATION: Fountain grass and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 1.45 m by 1.35 m by 0.49 m (approx.)
DESCRIPTION: Circular to C-shape in plan, it is built atop bedrock outcropping. The structure is constructed of basalt cobbles and pebbles, and has coral fragments present within the structure.

SITE NO.: State: 4128 PHRI: 672-11
SITE TYPE: Terrace
TOPOGRAPHY: Undulating terrain consisting of bedrock outcropping and boulders.
VEGETATION: Kiawe trees and grasses.
CONDITION: Poor
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 5.00 m by 2.30 m by 0.40 m (approx.)
DESCRIPTION: L-shaped in plan, the terrace is aligned east to west and is oriented perpendicular to the slope. The shorter wall segment is situated at the east end and is oriented c. north to south. It is open to the west.

The terrace is constructed of aligned rounded boulders, single-course high and built across the direction of the slope. Raised on the west side, it retains a soil area to the east (uphill).

A small concentrated area measuring c. 1.0 m by 1.0 m is situated c. 8.0 m at 270 degrees azimuth from the terrace. It contains shell midden, coral and waterworn pebbles ('ili'ili). This concentration is situated in a larger area of lighter scatter. This larger scatter measures c. 7.0 m (N/S) by 6.0 m (E/W) and also consists of shell midden, coral and waterworn pebbles.

The overall measurements, including the midden scatter area, are c. 14.0 m (E/W) by 8.5 m (N/S).

SITE NO.: State: 4129 PHRI: 672-63
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Situated atop southeast side of a lava ridge; the terrain consists of an undulating flow with ridges running downslope to the southwest, very rocky with exposed pahoehoe outcrops.
VEGETATION: Grassy ground cover and burned kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric; Feature C possibly historic
FUNCTIONAL INTERPRETATION: Temporary habitation-possible burial
DESCRIPTION: The overall complex area measures c. 18.0 m (E/W) by 17.0 m (N/S). The site complex consists of a walled terrace (Feature A), a platform (Feature B) that is situated within Feature A, and a terrace (Feature C).

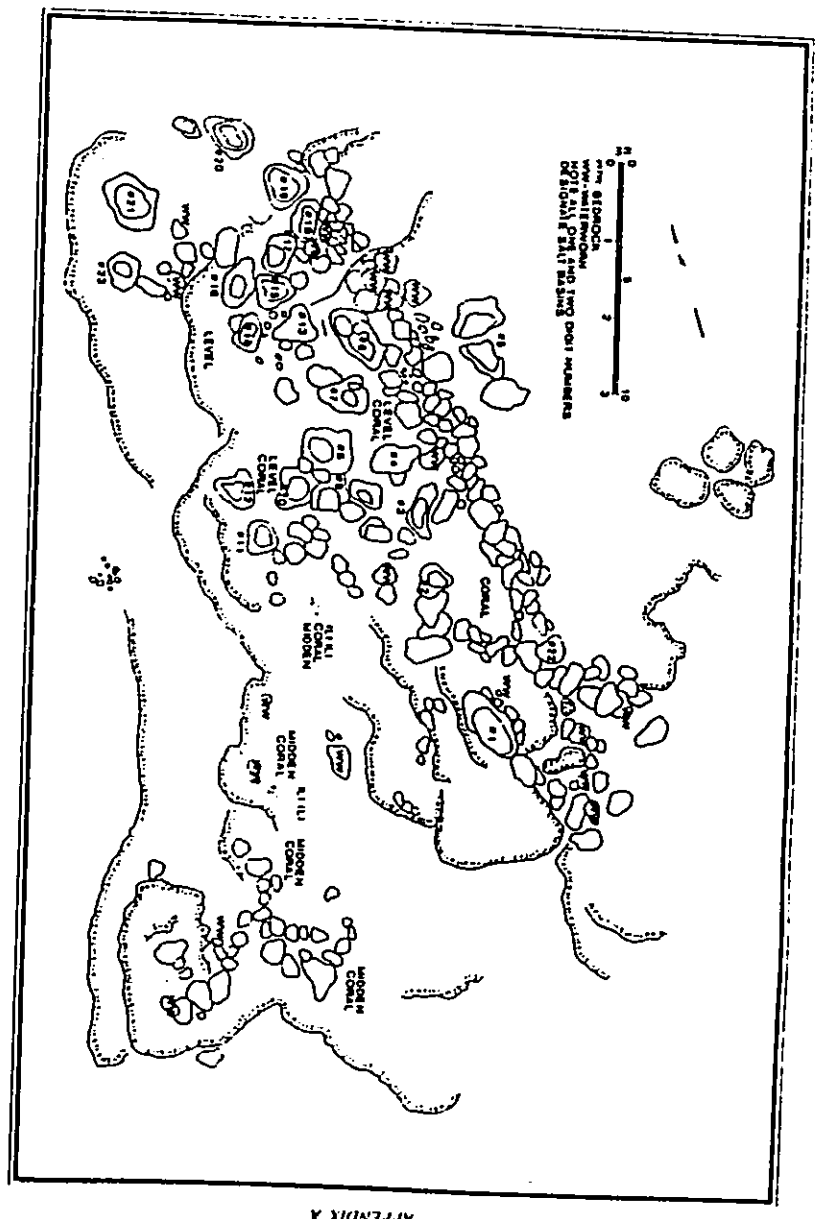


Figure A-1. SITE 4123

FEATURE A: Walled terrace
FUNCTION: Habitation
DIMENSIONS: 15.00 m by 9.00 m by 2.50 m (approx.)
DESCRIPTION: This structure has various component areas. The feature is linear, and basically follows the natural topography northwest to southeast along the southeast side of a lava ridge.

The northeast side of the feature is a combination of several natural outcroppings with crevices between the outcrops. The crevices are filled with stacked boulders and cobbles to form a fairly level and sectioned wall. Portions of the wall are faced along its interior.

Beginning from the northwest and moving southeast, there is a section c. 3.0 m long, 1.0 m in average width, and two to four courses high, with a maximum height of c. 1.25 m. This is followed from 3.0 m to 7.5 m by a fragmented section of single boulders and bedrock, with the boulders an average height of c. 0.40 m. From c. 7.5 to 9.5 m is another filled and faced crevice, c. 0.50 to 0.75 m wide and c. one to six courses high, with a maximum height of c. 1.40 m. There is another filled area between two bedrock boulders at c. 10.5 to 11.25 m. This area is lower, being c. 1.0 m above the terrace floor, and wider, at c. 2.25 m.

At c. 13.25 m from the southeast edge of the bedrock boulder (which completes the back of the terraced area), a stacked wall is oriented southwest for c. 3.0 m. This wall is bi-faced and built of small boulders and large cobbles. It has an average width of c. 0.75 m and is two to five courses high, with a maximum height of c. 0.95 m. The wall forms the side of a semi-enclosed, upper level of what appears to be a double terrace. This double terrace measures c. 5.00 m (NW/SE) by 5.30 m (NE/SW); the upper level measures c. 5.00 by 4.00 m, and the lower level measures c. 2.30 by 2.10 m. The surface of the two levels is of fairly flat soil with a light slope to the south, with some cobble rubble.

The southwest end of the wall has a medium boulder which may be bedrock, and two small boulders to the south which lead to a low, fairly flat mound, c. 1.35 m by 1.25 m, which acts as the southeast retainer of the lower terrace level. From this mound an irregular alignment of placed boulders and bedrock runs northwest to form the lower retainment of Feature A terrace. This alignment is curved at the southeast end, and also the northwest end which meets the back wall. From c. 5.0 m to 9.0 m southeast of the northwest end of the terrace is an area of rough and irregular small-boulder rubble. This may be collapse from the back wall.

At 8.6 m southeast of the site nail (which is at the west corner of Feature A terrace) and 2.0 m from the back wall is a bedrock boulder with several uprights and a small boulder mound to the north. These are retainments for a soil area which is 0.50 m higher that the double terrace on the SE end.

From c. 3.60 to 5.25 m southeast of the site nail is Feature B, a rectangular platform. The area from the site nail to Feature B is the remainder of the terrace. The surface is soil which slopes to the south and has a light cobble/boulder scatter, most of which appears to be wall collapse from the northwest wall section.

There is a short boulder alignment at c. 2.0 m southwest of the central area of the terrace, probably built as retainment for this section in front of Feature A terrace. It is also oriented northwest to southeast for c. 4.0 m, and has an average height of c. 0.35 m. Also, there is a short, curved alignment of bedrock and stacked boulders and cobbles c. 1.70 m southwest of the south corner. It runs roughly northwest to southeast for c. 1.95 m, with an average height of c. 0.45 m. There is a historic 'o'o (digging implement) blade jammed under the back wall, c. 6.75 m southeast of the site nail.

FEATURE B: Platform
FUNCTION: Possible burial
DIMENSIONS: 1.75 m by 1.40 m by 0.65 m (approx.)
DESCRIPTION: Feature B is rectangular shape in plan. It is built of small pahoehoe boulders with medium and large cobbles. The west corner is bedrock. The platform is built against the southwest side of a natural bedrock outcrop, and on the northwest half of Feature A terrace. The three exposed sides are faced two to three courses to heights of c. 0.40 m to 0.65 m. The long axis is northwest to southeast. The surface is irregular, though roughly flat and level.

FEATURE C: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 2.20 m by 0.50-0.80 m by 0.35 m (maximum height)
DESCRIPTION: This structure is built on the southeast side of a natural bedrock outcrop. Small boulders and medium cobbles of pahoehoe are loosely stacked in a short, low, curving wall against and between bedrock boulders. Light marine shell midden is visible.

Feature C may have functioned as a hunting blind or as a military fox-hole, based on the colorations of the stones used, along with nicks and the loose stacking.

SITE NO.: State: 4681 **PHRI:** 672-16
SITE TYPE: C-shape
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Grasses and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 3.70 m by 3.40 m by 0.45 m (approx.)
DESCRIPTION: The C-shape is open to the southwest and is built on the crest of a slope. It is constructed mainly of cobbles, with a few boulders stacked and piled three to four courses high. The western corner of the C-shape meets a contour of bedrock outcropping, which adds support for the structure.

There is an abundant amount of coral within the interior of the C-shape, and many 'ili'ili stones at the SW end of the enclosure. Historic trash and rubbish are present.

SITE NO.: State: 4682 **PHRI:** 672-15
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The site is situated at the bottom of a slope rising inland of the beach.
VEGETATION: Kiawe and dense grasses.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 12.0 m (E/W) by 10.5 m (N/S). The site complex consists of two walled terraces (Features A and C) and a terrace (Feature B). Midden, coral and waterworn basalt were associated with the site.

FEATURE A: Walled terrace
FUNCTION: Habitation
DIMENSIONS: 12.00 m by 8.10 m by 0.95 m (approx.)
DESCRIPTION: Feature A is located c. 12.0 m from the ocean and consists of an L-shaped wall. It is oriented c. E/W, and is three to five courses high with one upright along the interior western end of the E/W wall. The E/W wall measures c. 12.00 m long by 1.37-1.80 m wide, and 0.65-0.94 m high. The N/S wall measures c. 7.00 m long, 1.41-2.12 m wide, and 0.87-0.95 m high. The construction materials are waterworn and rough basalt boulders and cobbles. The E/W wall is aligned and faced along the interior and built against outcropping along the exterior. The N/S wall is bi-faced, with one area of wall collapse near the south end of the wall.

Interior of the L-shaped wall, and oriented N/S, are two levels of terracing. The E/W wall is situated along the northern end of the terracing, and the N/S wall is at the eastern end of the terracing. The northern terrace measures c. 7.0 m (E/W) by 3.5 m (N/S). It is constructed upon natural outcropping, and is partially paved in areas with basalt cobbles (waterworn and natural). The southern terrace is c. 0.5 m below the northern terrace and extends seaward. The construction is similar to the northern terrace, but shell midden and waterworns are more abundant. The southern terrace measures c. 7.0 m (E/W) by 3.5 m (N/S).

FEATURE B: Terrace
FUNCTION: Habitation
DIMENSIONS: 10.60 m by 9.88 m by 0.47 m (approx.)
DESCRIPTION: Feature B is immediately south of Feature A terrace. It was not confined by the L-shaped wall, and therefore was given a feature designation. It is constructed beyond the L-shaped wall (Feature A) and appears to extend east and west. Modified areas extend downward toward the ocean. Ocean surf has disturbed this portion of the terrace.

FEATURE C: Walled terrace
FUNCTION: Habitation
DIMENSIONS: 10.80 m by 1.00 m by 0.70 m (approx.)
DESCRIPTION: The terrace measures c. 6.2 m (N/S) by 4.5 m (E/W). It is walled along the north, east, and south sides. The terrace surface is a large soil deposit area, with coral and waterworn basalt. The terrace surface extends slightly west of the terrace walls.

Portions of the wall are built against and atop bedrock outcropping. The walls are constructed of cobbles and small boulders, partially- faced and stacked, two to three courses high. Uprights are utilized in the eastern corner of the wall, with piled cobbles.

SITE NO.: State: 4687 **PHRI:** 672-12
SITE TYPE: Platform
TOPOGRAPHY: Undulating coastal plain consisting of bedrock boulders.
VEGETATION: Fountain grass and kiawe trees.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible burial
DIMENSIONS: 6.50 m by 6.40 m by 0.80 m (approx.)
DESCRIPTION: The platform is circular shape in plan. It is raised along its perimeter and constructed using a mixture of basalt boulders and cobbles, waterworn basalt and coral. The surface interior appears paved in areas, but also appears to be boulder- and cobble-filled.

FEATURE A: Walled terrace
FUNCTION: Habitation
DIMENSIONS: 6.25 m by 4.30 m by 1.20 m (approx.)
DESCRIPTION: This structure is built atop a bedrock outcrop, most of which is contained by the southwest edge of the terrace. The northwest portion is a stepped face of seven courses with a maximum height of c. 1.25, in addition to retainment, this may have functioned as a stairway to the terrace.

The wall is oval-shaped and surrounds the terrace along all sides, except for the southwest edge of the terrace. The wall is constructed of small boulders and large cobbles, stacked and faced on both sides, with six uprights used within the first course and a large bedrock boulder in the middle of the NE wall. The wall begins low at both ends, having one to three courses and an average height of c. 0.50 m; it gradually gains height on the back wall, toward the center and over the bedrock boulder. The wall is stacked four to six courses high on either side of the bedrock boulder, with two to three courses above it, to a maximum height of c. 1.20 m.

There is a cupboard constructed at the southeast end between the two wall sections. Two linear boulders are placed over the top edges of the wall at the cupboard opening (facing northwest) and back. A pahoehoe slab lying near the opening may have served as a capstone. The overall measurement of the cupboard is c. 1.80 m by 1.75 m. The interior is c. 0.90 m front to back, 0.70 m wide, and 0.45 m in height.

There is a possible collapsed cupboard at the northwest side of the terrace, though no cover rocks are noted. There is another possible cupboard in the northeast wall, c. 1.80 m from the northwest side; it measures c. 0.40 m in diameter, and is 0.45 m deep.

FEATURE B: Enclosure
FUNCTION: Habitation
DIMENSIONS: 11.00 m by 9.00 m by 1.10 m (approx.)
DESCRIPTIONS: Feature B utilizes the same bedrock outcrop that fronts Feature A terrace. The outcrop ranges from c. 1.20-1.55 m in height. There is a single row of small boulders placed at the lowest portion of the outcrop to gain an additional average height of c. 0.35 m.

The enclosure abuts the outcropping along the SW side and utilizes it as part of the enclosure wall. The enclosure is constructed of natural and waterworn pahoehoe, small boulder and large cobble in size. The stones have been stacked in a roughly square-cornered U-shape, with the ends abutting the southwest side of the natural bedrock outcrop.

The northwest wall may have been double-faced, but it is presently badly collapsed. The average width is c. 0.80 m, and the height ranges from c. 0.30 to 0.50 m. The southeast wall is partially collapsed, but appears to have a sloping exterior face of six to seven courses throughout most of its length to meet the sloping hillside. The average width is c. 1.60 m. The interior height is c. 0.30 to 0.50 m, and the exterior height is c. 0.75 to 0.90 m. The southwest wall is faced two to three courses high, with heights from c. 0.50 to 0.65 m, and functions as a retaining wall.

The interior measurements of the enclosure are c. 5.00 (NW/SE) by 4.25 m. It is fairly flat with a slight slope to the southwest. The surface interior consists of soil, with a scatter of small to large cobbles.

There are also three pahoehoe slabs on the interior surface. One of the slabs in the northern corner is roughly square with a low depression, which could be either pecked or natural. This may have been a salt pan or other food preparation stone. The slab measures c. 0.53 m by 0.52 m and 0.4 m in thickness; the depression measures c. 0.40 by 0.39 m. This area is slightly darker in color with a rougher surface.

There is a cupboard area built into the eastern corner of the enclosure. Four medium boulders are placed upright in a curve with the east stone abutting the outcrop. The opening faces WNW, towards the interior of the enclosure. There are additional stones stacked over the cupboard and in an arch towards the bedrock. The overall dimensions of the cupboard are c. 1.30 (NW/SE) by 1.10 m (NE/SW) and c. 1.05 m in height. The internal dimensions are c. 1.10 m deep by 0.90 m wide and c. 0.75 m in height. A slab near the opening may have been a partial entrance cover.

At the west corner, below the northwest wall, is a sloping stone ramp constructed between two bedrock boulders. The bedrock boulders appear to serve as retainers. The ramp measures c. 3.60 m (NE/SW) by 2.50 (NW/SE). The surface of the ramp is irregular.

FEATURE C: C-shape
FUNCTION: Habitation
DIMENSIONS: 4.50 m by 4.00 m by 0.85 m (approx.)
DESCRIPTION: This structure is a stacked and faced boulder and cobble wall which opens to the northwest. The wall is constructed of small-boulder and large-to medium-

The SIHP No. 13570 (PHRI 672-9) Trail is present on the inland side of the platform. Coral is sparsely scattered over the surface interior, but it is abundant along the northwest corner. Waterworn basalts are also on the northwest corner.

SITE NO.: State: 4688 PHRI: 672-7
SITE TYPE: C-shape
TOPOGRAPHY: Undulating lava flow with a southern slope. The terrain consists of a rocky surface of loose and embedded boulders and cobbles.
VEGETATION: Grass and burned kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 5.50 m by 3.50 m by 0.55 m (approx.)
DESCRIPTION: The site is located c. 2.90 m northeast of a wooden gate and roadway. C-shape in roughly rectangular shape in plan, this is a stacked, walled feature built against the southwest side of a large boulder. The wall is built of small pahoehoe boulders with some large cobbles. They are loosely stacked and semi-faced one to three courses high, with heights from c. 0.40 m to 0.70 m. The width varies from 0.50 m to 0.75 m.

The wall abuts a natural bedrock boulder which serves as the northeast wall and acts as a wind break; maximum height of the boulder is c. 1.95 m. The enclosure is divided into two areas by an internal wall which connects with the southwest wall and abuts the boulder. The main area is on the southeast side and measures c. 3.25 m (NW/SE) by 2.35 m (NE/SW), including the walls. The interior surface is flat with a level soil area that averages c. 0.5 m deep. There is an entrance measuring c. 0.90 m wide leading to this area at the south corner of the southwest wall. The wall stones at the northwest of this entrance consist of uprights. The small area on the northwest side measures c. 2.00 (NE/SW) by 1.60 m (NW/SE), including the walls.

The southwest half is of large, stacked cobbles with a rough face on the northeast, four courses high. The northeast half is a probable excavated cupboard which extends c. 0.60 m northeast under the boulder to a depth of c. 0.70 m. There is a small pile of 12 probable konane gamestones c. 5.0 m northeast of the site.

Marine shell midden and waterworn cobbles and coral were present; in addition, historic metal and glass fragments were found.

SITE NO.: State: 4689 PHRI: 672-8
SITE TYPE: Terrace
TOPOGRAPHY: Sloping area in all directions, with bedrock outcropping and scattered boulders and cobbles.
VEGETATION: Fountain grass and kiawe trees.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DIMENSIONS: 4.00 m by 2.50 m by 0.75 m (approx.)
DESCRIPTION: Generally V-shaped in plan, it is raised along the west side and oriented roughly N/S. The retaining wall follows a perimeter of natural bedrock contour along the northern end. Waterworn boulders and basalt cobbles are stacked three and four courses high at the northern end. Bedrock contour continues to the south, and waterworn and regular cobbles are placed between to construct the retaining wall. In addition, cobbles and pebbles, waterworn cobbles, 'ili'ili and coral are used as fill. The surface interior of the terrace consists of a level soil area to the east. The area measures c. 1.08 m by 1.58 m.

An upright, waterworn boulder is present at the northern end. It may possibly have been a salt basin; it contains eight waterworn depressions ranging in diameter from c. 3 to 4 cm, and linear waterworn areas.

SITE NO.: State: 4690 PHRI: 672-6
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Undulating lava flow sloping to the southwest. Rocky with exposed bedrock outcrops and loose and embedded boulders and cobbles.
VEGETATION: Grassland and burned kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 23.0 m (N/S) by 12.0 (E/W). The site complex consists of a walled terrace (Feature A), an enclosure (Feature B), a C-shape enclosure (Feature C), and a terrace (Feature D).

Portable remains consisted of a coral abrader, salt pan, marine shell midden, waterworn basalt cobbles and pebbles and waterworn coral and fragments. There is a layer c. 10 to 15 cm thick of a brownish, silty loam within and around the features.

cobble-sized pahoehoe basalt and waterworns. A medium-sized boulder is placed at the southwest end of the C-shape.

The northeast portion is wider and higher than the remaining walls. It is stacked three to five courses to a height of c. 0.70 to 0.85 m, and has an average width of 1.20 m. The remaining walls are one to three courses high with an average height of c. 0.50 m. The center wall width is c. 0.90 m, and the southwest portion is c. 0.65 m wide. On the interior, the walls are vertically faced. There is minor collapse on the northeast side, and the exterior has a slight slope. The interior floor surface is of fairly flat soil with a slight slope to the SSW, and with some collapsed stones. Marine shell midden, waterworn cobbles and pebbles were visible.

FEATURE D: Terrace
FUNCTION: Habitation
DIMENSIONS: 6.00 m by 2.50 m by 0.60 m (approx.)
DESCRIPTION: Feature D is a low, linear alignment of small boulders and large to medium cobbles of pahoehoe. They are placed singularly in three abutting rows, oriented c. 145/325° as retainers against the natural hillside slope. Some waterworn cobbles are also noted within these alignments. The retainment is c. 0.90 m to 1.30 m wide, and begins c. 3.50 m southwest of Feature C. Marine shell midden, waterworn basalt cobbles and coral were present.

Above and southeast of the retaining alignments is an area of a few small boulders and large to small cobbles; no alignment was visible.

SITE NO.: State: 7149 Tomonari-Tuggle: K-179, K-1 PHRI: 672-94, 95
SITE TYPE: Hawaiian Railroad Co.- Mahukona Harbor Complex
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Kiawe trees and grasses.
CONDITION: Poor-fair
INTEGRITY: Unaltered-altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Agriculture-harbor-transportation
DIMENSIONS: 475.00 m by 320.00 m (approx.)
DESCRIPTION: According to the HRHP site form, the Mahukona Terminals and the Hawaiian Railroad Company relate "directly to the transportation and agricultural history of North Kohala, and generally to the economic history of Hawaii." The complex consists of warehouses and office building remains, pier and related wharf equipment, in addition to scattered remains of railroad grades and embankments with no tracks evident.

SITE NO.: State: 7351 PHRI: 672-2, 3
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating and sloping terrain with a silty loam soil cover; there are many surface boulders and cobbles.
VEGETATION: Fountain grass and kiawe.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 25-35 m (E/W) by 10 m (N/S). The site complex consists of two terraces (Features A and B). Feature A is the southernmost terrace; Feature B is the northernmost.

FEATURE A: Terrace
FUNCTION: Habitation
DIMENSIONS: 11.00 m by 5.00 m by 0.65 m (approx.)
DESCRIPTION: This terrace is constructed along natural bedrock at a crest just above the coastal shoreline. Basalt cobbles and waterworms have been placed to fill crevices or gaps in the outline of the terrace. There is an abundance of waterworn stones used in the construction of the retaining wall. The terraced area is a fairly flat soil surface. Midden and 'ili'ili stones are scattered on the entire surface.

FEATURE B: Terrace
FUNCTION: Habitation
DIMENSIONS: 15.50 m by 5.50 m by 1.10 m maximum height (approx.)
DESCRIPTION: Feature B is a double terrace that is oriented c. NW/SE and situated immediately above the coastal shoreline. Both terraced areas are constructed across slope. The upper (NW) retaining wall measures c. 10.0 m in length. It is raised on the seaward side to heights ranging from c. 0.42 m to 1.10 m. The lower (SE) retaining wall measures c. 13.0 m in length. It is also raised on the seaward side, with heights ranging from 0.35 m to 0.70 m. Both terraces are constructed along a natural contour of bedrock. Basalt cobbles and boulders are stacked two to three courses high in several different areas of the retaining walls. The upper terraced area has several low spots that have been filled in with pebbles and cobbles.

Shell midden, coral and waterworn basalt were present. A reddish- brown silty loam deposit, c. 0.10 m thick, was also visible.

SITE NO.: State: 7355 PHRI: 672-5
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The area consists of sloping coastal plain
VEGETATION: Fountain grass and kiawe trees.
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The overall complex measures c. 8.7 m (N/S) by 8.1 m (E/W). The site complex consists of two C-shapes (Features A and B).

No portable remains were present on Feature A; Feature B contained coral, two fragments of Cypraeidae, and a modified waterworn basalt. A reddish-brown silty loam soil deposit, c. 0.10 m thick, is present in and around the features.

FEATURE A: C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 4.70 m by 4.00 m by 0.93 m (approx.)
DESCRIPTION: Feature A is built atop bedrock outcropping which supports the shape and structure along its northern side. Open to the west, it is situated on a slope and is oriented east to west. The C-shape is constructed with piled cobbles and boulders, piled c. two to three courses high. At present, this structure is collapsed.

FEATURE B: C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 4.10 m by 4.00 m by 0.93 m (approx.)
DESCRIPTION: Open to the west, Feature B is situated east and adjacent to Feature A. It is constructed of cobbles piled two to three courses high. The north end of the C-shape abuts and utilizes bedrock outcropping as a portion of its wall. It is collapsing slightly along the south and west portions of the C-shape.

Basalt and waterworn basalt are present in the immediate area. Two fragments of *Cypraeidae*, coral, worked waterworn coral, and basalt were also present.

SITE NO.: State: 12350 Peterson Trail Section: 3 PHRI: 672-92
SITE TYPE: Road
TOPOGRAPHY: The terrain consists of a gently undulating flow.
VEGETATION: Kiawe trees, grasses, 'uhaloa and 'ilima.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Transportation
DIMENSIONS: 2400.00 m by 6.0 m (approx.)
DESCRIPTION: The road was originally identified by Peterson (1968) as Trail Section 3. It was reidentified and assigned SIHP Site No. 12350 by Rosendahl (1989). Within the project area, it resembles a graded dirt road which is approximately parallel to the old Mahukona-Hawi Road and the Akoni Pule Highway. This road may have been a primary historic-period route between Mahukona Harbor and Hawi. Following is an excerpt from Peterson:

> "Section 3 is the northern branch of the base trail, Section 9. Owing to Emerson's omission of this trail in the 1881 map, Section 3 must have been constructed after that year."
>
> "The path is generally covered with a high growth of grass, although a fairly recent jeep track has worn it down somewhat, and has kept the trail relatively free of kiawe. Lining is variable. Generally, however, the walls are well-built with groups of large lava rocks, and are several feet high. Periodically, the kerbing disappears altogether, and then resumes in its original form. Width is between 6 and 9m....Section 3 started in an easterly direction, and then curved to the north, running parallel to the highway to Hawi" (Peterson 1968:79).

In addition, Peterson noted that the trail had two types of paving: large flat paving stones, and gravel paving.

SITE NO.: State: 13570 Peterson Trail Section: 13 *(see Appendix C: Selected Photographs)*
PHRI: 672-9, 57, 60
SITE TYPE: Trail
TOPOGRAPHY: Flat to sloping terrain consisting of a soil mantle cover and bedrock outcropping.
VEGETATION: Kiawe trees and dense grass cover.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Transportation-marker
DIMENSIONS: 508.00 m by 1.00 m by 0.30 m (approx.)
DESCRIPTION: The site consists of a trail, with at least three cairns occurring along some portions of the trail. The trail is oriented c. north-south and is visible within the southern third of the project area.

The trail type is a cleared depression within the ground soil, and also exists as a worn path over pahoehoe bedrock. Occasional boulder and cobble alignments line each side

along portions of its length. It is mostly narrow, c. 0.50-0.70 m wide, and parallels the coast.

According to Peterson (1968:74),

"It winds through the dense kiawe trees as a vague, narrow trail, occasionally marked with ahus. At a point indicated by a large round rock pile, nearly 195m. from the beginning of section 20, it joins the jeep road, but after about 30m. cuts back into the forest."

"Traveling northward for some distance, side trails are noted heading makai (see sections 16 and 141), but these do not seem to be part of section 13. The trail continues north, crossing several stream beds, and becomes very obscure most of the way. However, in critical areas, places where it is difficult to pass, it is invariably marked. Kerbing, ahus and upright rocks occur frequently to confirm the location of the trail. Also, occasional coral is encountered on the path. Finally, Section 13 leads to a well-lined trail, running mauka-makai. It does not continue on the opposite side, but rather is an apparent branch of this larger trail (section 12)."

"Although Section 13, due to its narrow, winding difficult nature, appears to be a Type AB trail, this becomes doubtful on closer inspection. The trail crosses the ahupua'a boundaries of Mahukona and Lapakahi, and is inland of the coastal trails, thus more closely fitting the description of a Type B trail" (Apple 1965).

SITE NO.: State: 13571 *(Figure A-2)* **PHRI:** 672-10
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating coastal plain with bedrock outcropping.
VEGETATION: Fountain grass and kiawe trees.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Indeterminate
DESCRIPTION: The overall complex area measures c. 11.5 m (N/S) by 2.5 m (E/W). The site complex consists of two circular boulder-wall structures (Features A and B) that are very similar to each other. Both are constructed atop bedrock outcroppings that are c. 8.0 m apart.

A level surface between the outcrops and west of Features A and B has a heavy concentration of surface midden, volcanic glass, 'ili'ili, and waterworn coral and basalt pebbles. This concentrated area measures c. 7.0 m by 3.0 m.

FEATURE A: Circular boulder wall
FUNCTION: Indeterminate
DIMENSIONS: 2.50 m by 2.25 m by 0.35 m (approx.)
DESCRIPTION: Feature A utilizes bedrock outcropping along the western portion of the feature. It is constructed of basalt cobbles and pebbles, forming a small circular structure. The stones appear to be stacked one to two courses high. Eight pieces of coral are present at the western end of the circle where the cobbles join with the bedrock outcropping; two pieces of coral are present in the middle of the circle.

FEATURE B: Circular boulder wall
FUNCTION: Indeterminate
DIMENSIONS: 2.40 m by 1.60 m by 0.53 m (approx.)
DESCRIPTION: Feature B is built atop bedrock outcropping and is constructed of cobbles and pebbles, forming a small circular structure. It is stacked from two to seven courses high on the east side of the circle; one piece of coral is placed in the side of this area. The interior surface contains one piece of coral and reddish-brown silty loam.

SITE NO.: State: 13572 **PHRI:** 672-17
SITE TYPE: C-shape
TOPOGRAPHY: The terrain consists of a sloping coastal plain.
VEGETATION: Grasses and kiawe trees.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: W.W. II military
DIMENSIONS: 2.20 m by 1.90 m by 0.40 m (approx.)
DESCRIPTION: Semi-circular shape in plan, it is open to the NNE with a sloping depression within the interior of the structure. The structure is located immediately above the shoreline. It consists of a basic, single-cobble alignment with two boulders on the western end. The southern end is built atop bedrock outcropping.

SITE NO.: State: 13573 *(Figure A-3)* **PHRI:** 672-18
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The site is situated on the boulder-beach shore.
VEGETATION: Grasses and large kiawe trees.
CONDITION: Fair-good
INTEGRITY: Fea. A altered; Fea. B unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible ceremonial

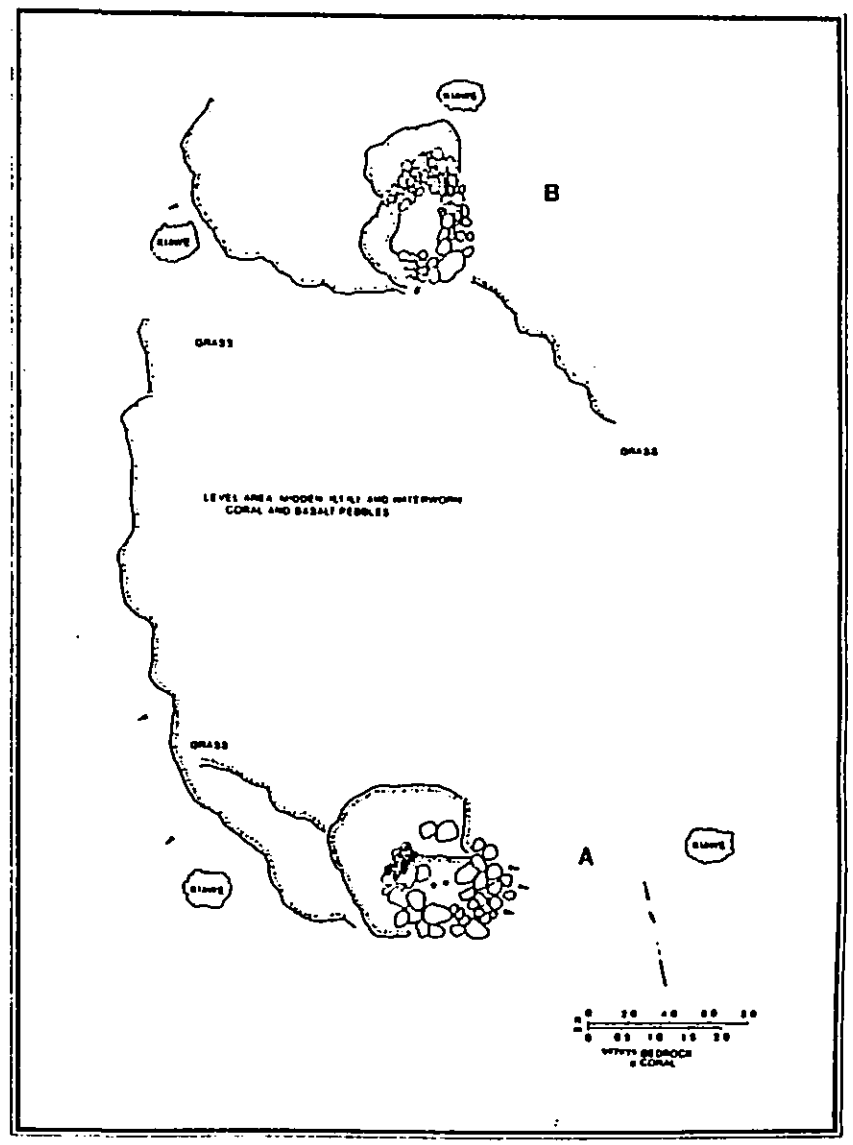


Figure A-2. SITE 13571

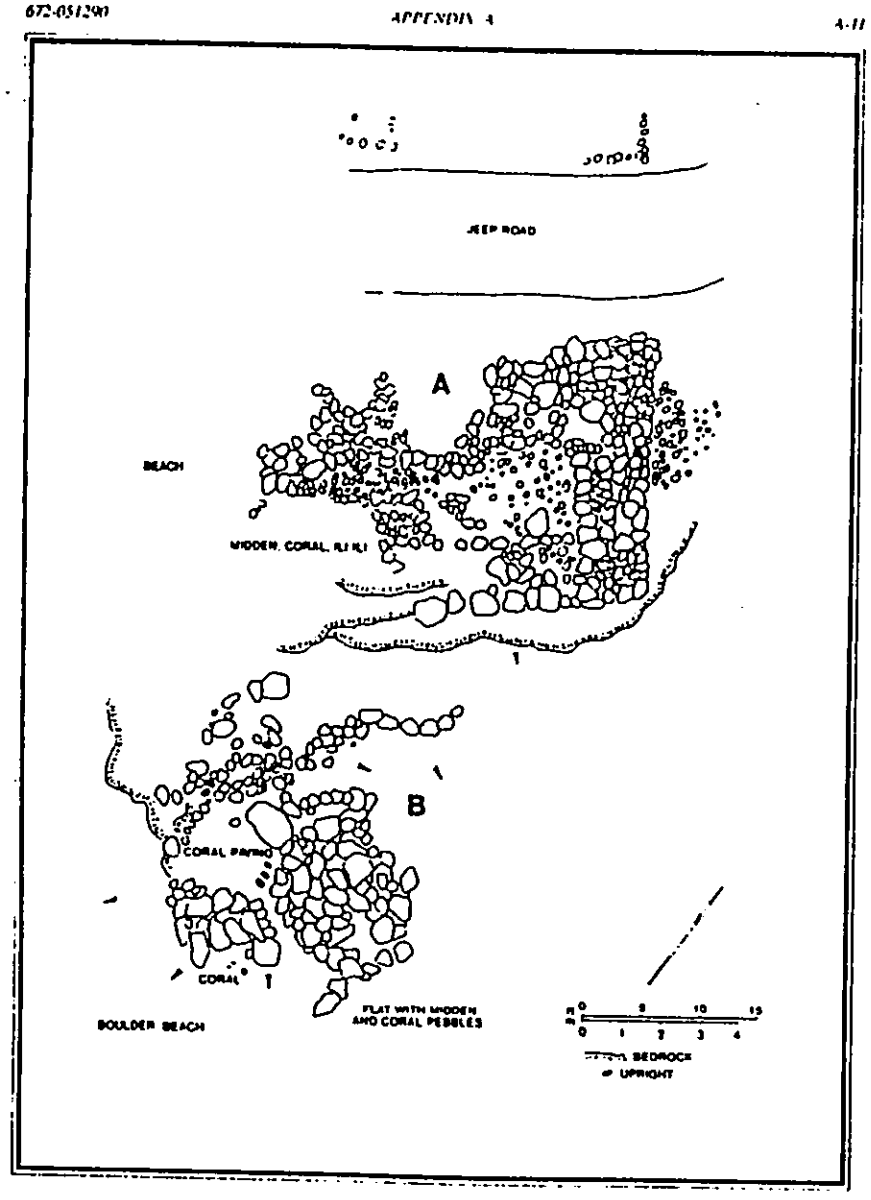


Figure A-3. SITE 13573

DESCRIPTION: The overall complex area measures c. 20.0 m (N/S) by 10.0 m (E/W). The site complex consists of two terraces (Features A and B). Both features extend westward, toward the upper edge of the beach.

FEATURE A: Terrace
FUNCTION: Possible ceremonial
DIMENSIONS: 10.30 m by 7.40 m by 1.10 m maximum height (approx.)
DESCRIPTION: This terrace is of angular and sub-angular boulders and cobbles and waterworn stones, with a faced wall extending north to southeast. A row of large boulders leads west from the southeast corner. The terrace is irregular in shape, except for the north to southeast wall. The surface is roughly paved and there are areas of collapse on the northwest side. A jeep road runs to the south side of the beach edge and appears to have cut through the terrace. The aligned stones and piled boulders and cobbles are evident past the roadway on the north side.

The wall is faced and has heights of c. 0.96 m to 1.10 m. It has large angular boulder foundation stones. The wall widens at the base, but appears nearly vertical. At c. 1.75 m southwest of the wall edge is a row of large, aligned cobbles on the flat terrace surface. They are oriented parallel to the wall.

The south side of the terrace has some collapse, although the original shape does not appear to have been straight-walled. The north side appears to have been cut by the road and shows a great deal of collapse. As only minimal clearing was done, however, it is impossible to define the precise limits of the terrace rubble on the north side.

FEATURE B: Terrace
FUNCTION: Possible ceremonial
DIMENSIONS: 6.40 m by 6.40 m by 1.50 m (approx.)
DESCRIPTION: Feature B is constructed atop a high outcrop, at the edge of a boulder beach. Angular basalt boulders are piled to the height of the outcrop. A large boulder measuring c. 1.3 m by 0.9 by 0.6 m is situated on top, with coral pebble paving on three sides. Three upright waterworn stones are aligned on the south side of the boulder. Three more waterworn uprights are to the west within a triangular space.

SITE NO.: State: 13574 PHRI 672-19
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The immediate terrain is coastal shoreline and plains.
VEGETATION: Grasses, kiawe trees and bougainvillea.
CONDITION: Poor
INTEGRITY: Possibly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 31.0 m (NW/SE) by 23.0 m (NE/SW). The site complex consists of a U-shaped enclosure (Feature A), a rock wall (Feature B) and a rock wall alignment (Feature C).

Only the inland wall remains intact, with the south wall foundation stones visible. A possible terrace is situated within the enclosure interior. Coral is also present on all features.

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 12.80 m by 8.60 m by 1.80 m (approx.)
DESCRIPTION: The enclosure is located at the northern side of the parking lot at Mahukona Park. Feature A is U-shape in plan, with an opening to the northwest. There appears to be a terraced area within the interior along the east side of the enclosure, extending west within the perimeter of the enclosure. The entire feature is severely collapsed, except for the northeast portion of the wall, which remains intact.

The northeast wall is bi-faced, stacked 10 to 11 courses high, and constructed with cobbles, boulders, waterworns and coral. The remaining part of the enclosure is severely collapsed. It appears to be constructed the same; core-filled areas of pebbles, cobbles and coral are visible. Midden and coral are present; coral is abundant within the construction of the structure. Scattered boulders and cobbles are strewn here and there on the west side of the collapsed enclosure wall.

FEATURE B: Wall
FUNCTION: Habitation
DIMENSIONS: 16.00 m by 2.50 m by 0.60 m (approx.)
DESCRIPTION: Feature B is a cobble/boulder wall alignment oriented NW/SE. It follows the northeast edge of the enclosure and extends beyond the limits of the enclosure to the northwest and southeast.

The wall alignment is a single course wide and high as it extends beyond the northwest corner of the enclosure. It is not constructed as well as the portion that extends into the enclosure, portions of which are stacked four to eight courses high, faced with cobbles and boulders along the southwest edge and core-filled with pebbles and coral; however, it is severely collapsed.

Midden is abundant but appears to be from recent opihi pickers. There is a large amount of historic trash within the area. Kiawe trees have been uprooted along the southeast wall.

FEATURE C: Wall
FUNCTION: Habitation
DIMENSIONS: 3.50 m by 0.50 m by 0.50 m (approx.)
DESCRIPTION: Feature C is oriented c. E/W. It is constructed of basalt boulders and cobbles stacked two to four courses high. Scattered coral cobbles are visible along the wall. The wall is situated c. 2.5 m from the eastern corner of Feature A.

SITE NO.: State: 13575 **PHRI:** 672-20
SITE TYPE: Enclosure
TOPOGRAPHY: Bedrock outcroppings and boulders to the north and east.
VEGETATION: Kiawe trees and thick, tall grasses.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 19.80 m by 13.50 m by 0.82 m (approx.)
DESCRIPTION: This enclosure is oval shape in plan. It is constructed of loosely piled, angular basalt cobbles and large boulders. The enclosure wall width ranges from 0.75 m to 1.40 m. The heights range from 0.42 m to 0.82 m. Massive bedrock boulders form the base of the south wall. The enclosure has been disturbed by uprooted trees.

A four-inch pipe runs under and through the bend of the enclosure wall and extends along the interior. It appears that the wall was built over the pipe. There are standing pipes with valves between the enclosure, a warehouse, and a large tank. The pipe leads from the site toward the valves; other pipes lead from the valves toward the large tank.

Two 50-gallon drums and other metal and glass debris are present within the enclosure.

SITE NO.: State: 13576 **PHRI:** 672-21
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Fairly flat outcroppings to the north and south.
VEGETATION: Grasses and kiawe trees.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 21.0 m (E/W) by 13.5 m (N/S) and is generally rectangular shape in plan. The site complex consists of an L-shape wall (Feature A) and a modified outcrop with an alignment (Feature B).

There is a surface scatter of coral and shell midden by the west wall of Feature A, extending west inward the bank of the road cut. Midden and coral are visible in the bank.

FEATURE A: L-shape wall
FUNCTION: Habitation
DIMENSIONS: 10.80 m by 0.90 m by 1.50 m (approx.)
DESCRIPTION: Feature A is an L-shape wall that is generally open to the north. It is constructed of boulders and small to large cobbles of basalt. The west wall is constructed of loosely placed stones, one to two courses high. It becomes loosely formed and irregular in shape.

Midpoint in the length of the wall, it is a placement of single cobbles and boulders. The west wall is low, with small basalt cobble and waterworn coral paving along the exterior of the wall. The paved area is c. 6.0 m long and 1.5 m wide. There is much historic rubbish in this area.

The east wall is constructed of pahoehoe cobbles and boulders, stacked one to four courses high. Loosely piled boulders and cobbles make up the seaward half of the east wall. The remaining inland portion appears to be of original construction. This portion is faced and of fairly regular width and height. Both walls appear to have been partially disassembled and reconstructed.

FEATURE B: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 7.50 m by 5.00 m by 0.58 m (approx.)
DESCRIPTION: This is a modified outcrop with a boulder alignment extending southeast from the feature. Pahoehoe cobbles are stacked three courses high on the west half of the circular outcrop. Extending southwest c. 1.5 m, it abuts the boulder alignment. The alignment extends c. 6.5 m ESE and ends at a low rock pile that is c. 0.30 m high.

There are two concrete building foundations c. 20.0 m south of Feature B.

SITE NO.: State: 13577 **PHRI:** 672-22
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of a gentle slope.
VEGETATION: Kiawe tree and fountain grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation

DESCRIPTION: The overall complex area measures c. 19.3 m (N/S) by 5.0 m (E/W) with heights ranging from 0.45 m to 0.85 m. The site complex consists of two terraces (Features A and B) that are constructed with pahoehoe cobbles. A brownish soil is present throughout the site. Marine shell midden and coral are present.

FEATURE A: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 4.5 m by 1.4 m by 0.3 m average height
DESCRIPTION: Feature A is constructed of pahoehoe cobbles. It is stacked and partially faced on the north side. Fragments of coral are scattered around and on the terrace.

FEATURE B: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 6.5 m by 1.6 m by 0.20 m average height
DESCRIPTION: Feature B is constructed of pahoehoe cobbles. It is partially stacked five courses high along the west side, and two courses high along the east side. It is raised on the southern portion and is level with the ground surface to the north.

SITE NO.: State: 13578 **PHRI:** 672-23
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Outcrops rising to the north.
VEGETATION: Kiawe trees and grass.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 20.0 m (N/S) by 14.0 m (E/W). The site complex consists of a wall (Feature A), three mounds (Features B, C and D) and a midden scatter (Feature E).

The complex is situated on a cut bank above a jeep road. The bank is eroding at the location of the midden scatter. There are wooden beams placed at the north edge of the bank cut above the road. The beams are secured with metal cables with spliced eyes.

FEATURE A: Wall
FUNCTION: Habitation
DIMENSIONS: 5.30 m by 0.80 m by 0.42 m (approx.)
DESCRIPTION: Feature A is a wall of angular boulders and cobbles joining bedrock on the north side to form a C-shape shelter. It is open to the northeast and away from Makaohule Point. One waterworn cobble is present near the top interior of the wall. Basalt boulders piled one to two courses high form overlapping wall segments, curving to abut the bedrock outcrop. Midden and waterworn coral pebbles are present on the soil surface.

FEATURE B: Mound
FUNCTION: Habitation
DIMENSIONS: 3.00 m by 0.90 m by 0.27 m (approx.)
DESCRIPTION: Feature B is a linear mound of small, angular basalt cobbles piled in a low mound. One large cobble is placed at each end of the mound, and one small waterworn upright on the south side of the mound, near the west end. Midden is visible on the soil surface surrounding the feature.

FEATURE C: Mound
FUNCTION: Possible habitation
DIMENSIONS: 3.00 m by 2.70 m by 0.14 m (approx.)
DESCRIPTION: Feature C is a low, circular mound of small, piled cobbles and soil. Three large cobbles are on the mound. Shell midden, coral and 'ili'ili are visible on the mound surface and on the surrounding soil surface.

FEATURE D: Mound
FUNCTION: Habitation
DIMENSIONS: 1.75 m by 1.50 m by 0.32 m (approx.)
DESCRIPTION: Feature D is a small mound of angular basalt and small cobbles piled on the surface, c. 1.5 m west of Feature C. There are two large basalt cobbles side by side at the west end of the feature. Midden is visible on the soil surface surrounding the mound. Bedrock outcropping lies c. 1.0 m north of Feature D, and contains an upright waterworn boulder.

FEATURE E: Midden scatter
FUNCTION: Habitation
DIMENSIONS: 12.00 m by 8.00 m (approx.)
DESCRIPTION: Feature E consists of a concentrated midden scatter on the surface of the site. The scatter covers a larger surface area than it appears, extending to the edge of the bank cut. Midden was seen in portions of the bank cut, eroding to the roadway below.

SITE NO.: State: 13579 Tomonari-Tuggle: K-175
PHRI: 672-24
SITE TYPE: Complex (6 Features)
TOPOGRAPHY: Level coastal area with bedrock outcropping to the north, south, and east.
VEGETATION: Large kiawe trees, dense grasses and low ground cover.
CONDITION: Good
INTEGRITY: Only Feature A appears altered
PROBABLE AGE: Indeterminate

FUNCTIONAL INTERPRETATION: Habitation-agriculture
DESCRIPTION: The overall complex area measures c. 31.6 m (N/S) by 19.5 m (E/W). The site complex consists of an enclosure (Feature A), a terrace (Feature B), and four platforms constructed around kiawe trees (Features C-F). There are many additional kiawe trees in the area which have rocks and coral built around the bases; all are not formally platforms. Several have toppled, pulling the structures apart. The trees with platforms appear northwest and southeast of the site; there are at least 12 of these.

Two areas at and just below the vegetation line west of the site have small, rough basalt pebble and coral paving, confined on the seaward edge by large waterworn and rough basalt cobbles. The ground surface between Features A, B, and the boulder beach has small pieces of waterworn coral and some marine shells that are fairly evenly distributed. An irregular boulder wall is c. 20.0 m NW of the site, along the beach. The wall is two courses high in places, and extends c. 2.0 m onto the boulder beach. The east end of the wall has been disturbed and covered by two large fallen kiawe trees. There are waterworms and branch coral on the wall where it crosses the vegetation line. Beyond that, the wall is disturbed and hard to distinguish.

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 12.20 m by 6.30 m by 1.16 m (approx.)
DESCRIPTION: Feature A is rectangular shape in plan, with walls of irregular heights, shapes and widths. It is built upon a bedrock outcrop on the northwest and northeast sides. The enclosure contains no opening and has an extension of boulders and cobbles at the southwest exterior corner. This extensions measures c. 3.5 m by 3.0 m.

The northeast and east portion of the northwest wall appears to be bi-faced, rubble-filled, and wider at the base. The remaining walls are lower and stones are heaped rather than carefully placed. Much of the south and west wall structure appears to have been rebuilt.

FEATURE B: Terrace
FUNCTION: Habitation
DIMENSIONS: 17.10 m by 2.40 m by 1.03 m (approx.)
DESCRIPTION: Feature B is a linear terrace oriented c. (N/S) and situated seaward (west) of a linear bedrock outcrop. A small rectangular terrace with a low circular pile in the center adjoins the terrace to the north. The terrace consists of basalt cobbles piled atop bedrock outcrop. The area west of the feature is fairly level and slopes gently towards the beach. A level terraced area is formed that extends inland (east) to the linear outcropping. Except for a few boulders, all the cobbles are quite small, ranging from c. 0.12 m to 0.21 m. Most large cobbles and boulders are gone. The terrace differs slightly in appearance from most prehistoric terraces, this may be a historic garden terrace.

FEATURE C: Platform
FUNCTION: Agriculture
DIMENSIONS: 3.0 m by 2.8 m by 0.76 m maximum height
DESCRIPTIONS: Feature C is constructed of basalt boulders and cobbles stacked in a roughly circular shape around the base of a kiawe tree. The platform surface is flat, with historic rubbish under the surface rocks. Coral is at the base of the feature.

FEATURE D: Platform
FUNCTION: Agriculture
DIMENSIONS: 2.6 m by 2.6 m by 0.45 m (approx.)
DESCRIPTIONS: Feature D is constructed of basalt boulders and cobbles piled in a roughly circular shape around the base of a kiawe tree. Coral is present at the base of the feature and historic rubbish is under the surface rocks. There is evidence of a recent firepit on the east side of Feature D.

FEATURE E: Platform
FUNCTION: Agriculture
DIMENSIONS: 2.6 m by 2.1 m by 0.64 m maximum height
DESCRIPTION: Feature E is constructed of basalt boulders and cobbles stacked in a circular shape and slightly tiered around the base of a kiawe tree. A metal cable is on the surface of the platform; historic rubbish is under the surface rocks; coral is visible at the base of the platform.

FEATURE F: Platform
FUNCTION: Agriculture
DIMENSIONS: 2.70 m by 2.35 m by 0.52 m maximum height
DESCRIPTION: Feature F is constructed of basalt boulders and cobbles stacked in a roughly circular shape around the base of a kiawe tree. The surface is flat and the sides are faced with small, boulder-sized basalt. Beer bottles and cans are on the surface of Feature F; historic rubbish is present under the surface rocks; coral is visible at the base of the platform.

SITE NO.: State: 13580 Tomonari-Tuggle: K-176
PHRI: 672-25
SITE TYPE: Enclosure
TOPOGRAPHY: The terrain consists of coastal plains.
VEGETATION: Kiawe trees, sisal plants, thick dense grass, and false 'ilima.
CONDITION: Fair-good
INTEGRITY: Unaltered-altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation-possible ceremonial
DIMENSIONS: 15.20 m by 14.00 m by 0.80 m (approx.)
DESCRIPTION: Open to the southwest, it is oriented c. NE/SW at 67-70 degrees azimuth. This enclosure is located immediately below SIHP Site 13581 on a slightly-sloping surface.

The southern portion of the enclosure consists of a paved and filled double-boulder alignment that measures c. 7.70 m in length. It is constructed of boulders c. 0.67 m apart and parallel to one another. The area between the boulders is filled with cobbles and pebbles and partially paved at the southwest end. Boulders form the southwest and northeast end of the alignment, enclosing the paved area. The height at the south side is c. 0.74 m, and the height on the north side is 0.44-0.53 m. No midden or coral were seen on the surface of the filled area.

Immediately following the northeast end is an opening c. 0.94 m in width, which may function as an entrance. On the northeast side of the possible entrance is another double-boulder alignment very similar to the previous one just described. The interior has been filled with cobbles and pebbles, with an upright on the north side. There is no sign of midden or coral on the filled surface. This alignment extends c. 4.10 m (NE/SW) in length.

The northeast end of the enclosure follows the bedrock contour. This section is oriented c. east to west, and is also constructed with boulders. The interior between the boulders contains scattered cobbles, pebbles and waterworms. The northeast wall measures c. 8.60 m in length and 0.43 m in width. At the end of the northeast wall are three boulders aligned on the north side, and one boulder on the south side.

South of the northeast wall, at c. 5.25 m, is another parallel boulder alignment oriented c. NE/SW, and linear in shape. It is partially filled with pebbles and cobbles.

The interior width of the enclosure is c. 4.75 m. Coral and midden are present on the interior surface. The east interior corner has two areas of uprights. The north-easternmost area has an upright slab and some basalt boulders, and contains coral and marine shell. The southeasternmost area has a raised pebble platform with an upright. A possible salt cup is present along the northwest interior.

SITE NO.: State: 13581 Tomonari-Tuggle: K-176
(see Appendix C: Selected Photographs)
PHRI: 672-26
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Sisal plants, kiawe trees, false 'ilima, and dense grass.
CONDITION: Fair-good
INTEGRITY: Unaltered-altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 16.3 m at 330 degrees azimuth by 11.90 m. The site complex consists of two walled terraces (Features A and B), a terrace (Feature C), and a wall (Feature D).

A possible C-shape is located c. 10-15 m at 150 degrees from Feature A. The structures are adjacent to each other. Uprights, coral, midden, and 'ili'ili pebbles are visible.

FEATURE A: Walled terrace
FUNCTION: Habitation
DIMENSIONS: 6.00 m by 1.50 m by 0.90 m (approx.)
DESCRIPTION: This walled terrace is linear in shape and oriented c. northwest to southeast. It is situated along a crest of the slope. It is walled along the northwest, northeast, and southeast sides, with the terraced area on the southwest side. Coral, shell midden, 'ili'ili, and a possible salt basin are present within the structure.

The northwest side of the structure contains a boulder (0.78 m in height) at the base of the wall. The interior of the wall consists of stacked cobbles, three to four courses high, on top of the boulder; the exterior is collapsed. The northwest corner extends slightly to the southwest, and appears to have minor collapse as it continues; the interior portion of the wall is level with the soil surface. The northeast portion of the structure appears to have been faced on both the interior and exterior sides, and is stacked seven to eight courses high with cobbles; boulders support the base. There is a cobble alignment extending southwest off the southeast corner of the enclosure that forms another terrace. There is bi-terracing below the structure. Waterworms are present within the construction of the enclosure.

FEATURE B: Walled terrace
FUNCTION: Habitation
DIMENSIONS: 8.50 m by 8.20 m by 1.10 m (approx.)
DESCRIPTION: Feature B consists of a wall (C-shape in plan) that is open to the south, and surrounds a circular terraced area which is paved with 'ili'ili stones. The northwest corner of the structure shares the wall with the Feature A walled terrace.

Feature B is constructed of cobbles stacked five to six courses high. Waterworn basalt has also been placed in certain areas within the construction of the wall. The northwest interior corner of the walled terrace contains a cupboard. The cupboard measures c. 1.05 m in length and 0.85 m in width, narrowing to the northeast. The opening is c. 0.41 m in width. The surface interior of the cupboard contained waterworms and pieces of basalt, coral, Nerita picea and c. 0.07 m of brown silty loam.

A portion of the structure immediately before the cupboard is constructed of piled rocks six to seven courses high, with an upright in the middle. In addition, there are waterworms in front of the structure. The northeast corner of the wall ends abruptly; it is core-filled and slightly collapsed.

The terrace interior has been paved with 'ili'ili pebbles; in the southern half it reaches a thickness of c. 0.08 m. There is a waterworm upright and a fallen waterworm boulder in the center by the edge of the terraced area.

Cobbles line the roughly circular pattern of the terrace following the contour of the raised bedrock surface. On the eastern side of the circular terraced area is a collapsed pile of cobbles with an upright boulder to the south, and a modified area, possibly faced but presently collapsed.

FEATURE C: Terrace
FUNCTION: Habitation
DIMENSIONS: 8.60 m by 7.00 m by 0.45 m (approx.)
DESCRIPTION: Feature C follows the exterior contour of bedrock, which also connects to Features A and B. It consists of two terraces. The terraces are located on the slope that is raised by the natural contour of bedrock.

The first level is immediately below Feature B and the bedrock contour. At the northern corner are two boulders extending toward the bedrock. On top of this bedrock is a broken salt basin. The bedrock continues, forming a semi-circular terrace which has been modified with cobbles and waterworms to fill in the spaces. Midden and coral are present on the surface of the terrace.

Directly below the first terrace and Feature A is the second terrace. The perimeter of the terrace also follows natural bedrock contour, which has been modified by filling in the gaps. Scattered collapsed cobbles from Feature A are on the surface of the terrace. Midden and coral are also present. The northwest corner of the terrace contains a paved cobble area; large century plants are growing in this particular area.

FEATURE D: Wall
FUNCTION: Habitation
DIMENSIONS: 4.20 m by 1.55 m by 0.79 m (approx.)
DESCRIPTION: This wall is irregular in shape and is oriented c. N/S. It is situated c. 10-15 m at 150 degrees from Feature A. The southern end is constructed with cobbles and boulders stacked three to four courses high and core-filled. Waterworn basalt is present in the structure.

The midsection of the wall bends slightly to the east and to the west. This bend forms two curved and possibly protected areas, one along the east side of the wall and one along the west side of the wall. These areas are slightly collapsing, with coral and shell midden present.

SITE NO.: State: 13582 **PHRI:** 672-27
SITE TYPE: Enclosure
TOPOGRAPHY: The area lies between low ridges. The rocky terrain slopes to the south and southwest and consists of exposed bedrock and loose boulders and cobbles.
VEGETATION: Kiawe tree, sisal plant, and grass.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 5.00 m by 4.00 m by 1.00 m (approx.)
DESCRIPTION: This is a small oval-shaped structure, with the long axis oriented northwest to southeast. The enclosure incorporates two large bedrock boulders along the north side. A semi-circular, double-stacked and bi-faced wall abuts the southeast side of the two boulders, curves around to the south, then southwest toward the downslope front of the structure. This wall section averages c. 0.80 m in width, with a maximum interior height of c. 1.0 m. It is constructed of two to six courses of boulders.

Extending along the southwest side and curving toward a low bedrock boulder at the northwest end is an alignment of small to medium boulders to complete the enclosure. The boulders are single-placed, with an overlapping stack in two places. These boulders average c. 0.60 m in width by c. 0.30 m in height. The low bedrock boulder at the northwest end nearly abuts one of the large bedrock boulders at the north end.

The interior surface of the enclosure is of flat soil, and has a slight natural southwest slope. Two small boulders, possibly from the southwest wall, are on the surface and one piece of waterworn coral is near the center. No internal features were visible. A site tag is tied to the interior wall along the east side. The southeast wall and bedrock boulders make a partly natural, partly constructed windbreak. The old railroad bed (SIHP Site 7149) is c. 60 m to the southwest, near the track cut.

SITE NO.: State: 13583 **PHRI:** 672-28
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Dense grass, and kiawe trees.
CONDITION: Poor-good
INTEGRITY: Feature A unaltered; Feature B possibly altered.
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Temporary habitation - probable W.W.II
DESCRIPTION: The overall complex area measures c. 13.0 m (E/W) by 4.0 m (N/S). The site complex consists of a possible W.W. II military type fox-hole (Feature A), and a modified bedrock outcrop (Feature B).

FEATURE A: C-shape
FUNCTION: Temporary habitation / probable W.W.II
DIMENSIONS: 3.00 m by 1.50 m by 0.48 m (approx.)
DESCRIPTION: The C-shape is open to the north and is constructed atop bedrock. It is constructed with cobbles four to five courses high, and overlooks the ocean.

FEATURE B: Modified outcrop
FUNCTION: Temporary habitation
DIMENSIONS: 4.20 m by 2.30 m by 1.00 m (approx.)
DESCRIPTION: Cobbles and waterworms have been stacked or piled to construct a shelter that is oriented c. northeast to southwest. The basalt is stacked at least eight to ten courses high and fills a gap in the bedrock contour that measures c. 0.65 m to 0.70 m. The NW area behind the bedrock is the possible shelter area. At the northeast side of the bedrock, a possibly placed boulder forms a corner and side. There is an alignment of cobbles on the northern bedrock. The remaining portion of the modified structure has collapsed. The remains of cobbles are still seen between the bedrock, but the structure has collapsed to the southwest side.

SITE NO.: State: 13584 Tomonari-Tuggle: K-174
(see Appendix C: Selected Photographs)
PHRI: 672-29
SITE TYPE: Complex (6 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Grass, kiawe tree, and 'ilima.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Ceremonial/ possible burial
DESCRIPTION: The overall complex area measures c. 33.0 m (NW/SE) by 19.60 m (NE/SW). The site complex consists of two platforms (Features A and B), two modified outcrops (Features C and D), and two mounds (Features E and F).

FEATURE A: Platform
FUNCTION: Ceremonial
DIMENSIONS: 14.40 m by 12.80 m by 0.90 m (approx.)
DESCRIPTION: The location of this platform is atop a knoll overlooking the ocean and "Nishimura Bay". This platform is roughly rectangular shape in plan. It is constructed of crudely stacked sub-angular and weathered basalt boulders. The platform is raised on all four sides, with the exception of a c. 3.0 m section on the downslope (west side). Not formally faced, its sides are generally sloping in profile and collapsed in appearance. The platform contains a rough and somewhat uneven boulder surface which slopes seaward. Nine large, elongated, waterworn basalt boulders (measuring c. 0.5 m to 1.1 m in height) and two weathered basalt boulders (measuring c. 0.50 to 0.65 m in height) are set upright on the platform. Seven additional large, elongated, waterworn and weathered basalt boulders are present on or immediately downslope and west of the platform. These may have previously been set upright, but have now collapsed. The smaller waterworn basalt cobbles and boulders are scattered over the platform surface. Several small concentrations of waterworn basalt cobbles are present on the surface of the platform.

Broken fragments of old concrete (possibly a surveyor's benchmark) with the inscriptions "Mahukona," fragments of the name "Joe Kaain...," and the initials "D.K.K." and "K.H." are present on the south side of the platform. A section of metal channel iron, chicken wire, barbed wire, old cans, wooden boards and broken pane glass indicate that

a historic period structure may have been built atop the platform (possibly W.W. II military).

FEATURE B: Platform
FUNCTION: Ceremonial
DIMENSIONS: 5.20 m by 5.00 m by 0.65 m (approx.)
DESCRIPTION: This platform is very roughly square shape in plan. It is constructed of crudely stacked, weathered sub-angular basalt boulders and cobbles. The sides are raised, but not formally faced. The sides are sloping in profile and collapsed in appearance.

The platform surface is rough and uneven. Two rounded waterworn basalt boulders are present on this platform surface. A boulder mound or raised area is present on the inland (east) side of the platform. Metal rings secured into the bedrock are present c. 2.0 m south of Feature B. The poor condition of the platform renders it vague and indistinct.

FEATURE C: Modified outcrop
FUNCTION: Possible ceremonial
DIMENSIONS: 10.50 m by 3.00 m by 0.90 m (approx.)
DESCRIPTION: This modified outcrop is amorphous shape in plan. The bedrock outcrop is modified with weathered sub-angular basalt boulders and cobbles piled on its downslope (west) side. It resembles a crude terrace. The downslope (west) side is raised above the surrounding ground surface, but it is not formally faced. The west side is sloping in profile and collapsed in appearance. The upslope side (east) is roughly level with the surrounding ground surface. Several waterworn basalt boulders and cobbles are present on the modified outcrop surface. Poor condition has rendered it vague and indistinct.

FEATURE D: Modified outcrop
FUNCTION: Indeterminate/possible burial
DIMENSIONS: 7.70 m by 6.20 m by 0.90 m (approx.)
DESCRIPTION: This modified outcrop is amorphous shape in plan. The site consists of basalt boulders and cobbles piled within crevices and openings between large, weathered bedrock boulders. The basalt boulders and cobbles are concentrated in several areas, but also scattered in others. With the exception that it lacks coral fragments, the feature resembles several sites in the Land of Kapaanui (an ahupua'a to the north) found to contain burials.

A faint human-figure petroglyph was noted on a boulder. It measures c. 0.15 m by 0.14 m.

FEATURE E: Mound
FUNCTION: Indeterminate
DIMENSIONS: 2.70 m by 1.90 m by 0.70 m (approx.)
DESCRIPTION: Feature E is roughly oval shape in plan. It is constructed of weathered subangular basalt boulders and cobbles, stacked three to four courses high. The mound is crudely faced on the north, south, and portions of its east sides. The west side is slightly collapsed and contains an uneven surface. Its interior is somewhat lower than its outside edges. Portions of the mound appear to be built on large, weathered bedrock boulders. Several weathered bedrock boulders and collapsed boulder and cobble rubble are present downslope (west) of the mound.

FEATURE F: Mound
FUNCTION: Indeterminate
DIMENSIONS: 2.60 m by 1.54 m by 0.64 m (approx.)
DESCRIPTION: This mound is oval shape in plan and constructed of weathered angular basalt cobbles, stacked atop bedrock. Feature F is oriented southeast and northwest, sloping seaward. The southeast side remains fairly intact, with basalt cobbles stacked three to four courses high. The southwest and southeast sides of the mound are stacked three to four courses high and slope inward.

The mound has an uneven surface. Scattered basalt cobbles (possibly from collapse) lie on the surface of the bedrock at the perimeter of the mound. Additional basalt cobbles are between Features E and F and appear to connect these two features; the distance between the two features is c. 0.70 m.

SITE NO.: State: 13585 PHRI: 672-30
SITE TYPE: Mound
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Grass, 'ilima, and kiawe.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible burial
DIMENSIONS: 1.20 m by 1.00 m by 0.28 m (approx.)
DESCRIPTION: The mound consists of weathered basalt boulders that are placed atop and against bedrock contour on the northeast and southeast sides. The bedrock contour is oriented c. north/south with modifications at both ends. The weathered basalt is used to form a circular pattern or shape.

The west side of the feature contains an upright slab that is supported by basalt cobbles on its west side. There are boulders at the south end that are placed in a semicircular fashion, connecting to the outer perimeter of the bedrock outcropping. The structure is somewhat headstone-like in appearance.

SITE NO.: State: 13586 (*Figure A-4*) PHRI: 672-31
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: The terrain consists of undulating lava flow.
VEGETATION: Kiawe trees, koa'e, 'uhaloa, 'ilima and pasture grasses.
CONDITION: Fair
INTEGRITY: Unaltered-slightly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture/habitation-possible ceremonial/possible burial
DESCRIPTION: The overall complex area measures c. 57.5 m (N/S) by 25.0 m (NW/SE). The site complex consists of a terrace (Feature A), a modified outcrop (Feature B), an alignment (Feature C), a terrace (Feature D), and a mound (Feature E). Portable remains consisting of marine shell midden, a salt pan, artifacts and waterworn uprights are associated with some of the features.

FEATURE A: Terrace
FUNCTION: Agriculture/habitation
DIMENSIONS: 3.00 m by 1.40 m by 0.55 m (approx.)
DESCRIPTION: This short crude terrace is constructed of rounded and angular vesicular boulders. The boulders are stacked two to five courses high, on natural boulder outcropping.

FEATURE B: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 7.00 m by 2.00 m by 0.60 m (approx.)
DESCRIPTION: This feature consists of an area measuring c. 8.0 m (N/S) by 6.0 m (E/W) of natural boulder outcropping with a linear mound measuring c. 1.25 m by 1.00 m, filled with stacked rounded and angular boulders. A cupboard has been constructed by standing three large boulders upright at the southernmost end of this natural outcrop. Within the cupboard are a few marine shell fragments, and a waterworn hammerstone that shows signs of use at both ends.

FEATURE C: Alignment
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m by 2.70 m by 1.05 m (approx.)
DESCRIPTION: This feature consists of two C-shaped alignments. The first C-shaped alignment is smaller and in the northeast. It measures c. 1.2 m by 0.8 m and 0.46 m high. The structure is constructed with large cobbles stacked two courses high on a large natural boulder outcrop. This alignment is constructed on the east (uphill) side of the outcrop, and forms a low circular depression by its juncture with the natural outcrop to the west. A waterworn hammerstone and a possible salt pan were used to form the alignment.

The second C-shaped alignment that adjoins the southeast portion of the boulder outcrop nearly forms an enclosure, which would be ideally suited for habitation as it would be in the lee of the wind. It measures c. 2.50 m by 2.25 m, with heights ranging from 0.30-1.05 m. The alignment is constructed of angular and rounded vesicular basalt cobbles and boulders stacked one to two courses high. Marine shells were present within the second alignment.

FEATURE D: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 9.40 m by 4.75 m by 0.60 m (approx.)
DESCRIPTION: Located c. 13.0 m east of Feature A, this feature is situated on a flat knoll that is the highest point in this site complex. Feature D consists of two terraces. The larger terrace is a crude cobble- and boulder-filled structure that is aligned north to south. It measures c. 9.4 m by 3.0 m, and is 0.6 m high. There is a cupboard located at the south end of the main terrace. The main terrace abuts what appears to be a natural boulder terrace to the east.

The second terrace is smaller and lies c. 0.80 m west of the south end of the main terrace. It measures c. 1.80 m by 1.25 m, and is 0.50 m high. This terrace is constructed of angular and rounded vesicular basalt cobbles and boulders, stacked two to three courses high.

There are a few marine shell fragments located c. 6.0 m southwest of Feature D.

FEATURE E: Mound
FUNCTION: Possible ceremonial/possible burial
DIMENSIONS: 3.20 m by 2.70 m by 0.80 m (approx.)
DESCRIPTION: A somewhat amorphous, mounded pile of cobbles and boulders with a large upright slab and a smaller, fallen waterworn boulder, this mound is set on a bed of natural outcropping located c. 50.0 m at 355 degrees azimuth north of Feature A. It is constructed of angular and rounded basalt cobbles and boulders stacked three to five courses high.

SITE NO.: State: 13587 (*Figure A-5*) PHRI: 672-32
(See Appendix C: Selected Photographs)
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Coastal prehistoric pahoehoe lava flow. Near the top on the southwest side of wide ridge; c. 30 degree slope to the southwest, very rocky with exposed boulders, cobbles, and bedrock outcropping.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

a historic period structure may have been built atop the platform (possibly W.W. II military).

FEATURE B: Platform
FUNCTION: Ceremonial
DIMENSIONS: 5.20 m by 5.00 m by 0.65 m (approx.)
DESCRIPTION: This platform is very roughly square shape in plan. It is constructed of crudely stacked, weathered sub-angular basalt boulders and cobbles. The sides are raised, but not formally faced. The sides are sloping in profile and collapsed in appearance.

The platform surface is rough and uneven. Two rounded waterworn basalt boulders are present on this platform surface. A boulder mound or raised area is present on the inland (east) side of the platform. Metal rings secured into the bedrock are present c. 2.0 m south of Feature B. The poor condition of the platform renders it vague and indistinct.

FEATURE C: Modified outcrop
FUNCTION: Possible ceremonial
DIMENSIONS: 10.50 m by 3.00 m by 0.90 m (approx.)
DESCRIPTION: This modified outcrop is amorphous shape in plan. The bedrock outcrop is modified with weathered sub-angular basalt boulders and cobbles piled on its downslope (west) side. It resembles a crude terrace. The downslope (west) side is raised above the surrounding ground surface, but it is not formally faced. The west side is sloping in profile and collapsed in appearance. The upslope side (east) is roughly level with the surrounding ground surface. Several waterworn basalt boulders and cobbles are present on the modified outcrop surface. Prior condition has rendered it vague and indistinct.

FEATURE D: Modified outcrop
FUNCTION: Indeterminate/possible burial
DIMENSIONS: 7.70 m by 6.20 m by 0.90 m (approx.)
DESCRIPTION: This modified outcrop is amorphous shape in plan. The site consists of basalt boulders and cobbles piled within crevices and openings between large, weathered bedrock boulders. The basalt boulders and cobbles are concentrated in several areas, but also scattered in others. With the exception that it lacks coral fragments, the feature resembles several sites in the Land of Kapaanui (an ahupua'a to the north) found to contain burials.

A faint human-figure petroglyph was noted on a boulder. It measures c. 0.15 m by 0.14 m.

FEATURE E: Mound
FUNCTION: Indeterminate
DIMENSIONS: 2.70 m by 1.90 m by 0.70 m (approx.)
DESCRIPTION: Feature E is roughly oval shape in plan. It is constructed of weathered subangular basalt boulders and cobbles, stacked three to four courses high. The mound is crudely faced on the north, south, and portions of its east sides. The west side is slightly collapsed and contains an uneven surface. Its interior is somewhat lower than its outside edges. Portions of the mound appear to be built on large, weathered bedrock boulders. Several weathered bedrock boulders and collapsed boulder and cobble rubble are present downslope (west) of the mound.

FEATURE F: Mound
FUNCTION: Indeterminate
DIMENSIONS: 2.60 m by 1.54 m by 0.64 m (approx.)
DESCRIPTION: This mound is oval shape in plan and constructed of weathered angular basalt cobbles, stacked atop bedrock. Feature F is oriented southeast and northwest, sloping seaward. The southeast side remains fairly intact, with basalt cobbles stacked three to four courses high. The southwest and southeast sides of the mound are stacked three to four courses high and slope inward.

The mound has an uneven surface. Scattered basalt cobbles (possibly from collapse) lie on the surface of the bedrock at the perimeter of the mound. Additional basalt cobbles are between Features E and F and appear to connect these two features; the distance between the two features is c. 0.70 m.

SITE NO.: State: 13585 **PHRI:** 672-30
SITE TYPE: Mound
TOPOGRAPHY: The terrain consists of sloping coastal plains
VEGETATION: Grass, 'ilima, and kiawe.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible burial
DIMENSIONS: 1.20 m by 1.00 m by 0.28 m (approx.)
DESCRIPTION: The mound consists of weathered basalt boulders that are placed atop and against bedrock contour on the northeast and southeast sides. The bedrock contour is oriented c. north/south with modifications at both ends. The weathered basalt is used to form a circular pattern or shape.

The west side of the feature contains an upright slab that is supported by basalt cobbles on its west side. There are boulders at the south end that are placed in a semicircular fashion, connecting to the outer perimeter of the bedrock outcropping. The structure is somewhat headstone-like in appearance.

SITE NO.: State: 13586 *(Figure A-4)* **PHRI:** 672-31
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: The terrain consists of undulating lava flow.
VEGETATION: Kiawe trees, kosi'e, 'uhaloa, 'ilima and pasture grasses.
CONDITION: Fair
INTEGRITY: Unaltered-slightly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture/habitation-possible ceremonial/possible burial
DESCRIPTION: The overall complex area measures c. 57.5 m (N/S) by 25.0 m (NW/SE). The site complex consists of a terrace (Feature A), a modified outcrop (Feature B), an alignment (Feature C), a terrace (Feature D), and a mound (Feature E). Portable remains consisting of marine shell midden, a salt pan, artifacts and waterworn uprights are associated with some of the features.

FEATURE A: Terrace
FUNCTION: Agriculture/habitation
DIMENSIONS: 3.00 m by 1.40 m by 0.55 m (approx.)
DESCRIPTION: This short crude terrace is constructed of rounded and angular vesicular boulders. The boulders are stacked two to five courses high, on natural boulder outcropping.

FEATURE B: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 7.00 m by 2.00 m by 0.60 m (approx.)
DESCRIPTION: This feature consists of an area measuring c. 8.0 m (N/S) by 6.0 m (E/W) of natural boulder outcropping with a linear mound measuring c. 1.25 m by 1.00 m, filled with stacked rounded and angular boulders. A cupboard has been constructed by standing three large boulders upright at the southernmost end of this natural outcrop. Within the cupboard are a few marine shell fragments, and a waterworn hammerstone that shows signs of use at both ends.

FEATURE C: Alignment
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m by 2.70 m by 1.05 m (approx.)
DESCRIPTION: This feature consists of two C-shaped alignments. The first C-shaped alignment is smaller and to the northeast. It measures c. 1.2 m by 0.8 m and 0.46 m high. The structure is constructed with large cobbles stacked two courses high on a large natural boulder outcrop. This alignment is constructed on the east (uphill) side of the outcrop, and forms a low circular depression by its juncture with the natural outcrop to the west. A waterworn hammerstone and a possible salt pan were used to form the alignment.

The second C-shaped alignment that adjoins the southeast portion of the boulder outcrop nearly forms an enclosure, which would be ideally suited for habitation as it would be in the lee of the wind. It measures c. 2.50 m by 2.25 m, with heights ranging from 0.30-1.05 m. The alignment is constructed of angular and rounded vesicular basalt cobbles and boulders stacked one to two courses high. Marine shells were present within the second alignment.

FEATURE D: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 9.40 m by 4.75 m by 0.60 m (approx.)
DESCRIPTION: Located c. 13.0 m east of Feature A, this feature is situated on a flat knoll that is the highest point in this site complex. Feature D consists of two terraces. The larger terrace is a crude cobble- and boulder-filled structure that is aligned north to south. It measures c. 9.4 m by 3.0 m, and is 0.6 m high. There is a cupboard located at the south end of the main terrace. The main terrace abuts what appears to be a natural boulder terrace to the east.

The second terrace is smaller and lies c. 0.80 m west of the south end of the main terrace. It measures c. 1.80 m by 1.25 m, and is 0.50 m high. This terrace is constructed of angular and rounded vesicular basalt cobbles and boulders, stacked two to three courses high.

There are a few marine shell fragments located c. 6.0 m southwest of Feature D.

FEATURE E: Mound
FUNCTION: Possible ceremonial/possible burial
DIMENSIONS: 3.20 m by 2.70 m by 0.80 m (approx.)
DESCRIPTION: A somewhat amorphous, mounded pile of cobbles and boulders with a large upright slab and a smaller, fallen waterworn boulder, this mound is set on a bed of natural outcropping located c. 50.0 m at 355 degrees azimuth north of Feature A. It is constructed of angular and rounded basalt cobbles and boulders stacked three to five courses high.

SITE NO.: State: 13587 *(Figure A-5)* **PHRI:** 672-32
(See Appendix C: Selected Photographs)
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Coastal prehistoric pahoehoe lava flow. Near the top on the southwest side of wide ridge; c. 30 degree slope to the southwest, very rocky with exposed boulders, cobbles, and bedrock outcropping.

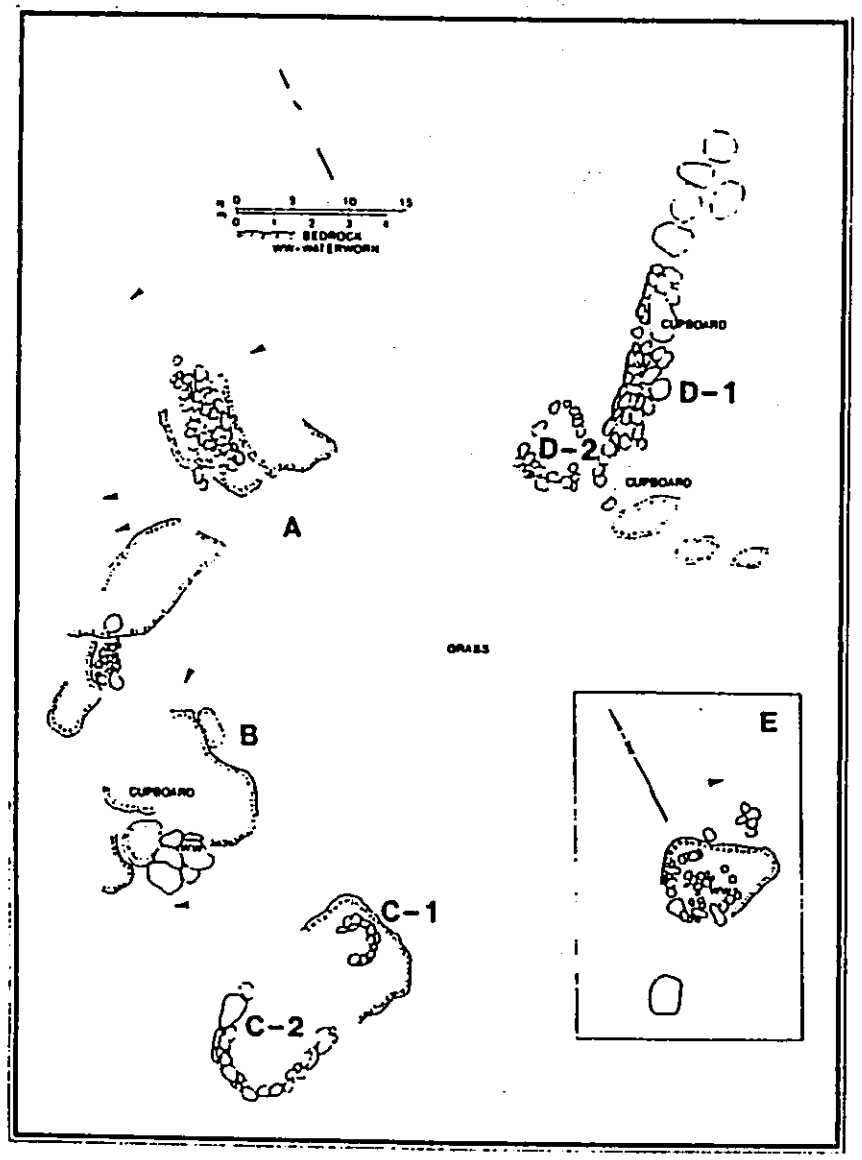


Figure A-4. SITE 13586

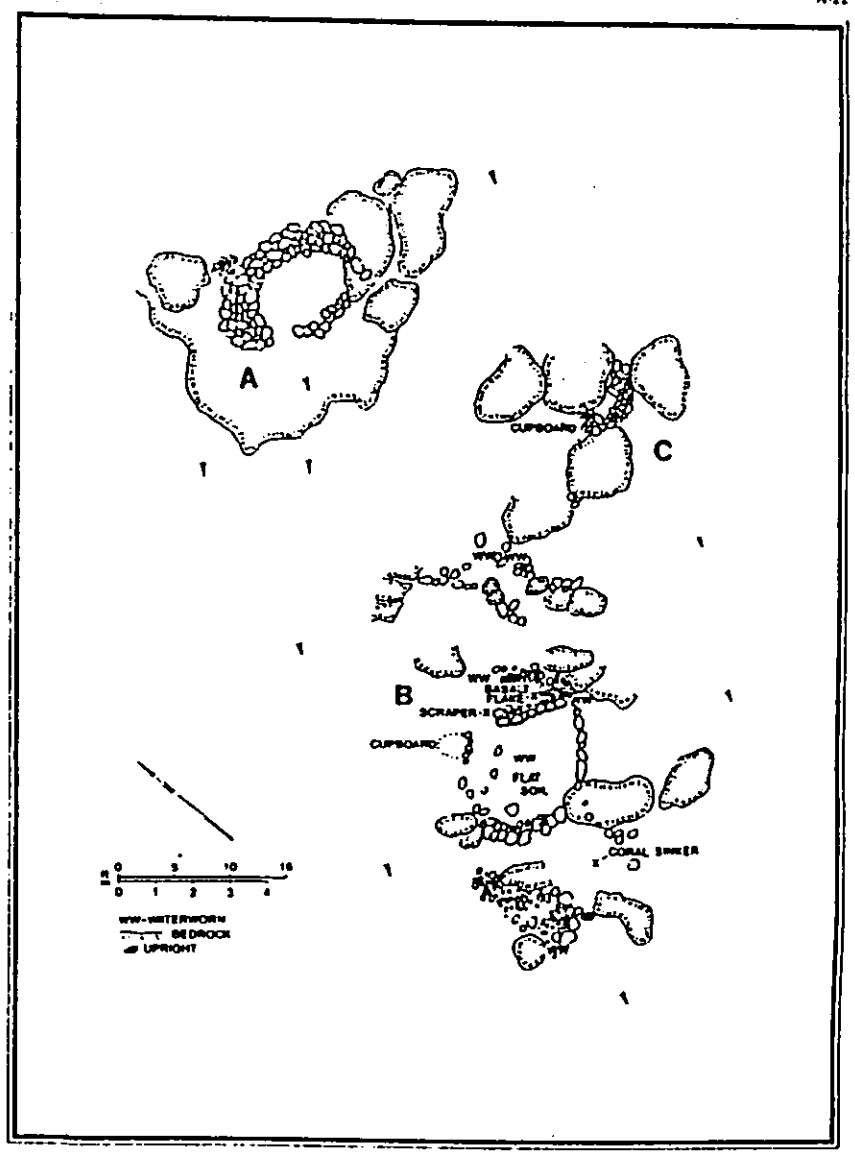


Figure A-5. SITE 13587

VEGETATION: Grasses, kiawe trees, and 'ilima
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation-possible burial
DESCRIPTION: The overall complex area measures c. 21.0 m by 15.0 m. The site complex consists of an enclosure (Feature A), a terraced slope (Feature B), and a cupboard (Feature C). All features are constructed of small to medium pahoehoe boulders and small to large cobbles, incorporating bedrock outcroppings. Marine shell midden, artifacts, waterworn basalt, and coral were present on Feature B, and midden was present on Feature C.

FEATURE A: Enclosure
FUNCTION: Temporary habitation
DIMENSIONS: 4.30 m by 3.25 m by 1.00 m (approx.)
DESCRIPTION: This structure is oval in shape, with the long axis oriented NNW/SSE. The enclosure is constructed of a stacked wall of small pahoehoe boulders with a few large cobbles. The wall averages c. three stones wide at the base, tapering to single boulders at the top. The average width at the base is c. 0.75 m. The wall is stacked one to five courses high, with wall heights of c. 0.4-1.0 m. The wall is roughly vertical along the interior and tapers along the exterior.

The north side of the enclosure is a large bedrock boulder with a single alignment of small boulders placed on top, measuring c. 0.96 m in length. The west side also contains a single alignment of small boulders abutting a medium bedrock boulder to the southwest. The average height of this section is c. 0.35 m. Between the small and large bedrock boulders is a collapsed wall section.

On the west side at the northwest corner is an entrance measuring c. 0.40 m wide. The interior floor surface is of fairly flat and level soil with some wall collapse at the southwest, and exposed bedrock at the northeast; no internal features were noted. There is a vertical bedrock outcropping c. 2.0 m west of the enclosure. This bedrock edge averages c. 1.40 m in height.

FEATURE B: Terraced slope
FUNCTION: Habitation/possible burial
DIMENSIONS: 10.50 m by 7.60 m by 3.25 m (approx.)
DESCRIPTION: Feature B consists of four adjacent terraces oriented E/W and extending downslope. All four are constructed of small to medium pahoehoe boulders with small to large cobbles, and incorporating natural bedrock outcrops. Forming four levels, the uppermost terrace is mostly natural bedrock, primarily along the southern end and at the center. It measures c. 5.35 m by 1.50 m and is c. 1.00 m above the second terrace. Gaps between the bedrock outcroppings and cracks have been filled with small boulders and cobbles. Three large waterworn cobbles were noted in the construction. The central area is collapsed and the surface interior is irregular and roughly level.

The overall dimensions of the second terrace are c. 3.35 m by 3.20 m. It has a stacked, faced retainment on the west and downslope side. The face is of medium and small boulders two to three courses high, with an average height of c. 0.70 m. The south end of the retainment curves to the west to become a single-boulder alignment, extending across the third terrace to a large bedrock boulder at its west side. The remainder of this terrace is bedrock. The stacked area is c. 2.85 m by 1.40 m. A large, worked basalt flake was found on the stacked area. Several waterworn basalt cobbles were used in the construction. A *Cypraeidae* scraper was found on the surface at the base of the terrace retaining wall.

The third terrace has a natural bedrock face at the south end for c. 3.00 m, and also for c. 1.50 m at the north end; small boulders and cobbles are placed in the cracks in the bedrock. The central west side of the terrace has a roughly-faced retainment. It is constructed of medium and small boulders stacked one to three courses high, with an average height of c. 0.65 m. The stacked and filled area of this terrace level measures c. 3.1 m by 1.4 m. The remainder of the terrace surface is natural bedrock and soil, and is fairly flat and level. The terrace surface measures c. 7.6 m (N/S) by 3.7 m.

At the northeast corner of this level is a large bedrock boulder with a cavity/cupboard underneath. The floor surface of this cavity/ cupboard is level with the terrace surface. Six small boulders have been placed around the opening of this natural cupboard. The interior measures c. 0.70 m deep by 0.55 m, and is 0.35 m in height.

The lowest (westernmost) terrace measures c. 5.50 m (N/S) by 3.25 m. This terrace is raised on the west side, with large bedrock boulders on the north and south ends of the retaining wall. A large boulder and small to medium boulders are placed between the bedrock as retainment. One of the medium-sized boulders is upright; the others are stacked one to two courses high with an average height of c. 0.75.

There is a boulder- and cobble-filled area behind the lowest retaining wall, along the northern half. The surface interior of the northern half is irregular and level with exposed bedrock.

The southern half has a cleared soil surface with some fill in a depression next to the bedrock boulder. This surface is flat and level. A coral sinker and several waterworn cobbles were noted on this soil surface.

FEATURE C: Overhang
FUNCTION: Habitation (Cupboard)
DIMENSIONS: 2.50 m by 2.05 m by 0.90 m (approx.)
DESCRIPTION: Feature C consists of low pahoehoe overhang that probably functioned as a cupboard. The interior of the feature measures c. 2.05 m wide (NW/SE) by 1.10 m deep, with the interior height averaging c. 0.40 m. The overhang is open to the west and southwest. South and west of the overhang are two bedrock boulder outcroppings, c. 0.50 m from the overhang opening. Basalt boulders and large cobbles have been placed to fill the spaces between the overhang and the outcropping; some stones are used to form arched areas at either ends of the opening creating a larger cupboard interior.

The boulder/cobble fill continues between the two boulders to form a low wall c. 0.20 m to 0.30 m from the opening. The wall is c. 0.40 m high; the arched stones at the ends of the filled areas ride on this wall and the edge of the overhang at c. 0.60 m. The constructed opening is c. 0.55 (NW/SE) by 0.40 m. There are two waterworn cobbles used in the construction.

SITE NO.: State: 13588 Tomonari-Tuggle: K-173 PHRI: 672-33
SITE TYPE: Mound
TOPOGRAPHY: Flat knoll overlooking coastlines.
VEGETATION: Pasture grasses, 'ubaloa, 'ilima and kiawe trees.
CONDITION: Poor
INTEGRITY: Extensively altered
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 11.50 m by 11.00 m by 1.70 m (approx.)
DESCRIPTION: The mound is constructed with crudely-stacked angular and rounded vesicular basalt, three to four courses high, atop a natural outcrop. A pipe has been set in concrete in the southern portion of the natural outcrop; the number 6 is painted on an adjacent rock.

The site is a probable boundary marker, presently used as a survey marker. It is situated approximately at the division between the Lands of Kou and Kapaanui, at a prominent elevation that can be viewed from all areas.

SITE NO.: State: 13589 PHRI: 672-34
SITE TYPE: Cairn
TOPOGRAPHY: The site is situated atop a wide ridge oriented c. E/W, and located near the west end. The slope is to the west and very rocky, with exposed boulders and cobbles and low-lying bedrock outcroppings.
VEGETATION: Various grasses, kiawe trees, 'ilima and scrub brush.
CONDITION: Poor
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.85 m by 0.75 m by 0.40 m (approx.)
DESCRIPTION: This structure was built on the high point of an exposed bedrock outcrop. The outcrop is about the highest point in the area, and can be seen clearly from downslope to the west. The cairn is constructed of small pahoehoe boulders and large cobbles. It is collapsed, but appears to have been oval shape in plan.

SITE NO.: State: 13590 PHRI: 672-35
SITE TYPE: Modified outcrop
TOPOGRAPHY: The site is situated atop a wide ridge that slopes generally to the west. The terrain is very rocky with exposed boulders, cobbles and bedrock outcroppings.
VEGETATION: Various grasses, 'ilima, scrub brush and kiawe trees.
CONDITION: Poor-fair
INTEGRITY: unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: W.W. II military
DIMENSIONS: 2.25 m by 1.75 m by 0.75 m maximum height (approx.)
DESCRIPTION: This is a small, low bedrock that has been modified simply by the construction of a short wall at the northwest corner of the outcrop. The wall was built by loosely stacking small to medium boulders in a WSW direction for c. 1.3 m to the top of a low bedrock boulder. The boulders are single-stacked to two and three courses high, for a maximum height of c. 0.9 m and an average width of c. 0.35 m. Some large cobbles were also placed in a crack and along the top of the west edge of the outcrop.

SITE NO.: State: 13591 PHRI: 672-36
SITE TYPE: C-shape
TOPOGRAPHY: Lowland pahoehoe lava flow, very rocky with loose boulders, cobbles and exposed bedrock outcroppings.
VEGETATION: Grassland and kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation

DIMENSIONS: 4.40 m by 4.00 m by 1.55 m (apprx.)
DESCRIPTION: This structure is built atop and southwest of a large bedrock outcrop. Light midden, waterworn basalt, and coral were present. The structure is oval shape in plan, with the long axis extending NW/SE. The wall is stacked with small pahoehoe boulders and large cobbles. This boulder/cobble wall extends southeast along the top southwest edge of the outcrop, continues down the southeast side, then northwest below the outcrop, and from there it curves around northeast and back to the base of the outcrop.

The wall section atop the outcrop is curved, with the ends pointing southwest. This section is muliuple-stacked, one to four stones wide, with widths ranging from c. 0.40-0.85 m at the ends. The stones are stacked one to six courses high, with heights ranging from c. 0.30-0.85 m. This section is faced vertically on the interior and tapered on the exterior.

The northeast wall section runs down the side of the outcrop, and was built to fill in gaps and provide additional windbreak. This section consists of small boulders one to four courses high, and follows a 45 degree angle.

The southwest wall section averages c. 1.7 m from the outcrop, is wide, low, and serves as retainment for the interior floor surface. This section is constructed of small boulders with some large cobbles stacked two to three courses high, with average widths of c. 0.85 m and average heights of c. 0.60 m. The southwest edge of this section is roughly-faced.

The northwest wall section is a double alignment of small boulders which abuts the base of the outcrop. There is also an alignment extending southwest from the southwest corner and base of the outcrop. It is constructed of medium to small boulders ending c. 2.5 m at a large bedrock boulder.

There is a low retaining alignment of small boulders and large cobbles running from this boulder to the main enclosure wall at its west corner. This creates another open floor surface that averages c. 1.20 m in width. This smaller floor consists of soil, and it is fairly flat and level with light rubble. The large floor area to the southeast is c. 2.30 m (NW/SE) by 1.40-1.80 m wide. It also consists of a flat and level soil area with much wall collapse and rubble.

The outcrop face is above the main enclosure, is fairly flat and vertical, and c. 1.55 m high. The outcrop is undercut c. 0.75 m at the base near the central area of the floor. The outcrop face is above the small floor area and slopes at c. 45 degrees.

The site tag is on the top of the wall near the center. There is a collapsed cairn on an exposed knoll at a distance of c. 20 m at 125 degrees. This cairn is believed to be a recent land survey marker

SITE NO.: State: 13592 Tomonari-Tuggle: K-177
PIRI: 672-37 *(Figure A-6)*
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Lowland prehistoric pahoehoe lava flow. The site is situated on the south side of an E/W ridge, c. 50 m from the top. The terrain slopes to the SSW and is very rocky, with loose boulders and cobbles and exposed low bedrock outcroppings.
VEGETATION: Grass, kiawe trees and 'ilima.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The overall complex area measures c. 13.0 m (N/S) by 9.0 m (E/W). The site complex consists of a double C-shape (Feature A), and two modified outcrops (Features B and C). All features are constructed of pahoehoe boulders and cobbles. Light marine shell midden, waterworn basalt and coral were visible on the site. In addition, a squared depression was noted on Feature A.

FEATURE A: Double C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 4.40 m by 2.50 m by 1.65 m (apprnx.)
DESCRIPTION: This structure is constructed against and atop the southwest side of a low bedrock outcrop. A double C- or E-shaped wall was built with the long axis oriented c. NW/SE. The southeast section was stacked partially on the edge of the outcrop and partially on large loose boulders broken off the outcrop. The south end of the wall also abuts a low bedrock boulder.

Beginning with the short dividing section of the wall at the center, the wall is built on the bedrock ledge, which continues out to the southwest for c. 2.70 m. The wall continues northwest with a light curve to the northwest edge of the bedrock ledge. The wall is constructed of small boulders and some large cobbles, stacked from three courses at the ends (c. 0.50 m in height) to six courses at the center (interior height is c. 1.15 m). The wall is two to three stones wide at the base, and tapers to a single-stone top. It is faced on both the interior and exterior sides.

The surface of the southeast half is mostly soil with a few imbedded cobbles, slightly irregular, and sloping slightly to the southwest. The surface of the northwest half is mostly

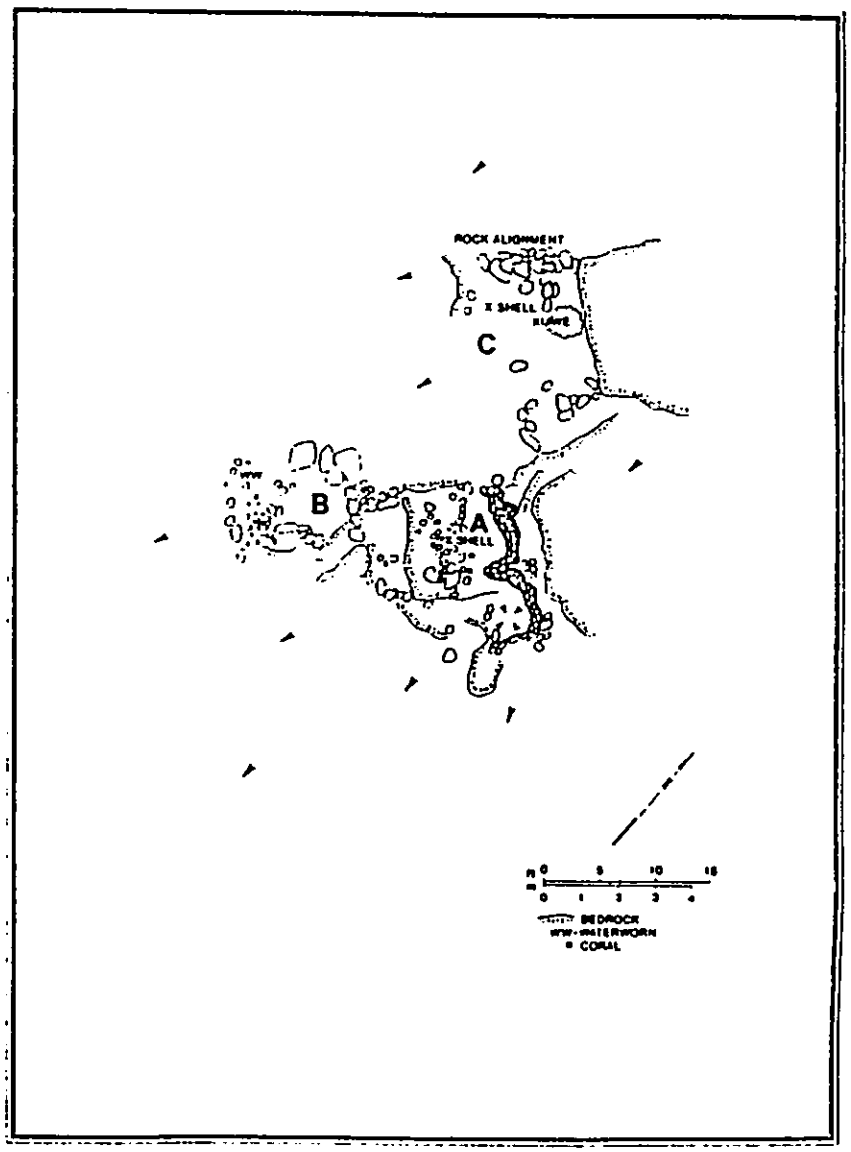


Figure A-6. SITE 13592

bedrock with a small pocket of soil, irregular, and fairly level. On this ledge surface are coral fragments, marine shell, waterworn basalt and the site tag. The southwest half has a cobble scatter.

FEATURE B: Modified outcrop
FUNCTION: Temporary habitation
DIMENSIONS: 5.25 m by 4.50 m by 1.70 m (approx.)
DESCRIPTION: This feature consists of two different levels of an exposed outcrop with simple modifications. The upper level is a narrow ledge southwest of a higher and exposed outcrop ledge. This outcrop ledge is part of the northwest half of Feature A, and averages c. 0.50 m above the narrow upper level of Feature B.

The narrow, upper-level ledge measures c. 4.50 m (NW/SE) by 1.80 m (NE/SW). On the southeast end is a short stone alignment of single boulders and large cobbles, built against the outcrop ledge of Feature A and measuring c. 1.40 m in length by 0.50 m in height. Northwest of the alignment, some cobbles have been loosely piled on exposed bedrock abutting the outcrop ledge (Feature A) in a crack or depression along the southwest edge. Large cobbles and small boulders have been stacked one to three courses high, to the level of the remainder of the narrow ledge. The ledge surface is mostly bedrock, with a thin layer of soil at the base of the uppermost ledge. The surface is irregular with a slight slope to the southwest.

The lower level is situated below and abutting the upper level, and is similar in form. This lower level measures c. 2.70 m (NE/SW) by 2.60 m. The lower level has more soil deposit (c. 0.05 to 0.10 m), but the bedrock is exposed in several places. The surface is fairly flat and level with a slight slope to the southwest. There is a light rubble scatter on the surface.

Along the northeast portion of the lower level, the upper level averages c. 0.75 m in height. On the southeast edge is a rock alignment of small boulders and large cobbles built against the upper level, and measuring c. 1.20 by 0.65 by 0.40 maximum height. At the northwest side are bedrock boulders. One large waterworn cobble and loose subangular basalt cobbles are scattered at the southwest edge. The southwest edge averages c. 0.40 m height.

FEATURE C: Modified outcrop
FUNCTION: Temporary habitation
DIMENSIONS: 4.50 m by 2.50 m by 1.20 m (approx.)
DESCRIPTION: This feature consists of simple modifications on the southwest side of an exposed bedrock outcrop. The outcrop face is roughly straight and vertical, with an average height of c. 1.05 m. At the southwest corner of the outcrop, a small to medium boulder alignment was constructed. The alignment extends southwest for c. 2.35 m. The boulders are loosely stacked two courses high, for an average height of c. 0.40 m and an average width of c. 0.80 m.

At the southeast end of the outcrop there is another boulder alignment extending southwest for c. 1.80 m. These boulders are loosely stacked one to two courses high and wide, for an average height of c. 0.50 m and an average width of c. 0.40 m. The surface southwest of the outcrop is soil with some exposed bedrock. It is fairly flat and sloping to the southwest. No other modifications were noted. A single Cypraeidae fragment was present on the surface.

SITE NO.: State: 13593 PHRI: 672-38 *(Figure A-7) (See Appendix C: Selected Photographs)*
SITE TYPE: Complex (7 Features)
TOPOGRAPHY: Lowland prehistoric pahoehoe lava flow. The site is situated on the upper south side of a wide ridge that slopes southwest to the coast. The terrain is very rocky, with loose boulders and cobbles and exposed outcrops throughout the area.
VEGETATION: Grassland, kiawe, 'ilima, koa-haole and the northern edge of scrub forest.
CONDITION: Fair-good
INTEGRITY: Possibly slightly altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible burial-marker
DESCRIPTION: The overall complex area measures c. 24.0 m (N/S) by 16.0 m (E/W). The site complex consists of four platforms (Features A, C, D and E), a mound (Feature B), a terrace (Feature F), and an upright (Feature G). The upright monuments or markers are very unstable. The stone coloration and lichen growth suggest recent placement.

FEATURE A: Platform
FUNCTION: Possible burial
DIMENSIONS: 7.00 m by 5.50 m by 0.80 m (approx.)
DESCRIPTION: This structure is irregular shape in plan, with the narrow end downslope, and widening upslope. The southwest side is roughly-faced with medium to small boulders, three courses high, to an average height of c. 0.80 m. Boulders continue upslope at the edges of the northwest and southeast sides, gradually diminishing in size about half way up the structure. Near the center of the southwest side, c. 0.90 m from the edge, is a small upright boulder c. 0.60 m in height.

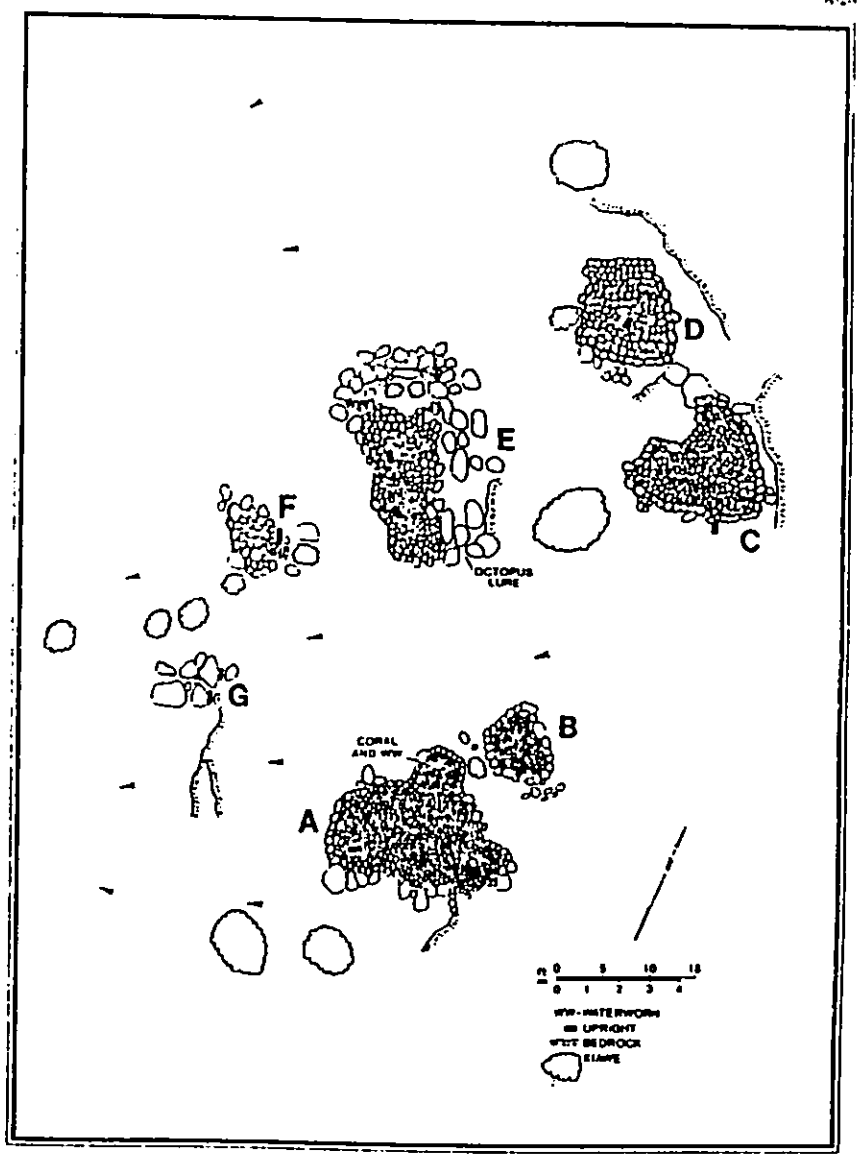


Figure A-7. SITE 13593

The interior of the platform is filled with small boulders and large to medium cobbles. These stones continue to the edges of the upper northeast half, with a few small areas of rough facing. The surface is irregular with an overall southwestern slope. There are two slightly raised linear areas; one is located behind the southwest face and extending northeast for c. 2.20 m by 1.10 m. This mounded area is also behind and north of the upright. The second raised area is in the central third of the platform on the southeast side. It is also oriented southwest to northeast for c. 1.75, and measures c. 1.25 m wide. It is retained by boulders on the southwest and southeast sides.

Northeast of this mounded area, at the eastern corner of the platform, is one of two roughly circular mounded areas; the other is in the northern corner. The eastern mounded area measures c. 1.6 m by 1.6 m. It is constructed of a medium boulder along the east corner and stacked smaller boulders on the northeast side, and its average height is c. 0.55 m. At the top of the mound is a small upright boulder. This boulder stands c. 0.65 m high.

The northern corner contains a raised area consisting of small boulders and large cobbles, c. 0.45 m high. There is a depression in the center which may have held an upright, although no stone is visible. This area measures c. 1.75 (E/W) by 1.55 m (N/S). There is an internal depression in the platform between the ninth and east corner mounds and between the lower of the two linear raised areas. Some of the exposed stones in this depression and on the two upper corner mounds do not show the weathered and darker coloring, suggesting the stones may have been removed to build up the two corner areas. Both standing uprights are very unstable and appear to have been recently placed. Several waterworn basalt cobbles are visible on the surface interior, in addition to three pieces of coral.

FEATURE B: Mound
FUNCTION: Possible burial
DIMENSIONS: 2.50 m by 2.40 m by 1.15 m (approx.)
DESCRIPTION: This structure is circular in shape and semicircular in cross- section. It is constructed of mostly small pahoehoe boulders, with a few medium boulders at the base and some large to medium cobbles. The stones were stacked five to eight courses to a maximum height of c. 1.15 m above the southwest (downslope) side. Stacking appears random though tight, with no internal alignment visible. The site tag was placed at the center of this feature.

FEATURE C: Platform
FUNCTION: Possible burial
DIMENSIONS: 5.00 m by 4.50 m by 1.10 m (approx.)
DESCRIPTION: Feature C is irregular shape in plan. It is constructed partially against the southwest side of a low bedrock outcrop. The south corner is also resting against exposed bedrock and the north corner is built on a large, loose bedrock boulder. All sides are faced, but showing some collapse, with medium to small pahoehoe boulders three to six courses high. The highest face is on the northwest side at c. 1.10 m. There is a large upright at the south corner with a height of c. 0.88 m. The interior is filled with small boulders and large cobbles. The surface is irregular and mounded. There is a boulder alignment, three stones long and high, built on the large bedrock boulder at the north corner.

FEATURE D: Platform
FUNCTION: Possible burial
DIMENSIONS: 4.00 m by 3.50 m by 0.70 m (approx.)
DESCRIPTION: This is a rectangular-shaped structure, almost square, with slightly rounded corners. The long axis is oriented northwest to southeast, and all sides are raised and faced with medium and small pahoehoe boulders, two to four courses high. The maximum height on the downslope southwest side is c. 0.70 m. The interior fill is of small boulders and medium to large cobbles. The surface is slightly irregular and fairly level, with a slight slope to the southwest. The south corner is collapsed. Near the center in the south quadrant is a small upright boulder, lightly supported by upturned cobbles. This marker stands c. 0.40 m high. The upright is unstable and believed to be recently placed. The support stones on the top surfaces are not weathered, and it appears that they came from a small depression immediately to the east. No internal alignments were noted. Only one large waterworn cobble was seen, in the southwest wall.

FEATURE E: Platform
FUNCTION: Possible burial
DIMENSIONS: 7.00 m by 4.50 m by 0.90 m (approx.)
DESCRIPTION: This structure is roughly rectangular shape in plan, with the long axis oriented northwest and southeast. It was constructed against the southwest side of a low, exposed bedrock outcrop. Sections of the northeast edge, the entire northwest edge, and sections of the southeast edge consist of large boulders, some of which may be loose bedrock, and others which appear to have been levered into place. The southwest edge is partially faced with medium to small boulders two to four courses high. The southwest (downslope) wall heights range from c. 0.50 to 0.90 m. The interior fill is of small boulders and small to large cobbles, with an irregular surface which slopes to both ends from the center. There are two small upright boulders placed near the southwest edge. The first one is c. 0.70 m from the

southwest edge and c. 1.40 m northwest from the southeast edge. It stands c. 0.75 m above the platform surface. The second is c. 0.80 m from the southwest edge and c. 3.20 m northwest from the southeast edge. It stands c. 0.65 m high. There is a non-filled area at the northwest end which averages c. 0.80 m wide (NW/SE). The interior of this area is soil. An octopus lure was found at the base of the bedrock at the east corner.

FEATURE F: Terrace
FUNCTION: Possible burial
DIMENSIONS: 2.50 m by 2.00 m by 0.70 m (approx.)
DESCRIPTION: This structure is roughly rectangular in shape, with the long axis oriented northwest to southeast. The terrace is built against the southwest edge of a low bedrock ledge. All three sides of the structure are faced with medium to small boulders placed one to three courses high. The maximum height at the downslope (southwest) side is c. 0.70 m.

The interior is filled with small boulders and small to large cobbles. The surface is irregular and fairly level. At the center of the northeast edge, a boulder has been placed upright as a marker or possible "headstone," and is leaning against the bedrock. This stone stands c. 0.70 m above the terrace surface. It appears recent, as it is unstable and is not apparently as weathered as the terrace.

FEATURE G: Upright
FUNCTION: Possible marker
DIMENSIONS: 3.25 m by 2.50 m by 0.90 m (approx.)
DESCRIPTION: This is a single small pahoehoe boulder which is balanced upright between two boulders, one small and one medium, in a low, exposed bedrock outcrop. Several of the boulders of the outcrop are loose, while the stones upslope to the northeast are solid and imbedded. The upright "faces" downslope to the southwest, and is the farthest downslope feature of the site complex. All possible burial features are behind this marker. The upright stone dimensions are c. 0.38 m by 0.20 m and 0.54 m high. The upright is fairly unstable and can be rocked easily.

SITE NO.: State: 13594 PHRI: 672-39
SITE TYPE: C-shape
TOPOGRAPHY: Lowland prehistoric pahoehoe lava flow. The site is situated on the south side of a wide ridge with a slope to the south and southwest. It is very rocky, with loose boulders and cobbles and many low exposed outcrops.
VEGETATION: Sisal plants, kiawe, grass and koa-haole.
CONDITION: Poor-Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 4.25 m by 3.10 m by 1.20 m (approx.)
DESCRIPTION: This structure is a stacked C-shape wall which opens to the southwest (downslope). The southeast wall is c. 1.0 m longer than the northwest wall.

The wall is constructed of stacked small pahoehoe boulders and large cobbles. The stones are stacked two courses high at the ends and five courses high at the center. The center interior height is c. 1.05 m, and the southeast wall height is c. 0.50 m. The wall is three to four stones wide, with an average width of c. 0.95 m.

The interior of the wall is faced, and the exterior is tapered. The northwest half of the structure is basically collapsed, probably as a consequence of usual plant growth in this area. The interior near the center is fairly flat and level soil. The interior surface of the southwest half is covered with wall collapse.

SITE NO.: State: 13595 PHRI: 672-40 *(Figure A-8)*
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Coastal prehistoric pahoehoe flow. The site is situated on the top of the ridge, but at the lower end. The ridge drops down to the west below the site. It is rocky with exposed outcrops, boulders and cobbles.
VEGETATION: Sisal plants, kiawe, grasses and koa-haole.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation-possible burial
DESCRIPTION: The overall complex area measures c. 20.0 m (E/W) by 12.0 m (N/S). The site complex consists of a platform (Feature A), an enclosure (Feature B) and a C-shape (Feature C). All features are constructed of pahoehoe boulders and cobbles. The site contains waterworn coral and basalt upright boulders.

FEATURE A: Platform
FUNCTION: Possible burial
DIMENSIONS: 2.10 m by 1.60 m by 0.75 m (approx.)
DESCRIPTION: Feature A is irregular to rectangular shape in plan. It is constructed against the west side of a natural bedrock outcrop. The sides are built of boulders one to two courses high, in a rough face with two large uprights at the southwest corner. The interior is filled with medium to large cobbles. The top surface is fairly flat and level. One waterworn cobble was visible on the surface. The site tag is at the center of this feature.

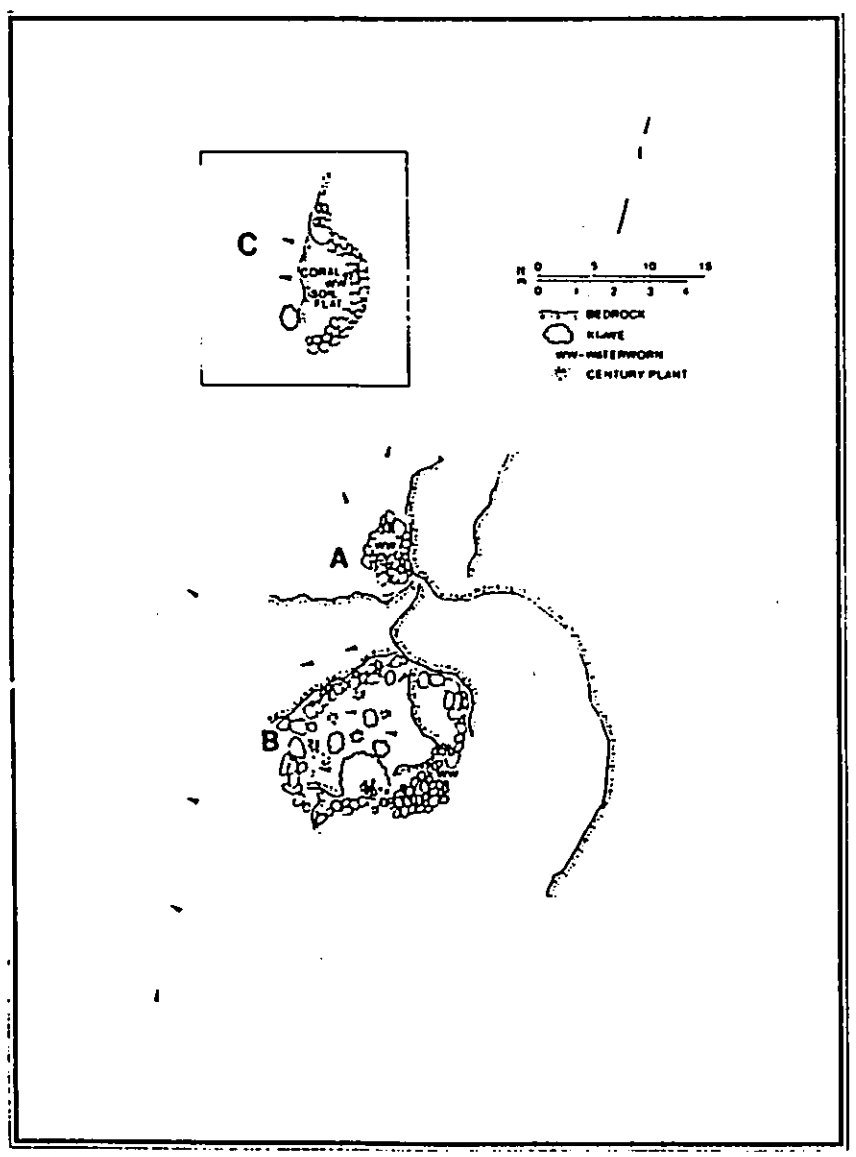


Figure A-8. SITE 13595

FEATURE B: Enclosure
FUNCTION: Habitation
DIMENSIONS: 6.00 m by 4.50 m by 1.70 m (approx.)
DESCRIPTION: This structure is roughly oval in shape, with the long axis oriented northeast to southwest. The enclosure is built against the southwest side of a natural bedrock outcrop, which serves as part of the upslope rear wall. A stacked wall was built below the outcrop of small pahoehoe boulders, with some large cobbles. A section was also constructed in gaps along the top of the outcrop.

The lower wall varies from one to four courses high, with heights ranging from c. 0.15 m at the southwest end to c. 0.60 m at the southeast side. The width varies from one to four stones wide (c. 0.40 m to 0.90 m). The wall section on the top edge of the outcrop also varies from one to two courses high (c. 0.15 m to 0.55 m), and one to three stones wide (c. 0.20 m to 0.55 m). A few water- worn cobbles were noted in the wall.

The surface of the interior is soil on bedrock, sloping to the southwest. There is rubble scatter from wall collapse. A large kiawe, smaller trees, and century plants fill most of the interior; very little floor surface is visible. The wall on the outcrop rises to c. 1.40 m above the interior floor surface.

FEATURE C: C-shape
FUNCTION: Habitation
DIMENSIONS: 2.70 m by 1.75 m by 1.10 m maximum height (approx.)
DESCRIPTION: Feature C is open to the west. It is constructed of a bi-faced wall, two and three courses wide at the base and tapering to single stones at the top. Built of small pahoehoe boulders with some large cobbles, three to seven courses high, the average width at the base is c. 0.80 m. One large waterworn cobble was noted at the base of the wall at the northwest end. The surface interior is flat soil with a slight slope to the west. There is a small group of five pieces of waterworn coral at the east interior floor surface, at the base of the wall.

SITE NO.: State: 13596 PIRI: 672-41
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Lowland prehistoric pahoehoe flow. The immediate terrace consists of a large exposed outcrop that serves as a high point on a ridge which runs NE/SW. The slope below the outcrop is to the southwest.
VEGETATION: Sisal plants, kiawe trees, grasses, 'ilima and koa-haole.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 35.0 m (N/S) by 25.0 m (E/W). The site complex consists of three enclosures (Features A, B and D), a terrace (Feature C), and a cairn (Feature E). All features are constructed of pahoehoe boulders and cobbles.

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 10.00 m by 8.00 m by 1.95 m (approx.)
DESCRIPTION: This structure is built on the southwest and northwest sides of a high, natural bedrock outcrop. It is irregular, but roughly oval shape in plan. The enclosure wall is built of small and medium pahoehoe boulders and large cobbles. The south side of the enclosure is natural bedrock. The wall is crudely stacked, ranging from one stone wide and high (SE side) to double-stacked and five courses high (NW side). The northwest wall is roughly faced on the interior and exterior side. The east wall is built on a ledge of the bedrock outcrop, and the southeast wall is on the top edge of the outcrop. A low area at the south corner may be an entrance or collapse. A large waterworn cobble is on the northwest wall.

The surface of the interior is very irregular with bedrock outcroppings. There are two small, flat areas at the northeast and south sides. In general, the interior slopes to the southwest. No internal features were noted. There is scattered wall collapse and rubble in and around the feature. The site tag is on the west wall.

FEATURE B: Enclosure
FUNCTION: Habitation
DIMENSIONS: 8.00 m by 5.00 m by 0.85 m (approx.)
DESCRIPTION: Feature B is a long oval or a rounded rectangular-shaped structure. The long axis is oriented c. N/S, with the southern end slightly narrower. The enclosure wall is of single- and double-stacked small pahoehoe boulders with some large cobbles. The wall has some interior faced sections, but is mostly collapsed. Some uprights were used in the construction. The south 3.0 m of the east wall is nicely faced, and also serves as retainment for the Feature C terrace. At the north end there is low natural bedrock, with very little wall collapse, that may serve as an entrance.

The interior surface is a brown silty loam with a light rubble scatter of wall collapse. The surface is flat with a slight natural southwest slope. No internal features were noted.

FEATURE C: Terrace
FUNCTION: Habitation
DIMENSIONS: 4.50 m by 3.50 m by 1.50 m (approx.)
DESCRIPTION: This structure is built against the west side of a natural bedrock outcrop. There is a faced retaining wall of small pahoehoe boulders, with some large cobbles built on the downslope (west) side. It is constructed of crudely stacked boulders three to five courses high, with heights of c. 0.65 to 0.80 m. This retaining wall also serves as a wall section of the Feature B enclosure.

At the northeast is a wall section above the terrace which abuts the northwest side of the outcrop. It continues northwest for c. 1.75 m, where it is collapsed. Its maximum height above the terrace floor is c. 1.05 m. This wall may have continued west, out to the front retaining wall, and functioned as an additional wind break for the outcrop.

East of this wall is another construction that is a probable cupboard, using the wall as the west side of the cupboard. Two single boulders are stacked to the east against the outcrop, and three more are stacked in alignment to the north, parallel to the windbreak wall. Large cobbles were stacked at the north end, but have collapsed. The interior measurements are c. 0.70 m (N/S) by 0.35 m (E/W) by 0.50 m deep. The surface is of flat and level soil with some rubble, mainly on the east and west sides. There is also an overhang area, under the outcrop next to the cupboard, measuring c. 0.90 m by 0.70 m, and 0.30 m in height.

FEATURE D: Enclosure
FUNCTION: Habitation
DIMENSIONS: 3.50 m by 2.50 m by 0.65 m (approx.)
DESCRIPTION: This structure is built against the west/southwest side of a natural bedrock outcrop. The enclosure is irregular, slightly ovoid in shape. The enclosure wall is constructed of one medium pahoehoe boulder (south side) and small boulders with large cobbles roughly stacked in a semicircle, with the ends abutting the outcrop. The boulders are stacked one to three courses high and one to four courses wide, with widths ranging from c. 0.40 to 0.75 m. The western wall has collapsed outward. The northeast and north sides of the enclosure are a natural outcrop that is c. 1.30 m high. This outcrop is also incorporated as part of Feature C.

The interior surface of the enclosure is a brown silty loam. It is a flat surface with a slight natural slope to the west, consisting of a scatter of wall collapse. Waterworn coral, light marine shell midden, and waterworn basalt were noted on the surface southwest of the feature.

FEATURE E: Cairn
FUNCTION: Habitation
DIMENSIONS: 1.10 m by 0.85 m by 0.50 m (approx.)
DESCRIPTION: This structure is partially collapsed, but believed to have been roughly circular in shape, and centrally raised in profile. It is constructed of small pahoehoe boulders and large cobbles stacked at least four courses high. Some small slabs that may have been uprights are evident. Several of the cobbles do not appear local.

SITE NO.: State: 13597 PHRI: 672-42 *(Figure A-9)*
(See Appendix C: Selected Photographs)
SITE TYPE: Complex (6 Features)
TOPOGRAPHY: Steep and undulating slope that becomes flat at the southwest. The site is situated along the north and south sides of the gully.
VEGETATION: Kiawe trees, sisal plant, and grasses.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation-agric.
DESCRIPTION: The site complex consists of two walls (Features A and D), an enclosure (Feature B), a terrace (Feature C) and two overhangs (Features E and F). This complex is constructed of angular and rounded vesicular basalt cobbles and boulders stacked on natural outcropping. Extremely dense vegetation may be obscuring additional features within this complex. SIHP 13597 is situated on the north and south sides of the gully.

FEATURE A: Wall
FUNCTION: Agriculture
DIMENSIONS: 35.00 m by 0.80 m by 0.82 m (approx.)
DESCRIPTION: Feature A is roughly L-shape in plan. The east/west portion continues eastward, while the west portion forms a corner and continues south. The north/south section continues c. 28.5 m to SIHP No. 13598.

The east/west wall is interrupted in places and irregular in form. It utilizes the natural terrain and outcroppings. It is constructed of rounded and angular vesicular basalt, stacked (primarily on beds of natural outcrop) 1 to 8 courses high. This cross-slope alignment, free-standing in places, consists mainly of cobbles, boulders, and slabs set on end and placed on the natural outcrop. It appears intermittent in places.

Formally, this feature would be described as a wall; however, parts are actually terraced by uphill (north) soil buildup. It appears that the uphill soil buildup has eroded out from the wall in many places, and now lies downhill.

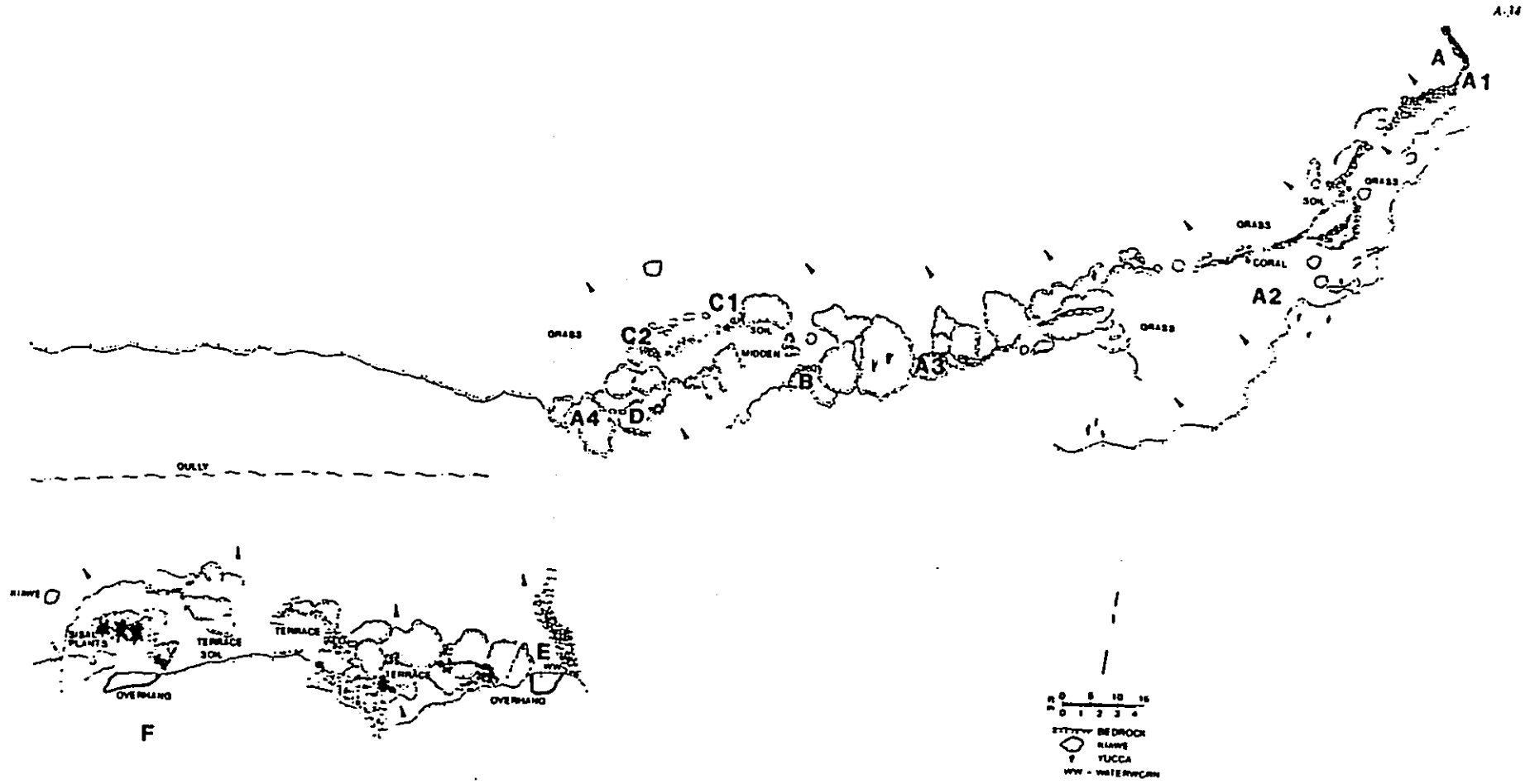


Figure A-9. SITE 13597

While it appears unlikely that the entire wall functioned as a terrace, the direction of the wall which utilizes the natural terrain may have functioned as water diversion for agricultural activities, which may have occurred downslope or to the south of the structure. A widespread concentration of midden, coral, and waterworn pebbles lies c. 10.0 m at 30 degrees azimuth north of the metal site tag, on a flat knoll. This midden is not associated with any remaining structural features nearby, and judging from the levelness of the immediate surrounding area, if prehistoric structures were associated with these remains, it is possible that they may have been destroyed for pasture clearing.

FEATURE B: Enclosure
FUNCTION: Habitation-agriculture
DIMENSIONS: 1.25 m by 0.90 m by 0.57 m (approx.)
DESCRIPTION. This C-shape alignment abuts natural outcrop to the east and west, and has a boulder- and soil-filled floor. It is constructed of angular basalt boulders stacked two courses high.

FEATURE C: Terrace
FUNCTION: Habitation
DIMENSIONS: 6.00 m by 2.00 m by 0.64 m maximum height (approx.)
DESCRIPTION. This feature consists of two short terraces which may continue and join each other; thick vegetation makes this determination difficult. They abut natural outcropping at the east and west ends. The westernmost terrace measures c. 1.25 m (E/W) by 0.8 m (N/S), and the easternmost terrace measures c. 1.3 m (E/W) by 0.6 m (N/S). Both are constructed of angular basalt boulders and cobbles stacked one to two courses high.

There is a leveled, soil-filled area c. 1.0 m west of the western end of Feature C that may have functioned as a cleared habitation area.

FEATURE D: Wall
FUNCTION: Habitation
DIMENSIONS: 3.20 m by 1.20 m by 0.00 m (approx.)
DESCRIPTION: This feature consists of a soil-filled flat area on natural bedrock, with two short wall segments consisting of three small boulders on each side. It is constructed of single-stacked basalt boulders. This location would be ideally suited for habitation. It is possible the stone alignment may have continued to the north to provide shelter and protection from the prevailing winds.

FEATURE E: Overhang
FUNCTION: Habitation
DIMENSIONS: 5.65 m by 1.20 m by 0.38 m (approx.)
DESCRIPTION: This is a bedrock overhang with a wall that is oriented north and south at the east side of the overhang. One waterworn stone is near the top of the wall, close to the outcrop. It is built of stacked, angular basalt cobbles and boulder foundation base stones measuring c. 0.66 m by 0.30 m. There are two large, flat boulders at the extreme north end of the wall.

FEATURE F: Overhang
FUNCTION: Habitation
DIMENSIONS: 1.60 m by 0.60 m by 0.27 m (approx.)
DESCRIPTION: Feature F is an overhang that is walled on the east side of the opening, and has cobble terracing in front of the overhang. It is constructed of angular basalt cobbles, one to two courses high, and extending north from the outcrop.

A long outcrop has walled overhang at each end. Spaces between the large bedrock boulders have cobbled floors. There is a long and narrow terrace from the large bedrock boulders near the east end to the overhang, with a low wall at the west end of the outcrop.

The SIHP Site No. 13599, Feature C wall abuts the Feature F outcrop at c. 2 m to the south.

SITE NO.: State: 13598 Tomonari-Tuggle: K-178
(Fea. A) PIIRI: 672-43 *(Figure A-10)*
(See Appendix C: Selected Photographs)
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Sloping coastal plains.
VEGETATION: False kiawe, dense grass, sisal plants, and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The site complex consists of an overhang (Feature A) and a wall (Feature B). A possible additional overhang is situated slightly south of Feature A. Feature A appears to be a portion of Tomonari-Tuggle Site K-178. Midden, coral and waterworn basalt were present.

FEATURE A: Overhang
FUNCTION: Temporary habitation
DIMENSIONS: 3.00 m by 2.50 m by 3.05 m maximum height (approx.)
DESCRIPTION: The shelter overhang is circular in shape, and is located immediately below the northern end of the SIHP 13599 (672-44) enclosure. The overhang shelter is primarily bedrock. It has been modified with stacked

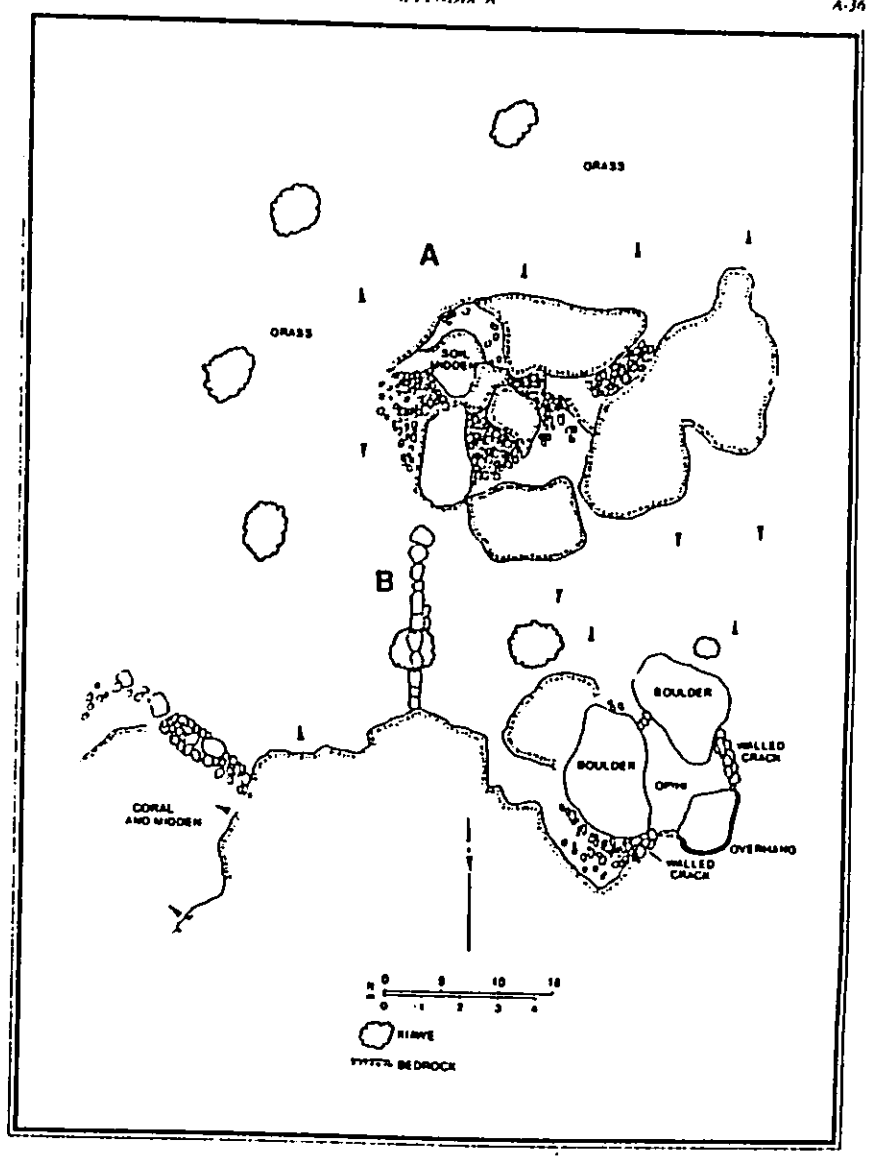


Figure A-10. SITE 13598

cobbles six to seven courses high between the openings and following bedrock contour. The openings that have been filled in are on the east, west and north sides. The overhang is located on the south side of the shelter.

The interior of the shelter is brown silty loam in the middle of the contour of the bedrock with scattered cobbles surrounding the soil. Opihi and other marine shell fragments, kukui nut fragments and coral are on the soil surface. On the exterior eastern side of the stacked cobbles is a paved area.

FEATURE B: Wall
FUNCTION: Temporary habitation
DIMENSIONS: 5.00 m long by 0.50 m wide (approx.)
DESCRIPTION: This feature is situated on the same high outcrop bubble as Feature A. It consists formally of a wall that modifies a bedrock outcrop to create a shelter area. The contour of bedrock makes up the base of the wall which lies upon a decline of slope. The bedrock contour provides shelter at the southeast end.

Feature B is oriented c. northwest to southeast. A wall alignment on the southwest side is constructed with stacked boulders and cobbles three to four courses high on top of bedrock. The northeast corner area is also modified with alignments stacked two to three courses high to fill in the spaces between the outcrops and boulders. A cobble wall alignment extends down the northeast side of the shelter, following the bedrock contour. It consists of boulders and cobbles piled four to five courses high and extends south along the bedrock contour.

SITE NO.: State: 13599 Tomonari-Tuggle: K-178
PHRI: 672-44 *(Figure A-11) (See Appendix C: Selected Photographs)*
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Sisal plants, kiawe trees, and dense grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/possible burial/possible ceremonial-agricultural
DESCRIPTION: The overall complex area measures c. 23.5 m at 352° by 13.5 m. The site complex consists of an enclosure (Feature A), a platform (Feature B) and a wall (Feature C).

FEATURE A: Enclosure
FUNCTION: Temporary habitation/possible burial
DIMENSIONS: 23.50 m by 13.50 m by 1.30 m (approx.)
DESCRIPTION: This enclosure is irregular in shape, with a jog at the northeast corner. This jog in the enclosure surrounds Feature B. The southern end is wide and semicircular, constructed on a fairly flat surface. The northern end becomes narrow and slopes downward.

The enclosure, except for the eastern side, is constructed of cobbles and boulders stacked four to five courses high. The eastern side of the enclosure is stacked seven to eight courses high. Waterworn and coral are present within the construction of the enclosure; midden and coral are present within the interior surface of the enclosure. At the northern and exterior portion of the enclosure is a steep slope descending into a ravine.

FEATURE B: Platform
FUNCTION: Possible ceremonial
DIMENSIONS: 4.60 m by 3.50 m by 0.40 m (approx.)
DESCRIPTION: This platform is circular shape in plan, located within the interior of the Feature A enclosure along the eastern side. The outer perimeter of the feature is constructed of piled pebbles and cobbles on the north, east, and southeast area which joins a contour of bedrock on the south and western side. Cobbles are scattered along the perimeter. The eastern side appears to have collapsed. There is a waterworn present on the east side of the wall.

The interior of the feature measures c. 1.75 m by 1.50 m, and it has been partially paved and filled in on the southern side. The northern side is partially filled and contains scattered cobbles and soil. A large upright stands in the middle (close to the eastern end), with cobbles forming an alignment around the upright. On the western side of the upright lies a complete Cypraeidae and a complete Conidae shell with a broken glass bottle; coral is also present.

FEATURE C: Wall
FUNCTION: Agriculture
DIMENSIONS: 12.25 m by 0.95 m by 1.27 m (approx.)
DESCRIPTION: This wall is built on the highest of the stepped outcrops in an elevated area between two outcrop bubbles/mounds. The wall is constructed with boulders piled one to two courses high, and cobbles three to seven courses high. The retaining wall's function was to keep the soil surface around Feature A from eroding to the bottom of the steep outcrop. There is evidence of much erosion at the bottom of the outcrop, near the south end.

There is a grassy area between Features A and C which slopes gently toward the wall. The point at which the wall is 1.27 m high on the east side has a soil surface within c. 0.6 m of the top of the wall on the west side.

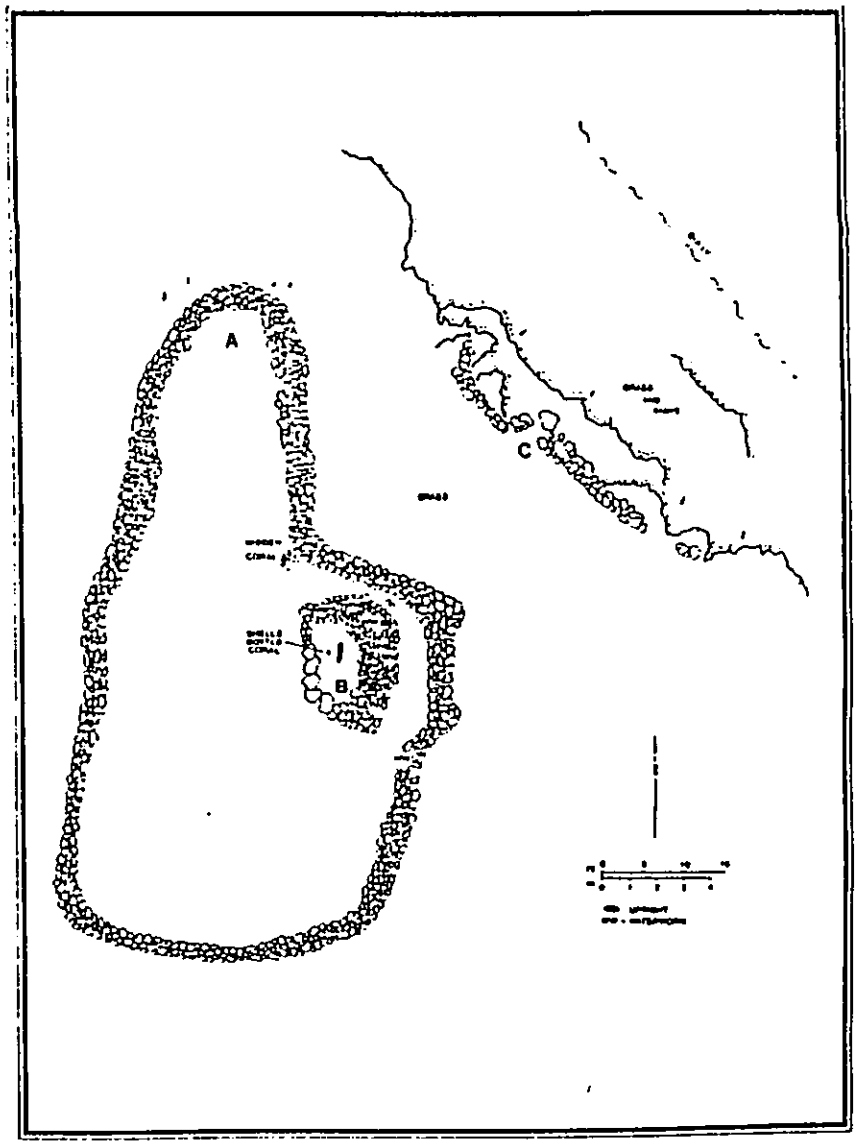


Figure 11. SITE 13599

SITE NO.: State: 13600 PHRI: 672-45
(See Appendix C: Selected Photographs)
SITE TYPE: C-shape
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Sisal plants and fountain grass.
CONDITION: Good
INTEGRITY: Partially altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 5.10 m by 4.20 m by 0.64 m (approx.)
DESCRIPTION: This C-shape is constructed of boulders that make up the base. Cobbles are stacked five to six courses high, built against bedrock along the northwest side. There is an opening to the southwest.

SITE NO.: State: 13601 PHRI: 672-46 *(Figure A-12)*
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: The site sits on a ridge on the north side of a shallow gully meandering east and west. From the site, the terrain slopes gently seaward (makai).
VEGETATION: Grasses and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The overall complex measures c. 62.6 m (E/W) by 24.0 m (N/S). The site complex consists of five features: three enclosures (Features A, C, and D), a wall (Feature B), and a terrace (Feature E). Waterworn basalt and coral were present.

FEATURE A: Enclosure
FUNCTION: Temporary habitation
DIMENSIONS: 18.80 m by 9.45 m by 1.03 m (approx.)
DESCRIPTION: This enclosure is a curved wall roughly following the contour of the bedrock. It is oriented c. NE/SW, with short, straight wall sections at either end, abutting a bedrock outcrop and forming a long enclosure. The enclosure has two long curving walls and two short straight walls. No opening is present in the walls.

The enclosure is constructed of angular basalt boulders and cobbles stacked two to four courses high. It abuts the outcrop at the northwest and southeast ends of the enclosure. A massive bedrock boulder forms the west corner. Boulders and cobbles are placed atop the outcrop, forming the north and west walls of the enclosure. Large cobbles fill the wide cracks in the bedrock. Waterworn basalt and coral are used in the east and west wall. Two waterworn stones are standing upright. The walls are stacked one stone wide at the top, and widening at the base. There are no faced walls. Portable remains consisted of coral and waterworn basalt; no midden was visible on the surface.

FEATURE B: Wall
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m by 1.00 m by 0.80 m (approx.)
DESCRIPTION: This wall extends south from near the midpoint of the bedrock forming the north wall of the Feature A enclosure. The Feature B wall begins at the cobble-filled bedrock crack and continues south for c. 6 m, ending c. 2.0 m before reaching the south enclosure wall (Feature A).

Feature B is constructed of angular cobbles and boulders loosely piled on the sloping bedrock. The wall divides the enclosure into two sections without closing the access between them. One piece of coral was noted on the wall; however, no midden was present on the surface.

FEATURE C: Enclosure
FUNCTION: Temporary habitation
DIMENSIONS: 8.40 m by 5.80 m by 1.30 m maximum height (approx.)
DESCRIPTION: This enclosure sits against a high bedrock outcrop, incorporating the bedrock on three sides. The stacked cobble wall on the south side abuts the outcrop at the northwest end, and terminates c. 0.80 from the bedrock boulders at the southeast end. The cracks between the bedrock boulders are filled to create a closed wall on the east side. Two massive bedrock boulders form the north wall. Access into the enclosure is on the south side.

FEATURE D: Enclosure
FUNCTION: Temporary habitation
DIMENSIONS: 6.20 m by 5.20 m by 0.60 m (approx.)
DESCRIPTION: Feature D is an irregular-sided wall consisting of angular shaped basalt cobbles. The cobbles are crudely stacked two to four courses high to form the wall atop the ground surface. The wall abuts outcrop at the north end. Cobbles are piled one to two courses high on the outcrop for a distance of c. 2.2 m E/W, adjoining bedrock. The enclosure has a fairly level interior surface.

FEATURE E: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 9.00 m by 4.60 m by 1.06 m maximum height (approx.)
DESCRIPTION: This terrace is built around a small bedrock overhang at the top of the north side of a shallow gully. Cobbles have been piled to a height of c. 1.0 m to

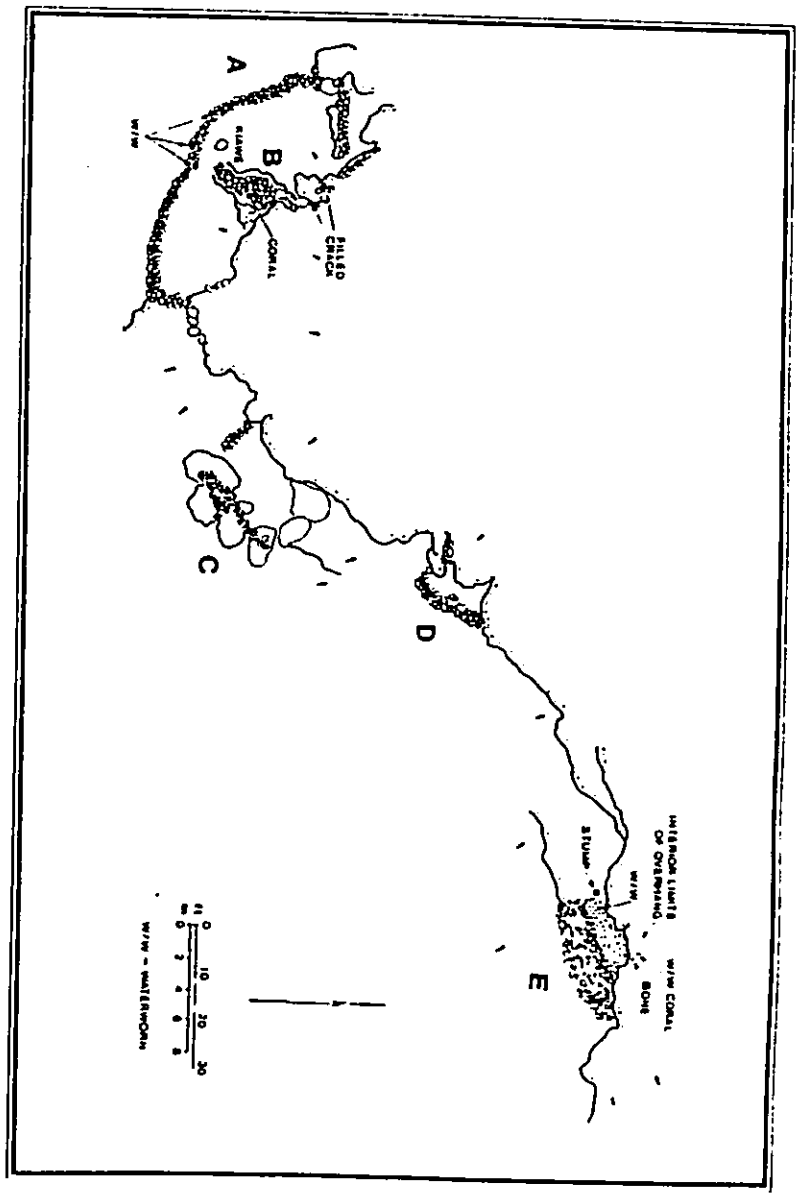


Figure A-12. SITE 13601

form a flat surface in front of the overhang. This flat and level area measures c. 2.0 m by 4.0 m. The area inside and directly in front of the overhang is paved with small cobbles. There is one waterworn stone outside of the overhang near the west end of the opening. Medium to large cobbles are piled on the sloping gully side to create a level surface near the top of the outcrop. One piece of worked or cut bone and waterworn coral were present.

SITE NO.: State: 13602 PHRI: 672-47
SITE TYPE: Enclosure
TOPOGRAPHY: Bedrock outcrops are to the north and east; shallow gully immediately north; bedrock boulders and outcrops south.
VEGETATION: Dense tall grass and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 12.60 m by 8.40 m by 1.35 m (approx.)
DESCRIPTION: This enclosure wall is of angular basalt cobbles and boulders one to five courses high, paralleling a high bedrock outcrop and abutting the outcrop at the east end. Natural crevices in the outcrop have been filled with cobbles. The shelter floor is c. 0.67 m below the bedrock shelf at the east end, and has been leveled with small cobbles and concrete pieces, creating a split-level shelter.

The enclosure wall is constructed with stacked pahochoe boulders, and the wall is faced along the interior. The wall abuts a large bedrock boulder at the east end of the shelter. Cobble-filled crevices and bedrock boulder form the east wall. No cultural deposit was visible, but one may be exist subsurface. Historic rubbish, metal roofing, glass and concrete fragments were present.

SITE NO.: State: 13603 PHRI: 672-48
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: The site consists of an even, gently sloping area of bedrock boulders.
VEGETATION: Dense tall grasses and kiawe trees.
CONDITION: Good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric-historic use
FUNCTIONAL INTERPRETATION: Habitation-indeterminate/possible burial
DESCRIPTION: The overall complex area measures c. 14.5 m (NW/SE) by 9.0 m (NE/SW). The site complex consists of four features: a U-shaped wall (Feature A), two mounds (Features B and C), and a platform (Feature D).

FEATURE A: U-shaped wall
FUNCTION: Habitation
DIMENSIONS: 8.80 m by 7.60 m by 0.85 m (approx.)
DESCRIPTION: This U-shaped wall is faced along the interior. The east wall is curved, and the north wall is irregular-shaped with much collapse. The southeast wall contains one straight wall section and collapse. The walls are constructed of angular basalt and cobbles stacked five courses high. The wall width ranges from c. 0.75-1.00 m, and the heights range from 0.35-0.85 m.

A historic trash pile lies just north of the north wall. A tree c. 12.0 m northwest has a rock pile around its base. Midden scatter is on the surface c. 40.0 m southwest of the feature, and continues to the low bank of the roadway.

FEATURE B: Mound
FUNCTION: Indeterminate
DIMENSIONS: 2.70 m by 1.75 m by 0.89 m (approx.)
DESCRIPTION: Feature B is a triangular mound of basalt cobbles, with one large boulder measuring c. 0.80 by 0.40 m at the top near the center.

FEATURE C: Mound
FUNCTION: Indeterminate
DIMENSIONS: 0.95 m by 0.75 m by 0.35 m (approx.)
DESCRIPTION: Feature C is amorphous in shape, with six to seven cobbles piled on the bedrock outcrop.

FEATURE D: Platform
FUNCTION: Indeterminate/possible burial
DIMENSIONS: 2.50 m by 2.15 m by 0.70 m (approx.)
DESCRIPTION: This platform is rectangular shape in plan. It consists of large cobble walls and small cobble paving at the top, and a small, square depression c. 0.42 m deep near the north edge of the platform. The depression has one large Thaididae shell at the bottom. One piece of waterworn coral is at the southeast corner. The platform is constructed of large cobbles to form retaining walls. The platform interior is cobble-filled and surfaced with small cobbles.

SITE NO.: State: 13604 PHRI: 672-49
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Shallow gullies to the east with the terrain sloping to the southwest.
VEGETATION: Kiawe trees and dense grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Temporary habitation

DESCRIPTION: The overall complex area measures c. 68 m (NE/SW) by 11 m (NW/SE). The site complex consists of two features, both of which are enclosures (Features A and B). They are constructed of boulders and cobbles stacked one to five courses high.

The SIHP Site Nos. 13634 and 13644 (trails) extend west into this site complex. Site 13634 extends into Feature B. Site 13644 extends between Features A and B, and appears as a flat sloping area between the features; it is somewhat road-like in appearance.

FEATURE A: Enclosure
FUNCTION: Temporary habitation
DIMENSIONS: 21.00 m by 15.10 m by 0.87 m (approx.)
DESCRIPTION: Feature A is triangular shape in plan, situated on the west side of the shallow gully, and oriented c. north and south. It is constructed of basalt cobbles and boulders stacked one to four courses high. The east wall of the enclosure follows the top of the gully and is a single boulder alignment. The southwest wall is divided by the outcrop, with cobbles placed on top of the outcrop. The wall continues to the top of the gully, and the enclosure has no visible opening.

One large Conidae shell is visible in the west wall. Shell midden, consisting of cowrie and opihi, and broken glass are on the surface of the west wall.

FEATURE B: Enclosure
FUNCTION: Temporary habitation
DIMENSIONS: 19.00 m by 11.00 m by 0.55 m (approx.)
DESCRIPTION: Feature B is open at the northwest end, where it joins the boulder alignments of SIHP 13634. The interior of the enclosure contains a small terrace extending from the northwest wall. The terrace measures c. 3.0 m by 2.0 m.

The enclosure is constructed of basalt boulders and cobbles two to five courses high on the east, west, and south walls. The short northern wall is a single boulder alignment. The inland (mauka) enclosure wall meets the inland (mauka) boulder alignment of SIHP 13634; the seaward (makai) wall of the enclosure angles toward the seaward (makai) alignment; however, the wall ends c. 2.0 m from the alignment.

No definite cultural deposit or portable remains were visible, but may be present subsurface.

SITE NO.: State: 13605 PHRI: 672-50
SITE TYPE: Enclosure
TOPOGRAPHY: Bedrock outcrops sloping south toward gully.
VEGETATION: Kiawe trees and grasses.
CONDITION: Poor-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 15.00 m by 11.75 m by 0.73 m (approx.)
DESCRIPTION: This is a possible enclosure remnant. The site appears to have been dismantled and reconstructed. While it is mostly prehistoric in construction, there are historic sites in the vicinity.

The wall is roughly C-shaped with two short walls measuring c. 1.15 to 2.00 m, perpendicular to each other and adjoining at the east end of the structure. The eastern section of the enclosure is a single boulder alignment. The north and south walls are loosely piled cobbles. There is one section of bi-faced, rubble-filled wall at the west end. A different wall construction is used at the north wall. A pottery sherd was sighted on the north wall. A cultural deposit may be present subsurface.

SITE NO.: State: 13606 PHRI: 672-51
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: A gully is to the south and bedrock boulders and outcrops are to the north, the western portion has only a few boulders and trees.
VEGETATION: Dense grass and kiawe trees.
CONDITION: Fair-good
INTEGRITY: Appears unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 22.5 m (N/S) by 19.5 m (E/W). The site complex consists of a U-shaped wall (Feature A), a modified outcrop (Feature B), and a C-shaped wall (Feature C).

FEATURE A: U-shaped wall
FUNCTION: Habitation
DIMENSIONS: 22.50 m by 19.50 m by 0.60 m (approx.)
DESCRIPTION: The walls are constructed atop bedrock outcropping. A boulder align-ment extends north from the northwest corner of the structure. The structure has irregular-shaped walls of varying widths. For a length of 5.0 m at the south end, the west wall is faced on both sides.

The wall is constructed of angular basalt cobbles and boulders stacked on the low bedrock outcrop. Two bedrock boulders are incorporated into the short east wall.

FEATURE B: Modified outcrop
FUNCTION: Indeterminate
DIMENSIONS: 2.00 m by 2.00 m by 0.69 m (approx.)

F-46

Medium to large cobbles are arranged in a somewhat circular pattern, one to two courses high, on the low and flat bedrock outcrop. The only portable remains noted were lumber and rusted metal.

FEATURE C: C-shape
FUNCTION: Habitation
DIMENSIONS: 2.50 m by 1.55 m by 0.79 m (approx.)
DESCRIPTION: Feature C is constructed of bi-faced and rubble-filled walls, with basalt cobbles stacked one to five courses high. The immediate terrain consists of a swale to the south, with outcroppings and boulders to the north. Grass and boulders are to the west. An ʻoʻuhi shell, plus historic material (screen and a glass jar top) were noted.

SITE NO.: State: 13607 **PHRI:** 672-52
SITE TYPE: Enclosure
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Thicket of small kiawe trees and high dense grasses.
CONDITION: Good
INTEGRITY: Appears unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture (animal pen)
DIMENSIONS: 11.50 m by 9.10 m by 0.87 m maximum height (approx.)
DESCRIPTION: Roughly square, this enclosure is built upon and abutting bedrock outcrop on the west side. It is constructed of boulders at the base, and cobbles piled and stacked two to five courses high atop bedrock. The northwest corner has a height of c. 0.67 m. The walls are of varying widths, with the cracks between boulders cobble-filled. A short wall extends c. 2.0 m west from the enclosure's west wall. The south wall extends c. 3.0 m east beyond the enclosure, ending on a high bedrock outcropping. The outcrop extends east, crossing a shallow E/W swale, to SIHP 13605. Several places along the outcrop have stones placed between the boulders.

Rusted bedsprings and cans, beer bottles, beverage and pharmaceutical bottles are on the wall and inside the enclosure. No midden or artifacts were seen on the walls or on the soil surface under the tall grass. However, it is possible that portable remains and cultural deposits may be present subsurface.

SITE NO.: State: 13608 **PHRI:** 672-53
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Small kiawe trees and dense high grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 14.00 m (N/S) by 7.25 m (E/W). The site complex consists of a terrace (Feature A) and a platform (Feature B).

FEATURE A: Terrace
FUNCTION: Habitation
DIMENSIONS: 5.00 m by 2.50 m by 0.80 m (approx.)
DESCRIPTION: The west edge of the terrace is confined by large boulders two to three courses high that continue on past the northwest terrace corner for c. 7.5 m, toward SIHP Site No. 13606 (672-51). The location of the terrace is on the north side of the shallow swale or gully running to the culvert under the roadway c. 1.50 m west. The terrace is constructed of boulders and large cobbles stacked two to five courses high, forming the retaining wall on the north, south, and west sides. The east edge of the terrace adjoins the Feature B platform. The terrace is filled with medium-sized cobbles.

FEATURE B: Platform
FUNCTION: Habitation
DIMENSIONS: 7.25 m by 5.75 m by 0.54 m (approx.)
DESCRIPTION: This is a platform of pahoehoe boulders and cobbles stacked on a relatively flat outcrop. A short wall of stacked cobbles extends c. 4.0 m east of the south end of the outcrop. The surface of the platform and parts of the outcrop have been used as a rubbish dump; many bottles and cans cover cobbles on the platform, and obscure exact dimensions.

SITE NO.: State: 13609 **PHRI:** 672-54
SITE TYPE: Terrace
TOPOGRAPHY: Outcrops sloping gently seaward, and small, shallow gullies. Terraces at the bottom of the shallow depression/gully.
VEGETATION: Grasses and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric-historic use
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 8.75 m by 8.65 m by 0.73 m (approx.)
DESCRIPTION: The terrace consists of a V-shaped cobble and boulder wall. The north end is situated upon a flat pahoehoe outcrop. The south side is built along an outcrop. In general, the NE/SW wall consists of boulders and cobbles stacked one to four courses high. The northeast end of the

wall is c. four to five courses high, and abuts an outcrop that is oriented c. east to west. The wall is one course high at the southwest end, creating a level terrace. The E/W wall consists of boulders piled along the outcrop one to two courses high.

The flat pahoehoe outcrop north and northwest of the terrace has bottles and cans covering most of the surface, to a depth of c. 0.25 cm. Under the dense grass on the terrace are numerous bottles and rusty cans. There is no sign of midden or coral on the surface below the thick grass; however, they may be present subsurface.

SITE NO.: State: 13610 **PHRI:** 672-55
SITE TYPE: C-shape
TOPOGRAPHY: The terrain consists of a sloping flow.
VEGETATION: Kiawe trees and grasses.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 2.50 m by 2.50 m by 0.90 m (approx.)
DESCRIPTION: The C-shape is open to the west. The wall consists of cobbles stacked between outcrop boulders. It is constructed of small to large boulders both north and south, and abuts two large boulders forming the bend of the C-shape. The north wall is stacked three boulders high, and the south wall is stacked two boulders high.

SITE NO.: State: 13611 **PHRI:** 672-56
(See Appendix C: Selected Photographs)
SITE TYPE: C-shape
TOPOGRAPHY: The terrain consists of gently sloping outcrop.
VEGETATION: Kiawe trees and dense grasses.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 2.45 m by 2.20 m by 0.62 m (approx.)
DESCRIPTION: This C-shape is open to the northwest. It is situated atop bedrock outcropping. The C-shape is constructed of large pahoehoe cobbles stacked two to four courses high on the north wall, and two courses high on the east and south walls. The north wall extends c. 1.2 m beyond the south wall.

SITE NO.: State: 13612 **PHRI:** 672-99
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The site is situated on the north side of a swale. High, stepped outcrops to the south and east.
VEGETATION: Dense stand of small to large kiawe trees, thick grass and sisal bush with yellow blossoms.
CONDITION: Fair-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation-boundary
DESCRIPTION: The overall complex area measures c. 16.15 m (N/S) by 4.00 m (E/W). The site complex consists of a wall (Feature A) and a terrace (Feature B). The importance of this site increases with its relationship to the site complexes within the vicinity.

FEATURE A: Wall
FUNCTION: Boundary
DIMENSIONS: 9.65 m by 0.61-1.15 m by 0.76 m maximum height (approx.)
DESCRIPTION: The wall is oriented N/S and extends downslope toward the gully. The northernmost two meters have boulder facing and cobble fill. The remainder of the wall has collapsed. A re-stacked section with a single width of boulders is stacked two to four courses high atop the center rubble fill. The re-stacked section measures c. 2.4 m.

The wall appears to have been originally bi-faced and core-filled. At present, sections are stacked basalt boulders and sections are linear-piled rubble. Much wall collapse is on the ground. The wall at the north end was probably higher than at present.

FEATURE B: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 4.50 m by 2.90 m by 0.53 m (approx.)
DESCRIPTION: The terrace consists of small cobbles on top of bedrock at the south end of Feature A. The terrace is sloping to the south, with humus and soil deposit covering most stones on the south end of the terrace. The terrace is constructed of small basalt cobbles measuring c. 0.14 m by 0.10 m and piled 0.33 m from midpoint to the north end of the terrace. There are scattered cobbles and soil on portions of the terrace. Midden, waterworn basalt and coral are also on the surface, with ʻiliʻili on the west side.

SITE NO.: State: 13613 **PHRI:** 672-58
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of sloping inland coastal plains.
VEGETATION: Kiawe trees and grass.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture

DESCRIPTION: The overall complex area measures c. 14.0 m (N/S) by 12.0 m (E/W). The site complex consists of an enclosure (Feature A) and an alignment (Feature B).

FEATURE A: Enclosure
FUNCTION: Agriculture
DIMENSIONS: 14.05 m by 14.00 m by 2.00 m (approx.)
DESCRIPTION: Feature A is rectangular shape in plan. It is a boulder and cobble structure constructed on a slight northern slope. Boulders make up the base of the enclosure. The bi-faced walls are constructed of cobbles and boulders stacked nine to ten courses high at the northwest end of the wall. The northeast corner contains a possible cairn on the corner, possibly modified historically. The west and east sides of the enclosure appear to have been the same height at one time, but are presently collapsed. The east and west walls are also bi-faced. There is a waterworn on the southwest corner. The south wall is severely collapsed. Locating an opening is problematic as a result of the collapse. No midden or coral were noted within the interior or in the holding pen.

FEATURE B: Alignment
FUNCTION: Possible agriculture
DIMENSIONS: 12.00 m by 0.40 m (approx.)
DESCRIPTION: This feature consists of an alignment of boulders and cobbles oriented c. 60 degrees azimuth. It is situated c. 2.0 m south of Feature A, and measures c. 12.0 m long by 0.4 m wide.

SITE NO.: State: 13614 Tomonari-Tuggle: K-181 **PHRI:** 672-59
SITE TYPE: Machine gun emplacement
TOPOGRAPHY: The terrain consists of sloping coastal plain.
VEGETATION: Kiawe trees and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: W.W. II military
DIMENSIONS: 6.50 m by 4.40 m by 0.95 m (approx.)
DESCRIPTION: This site consists of a circular cobble and soil wall surrounding a military gun mount and situated on top of bedrock. It is open to the northwest. A boulder alignment extends from the west corner of the structure and parallels the fenceline; the fenceline is oriented c. 240/60°.

The circular wall is constructed of cobbles and boulders on the northeast side. Boulders make up a good portion of the base, with cobbles stacked four to five courses high. The SSW corner of the structure is a mixture of cobbles, pebbles and soil, with a piece of sheet metal/iron roofing below the structure; it appears that it may have been used to support the structure, or possibly as artillery storage.

At the northwest is the entrance into the interior. It is c. 0.80 m wide and leads to the military gun mount. A steel pipe is positioned from the ground surface to c. 1.02 m in height. It is braced to the ground surface by three partially-buried steel pipes for support. On top of the mount is the area where military guns were placed, with a bar to support the body when in action. The height of the entire mount is c. 1.34 cm.

SITE NO.: State: 13615 **PHRI:** 672-100
SITE TYPE: Complex (15 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Kiawe trees, grasses, 'ihalona, pa'u o hi'iaka, Australian salt bush, 'ilima.
CONDITION: Poor-fair
INTEGRITY: Unaltered-altered
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Habitation-agriculture
DESCRIPTION: The overall complex area measures c. 76.0 m (NW/SE) by 41.0 m (E/W). The site complex consists of two walls (Features A and N), a firepit (Feature B) and 12 mound/platform (Features C to M and O).

FEATURE A: Wall
FUNCTION: Habitation
DIMENSIONS: 13.60 m by 12.00 m by 0.75 m (approx.)
DESCRIPTION: This is the most prominent feature associated with the site complex, consisting of a large U-shaped wall that is open to the south (seaward). The southwest corner of this structure may have been mounded, evidenced by a somewhat circular construction style, although it is presently collapsed. A few waterworn boulders, coral and concreted cobbles are present. It is constructed with angular cobbles and boulders, stacked two to five courses high, but not faced. A few fragments of marine shell and possible salt pans were observed in the area. There is also a recent firepit c. 0.75 m to the east of the southwest corner.

Its location and appearance suggest the remnants of a ceremonial structure. The overall structure appears to have been modified during the historic period for fishing and camping, and it may well have been an enclosure (with a wall enclosing the structure to the south). A small terrace oriented c. 2.00 m (N/S) lies c. 0.75 m west of the east wall of this structure.

FEATURE B: Firepit
FUNCTION: Habitation
DIMENSIONS: 2.00 m by 1.40 m by 0.60 m (approx.)
DESCRIPTION: This is a small, low circular stone alignment. It is constructed of angular basalt boulders, stacked one to two courses high. This appears to be a recent construction made using boulders from the Feature A wall.

FEATURES C through L, and FEATURE O: Platform/mound
FUNCTION: Agriculture
DESCRIPTION: The following features represent circular mound or platform structures that have been constructed around a kiawe tree in the middle. They are basically constructed of angular, vesicular basalt boulders (0.4-0.6 m wide) arranged in a circular manner around the trees, piled to stacked (single to four courses high), and filled with fist-size cobbles. These mounds or platforms appear to be cleared areas for improved pasture grass. Each has a large kiawe tree growing out of the middle. Judging by the construction methods and lack of soil accumulating on the uphill side, it appears that the mounds or platforms are younger than the trees. A recent circular alignment lies c. 2.0 m to the northeast of Feature C.

FEATURE C: Mound
DIMENSIONS: 2.60 m by 1.40 m by 0.26-0.40 m (approx.)

FEATURE D: Platform
DIMENSIONS: 3.00 m by 2.00 m by 0.46-0.53 m (approx.)

FEATURE E: Platform
DIMENSIONS: 3.80 m by 2.20 m by 0.31-0.50 m (approx.)

FEATURE F: Mound
DIMENSIONS: 3.60 m by 1.80 m by 0.30-0.43 m (approx.)

FEATURE G: Mound
DIMENSIONS: 2.40 m by 1.60 m by 0.32-0.43 m (approx.)

FEATURE H: Mound
DIMENSIONS: 3.0 m by 2.80 m by 0.42-0.78 m (approx.)

FEATURE I: Mound
DIMENSIONS: 2.40 m by 1.60 m by 0.50 m (approx.)

FEATURE J: Mound
DIMENSIONS: 3.60 m by 2.20 m by 0.50-0.92 m (approx.)

FEATURE K: Mound
DIMENSIONS: 3.60 m by 2.20 m by 0.20-0.80 m (approx.)

FEATURE L: Mound
DIMENSIONS: 2.00 m by 1.60 m by 0.60-0.80 m (approx.)

FEATURE O: Mound
DIMENSIONS: 2.00 m by 1.20 m by 0.22-0.35 m (approx.)

FEATURE M: Mound
DIMENSIONS: 5.00 m by 3.00 m by 0.40-1.25 m (approx.)
FUNCTION: Indeterminate
DESCRIPTION: Feature M is an amorphous-shaped rubble pile. It appears to be bulldozer push, consisting of several slabs of concrete mortar with basalt cobbles and pebbles. It is situated adjacent to the coastal Jeep road, with historic building material and trash nearby. Upon removing a few of the top stones of this rubble pile, an accumulation of recent historic trash is visible immediately below the surface; historic glass is also present on the surface.

FEATURE N: Wall
DIMENSIONS: 4.00 m by 3.40 m by 0.27 m
FUNCTION: Indeterminate
DESCRIPTION: This is a short wall segment consisting of c. four single boulders oriented E/W and parallel to the direction of the slope, abutting a natural outcrop to the east (inland). This feature may be natural decomposing bedrock.

SITE NO.: State: 13616 **PHRI:** 672-61
SITE TYPE: L-shape
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Fountain grass and kiawe trees.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 7.50 m by 1.60 m by 0.80 m (approx.)
DESCRIPTION: Open to the southwest, it is constructed of boulders that support the base. Cobbles and boulders are stacked haphazardly, and are collapsed in the middle of the structure. The north side of the structure is built up against the bedrock contour. Cobbles and boulders are stacked four to five courses high. The southern end is basically the same construction, but stacked two to three courses high.

SITE NO.: State: 13617 **PHRI:** 672-62
SITE TYPE: Complex (10 Features)
TOPOGRAPHY: The terrain consists of undulating flow.
VEGETATION: Grasses and kiawe trees.

CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The overall complex area measures c. 26.0 m by 23.0 m. The site complex consists of a C-shape (Feature A), six mounds (Features B, E and F, and H to J), and three terraces (Features C, D, and G). Coral, waterworn basalt and shell midden were present on all features.

FEATURE A: C-shape State: 4130
FUNCTION: Temporary habitation
DIMENSIONS: 3.60 m by 3.00 m by 0.65 m (approx.)
DESCRIPTION: Feature A is open to the west (seaward). It is stacked on pahoehoe outcrop, two to four courses and c. 0.60 m high on the east (upslope) side. The C-shape may have been originally closed to the west, but presently all that remains is a single course of stones. The interior floor space of the C-shape lies c. 0.20 m below the natural outcrop to the west.

The C-shape is constructed of angular cobbles and boulders stacked two to four courses high along the east (upslope) side. Judging from the small size, the lack of food midden, and the dense amount of branch coral present, a function other than habitation may be indicated. The prominent location of the structure on a knoll overlooking Lanakahi and the surrounding coastline further suggests another interpretation.

FEATURE B: Mound
FUNCTION: Temporary habitation
DIMENSIONS: 2.70 m by 2.50 m by 0.55 m (approx.)
DESCRIPTION: Circular in plan and partially mounded, it is c. 0.40 m to 0.55 m high and two to three courses high. It is constructed of stacked angular boulders and cobbles. A few large waterworn boulders were used in the construction. The surface of the mound is somewhat flat, with a hole in the center that contains an abundance of coral. However, the presence of coral suggests a possible ceremonial use. Coral is in abundance within a cupboard area; several waterworn boulders were used in the construction of this feature.

FEATURE C: Terrace
FUNCTION: Temporary habitation
DIMENSIONS: 7.50 m by 1.40 m by 0.90 m (approx.)
DESCRIPTION: The terrace is constructed across-slope. It consists of a single boulder alignment commencing at a large boulder outcrop, extending c. 180 degrees south for c. 8.0 m. The terrace blends with and takes advantage of a natural outcrop to form a cross-slope terrace. A few coral fragments were present.

FEATURE D: Terrace State: 4131
FUNCTION: Temporary habitation
DIMENSIONS: 1.50 m by 0.80 m by 0.47 m (approx.)
DESCRIPTION: Feature D is triangular-shaped in plan. It is constructed of angular cobbles and boulders stacked one to two courses high. A coral abrader was present c. 0.40 m to the west. A few pieces of coral were scattered c. 0.50 m downslope. It could not be determined whether the coral abrader is associated with Feature D or the terrace uphill.

FEATURE E: Mound State: 4131
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m by 4.50 m by 0.37 m (approx.)
DESCRIPTION: This is a small, crude cobble and boulder mound which abuts the natural outcrop to the northeast uphill. Similar to the Feature F mound, it is located c. 4.1 m to the northwest and c. 1.5 m southeast of the southeast end of the Feature C terrace. Feature E is constructed of stacked angular boulders. A few shell midden, consisting of Conidae and Cypraeidae, and a coral fragment were visible within 1-2 m downslope of the mound.

FEATURE F: Mound
FUNCTION: Temporary habitation
DIMENSIONS: 3.00 m by 2.30 m by 0.74 m (approx.)
DESCRIPTION: This is a small cobble- and boulder-filled mound which abuts outcropping to the northeast (uphill). It is similar to Feature E, which lies c. 4.1 m to the southeast. Feature F is constructed of rounded and angular cobbles and boulders one to two courses high. A metal washer, #N0100, was located on Feature F. Another metal washer, #N0099, lies c. 3.25 m at 20° north of this one.

FEATURE G: Terrace State: 4132
FUNCTION: Temporary habitation
DIMENSIONS: 8.00 m by 3.50 m by 0.55 m (approx.)
DESCRIPTION: This is a large, crude boulder terrace with an uneven floor, west of Feature D. It is constructed of crudely stacked angular cobbles and boulders. A large cupboard is located in the northeast corner of the structure; it employs a large, c. 0.40 m by 0.50 m, flat, waterworn boulder, balanced over a cleared portion lying below the terrace floor. A cleared area allows access to the area beneath the waterworn boulder from both the east and west.

FEATURE H: Mound
FUNCTION: Temporary habitation
DIMENSIONS: 4.70 m by 1.70 m by 0.36 m (approx.)
DESCRIPTION: Feature H is a collapsed and rounded mound. It is constructed of basalt boulders, single-stacked and arranged in a crudely circular fashion. Coral fragments were nearby. Metal washer #N0156 was located here.

FEATURE I: Mound
FUNCTION: Temporary habitation
DIMENSIONS: 2.50 m by 2.00 m by 0.40 m (approx.)
DESCRIPTION: Feature I is a collapsed mound. It is constructed of angular basalt boulders. A few fragments of shell midden were present within 1.0-2.0 m downslope (south and seaward). The condition of the feature is poor and the integrity is questionable. However, it was given a feature designation because a metal washer (site tag #N0155) was located at the base of this rubble pile.

FEATURE J: Mound
FUNCTION: Temporary habitation
DIMENSIONS: 2.10 m by 1.50 m by 0.56 m (approx.)
DESCRIPTION: Feature J is a low, flat-topped mound. It is constructed of angular boulders, crudely stacked one to two courses high, atop boulder outcropping. Coral fragments were also present.

SITE NO.: State: 13618 PIIRI: 672-13 *(Figure A-13)*
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Undulating and sloping coastal plain.
VEGETATION: Vegetation consists mostly of fountain grass.
CONDITION: Poor-good
INTEGRITY: Unaltered to altered
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The site complex consists of a wall (Feature A), two modified outcrops (Features B and E), a terrace (Feature C) and an enclosure (Feature D). The overall complex area measures c. 32.0 m (NW/SE) by 12.0 m (NE/SW). Midden, coral, and waterworn coral abraders were also present.

FEATURE A: Wall State: 4032
FUNCTION: Habitation
DIMENSIONS: 11.00 m by 9.00 m by 0.80 m (approx.)
DESCRIPTION: The wall is semicircular in shape and constructed atop the bedrock outcrop. It is enclosed along the west side by Feature B. Feature A is situated atop a hill and overlooking 13-14 site complexes.

The enclosure is constructed of cobbles and boulders, in addition to waterworn basalt and coral. It appears to have been previously faced, and seven to eight courses high. However, the structure has collapsed severely. Large boulders appear to be the base of the enclosure. Maximum height of the partially-faced and stacked area is c. 0.80 m at the northwest corner.

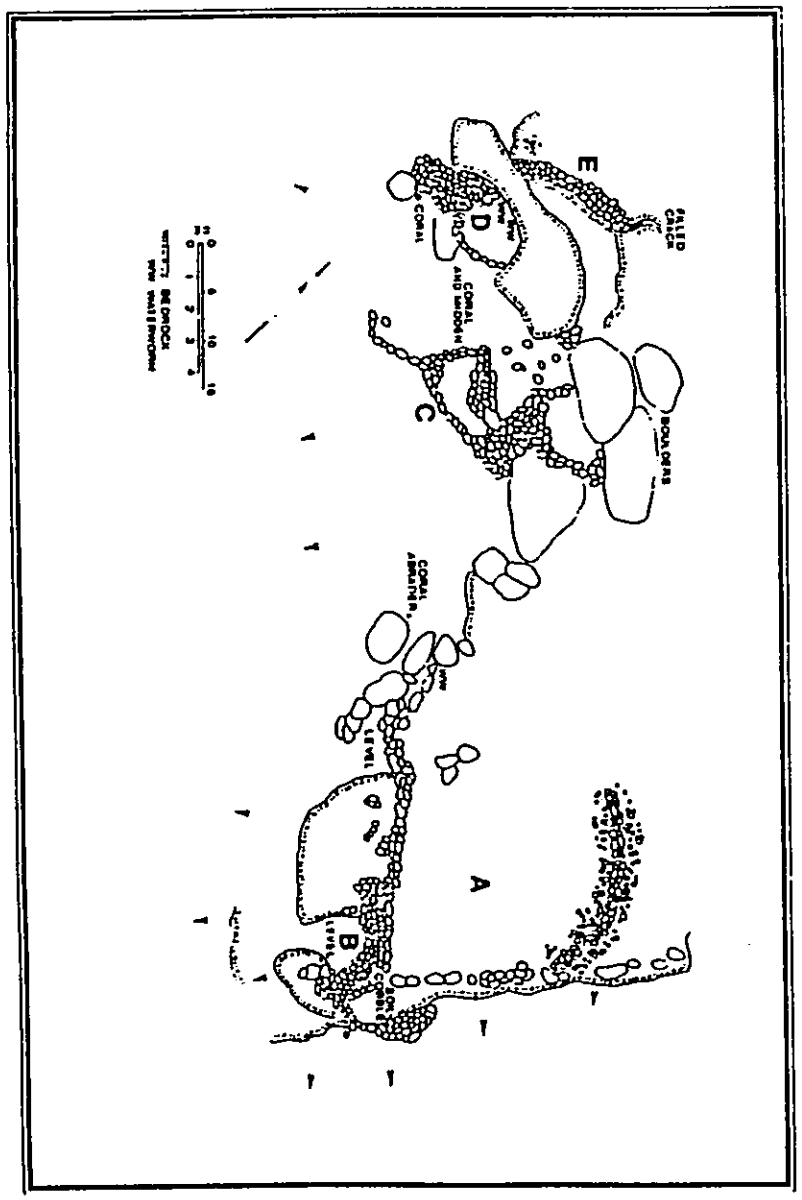
FEATURE B: Modified outcrop State: 4032
FUNCTION: Habitation
DIMENSIONS: 2.5 m by 1.45 m (approx.)
DESCRIPTION: Feature B is oriented c. NW/SE. The SE portion is roughly C-shaped, and measures c. 2.5 m in diameter. It is constructed with cobbles and boulders atop large bedrock outcropping. The middle of the structure is supported by bedrock. It is faced along the interior, and stacked c. nine to ten courses high along the northern end, where it is c. 1.5 m high, as opposed to the east side which is collapsed. The exterior consists of piled boulders and cobbles. Bedrock contour forms the NW and SE ends. An alignment of cobbles is on the south side, piled two to five courses high on bedrock.

Extending NW is a rubble wall, consisting of boulders and cobbles, piled atop bedrock contour. The surface is collapsing slightly; maximum height is 1.3 m. Waterworns are scattered throughout the entire feature.

FEATURE C: Terrace State: 4031
FUNCTION: Habitation
DIMENSIONS: 5.40 m by 3.00 m by 0.55 m (approx.)
DESCRIPTION: Feature C consists of two terraces constructed and supported by the contour of bedrock. Two levels lie in front of enormous bedrock outcrops that are situated along the northern side. The terraces run south and lie directly in front of two enclosures. The first level of terracing consists of cobbles that outline the formation of the terrace. The bedrock contour supports the upper alignment of cobbles, with coral and *Neritia picea* present on the terraced area. The second terrace is on the western side, and is not as large as the first level. Boulders support the edge of the terrace at the base, with cobbles aligned around the perimeter of the boulders. Waterworn basalt is present on both terraces; a thin (0.01 m) gray silty ash and a reddish-brown silty loam were present in and around the terraces.

FEATURE D: Enclosure State: 4031
FUNCTION: Habitation
DIMENSIONS: 2.10 m by 2.00 m by 0.75 m (approx.)
DESCRIPTION: Feature D is circular in shape, with large bedrock outcroppings forming most of the structure. The south and northwest corner of the enclosure have cobbles stacked to fill in the gaps following the bedrock contour. It appears that the whole structure was enclosed, with no openings.

The enclosure is constructed mostly of bedrock, which supports this feature on the east, north and southwest corner.



F-50

Figure A-13. SITE 13618

The southeast side of the feature consists of cobbles stacked four to five courses high, with a single alignment of cobbles running southwest over the top of the bedrock contour. The northwest side has cobbles and pebbles crudely stacked four to five courses high, and meeting the north side of the bedrock. Immediately beyond the perimeter of the NW side are piled boulders and cobbles that have collapsed; collapse also is occurring along the interior. A large chunk of coral is at the end of the collapse; also waterworms are in the collapsed area. The north side of the enclosed bedrock contour consists of cobbles piled in an area to fill in the gap, acting as a windbreak. Extending west are cobbles that have been strewn haphazardly along the bedrock contour. At c. 3.0 m from the enclosure is a pile of cobbles placed over reddish-brown silty loam and supported by bedrock on the north/south side; the gap between soil and placed cobbles is c. 0.43 m in height and c. 0.39 m in length.

FEATURE E: Modified outcrop State: 4033
FUNCTION: Habitation
DIMENSIONS: 3.50 m by 1.50 m by 0.35 m (approx.)
DESCRIPTION: Feature E is a modified outcrop that resembles an enclosure. It is situated immediately adjacent to Feature D, beyond the perimeter of bedrock outcropping. It consists of bedrock on all four sides, with cobble-filled gaps on the south side. A piled cobble alignment lies atop the bedrock on the north side. At the south end of Feature E is an opening which is c. 0.64 m in width, narrowing towards the southern end. Cobbles were piled between this gap, but have collapsed. The north wall has piled cobbles and boulders used to enclose the side and act as a windbreak. Approximately 0.01+ m of decomposed plant material along with cracked macadamia nut shells are on the interior ground surface.

SITE NO.: State: 13619 PIIRI: 672-64
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: The terrain consists of undulating flow.
VEGETATION: Grasses and kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered to partially altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation/-agriculture
DESCRIPTION: The overall complex area measures c. 18.6 m (N/S) by 15.2 m (E/W). The complex consists of a walled terrace (Feature A), a platform (Feature B), a C-shape (Feature C) and two terraces (Features D and E). In addition, numerous previously excavated test units appear throughout the site.

FEATURE A: Walled terrace
FUNCTION: Temporary habitation
DIMENSIONS: 2.00 m by 1.00 m by 0.56 m (approx.)
DESCRIPTION: The terrace is oriented c. 2.0 m north to south, and abuts natural outcropping to the east (uphill). The walled portion of this terrace is constructed of two uprights, c. 0.56 m high, and possibly a third, presently collapsed. An area of c. 2.0 m west (downhill) is filled with boulders. This area slopes downhill and is not level. The uprights are at the highest point of this feature, with the terrace immediately below (downhill).

The walled terrace consists of a stacked wall of upright boulders. The fill portion of the terrace consists of small to large boulders. This feature also includes the area adjacent to Feature B, which appears to have been previously excavated.

FEATURE B: Mound **STATE:** 4724
FUNCTION: Disinterred burial
DIMENSIONS: 2.30 m by 1.20 m by 0.70 m (approx.)
DESCRIPTION: According to Tuggle and Griffin (1973:207 -211) Feature B, mound was previously identified by Rosendahl (1969) as a burial and disinterred by McKenzi in July of 1969. The formal structure of the mound has probably been altered by the excavation and its description is based on its present appearance.

This small mound is delineated from the immediate area to the south, which appears to contain previous excavation units, by a wall consisting of four upright boulders c. 0.47 m high. This wall extends c. 1.55 m (E-W).

Stacked boulders and uprights form the faced west wall. It is filled with cobbles, boulders and pebbles. The filled portion of the platform continues c. 1.35 m to the north where it abuts the natural outcrop. The portion of the site immediately to the south and described with Feature A may have been a platform as well, but appears modified and reconstructed. It is at the location of the previous excavation units.

FEATURE C: C-shape
FUNCTION: Agricultural/habitation
DIMENSIONS: 2.70 m by 1.80 m by 0.60 m (approx.)
DESCRIPTION: This enclosure consists primarily of a natural boulder outcrop. The uphill portion of this structure includes a wall of stacked cobbles, two to five courses and c. 0.43 m high, and set atop a natural outcrop. The downhill portion of the C-shape was formed by constructing an alignment of single- and double-stacked cobbles from one

end of the natural outcrop in a semicircular manner, until the wall joined the natural outcrop at the other end.

The height of the wall which forms the uphill portion of the enclosure stands c. 0.75 m higher than the single- and double-stacked cobble wall downhill. An area measuring c. 1.00 m (N/S) by 0.50 m (E/W) within the inhabitable area of the enclosure appears to have been subject to a previous excavation. Cultural material consisting of shell midden and waterworn pebbles extends from the surface to c. 0.35 m below the surface. The area immediately west of this enclosure may have been a rubble-filled terrace or platform, but the stone appears disturbed.

There is a stone mound to the southwest. Between this stone mound and the excavated interior of the enclosure lies a soil mound presumed to contain material excavated from within the C-shape enclosure, for it contains loose, crumbly soil with shell midden, coral cobbles and waterworn pebbles.

The area between Features B and C is filled with 0.15+ cm of reddish-brown loamy silt that appears suitable for agriculture.

FEATURE D: Terrace
FUNCTION: Agricultural/habitation
DIMENSIONS: 5.00 m by 2.50 m by 0.88 m (approx.)
DESCRIPTION: Feature D consists of an outcrop that has been modified to form a terrace. A section of natural outcrop has a crudely stacked, mostly single-course alignment. It is constructed of cobbles and boulders, with a fairly flat interior surface. This terrace has been soil- filled to the north (uphill). It lies c. 10 m southeast of the Feature A walled terrace.

Shell midden, coral and waterworn cobbles have eroded out from this structure and are visible to the northwest.

FEATURE E: Terrace
FUNCTION: Agricultural/habitation
DIMENSIONS: 4.50 m by 4.50 m by 0.65 m (approx.)
DESCRIPTION: Feature E is located c. 4.0 m west of Feature D. It is constructed of single stacked angular cobbles and boulders. The surface interior is slightly sloped. Shell midden, coral, and basalt are present on and along the northeast end of the terrace.

Feature E and Feature D terraces are separate from the locations of Features A, B and C. Midden remains suggest that habitation was a primary function. Features E and D are situated uphill from the remaining three sites.

SITE NO.: State: 13620 **PHRI:** 672-65
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The top of the wide ridge is a slight slope to the northwest, rocky with exposed boulders and cobbles.
VEGETATION: Grassland and burned kiawe tree.
CONDITION: Fair-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The overall complex area measures c. 15.0 m (N/S) by 7.0 m (E/W). The site complex consists of a platform (Feature A) and two firepits (Features B and C). In general, the site is constructed using local pahoehoe boulders and cobbles, waterworn boulders, cobbles, 'ili'ili pebbles and coral. Marine shell midden and a basalt flake were also present.

FEATURE A: Platform
FUNCTION: Temporary habitation
DIMENSIONS: 14.50 m by 4.00 m by 0.27 m (approx.)
DESCRIPTION: This is a low, roughly rectangular structure built of small pahoehoe boulders and cobbles with a few waterworn cobbles and pebbles; 'ili'ili and coral are used as paving. The long axis is oriented c. NNE/SSW. Small boulders were placed in alignments on all four sides to an average height of c. 0.25 m above the surrounding ground surface. To the north, west, and south sides, alignments appear unbroken.

The east side has two separate alignments visible. The alignment running north from the south side alignment forms a narrower half of the platform than the northern half. There is a gap of c. 1.25 m between the northern and southern halves of the eastern side alignment, which may have been an entrance to the platform.

The surface of the platform is flat and level and has double paving. Large pahoehoe cobbles, with some waterworn cobbles and a few small boulders, are visible throughout most of the platform as placed paving. Above this is a paving of small waterworn cobbles and waterworn pebbles of basalt and coral. The ground surface east of the platform also has a concentration of pebbles and coral, but no boulder alignment or cobble paving are evident. Bulldozer tracks are visible on the paving of the platform, and the area to the east may have been pushed. This area also may have been hand-cleared and lightly paved as a cooking area, in association with Feature B (firepit).

Upon closer inspection, it was observed that the narrow imbedded alignment on the east side continued the entire length to the north side. There is also a five-stone alignment running perpendicular between the two east side alignments, c. 5 m south of the north side.

The southern third of the platform is slightly raised from the rest of the structure, with a slightly angled alignment extending east to west across the platform, c. 9 m south of the north end.

FEATURE B: Firepit (slab-lined)
FUNCTION: Temporary habitation
DIMENSIONS: 0.84 m by 0.84 m by 0.04 m (approx.)
DESCRIPTION: This structure is square, and consists of four linear basalt stones imbedded in the ground, with one to four cm visible above the surface. The pit is aligned NNE/SSW. The exposed area of the north stone is c. 0.62 m by 0.12 m, the east stone is c. 0.36 m by 0.04 m, the south c. 0.60 m by 0.05 m, and the west stone is c. 0.41 m by 0.08 m. The pit is c. 1.00 m east of the eastern side of Feature A at c. 3.25 m from its southern end.

FEATURE C: Firepit (stone lined)
FUNCTION: Temporary habitation
DIMENSIONS: 0.98 m by 0.90 m by 0.08 m (approx.)
DESCRIPTION: This structure is a circular alignment of six pahoehoe stones (four large cobbles, one medium cobble, and one small boulder) imbedded in the ground, with exposed heights of c. 0.02 m to 0.08 m. This structure was placed at the southern end of a small boulder alignment that extends c. 7.0 m to the north along the eastern side of the Feature A platform.

SITE NO.: State: 13621 **PHRI:** 672-66
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The terrain consists of hilly, undulating terrain.
VEGETATION: Grass and kiawe tree.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The overall complex area measures c. 19.0 m (NNE/SSW) by 5.0 m (ESE/WNW). This complex consists of two C-shapes (Feature A and C) and a cairn (Feature B).

FEATURE A: C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 5.00 m by 4.00 m by 0.60 m (approx.)

This feature is a faced, basalt boulder- and cobble-wall C-shape. It is situated on a slight shoulder to the west of a low hill and to the east of a ravine; farther west is a hill within the SIHP 13613. Grass and kiawe dominate.

Feature A is horseshoe shape in plan, with the opening toward the southeast. The east wall is built atop a linear outcrop. The outcrop is modified with three to four courses of basalt cobbles. It is bi-faced and is the more intact portion.

The structure continues across large boulders and/or bedrock outcrops on the northwest end, then becomes more substantial in the west, with basalt cobbles and small boulders slightly faced and piled two to three courses high. Below the west wall is a possible cobble facing, shoring up the east side of a ravine to the west of the site. A loose collection of inset basalt partially encloses this structure at the south end.

FEATURE B: Cairn
FUNCTION: Temporary habitation
DIMENSIONS: 0.50 m by 0.50 m by 0.47 m (approx.)
DESCRIPTION: Feature B consists of two courses of stacked basalt. It is situated on a shoulder of a hill in undulating terrain. The structure is constructed using a 0.5 m basalt boulder with a large cobble stacked on top. A brown, silty clay loam is present in the area.

FEATURE C: C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 3.20 m by 2.30 m by 0.52 m (approx.)
DESCRIPTION: Feature C is a partially collapsed, basalt cobble and small boulder C-shape. A partially depressed, excavated area is somewhat centered on the bedrock of the structure. It is surrounded by piled cobbles and small basalt boulders, in a C-shape, with a small faced area on the eastern portion. A slight soil surface consisting of a brown, silty clay loam exists in the depressed area, with bedrock borders and margins, on which the C-shape is piled.

SITE NO.: State: 13622 **PHRI:** 672-67
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The site is situated on the top of a low ridge, with a slight slope to the southwest.
VEGETATION: Grass, with burned and alive kiawe trees and 'ilima.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible burial
DESCRIPTION: This complex consists of two stone platforms (Features A and B). The overall measurements

are c. 7.5 m (N/S) by 6.0 m (E/W). It is constructed of small pahoehoe boulders and large cobbles. Coral, 'ili'ili, and marine shell midden are also present on site.

FEATURE A: Platform
FUNCTION: Possible burial
DIMENSIONS: 4.50 m by 3.00 m by 0.50 m (approx.)
DESCRIPTION: This structure is roughly rectangular shape in plan. It is constructed of single- and double-stacked, small to medium size pahoehoe boulders. All four sides consist of rough facing. The higher and downslope sides are c. 0.40 m in height.

The surface interior is filled with medium to large cobbles, with a few small boulders. There are also some waterworn cobbles in the fill. The surface is irregular and level with a slight slope to the north. The corners are slightly rounded, with the long axis oriented northwest to southeast. The ground surface between the features and c. ±5.0 m downslope to the southwest has a scatter of beach rubble. The site tag is located on the south corner.

FEATURE B: Platform
FUNCTION: Possible burial
DIMENSIONS: 3.20 m by 2.10 m by 0.40 m (approx.)
DESCRIPTION: This is a linear, roughly rectangular structure with tapering ends. The long axis is oriented ENE/WSW. The side walls are faced with a single to double layer of small pahoehoe boulders. The interior is filled with large cobbles, with a few waterworns. The surface is slightly irregular and level.

SITE NO.: State: 13623 PHRI: 672-68 *(Figure A-14)*
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The terrain consists of bedrock outcrops. A gully is on the southeast side of the site; Feature B is located at the bottom of the gully; Feature C is on the northwest gully slope.
VEGETATION: Kiawe trees, sisal and high grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 22.5 m (NE/SW) by 18.0 m (NW/SE). The site complex consists of an enclosure (Feature A) and two terraces (Features B and C). This complex is situated on the west side of a N/S swale c. 80 m south of SIHP 13624 (PHRI 672-69). Coral, 'ili'ili, and shell midden are present on site.

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 22.50 m by 18.00 m by 1.40 m (approx.)
DESCRIPTION: The Feature A enclosure is roughly triangular in shape. Wall widths range from 0.40-0.80 m; interior heights are 0.40-0.70 m; exterior heights are 0.30 -1.40 m.

The east wall of the enclosure lies along the outcrop at the top of the swale, which has been walled two to five courses high on the bedrock. The west and south walls are constructed of boulder bases, incorporating bedrock at several points. The south wall is undulating and irregular. The west wall curves and angles to meet massive bedrock boulders near the gully/swale edge, connecting with the north end of the east wall.

A section measuring c. 7.8 m by 3.7 m from the southeast wall of Feature A to the bottom of the swale has been confined by boulders into a sloping terrace (Feature B). Two to three large boulder overhangs have been paved with pebbles, and have small pieces of waterworn coral. The coral is on the terrace and in the south wall.

There is no visible entrance or opening in the enclosure walls. In general, the walls are constructed with two to five courses of angular basalt cobbles, stacked on the soil surface and areas of flat outcropping. Large to massive bedrock boulders are filled in with cobbles to form the northeast corner wall. Coral and sparse marine shell midden were visible. The feature is in good condition, with no visible collapse of walls.

FEATURE B: Terrace
FUNCTION: Habitation
DIMENSIONS: 7.00 m by 4.00 m by 0.76 m (approx.)
DESCRIPTION: This is a terrace with two small possible shrines. Feature B is situated on the north slope of the gully below the south wall of Feature A. The portion from the wall to the slope of the gully has been terraced with angular cobbles. Two large boulders on the east wall overhang the terrace. The area below and in front of the overhangs has been paved with 'ili'ili, and has small waterworn coral pebbles on the surface. A small c. 0.60 by 0.40 m enclosure formed by boulders and cobbles at the east edge of the terrace also has 'ili'ili and coral.

Feature B is constructed with small to medium-sized angular basalt boulders, stacked from the bottom of the gully to the base of the east wall.

FEATURE C: Terrace
FUNCTION: Habitation
DIMENSIONS: 3.20 m by 2.00 m by 0.53 m (approx.)

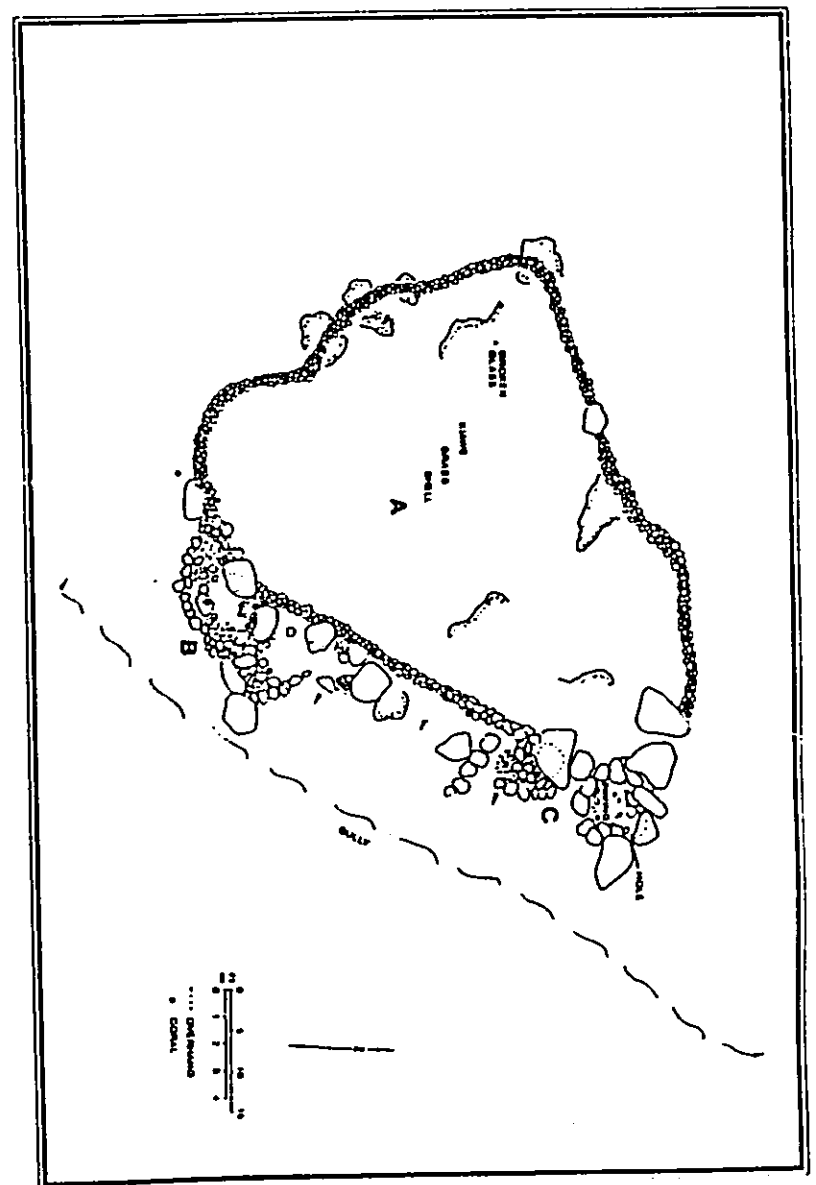


Figure A-14. SITE 13623

DESCRIPTION: Feature C is situated on the northeast exterior portion of the Feature A enclosure, on the slope toward the bottom of the gully. Large bedrock boulders in the south wall overhang the terrace and have been propped with cobbles. The area in front of the boulder has a semicircle of cobbles. 'Ili'ili paving and coral are present within the interior and under the overhang. The portion of the terrace outside of the semicircle of stones is paved with angular and subangular pebbles and small cobbles. Massive bedrock boulders at the northeast corner of the enclosure (Feature A) and north of the Feature C terrace have small boulders and cobbles enclosing a circular area. It is paved with small cobbles. There is a hole c. 0.35 m deep in the paving. No 'ili'ili or coral are visible.

SITE NO.: State: 13624 PHRI: 672-69
SITE TYPE: Enclosure
TOPOGRAPHY: The terrain is a swale with outcrops on the sides.
VEGETATION: High dense grass, a grove of large to small kiawe trees in and around a swale.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DIMENSIONS: 6.00 m by 3.60 m by 1.20 m (approx.)
DESCRIPTION: The site is situated at or near the top on the west side of a swale that is roughly oriented approximately north to south. Massive basalt boulders and outcrop run east to west across the swale from the southeast corner of the enclosure.

The enclosure is constructed of stacked basalt cobbles, five to six courses high, forming the south and east walls which abut a high, L-shaped bedrock outcrop on the north and west side. The bedrock on the north side has two to three courses of cobbles on the surface, meeting the east wall and bringing it to the height of the bedrock on the west side.

SITE NO.: State: 13625 PHRI: 672-70 *(Figure A-15)*
SITE TYPE: Mound
TOPOGRAPHY: The terrain drops sharply toward a gully c. 3 m south of the mound. Outcrops rising gently to the north and east.
VEGETATION: Kiawe trees and dense grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible burial
DIMENSIONS: 4.45 m by 3.72 m by 0.71 m (approx.)
DESCRIPTION: The mound is constructed of piled basalt cobbles and waterworn basalt. It is a roughly rectangular-shaped mound, with an upright stone in the middle of the south end. A large upright slab is at the northeast corner. A circular arrangement of cobbles is at the top midpoint of the mound. One rectangular waterworn stone and several pieces of coral are within the circle of stones. Small waterworn stones and coral (weathered) are on the surface of the mound, mostly on the south half.

The surrounding flat area has small pieces of coral on the surface up to c. 12.0 m north, east, and west. 'Ili'ili, coral and marine shells are visible to the north and east for c. 6.0 m.

SITE NO.: State: 13626 PHRI: 672-71
SITE TYPE: Enclosure
TOPOGRAPHY: The terrain consists of a prehistoric pahoehoe flow with a southern slope.
VEGETATION: Sisal plants, kiawe trees and grasses.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible temporary habitation
DIMENSIONS: 5.20 m by 2.80 m by 2.10 m (approx.)
DESCRIPTION: The enclosure is constructed by using several large outcrop boulders and stacking loose to small boulders between the gaps. The largest bedrock outcrop is on the south, with two large bedrock boulders on the north and a large boulder on the east. A small gap between the south and east outcrops has small boulders stacked five courses to a height of c. 0.94 m. A larger gap between the east and north outcrops is stacked two to four courses at c. 0.20 m to 0.75 m in height. A longer gap between the south and north outcrops on the west side is stacked three courses at an average height of c. 0.50 m. There are a few large, loose cobbles placed in cracks in the south outcrop.

SITE NO.: State: 13627 PHRI: 672-72
(See Appendix C: Selected Photographs)
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Grass, kiawe trees, sisal plants, and 'ilima.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The site complex consists of two C-shapes (Features A and B) and one modified outcrop (Feature C).

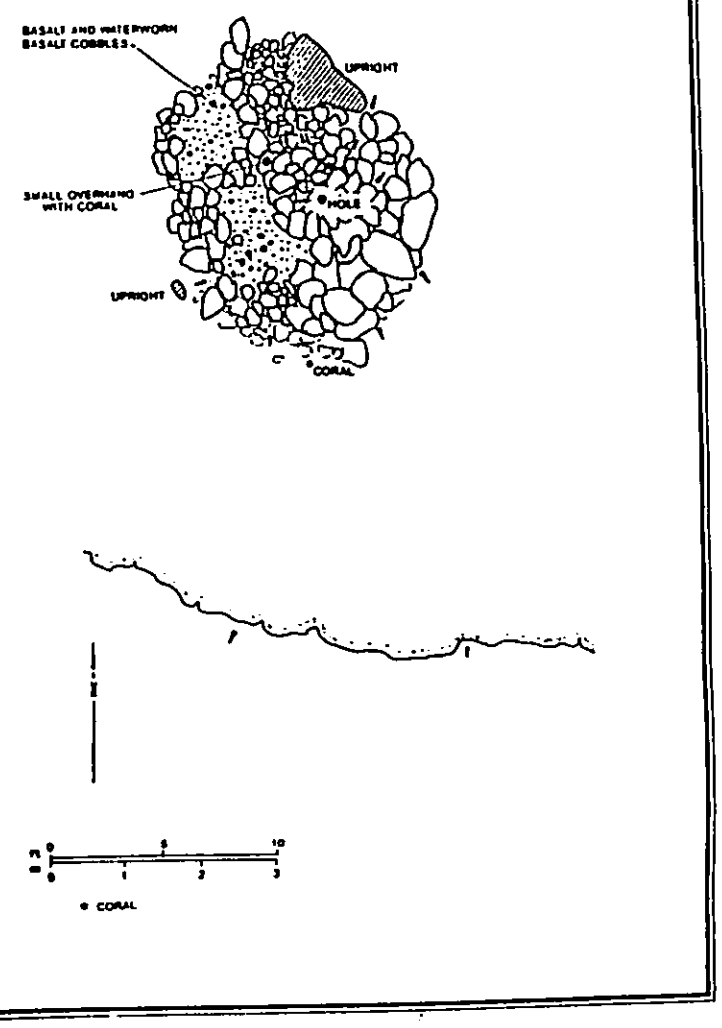


Figure A-15. SITE 13625

The overall complex area measures c. 5.90 m (N/S) by 5.50 m (E/W). No definite cultural deposit or portable remains were visible, but may be present subsurface.

FEATURE A: C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 2.00 m by 1.50 m by 0.80 m (approx.)
DESCRIPTION: This C-shape is constructed on the surface of bedrock with an opening to the southwest. It is built of basalt cobbles, stacked six to seven courses high, and a few boulders to make up the structure. A slight collapse is visible at the southeast corner. The southeast and northwest corners extend to form the C-shape. Cobbles have been piled one to two courses high on the southeast and northwest sides and crudely faced. Adjacent to Feature A is Feature B. The space between the two features resembles a pathway c. 0.84 m to 1.78 m in length with a cobble alignment extending c. 2.46 m southwest.

FEATURE B: C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 2.90 m by 1.40 m by 0.60 m (approx.)
DESCRIPTION: Feature B is formally constructed the same as Feature A, using stacked basalt cobbles on the surface of the bedrock, and with an opening to the southwest. The C-shape is crudely faced at the northeast and southeast corner. The opening to the southwest has collapsed, but had been stacked six to seven courses high. The northwest corner has also collapsed.

FEATURE C: Modified outcrop
FUNCTION: Temporary habitation
DIMENSIONS: 12.00 m by 9.30 m by 1.00 m (approx.)
DESCRIPTION: This modified outcrop appears to have a variety of structures: two possible enclosures (one rectangular and one circular), and many scattered and piles of cobbles. The northern side of the bedrock is located on a hill.

The rectangular enclosure is built on a level portion of the outcrop at the west base. The north and south walls abut the outcrop at the east ends. Pahochoe boulders and cobbles are stacked three to four courses high on the lower ledge of the high outcrop; one to two courses are loosely piled on the north and south. The south wall is c. 2.5 m wide, and one to two courses high. The width of the south wall becomes a terrace, as does the west wall.

The circular enclosure is formed by one to two courses of boulders and cobbles. The stones are arranged in a circular pattern on a flattened portion of the outcrop. The leveled outcropping extends west from the base.

SITE NO.: State: 13628 PHRI: 672-73
SITE TYPE: Cairn
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Grass, kiawe trees and sisal plants.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Water catchment
DIMENSIONS: 3.20 m by 2.50 m by 0.50 m (approx.)
DESCRIPTION: This site consists of a cairn with a possible cupboard feature. The cairn is oval in shape and located on a slight slope. It appears to be oriented east to west, with an opening to the west. The cairn is constructed of basalt boulders that form and support its base. Cobbles have been piled on the top of the boulders, forming a bubble-like surface; cobbles have collapsed on the north and south side.

There is an opening to the west, and the interior of the cairn measures c. 0.95 m by 1.00 m (like a cupboard). The opening is c. 0.49 m in width and 0.54 m in height. Scattered cobbles extend west beyond the opening of the cairn.

SITE NO.: State: 13629 PHRI: 672-74
SITE TYPE: Cairn
TOPOGRAPHY: The terrain consists of bedrock outcrops.
VEGETATION: Dense grass and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 1.30 m by 1.20 m by 0.75 m (approx.)
DESCRIPTION: This site consists of a single cairn. It is constructed of stacked aa boulders and cobbles. Oval shape in plan, it has an open center and one toppled stone within the center.

SITE NO.: State: 13630 PHRI: 672-75
SITE TYPE: Wall section
TOPOGRAPHY: Gently undulating terrain, with numerous weathered basalt boulders on the surface.
VEGETATION: Kiawe trees and grasses.
CONDITION: Poor
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 1.70 m by 1.00 m by 0.75 m (approx.)
DESCRIPTION: The wall section is constructed of subangular basalt boulders crudely stacked two to three courses high. The sides appear somewhat vertical, but are

not formally faced. Because the wall is comprised of only a short section, it resembles a cairn.

SITE NO.: State: 13631 PHRI: 672-76
SITE TYPE: Mound
TOPOGRAPHY: The terrain consists of coastal plain.
VEGETATION: Grass, kiawe trees and sisal plant.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 3.00 m by 1.60 m by 0.80 m (approx.)
DESCRIPTION: The mound is oval shape in plan. It is constructed of basalt rocks and faced on all sides. The surface of the mound is sloping downward, and the surface around the mound is flat.

SITE NO.: State: 13632 Peterson Trail Section 9
PHRI: 672-77
SITE TYPE: Kerbstone trail
TOPOGRAPHY: Bedrock outcrops sloping seaward; the trail section is on the level area northwest of the swale and site 672-70.
VEGETATION: Dense grass, and a thicket of small kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Transportation
DIMENSIONS: 500.00 m by 3.00 m by 0.16-0.60 m (approx.)
DESCRIPTION: The trail section presently consists of two parallel rows of aligned boulders. There is a space between the rows that is filled with basalt cobbles and boulders. Some kerbstones are dislodged on both sides. The trail is covered with tall and dense grass, with kiawe trees growing between the kerbstones.

SITE NO.: State: 13633 PHRI: 672-78 *(Figure A-16) (See Appendix C, Selected Photographs)*
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: This site is on and below a bedrock outcrop on undulating terrain, below a fairly flat hilltop crest.
VEGETATION: Grass and kiawe trees.
CONDITION: Poor-good
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 24.6 m (N/S) by 6.1 m (E/W). The site complex consists of three enclosures. Historical remains such as wire, bottle glass and tin roofing are associated with the site. In addition to bare bedrock, there is a deposit of fairly deep, rocky, brown silty clay loam. There is a possibly-modified basalt boulder on Feature A.

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 3.00 m by 2.80 m by 0.73 m (approx.)
DESCRIPTION: Feature A is an angled, L-shaped, basalt-cobble and small-boulder wall. It modifies a basalt shelf with a slight overhang at the east end of the E/W wall. A N/S wall angles at a rough 90 degrees from a slightly rounded junction with the E/W wall. This wall is comprised of basalt cobbles and small boulders, some rather flat and slab-like. An upright begins the east wall under the overhang, modifying the basalt bedrock. This wall is roughly three to four courses high. The junction of the E/W wall and the N/S wall is rounded and widens slightly at the bend. This N/S portion is also three to four courses high, and partially encloses a flat soil deposit between itself and the bedrock outcrop.

FEATURE B: Enclosure
FUNCTION: Habitation
DIMENSIONS: 4.00 m by 2.00 m by 0.65 m (approx.)
DESCRIPTION: This is a small enclosure comprised of basalt cobbles and small boulders (some slab-like) that modify a basalt bedrock shelf escarpment. This structure is composed of two parts. A curved basalt-cobble, small-boulder wall running northeast and southwest comes off a basalt bedrock shelf in the northeast. The second portion begins after a separation from the southwest end of the wall, continues southwest, is faced and then has a corner and turns east and ends near the bedrock shelf escarpment. This second portion is also faced on the outside. In general, it is a very low, single- to double-course construction, and encloses a fairly flat soil deposit.

From the midpoint of Feature B, at c. 3.0 m at 140 degrees, is a possible bomb crater/excavated circular depression. It measures c. 3.0 m in diameter, and has a thin, dirt rim, around the edge that averages c. 0.20 m in height. The lowest point in the middle of the depression is c. 0.8 m below the surrounding ground surface.

FEATURE C: Enclosure
FUNCTION: Habitation
DIMENSIONS: 6.20 m by 5.50 m by 0.71 m (approx.)
DESCRIPTION: This is a roughly rectangular-shaped structure, with the axis oriented c. NE/SW. The enclosure is elevated and modifies a shelf bedrock in the northeast portion. The northeast portion of the enclosure has a round-shaped portion with no real corners. This structure is

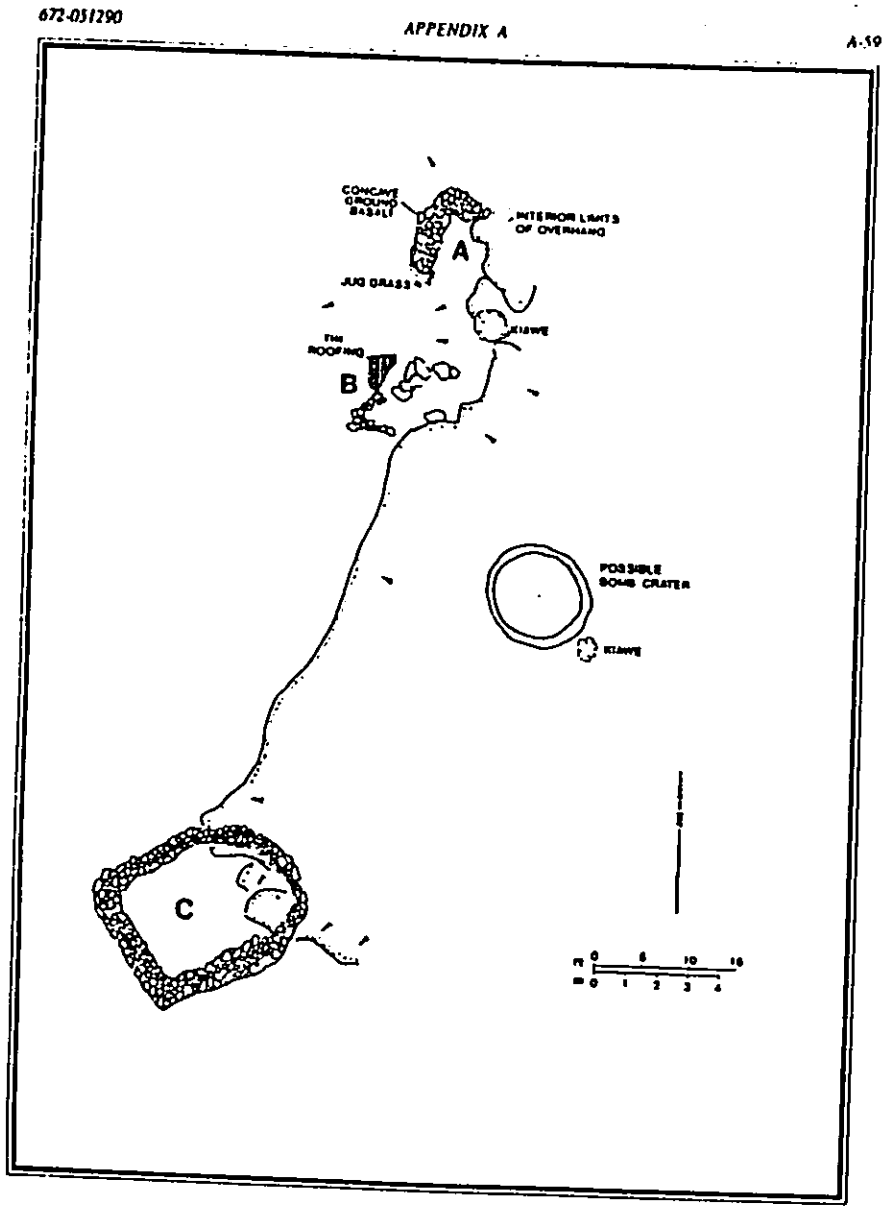


Figure A-16. SITE 13633

comprised of basalt cobbles and small boulders stacked and bi-faced, with small to medium boulders forming the exterior facing. Portions of the wall are cobble-filled. This wall is six to seven courses high, with a deteriorated section of two to three courses near the eastern corner. The southeast and northwest walls also have six to seven courses, with deteriorated sections two to three courses high. The rounded northeast portion extends up and onto a basalt shelf escarpment that basically runs through the entire site.

SITE NO.: State: 13634 Peterson Trail Section 10-12
PHRI: 672-79
SITE TYPE: Kerbstone trail
TOPOGRAPHY: The terrain consists of a low gully adjacent to the southeast, and extending southwest. It is very rocky with loose boulders and cobbles, bedrock boulders and outcrops.
VEGETATION: Grasses and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Transportation
DIMENSIONS: 500.00 m by 4.70 m by 0.25-1.05 m (approx.)
DESCRIPTION: This is a short section of an extensive upslope/downslope trail. This section is located c. 25 m south of SIHP 13634 (672-78), and on the southeast side of a small gully.

There is a stacked, faced kerbstone section on the northwest side of the trail at the edge of the gully. This section consists of medium to small boulders and large cobbles four to seven courses high, with an average height of c. 1.05 m. The internal face is rough with an average height of c. 0.20 m; this section measures c. 0.85 m wide. The southeast side is also 0.85 m wide with a rough internal face averaging c. 0.25 m high; exterior height averages 0.20 m. The interior width (path) between the two sections measures c. 3.20 m and is oriented c. 50/230°. The surface of the trail slopes gradually to the center, and has some cobble rubble. Lengthwise, the trail slopes naturally to the southwest.

This trail continues southwest to SIHP 13604 (PHRI 672-49). It may possibly be altered by the construction of SIHP 13604, Feature C, or perhaps the trail stops at Feature C.

SITE NO.: State: 13635 **PHRI:** 672-80
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The site is situated at the top of a ridge with a slight southwest slope. The terrain is rocky, with exposed boulders and cobbles and exposed bedrock boulders.
VEGETATION: Grassland, 'ilima, with burned and live kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation-possible burial
DESCRIPTION: This complex consists of a platform (Feature A) and an enclosure (Feature B). The overall complex area measures c. 14.50 m (N/S) by 8.0 m (E/W).

The Feature A platform is immediately adjacent to SIHP 13644 (kerbstone trail), which is to the north. North and northwest beyond the trail is an area measuring c. 20.0 m by 20.0 m which is littered with beach rubble (waterworn pebbles and cobbles, coral and coral fragments and marine shell). Also noted close to the trail were some volcanic glass fragments and a polished adze fragment. This entire area has been previously bulldozed.

FEATURE A: Platform
FUNCTION: Habitation/possible burial
DIMENSIONS: 6.50 m by 4.00 m by 0.70 m (approx.)
DESCRIPTION: This structure is rectangular in shape, with the long axis oriented ENE/WSW. Most of the stones used are small pahoehoe boulders, with some large and medium cobbles. Small waterworn boulders with some cobbles were also used in the construction. All sides are roughly faced with small boulders and some large cobbles, two to five courses high, with a height range of c. 0.40 m to 0.70 m.

The facing of the west side is rounded out at the center. There is a medium-boulder upright in the west side which stands c. 0.75 m high. The northeast corner is a large bedrock boulder. The interior is filled with small boulders and large to small cobbles. There is an alignment running north to south across the structure c. 2.60 m east of the west end, suggesting the west side may be an addition. Much of this alignment is made up of waterworn boulders and cobbles, one of which may have stood upright. The surface is irregular with slight depressions on the west and east sides. A few coral cobbles are visible on the surface, with some fragments visible under the surface. A light scatter of beach rubble is on the surface to the west and south. The site tag is at the center of the structure.

FEATURE B: Enclosure
FUNCTION: Habitation
DIMENSIONS: 7.00 m by 4.50 m by 0.80 m (approx.)

This structure is rectangular in shape, with the long axis oriented c. N/S. The enclosure walls are constructed of small pahoehoe boulders with large and medium cobbles, both local and waterworn. The walls are partially-faced on both the interior and exterior sides. They vary from single- to double-boulder wide and two to four courses high. Heights range from c. 0.20 m to 0.80 m; the width varies from c.0.40 to 1.00 m. There is a large bedrock boulder at the center of the north wall, and a section of the east wall is built atop bedrock.

The interior surface is roughly flat and level soil, with a slight southwest slope. There is a light rubble scatter from the collapsing wall, and a low bedrock boulder. There is sparse beach rubble on the surface. There is a rough and loose alignment of placed and natural bedrock boulders running from the northeast corner to the southwest corner of Feature A. There is much boulder rubble between Features A and B, and to the east of Feature B.

SITE NO.: State: 13636 **PHRI:** 672-81
SITE TYPE: Cairn
TOPOGRAPHY: The site is situated at the top of a ridge with a slight southwest slope. The terrain is rocky, with exposed boulders and cobbles and exposed bedrock boulders.
VEGETATION: Grassland, 'ilima, with burned and live kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.41 m by 0.25 m by 0.39 m (approx.)
DESCRIPTION: This is a three-course-high cairn that is built on a low bedrock boulder. It is located c. 23.0 m east at 92 degrees. The highway is c. 100 m at 302 degrees. The cairn is believed to be a recent marker.

SITE NO.: State: 13637 **PHRI:** 672-82
SITE TYPE: Enclosure
TOPOGRAPHY: The site is situated near the top of a broad ridge, on the north side, with a slight slope to the northwest. It is rocky, with many exposed boulders and cobbles.
VEGETATION: Grassland with burned and live kiawe trees.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 22.00 m by 16.00 m by 0.75 m (approx.)

DESCRIPTION: This structure is irregular to roughly triangular in shape. The perimeter of the structure is a loosely-stacked, partially-faced wall built of local, medium and small pahoehoe boulders, with large and medium cobbles and some waterworn cobbles and small boulders. The wall also incorporates two bedrock boulders along the west side. Many of the boulders used were placed as uprights. The wall varies from sections of single, medium boulders to sections of four courses, with heights ranging from c. 0.30 m to 0.75 m. Stacked sections also vary from one to three stones wide, measuring from 0.35 m to 1.0 m. There are two long side walls, one oriented NNW/SSE, and the other roughly N/S. There is one long side wall at the south extending ENE/WSW. At the north end, the two longer side walls join in a rounded end.

The surface of the interior is fairly flat, with a slight natural slope to the northwest. The surface is soil with light rubble scatter, including some beach rubble which may have been placed for paving. This beach rubble (consisting of shell, pebbles and small cobbles and coral) is more concentrated at the south half; however, it extends throughout the interior. No features were noted within the interior or in the walls.

There is a site tag on the east wall c. 5.0 m from the southeast corner. The structure is immediately adjacent to the east of a waterline bulldozer cut. Portable remains consisted of a coral abrader up and modified shell.

SITE NO.: State: 13638 **PHRI:** 672-83
SITE TYPE: C-shape
TOPOGRAPHY: The terrain consists of a fairly level plateau area, with bedrock outcropping and boulders.
VEGETATION: Dense grass with many small kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 4.75 m by 3.50 m by 0.43 m (approx.)
DESCRIPTION: This C-shape is built on the outcrop, with an opening to the west. It is constructed of one to three courses of irregular-shaped basalt cobbles and slabs piled atop the bedrock outcrop. No midden or coral were visible, although one piece of fine-grained blue-gray basalt was present.

SITE NO.: State: 13639 **PHRI:** 672-84 *(Figure A-17)*
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The terrain consists of a rolling lava

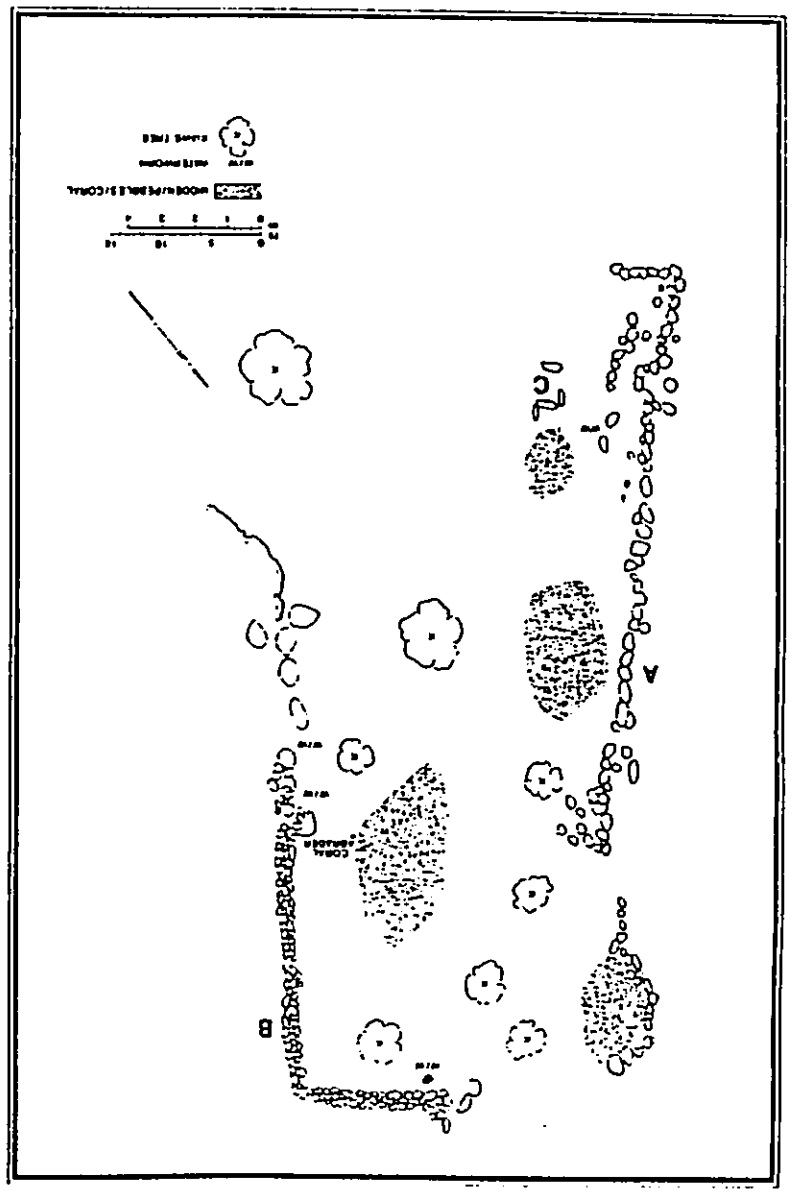


Figure A-17. SITE 13639

flow, rocky with exposed bedrock boulders and cobbles. Overall, the terrain slopes to the west and is adjacent to a gully to the northwest.
VEGETATION: Grassland with burned kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The site complex consists of three features: a terrace (Feature A), an L-shaped wall (Feature B), and a stone-lined firepit (Feature C). The overall complex area measures c. 25.0 m (NE/SW) by 12.0 m (NW/SE). Marine shell midden, waterworn pebbles and cobbles, and one coral abrader were present. A reddish-brown, loamy clay was present on and around the features.

FEATURE A: Terrace
FUNCTION: Habitation
DIMENSIONS: 25.00 m by 12.00 m by 0.23 m (approx.)
DESCRIPTION: This feature is rectangular in shape, with the long axis oriented northeast to southwest, and the downslope at the northwest. The retaining wall has an average exterior height of c. 0.25 m. It is constructed of a single layer of local, small pahoehoe boulders with some large and medium cobbles. This layer continues into the terrace as a paving through the entire length of the terrace at widths of c. 1.60 m to 1.90 m, with only a few small pockets where the paving is not visible. A few waterworn cobbles were used in the paving.

The remaining surface interior is soil, with a scatter of 'ili'ili pebbles and coral pebbles with some concentrated pockets. It has a slight WSW slope. There are loose, waterworn cobbles and small boulders, with three small, linear waterworn boulders in a northeast to southwest direction; two of these abut at the interior edge of the paving. There are also some linear waterworn stones forming a probable fire pit (Feature C). An L-shaped wall (Feature B) forms part of the back and northwest side of the terrace.

FEATURE B: L-shaped wall
FUNCTION: Habitation
DIMENSIONS: 10.50 m by 0.50 m by 0.55 m (approx.)
DESCRIPTION: The long axis is oriented NE/SW. This is a double-stacked, mostly bi-faced wall. It is constructed of small pahoehoe boulders and large to medium cobbles, with a few small, waterworn boulders. A few uprights were used as interior facing. Several small boulders are placed singly at the southwest end. The average width is c. 0.50 m, with interior heights of c. 0.40-0.55 m.

The wall encloses part of the southeast and northeast sides of the Feature A terrace, and acts as a retaining wall against the natural western slope of a hillside. The eastern corner is mostly collapsed, with three other minor collapsed areas. The site tag is on the longer NE/SW wall, near the north corner.

FEATURE C: Firepit
FUNCTION: Habitation
DIMENSIONS: 1.60 m by 0.84 m by 0.07 m above surface (approx.)
DESCRIPTION: This structure consists of two small, imbedded waterworn boulders that are linear and parallel. They are within the surface of the Feature A terrace in a northeast to southwest direction. There is also a large, linear waterworn cobble extending south to west, from the north corner. There are two medium waterworn cobbles at the east corner and a small, linear waterworn boulder extending northeast from the east corner. These linear stones appear to be buried slabs. The south to west stone measures c. 0.58 m by 0.20 m, with an exposed height of c. 0.07. The parallel stone measures c. 0.52 m by 0.15 m, with an exposed height of 0.06 m high. The northwest cobble is c. 0.29 m by 0.07 m, with an exposed height of 0.05 m. The outside east stone is c. 0.42 m by 0.13 m, with an exposed height of 0.05 m. The firepit is c. 3.0 m both from the northwest and southwest sides of Feature A. Ash was noted c. 0.02-0.03 m below surface, but this may possibly be from a recent grass fire.

SITE NO.: State: 13640 PHRI: 672-85 *(Figure A-18)*
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of a gently undulating flow.
VEGETATION: Kiawe trees and grasses.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 18.5 m (N/S) by 8.7 m (E/W). The site complex consists of a platform (Feature A) and a C-shape (Feature B). There is a dense amount of coral present, and food source midden remains are located outside of the Feature A platform.

FEATURE A: Platform
FUNCTION: Habitation
DIMENSIONS: 18.50 m by 8.70 m by 0.34 m (approx.)
DESCRIPTION: Feature A is a large, rectangular platform which sits prominently on a knoll overlooking the valley

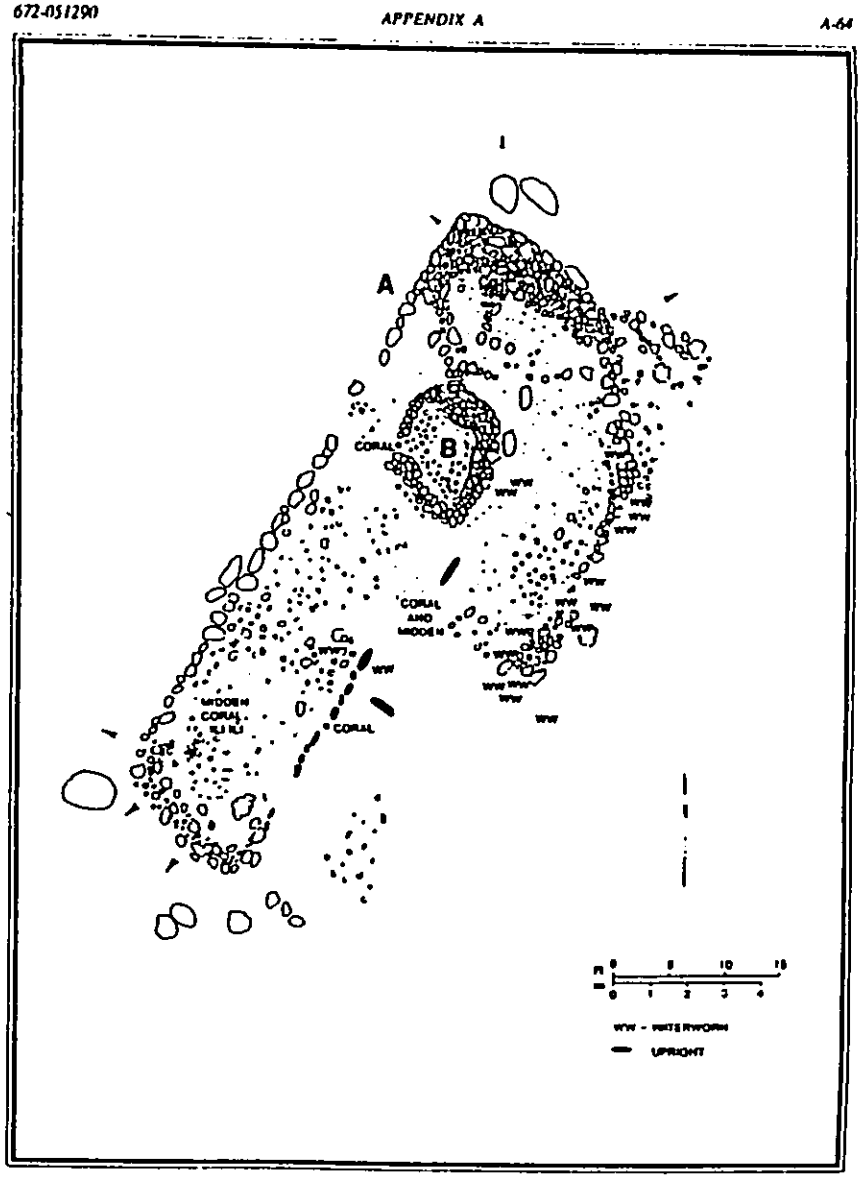


Figure A-18. SITE 13640

above Mahukona Harbor. It is constructed of angular and subangular waterworn cobbles and boulders that are stacked and faced.

The intact seaward (makai) wall is oriented c. N/S. It is constructed of large, single-course, upright boulder slabs. The massiveness of this wall appears similar to a historic road bed. The floor within the platform has numerous large, flat, waterworn boulders used as paving, but it was not possible to determine whether the interior was compartmented. It appears that the walls which formed the southeast corner of the platform are now buried under aeolian/alluvial deposits. The width of the north platform face has been re-faced; the northeast corner is collapsing. Numerous uprights, waterworn boulders and fallen uprights were visible within the feature.

Midden remains are eroding from a natural outcrop to the southeast. The massiveness in the size and style of construction suggest that this structure was built by or for someone of great importance.

FEATURE B: C-shape
FUNCTION: Habitation
DIMENSIONS: 3.60 m by 3.60 m by 0.35 m (approx.)
DESCRIPTION: Feature B is within the northern and central portion of the Feature A platform. It is constructed of rounded, subangular, and waterworn cobbles and boulders, stacked three to four courses high. In addition, several large, flat waterworn boulders were used to construct this enclosure. The C-shape appears to have stood higher than it is presently. This is the only internal feature within the main structure. It may not have functioned strictly as a habitation feature; possibly there was also a ceremonial function.

SITE NO.: State: 13641 **PHRI:** 672-86
SITE TYPE: Wall section
TOPOGRAPHY: Situated at the top of hillside with a northwest rock slope.
VEGETATION: Grassland with burned kiawe trees.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 1.20 m by 0.45 m by 0.85 m (approx.)
DESCRIPTION: It is located c. 15.0 m west of a pipeline road cut. This is a crudely-stacked alignment of small pahoehoe boulders and large cobbles placed on top of and between two large bedrock boulders. Stones are singly-stacked (with voids between) to a maximum height of c. 0.85 m, and with an average width of c. 0.35 m.

SITE NO.: State: 13642 **PHRI:** 672-87
SITE TYPE: Enclosure
TOPOGRAPHY: The site is situated on the northwest side of a broad ridge that consists of exposed bedrock outcrops, and sloping below to the NNW.
VEGETATION: Rocky grassland with burned kiawe and a medium-density live kiawe forest.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 8.50 m by 3.20 m by 0.75 m (approx.)
DESCRIPTION: The enclosure is built against the NNW side of a large bedrock outcrop. Small to medium pahoehoe boulders with large cobble rubble have been cleared away from the outcrop. The boulders and cobbles are roughly stacked in a curving wall between smaller outcrops averaging c. 1.25 m to 2.25 m northwest of the outcrop, with the ends curving back to the outcrop sides. The wall is one to three courses high and wide. The height varies from c. 0.25 m to 0.75 m, and the width varies from c.0.45 m to 0.75 m.

There is also a low wall crossing the floor about 1/3 of the way east from the west side. This section is one to two stones wide and high, with an average width of c. 0.40 m and heights from c. 0.25 m to 0.45 m at the outcrop. There is a small gap in the central outside wall. The back outcrop side walls are high (c. 1.5 m to 2.3 m) and smooth, and may have served as a water trap.

The interior floor surface is soil, fairly flat and level, with some rubble and small areas of exposed bedrock. No cultural deposits or portable remains were visible; however, they may be present subsurface.

SITE NO.: State: 13643 **PHRI:** 672-88
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of gently undulating flow.
VEGETATION: Grass and kiawe trees.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The site complex consists of two features: an enclosure (Feature A) and a terrace (Feature B). The overall complex area measures c. 34.0 m (N/S) by 16.0 m (E/W). Coral fragments, shell midden and waterworn pebbles and cobbles were observed on both Features A and B.

FEATURE A: Enclosure
FUNCTION: Habitation
DIMENSIONS: 11.0 m by 9.0 m by 0.72 m (approx.)
DESCRIPTION: This is a deteriorated enclosure comprised of small basalt boulders and cobbles. Feature A is roughly square or rectangular-shape in plan.

The south and east walls are fairly intact, while the north wall/alignment is deteriorated and incomplete, being only one to two courses high. The north wall/alignment curves inward to the south, past the northeast corner of the east wall. This may indicate a partial interior; it could also mean this was originally a semi-circular structure; or, it could be just severe collapse of the wall.

The west wall/alignment is a one-course, curved and imbedded alignment, beginning from the incomplete north wall. The south wall is two to four courses high, almost mound-like in the southwest portion of the wall/alignment. A small three- to four-stone alignment is immediately north of the eastern portion of the south wall. Fairly large boulders make up most of the junction or corner of the south and east walls. The north wall alignment has also fallen and spread into a linear mound-like structure that is shorter than the opposing wall to the south, and becomes a curved linear alignment curving into the very deteriorated west alignment.

Portable remains consisting of midden scatter, coral and waterworn pebbles and cobbles were visible. An aluminum waterpipe oriented c. 350 degrees abuts or is constructed over the west portion of the feature. The pipe is built on and in a foundation of basalt cobbles that may have been robbed from the feature.

FEATURE B: Terrace
FUNCTION: Habitation
DIMENSIONS: 25.00 m by 0.50 m by 0.20 m (approx.)
DESCRIPTION: Feature B is a single-course, aligned basalt terrace retaining some soil to the east. This feature extends from the Feature A enclosure. The terrace is constructed of aligned small boulders and large basalt cobbles. Midden material, coral, waterworn basalt pebbles and cobbles are surrounding the feature.

This feature angles into the aluminum irrigation pipe which is situated to the immediate area west of Features A and B. Feature A appears to have been constructed on top of Feature B.

SITE NO.: State: 13644 Peterson Trail Section 11
PHRI: 672-89
SITE TYPE: Kerbstone trail
TOPOGRAPHY: The site is situated at the top of a ridge with a slight southwest slope. The terrain is rocky, with exposed boulders and cobbles and exposed bedrock boulders.
VEGETATION: Grassland, 'ilima, with burned and live kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Transportation
DIMENSIONS: 425.00 m by 1.50 m by 0.40 m (approx.)
DESCRIPTION: The trail is oriented c. E/W. It consists of parallel alignments, basalt boulders, and cobbles. The interior width, between the alignments, averages c. 1.5 m. Marine shell midden, volcanic glass, and basalt flakes were found in association with the trail.

SITE NO.: State: 13645 **PHRI:** 672-90
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of a slight southwest slope; the area is flat, and has been cleared by bulldozing.
VEGETATION: Various grasses and kiawe trees.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric/probably historic
FUNCTIONAL INTERPRETATION: Agriculture
DESCRIPTION: The site complex consists of two mounds (Features A and B). The overall complex area measures c. 10.60 m (N/S) by 2.25 m (E/W). There are other clearing mounds around trees and bulldozed areas. The site complex probably functioned as clearing mounds.

FEATURE A: Mound
FUNCTION: Agriculture
DIMENSIONS: 2.80 m by 1.80 m by 0.35 m (approx.)
description: This a low, roughly rectangular structure with rounded corners. It is constructed of loosely piled or pushed pahoehoe, small boulders and large cobbles in size. The surface is irregular and slopes to all sides from the center. Stones were probably pushed by a bulldozer, with additional hand-piling. The surrounding area is cleared and flat.

FEATURE B: Mound
FUNCTION: Agriculture
DIMENSIONS: 3.00 m by 2.20 m by 0.50 m (approx.)
DESCRIPTION: This is a low, irregularly-shaped structure with an irregular surface which slopes to all sides from the center. Loosely constructed of piled or pushed pahoehoe boulders and cobbles, it is similar to Feature A.

SITE NO.: State: 13646 **PHRI:** 672-91
SITE TYPE: Complex (4 Features)

F-58

TOPOGRAPHY: The terrain consists of gently undulating flow.
VEGETATION: Kiawe trees, dense pasture grasses, 'uhaloa and 'ilima.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture-temporary habitation
DESCRIPTION: The site complex consists of two wall sections (Features A and C), a modified outcrop (Feature B) and a C-shape (Feature D). The overall complex area measures c. 12.8 m (NNW/SSE) by 8.4 m (ENE/WSW). The features are constructed of angular and vesicular basalt cobbles and boulders stacked three to five courses high.

FEATURE A: Wall section
FUNCTION: Agriculture
DIMENSIONS: 2.80 m by 1.20 m by 0.95 m (approx.)
DESCRIPTION: This short wall segment is set on natural bedrock. It is constructed of angular vesicular basalt cobbles and boulders stacked three to five courses high. The heights range from 0.20-0.95 m. On observation, the wall does not appear to have functioned as a direct agriculture or habitation shelter feature, as the areas immediately surrounding the structure are not suited for those activities. Instead, the immediate surrounding areas suggest historic agriculture and cattle grazing activities.

FEATURE B: Modified outcrop
FUNCTION: Agriculture
DIMENSIONS: 1.40 m by 0.80 m by 0.20 m (approx.)
DESCRIPTION: Natural bedrock outcropping is modified with cobbles, used as fill and leveled. It appears to be mostly a single-course high.

FEATURE C: Wall section
FUNCTION: Agriculture
DIMENSIONS: 1.40 m by 0.40 m by 0.30 m (approx.)
DESCRIPTION: This short wall segment is set on an outcrop boulder. It is constructed of stacked, angular vesicular cobbles.

FEATURE D: C-shape
FUNCTION: Temporary habitation
DIMENSIONS: 7.00 m by 4.50 m by 0.55 m (approx.)
DESCRIPTION: The C-shaped alignment is stacked on natural outcropping and is open to the west (makai). Feature D provides shelter from the prevailing winds, and takes advantage of the natural outcrop with a minimum of modifications. It appears that there is a low, single stone alignment to the west which joins both ends of the C-shaped wall to form an oval area of habitable space. A possible cupboard is located at the south end of the C-shaped wall.

SITE NO.: State: 13647 **PHRI:** 672-102
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: The site is on the level, high knoll overlooking Mahukona Harbor. A thicket of kiawe trees is to the east and south. The terrain is sloping to the NNE.
VEGETATION: Kiawe trees and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The site complex consists of three features; a modified outcrop (Feature A), a wall section (Feature B) and a platform (Feature C). The overall complex area measures c. 23.45 m by 20.0 m.

FEATURE A: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 12.45 m by 7.90 m by 1.60 m (approx.)
DESCRIPTION: This high outcrop has a surface at the northeast end leveled with small cobbles. Larger cobbles are on the edge of the outcrop, along the north and south sides. A single cobble c. 2.0 m by 1.4 m extends from the base of the outcrop on the southwest side.

Feature A is constructed of basalt cobbles, small fist-size to large, placed on the surface and at the base of the outcrop on the south side. Cracks on the north side are filled with cobbles.

FEATURE B: Wall section
FUNCTION: Habitation
DIMENSIONS: 10.20 m by 1.20 m by 0.63 m (approx.)
DESCRIPTION: The wall is built on the outcrop northeast of the Feature C platform. It is constructed of one to three courses of basalt cobbles and boulders, c. 0.20-0.90 m in length, stacked on low bedrock outcropping.

FEATURE C: Platform
FUNCTION: Habitation
DIMENSIONS: 12.20 m by 5.50 m by 0.40 m (approx.)
DESCRIPTION: This is a low, rectangular platform with aligned boulder perimeters, boulder and cobble fill, and a collapsed historic wooden structure lying on the surface. Some debris from the structure is scattered over the surrounding area.

The immediate area consists of a grassy level surface west to the road, and a slight southward slope with dense

grass and kiawe trees; additional outcrops and kiawe trees are to the east.

The platform is constructed of basalt boulders aligned to form its perimeter. The interior surface is filled and leveled with boulders and cobbles. A wooden structure built upon the platform has collapsed.

Feature C was previously identified on the Mahukona Railway Map (1933) as Jake Lincoln #25. It may possibly be associated with SIHP 13652 (PHRI 672-97).

SITE NO.: State: 13648 **PHRI:** 672-93
SITE TYPE: Cairn
TOPOGRAPHY: The terrain consists of gently undulating flow.
VEGETATION: Kiawe trees, pasture grasses, 'ilima, and 'uhaloa.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.84 m by 0.36 m by 1.00 m (approx.)
DESCRIPTION: The cairn is situated c. 100 m east of Mahukona-Hawi Jeep Road and c. 2.0 m west of the project area's eastern boundary and barbed wire line. This site consists of c. 10 small boulders stacked on a bed of natural boulder outcropping. It is constructed of angular vesicular basalt boulders stacked two to three courses high.

SITE NO.: State: 13649 **PHRI:** 672-101
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: The terrain consists of gently undulating flow.
VEGETATION: Kiawe trees, pasture grasses, 'uhaloa and 'ilima.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric-historic
FUNCTIONAL INTERPRETATION: Possible agriculture
DESCRIPTION: The overall complex area measures c. 10.0 m (E/W) by 8.5 m (N/S). The site complex consists of a wall section (Feature A) and a C-shape (Feature B).

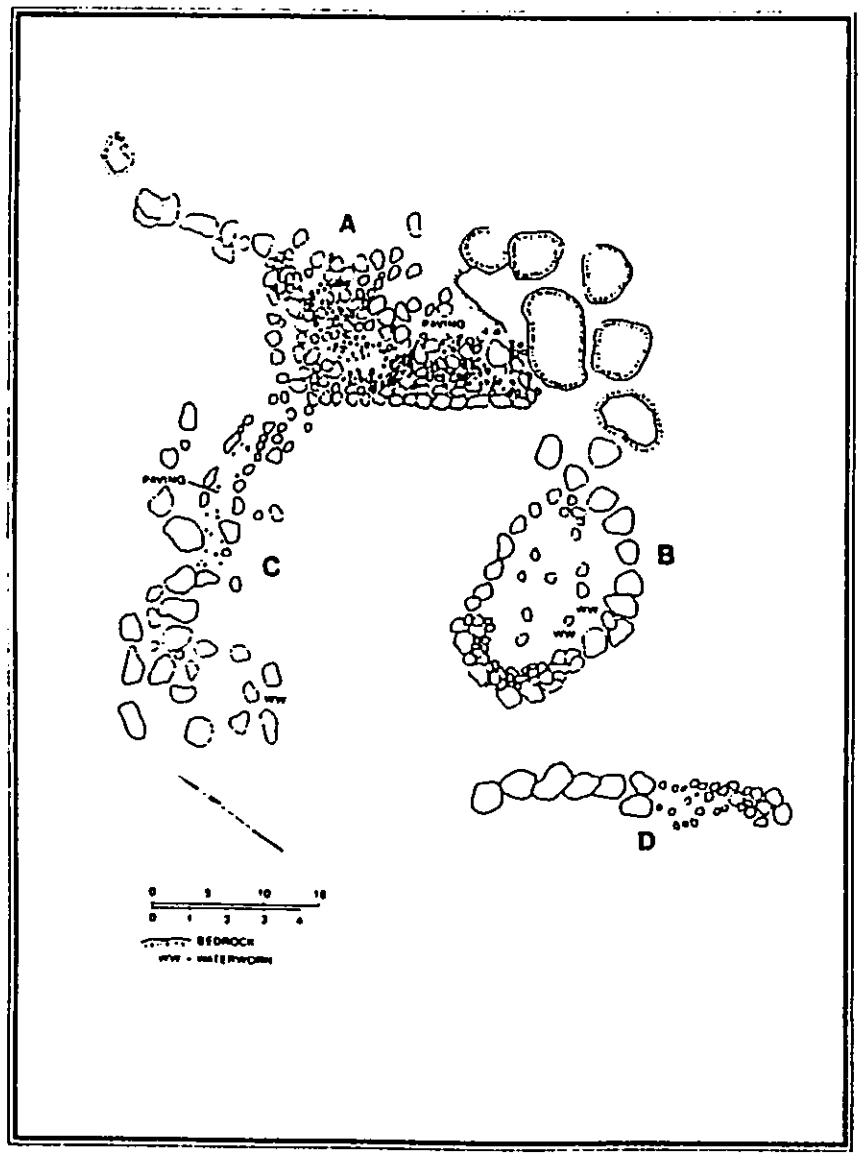
FEATURE A: Wall section
FUNCTION: Possible agriculture
DIMENSIONS: 1.30 m by 0.90 m by 0.42 m (approx.)
DESCRIPTION: This short wall section consists of 12 to 15 boulders set on natural boulder outcropping. It is constructed with angular and vesicular cobbles and boulders stacked two to three courses high.
FEATURE B: C-shape
FUNCTION: Possible agriculture
DIMENSIONS: 4.00 m by 3.00 m by 0.46 m (approx.)
DESCRIPTION: Feature B consists of a small, low, C-shaped wall which is open to the north and an area terraced with large boulders. It is constructed of angular and vesicular basalt cobbles and boulders, stacked and not faced. It is possible that the rather crude boulder terrace may be primarily natural, consisting of decomposing outcropping.

SITE NO.: State: 13650 **PHRI:** 672-98 *(Figure A-19)*
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: The terrain consists of sloping coastal plains.
VEGETATION: Sisal plants, kiawe trees, dense grass and false 'ilima.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation/agriculture-boundary
DESCRIPTION: This complex consists of a terrace (Feature A), a platform (Feature B), an alignment (Feature C) and a wall (Feature D). The overall measurements of the complex are c. 30.90 m (NW/SE) by 17.80 m (NE/SW).

FEATURE A: Terrace
FUNCTION: Habitation/agriculture
DIMENSIONS: 7.50 m by 5.00 m by 0.74 m (approx.)
DESCRIPTION: Feature A consists of a linear-walled cobble and boulder terrace. It is oriented c. northwest to southeast. The southeast end meets the contour of bedrock where the terraced area ends.

The terrace is constructed with a boulder base and cobble fill. The northwest area has cobbles piled high. It slopes inward to the northeast, where cobbles have also been piled. The southeast area is more of a boulder arrangement, dropping down to a paved, scattered-cobble area.

FEATURE B: Platform
FUNCTION: Habitation/agriculture
DIMENSIONS: 6.50 m by 5.00 m by 0.75 m (approx.)
DESCRIPTION: The platform is irregular to oval shape in plan. It is oriented northeast to southwest below the Feature A terrace. The platform is raised on two sides and free-standing on the northeast side. The construction utilizes boulders to form the base of the structure. At the southwest end of the platform, cobbles are piled two to three courses high. The platform then slopes inward towards the middle, forming a slight depression, and leveling off to free-standing boulders. A boulder alignment forms the southeast



F-60

Figure A-19. SITE 13650

side of the platform. The northwest side has a piling of cobbles and then extends into an alignment.

The interior of the terrace is paved in addition to having scattered cobbles. Small and large waterworns are present within the interior and outer perimeter. The boulder alignment on the southeast side continues to connect with a natural contour of the bedrock, which in turn connects to Feature A.

FEATURE C: Alignment
FUNCTION: Indeterminate
DIMENSIONS: 8.90 m by 4.50 m by 0.71 m (approx.)
DESCRIPTION: Feature C consists of two parallel boulder and cobble alignments that extend from the Feature A terrace. The alignments run northeast to southwest.

The eastern end is mostly a cobble alignment. It is filled rather than paved with cobbles, and closed off at the east end. It is open and paved at the western end, extending into the beginning of the boulder alignment. The boulder alignment curves slightly to the north, then extends northeast to southwest. As it continues, the boulder alignments are parallel to one another, but the space between them is c. 0.46 m and closes off at the southwest end. The soil is a silty brown loam that is c. 0.03+ m thick. The southeast side of the alignment consists of large boulders in no particular arrangement. Midden and coral surround the feature area.

FEATURE D: Wall
FUNCTION: Boundary
DIMENSIONS: 20.20 m by 0.70 m by 0.70 m (approx.)
DESCRIPTION: Feature D consists of a wall alignment of cobbles and boulders oriented north to south. The northern end consists of boulders that appear to extend into a possibly stacked (four to five courses) cobble area. The wall continues as boulders, and again possibly extends into a stacked cobble area. Waterworns are present in the cobble area collapse. Approximately 40 to 60 m downhill from the end of the wall at 60 degrees is SIHP 13597 (site 672-42).

SITE NO.: State: 13651 PHRI: 672-96 *(Figure A-20)*
SITE TYPE: Complex (7 Features)
TOPOGRAPHY: Gently sloping outcrop at the edge of the beach. Flat areas have large bedrock boulders.
VEGETATION: Dense amounts of grass and large kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric-possibly historic
FUNCTIONAL INTERPRETATION: Habitation-possible burial-possible ceremonial
DESCRIPTION: The overall complex area measures c. 26.5 m (NW/SE) by 20.7 m (NE/SW). The site complex consists of a platform (Feature A), two terraces (Features B and D), a mound (Feature C), uprights (Feature E), an enclosure (Feature F) and a C-shape (Feature G).

Coral and midden are on the ground surface between SIHP 13573 and 13651. Although there is midden and coral exposed on the soil surface in all directions from Feature A, only one piece is present on Feature A (within the square depression with the upright).

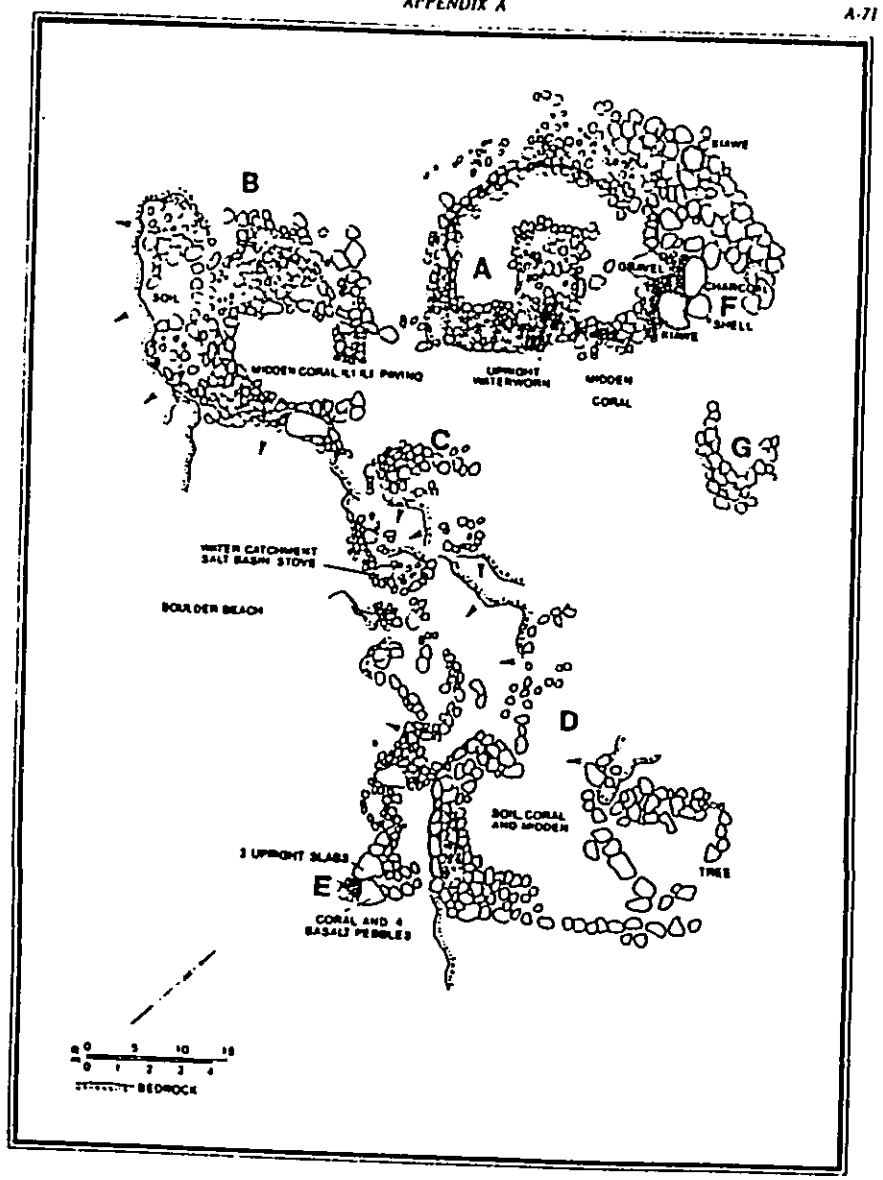
FEATURE A: Platform **State:** Possibly 4022
FUNCTION: Possible ceremonial
DIMENSIONS: 11.30 m by 8.10 m by 0.52 m (approx.)
DESCRIPTION: This platform is irregular in shape, with a shallow and square depression at the center near the southeast wall. There is one upright waterworn basalt stone on the southeast edge of the depression and one waterworn coral cobble near the depression. Large boulders at the northeast end of the platform extend north for c. 2.5 m. The surface of the platform is uneven and the sides are collapsed.

Flat foundation stones are at the northeast, southeast and southwest corners. Basalt cobbles are stacked to a height of c. 0.52 m at the southwest end. Large boulders measuring c. 1.6 m by 0.8 m lie along the northeast end of the platform. The southeast wall is constructed of four courses of stones; however, much of this side is collapsed or built in two tiers.

The platform is covered with dried grass and fallen kiawe trees and branches. Many large boulders are beyond the northeast and northwest walls of the platform; three large boulders define the northeast edge; others expand the platform on the northwest side. Three rows of medium-sized aligned boulders measuring c. 0.45 to 0.46 m wide extend c. 2.2 m east from the northeast end of the platform, meeting two large (c. 1.15 m by 1.05 and 0.90 m by 0.65 m) boulders forming an L-shape and enclosing Feature F and a flat soil surface area.

The area appears to have been burned; however, a charcoal deposit is visible below the burned surface and underlying soil. A large boulder at the northeast end of the platform, near a large kiawe tree, has four grooves worn or abraded into the top, near the northwest end of the boulder. Only one coral fragment was visible; however, portable remains may be present subsurface.

FEATURE B: Terrace
FUNCTION: Possible ceremonial
DIMENSIONS: 7.50 m by 7.20 m by 0.48 m (approx.)
DESCRIPTION: Feature B is c. 2.0 m from Feature A and



F-61

Figure A-20. SITE 13651

extends towards the beach. A flat surface area measuring c. 3.0 m by 4.5 m is walled at the northeast end. An area measuring c. 3.0 m by 2.5 m on the south half of the terrace has 'ili'ili paving, midden, and waterworn coral. The remaining terrace has a somewhat level yet rough surface of small to medium cobble, sloping to the beach outcrop at the west end. There are stones stacked atop the outcrop, meandering southeast toward Features C and D.

The terrace is constructed of piled pahoehoe cobbles forming a 3.0 m by 0.7 m and 0.48 m high wall at the northeast edge of the terrace. The terrace is piled cobbles extending northeast from the beach, creating a level surface c. 3.0 m by 2.5 m with 'ili'ili, coral, and midden. The remaining c. 3.5 m is rough terracing consisting of small to large cobbles with sloping northwest and west sides. The wall on the southwest side joins boulders on the beach outcrop forming a short section of wall extending along the beach. There is a short break in the wall between Features B and C.

FEATURE C: Mound
FUNCTION: Possible burial
DIMENSIONS: 3.72 m by 1.90 m by 0.52 m (approx.)
DESCRIPTION: The immediate area surrounding Feature C consists of a boulder beach to the southwest and northwest; bedrock outcrops and boulders are to the northeast and southeast. Thick grass and large kiawe trees are in the area.

Feature C is constructed of piled basalt cobbles. It is built on the edge of an outcrop oriented east to west and paralleling the beach towards Feature D. The mound is situated c. 0.70 m from the beach outcrop. There is a large salt basin placed atop the beach outcrop c. 2.1 m southeast of the mound.

FEATURE D: Terrace
FUNCTION: Habitation
DIMENSIONS: 11.10 m by 8.00 m by 0.83 m (approx.)
DESCRIPTION: Feature D follows the outcrop paralleling the beach from Feature C. The lower level is c. 2.0 m wide and follows the outcrop at the edge of the beach. A single boulder alignment defines the southeast edge of the terrace for c. 3.5-5.0 m (toward the beach) and a width of c. 6.7 m. Cobbles and boulders have been piled to a height of 0.83 m at the southwest end (meeting the west wall), creating a level surface. The terrace is constructed of aligned boulders along the southeast side, and stacked cobbles and boulders following an outcrop on the northwest side. The south side of the terrace has been disturbed by exploding or falling burned trees at both the east and west ends; the terrace stones at the corners are dislodged.

Midden consisting of cowrie, opihi and Conus were visible. A salt basin is situated on the wall of the lower terrace edge. A large flat beach boulder with a c. 0.07 m depression looks like a possible salt basin.

FEATURE E: Upright (2)
FUNCTION: Possible ceremonial
DIMENSIONS: 2.65 m by 1.55 m by 0.83 m (approx.)
DESCRIPTION: Situated on the beach are two large upright slabs with the top edges leaning towards and touching each other. Two rows of three to four stones extend southwest from the outcrop at the vegetation line towards the base of each leaning upright slab. The interior has rough basalt pebbles, four waterworn pebbles, and coral. The southwest (makai) side has a small platform built up to a height of c. 0.33 m, consisting of five stones with pebbles and coral on the surface.

FEATURE F: Enclosure
FUNCTION: Indeterminate
DIMENSIONS: 1.60 m by 1.50 m by 0.71 m (approx.)
DESCRIPTION: Feature F is formed by large (c. 1.3 m to 0.50 m) boulders at the northeast end of the Feature A enclosure. Nine boulders confine an almost square area with an opening to the east. The enclosure has a flat interior surface with recently burned grass on the surface. A charcoal deposit may be the result of earlier brush or grass fires. Except for the charcoal present within the feature, and one opihi near the southernmost boulder, the feature has no discernible function.

FEATURE G: C-shape
FUNCTION: W.W. II military
DIMENSIONS: 3.50 m by 2.70 m by 0.46 m (approx.)
DESCRIPTION: Feature G is open to the northwest. It is constructed of one to two courses of large cobbles of pahoehoe on a flat bedrock outcrop. The west wall is somewhat longer than the east wall. Coral and midden were visible on the ground surface surrounding the C-shape.

SITE NO.: State: 13652 **PHRI:** 672-97
SITE TYPE: Complex (6 Features)
TOPOGRAPHY: The terrain consists of sloping bedrock outcrops and bedrock boulders.
VEGETATION: Kiawe trees and grasses.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic-possible
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 27.7 m (E/W) by 25.4 m (N/S). The site complex consists of a platform (Feature A), a wall (Feature B), a terrace

(Feature C), two modified outcrops (Features D and E) and a cucular alignment (Feature F). A historic house site (SIHP 13647) identified as Jake Lincoln No 5 on the Mahukona Railway Map (1933) is located immediately to the south; these site complexes may well be a part of the Lincoln site.

A roughly square and open space bounded by Feature A (south), Feature B (east) and Feature C (west) is a level area containing historic trash and building materials.

FEATURE A: Platform
FUNCTION: Habitation
DIMENSIONS: 6.35 m by 3.90 m by 0.83 m (approx.)
DESCRIPTION: Feature A is triangular shape in plan. The walls are built of angular basalt boulders and cobbles. The south wall ends at a bedrock boulder. A pile of cobbles measuring c. 1.0 m by 2.0 m is built against the north half of the east edge, creating a U-shape between cobbles and bedrock on the south.

The platform is constructed of large, angular boulders at the west point of the platform. The south wall consists of large cobbles, and ends at the bedrock boulder. The north wall is constructed of one to three courses of large cobbles; bedrock outcrop is incorporated into the wall at midpoint. The platform interior consists of medium to small angular cobble fill with small waterworn stones and coral on the surface.

Marine shell midden and coral are visible on the feature, with soil at the base of the platform. Historic trash is also on the platform. A square metal post is driven into the ground close to the north side of the platform.

FEATURE B: Wall
FUNCTION: Habitation
DIMENSIONS: 24.25 m by 0.45-1.60 m by 0.30-0.81 m (approx.)
DESCRIPTION: Feature B consists of a boulder alignment extending east from the Feature A platform, and connecting with a north/south wall c 2.0 m east of Feature A. It is constructed of stacked angular basalt cobbles and boulders, one to eight courses high. The north/south wall is constructed of massive bedrock boulders with cobble-filled cracks. Coral and midden are at the base of the boulders. The north section of the wall to the corner is c. 1.0 m wide. The wall angles east and meets the Feature F circular alignment at its north end. Waterworn coral and midden and historic building materials are seen along the north/south wall segment.

FEATURE C: Terrace
FUNCTION: Habitation
DIMENSIONS: 8.40 m by 5.90 m by 0.76 m (approx.)
DESCRIPTION: Feature C adjoins a bedrock outcrop to the south. Massive boulders form the west edge of the terrace. Large angular cobbles are stacked to form the north and west edges, creating a level and paved cobble surface. The level surface meets bedrock outcrop on the south, and boulders on the west. One piece of coral and historic rubbish were visible on Feature C.

FEATURE D: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 8.60 m by 5.75 m by 0.48 m (approx.)
DESCRIPTION: Feature D consists of an outcrop that has been modified with basalt cobbles to create an even surface. It is constructed of large basalt cobbles piled on the southwest side of the outcrop, small cobbles on the surface and between cracks, and forming a small platform below an overhang at the east end. The overhang may have functioned as a cupboard. Historic rubbish is also present on the surface of the feature.

FEATURE E: Modified outcrop
FUNCTION: Habitation
DIMENSIONS: 4.40 m by 2.60 m by 0.41 m (approx.)
DESCRIPTION: Feature E consists of an outcrop that has been modified with basalt cobbles, creating an even surface. It is constructed of large, angular basalt boulders aligned around the south and west ends. Small cobbles are on the surface of the west section of the outcrop. Historic rubbish is also present on the surface of Feature E.

FEATURE F: Alignment
FUNCTION: Habitation
DIMENSIONS: 2.20 m by 1.70 m by 0.30 m (approx.)
DESCRIPTION: Feature F consists of a circular alignment of boulders. Single-course high, it is situated at the northern end of the Feature B wall.

SITE NO.: State: 13653 PHRI: 672-14 *(Figure A-21)*
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: The terrain slopes seaward and consists of bedrock outcroppings and boulders.
VEGETATION: Dense grass and kiawe trees.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: The overall complex area measures c. 31.6 m (E/W) by 17.5 m (N/S). The site complex consists of two enclosures (Features A and C), a C-shape (Feature B) and a mound (Feature D) with salt pans. Coral, shell midden, 'ili'ili and boulder-constructed salt pans are present.

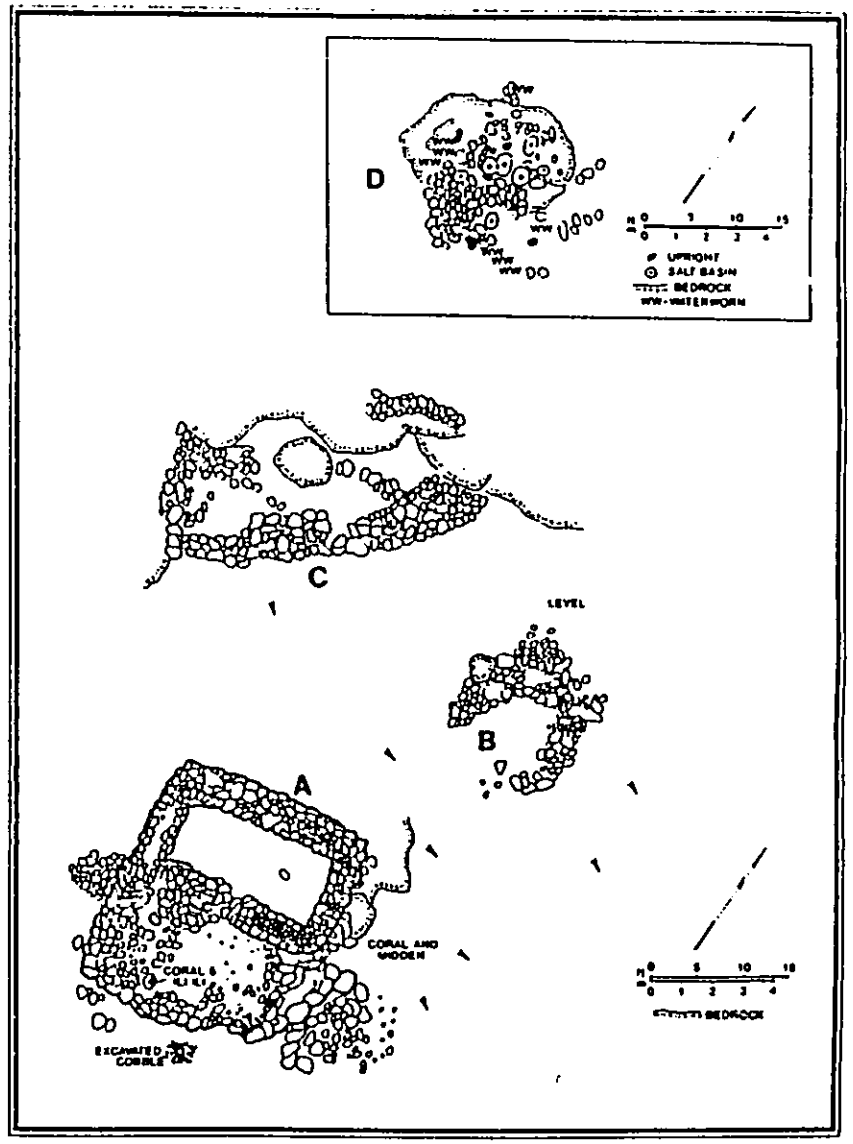


Figure A-21. SITE 13653

This site complex was previously recorded individually by Tuggle and Griffin (1973) and Conner (n.d.). In addition, numerous excavated test units were also visible throughout the site.

FEATURE A: Enclosure State: 4683 Conner 3
FUNCTION: Habitation
DIMENSIONS: 8.50 m by 8.25 m by 1.74 m (approx.)
DESCRIPTION: Feature A consists of an enclosure with an adjoining terrace. The enclosure measures c. 7.00 m by 4.25 m. The wall widths range from 0.85 m to 1.30 m. The heights range from 0.83 m to 1.74 m along the exterior and 1.05 m to 1.23 m along the interior.

The enclosure has bi-faced, core-filled walls with an opening near the midpoint in the west wall. The walls are constructed of five to six courses of angular basalt cobbles and boulders. Several waterworn boulders are in each wall and on the surface of the wall. The northwest portion of the wall has collapsed.

The walls are vertical on the interior; the exterior slopes outward from the top to the base for c. 0.30 m. Three exterior corners are rounded; the northwest corner is square. The interior walls form right angles at the northwest and southwest corners. The northeast and southeast corners are not right angles.

A small cupboard is located at the bottom of the east wall and at c. 0.40 m from the southeast interior corner. It measures c. 0.60 m by 0.54 m by 0.35 m deep.

Immediately adjacent to the west side of the enclosure is a cobble terrace. It measures c. 6.5 m by 3.85 m, and the height ranges from c. 0.38 m to 0.83 m. The cobble terrace has 'ili'ili paving and waterworn coral pebbles and cobbles on the surface. In addition, shell midden was also visible.

FEATURE B: C-shape State: 4684 Conner 4
FUNCTION: Habitation
DIMENSIONS: 4.30 m by 4.20 m by 0.71 (approx.)
DESCRIPTION: Feature B is open to the northwest. It is constructed of two to four courses of stacked basalt boulders and cobbles. Moderate amounts of shell midden were visible.

The southeast wall is linear, with four large aligned boulders on the interior; the exterior is faced. It measures c. 3.0 m in length and 0.8 m in width.

The northeast wall curves to the north and is somewhat retaining in form. There is soil to the top of the wall, with piled and scattered cobbles and boulders. It measures c. 3.85 m in length and 0.63 m in width. The northeast wall is built against bedrock at the northern end.

FEATURE C: Enclosure State: 4685 Conner 5
FUNCTION: Habitation
DIMENSIONS: 10.4 m by 5.5 m by 0.78 (approx.)
DESCRIPTION: Feature C consists of an outcrop that has been modified to form an enclosure. Two low walls abut the outcrop at the north and south ends. The walls are two to four courses high, constructed atop the outcrop near the south end. The enclosure is built with stacked basalt boulders and cobbles, both angular and waterworn. Surface shell midden is present and a possible salt basin is on top of the east/west wall.

There is a low wall within the interior of the enclosure, extending north toward the outcrop from the south curve of the enclosure wall. This low wall may be stones from previously excavated test units.

FEATURE D: Mound/terraced outcrop State: 4686 Conner 6
FUNCTION: Habitation-salt collecting
DIMENSIONS: 6.0 m by 4.47 by 0.51 (approx.)
DESCRIPTION: Feature D is an outcrop that is leveled with waterworn and rough basalt boulders and cobbles on the surface of the outcrop. Scattered stones on the outcrop along the south edge of the feature, and two to three courses of stone on the north and east, make the surface somewhat level.

A single course of boulders is aligned to the northwest. Four large waterworns lie along the north edge of the terrace.

The bedrock boulder surface has one and possibly two shallow salt basins. Five deeper, portable salt basins were also present. Waterworn coral is distributed on the surface.

SITE NO.: State: 13654 PHRI: 672-103
SITE TYPE: Modified outcrop
TOPOGRAPHY: The terrain consists of outcrops sloping north toward gully and west toward the ocean.
VEGETATION: Dense grass and kiawe trees with some open spaces between the trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate-probably W.W. II
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 29.80 m by 5.00-6.00 m by 1.03 m (approx.)

DESCRIPTION: The outcrop is modified with basalt boulders and cobbles stacked atop an outcrop. The boulders and cobbles are piled one to three courses high in five places along the length of the outcrop. Four large cracks are filled with cobbles. Two cracks have boulders on the top creating small, protected spots below. No cultural deposit was noted; insulator wire and rifle cartridges were present.

SITE NO.: State: 13655 PHRI: 672-104
SITE TYPE: Enclosure
TOPOGRAPHY: The terrain consists of aa boulders, outcroppings and pahoehoe flows. There is a cliff (pali) to the west.
VEGETATION: Kiawe grove with dense grasses.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DIMENSIONS: 8.00 m by 4.70 m by 0.48 m (approx.)
DESCRIPTION: The enclosure is situated on a bluff overlooking Mahukona Harbor. A high bedrock bluff is to the west and northwest of the site.

Rectangular shape in plan, it is oriented c. north/south. The south end of the enclosure is built against bedrock outcropping. The low walls are constructed of loosely piled angular cobbles and boulders. There are fairly vertical faces on portions of the interior walls, especially the east wall. The walls measure c. 0.60-0.90 m wide and 0.23-0.48 m high. An upright boulder is present at the southeast corner of the enclosure.

Waterworn basalt is also visible in the east and west walls. A Thaididae and three small pieces of waterworn coral are at the base of the exterior northwest corner. Two large (fist-size) pieces of waterworn coral are on the south section of the east wall.

SITE NO.: State: 13656 PHRI: 672-105
SITE TYPE: Enclosure
TOPOGRAPHY: The terrain slopes seaward and consists of many high bedrock outcroppings and aa boulders.
VEGETATION: Various grasses, sisal and kiawe trees.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture/ temporary habitation
DIMENSIONS: 9.20 m by 5.60 m by 0.75 m (approx.)
DESCRIPTION: The site consists of two walls abutting a high (0.78-1.00 m) outcrop ledge. Oriented c. east/west, the walls are constructed of pahoehoe boulders and cobbles, one to two courses high and stacked on the flat pahoehoe surface south of the outcrop ledge. The west wall of the enclosure extends c. 3.4 m northwest and stops c. 0.70 m from the outcrop ledge.

A cobble wall on top of the outcrop ledge extends c. 4.4 m west of the enclosure. It is constructed of stacked pahoehoe boulders and cobbles. One upright is positioned against the outcrop at the north end of the east wall.

APPENDIX B

LIMITED HISTORICAL DOCUMENTARY RESEARCH

by Helen Wong Smith, B.A.

The ahupua'a of Kou, Kamano, Mahukona, Hihiu, and Kaoma on the leeward side of North Kohala are rather obscure in regards to historical references. This is due to the fact that the windward side, with its numerous watercourses, was chosen in both prehistoric and modern times as the center of Kohala. The leeward side is characterized by long gradual slopes or kula lands, some intermittent streams, and a dry climate along the coast (Loo and Bonk 1970:28). Previously, the shoreline was populated with fishing villages, scattered house sites, and shelters. The upland regions show evidence of agricultural land use in prehistoric times, but most of this evidence has been destroyed from ranching activities (ibid).

Translations for the names of the above ahupua'a were sought in the community written anthology Kohala Kua. Only two out of the five names were found. For Kou: "a land division near Mahukona get its name from a tree named Kou which was grown along the leeward coast for shade and hard wood for bowls." The authors of the anthology surmise that Mahukona, which is translated "leeward stream," denotes a stream that must have flowed in ancient times when the mauka forests were lower (McDonald and McPeek 1977:107). Makaohule Point, which is located in Mahukona, is translated in the anthology as "eyes (or point) of Hule"; there is no mention of who Hule was. Also given in the anthology are two chants that mention Kohala. The chant "No Kohala Kamakani" in its first verse tells of the winds of Kohala:

No Kohala Kamakani
The winds of Kohala
Kamakani apa'apa'a
They blow from all directions
Oni ana oni ana kou kino
(or collide with each other)
Oni ana oni oni iho no
They will shake, shake your body

Another chant, "E Kamehameha Ekahi," mentions Kohala:

No keiala
This child who comes from
Keiki kupa hanau no na Kohala
(or was born in) Kohala

Kohala is often mentioned in Hawaiian legends. Kalakaua's book of legends mentions Kohala 61 times. Yet, there is no complete story which could be considered belonging to Kohala (Loo and Keawe 1977:111). Legends of Pupukea and of Punui speak of Kohala in general. The legend of Halemano, whose beautiful wife Kamalalawalu was often unfaithful, mentions Puu of Nale, which is in the subject ahupua'a. Here is an excerpt:

> Being lonely, Halemano began courting Kukekaala, the daughter of Nunulu, one of the high chiefs of Kohala. Kamalalawalu heard of Halemano's chanting and when she heard him she longed to return to him because he looked so handsome. But she had not reckoned with the high chief's daughter! Kukekaala sponsored a kilu contest. [A player chanted as he tossed a quoit towards an object placed in front of one of the opposite sex; if he hit the goal he claimed a kiss.] This contest was held at a popular kilu place, on the hill looking to the west, close to Puuonale and Hukukekii, with the winner to get the other as prize (Loo and Keawe 1977:111).

Traditional references indicate that Kohala was often the scene of warfare between chiefs of the island of Hawaii and those of Maui. It is on the leeward coast where Kamehameha was born to the wife of one of the war leaders while an attack on Maui was being prepared (Tomonari-Tuggle 1981:57). Kamakau (1964:67) relates that the war fleet was "encamped at Kohala, from Koai'e to Pu'uwepa." Handy and Handy note that from "this feudal seat he (Kamehameha) gradually extended his power to embrace the whole of the island, eventually gaining the suzerainty of all the Hawaiian Islands (1972:528). It is at Kohala that Kamehameha's son, Liholiho, retired to await the purification of Kailua, Kona (where Kamehameha died), before returning to be proclaimed king (Char and Char 1983:97).

Proverbs for Mahukona are given in Pukui's 'Olelo No'eau:

Ke awa haulanii o Mahukona.
(The restless harbor of Mahukona.)

Poets refer also to the surging (hanupanupa) waves of Mahukona.

Mahukona kalua pa'a.
(Mahukona, roasted whole.)

An epithet applied to Mahukona, Hawai'i. During Kamehameha's rule, Kanemakini, a native of Mahukona, was roasted whole there for thievery.

Makani luna ke lele 'ino mai la ke ao
(There is wind from the upland, for the clouds are set a-flying.)

Signs of trouble area seen. This saying originated shortly after the completion of the Pu'ukohola heiau by Kamehameha I. He sent Keaweaheulu to Ka'u to invite Keouakuahu'ula to Kawaihae for a peace conference between them. Against the advice of his own high priest, Keouakuahu'ula went, taking his best warriors along with him. When outside of Mahukona, he saw canoes come out of Kawaihae and realized that treachery awaited him. It was then that he uttered the words of this saying. His navigator pleaded with him to go back, but he refused. Arriving in Kawaihae, Keouakuahu'ula stepped off the canoe while uttering a chant in honor of Kamehameha. One of the latter's war leaders stepped up from behind and killed him. All of his followers were slaughtered except for Kuakahela, who hid and later found his way home, where he wailed the sad story.

The first reference by an early historic writer is found at the time of Cook's visit to the Kohala coast:

> ...the ships traded first at North Kohala where the people watched the sailors on the ships eat watermelon and were struck with how ferocious they were devouring the flesh of men. Here the sailors began to strip their uniforms of buttons to sew on pieces of red cloth as dazzling gifts for the girls (DLNR 1972:19).

Lt. King, part of Cook's crew in 1779, explored Kohala and wrote:

> The country, as far as the eye could reach, seemed fruitful and well inhabited...[three and four miles inland, plantations of taro and potatoes and wauke] neatly set out in rows. The walls that separate them are made of the loose burnt stone, which are got in clearing the ground; and being entirely concealed by sugar-canes planted close on each side, make the most beautiful fences that can be conceived....To the left a continuous range of villages, interspersed with groves of coconut trees spreading along the sea-shore; a thick wood behind this; and to the right, an extent of ground laid out in regular and well-cultivated plantations, as far as the eye could reach (Tomonari-Tuggle 1981).

While traveling from Kapa'au on the windward side of North Kohala to Kawaihae, south of the project area, Rev. William Ellis made these observations:

> In this part of the island there is another tradition very generally received by the natives...These traditions respect several visits, which in remote times some of the natives made to Nuuhiva and Tahuata, two islands in the Marquesan group, and to Tahiti, the principal of the Society Islands.
>
> One of these accounts the natives call, "The Voyage of Kamapiikai," in which they state that Kamapiikai (child running or climbing the sea-from Kama, a child, pii, to run or climb, and kai, the sea) was priest of a temple in Kohala, dedicated Kanenuiakea. This priest had journeyed to Tahiti in four double canoes and after 15 years returned, then made 3 subsequent voyages.
>
> About three p.m. we reached Owawaa, a considerable village on the north-west coast, inhabited mostly by fishermen. Here we tried to collect a congregation, but only three women and two small children remained in the place, the rest having gone to Waimea to fetch sandal wood for Karaiomoku.
>
> From Owawaua we passed on to Hihiu, where we had an opportunity of speaking to a small party of natives.
>
> In these villages we saw numbers of canoes and many large fishing nets, which are generally made with a native kind of flax, very strong and durable...
>
> ...we procured a canoe to take us to Towahihae, from which we were distant about twenty miles.
>
> Though we had numbered, in our journey today, 600 houses, we had not seen any thing like four hundred people, almost the whole population being employed in the mountains cutting sandal wood.
>
> Before daylight on the 22nd we were roused by vast multitudes of people passing through the district from Waimea with sandal wood, which had been cut in the adjacent mountains for Karaimoku, by

the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach, for the purpose of its being shipped to Oahu.

There were between two and three thousand men, carrying each from one to six pieces of sandal wood, according to their size and weight (Ellis 1963:284-286).

Tomonari-Tuggle writes that during the early 1800s, settlement along the leeward coast grew. Construction included the enlargement of chiefs' residences and extensive wall-building to enclose the houselots and gardens. This was due to a number of factors, including maintaining the productivity of the leeward agricultural fields and the use of the landing at Mahukona by natives and foreigners.

An 1833 letter from missionaries at Waimea, Hawaii to the Board of Commissioners for Foreign Missions noted that:

> The population as enumerated in 1832 was 8,014— many of these live along the western shore where there is a good fishing ground, a still greater number along the line of cultivation which commences two or three miles inland. Over all the interior and also the eastern part of the district, the population is more uniformly scattered (American Board of Commissioners for Foreign Missions circular of March 15, 1833; copy in the Hawaii Mission Children's Society Library.)

In 1835, the population of North Kohala was listed in another missionary census as 6,175, the first accounting of population by named land units (Kumu Hawaii 1835:98). The census showed an even distribution among the ahupua'a of the district, with a slightly higher population on the leeward side.

During the mid 1800s, settlements and agricultural areas consolidated toward the windward side of the district. "The windward side, especially the kula gulches which had been a focal point of settlement in earlier periods, became even more so as the leeward side was gradually abandoned" (Tomonari-Tuggle 1981:33).

Tomonari-Tuggle discusses what land was predominately used for on the leeward side:

> In the 1840s, herd of wild cattle, derived from the few head introduced by Vancouver in 1793, were creating havoc in the native gardens on the leeward slopes of Kohala and Waimea. Cattle hunting, a lucrative profession in the mid-19th century, evolved into the ranching business which required defined pasture lands and facilities (Wellman 1973). Large parcels on the leeward side of Kohala were purchased or leased for this purpose. Among significant cattle operations of this period were Kohala Ranch, part of the James Woods estate, Puakea Ranch, started in 1885 by James Wight but later leased to Kohala Ranch...(1981:35).

The Mahele caused the parceling of the Hawaiian nation's land between the throne, chiefs, and the government, respecting the rights of native tenants. Few claims were made on the leeward side of North Kohala by chiefs, as most clamored for the water-rich windward side. Tomonari-Tuggle (1981) writes of Mahukona:

> The disposition of Mahukona is unclear; it is noted as an award to Keelikolani, but became government land either through commutation or because the title was never perfected. Reg. 1704 shows grants to H. Christisen Grant 1992 for 735 acres; Two Gr. 2475 to Kamahiai, one for 70 acres to other not noted for acreage; Gr 1993 to J.D. Grasse for 100 ac; Gr. 3791 to Govt. says W.G. Irwin for 181 acres.

The ahupua'a of Kou and Kaoma are both listed as government land (Indices). A 1910 composite of Reg. Maps 1704, 1705, and 1706 indicates that in Kou, Grants 3405 and 3406 belonged to the James Woods estate, with a parcel of 145.50 acres to Kalimalena, Grant 2765. The ahupua'a of Kamano went to Lot Kamehameha (LCA 7715, with the exception of LCA 10679 to Palua for 38.08 acres). According to the 1910 map, Hihiu also went to Lot Kamehameha under the same LCA. The Indices lists Hihiu as Government land, so it may be assumed that it was given up as commutation. The following testimonies are for parcels in Mahukona:

> LCA 8729 to Kaheana, Native Test. 4:113 - Kane (konohiki) sworn & stated: "I have seen in the ili land Kiloa of Mahukona 1 ahupuaa, 3 sections. Sec. 1 (mauka) the boundaries are for the konohiki. Sec. 2 mauka and all around is my land. Sec. 3 All of the boundaries are mine; it has been cultivated, no house is there. House-lot section, Mahukona 3 ili: It has been enclosed and three houses are for him. The surrounding boundaries are for the konohiki. It was acquired at the time of Kamehameha I from his parents; no one had objected.

> LCA 8723 to Kaholwai, Native Test. 4:132 - Kalawaia sworn and stated: "I have seen in the ili land of Hakolono in Mahukona ahupuaa, Sec 1 all of the boundaries are for the konohiki; it has been cultivated. Sec 2, Kumukou ili The boundaries are exactly the same as sec 1; one half of it has been cultivated; no house. Sec 3, the ili of Iliku, all around is for the konohiki, one half of it has been cultivated and one house is for his people. Sec 4, the ili at Kamuku. The boundaries are exactly the same. It has been partially cultivated and 1 house is for his people. This was acquired during the time of Kam I from Hewahewa, no one had objected.

A large percentage of government land was made available through grants, and most of this was sold in the early 1850s. Thus, by 1860 most of the leeward coast was held as private property, with the government retaining only a small parcel in Kokoiki-Pu'uepa, a parcel in Kapa'a, and a section of the uplands (Tomonari-Tuggle 1981:58) (See Figure B-1).

A drawing showing plantations in North Kohala, all of which are located on the windward side, shows that the leeward side of the district fell under the jurisdiction of the Kohala Ranch Co., Ltd. (Char and Char 1983:96). In the 1880s, the Hawaiian Railroad Co. foundation was laid. It is credited as one of the major factors in the success of the Kohala sugar industry and the development and maintenance of a tie between Kohala and the modernizing world (Tomonari-Tuggle 1981:75). The railway was the lifeline of Mahukona port, running around the northern base of the Kohala Mountains to Niuli'i. It existed primarily to haul sugarcane and bagged sugar, but it also transported freight to some of the villages and plantations along the way and carried passengers in tiny wooden cars (Clark 1985).

In his book, The Hawaii I Remember (Kaneohe 1965) John Scott Boyd Pratt, Jr., manager of Kohala Sugar from 1936 to 1949, writes of King Kalakaua taking the train to attend ceremonies in Kapa'au:

> Along with the plantation purchase came the full ownership of the Hawaii Railway and its facilities at Mahukona. This 20-mile railroad from Mahukona to Niuli had been started by my great uncle, Samuel G. Wilder, who originally planned to carry it to Hilo by way of Hamakua. One of the cars was finished with etched glass doors and better seats. About 1883, King Kalakaua rode in it from Niuli to Kapaau to be present at a ceremony at the King Kamehameha statue at the Kohala courthouse. Destined for Honolulu, this statue had been sunk on its way out from Italy. A second statue was made for Honolulu and when the original was later recovered, it was brought to Kohala, Kamehameha's birthplace (Char and Char 1983:97).

Fifty years after Ellis' tour of the island, another descriptive narration of the vicinity is made. This one is found in The Island of Hawaii:

> Thence the road passes through cane fields and pasture lands until, at a point between two mills, just after sight can be had of the ocean directly westwards, a fork is encountered. The southerly branch leads past the ancient sugar mill, which was the first built on this island, and on to Mahukona, which is the shipping point for the entire district, hence a railroad runs throughout the district, but it carries no regular passenger traffic (Kinney 1913:49).

When the Hawaii Consolidated Railway Co. ceased operations in 1937, the port and railway were taken over by Mahukona Terminals, Ltd, a subsidiary of Kohala Sugar Co. (KSC). KSC, incorporated on Feb. 3, 1863, originally covered 3,282 acres, but by 1937 it had expanded to 13,000 acres through consolidation with other mills and plantations. The railway linked all components of the extensive plantation with Mahukona port. Raw sugar manufactured in the mills was bagged, transported on railcars to a warehouse at Mahukona, and stored until the arrival of a freighter (see Figure B-2). When the U.S. Navy closed Mahukona for security reasons, the sugar was transported to Pa'auilo and then onto Hilo Harbor. When the April 1, 1946 tsunami demolished three railroad bridges on the Hamakua coast, KSC reopened Mahukona until 1956, when the sugar was sent to Hilo again (Clark 1985).

As the demand for sugar diminished, Kohala started to lose its population. The death knell came when Castle & Cooke, owner of Kohala Sugar Company, closed operation of the 14,500 acre plantation in 1975 (Char and Char 1983:98). The closing of the harbor spelled the end of the leeward settlement. The current use of the leeward area is primarily recreational. The two county parks at Kapa'a and Mahukona have restrooms and pavilions and are used by campers, picnickers, and swimmers. The old Mahukona Harbor facilities (privately owned) are used by swimmers, although there are no public facilities (Tomonari-Tuggle 1981:59).

In 1956, Hawaiian cultural specialist Violet Hansen visited Mahukona Harbor and identified a nearby site which

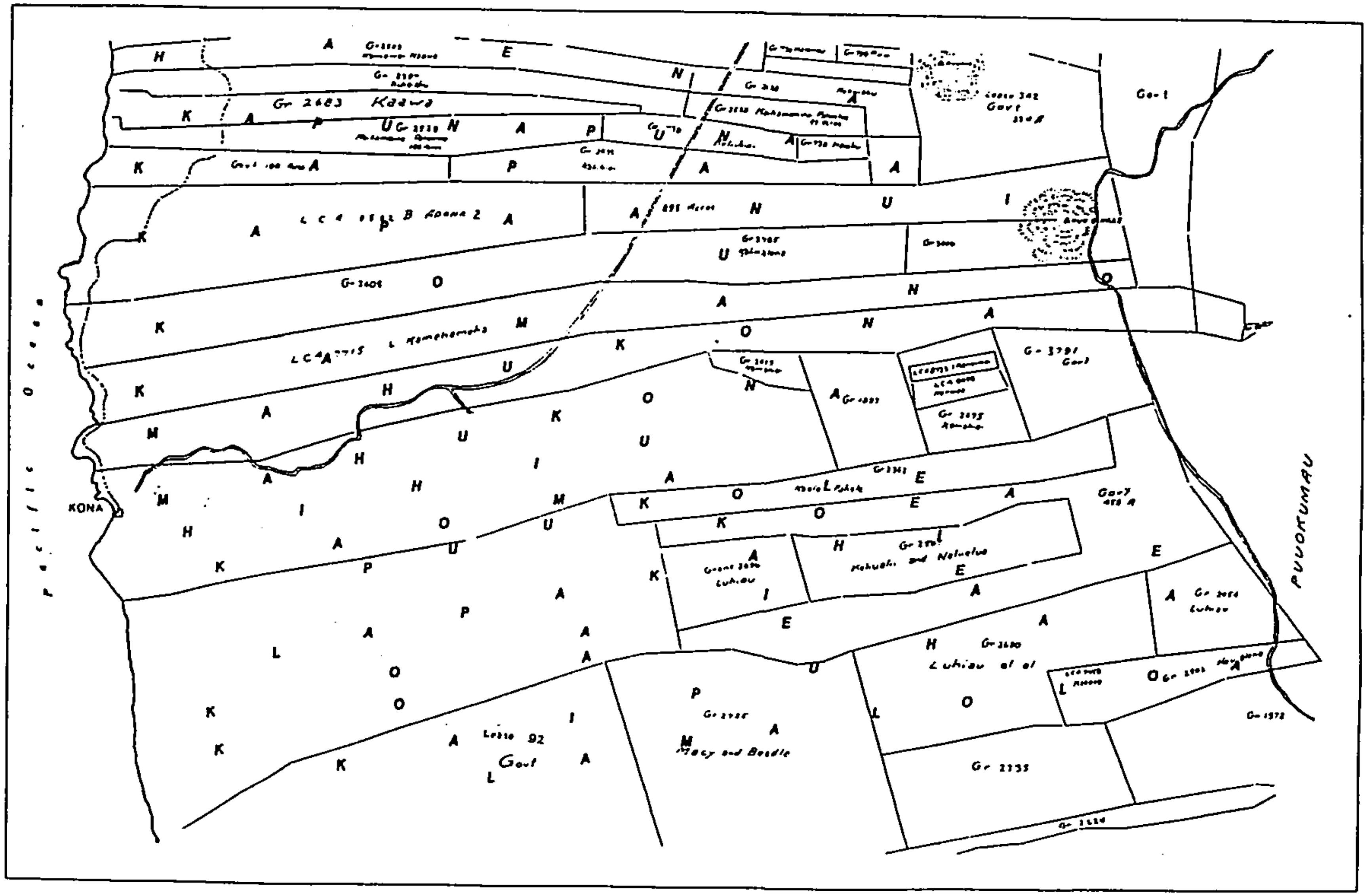
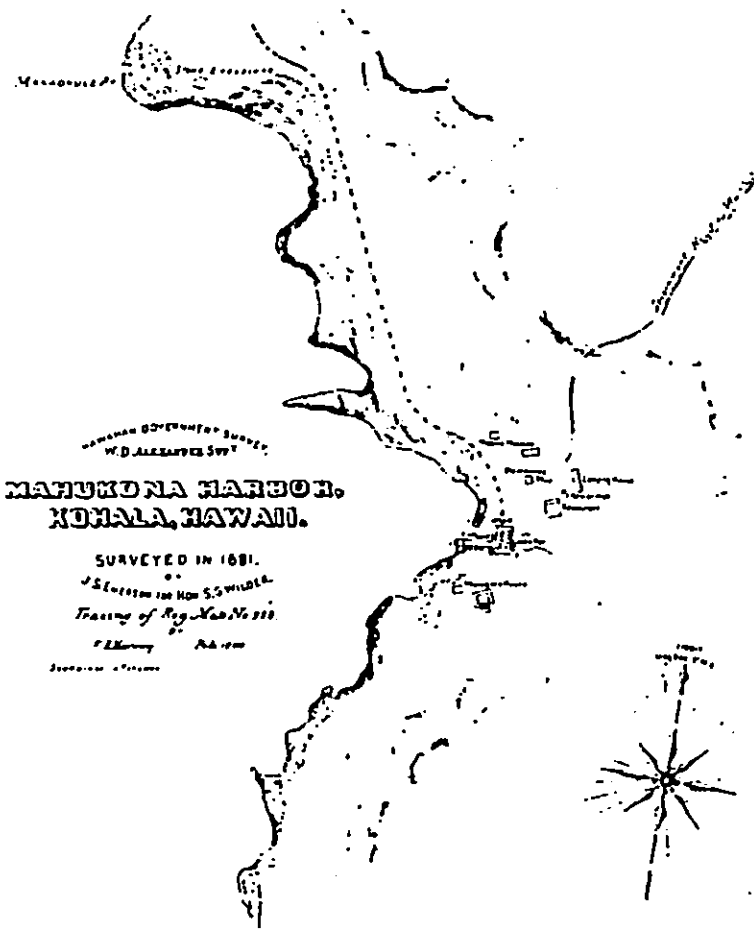


Figure B-1. MAP SHOWING LCA'S AND LAND GRANTS (REDRAWN FROM EARLY TAX MAPS)



F-67

Figure B-2. 1890 MAP OF MAHUKONA HARBOR

she refers to as a heiau. Hansen also recorded the story of a cave north of Mahukona; in this cave were found idols, stone objects, and artifacts (Hansen 1956). Certificate of Boundaries (dated 1882) for Kapaanui #148 to James Woods, the owner of said land, refers to an "old heiau or wall of stones on sea shore" (Hawaii State Survey Office) at the boundary between Kapaanui and Kou.

REFERENCES CITED

Char, T. and W.J. Char

1983 Chinese Historic Sites and Pioneer Families of the Island of Hawaii. Honolulu: University of Hawaii Press.

Clark, J.R.K.

1985 The Beaches of the Big Island. Honolulu: University of Hawaii Press.

DLNR (Department of Land and Natural Resources)

1972 North Kohala: Preservation Master Plan for Historical Resources. Preliminary Draft for Public Review. Div. State Parks, Outdoor Recreation, and Historic Sites, Dept. Land and Natural Resources.

Ellis, W.

1963 Journal of William Ellis. Honolulu: Advertiser Publishing Co., Ltd.

Hansen, V.

1956 IN Tomonari-Tuggle 1981.

Indices

1929 Indices of Awards Made by the Board of Commissioner to Quiet Land Titles in the Hawaiian Islands. Honolulu: Territory of Hawaii.

Kinney, H.W.

1913 The Island of Hawaii: Hilo: Published by Henry Wadsworth Kinney.

Loo, V.H., and W.J. Bonk

1970 A Historical Site Study and Evaluation of North Hawaii. Anthropological Research International. Prepared for Hawaii County Planning Dept.

Loo, D., and C. Keawe

1977 IN Stephenson 1977.

McDonald, M., and F. McPeek

1977 IN Stephenson 1977.

Pukui, M.K.

1983 'Olelo No'eau: Hawaiian Proverbs & Poetical Sayings Special Publication No. 71. B P Bishop Museum.

Stephenson, L.K.

1977 Kohala Kela (This is Kohala): A Collection of Community Expressions. Center for Continuing Education and Community Services, University of Hawaii at Hilo.

Tomonari-Tuggle, M.J.

1981 North Kohala: Perception of a Changing Community, A Cultural Resource Management Study. Prepared for Dept. Land and Natural Resources, Div. State Parks. (Uncirculated report)

APPENDIX C

SELECTED PHOTOGRAPHS

Figure C-1. SITE 4123, SALT PANS. View to W. (PHRI Neg.1361-9)

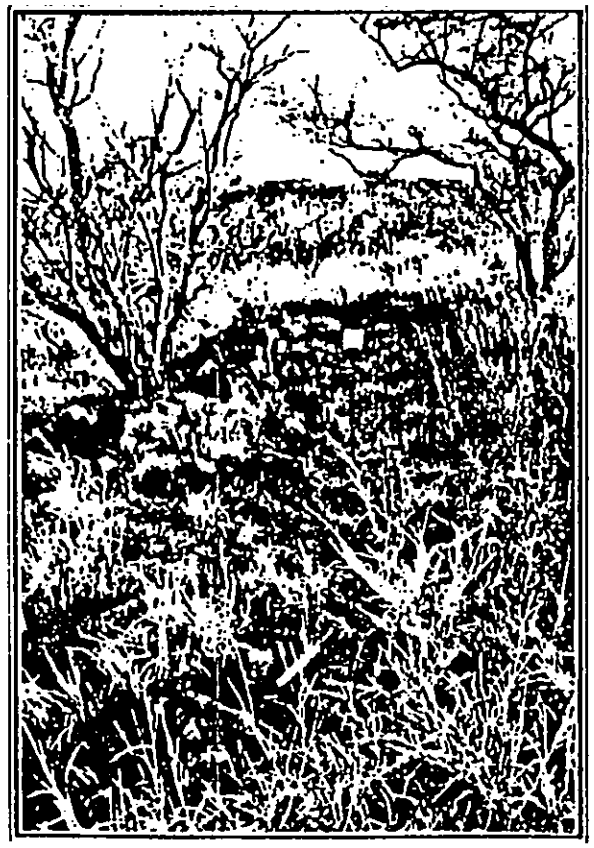


Figure C-2. SITE 13570, TRAIL SEGMENT. View to NE.
(PIIRI Neg.1367-6)

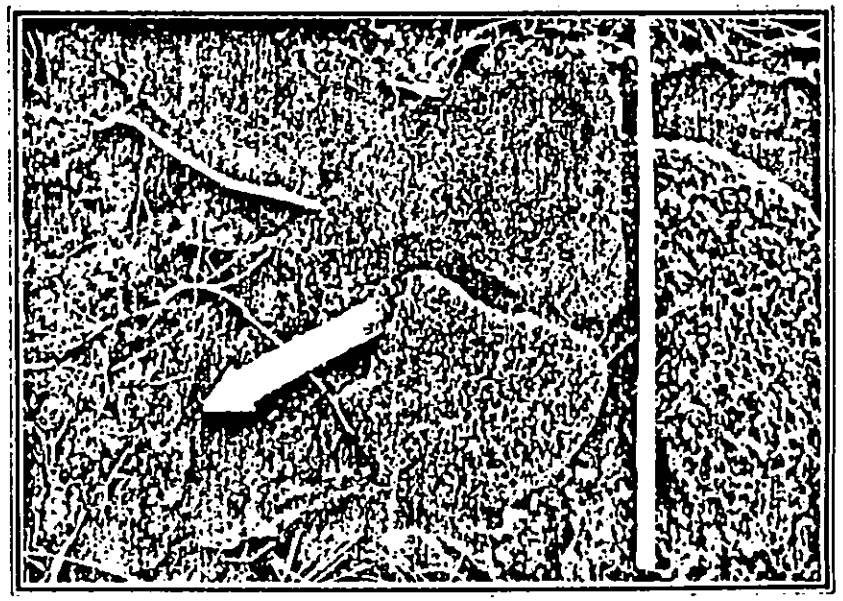


Figure C-3. SITE 13581, SALT BASIN. View to ESE.
(PIIRI Neg.1368-15)

F-70

Figure C-4. SITE 13584, FEATURE D, MODIFIED OUTCROP. View to E.
(PHRI Neg.1370-26)

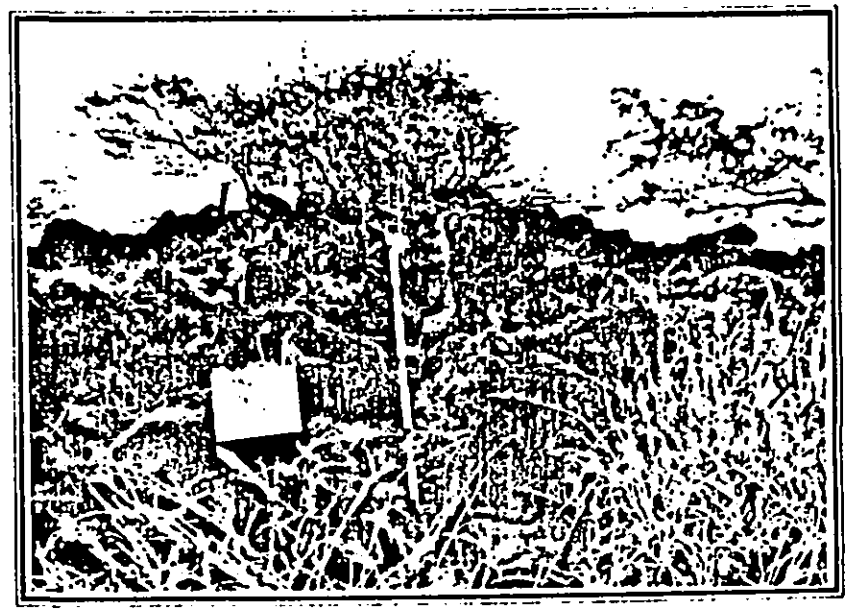


Figure C-5. SITE 13584, FEATURE A, PLATFORM. View to NE.
(PHRI Neg.1370-21)

F-71

Figure C-6. SITE 13587, FEATURE C, OVERHANG. View to NNE.
(PHRI Neg.1372-29)

Figure C-7. SITE 13593, FEATURE A, PLATFORM. View to E.
(PHRI Neg.1366-19)

Figure C-8. SITE 13597, FEATURE E, OVERHANG WITH WALL. View to E.
(PHRI Neg.1368-22)

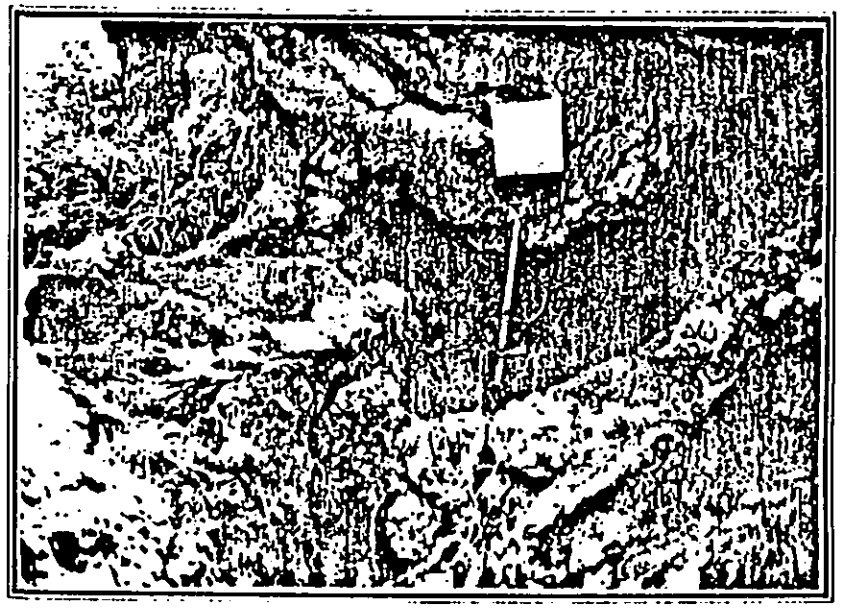
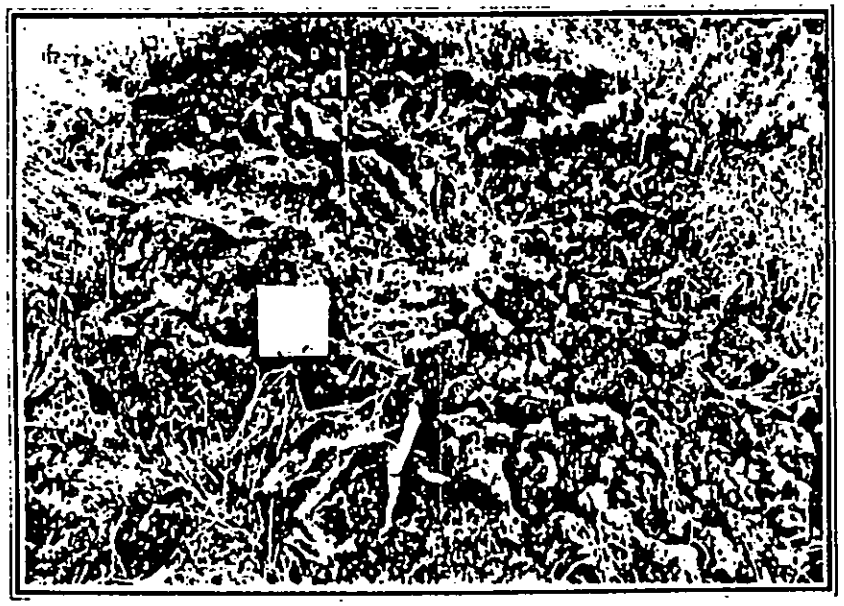


Figure C-9. SITE 13598, OVERHANG. View to ESE.
(PHRI Neg.1367-15)



F-73

Figure C-10. SITE 13599, FEATURE B, SMALL ENCLOSURE WITH UPRIGHT. View to NNW. (PHRI Neg.1367-9)

Figure C-11. SITE 13600, C-SHAPE. View to NW. (PHRI Neg.1367-14)

F-74

Figure C-12. SITE 13611, TERRACE WALL WITH BOTTLE DUMP. View to E. (PIIRI Neg.1374-8).

Figure C-13. SITE 13633, FEATURE A. ENCLOSURE. View to NW. (PIIRI Neg.1364-31)

F-75

Figure C-14. SITE 13627, FEATURE B, CARINICUPBOARD. View to NE.
(PIIRI Neg.1373-4)

Mahukona

Appendix G: *Assessment of Cultural and Historical Values Discussion of Site Relationships Disclosure of Additional Site Discoveries Recommendations for Development and Interpretation*

PRELIMINARY REPORT:

Assessment of Cultural and Historical Values

Discussion of Site Relationships

Disclosure of Additional Site Discoveries

Recommendations for Development and Interpretation

CHALON INTERNATIONAL MAHUKONA PROPERTIES

Including

Lands of Kou, Kamano, Mahukona I & 2, Hihiu and Paoma

NA MAKA'ALA 'O KOHALA

Monday, April 16, 1990

April 17, 1990

Russ Cordy
Historic Site Section
DLNR
Division of State Parks
P. O. Box 621
Honolulu, HI 96809

Dear Russ,

We have also finished a preliminary report on the Mahukona area, which we include in this letter. You will quickly discover that HPSI has not identified all of the historic sites in Mahukona (to date we have found about 23 features not mentioned in their inventory), and therefore, we have been bogged down with clearing sites and carefully searching the sisal for more sites. However, this report should give you and Chalon a taste of what we can accomplish with the help of our masters.

In light of all the discoveries we have been making recently, we would like to have you back for another visit, to tour the sites we have found, and make note of certain excavations and alterations we think are happening to sites. We hope you can make the time to return to Kohala sometime soon.

We all thank you for your support and encouragement.

Me he aloha,

Marlenakim Stafford
President

NA MAKA'ALA O KOHALA P. O. BOX 463, HAWI, HI 96719

G-2

Preliminary Report: Mahukona Properties

The purpose of this report is to provide information to Chalon International; its hired firms Paul H. Rosendahl, Ph.D., Inc., Gaye Davis Associates, and PBR Hawaii; the State of Hawaii Department of Land and Natural Resources Preservations Office; and eventually the general public about the historical sites and features included within the boundaries of Chalon's proposed Mahukona resort.

Na Maka'ala 'O Kohala, a non-profit organization based in Kohala, and made up primarily of Kohala community members, has prepared this report in response to requests of Chalon International and its hired firms for information about the cultural significance of the many historical sites contained within its Mahukona properties. Our organization relies upon volunteer participation of our members to locate, understand and preserve historical sites, and educate others about Kohala's history.

In March, 1990, Na Maka'ala 'O Kohala began examining sites in the Mahukona area. Our *kupuna* (elders and teachers), Robert and Marie Solomon, who are lifetime residents of Kohala, have been invaluable in the assessing of each site and determining its purpose and meaning. Mr. Solomon has explored this area many times over the years, and is familiar with its history for the past sixty years from his own experience, and with oral histories which come from the distant past. He was employed as a equipment operator at the Mahukona terminal during Kohala's sugar days. Mrs. Solomon is an historian who was schooled by her grandmother in both family history and the many details of ancient Hawaiian lifestyles and religion. We acknowledge the Solomons for their expertise, and thank them for their patience as we learn from them.

We feel this assessment is necessary to assist Chalon and its hired firms to make educated judgements about land use for the purposes of *tentative* planning. With Chalon's continued cooperation, Na Maka'ala O Kohala will continue research in the field until we are satisfied all important information has been revealed. We believe that this is desirable for developers, historians, prospective residents of Mahukona and, most importantly, the citizens of Kohala.

This report must be considered preliminary because:

a) findings of PHRI have not yet been made known to Na Maka'ala O Kohala, and
b) we are still discovering sites which, by their presence, shed new light on the meanings and purposes of land areas.

After being asked by Chalon International to assist in the assessment of cultural values within its proposed resort, our organization conferred with Mr. Paul Rosendahl of PHRI, who was reasonably certain all important sites had been located by his firm. Our first efforts were aimed at clearing sites PHRI had identified, in an effort to determine their meanings. However, as we began to search around identified features, we began to discover not all sites had been found. In some cases, for example in the saltmaking areas mentioned below and near Unu O Lono, large complexes have been uncovered which completely change the context of sites which originally seemed insignificant. Because of the amount of time it takes to clear these "new" sites, NMOK has been delayed in its assessment, and will need

additional time. However, we feel the wait is worthwhile; each new find we make adds to the value of Chalon's property, and will contribute to its appeal to its future clients.

Na Maka'ala 'O Kohala has identified at least 20 major features which were not listed in PHRI's interim report. These are not small cairns or rock piles; they are house sites, cupboards, burial mounds, and other significant sites. The most recent discovery (of seven major features) was made on Friday, April 13. Because of these unexpected developments, it has been impossible for Na Maka'ala 'O Kohala to complete its research on sites previously located by PHRI. We are certain that more sites have yet to be discovered, as we have not thoroughly explored all of the Mahukona properties. Therefore, we recommend that:

1) Na Maka'ala 'O Kohala be allowed to continue research in the Mahukona resort area until all sites have been located,
2) archaeological reports be made known to Na Maka'ala 'O Kohala regarding Chalon's Kapa'anui holdings so we can verify their accuracy and thoroughness,
3) more time be allowed before serious and specific planning take place for the Mahukona-Kapa'anui resort area, so that conflicts may be avoided between historic sites and construction,
4) archaeological excavations be curtailed; if they become necessary, that they be done only after consulting with Na Maka'ala 'O Kohala's Board of Directors (we are finding that archaeological work may destroy clues to sites' identities in a futile search for those identities),
5) sites which are cleared by archaeologists be kept clear by means of "weed-eaters" or mild herbicide supplied by Chalon International,
6) all sites which have been identified be cleared, under the supervision of our Historic Sites Committee chair, Mr. Robert Solomon, who should be hired as a consultant by Chalon International.
7) Chalon consider hiring a crew to clear sites identified by NMOK, as it takes time for us to clear these areas with volunteer labor.

Na Maka'ala 'O Kohala is pleased that we can serve Chalon and the community of Kohala by shedding new light upon Chalon's holdings in the Mahukona-Kapa'anui area. We congratulate Chalon International regarding the cultural values to be found within its property. We are certain that guests and residents of this area will feel enriched by their closeness to the societies of plantation and ancient Hawaii, which so many tourists come so far hoping to see, yet fail to find.

FINDINGS

Listed are sites located by Paul H. Rosendahl, Ph.D., Inc. (PHRI) and Na Maka'ala 'O Kohala (NMOK). Na Maka'ala 'O Kohala is still in the process of finding and clearing sites apparently missed by PHRI (to date we have identified at least twenty such features which we feel are significant, and feel certain that more will be found. We ask for Chalon's indulgence while these sites are cleared and researched; Na Maka'ala O Kohala will provide more information when we have completed our research. Meanwhile, we *can* discuss the sites located by PHRI and identified in its interim report, dated February, 1990, and a number of sites discovered and cleared by our organization as of this date.

Na Maka'ala 'O Kohala is not only concerned with the identification and preservation of historic sites, but also with their treatment by land owners, access by the citizens of Kohala to their history, and interpretation of the sites which befits their purpose. All these needs and concerns will be addressed in this section of the report.

I. Mahukona Kauhale*. PHRI sites 20, 21, 22, 23, 45, 46, 47, & 48; NMOK sites 10 & 11.

This area contains an interesting mixture of structures which could be combined in an interpretive package, addressing the lifestyles and living conditions of ancient Hawaiians and more recent residents who lived in Mahukona during the days when it was a busy harbor. PHRI sites 20 through 23 are railway terminal structures, and could be rebuilt to reflect that aspect of Mahukona's history. PHRI sites 45, 46, 47 and 48 and NMOK sites 10 and 11 include Hawaiian living areas, animal pens, family shrines and even a tomb planned for future use, but never "occupied". When incorporated into the larger interpretive plan of the Mahukona resort area, this area would be an opportunity to introduce visitors to the overall history of the area before delving deeper into ancient times.

Site descriptions:

PHRI 20, 21, 22, 23: not ancient sites. These were probably plantation structures; there is physical evidence such as the pipe in the wall of site 20, and garden plants, for example "Hawaiian" chili peppers near several of the foundations. It is recommended that these be rebuilt in a style which typifies Mahukona buildings of the sugar era, perhaps from photos, if these can be found. These buildings could be used as shops or small working examples of lifestyles in earlier days.

PHRI 47, 48: living areas. Site 47 is an animal pen, possibly for pigs or dogs, which would be fattened up for the imu. Behind this pen is a cave-like structure, now filled with rubbish, which may have been used as a shelter. Site 48 is a house site with a small family shrine.

PHRI 46, NMOK 10, 11: living area. Includes a large walled *lanai*, a high-walled house, a smaller enclosure, and small shrine. This complex is located on the north side of a small gulch, which looks across at sites 47 and 48; the two complexes were owned by different families, but are close enough to be included in one interpretive package. NMOK 10 is located to the north of PHRI site 46, feature A. Its has not yet been cleaned, and its function has not been determined. NMOK 11 is an open tomb, situated *mauka* of PHRI 46, feature E. It is an automobile-sized boulder, perched upon some smaller rocks, and hollowed out underneath, ready to receive a body. Our *kupuna* inform us that preparing burials in advance was a common practise in ancient times.

PHRI 45: C-shaped shelter. It is doubtful that this enclosure is related in any close ways to the other sites in the area. It is located by itself in a rather unremarkable area. This feature was used by visiting Hawaiians for shelter during fishing trips.

*kauhale: house complex or hamlet

RECOMMENDED:

Archaeology: No work should be done on PHRI 46E; 48D, C, D; or NMOK 10. These are shrines and burials, and excavation would desecrate them. We suggest that at most, limited archaeological work be done on the other features, as their purpose is already known to us.

Development: The sites should be cleared of rubbish, brush and scrubby trees. Kiawe should be cut back, but larger trees could be left for shade until native species can be established. New buildings should be designed with the Kohala plantation style in mind (see old pictures of T. Awai store), and should not be built *makai* of the Hawaiian sites.

Interpretation: Visitors should enter from the old wharf area; the Hawaii Railroad Company office would make an interesting interpretive center, and is located near Mahukona Beach Park, where the general public would have access without interfering with guests at the resort. The interpretive center could contain old photographs of the Mahukona area, a map showing the locations of trails and sites, artifacts for display, and hands-on displays for adults and children. Videos, slide shows or demonstrations could given at hourly intervals for those who do not wish to hike the Mahukona area.

A trail system should be established, using natural materials, and winding through the more modern houses back in time to the ancient ones. This gradual return to the past would set the mood for "Kaha Mana" which lies beyond. The theme of this cluster of sites should emphasize family life and ways of surviving in plantation and ancient society.

No motor vehicles should be allowed in the area, but horses and carts could be used, since these were present during plantation days.

No signs should be placed along the trail. Signs are unnatural looking, and obscure the surroundings. Visitors would benefit more from tour guides or printed brochures.

Cultural demonstrators could be placed at strategic points along the trail, near *kauhale* or in plantation buildings, to add interest. There are a number of Kohala residents who remember Mahukona in its busy days, or know about the more ancient places, and who are natural docents, and would need little or no training.

A hiking or biking trail could originate in the more recent part of Mahukona village and use the old pineapple cart road to go *mauka*. Horse and buggy rides might be offered to those who would rather not walk.

II. Kaha Mana (place of spiritual power). PHRI sites 43, 44, 42, 98, 99, 25, 26, 38, 37, 29 NMOK 5, 7, 12

Facing hillsides hold at least four shrines of various meaning. PHRI site 27 is an impressive *heiau* connected to sea travel and navigation. The other shrines, although not as majestic or prominent,

are as important, as they represent different aspects of Hawaiian religion. Unu O Lono (PHRI site 38) is a series of platforms with uprights on them. Mauma'lei (PHRI site 44), a small *heiau* with an altar and upright shaped like a stingray, was used by fishermen. Ahu Ho'oulu'ai (PHRI site 26) is dedicated to three gods, and is a small family shrine with three uprights, designed to increase and bless food supplies. PHRI sites 98, 99, 25, 42, and 43 are structures related to one or more of the shrines, and should be included in their interpretation.

Site descriptions:

PHRI 42, 43: agricultural area. The L-shaped gully has numerous overhangs and small caves on its southwest side; the northeast slope is enclosed by a low wall. Hawaiians used this area for sweet potato cultivation. The wall and outcroppings sheltered the plants from the sun and wind, and plants were maintained in these sheltered areas year round, so that slips could be taken and planted during times of rain. Evidence of terracing can be seen in several areas.

Larger caves were used to shelter belongings from rain, and as a refuge at noon from the hot sun. They were not permanent residences. One cave toward the west end of the gully appears to have been converted into an animal pen in later years.

It is probable that Mauma'lei belongs to the family who used this gully.

PHRI 44: shrine. Mauma'lei is a large shrine or small *heiau* dedicated to fishing. Many of the stones in its six-sided enclosing wall come from the shore, and show evidence of coral encrustation. A finger-like projection in the wall points toward the large *heiau* on the opposing hilltop. Pavement on the *makai* side of the structure is where commoners stood to worship. The center of their attention was Mauma'lei, which is a large, water-sculptured upright which rests on a platform within the enclosure. The *kahu* (keeper) of this *heiau* was a fisherman who had very strong *mana*. The god he tended represents the stingray, which chased fish into "Nishimura" bay, where they were easily caught. In contrast to the large *heiau* to which it points, this was a place for the common man to worship. However, it was also of great importance to the *heiau* on the hill, as the fishermen had to help support the *kahuna* and his students while they studied together.

PHRI 98, 99, 25, 26: *kauhale*. These structures belong to the owners of Ahu Ho'oulu'ai*. Hawaiian *kauhale* typically included several shelters with specialized uses. That is the purpose of these features. The complex is made extra special because of its small family shrine, located on a paved terrace on PHRI 26B. The family prayed here to Kane (god of medicine), Ku'ula (fisherman's god) for abundance of fish, and Lono, who was god who had domain over the farmer. At one time, much of the lower tier of the paved terrace was covered with salt pans. Now, only portions of two broken pans remain. A large pan which evidently could not be moved by vandals

*Ahu Ho'oulu'ai: altar for growing food

can still be seen just to the northwest of this area. Three small stone gods are aligned in the southeast corner of the upper level. The presence of *'ili'ili* (small, smooth pebbles) and midden scattered over a wide area in front of this complex suggests the flat open area was used for games or *hula*.

PHRI 30: Unu O Lono*. A series of platform shrines with uprights atop them climb a slope. These are not burials; rather they are dedicated to *'aumakua* (family god). The cone-shaped "mound" mentioned by Rosendahl is the trademark of such a site. There is evidence that this structure has been disturbed recently, perhaps in search of artifacts.

NMOK 7: *kauhale*. Situated just east of Unu O Lono, this large complex belonged to an important individual, perhaps a lesser chief. His family were the builders and caretakers of the nearby shrine. This site, which was just recently discovered by Na Maka'ala 'O Kohala, includes at least four major features, including platforms, a complex system of walls, and circular enclosure. We are in the process of cleaning this site, and can make more specific conclusions when we are done with this task.

PHRI 37: shrine. This simple shrine with naturally formed offering plate and sheltering C-shaped enclosure may have been connected to the salt-making activities which occurred in the valley below.

NMOK 5, 12: burials.

PHRI 29: *heiau*. Situated on a bluff, and commanding a spectacular view, this *heiau* is the most important structure from Mahuiona to Kawaihae (Mailekini Heiau). It is dedicated to travel and navigation, and stands as a beacon for travellers to other Polynesian island chains. Many of the upright gods have been toppled, probably by the army, who needed a clear line of sight for their gun emplacement, still in evidence at the east end of the structure.

This impressive *heiau* was meant to be used by the chiefly class; especially by those families of Kohala known to our *kupuna* as "Ali'i Peleleu" (nobles of the sea). Clan names of these families exists in *kupuna*'s oral histories. This was also a training area for "apprentice" *kahuna* (priests). Evidence of this can be found just *mauka* of the *heiau*, where stones have been set up for the preparation of *awa*, and star charts can be found. The petroglyph mentioned by Rosendahl is, unfortunately, recently made.

RECOMMENDED:

Archaeology. Under no conditions should any of these shrines be touched archaeologically, as to do so would be considered desecration. Burials should not be excavated, either. Na Maka'ala 'O Kohala has already verified the existance of human remains through observation of NMOK 12 in its present state. Archaeology work should be minimized at all other sites, as our *kupuna* have a good understanding of these features.

*Unu O Lono: Altar for the god Lono.

Development. No building should take place within the perimeter of this area. The sites located in the southern portion are quite close together and any building activities would encroach on them, and possibly damage them. As religious structures, the shrines deserve to be set aside and treated with respect and dignity. A tasteful trail system should be the limit of construction activities within this area.

Interpretation. Visitors could be channeled through the Mahukona *kauhale*, along the old railroad tract, and through the Nishimura Camp site to Mauna'lei. No one should be allowed within the stone enclosure, as this area was off limits to worshipers in the past. The trail could double back and then proceed through PHRI 42 and 43, and up to Ahu Ho'oulu'ai, then to Uhu O Lono and finally to the *heiau*, avoiding the two burials on the hillside. A well-planned trail system can avoid trampling through the sites while allowing visitors ample viewing of them.

Although the shrines are ancient, they are still sacred to the Hawaiian people, and must not be treated lightly. Instead, the need for different worship areas might be discussed with visitors, along with an elementary lesson in differences between worship areas for commoners and chiefs, and ceremonial requirements. Residents and visitors we have taken to these sites are inspired just by standing and allowing the atmosphere to affect them; there is no need for elaborate and gimmicky interpretive devices.

The two *kauhale*, one owned by commoners and the other by the chiefs, further emphasize that for everyone, religion was an important and immediate part of daily life, and these sites should be included in the discussion of Uhu O Lono and Ahu Ho'oulu'ai

III. Hanapa'akai (saltmaking areas). NMOK sites 1, 2, 3, 4, 13; PHRI sites 27, 39. There is a major salt-making area in the valley below the *heiau*. It includes cupboards, salt stages, shelters, mounds and some salt working areas, although most of the artifacts have been removed by vandals. This cluster lies along an ancient Hawaiian trail running *mauka*, (NMOK 13) which could be used in the interpretive plan.

Site descriptions:

NMOK 2, 3, 4; PHRI 27: salt factory. A small cluster of related sites which have as their main purpose support of salt making activities. NMOK 2 is a salt pan stage. The pans have been removed by vandals. NMOK 3 is a small C-shaped wall sheltering a *kaheka* naturally formed in an outcrop (probably could not be moved by souvenir hunters), and a cupboard. NMOK 4 has four features, including a ceremonial mound of stones and coral chunks, a shelter, cupboards and a platform with large *papa* (table rock) where salt was cleaned and ground. PHRI 27 is a large shelter where Hawaiians stayed over long periods of time while gathering salt.

NMOK 1, PHRI 39: Salt stage and C-shape shelter. These are located further *mauka*, and slightly off the trail. The C-shape has a stone floor. The salt pan stage is quite large, and located on an outcrop near PHRI 40.

NMOK 13: *ala hele*. Curb trail running *mauka-makai*.

RECOMMENDED:

Archaeology: Little or no information is likely to be found by archaeological excavation in these sites, as they are not permanent habitations. NMOK 4A should not be excavated, as it has ceremonial significance.

Development: This area lies in a line between the shrines. Even if the salt-making areas did not exist, building here would be a mistake. We recommend no construction in this sector.

Interpretation: Many of these salt pans are being kept a homes in Kohala and elsewhere on the Big Island. Chalon should make an effort to have them returned, now that the area will be made safe from vandalism. If the original salt pans cannot be found, new ones could be made as part of the interpretation of this cluster. Perhaps the first few might be made by machine, but demonstrators could show visitors how pans are made, stone-on-stone, while at the same time making more, so that salt pan stages might once again be covered with *kahekaheka* (salt pans).

It is interesting that salt, which was important in religious ceremonies, should be manufactured under the gaze of so many shrines. This fact could be brought out during interpretation, as visitors are invited to participate in the making of salt and salt pans.

IV. Ana Hu'na (secret caves). PHRI sites 31, 32, 33.

The bluff from the *heiau* to Kapa'anui is full of burials. Many of these are not visible on the surface of the land, but will be disturbed by any activity of heavy equipment. There are caves throughout the bluff area, although Na Maka'ala 'O Kohala has not as yet located the entrances. Construction of any kind on this slope is inappropriate. Visitors should be steered clear of the area.

V. Uplands, Lands from Government Road to Lapakahi.

We regret that because of delays caused by circumstances mentioned at the outset of the report, Na Maka'ala 'O Kohala has not been able to thoroughly explore these areas. We ask for Chalon's indulgence and continued cooperation; any assistance we can receive from Chalon in the way of manpower would be appreciated, as cleaning of sites seems to take a large portion of our time. It is impossible to accurately assess the purpose of sites and their historical significance unless they have been cleared so our *kupuna* can explore them intimately.

Depending upon how much time we must spend to clear "new" sites, we anticipate a complete report may take anywhere from a month to several months to complete.

SUMMARY

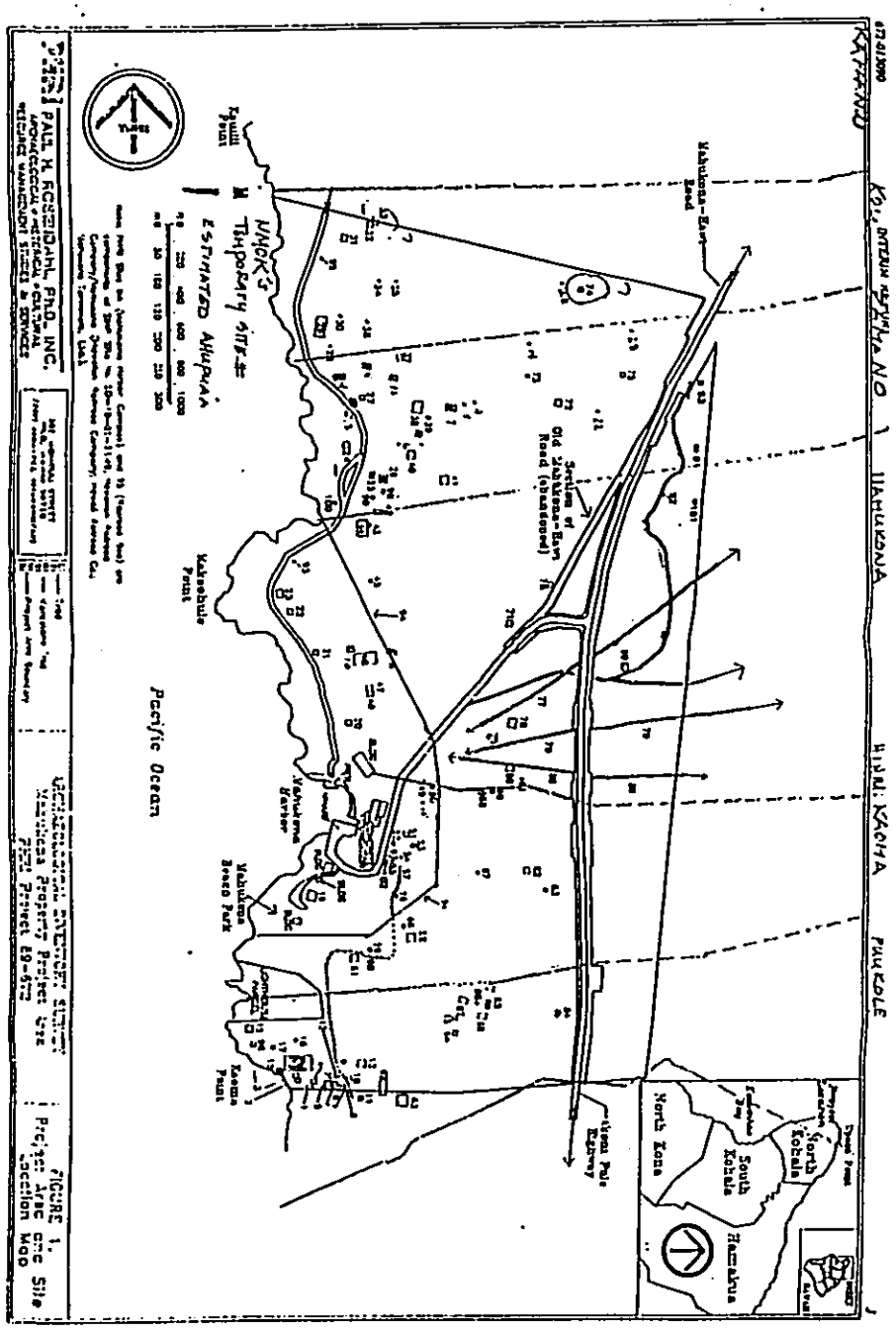
Na Mala'ala 'O Kohala has been asked by Chalon International to determine cultural values of ancient sites contained in its Mahukona properties. We have so far examined many sites previously identified by PHRI, and have discovered at least 20 features which were not identified by PHRI. To date we identify at least four major clusters, including "Mahukona Kauhale", a mixture of ancient and recent living areas; "Kaha Mana", a remarkable grouping of shrines and *heiau*, "Hanapa'akai", valley of salt-making; and "Ana Hu'na", a large burial bluff. We continue to identify previously unknown sites, and have more sites on PHRI's inventory to thoroughly investigate.

Thanks to Chalon International for allowing Na Maka'ala 'O Kohala to assist in the rediscovery of its very historic property.

signed,

Board of Directors, Na Maka'ala O Kohala

Marlenajon Stafford
Robert Solomon
Edwin Hoshida
Marie Solomon
Janet Coit
Margaret Hoshida
Geoffrey Stafford



Mahukona

Appendix H: *Social Impact Assessment of the Proposed Resort Development at Mahukona and Kapaanui, North Kohala, Hawaii County*

ADDENDUM

MAHUKONA LODGE EIR

SOCIAL IMPACT ASSESSMENT

- Section 4.3 SHORELINE ACCESS AND RECREATION

  Shoreline Access:

  Revise the second paragraph to read: "Pedestrian and vehicular access will be possible from at least three points within the project site, and from Mahukona Harbor."

H-1

SOCIO-ECONOMIC IMPACT ASSESSMENT
FOR THE PROPOSED RESORT DEVELOPMENT
AT MAHUKONA AND KAPAAHUI, NORTH KOHALA,
HAWAII COUNTY

February 1990

Prepared for:

PBR Hawaii, Inc.

and

Chalon International of Hawaii

Prepared by:

Community Resources, Inc.

Community Resources, Inc. personnel involved in this project include John M. Knox, Ph.D., President, John T. Kirkpatrick, Heidi Meeker, Carol S. Rosskam, Robert N. Stanfield, and Paula A. Yanagisako, along with CRI associate, K. C. Miller.

CONTENTS

CONTENTS (Cont.)

FIGURES

TABLES

TABLES (Cont.)

1.0 INTRODUCTION

1.1 THE MAHUKONA/KAPAANUI PROJECT

Chalon International of Hawaii has proposed the development of a resort on approximately 490 acres of its lands in Mahukona and Kapaanui, North Kohala District, Hawaii County. The proposed resort would include:

- o A Lodge, including a main lodge facility and about 30 villas situated nearby, with a total of 250 to 300 units;
- o An 18-hole golf course;
- o A tennis facility;
- o Several freshwater "lagoons" for swimming; and
- o 170 one-acre houselots.

The golf course would extend both mauka and makai of the Akoni Pule Highway. The rest of the resort's components would be situated makai of the Highway.

Figure 1-A shows the general location of the project site, while Figure 1-B provides a preliminary concept of the resort's layout.

The Mahukona lands in the project have for many years been designated a "Minor Resort" area on the Hawaii County General Plan (1987) and other regional plans (Phillips, Brandt, Reddick, 1984; Hawaii State Office of State Planning, 1989). Subdivision approvals for 170 one-acre lots have been given for the Kapaanui land in the project. The major new element in the project plans is the integration of resort and residential elements into a single planned development.

1.2 THE NORTH KOHALA MASTER PLAN

The project is part of a larger master plan that Chalon International of Hawaii is developing for its properties in the North Kohala area. The master plan process has included extensive discussion with community leaders, as well as surveys to determine community views of need for housing and other developments. Several community recommendations have been adopted into the master plan.

Chalon's announced aim is to "create and preserve an environment people will always look to return to." Corporate

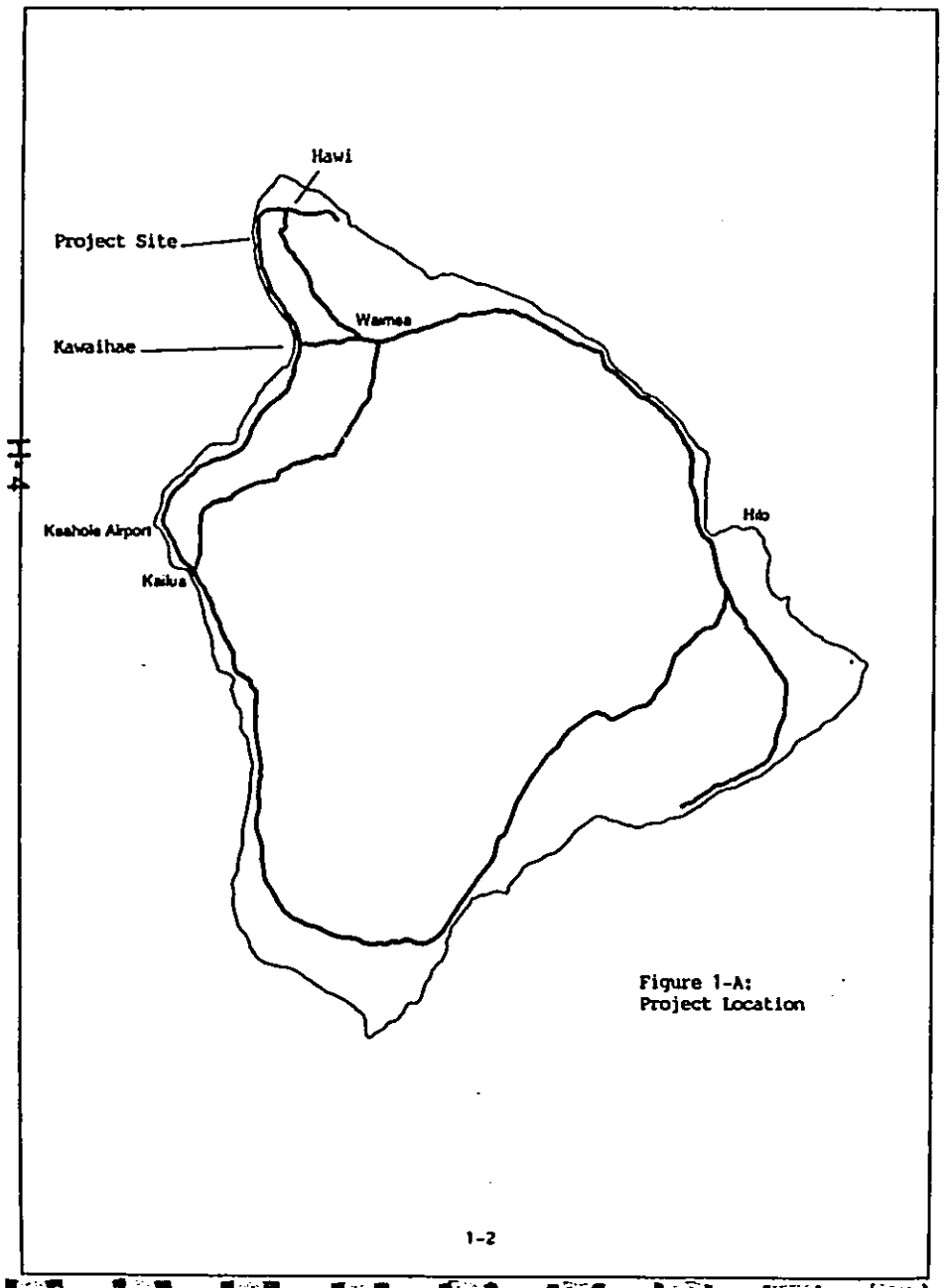


Figure 1-A:
Project Location

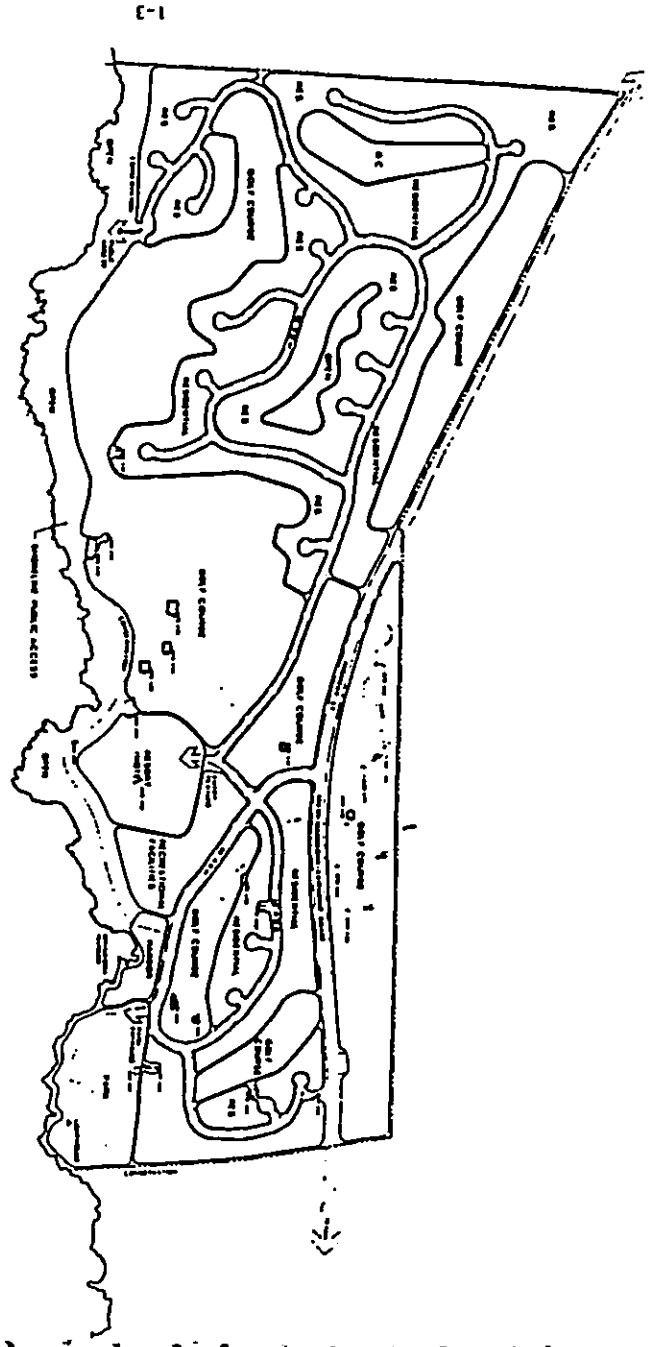


Figure 1-B:
PRELIMINARY CONCEPT PLAN
MAHUKONA RESORT

statements support limited development for North Kohala and close co-operation with the community. Some of the components of the master plan are:

- Completion of planned residential developments at Ainakea and Maliu Ridge;
- Further residential development in the Hawi area, providing affordable housing for Kohala residents;
- Expansion of agricultural activities, developing or improving nurseries, orchards, grazing, aquaculture, and raising experimental crops;
- Maintenance and improvement of the Kohala Ditch system;
- Creation of a light industrial area at Halaula and a "mini-mall" commercial area in Hawi;
- Improvements of parks and recreational facilities at Pololu Lookout, Kamehameha Park, Mahukona Park, and Mahukona Harbor.

The project is closely related to other elements of the master plan in several ways (described in Section 4.1.)

1.3 PURPOSE AND SCOPE OF THIS REPORT

This report is an assessment of the socio-economic impacts of the proposed Mahukona/Kapaanui project. It has been prepared for PBR Hawaii, for inclusion in the Environmental Impact Report being written for Chalon International of Hawaii.

Social impact assessments are made in order to identify and disclose information of use to decision-makers and citizens, as they evaluate the implications of proposed developments.

The impacts of a project must be judged in relation to the surrounding area at the time the project would take effect. Hence a project is considered in relation to probable future conditions, not just the situation existing at the time of the report.

Current plans call for the Lodge in the present project to open in 1995. Houses on the lots in the project will be built out over a period that could well extend beyond the year 2010. Hence, both trends now under way and ones expected to develop in the coming decades form the context for assessing the impacts of the project.

This report has four main sections:

- This section includes introductory material;
- The second section deals with the current situation at the project site and in the surrounding area, and with major trends likely to affect the area in the coming years;
- The third section reports on the issues and concerns expressed by members of the community in the study area with regard to their area's future and to the project; and
- The final section identifies socio-economic impacts of the project. Where appropriate, possible mitigating measures are noted.

2.0 SETTING FOR IMPACT ASSESSMENT

2.1 DEFINITION OF STUDY AREA

The project site is located in North Kohala District, County of Hawaii. The immediate area is little populated. The site is about six miles south of Hawi, the largest community of North Kohala, and about 12 miles north of Kawaihae in South Kohala.

The study area for this report consists of the two judicial districts of North and South Kohala. North Kohala is the area in which socio-economic impacts (if any) are considered most likely to occur, but South Kohala is important as the site of new housing, jobs, and shopping facilities for area residents.

(Where appropriate, data and forecasts dealing with all of West Hawaii are cited. For present purposes, West Hawaii is defined as the four judicial districts of North Kohala, South Kohala, North Kona, and South Kona.)

Construction of new hotels, golf courses, and/or major residential developments is in progress or proposed for sites in nearly all districts of Hawaii County. However, the project includes 2% or less of the new visitor units officially expected to be built in West Hawaii (Hawaii State Office of State Planning, 1989), and its impacts are not likely to extend through the entire region, much less the County.

2.2 EXISTING CONDITIONS

2.2.1 Geography and History

The Kohala region's social setting is largely shaped by its geographical setting -- both directly, and, through the impact of climate and terrain on economic activities, indirectly.

The Kohala mountains (peak elevation 5,480 feet) divide both North and South Kohala into a "dry side" on the western slope and plains and a lush "wet side" to the east.

North Kohala: This district is a peninsula formed by the Kohala Mountains. It can be separated into two distinct environmental zones. The windward or "wet" zone extends from the Hamakua boundary, and along the Kohala Mountain summit. The leeward or "dry" zone encompasses the area east of the Kohala Mountain ridge line.

The long ridge of the Kohala Mountain lies perpendicular to the predominant northeast tradewinds. As the mountains deflect the winds upwards, the air cools and condenses, resulting in

cloud and rainfall formation over summit areas. The rainfall decreases rapidly on the leeward side as the air warms in its descent to lower elevations.

Ancient Hawaiians made use of both the "wet" and "dry" portions of the Kohala region, but twentieth century Kohala residents focused almost all their economic and social activities in the "wet side" until 1965. Until very recently in the last century, the western, "dry side" mountain slopes and coastal areas have been populated only by a few cattle ranch employees. Human settlement has been concentrated in villages located in the "wet side," on the northeastern part of the peninsula. The road ends at Polulu Valley, marking the beginning of a series of steep cliffs and valleys that render the rest of the eastern coast virtually uninhabitable for significant numbers of people. Therefore, the settled parts of North Kohala have historically been isolated from the rest of the island.

An overview of the principal Kohala communities is provided in Table 2-A.

By the 19th century, the North Kohala population had grown significantly and agricultural priorities shifted from subsistence farming to export agriculture. This led to a decline in leeward area communities, and growth in windward communities with abundant irrigation sources. The settled "wet side" area is actually comprised of six villages (Hawi, Kapaau, Halaula, Makapala, Halawa, and Nuiili).

Sugar production on the windward side of North Kohala began during the 1860s. It rapidly became the dominant economic force and retained that position until 1975. Since the introduction of sugar production, the district history parallels that of many rural Hawaiian plantation regions. As waves of immigrants were brought to North Kohala to cultivate the cane, the area gained an ethnically diverse population. That diversity remains, after sugar cultivation has ended.

South Kohala: The South Kohala district has both a mauka and makai zone. The mauka zone extends from the "wet" to the "dry" side of the island. The mauka region in South Kohala lies within the saddle area between the Kohala Mountains and the northwestern flanks of Mauna Kea. The central South Kohala community of Waimea (also called Kamuela) is located in this cool, upland area.

For most of the past century, most of South Kohala's sparse population has lived in Waimea. However, rapid growth in the Waikoloa Village area since the early 1970's has created another population center in the South Kohala District. There are also small coastal settlements at Puako and Kawaihae, as well as some strip development along the road from Waimea to Kawaihae.

TABLE 2-A1 PRINCIPAL COMMUNITIES IN KOHALA

COMMUNITY	CAPSULE DESCRIPTION	MAJOR ECONOMIC ACTIVITIES	POPULATION CHARACTERISTICS
North Kohala ..... Hawi, Kapaau, Halaula	Former sugar mill towns; contain most of the area's population and all of commercial activity and government services.	Small grocery, diner, and other retail outlets; several nursery operations; small-scale industrial activities (tile shoe factory, auto and equipment repair).	Longtime residents tend to be aging, former plantation workers, with less formal education. An unknown proportion consists of relatively younger immigrants from the mainland.
Makapala, Waimea, Niulii	Sugar activities long abandoned, very small population, rural setting.	Only agriculture or subsistence activities; no commercial businesses.	Relatively more part-Hawaiian.
South Kohala ..... Waimea	Commercial and population center for both North and South Kohala.	Parker Ranch HQ and shopping center; telescope boosting; 2 private schools; professional offices; restaurants; retail outlets; small tourist attractions.	Longtime residents of paniolo tradition; influx of newcomers (professional); vacation homes for Oahu residents.
Waikoloa Village	Resort/residential community; 700 single-family homes, and 700 multi-family homes with 50 presently under construction and 197 to begin in 1990.	Project development; golf courses; clubhouse; 70,000 square foot shopping complex under construction to open 1990 including a gas station, a supermarket, office space, restaurants, and retail shops.	40% of Waikoloa is comprised of employees of resort businesses on the coast, characterized as short term renters who are primarily newcomers to Hawaii.
Kawaihae	Most population in Kawaihae village subdivision; few homes in old area near harbor.	Harbor and storage; one gas station; small stores; one renter rent; new shopping village.	Village units originally intended as employee housing for Mauna Kea Hotel, but most residents work elsewhere.
Puako	Vacation beach homes.	No stores; one condo bldg. serving as apartment/motel.	Retirees/younger people renting old cottages.

SOURCE: Community Resources, Inc., 1987; updated information on Waikoloa provided by personal communication with Ian Watrous, Waikoloa Land Company, January 26, 1990.

The mauka area's gently sloping hills and limited rainfall made the area highly suitable for cattle ranching, which dominated the South Kohala economy from the mid-1800s through the 1970's. The influence of the ranch in South Kohala created a different ethnic composition than that found in North Kohala. South Kohala has been characterized by large numbers of Caucasians and part-Hawaiian paniolos.

The Project Site: The project site includes open land now used for pasturage and the gathering of sisal, along with Mahukona Harbor and Park. (The park is owned by Chalon and leased to the County of Hawaii.)

Mahukona Harbor was the major port serving the Kohala Sugar Company and North Kohala's people until it closed in 1956. Houses, a store, and recreational facilities stood near the harbor. Both the park and harbor were used for recreation. With the closing of the harbor and the provision of houselots for residents elsewhere in North Kohala, Mahukona lost its resident population, but not its popularity as a recreation and fishing and shoreline gathering spot.

2.2.2 Current Economic Base and Employment

Major Industries: There is no major commercial activity in North Kohala at present. Local industries include ranching, small-scale retail enterprises, and agriculture (macadamia nuts and nursery products).

The Kohala sugar industry ended in 1975 with the permanent closure of the Kohala Sugar Company mill. In response to the plantation closure, the state government established the "Kohala Task Force", with a mandate to develop new industries which would capitalize on the area's resources. Those new industries proposed were generally agricultural in orientation.

The Task Force had minimal success in creating new jobs, except for the creation of a successful nursery operation. Several additional government-sponsored programs, such as the Lapakahi State Historic Park ground clearing, provided some stability for some North Kohala families. However, many people still chose to leave the area during the 1970's, and the overall population declined between 1970 and 1980. (See Section 2.2.3.)

Until the mid-1960's, ranching and truck farming were the mainstay of the South Kohala economy. These activities experienced stable growth in part because Waimea is directly linked to the island's economic and population centers via the Hawaii Belt Highway (the principal route between Hilo and Kona).

In 1965, a major hotel opened in the dry coastal region. With further expansion of the visitor industry in recent years, the Parker Ranch is no longer the dominant economic force in the

area. Economic activities now growing in importance in South Kohala include:

- o The Visitor Industry. South Kohala has three resort destination areas, at Waikoloa, Mauna Lani, and the Mauna Kea/South Kohala Resort area. These include hotels, condominiums, some single-family housing, and golf courses. The history of hotel development suggests the overall pace of growth:
  - The 310-room Mauna Kea Beach Hotel opened in 1965;
  - The 543-room Royal Waikoloan (previously known as the Sheraton Royal Waikoloa) opened in 1981;
  - The 351-room Mauna Lani Bay luxury hotel opened in 1983;
  - The 1,250-room Hyatt Regency Waikoloa opened in 1988.

  Additional hotels (and other facilities) are proposed for all three areas.

- o High Technology activities at the Mauna Kea astronomy complex. These generate direct and indirect economic activity in the South Kohala region. Operation expansions include construction of new telescope facilities and supporting infrastructure, and expansion of operations on Mauna Kea.

- o Diversified Agriculture. Activities include truck and poultry farming. Ranching still maintains a presence in the region.

Labor Force and Employment: High percentages of North Kohala workers commute elsewhere in West Hawaii for service jobs, according to Census and survey data. In a 1989 survey (SMS Research, 1989), nearly as many respondents worked outside North Kohala as in the district. (Actual responses from 306 respondents -- 35.6% employed in the district, 30.7% employed outside, and 30.1% not employed -- could well underrepresent the proportion of those who work outside the district, since such workers are less likely to be available for a telephone interview than others.)

Preliminary results from a 1988 survey for the State Department of Business and Economic Development, Tourism Branch (Community Resources, 1989a) which provide information about the combined North and South Kohala workforce include:

- o The study area's adult participation in the labor force is now 73%, compared to an islandwide figure of 69%, and a North Kona rate of 79%.

- o About 25% of employed workers living in Kohala commute at least thirty minutes or more to work, compared to 16% of North Kona residents and an islandwide figure of 19%.

- o The percentage of workers who work 49 or more hours per week was 23% in the Kohala district. This is well above the islandwide figure of 17%.

The most recent detailed analysis of occupational patterns for the study area is provided by the 1980 Census. Table 2-B provides selected data from the 1980 and 1970 Censuses, showing:

- o Tourism-related occupations employed a higher percentage of North and South Kohala residents than islandwide or statewide residents in 1980.

- o In North Kohala, there was a dramatic 1970-1980 shift from agriculture to tourism-related work, due to the sugar phaseout. Most tourism jobs were located outside North Kohala, as indicated by high average commute times.

- o North Kohala had relatively low proportions of both mangerial/professional workers and construction workers.

The most recent available unemployment and workforce estimates from the Department of Labor and Industrial Relations (DLIR) (personal communication, Manuel Fragrante, Researcher, Research and Statistics Office, Hawaii State DLIR, January 31, 1990) are:

	1989 Annual Average		December 1989	
	Civilian Labor Force	Unemp. Rate	Civilian Labor Force	Unemp. Rate
North Kohala	1,900	5.9%	1,850	4.2%
South Kohala	2,950	4.0%	2,950	2.8%
Study Area	4,850	4.7%	4,850	3.3%
Hawaii County	57,400	4.4%	57,100	3.1%

(NOTE: DLIR estimates for sub-county areas are based on 1980 census shares. By the end of the decade, these estimates usually under-estimate numbers for high-growth areas like West Hawaii.)

2.2.3 Population Levels and Composition

Since 1980, the study area's rate of population growth has been faster than in either the State or the County of Hawaii. As Table 2-C shows, nearly all of the study area's population increase has occurred in South Kohala, where major resorts have been developing.

For most of this century, North Kohala's people outnumbered South Kohala's. Figure 2-A shows both the decline in the North Kohala population that occurred as sugar became less labor-intensive, then ceased production, and the recent growth in South Kohala.

South Kohala had only 41% of the study area population in 1970, and reached 68% by 1988. In North Kohala, there was no growth from 1970 to 1980 and only modest increases during the 1980's.

The respondents to the 1989 North Kohala phone survey (SMS Research, 1989) included both relative newcomers -- 28% had lived in the district less than 10 years -- and a substantial group of lifetime residents (40.5%).

Census data (in Table 2-D) show North Kohala's population to have been far more settled, overall, than South Kohala's:

- Over 75% of North Kohala's people were Hawaii-born in 1980;
- People from the Mainland U.S. formed 30% of South Kohala's 1980 population;
- Far more North Kohala residents had lived in the same house for 5 years in 1980 than in 1970.

In 1980, North Kohala had a more diverse ethnic population than South Kohala. However, the percentages of Japanese and Filipino residents in the North Kohala area decreased during the 1970's, and Hawaiians' share increased markedly.

In South Kohala, Caucasians formed the largest group in 1970. Their share in the population increased to nearly 50% by 1980.

South Kohala's population was relatively youthful and well educated in 1980. In contrast, the North Kohala population was older and had, on average, lower educational levels.

TABLE 2-B: LABOR FORCE SIZE AND CHARACTERISTICS -- STATE AND COUNTY OF HAWAII, AND WEST HAWAII DISTRICTS, 1970 AND 1980

	STATE OF HAWAII		COUNTY OF HAWAII		SOUTH KOHALA		NORTH KOHALA	
	1970	1980	1970	1980	1970	1980	1970	1980
POTENTIAL LABOR FORCE (aged 16+)	522,018	723,479	43,075	67,205	1,446	3,290	2,240	2,286
not in labor force	34.1%	31.7%	39.5%	38.7%	34.2%	35.9%	38.6%	39.8%
armed forces	9.5%	8.1%	0.4%	0.3%	0.0%	0.0%	1.1%	1.0%
civil. labor force	56.4%	60.2%	60.1%	61.0%	65.8%	64.1%	60.3%	59.3%
CIVILIAN LABOR FORCE (CLF)	294,486	435,780	25,889	41,006	951	2,110	1,355	1,355
unemployed	3.0%	4.7%	2.7%	7.0%	4.1%	6.3%	1.9%	9.2%
EMPLOYED CLF	285,556	415,181	25,180	38,150	912	1,978	1,330	1,230
OCCUPATION	%	%	%	%	%	%	%	%
service	15.6	17.9	16.3	16.5	15.9	18.0	25.9	34.2
manager./profes.	NC	23.5	NC	20.0	NC	20.6	NC	15.2
technical, sales & adminis.	NC	32.0	NC	26.1	NC	19.2	NC	13.7
farm/fish/forest	NC	3.4	NC	10.3	NC	14.0	NC	14.2
precision, craft, repair	NC	11.6	NC	12.7	NC	16.5	NC	9.7
operators, fabri-cators, laborers	NC	11.7	NC	14.4	NC	11.8	NC	12.9
INDUSTRY (selected)								
agric., mining	4.7	3.6	12.5	11.2	N/A	16.8	N/A	8.1
construction	9.3	7.2	10.6	9.1	13.6	12.3	2.6	5.0
manufacturing	10.9	7.9	15.0	8.3	2.3	5.1	29.3	8.1
retail trade	17.4	19.9	14.8	17.5	15.9	13.8	2.9	7.0
financ., real estate	5.0	7.6	2.8	5.7	3.5	7.6	1.1	2.3
personal, entertain. & recreat. services	8.5	9.2	11.2	10.9	N/A	16.0	N/A	31.6
health, educ, & professional	17.2	17.7	14.1	16.7	13.9	14.8	14.7	20.5
public adminis.	11.4	10.0	6.5	7.3	3.1	2.1	5.5	8.1
COMMUTE TO WORK								
45 minutes or more	N/A	13.5	N/A	6.0	N/A	13.9	N/A	22.6
mean travel (min.)	N/A	21.5	N/A	16.5	N/A	21.7	N/A	26.1

Notes: All figures based on 15% sample; hence, numbers represent estimates.
"N/A" = "Not Available" in published form. "NC" = 1970 categories or bases "Not Comparable" to 1980 Census.

Sources: U.S. Bureau of the Census, 1970 Census of Population and Housing--Census Tracts--Honolulu, Hawaii, PHC(1)-88; 1980 Summary Tape File 3-A; State of Hawaii, 1973, Community Profiles for Hawaii.

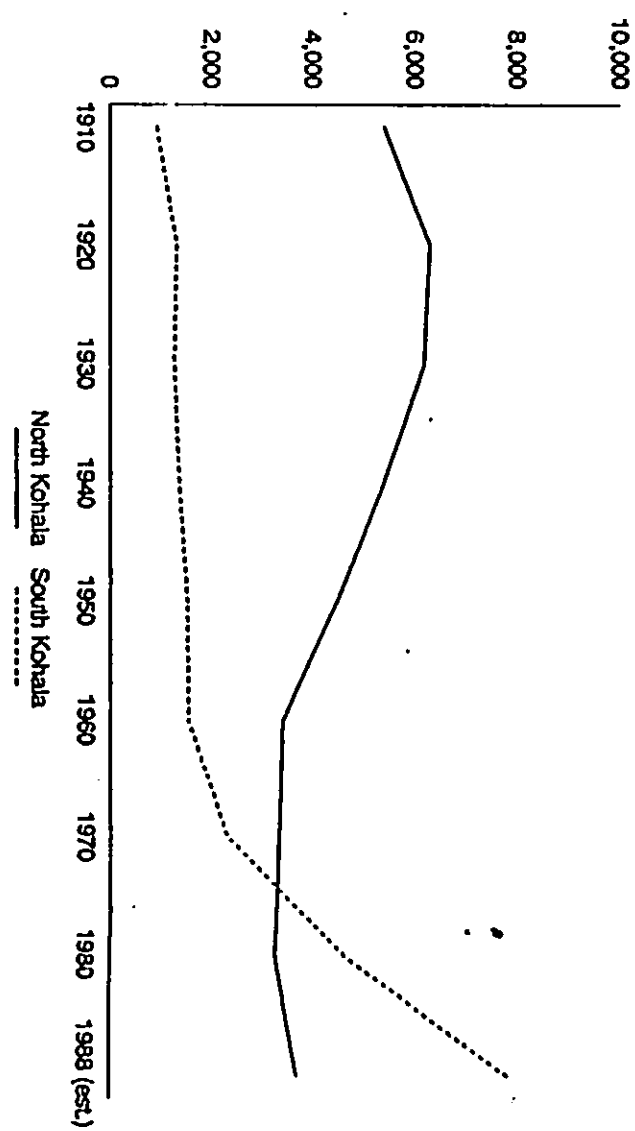
TABLE 2-C: POPULATION TRENDS, STATE OF HAWAII, COUNTY OF HAWAII, AND STUDY AREA, 1970 - 1988

	April 1, 1970	April 1, 1980	July 1, 1988 (est.)
South Kohala District	2,310	4,607	7,900
North Kohala District	3,326	3,249	3,700
Total Study Area	5,636	7,856	11,600
County of Hawaii	63,468	92,053	117,500
State of Hawaii	769,913	964,691	1,098,200

	AVERAGE ANNUAL RATE OF GROWTH		
	1970-1980	1980-1988	1970-1988
South Kohala District	7.1%	6.8%	7.0%
North Kohala District	-0.2%	1.6%	0.6%
Total Study Area	3.4%	4.8%	4.0%
County of Hawaii	3.8%	3.0%	3.4%
State of Hawaii	2.3%	1.6%	2.0%

Source: Hawaii State Department of Business and Economic Development, 1989b.

FIGURE 2-4: HISTORICAL POPULATION TRENDS, NORTH AND SOUTH KOHALA DISTRICTS, HAWAII COUNTY



SOURCES: US Census, 1930, 1942, 1952, 1960, 1970, 1980; Hawaii State Dept. of Business and Economic Development, 1989.

TABLE 2-D: TOTAL POPULATION AND DEMOGRAPHIC BREAKDOWN -- STATE AND COUNTY OF HAWAII, AND WEST HAWAII DISTRICTS, 1970 AND 1980

	STATE OF HAWAII		COUNTY OF HAWAII		SOUTH KOHALA		NORTH KOHALA	
	1970	1980	1970	1980	1970	1980	1970	1980
TOTAL POPULATION	769,913	964,691	63,468	92,053	2,310	4,607	3,326	3,249
	N	%	%	%	%	%	%	%
ETHNICITY								
Caucasian	38.8	34.4	28.8	35.0	39.2	44.5	28.6	27.8
Japanese	28.3	24.9	37.3	26.6	24.4	16.4	23.8	16.1
Chinese	6.8	5.8	2.9	1.7	1.3	1.4	4.3	1.0
Filipino	12.2	13.7	14.5	15.9	9.6	5.6	29.2	24.0
Hawaiian	9.3	12.5	12.3	18.8	20.6	28.5	15.3	26.7
Other	4.6	9.0	2.0	1.1	2.0	3.4	1.7	4.4
AGE								
Less than 5 yr.	9.2	8.1	8.4	9.1	9.3	10.2	10.0	9.2
5 - 17 yr.	26.0	20.5	27.8	21.5	28.3	23.6	29.4	22.9
18 - 64 yr.	58.5	63.5	54.4	59.2	56.1	58.6	51.1	54.6
65 or more yr.	5.8	7.9	9.2	10.2	6.4	7.7	9.5	13.6
Median age (yr.)	25.0	28.4	28.9	29.4	28.1	29.3	27.3	31.9
PLACE OF BIRTH								
Hawaii	NC	57.8	NC	70.5	NC	64.9	NC	75.6
Other U.S.	NC	28.0	NC	20.0	NC	30.4	NC	13.6
Foreign country	NC	14.2	NC	9.6	NC	4.7	NC	10.8
RESIDENCE 5 YRS. PREVIOUS (people aged 5+)								
Same house	44.0	49.3	62.5	52.9	65.6	50.7	69.9	66.9
Same island	NC	25.2	NC	24.9	NC	17.3	NC	12.1
Different island	NC	2.8	NC	8.1	NC	14.9	NC	4.4
Different state	NC	16.9	NC	11.1	NC	16.4	NC	11.6
Different country	NC	5.9	NC	3.1	NC	0.7	NC	3.1
EDUCATION (people aged 25+)								
0-8 years only	24.8	16.2	37.2	20.1	24.1	8.6	44.2	20.0
81 school only	35.9	35.1	31.6	35.5	34.2	37.0	30.0	30.0
College, 4+ yr.	14.0	20.3	7.5	15.2	13.1	20.7	5.9	8.1

NOTES: "Figures based on 1/5 sample; hence, numbers represent estimate.
"Including persons born in U.S. territories, and persons born abroad or at sea to American parents.
"NC" = 1970 categories or bases not comparable to 1980.

SOURCES: U.S. Bureau of the Census, 1970 Census of Population and Housing--Census Tracts--Honolulu, Hawaii, PHC(1)-80; 1980 Summary Tape Files 1-A and 3-A; State of Hawaii, 1972, Community Profiles for Hawaii.

H-11

2.2.4 Housing Stock

Housing in the study area is now considered to be in very short supply. Crowding, high rentals, and high sales prices have resulted. Reportedly, many ohana units and illegal rentals have been created in South Kohala and, to an extent, in North Kohala.

During the 1980's, the study area housing inventory grew more slowly than the resident population, meaning that more people must share living quarters. From 1980 to 1988, study area population increased by more than 47% (Table 2-C). However, County figures in Table 2-E indicate that, even by March 1989, the total study area housing unit inventory had increased by only 27%. Moreover, over a quarter of the new inventory was dedicated to visitor use in 1989 (Hawaii Visitors Bureau, 1989).

Population grew much faster than housing for residents in North Kona as well as in the study area. In the rest of Hawaii County, growth in housing units more closely matched population growth.

Table 2-F contains additional descriptive information from past Censuses:

- o High housing costs have been characteristic of parts of the region for some time. South Kohala median rents and housing values were already over 36% higher than countywide averages in 1980. However, median rents in North Kohala were about 31% below the county averages in 1980.
- o Few housing units were available for rent in both North and South Kohala ten years ago. This was especially true in North Kohala.

Currently, properties for sale or rent are in short supply in both North and South Kohala (personal communication, Bob Chancer, Realtor, C and H Properties, January 26, 1990). Moreover, much of the housing for sale is located in upscale, costly subdivisions, such as Kohala Ranch and Puakea Bay. All properties in North Kohala now list for $100,000 or more.

Values for average single family sales prices in South Kohala are lagging only slightly behind those in North Kona (Pang, 1990). Figure 2-B indicates a consistent upward trend in South Kohala average single-family sales prices since 1985.

2.2.5 Lifestyle and Values

All of North Kohala is a single community, in the sense that commercial activities are concentrated in Hawi, Kapaau, or Halaula. In another sense, Hawi-Kapaau-Halaula represents the

TABLE 2-E1 HOUSING UNIT INVENTORY, COUNTY OF HAWAII AND WEST HAWAII DISTRICTS, 1980 AND 1989

	1980	1989	% Change, 1980-1989
STUDY AREA			
North Kohala			
-- Single-Family	1,092	1,235	13.1%
-- Duplex	12	14	16.7%
-- Multi-Family	7	7	0.0%
-- Other	11	N/A	
-- District Total, All Units	1,122	1,256	11.9%
South Kohala			
-- Single-Family	1,692	2,236	32.2%
-- Duplex	10	84	740.0%
-- Multi-Family	511	653	27.8%
-- Other	5	N/A	
-- District Total, All Units	2,218	2,973	34.0%
TOTAL STUDY AREA			
-- Single-Family	2,784	3,471	24.7%
-- Duplex	22	98	345.5%
-- Multi-Family	518	660	27.4%
-- Other	16	N/A	
-- TOTAL, ALL UNITS	3,340	4,229	26.6%
NORTH AND SOUTH KONA			
-- TOTAL, ALL UNITS	9,262	11,673	26.0%
REST OF COUNTY			
-- TOTAL, ALL UNITS	22,370	26,287	17.5%
HAWAII COUNTY			
-- TOTAL, ALL UNITS	34,972	42,189	20.6%

NOTE: "N/A" -- Category no longer used by County.

SOURCE: Data file, Land Use Inventory, County of Hawaii Planning Department, March 1989

TABLE 2-F1 HOUSING STOCK AND CHARACTERISTICS -- STATE AND COUNTY OF HAWAII, AND WEST HAWAII DISTRICTS, 1970 AND 1980

	STATE OF HAWAII 1970	STATE OF HAWAII 1980	COUNTY OF HAWAII 1970	COUNTY OF HAWAII 1980	SOUTH KOHALA 1970	SOUTH KOHALA 1980	NORTH KOHALA 1970	NORTH KOHALA 1980
TOTAL YEAR-ROUND HOUSING UNITS	215,972	332,213	18,939	33,954	798	1,959	941	1,121
TOTAL YEAR-ROUND OCCUPIED UNITS	203,088	294,052	17,240	29,217	650	1,483	879	1,022
	%	%	%	%	%	%	%	%
TENURE								
owner-occupied	48.9	51.7	54.9	60.6	58.9	59.3	66.6	67.7
renter-occupied	51.1	48.3	43.1	39.4	41.2	40.7	33.4	32.2
SELECTED CONDITIONS								
lacking some or all plumbing	5.6	2.2	12.1	6.4	15.4	2.0	17.6	7.3
1.51 or more persons/room	7.8	7.0	6.3	5.0	8.2	5.3	9.7	7.1
PERSONS/HOUSEHOLD	3.59	3.15	3.61	3.09	3.51	3.07	3.75	3.16
1980 MEDIAN RENT (renter-occupied)	N/A	$273	N/A	$323	N/A	$307	N/A	$355
1980 MEDIAN VALUE* (owner-occupied)	N/A	$119,400	N/A	$70,300	N/A	$95,700	N/A	$64,200

NOTE: * Median values are for non-condominium housing units.
N/A: "Not Available."

SOURCE: U.S. Bureau of the Census, 1970 Census of Population and Housing--Census Tracts--Honolulu, Hawaii, PHC(1)-8B; 1980 Summary Tape File 1-A; State of Hawaii, 1973, Community Profiles for Hawaii.

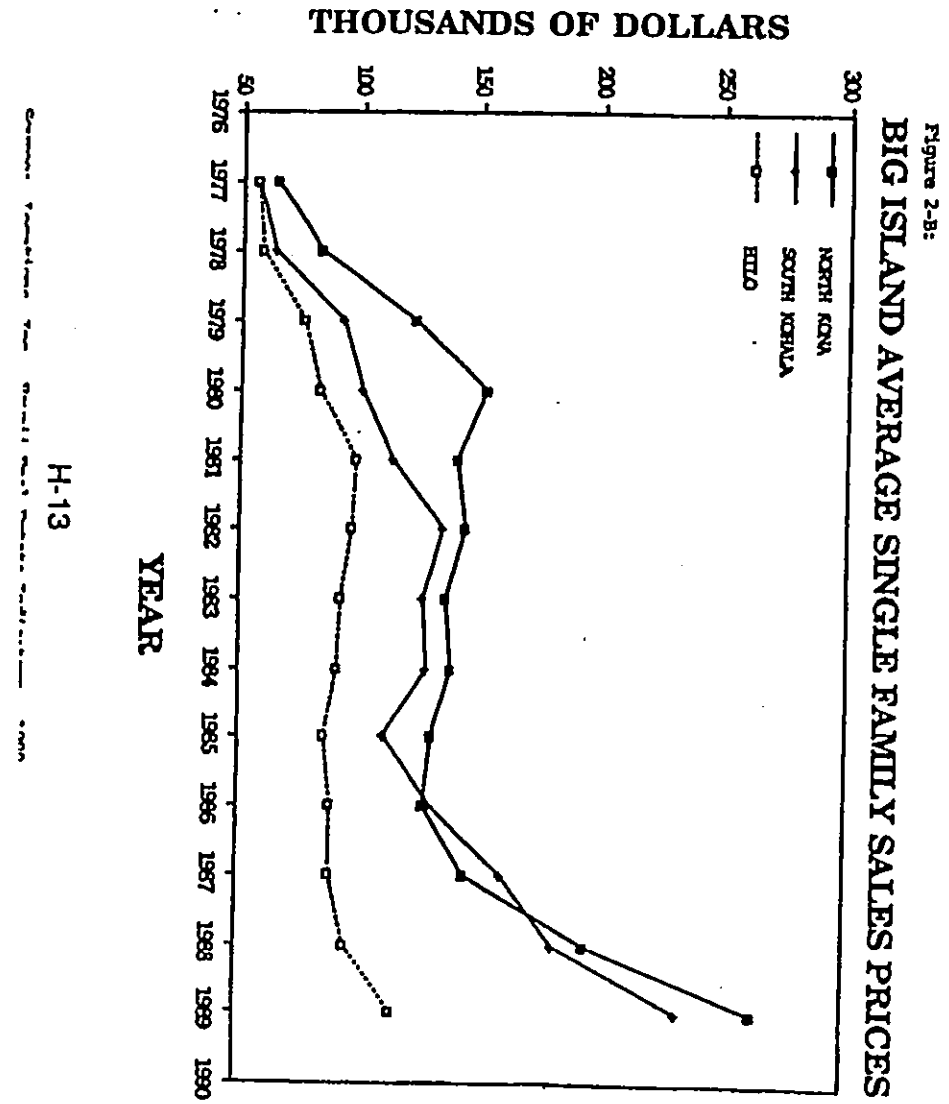


Figure 2-B: BIG ISLAND AVERAGE SINGLE FAMILY SALES PRICES

comparatively "urban" part of North Kohala, and Makapala-Halawa-Niulii is the "rural" area. North Kohala today remains an area with a predominantly rural lifestyle.

Plantation managers, mixing paternalism and authoritarianism, controlled most social and economic aspects of life in the North Kohala area until mid-century. Although this was partly modified after the sugar plantations were unionized in 1946, barriers to both geographic and social mobility remained.

Until the mid-1960's, the highway system left North Kohala as one of the most physically isolated places on the island. The only highway into or out of North Kohala was the 22-mile road over the Kohala Mountains into Waimea. A 6-mile road from Hawi to the Mahukona harbor (where sugar was shipped) was the only penetration into the "dry side." On the other side, the highway stopped at the Polulu Valley lookout. North Kohala formed an "end of the road" community in all respects.

North Kohala residents made ample use of outdoor resources in the past. Family picnics, hunting, fishing, and shoreline gathering brought residents to parks and open areas. (In 1961 and 1971, surveys showed that over half the households of North Kohala gained some of their food through fishing (Hawaii State Department of Planning and Economic Development, 1972). About a fifth of the households depended in part on hunting.

South Kohala was historically a close-knit community, following establishment of the Parker Ranch in the 1800's. In the manner of the times, Ranch managers exercised paternalistic control over many aspects of employees' lives, including provision of housing and health care. In the past several decades, the transition from an agricultural to a service-based economy -- along with substantial in-migration and demographic shifts -- has modified these patterns.

South Kohala has grown in popularity as a vacation home area for relatively affluent residents of Oahu and the West Coast of the Mainland U.S. The community of Waikoloa Village, now a prominent part of South Kohala, has a lifestyle which has mostly developed around golfing.

Some quantified indications of lifestyle and values are provided by preliminary results of a 1988 State survey with combined samples for both North and South Kohala, as noted in Table 2-G. Asked why they chose to live in their part of the island, Kohala residents were much more likely than other Big Island residents to talk about "family/roots in the area," the "outdoor character of the area," and "climate/health" -- much less likely to refer to housing value/affordability or "social character of the area."

TABLE 2-G: REASONS FOR CHOOSING TO LIVE IN VARIOUS PARTS OF THE BIG ISLAND

Question: "Why did you choose to live in THIS PART of the island?"

(Answers were given in respondents' own words, then later coded into categories. Percentages sum to more than 100% because more than one answer could be given.)

	Hawaii County	N. & S. Kohala
Family/roots in area	32%	39%
Convenient/close to jobs, schools, shopping, etc.	27%	27%
Lack of congestion, traffic	24%	24%
Climate/health	16%	25%
Housing value/affordability	11%	3%
Outdoor character of area	10%	23%
(No sense of choice)	9%	5%
Social character of area	6%	8%
like neighborhood character	1%	1%
Non-replies	3%	1%
Survey Base:	789	152

NOTE: Further information about survey respondents and their attitudes is provided in Tables 3-A and 3-B.

SOURCE: Community Resources, Inc., 1989a.

2.3 LIKELY FUTURE TRENDS

West Hawaii's population and economy are expected to grow substantially in the next two decades. North Kona and South Kohala, as the major visitor areas, are expected to see greater expansion than South Kona and North Kohala. The latter two areas are likely to experience continuing population growth, even if no new sources of employment are located in those districts.

Many of North Kohala's people are already involved in the visitor industry. This involvement is expected to grow, whether or not the project is built.

The project will create construction employment mainly in the period 1993-1995, and most operational jobs will begin in 1995. Project buildout, including houses on all the residential lots, is estimated as occurring in 2031 (personal communication, Max Umegaki, Research Associate, KPMG Peat Marwick, February 15, 1990). As a result, this assessment is concerned mainly with near-term (to 1995) changes, but also with long-term trends, to 2010 and beyond.

2.3.1 Near-Term Developments in the Study Area

Sources of Employment: Resort hotels likely to be built in the study area by 1995 (when the proposed lodge at Mahukona would open) will add about 1,200 visitor units by 1995:

- The Ritz-Carlton Mauna Lani, now under construction, will have 450 rooms;
- A new hotel at the Waikoloa Beach Resort is likely to be built, with about 400 rooms; and
- The South Kohala Resort Hotel will have 350 rooms.

North Kona hotel projects and expansions with State and County approvals (at Kona Village, Kaupulehu, Regent Beach, and Kohanaiki) could account for an additional 1,800 units by 1995 (KPMG Peat Marwick, 1990a).

Condominium projects now under construction or with land use approvals could add nearly 1,600 new resort units in South Kohala by 1995, and about 700 units in North Kona (KPMG Peat Marwick, 1990b).

(Resort condominiums have been proposed for North Kohala projects, including Kahua Makai, Kahua Shores, and Kohala Makai. These are not included in forecasts for the near future, as they do not have all the necessary land use permits.)

Housing: In North Kohala, several residential developments have been proposed. Housing for North Kohala residents will be provided by 1995 in three Chalon International projects:

- **Ainakea:** Phases 1 and 2 of this project include 165 10,000 sq. ft. lots, of which 65 remain to be sold. The North Kohala Master Plan calls for further development, possibly including elderly housing, in the long term.

- **Hawi:** Chalon's plans call for development of a mix of affordable housing types in the area between Hawi and Kohala High School in the next few years, and further expansion of Hawi afterwards to meet community needs for housing.

  Current plans -- which are only provisional -- call for the development of nearly 400 units in Ainakea and Hawi by 1995. About 290 affordable units would be developed.

- **Maliu Ridge:** This development involves one- to six-acre lots priced below lots of similar size in "estate" projects. Plans call for completion of Phases 2 and 3, for a total of 170 units, in the near term. Homes have been built on about 40% of the lots sold thus far.

These developments are on the "wet" side of North Kohala. On the northern end of the "dry" side, construction is likely on a few lots at Puakea Bay Ranch. Towards South Kohala, some building on lots at Kohala Estates and Kohala Ranch is expected. If current trends continue, no more than 50 new houses will be built in existing increments of "dry" side North Kohala estate projects by 1995.

At Kohala Ranch, the first phase of a fourth increment will be developed in the near term, if County approvals are gained. This phase is to include 300 single family lots and space for 200 multifamily units (personal communication, Harry Otsuji, Project Manager, Kohala Ranch Development, February 9, 1990). No subsidized or "affordable" units would be within this project, which will aim at a "market" to "upscale" clientele.

Kohala Ranch's land use permits include affordable housing requirements, to be satisfied by cash payments. Future projects are likely to be subject to similar requirements. It is State policy to locate such housing near the project in question (personal communication, Abe Mitsuda, Land Use Division, Office of State Planning, February 13, 1990). However, with major government efforts devoted to housing projects to the south -- Kealakehe in North Kona, and the Kawaihae and Lalamilo projects described in the next section -- it is unlikely that more than a few affordable units will be developed in North Kohala by government agencies by 1995. Consequently, only the Chalon projects are probable sources of affordable housing in North Kohala in the 1990's.

In South Kohala, a 225-unit increment of affordable housing is proposed for Waikoloa Village on County land. However, the project is currently under litigation, and those involved are likely to appeal a decision (personal communication, Brian Nishimura, Planner, Department of Housing and Community Development, County of Hawaii, February 14, 1990). Some units could be built in South Kohala planned communities by 1995, but development of the other major housing projects listed will likely continue beyond that date.

2.3.2 Long-Term Growth Projections

Countywide: The State of Hawaii's official "M-K Series" forecast for the period through year 2010 (as shown in Table 2-H) indicate substantial economic and population growth for Hawaii County:

- Resident population increasing by 75% between 1988 and 2010;
- The visitor count reaching 36,900 in 2010, nearly 350% of the 1988 level;
- Per capita personal income increasing by 40% from 1990 to 2010, to an average of $13,600 (1982 dollars).

West Hawaii: Projected massive growth in West Hawaii's visitor industry is expected to produce major increases in employment and population.

For example, the West Hawaii Regional Plan (Office of State Planning, 1989) estimates that over 25,000 visitor units (in hotels and condominiums) will be built by 2005 -- nearly three and a half times the existing inventory.

Unpublished projections made by the Hawaii County Planning Department in April 1989 assumed only slightly slower growth -- a total of about 26,000 visitor units (13,600 hotel rooms plus 12,400 resort condominiums) by the year 2010. More than 60% of these are assumed to be located in North Kona; most of the rest in South Kohala; and only a handful in South Kona or North Kohala.

The County Planning Department's unpublished April 1989 projections anticipate that about 53% of the island's employment will be located in West Hawaii (primarily North Kona and South Kohala) by the year 2010.

The State's M-K projections apply only to the county level. Regional and district population forecasts are available in the County's General Plan. This contains three sets of population and visitor industry projections. The lowest of these ("Series A,"

TABLE 2-H: OFFICIAL STATE POPULATION AND ECONOMIC PROJECTIONS FOR HAWAII COUNTY, 1990 - 2010

	1990	1995	2000	2005	2010
Resident Population	124,600	142,500	160,400	180,800	206,100
Average Daily Visitor Population	11,400	17,900	24,700	32,600	39,600
Civilian Jobs:	50,800	59,300	68,200	78,300	89,800
Jobs in Selected Industries: *	%	%	%	%	%
Agriculture	8.6%	7.5%	6.6%	5.8%	5.2%
Construction	3.7%	3.7%	3.7%	3.6%	3.6%
Trade (excluding eating/drinking)	16.9%	16.7%	16.8%	16.8%	16.7%
Eating and Drinking	8.8%	9.8%	10.7%	11.7%	12.5%
Banking, Finance	3.9%	3.7%	3.7%	3.8%	3.8%
Services	26.9%	28.7%	30.0%	30.9%	31.8%
-- Hotels	--12.1%	--12.4%	--12.5%	--12.7%	--12.8%
Government	18.8%	18.3%	18.0%	17.5%	17.1%
Personal Income (millions of 1982 dollars)	1,328	1,643	1,965	2,342	2,812
Per Capita Income (1982 dollars)	10,700	11,500	12,300	13,000	13,600

NOTE: * Percentages of wage and salary workforce (excluding the self-employed).

SOURCE: Hawaii State Department of Business and Economic Development, 1988c.

the current basis for County infrastructure planning) indicates a year 2005 countywide population of 173,000, slightly lower than the M-K figure of 180,800. Projected distribution of this total population is:

North Kohala	5,363	3%
South Kohala	19,203	11%
North Kona	43,250	25%
South Kona	10,899	6%
(West Hawaii Subtotal)	(78,715)	(46%)
South Hilo	44,115	26%
Puna	39,790	23%
Rest of East Hawaii	10,380	6%
COUNTY TOTAL	173,000	100%

Study Area: The study area will participate in the overall pattern of growth. The County's "Series A" forecast shows South Kohala's population increasing by 143% by 2005, and North Kohala's by 45%.

By 2010, South Kohala could have 2,600 more hotel units than are currently available, and 4,900 more condominium units (according to current consultants' estimates, in KPMG Peat Marwick, 1990a, 1990b). Condominium development in North Kohala could account for up to 1,600 units eventually. Estate projects, mostly in North Kohala, could add up to 1,700 lots -- not units, since construction need not follow lot sales quickly -- to the existing inventory.

New golf courses will bring South Kohala's total up to 11 (Kwon, 1990). In North Kohala, both the project and Kohala Ranch propose golf courses.

Relatively few new job opportunities are expected to be created in North Kohala by 2010, compared to South Kohala. (However, Finance Factors has proposed development of a resort south of Lapakahi State Park, which could employ as many as 1,800 operational workers (Belt Collins & Associates, 1981). That project does not have government approvals needed to begin construction, but the developer indicates that it will be built as planned (personal communication, Wellington Chu, President, Mahola, Inc., February 13, 1990).)

(Parker Ranch, the remaining major landowner along the "dry" coast of North Kohala, has no plans to develop its land (personal communication, Mel Hewett, Land Consultant to Parker Ranch, January 31, 1990). Also, the ranch has announced that it will not sell its oceanfront land north of the proposed project. The Bishop Estate owns two large North Kohala parcels north of the project site. Current plans call for continued use of these as

pasture lands at least through 1995 (personal communication, Sidney Kelipuleole, Land Manager, Bishop Estate, February 21, 1990).)

The projected population increase in North Kohala is largely due to (a) natural increase, (b) movement into North Kohala by persons working to the south, and (c) development of upscale developments at the southern edge of the district, such as Kohala Ranch.

The projections reviewed here assume that most of the workforce for North Kona and South Kohala resorts will live in those districts. Planned communities for West Hawaii residents, if developed in pace with economic expansion, could go far towards (a) housing residents of moderate means in affordable shelter, (b) encouraging persons with roots in Hawaii to live in the study area, and (c) directing population growth more to these developments and resort areas, than to existing communities. Major residential projects in South Kohala include:

- **Kawaihae:** The State Department of Hawaiian Home Lands is now contracting for a Master Plan for the makai portions of its land at Kawaihae (personal communication, Hardy Spoehr, Acting Director of Planning, State Department of Hawaiian Home Lands, February 2, 1990). Future developments will likely include a planned community of up to 1,500 homes, most of which would be developed by the Department, rather than leaseholders. Also, expansion of the commercial area at Kawaihae is probable. One possibility under consideration is the development of a regional commercial center.

- **Lalamilo:** This has been identified as a site for a major support community (Office of State Planning, 1989). The State Housing Finance Development Corporation (HFDC) plans to have 28 units built in the near future. Additional affordable housing development is proposed, but specific plans will be affected by water development and the outcome of private developers' planning (personal communication, Francis Blanco, Project Officer, HFDC, February 5, 1990).

- **Puako:** The Signal Puako Master Plan covers a residential project with 2,700 units. The State Land Use Commission has required the developer to provide 1,600 units for families with moderate incomes or in the "gap group" (120% to 140% of median income). The development still needs zoning permits. New homes are not likely to be available until the mid- to late-1990's.

  Since Signal Puako is a private development, homes there will likely not be subject to restrictions found in State and County projects. An unknown percentage of units could then be dedicated to visitor rentals or vacation use, rather than resident housing.

- **Waikoloa Village:** The County of Hawaii has been ceded 300 acres for affordable housing projects by Waikoloa Development. A master plan is being developed. Construction of 1,200 to 1,500 units, including both single-family and multifamily housing, is envisioned (personal communication, Brian Nishimura, Planner, Department of Housing and Community Development, County of Hawaii, February 14, 1990). The community would include housing for all segments of the "affordable" market (including families with incomes up to 140% of median). The precise mix of units would respond to market demand.

In North Kohala, several residential projects offer large lots to affluent buyers. So far, about 500 lots have been sold at Kohala-by-the-Sea, Kohala Estates, Kohala Ranch, and Puakea Bay Ranch. In the long term, estate developments could include about 2,000 housing units in the study area, mostly in North Kohala. However, less than 50 homes have been built. Many lots in these projects have been acquired for investment purposes. It is not yet clear whether a strong market for upscale estates in North Kohala will emerge.

Developers of some projects in North Kohala towards Kawaihae have proposed building condominium units for the vacation and visitor markets. The number of units involved is not certain, but would be far fewer than those proposed for South Kohala.

In North Kohala, Chalon will continue to develop lots for residents at Ainakea and Maliu Ridge. Chalon also plans to develop both single-family and multifamily housing in Hawi. The long-term aim is to meet North Kohala residents' need for affordable housing.

Factors Affecting the Impacts of Growth: The social impacts of the preceding trends will depend in large part on factors which cannot be fully specified at this time: (1) the geographical distribution of growth; (2) the development of infrastructure (including housing); and (3) characteristics of in-migrant workers.

Geographical Distribution of Growth: This is still being determined through the government land use process, but broad policies are emerging:

- Projected distributions of population indicate that West Hawaii growth will be concentrated primarily in North Kona and secondarily in South Kohala.

- The West Hawaii Regional Plan calls for South Kohala housing development at Waikoloa, Lalamilo, Puako, and Kawaihae, and development of a major new support community in Kealakehe (just north of Kailua-Kona).

- Land Use Commission approvals granted Kohala Ranch amount to government acceptance of a combination of urban and upscale estate development in North Kohala, outside the major resort areas. (Kohala Ranch is, however, only three miles north of Kawaihae, and closer to the South Kohala resort centers than to the towns of North Kohala.)

Resort and resort-related developments such as golf courses have been proposed for sites in all districts of West Hawaii, Ka'u, Puna, and Hamakua. However, the West Hawaii Regional Plan calls for resort development to be distributed among various coastal "nodes" -- two in North Kona (Keahole-Keauhou and Kaupulehu-Kukio) and two in South Kohala (Hauna Kea and Waikoloa-Hauna Lani).

Physical and Social Infrastructure Development: Existing infrastructure is widely seen as inadequate -- lack of affordable housing and congested highways are major sources of unhappiness. Also, construction of planned developments is contingent on the development and transmission of water.

The location and timing of infrastructure development will determine the extent of social impacts of growth. Notably, it is not certain whether or when the affordable South Kohala communities listed above will be built out to the levels estimated. If these should only be built after the South Kohala workforce increases greatly, crowding and related problems could affect the entire study area.

Characteristics of New In-Migrant Population comprise the third major determinant of social impacts from future West Hawaii growth. Two components may be identified:

- Relatively affluent retirees and second-home owners; and
- In-migrant workers, who will be required to fill anywhere from 60% to 90% of new West Hawaii jobs (based on analysis in Community Resources, Inc., 1990).

In reality, West Hawaii in-migrant workers will probably come from a variety of locations, including as well some returning former Hawaii residents, foreign nationals, Pacific Islanders, and non-Caucasian Mainlanders. Also, reductions in other sectors of the State economy -- such as sugar in East Hawaii or military-related employment on Oahu -- could also free up additional labor supply for West Hawaii.

The exact composition of the in-migrant workforce cannot be predicted at present. However, projected growth levels clearly imply some major shifts in the Big Island's overall population composition over the next 15 to 30 years.

3.0 COMMUNITY ISSUES AND CONCERNS

3.1 APPROACH

This section deals with community concerns in the study area, both in general and in connection with the project. Conclusions in this section are based on

- Surveys and published reports concerning the study area; and
- Original interviews conducted for this study.

Interviews were conducted in January and February 1990 with some 50 persons, mostly from North Kohala. (Appendix A lists those interviewed.) The interviewees were leaders and established members of the community. A set of known leaders and participants in ongoing community dialogue with Chalon International of Hawaii were interviewed first. Then interviews were conducted with others thought by study area residents to be especially knowledgeable or concerned. However, elected officials were not interviewed.

The interviews were conducted for the purpose of issue identification. It was not a random public opinion survey, and no attempt was made to measure the extent of project support or opposition.

Interviews were loosely structured, usually beginning with questions about general concerns and then moving on to the specifics of the project. (However, project design was not fully determined at the time. Most importantly, the plan to disperse Lodge guest units in villas was not yet known.) Informants were told that their concerns would be summarized in this report but that their individual comments would remain confidential.

Most of the interviews were with North Kohala residents. However, a few South Kohala community leaders were contacted to see if they believed residents there would have any particular concerns about the project. Since the Mahukona-Kapaanui project is located in North Kohala, South Kohala community leaders judged that residents of their area were not likely to have strong reactions to the project. However, they noted that persons concerned with islandwide issues, such as public coastal access, might become concerned should such issues arise with regard to the project.)

3.2 ISSUES AND CONCERNS INDEPENDENT OF PROJECT

3.2.1 Findings from Surveys

Surveys provide indications of the broad concerns of the population, apart from the controversies of the moment. On the Big Island, surveys during the 1980's have tapped two sides of residents' attitudes towards the visitor industry and economic development:

- Most Big Island residents support economic development as providing needed jobs for their communities; yet
- Big Island residents are concerned about the preservation of open space and environmental quality, and many find that existing and planned developments could strain their island's infrastructure.

Study area residents have expressed views broadly similar to islandwide opinions. However, East Hawaii residents, who are not experiencing the visitor industry growth of West Hawaii, bring different perspectives to surveys.

Most recently, 400 people on the Big Island responded to the 1989 State Plan Survey (Sunderland Smith Research Associates, Inc., 1989). Most favored growth that has already occurred. Nearly three-quarters felt that development on the Big Island has not yet reached its limits. (Most residents surveyed in the other two Neighbor Island counties disagreed.)

However, Big Island respondents were concerned that traffic congestion and other infrastructure problems have been by-products of growth. Most wanted more jobs created, but valued clean air and water more strongly. Most viewed affordable housing as a greater priority than job creation.

Study area respondents to the 1988 Tourism Impact Core Survey were somewhat more positive about the quality of life in their part of the island than others in Hawaii County (as shown in Table 3-A). Their strongest concern -- which may be partly due to short-term problems during construction of the Hyatt Regency Waikoloa -- was with the cost of housing. While several other issues were seen as "big problems," Kohala area residents did not note as many problems linked to development as did others on the island. Still, population growth and the impact of development on the beauty of the area were sources of concern for many.

Many Kohala area respondents were already involved in the visitor industry. (See Table 3-B.) A large majority expressed positive views of tourism and contact with tourists. However, many have experienced some irritation in traffic or when parking due to visitors on the road.

TABLE 3-A: GENERAL COMMUNITY ISSUES AND ATTITUDES (1988 SURVEY RESULTS)

		Hawaii County	N.& S. Kohala
COMMUNITY ISSUES -- %'S RATED "BIG PROBLEM IN YOUR PART OF ISLAND"			
Cost of housing		48%	60%
Cost of food and clothing		44%	41%
Lack of nearby jobs		33%	26%
Not enough sports and recreation facilities		33%	22%
Traffic		28%	16%
Pollution of oceans or natural areas		26%	24%
Population growing too fast		22%	31%
Crime		22%	7%
Crowded beach parks		21%	22%
Beauty of area being destroyed by development		20%	27%
Not enough nearby stores, restaurants, entertain.		18%	22%
Problems between people of different backgrounds		7%	4%
Too many tourists (1)		4%	2%
QUALITY OF LIFE "IN THIS PART OF THE ISLAND" VS. FIVE YEARS AGO			
Today is ...	Better	35%	39%
	Worse	18%	15%
	Same	45%	43%
	Not Sure	2%	4%
DEMOGRAPHICS			
Survey Base:		789	152
Length of Residence, Hawaii			
0 to 5 years		31%	28%
6 to 20 years		49%	45%
over 20 yrs or lifetime		20%	27%
Place of Birth			
Hawaii		64%	70%
Mainland U.S.		30%	26%
Ethnicity			
Caucasian		33%	37%
Japanese		26%	18%
Hawaiian		22%	25%

NOTE: (1) Surveyed attitudes to tourism and the visitor industry are described in Table 3-B.

SOURCE: Community Resources, Inc., 1989a.

TABLE 3-8: COMMUNITY INVOLVEMENT WITH AND VIEWS OF THE VISITOR INDUSTRY (1988 SURVEY RESULTS)

	Hawaii County	N. & S. Kohala
VISITOR INDUSTRY INVOLVEMENT		
Currently working in the visitor industry	25%	34%
Ever worked in the visitor industry	23%	27%
Had a tourism job waiting when moved moved to Hawaii	4%	10%
Current job has contact with visitors	40%	41%
EVALUATION OF TOURISM AND THE VISITOR INDUSTRY		
Overall effect of tourism on family and self		
Good	62%	72%
Bad	4%	2%
Tourism brought more benefits than problems		
Agree	71%	69%
Disagree	21%	20%
Don't Know	9%	11%
Evaluation of contact with visitors		
Pleasant	85%	79%
Unpleasant	2%	2%
Mixed	4%	10%
Effect of visitor activities on the area		
More pleasant	72%	71%
More unpleasant	8%	7%
Most enjoyable visitor contacts		
Outdoor recreation settings	31%	27%
Commercial situations	22%	18%
Tourist attractions	12%	14%
No situations	9%	11%
When visitors have interfered		
Traffic, driving, parking	59%	81%
Recreation	12%	7%
General tourist behavior	11%	6%
Job/economic situations	3%	0%

(Continued)

TABLE 3-8 (Cont).

	Hawaii County	N. & S. Kohala
COMMENTS ON VISITOR INDUSTRY JOBS -- % 'S AGREEING WITH VARIOUS STATEMENTS		
The pay is pretty good	40%	57%
Industry has poor hours & lay offs	58%	54%
Tourism jobs lack advancement opportunities	43%	43%
Workers treated like servants	27%	29%
Residents cannot compete for jobs	40%	44%
Kids should study tourism management	36%	46%
GENERAL VIEWS ON TOURISM -- % 'S AGREEING WITH VARIOUS STATEMENTS		
This island needs more tourism jobs	57%	50%
Stop building hotels on this island	48%	49%
In my part of the island, it's more important to keep things as they are than to increase tourism jobs	53%	56%
Future resorts should be close to existing hotels	69%	74%
This island is run for tourists at local people's expense	37%	35%

SOURCE: Community Resources, 1989a.

Kohala respondents seemed evenly divided on the question of visitor industry growth, with half wanting more jobs, and half wanting no more hotels on the island. Keeping "things as they are" was a priority for 56% of the Kohala respondents, and some 74% thought that future hotels should be kept near existing resorts.

Surveys conducted as part of Chalon International's Citizen Participation Committee process provide detailed, recent North Kohala data on specific needs. These are discussed in Section 3.3.2. In 1987, a survey of North Kohala residents by the Kohala Community Association dealt with the relative importance of different issues for residents. In 163 responses -- over 12% of the questionnaires sent out -- residents ranked issues as follows (summing answers, with 1 as "very important," 2 as "important," 3 as "no opinion," and 4 as "not important"):

Issue	Average Score
Education	1.6
Fire Protection	1.7
Water	1.8
Health Care	1.9
Housing	2.0
Jobs	2.0
Development	2.1
Police Protection	2.1
Mauka/makai Access	2.2
Transportation, Roads	2.2
Recreation	2.3
Kohala County Fair	2.7

These responses suggest that residents' primary concern is with the provision of basic services which tend to be minimal in less populous areas, while economic growth is a secondary concern. However, the survey is a non-random sample, and does not show the precise distribution of opinions among Kohala residents.

3.2.2 Findings from Interviews for this Report

When asked to identify general issues and concerns that they thought important, members of the North Kohala community stressed growth and the value of maintaining North Kohala's rural lifestyle. Housing, growth, shoreline and mauka access, and general social and political concerns were major topics. (Table 3-C provides an overview of the issues and concerns independent of the project raised by interviewees.

Residents who had lived in the district all their lives tended to emphasize the need for housing and jobs, to allow the next generation to enjoy life in North Kohala. Those who had moved to the district were more likely to stress environmental

TABLE 3-C: COMMUNITY ISSUES AND CONCERNS INDEPENDENT OF THE PROJECT (FROM INTERVIEWS)

PRIMARY	SECONDARY	OCCASIONAL
Housing:		
Kohala lacks housing residents can afford.	Housing will become a greater problem as more West Hawaii resorts are built.	
Speculation has contributed to increased housing costs.		
Growth:		
Brings more jobs, better public services, and amenities.	Will change Kohala's lifestyle.	Causes social problems, especially crime.
Important to preserve Kohala's rural lifestyle.	Leads to loss of open space.	Important to keep mauka lands free of development (to preserve views and in "ag" areas, agriculture).
		Will increase pressure to develop Kohala's best agricultural land.
Shoreline and Mauka Access:		
After the plantation closed, access became limited.	Freedom to hunt, fish, and gather are important to rural life.	
Ranchers, estate owners, and new developers seen as likely to limit public access.		
General Social & Political Concerns:		
Long-time residents and newcomers have different values and interests leading to social tensions.	Most recent newcomers are affluent, part-time residents, who tend to isolate themselves from the community.	Residents feel exploited by affluent newcomers.
Long-time residents feel unrepresented because they are uncomfortable expressing themselves in a public forum.		

(Continued)

protection as a way of maintaining North Kohala's special qualities.

Housing: A majority of persons interviewed thought a lack of affordable housing is Kohala's most pressing problem. High prices were most often seen as resulting from speculation by outsiders. Other factors mentioned were a low inventory of housing and low wages.

Several said that demand for housing increased due to the opening of the Hyatt Regency Waikoloa. They predicted that the housing problem will worsen as more West Hawaii resorts are built.

To cope with high housing costs, some families share homes, have two jobs, or leave Kohala. Many interivewees said the lack of housing has prevented former residents from returning. Some older long-time residents commented that affordable housing would allow their children to return to Kohala.

North Kohala interviewees tended to think that homes priced between $60,000 to $100,000 are considered affordable to Kohala residents. Some felt that future affordable housing projects should base prices on North Kohala's average family income, rather than County or Statewide average family incomes.

The interviewees often commented that resort workers are the ones in need of affordable housing. Most interviewees chose to discuss home ownership rather than rental. However, others commented that rental units would help meet housing needs.

Lot sizes in affordable housing developments were of general concern. Several said 7,500 square foot lots are acceptable in Honolulu, but not in Kohala. A sense of space is important to residents, and lots with at least 10,000 square feet are preferred.

Many, while stressing the need for housing, also believed more housing would increase problems such as crime.

Growth: More jobs, better public facilities and services, and amenities such as supermarkets were identified as positive impacts of growth. Many residents would like these benefits for North Kohala, but not at the cost of its rural character.

Most respondents said they value a small community because it affords a kind of intimacy not possible in a large community. One lifetime Kohala resident said: "I leave my car unlocked with the keys in it all the time. There is a sense of community -- people look after each other. Most here want to keep that."

Older long-term residents remembered a time, before World War II, when North Kohala's population was over 6,000. They described the district as "vital" or "thriving" then, while there is less community activity currently.

TABLE 3-C (Cont.)

PRIMARY	SECONDARY	OCCASIONAL
Education/Youth: Better schooling needed as children are prepared for skilled jobs.	Those who leave to attend college do not return because there are few job opportunities for them.	Teen pregnancies prevent young people from going to college.
Economy: Kohala needs non-resort jobs for future generations.		
Infrastructure: Kohala needs an improved medical facility.		

NOTES:

Issues and concerns listed under the column heading "PRIMARY" were the most frequently raised comments within the listed categories. The "SECONDARY" column lists those issues (within a category) that were raised less often, or were considered by the respondent to be less significant. Issues and concerns listed in the "OCCASIONAL" column were raised by at least two different individuals.

Items in the table reflect informant judgements and are not meant as consultant opinions.

Many interviewees associated growth with a loss of open space. Several thought unobstructed view planes and low-density development important. The freedom to pursue outdoor activities such as fishing, hunting, and gathering is a significant part of Kohala's culture. Some emphasized the importance of increasing agricultural activity in North Kohala, and opposed other sorts of development for makai lands in the district.

Some residents said that Kohala has already experienced an increase in crime due to resort and estate developments in Kohala. They believe crime will increase with the population. Others said growth will increase other social problems, such as child abuse.

Shoreline and Mauka Access: Many commented that ranches and estate developments have limited public access. They expressed concern that future developments will decrease access even more.

According to many long-time residents, the community enjoyed relatively free access to mountain and shoreline areas when Castle & Cooke operated its sugar plantation. One resident described food growth or gathered locally as of great value: "We want gardens, to be able to go out and get fish or hunt pig, collect opihi or opae. You like, you go get; it's the way it has traditionally been. We don't want to lose that."

General Social and Political Concerns: A majority of interviewees discussed social tensions in the community. Most identified three distinct groups with different interests in the community: long-time residents, newcomers, and affluent newcomers.

Most long-time residents were once Castle & Cooke sugar plantation employees, or the children of such employees. Most newcomers were originally from the Mainland and have moved to Kohala for its rural lifestyle. Affluent newcomers are generally identified as residents of estate developments in Kohala.

Most long-time residents discussed differences between themselves and newcomers, with regard to verbal style and lifestyle in general. Most newcomers discussed differences between the community and affluent newcomers, treating the latter as uninvolved in the North Kohala community and as having little interest in the community.

Many long-time residents said they feel a lack of control over changes in Kohala.

Differences between long-time resident and newcomer communication styles was discussed as a major issue. Public community involvement was often mentioned as a newcomer, not a long-time resident trait. Newcomer residents generally acknowledged this difference in communication style, but focused their critical comments on affluent newcomers.

Education/Youth: Some residents view the improvement of education in Kohala as an important issue.

Several commented that only a few of Kohala's children pursue a college education and obtain high level jobs. Those with college degrees move elsewhere for better job opportunities.

A few mentioned fights and discipline problems at Kohala High School. Teen pregnancies were discussed by a few residents as obstacles to higher education and better jobs.

Kohala's Economy: Several interviewees stressed the need to diversify the area's economy. A few commented that the economy is too dependent on tourism. Most said diversification could offer greater opportunity to future generations and bring back those who left Kohala.

Others commented that Kohala's economy was saved by tourism. After the plantation closed residents were able to find work at the Mauna Kea Hotel and Mauna Lani Resort.

Infrastructure: Few residents made comments on infrastructure needs. The most common remark was that Kohala Hospital has limited equipment. Some said the fire station needs building improvements.

3.3 COMMUNITY INPUT DEVELOPED IN CHALON COMMUNITY INVOLVEMENT PROCESSES

3.3.1 Community Involvement Activities

Chalon International of Hawaii began meeting with a group of North Kohala citizens, the Citizen Participation Committee (CPC), in February 1989. Some 15 persons were invited to participate because of their leadership roles in Kohala organizations such as the Kohala Community Association. The CPC has functioned to inform Chalon of the needs and concerns of Kohala residents and to find ways that Chalon's North Kohala Master Plan can respond to those needs and concerns.

The CPC met at least once a month from February 1989 to January 1990. Meetings of the CPC and its various subcommittees were open to the public. In January 1990, a version of the North Kohala Master Plan that incorporated many CPC recommendations was presented to the community at large. Chalon plans to continue meeting with the CPC and the community in the future.

CPC subcommittees were formed to address major concerns. Subcommittees dealt with Housing; Public Infrastructure/Recreation/Access; Natural Resources/Environmental Quality; Historic/Cultural Resources; Commercial/Industrial Land Use; and Agricultural Land Use.

3.3.2 Survey Results

Two surveys were developed by CPC subcommittees working in conjunction with Chalon's planners. These were administered in North Kohala in 1989.

The Land Use-Commercial/Industrial Subcommittee created a questionnaire that was mailed to 1,400 post office boxholders in North Kohala in June, 1989. About 30% of the questionnaires were returned -- a very high proportion. Respondents favored further commercial and industrial development in North Kohala (on a limited scale):

	% Favoring	% Opposing
Development and expansion of enterprises such as fishing, energy (windfarms), recycling	67%	18%
A light industrial area	61%	29%
A mini-mall	57%	33%
Off-road parking lots	43%	23%

Respondents identified preferred locations for commercial and industrial development (largely in the Hawi area). Most (62%) also saw need for multifamily housing in North Kohala.

A telephone survey was conducted by SMS Research for the Housing Committee of the CPC in September 1989. Heads of 306 households responded.

The survey documented the need for affordable housing in North Kohala. Members of 37% of the households called were interested in buying a house. Extrapolating from the sample to the entire population, about 350 householders and about 90 others are interested in buying. Most of those who were interested reported low to moderate household incomes. Some interest was expressed in townhouses or apartments, and in renting rather than buying housing, if these alternatives were cheaper.

Interest in -- and presumably need for -- housing was greater among those who work outside North Kohala than among those who work in the district.

3.4 ISSUES AND CONCERNS IDENTIFIED THROUGH INDEPENDENT INTERVIEWS

3.4.1 Overview

During community interviews, several major issues emerged. While members of the community had different perspectives on these issues, most interviewees agreed that the central issues were employment, access to the shoreline, and the landowner's relation to the community.

All the persons interviewed spoke, in one way or another, of North Kohala residents' concern with a rural lifestyle. (Table 3-D lists respondents' views and separates the more widely expressed concerns from those that were voiced less frequently.) Most long-term residents spoke of a need for more jobs in North Kohala. Newcomers tended to be more suspicious of new jobs in the visitor industry. Both groups expressed strong concern about shoreline access.

Employment: Many viewed the proposed resort as a welcome new source of jobs for Kohala residents. The resort could provide jobs close to Hawi and Kapaau. This could benefit those who now commute long distances to work in resorts, Kohala's young people, and perhaps those who moved away due to the lack of employment opportunities in North Kohala.

However, some argued that resort employment would not benefit the community. Also, several persons wondered whether many North Kohala residents would actually work at the resort.

Access: Access to the shoreline at Mahukona and Kapaanui was a crucial issue for the majority of residents interviewed. Upland access was also mentioned, but usually treated as a less pressing issue.

The major concern was that community use of the shoreline not be affected by development. Strong concern was expressed that access continue, and respondents generally felt that a workable solution could be found. Some residents thought that other North Kohala residents would feel excluded or out of place if public access went through an upscale development.

Different opinions were expressed concerning the extent of vehicle access wanted along the shoreline.

Community Relations with the Developer: Residents were quick to comment that Chalon shows a more open attitude toward the community than the former land owner, Castle & Cooke. Most regard Chalon's efforts to facilitate dialogue with the community as a good start.

Most feel more time is needed to assess Chalon's committment to the community. They have taken a "wait and see" attitude. Others were more pessimistic and said that Chalon can ultimately do as it pleases without community input.

3.4.2 Specific Issues and Concerns

Employment: Many interviewees viewed more jobs in Kohala as a positive impact. However, they also identified problems that could arise with new employment. Most believed that careful planning could minimize negative impacts and maximize positive impacts.

TABLE 3-9 (Cont.)

	PRIMARY	SECONDARY	OCCASIONAL
Coastal Development:	The resort could lead to the development of other coastal properties.		A marina or new estate lots development could eventually be proposed for other coastal sites.
			The appearance and maintenance of the area will be improved.
Infrastructure:	Schools are crowded and will need expansion.		All new developments should be mauka of Akoni Pule Highway.
	More police and fire protection will be needed.		Akoni Pule Highway will need widening.
			Improved medical facilities will be necessary.
General Social & Political Concerns:		Crime will increase.	Kohala will have more clout with the government and legislature.
			Part-time residents do not take interest in the community. Existing tensions will increase.
			There will be speculation on the residential units.
Environmental Concerns:		Damage to ocean life due to runoff and golf course fertilizers.	Damage to ocean life due to the improper sewage treatment.
Resort Design:		Architecture should reflect Kohala's history and lifestyle.	

(Continued)

3-15

TABLE 3-9: COMMUNITY ISSUES AND CONCERNS RELATED TO THE PROJECT (FROM INTERVIEWS)

	PRIMARY	SECONDARY	OCCASIONAL
Employment:	Opportunity for jobs in North Kohala.	Jobs for those that want to return to Kohala.	Resort jobs pay low wages and offer little chance for advancement.
	Future jobs for Kohala's youth.	Jobs will attract outsiders and Kohala's small town atmosphere will change.	Desire to work at the resort will depend on the transfer of seniority from other resorts.
			Kohala residents do not need jobs.
			Employee housing should be provided.
Shoreline Access:	Public access to the shoreline could be reduced.	Residents will feel out of place if public access is through an upscale development.	
	Mahukona Park and Harbor are highly valued by the community.		
Chalon International of Hawaii:	Chalon's community involvement process seen as a sign of good intentions.	Unsure of Chalon's commitment to the community.	Chalon will proceed with its plan despite community sentiment.
		Long-time residents feel unrepresented.	Chalon could sell its property to a landowner with little regard for the community.
			Calling the hotel a "lodge" seems deceptive.

(Continued)

3-14

TABLE 3-8 (Cont.)

	PRIMARY	SECONDARY	OCCASIONAL
Amenities:			
Historical Sites	Chelan should preserve historic sites and provide public access to them.		
Growth will support supermarkets and other amenities.			
			Residents would like affordable golf and tennis rates.

NOTES:

Issues and concerns listed under the column heading "PRIMARY" were the most frequently raised comments within the listed categories. The "SECONDARY" column lists issues (within a category) that were raised less often, or were considered by respondents to be less significant. Issues and concerns listed in the "OCCASIONAL" column were raised by at least two different individuals.

Items in the table reflect informant judgements concerning potential events and are not meant as consultant opinions.

Many respondents consider the proximity of the resort jobs to Hawi and Kapaau a positive impact. Shorter commutes would reduce expenses for resort employees, increase time for family life, and create a greater sense of community.

Most of those who expressed this opinion went on to say that Kohala residents should be hired before others. A few commented that employment of Kohala residents would minimize crime at the resort, because the resort would be viewed as an important part of the community.

Some long-time residents interviewed stressed that new jobs in North Kohala will enable young people to stay in the same community with their parents. Many commented that young people and others have left Kohala for better employment opportunities.

Negative impacts anticipated as a consequence of new jobs were tied to the idea that the project would bring new residents -- employees and their families -- to North Kohala. Population increase and the arrival of new residents with different values would change Kohala's unique qualities. Residents would no longer know each other and the "laid back" atmosphere of Kohala would change. Most also said growth will bring crime.

For some respondents, resorts offer low quality jobs and are not beneficial to the community. Low numbers of local residents in management positions, low wages and evening shifts were discussed as drawbacks of resort jobs. Low wages and evening shifts were viewed as lowering the quality of family life.

However, others said the quality of resort jobs is not an issue. Some residents commented that resort workers are proud of their jobs. One said, "We used to have to work hard to survive and there was pride in that." Also, several interviewees noted that persons with limited educational backgrounds are able to find stable employment at resorts.

Several questioned whether North Kohala residents would actually work at the resort. Many residents already work for other resorts. Jobs closer to home would be desireable, interviewees thought, but other factors would also be considered. Above all, workers might not change jobs if it meant losing seniority accrued in their current jobs. Also, resort workers may want to decide which is the better employer. A former resort employee said workers may keep jobs at other resorts and work at the new resort part-time to decide which employer they prefer.

For many Kohala residents who already work in resorts, the labor union representing the resort's employees was also a consideration affecting job choice.

Only a few interviewees thought that more jobs in Kohala would bring more problems than benefits. The resort would increase competition for labor and the housing shortage would worsen.

Shoreline Access: Many residents interviewed are concerned that access to the shoreline would be reduced, although they were uncertain as to how the resort would limit access. Most felt that a solution that meets the needs of residents and the resort can be found. Residents' needs were identified in terms of continuing use of coastal areas at current levels.

Comment: The road to Mahukona Harbor and Park is recognized by Chalon as a government road, which could not be obstructed by the resort. Chalon has said it is committed to maintaining public access to the shoreline.

Respondents stressed that Mahukona and Kapaanui are popular recreational areas with Kohala residents. The area's sunshine and calm waters have made it popular for swimming, fishing, camping, and picnics for decades. Calm waters at Mahukona harbor make it a good swimming place for children.

North Kohala fishermen also value Mahukona Harbor. Both shore and boat fishermen frequent the Mahukona and Kapaanui coastal areas. An electric winch at the harbor is used by fishermen with small boats. Fishermen help to maintain the County-owned winch.

Many interviewees expressed strong concern that resort development at Mahukona and Kapaanui will cause residents to perceive the area as restricted. They thought some residents would feel out of place in or near an upscale development or near resort guests. Assurance of a long-term commitment to public access was said to be important.

Interviewees were concerned that the resort would limit public access through control over roads and parking. Limited public parking at the Mauna Kea Resort was often mentioned. Respondents said public access to the shoreline in Kohala has been increasingly limited due to development.

A few interviewees thought that fishermen would want to drive along the shoreline. On the other hand, damage to the shoreline due to increased access was an issue for several respondents. They believed that protection of the environment and public access would be best served by parking areas away from the shore with pedestrian pathways to it.

Similarly, a few interviewees were concerned that improved access would bring more people from other parts of the island. Some have noticed an increase in park users from outside North Kohala. A few suggested that access should be controlled to prevent vandalism and overuse.

Chalon International of Hawaii: Many respondents commented on Chalon's relationship with the community. The most common judgment was that Chalon's attitude has been better than Castle & Cooke, which never consulted with the community. However, many interviewees said that more time is needed to assess Chalon's integrity.

Overall, Chalon's community input process has been taken as a sign of good intentions. People frequently commented that residents have a "good feeling" about Chalon, but uncertainty about future developments remains. Many are waiting to see the extent to which community input is integrated into final plans and actions.

Some interviewees criticized the Citizen Participation Committee (CPC) process. Some said sufficient time was not provided for the committee to evaluate and discuss all the Master Plan components, including the resort. Others said issues the CPC emphasized were not presented as such at public meetings. According to some interviewees, meeting notices had not been widely visible. It was suggested that future meeting notices include agendas.

Many long-time residents interviewed said their views have not been adequately represented in the community input process. As discussed above, few long-time residents are comfortable asserting their views in a public setting. Interviewees who made these comments said that mostly newcomer interests have been heard.

A few of the long-time residents interviewed feel their opinion of Chalon's plans is not important, since Chalon can execute its plans with or without public input. One long-time resident said, "Local people will be here regardless of what Chalon does; they've stayed through the plantation, the State projects [Kohala Task Force], and now this."

A few others fear Chalon will sell the resort. A new landowner might not value community input, and might want to develop less desirable projects than the Chalon Master Plan. Some even suggested that excessive demands from the community could prompt Chalon to sell the resort.

The number of units in the resort lodge was discussed by many as a community relations issue. A resort facility of 200 to 300 units was considered too large to be called a lodge. Most said they expected the lodge would be a 50-100 unit facility. Some respondents saw in this misunderstanding a sign that the landowner and the community have very different perspectives.

Comment: At the time of the interviews, it was generally assumed that the lodge would be a single structure containing 250-300 rooms, not a smaller structure with low-rise villas nearby. The design concepts involved -- several villas, not a single facility, low-rise design, and use of Hawaiian architectural elements -- took on increased importance for Chalon in response to community views expressed in the CPC process and in interviews for this report.

Coastal Development: Several respondents suggested that development at Mahukona and Kapaanui could be the "icebreaker"

for development of other coastal properties. A lack of water has prevented previous development of the area and these informants thought that Chalon could supply water to other developments from Kohala Ditch.

A few respondents wondered if a marina for the resort would be proposed in the future. The proposed Mauna Lani Cove marina was mentioned as an example of possible -- but undesirable, for these residents -- development. New estate lot developments were also anticipated consequences of the resort project.

Several interviewees opposed all coastal development in North Kohala. A few wanted all development kept mauka of Akoni Pule Highway, to preserve ocean views and open space.

Other interviewees commented that a resort at Mahukona and Kapaanui could improve the maintenance and appearance of the area. The resort could clean up litter at Mahukona Harbor and Park. Some said a resort development would be an improvement over what is now a "waterless keawe desert".

Infrastructure: Interviewees focused on future educational, police, fire, road, and medical needs.

Several informants said that Kohala Elementary and High School is presently operating at capacity. Schools would have to expand to accomodate the children of new resort employees and resort residents. A larger Kohala community would also require 24-hour police protection and expanded fire protection services.

A few expressed concern that Akohi Pule Highway would require widening because the resort will increase traffic. Improved medical facilities would also be necessary.

General Social and Political Concerns: Many see population growth as leading to an increase in crime. A few respondents said crime in Kohala increased when the Hyatt Regency Waikoloa opened. They suspected the proposed resort would also be a crime target.

A few believed that growth in Kohala would give the area more clout with the government and legislature.

Others expressed concern over an increase in the number of part-time residents in the region. Tensions already exist between full-time and part-time residents of North Kohala. Part-time residents are seen by full-time residents as uninterested in the community. Also, resort homes were seen by some as likely to attract more speculative buyers to Kohala.

Environmental Concerns: Several Kohala residents expressed concern over potential damage to the coral reef and ocean life at Mahukona and Kapaanui due to construction runoff and chemicals used on the golf course. Others thought damage to ocean life would occur due to improper sewage treatment.

Resort Design: Several interviewees believe design of the resort should have ties with Kohala's history and traditional architecture. The resort should be designed to fit in with Kohala's lifestyle and traditions. Others commented that mauka and makai viewplanes from the highway should not be obstructed by the resort.

Amenities: A few residents interviewed said that increased amenities in Kohala would be a positive impact of population growth. Supermarkets were most frequently mentioned. A few interviewees suggested that the resort offer affordable golf and tennis rates for residents.

Historical Sites: Respondents frequently commented that historical sites on the resort are important and should be preserved. Public access to historic sites should be provided.

3.5 PROPOSED MODIFICATIONS

During interviews, members of the community suggested possible changes and additions to the resort and master plan. Interviewees initiated discussions of possible changes themselves.

(Inclusion of items in the following list does not mean that the modifications will or will not be part of Chalon plans. In some cases, residents suggested steps which Chalon has announced it will take.)

The ideas mentioned in the interviews can be briefly listed under four headings:

Overall Design of Resort:

- Architectural design of the resort should be appropriate for Kohala.
- Use native Hawaiian plants in the resort landscaping. This would educate others about Hawaiian culture and perhaps create an opportunity for a local industry.
- Development should not be pressed up against the harbor.
- Build the resort mauka of the highway.
- Provide three public accessways through the resort to the shoreline.

Resort Design Elements:

- Do not build a boat ramp at Mahukona. If boating facilities are improved, replace the winch system with a larger and improved one. A boat ramp will encourage greater islandwide use.

- Do not remove the pavilion at Mahukona Park.
- Do not put up gates.
- Cluster residential units together, instead of spreading them on one-acre parcels, to create more open space.

Resort Employment:

- Provide employee child care services to attract workers.
- Provide employee housing near the resort. This would ease the housing situation in Kohala and create good employee morale.

Master Plan Elements (Outside the Resort):

- Use the railroad route, or perhaps a train, to provide public shoreline access. This would preserve part of Kohala's history and serve a practical purpose.
- Do not build a restaurant at Pololu Lookout.
- Make the center of Hawi a historical town and build commercial structures and new housing outside the center of town. The historical value of Hawi is not emphasized enough.
- Minimize modern architecture in Hawi and keep styles similar to existing buildings.
- Convert the old Kohala Corporation office into a sugar history museum.
- Hawi Road has no shoulders and no sidewalks. It will have to be widened to accomodate traffic caused by the multifamily units.
- Affordable housing lots should be from 10,000 square feet to 12,000 square feet in size.
- Affordable housing should be for sale not for rent. Pride in ownership is important to prevent problems such as crime.
- Build the multifamily units where the values of Chalon property alone are affected.
- Agricultural leases should be long-term.
- Kohala Ditch should be improved and used to support agriculture in Kohala.
- Future plans should encourage more non-tourism jobs.

Several informants stressed that the resort's architecture and design should be appropriate for Kohala. With regard to Master Plan elements, several interviewees expressed concern with the size of housing lots, with Hawi Road, and with Pololu Lookout. (Since interviewees were not specifically asked to identify possible changes, it is not clear whether many people support various proposals for modification. Still, the repeated mention of these few proposals suggests that they are of some importance.)

4.0 SOCIO-ECONOMIC IMPACTS AND MITIGATIONS

This section presents an independent consultant's assessment of both quantifiable changes, such as employment and on-site population impacts, and more qualitative changes associated with the Mahukona/Kapaanui resort project.

(NOTE: The preceding section on Community Issues and Concerns should also be considered as part of the "Social Impact Assessment," since the affected community is often the best judge of qualitative impacts. Also, community reactions are appropriately considered as effects of a project.)

By the time the proposed Lodge is scheduled to open, the study area will have already experienced economic and population growth. New residential developments will likely have begun to address the community's need for housing for both current and new residents. (However, it is not clear whether South Kohala housing projects will be developed on a scale adequate to meet the needs of that district's workforce.) In North Kohala, gradual buildout of new and existing upscale residential developments will increasingly bring affluent part-time residents and visitors to the district.

In short, the project must be assessed in the context of changes in the study area, including general growth trends and the Chalon Master Plan. This section deals with:

- Impacts following from the implementation of the North Kohala Master Plan;
- Displacement of existing activities at the project site;
- Impacts on coastal access and recreational activities;
- Employment and labor supply;
- Population and housing impacts;
- Impacts on property values and development;
- Impacts of resort employment on North Kohala; and
- Impacts of project residents and visitors on North Kohala's social and economic life.

Many of the impacts or effects associated with the project are positive. However, measures to mitigate possible negative impacts and/or enhance positive impacts are discussed where appropriate.

4.1 IMPACTS FOLLOWING FROM IMPLEMENTATION OF THE NORTH KOHALA MASTER PLAN

According to Chalon International, the Mahukona Resort project is the linchplan of a larger development program, contained in the tentative North Kohala Master Plan. Likely impacts of the overall Master Plan program include increased prosperity for North Kohala residents and businesses, reduction of housing need, and enhancement of existing communities.

Although the Master Plan impacts can only be assessed when it is finalized, there are several reasons for believing it will have significant social benefits:

(1) Since the sugar plantation of the 1970's, much of North Kohala has undergone economic and physical stagnation. Some storefronts on the main streets of Hawi and Kapaau remain unpainted; some buildings have even collapsed. There has been little sense of positive change or growth in the area.

(2) The preliminary Master Plan for the overall region is primarily based on recommendations from the community itself, through the participation process described earlier in Section 3.3. Thus, it reflects existing community values, especially in regard to:

-- Community revitalization through limited commercial and housing expansion in town areas;

-- Preservation and enhancement of agriculture and aquaculture in rural areas outside of towns.

However, since many elements of the Master Plan do not generate income, according to Chalon, the Mahukona Resort is necessary to pay for the various other community benefits which are currently envisioned.

The Master Plan is still being finalized. However, many elements appear to have gelled. Components with socio-economic impacts for North Kohala include:

- **Affordable Housing:** In response to widespread concern over housing, Chalon International plans to develop both single- and multifamily housing for the community.
- **Development of Community Infrastructure:** In the near term,Chalon plans to work with the County to develop an "urgent care" center near the North Kohala Hospital. In the long term, Chalon plans to identify sites for future schools, to help develop a solid waste management plan for North Kohala, and to have improvements made to Pratt Road.

- **Support for Diversified Agriculture:** Chalon plans several actions which will aid agriculture, on its land and elsewhere. In the short term, Chalon plans to:

  - improve and maintain Kohala Ditch, making more irrigation water available to farmers;

  - provide land (and possibly structures) for a produce stand on Akoni Pule Highway;

  - renovate macadamia orchards on its land; and

  - lease four additional agricultural lots at Kahe.

  Over the longer term, Chalon will explore:

  - aquaculture development, with associated agricultural activity, near the outfall of the Kohala Ditch;

  - expanded diversified agriculture and nursery activities in the Kahe-Kapaau area;

  - community gardens in planned residential areas; and

  - agricultural processing facilities in a proposed light industrial development at Halalau Mill.

- **Support for Limited Commercial/Industrial Development in North Kohala:** A mini-mart proposed for Hawi and the Halalau Mill development could provide commercial opportunities and jobs for North Kohala residents.

- **Expanded Recreation Resources:** Short-term plans call for improvements at Mahukona Park, including new pavilions, restrooms, ocean access, and parking, and at Pololu Lookout. Eventually, facilities at Kamehameha Park could be increased by the addition of a hiking trail to the shore. (These improvements would be made after consultation with State and County agencies.)

  Chalon further plans to facilitate access to both shoreline areas and the forest reserve. A program for recreation and hunting in the forest reserve will be implemented.

- **Maintenance and Development of North Kohala's Historic/Cultural Resources:** Chalon plans to work with the community and with government agencies to:

  - establish a Kohala Historical and Cultural Center;

  - preserve and enhance Mookini Heiau and the Kamehameha birth site; and

  - identify other sites of historic and archaeological importance.

Chalon plans to work with others in the community to preserve the historic character of Hawi and Kapaau, and to retain Hawi's central open area. Furthermore, Chalon will strive to maintain the open character of views along both the Akoni Pule Highway and the Kohala Mountain Road.

The plan was developed through consultation with community leaders. It promises to respond to needs for housing and recreational resources, and to encourage limited economic development. Since many elements of the plan do not generate income, the plan's implementation depends on the project as a source of income.

An important linkage between the resort and the rest of the master plan is the use of Kohala Ditch water for irrigation. By maintaining the Ditch, Chalon plans to support agriculture and aquaculture in North Kohala. The resort's demand for water will help to offset Ditch maintenance and improvement costs, and hence lower the cost of water for agricultural uses.

The project will further support recreational developments, since Mahukona Harbor and Park will be improved in the process of project construction. The resort will likely maintain these areas on a regular basis.

4.2 DISPLACEMENT

Currently, most of the project site is little used. However, Mahukona Park and Harbor are popular recreation areas. The former is used for picnics, the latter for swimming and boating. Also, fishermen use shore areas along the length of the project's ocean frontage.

The project will not displace the general public. Instead, the facilities available to the public will increase.

Two lessees now have rights to much of the project site on a month-to-month basis. One is preparing to graze about 40 head of cattle on-site. The second gathers plants for resale to nurseries and florists. Both are aware that their leases will end when construction begins.

Project construction is not expected to limit public use of Mahukona Park and Harbor. The road to those sites will remain open. However, dust and noise due to construction may deter some persons from using those sites during the major construction period, before the Lodge opens.

4.3 SHORELINE ACCESS AND RECREATION

The project is likely to have immediate impacts on recreation at Mahukona Beach Park and Harbor, in the project

- **Support for Diversified Agriculture:** Chalon plans several actions which will aid agriculture, on its land and elsewhere. In the short term, Chalon plans to:

  - improve and maintain Kohala Ditch, making more irrigation water available to farmers;

  - provide land (and possibly structures) for a produce stand on Akoni Pule Highway;

  - renovate macadamia orchards on its land; and

  - lease four additional agricultural lots at Kahe.

  Over the longer term, Chalon will explore:

  - aquaculture development, with associated agricultural activity, near the outfall of the Kohala Ditch;

  - expanded diversified agriculture and nursery activities in the Kahe-Kapaau area;

  - community gardens in planned residential areas; and

  - agricultural processing facilities in a proposed light industrial development at Halalau Mill.

- **Support for Limited Commercial/Industrial Development in North Kohala:** A mini-mart proposed for Hawi and the Halalau Mill development could provide commercial opportunities and jobs for North Kohala residents.

- **Expanded Recreation Resources:** Short-term plans call for improvements at Mahukona Park, including new pavilions, restrooms, ocean access, and parking, and at Pololu Lookout. Eventually, facilities at Kamehameha Park could be increased by the addition of a hiking trail to the shore. (These improvements would be made after consultation with State and County agencies.)

  Chalon further plans to facilitate access to both shoreline areas and the forest reserve. A program for recreation and hunting in the forest reserve will be implemented.

- **Maintenance and Development of North Kohala's Historic/Cultural Resources:** Chalon plans to work with the community and with government agencies to:

  - establish a Kohala Historical and Cultural Center;

  - preserve and enhance Mookini Heiau and the Kamehameha birth site; and

  - identify other sites of historic and archaeological importance.

Chalon plans to work with others in the community to preserve the historic character of Hawi and Kapaau, and to retain Hawi's central open area. Furthermore, Chalon will strive to maintain the open character of views along both the Akoni Pule Highway and the Kohala Mountain Road.

The plan was developed through consultation with community leaders. It promises to respond to needs for housing and recreational resources, and to encourage limited economic development. Since many elements of the plan do not generate income, the plan's implementation depends on the project as a source of income.

An important linkage between the resort and the rest of the master plan is the use of Kohala Ditch water for irrigation. By maintaining the Ditch, Chalon plans to support agriculture and aquaculture in North Kohala. The resort's demand for water will help to offset Ditch maintenance and improvement costs, and hence lower the cost of water for agricultural uses.

The project will further support recreational developments, since Mahukona Harbor and Park will be improved in the process of project construction. The resort will likely maintain these areas on a regular basis.

4.2 DISPLACEMENT

Currently, most of the project site is little used. However, Mahukona Park and Harbor are popular recreation areas. The former is used for picnics, the latter for swimming and boating. Also, fishermen use shore areas along the length of the project's ocean frontage.

The project will not displace the general public. Instead, the facilities available to the public will increase.

Two lessees now have rights to much of the project site on a month-to-month basis. One is preparing to graze about 40 head of cattle on-site. The second gathers plants for resale to nurseries and florists. Both are aware that their leases will end when construction begins.

Project construction is not expected to limit public use of Mahukona Park and Harbor. The road to those sites will remain open. However, dust and noise due to construction may deter some persons from using those sites during the major construction period, before the Lodge opens.

4.3 SHORELINE ACCESS AND RECREATION

The project is likely to have immediate impacts on recreation at Mahukona Beach Park and Harbor, in the project

site. Those impacts will be, on balance, beneficial. Available facilities will increase, and access will be improved. The impact on the use of other coastal and recreation areas are expected to be indirect and minimal.

The project will keep access routes and coastal areas clean, and will likely contribute to the maintenance of public areas in the project site. Resort areas will be landscaped. As a result, the overall appearance of the site will improve.

Access to the Harbor, Beach Park, and Shoreline through a Resort Area: Area residents were concerned that the resort could try to limit public access to shore areas, or that some area residents would feel out of place and excluded in the general atmosphere of an upscale resort community.

The entry road leading to the Harbor and Beach Park is public, and will remain open. Other roads will lead to access points. The Lodge will not be ostentatious -- project design calls for low-rise development and architecture rooted in Hawaiian history. Extensive landscaping will help the Lodge buildings to fit in with their surroundings. Additional parking will be provided.

Mahukona Harbor and Beach Park: These are now enjoyed by both area residents and visitors (personal communication, Nario Libron, Mahukona Beach Park Caretaker, February 20, 1990). Tourists come mainly on weekdays, residents on the weekends. The park pavilion is booked every weekend for private parties.

Currently, a major constraint on use is parking. Space for parking and for racreation at the park can be a problem at times in the summer.

Residents expressed some concern that the project would increase park usage appreciably, due to use by either project residents and visitors or persons from outside North Kohala. The idea of "quality access" -- easy access for current users, but little to invite visitors from outside the project -- was proposed.

Chalon International has subscribed to community recommendations for improvements, including new pavilions, restroom facilities, ocean access, volleyball courts, camping areas, and parking. (Such improvements would emerge from co-operation of the landowner, the County and State, and the community.) Chalon recognizes that the Harbor is valued by residents as a swimming area.

The project will bring visitors and new residents to the area, increasing use of Mahukona Park and Harbor. That use will have only limited impact on resident use of these areas for several reasons:

SEE ADDENDUM AT BEGINNING OF THIS APPENDIX

- Resort guests and residents will be able to swim in pools on the project site. Many guests may come to look at the Harbor and Park, but will swim only in the resort.
- Resort guests' use of these areas will be spread through the week, while resident use is highest on weekends.
- Resort guests will not drive to the Harbor and Park, and so will not use limited parking facilities.
- No resort rooms or entertainment area will adjoin the Harbor. Instead, recreation areas will provide a buffer between the Lodge and the Harbor.

Many project residents would be likely to own boats and use the Harbor. Use of the boat winch would then increase.

It is not certain that project development would bring more than a few visitors from outside the project or Hawaii residents living outside the study area to Mahukona.

Shoreline Access: Currently, fishermen and other area residents visit the shoreline along the length of the project site. Chalon International guarantees continuing public access.

Pedestrian access will be possible from at least three points within the project site. (Vehicular access to the shore will be barred, except at the Harbor, to preserve coastal areas. This could reduce access to the coast for a few current users.)

At Nishimura Bay, makai of the Lodge area, a landing or landings for bathers could be added. The resort could thus change the experience people have of this site, affecting a few residents. (No other structures are planned, and resort guests are expected to make only limited use of the Bay.)

The coastal area will be left open -- all structures will be set back from the shoreline. To protect coastal areas, vehicle access to the shore will not be allowed (except at the Harbor).

Because the Lodge and associated villas will be relatively low-rise structures, views from the shore (along the coast and mauka) will be little affected.

Elsewhere in Hawaii, conflict over shoreline access between new and established residents has been most likely where newcomers buy separate beachfront properties (Belt Collins and Associates, 1983). Plans for the Mahukona Resort show only a few residential sites (in Kapaanui) adjoining the shore Conservation area (as shown in Figure 1-B). The Lodge and golf course take up most of the land immediately mauka of the shore. Consequently, the chance that project residents and shore area users will be in conflict has been minimized by project design.

Other Scenic and Recreation Areas: Project visitors and residents are likely to visit lookouts and other scenic sites in the study area. They are not expected to increase usage to a point that resident use would be affected. Plans to improve Pololu Lookout and Kamehameha Park should augment facilities outside the project site far more than increased use by project residents will affect these.

Mitigations: Chalon can respond to some community members' concern that area residents will feel out of place in an upscale area through project design and community activities:

- Public access to the shore by ungated roads open to the public will be guaranteed by Chalon;
- The presence of established members of the community on the staff at the resort can help to avoid misunderstandings between resort personnel or residents and community residents;
- Chalon's work to help maintain the Beach Park and Harbor should make these areas more attractive to many community members; and
- Through continuing involvement with the community, Chalon can demonstrate openness to all segments of the community.

Project impacts on Mahukona Beach Park and Harbor can be minimized by:

- Development of additional parking (per the Chalon North Kohala Master Plan).
- Landscaping and signage at the highway and along the access road to encourage "quality access" -- open access for the public, but little encouragement for persons not familiar with the area to come to these areas.

  (Signs clearly directing the general public to the County Beach Park will of course be necessary. Non-residents need not, however, be informed that the Harbor is a swimming area.)
- Discouraging project residents from using cars to reach the Lodge, Harbor and Beach Park, perhaps by providing transport from their homes to these areas.
- Encouraging project residents to join existing fishermen's associations or to support those associations in maintaining facilities at the harbor.

4.4 EMPLOYMENT AND LABOR SUPPLY

This sub-section discusses quantitative employment impacts, including need for importation of workers.

Estimated impacts should be considered maximal likely effects. They are based on the assumption of a 300-unit lodge. The actual size of the lodge has not yet been determined. It could be only 200 or 250 units; if so, employment impacts would be correspondingly less.

The resort will create both short-term (construction) and permanent (operational) employment. Jobs in each category are of several types:

- Direct on-site jobs;
- Indirect jobs, created when resorts purchase goods or services from other businesses; and
- Induced jobs, created when direct and indirect employees spend their wages and stimulate the general economy.

Various state or county multipliers can be applied to the on-site direct job figure to generate estimates of the off-site indirect or induced figures. Generally, a "Type II multiplier" is used to calculate combined indirect/induced jobs. (A Type I multiplier would calculate indirect jobs only.)

4.4.1 Construction Employment

Under a separate contract, KPMG Peat Marwick has estimated direct on-site construction jobs, as well as statewide total jobs (including indirect and induced jobs). The task of Community Resources, Inc. (CRI) for this report is to apportion Peat Marwick's estimated job numbers to more specific geographical areas:

- in the study area;
- elsewhere on the Big Island; and
- off-island in the state of Hawaii.

Table 4-A shows results of the CRI analysis. During the initial two-year construction period for the golf course, these activities will support 160 average annual on-site jobs; 25 other jobs elsewhere in the North/South Kohala study area (for a regional total of 185); 75 additional jobs elsewhere on the Big

TABLE 4-A: TOTAL STATEWIDE, ISLANDWIDE, AND STUDY AREA CONSTRUCTION JOBS FROM MAHUKONA-KAPAAHU RESORT DEVELOPMENT, 1995 - 2010

(Islandwide Numbers Are Rounded)
(Average Annual Person-Years)

	1993-1995	1996-2000	2001-2005	2006-2010
On-Site (1)	160	30	10	10
Off-Site, Elsewhere in Study Area (2)	25	5	2	2
STUDY AREA SUBTOTAL	185	35	12	12
Off-Site, Elsewhere on Island	75	15	8	8
ISLAND SUBTOTAL (3)	260	50	20	20
Off-Site, Other Islands	190	38	10	10
STATE TOTALS (1)	450	80	30	30

(1) From KPMG Peat Marwick.
(2) Assumes 25% of off-site islandwide jobs are in study area (North plus South Kohala).
(3) On-site direct jobs times 0.65 multiplier derived by Decision Analysts Hawaii, Inc. (DAHI), 1986.

NOTE: Figures represent MAXIMAL impacts, since they are based on assumed 300-unit lodge. In reality, lodge may be somewhat smaller.

Island (for an islandwide total of 260); and 190 in the rest of the state (summing to Peat Marwick's estimated 450 statewide jobs).

Construction activity is expected to drop off in the late 1990's, as the only remaining construction activity would be buildout of homes on the residential lots and a little associated infrastructure development. By the year 2000, all infrastructure will be in place, and remaining residential lots are expected to build out more gradually.

4.4.2 Operational Employment

Non-Mahukona Study Area Resort Development, 1990 - 95: For purposes of the subsequent labor supply analysis, it is necessary to calculate additional study area jobs coming on line prior to or about the same time as expected Mahukona Resort jobs.

KPMG Peat Marwick market studies indicate there will likely be one major new hotel opening by 1995 at each of the three major South Kohala resort destinations -- the Ritz-Carlton Mauna Lani (currently under construction), the South Kohala Resort hotel near Hapuna Beach and Mauna Kea Beach Hotel, and one yet-to-be-specified additional hotel at Waikoloa Beach Resort. Additionally, developer plans call for 80,000 square feet of commercial space at Waikoloa and nearly 1,600 new condominium units (208 at South Kohala Resort, 500 at Mauna Lani, and 880 total for two Waikoloa Beach Resort projects).

The method used to calculate islandwide and study area employment is that developed for the Hawaii County Planning Department by Decision Analysts Hawaii, Inc. (DAHI, 1986) and utilized by CRI in past South Kohala resort EIS's (Belt Collins and Associates, 1987a, 1987b). Required assumptions are shown in Table 4-B, while Table 4-C provides the analysis and results.

Table 4-C indicates that the expected new South Kohala resort development (if it occurs as currently planned) will generate more than 4,000 new islandwide jobs by 1995. Of these, some 2,900 could be in the North and South Kohala study area. The great majority of the study area jobs would presumably be located in South rather than North Kohala.

Mahukona Resort Development: KPMG Peat Marwick has already estimated direct on-site and total statewide employment from Mahukona project development. CRI's task is again to allocate off-site employment to various geographical areas, in order to come up with estimates of study area and islandwide employment.

The DAHI methodology is again utilized for this purpose, and Table 4-D shows required input assumptions (all adapted from the KPMG Peat Marwick market study). Results of the analysis are shown in Table 4-E. (NOTE: The numbers in this table vary

TABLE 4-B: SUMMARY OF EMPLOYMENT ASSUMPTIONS FOR NON-MAHUKONA RESORT DEVELOPMENT IN STUDY AREA, 1990 - 95

	Ritz-Carlton (1)	South Kohala Resort (1)	Waikoloa Hotel (2)	Multi-Family (Condos) (3)
Total Units (1):	450	350	400	1588
Units in Visitor Use				
% of Units in This Use	100%	100%	100%	50%
Average Party Size	1.90	1.90	1.90	2.10
Occupancy	70%	70%	70%	50%
On-Site FTE Jobs/Unit (4)	1.51	1.40	1.40	0.40
Luxury Adjustment (5)	0.35	0.35	0.35	0.00
Units in Part-Time Residential Use				
% of Units in This Use	0%	0%	0%	25%
Average Party Size	0.00	0.00	0.00	2.00
Occupancy	0%	0%	0%	25%
On-Site FTE Jobs/Unit	0.00	0.00	0.00	0.20
Units in Full-Time Residential Use				
% of Units in This Use	0%	0%	0%	25%
Average Party Size	0.00	0.00	0.00	2.00
Occupancy	0%	0%	0%	95%
On-Site FTE Jobs/Unit	0.00	0.00	0.00	0.30
Waikoloa Commercial (1000 sq. ft.)			80	
On-Site Commercial Jobs			230	

NOTES:

(1) From respective project EIS's.

(2) Unit count from KPMG Peat Marwick market study, Waikoloa expansion. Commercial square footage and employment from same source. Hotel assumed by CRI to have same characteristics as South Kohala Resort hotel.

(3) Unit count from KPMG Peat Marwick market study, Kealakehe housing. Condominiums assumptions identical to those used for Ritz-Carlton and South Kohala Resort EIS studies.

(4) FTE = Full-Time Equivalent.

TABLE 4-C: EMPLOYMENT FROM NON-MAHUKONA RESORT DEVELOPMENT IN STUDY AREA, 1990 - 95

	1995
Jobs from Units in Visitor Use	
Total Units (Hotel and Condo) in This Use	1,994
Average Daily Visitor Population	2,430
Weighted Average Party Size	1.96
Weighted Occupancy	62.0%
Adjusted DAHI Multiplier (1)	1.68
Jobs (Units times DAHI Multipliers)	3,355
Additional Jobs from Luxury Factor (2)	420
Total Islandwide Jobs Generated by Visitors	3,775
Jobs from Units in Part- or Full-Time Residential Use	
Total Units in These Uses	794
Average Daily Part- and Full-Time Resident Population	953
DAHI Multiplier for Residential	0.29
Total Islandwide Jobs Generated by Resort Residents	276
Expected Distribution of Jobs (Numbers Rounded)	
On-Site (3)	2,470
Off-Site, Elsewhere in Study Area (4)	390
STUDY AREA SUBTOTAL	2,870
Off-Site, Elsewhere on Island	1,180
ISLAND TOTAL (5)	4,050

NOTES:

(1) Decision Analysts Hawaii Inc. (DAHI) standard multiplier is 1.75, but only if occupancy is 65% and average party size is 1.95. If not, multiplier is adjusted by multiplying 1.75 times (weighted occupancy divided by 65%) times (weighted party sized divided by 1.95.)

(2) Luxury hotel units times "Luxury Adjustment," Table 4-B.

(3) Calculated from assumptions in Table 4-B.

(4) Assumes 25% of off-site islandwide jobs are in study area (North plus South Kohala).

(5) Sum of islandwide jobs from visitors and jobs from part- and full-time residents.

TABLE 4-D: SUMMARY OF EMPLOYMENT ASSUMPTIONS FOR MAHUKONA-KAPAANUI RESORT DEVELOPMENT, 1995 - 2010

	Lodge (1)	Residential (1)
Total Units Built:		
--1995	300	15
--2000	300	76
--2005	300	115
--2010	300	138
Units in Visitor Use		
% of Units in This Use	100%	20%
Average Party Size	1.90	2.50
Occupancy		
--1995	55%	25%
--2000	67%	25%
--2005	75%	25%
--2010	75%	25%
On-Site FTE Jobs/Unit (2)		
--1995	1.20	0.15
--2000	1.40	0.15
--2005	1.55	0.15
--2010	1.55	0.15
Luxury Adjustment (3)	0.21	0.00
Units in Part-Time Residential Use		
% of Units in This Use	0%	40%
Average Party Size	0.00	2.50
Occupancy	0%	50%
On-Site FTE Jobs/Unit (4)	0.00	0.05
Units in Full-Time Residential Use		
% of Units in This Use	0%	40%
Average Party Size	0.00	2.50
Occupancy	0%	90%
On-Site FTE Jobs/Unit (4)	0.00	0.10

(Continued)

TABLE 4-D (Cont.)

NOTES:

(1) All assumptions from KPMG Peat Marwick market study for this project, except as noted below. Assumption of 300-unit lodge implies maximal impacts, since lodge may actually be somewhat smaller.

(2) FTE = Full-Time Equivalent. Ratio used by KPMG Peat Marwick for lodge alone (1.40) adjusted here to include golf course and administrative jobs, which were separately calculated in market study. Lower ratio used in earlier years due to lower occupancy figures.

(3) Because of the project's small scale, the luxury adjustment factor assumed here is smaller than that used for hotels at the large South Kohala resorts. The purpose of the luxury adjustment is to capture effects of jobs which would normally be indirect/induced but may occur on-site at large resorts (e.g., laundry service or employee cafeterias). This would occur to some extent at Mahukona, but not as much as at larger operations.

(4) Very minor on-site employment for residential units assumed in order to be consistent with DAHI (1986) methodology.

TABLE 4-E: TOTAL STATEWIDE, ISLANDWIDE, AND STUDY AREA OPERATIONAL JOBS FROM MAHUKONA-KAPAANUI RESORT DEVELOPMENT, 1995 - 2010

(Rounded Numbers)

	1995	2000	2005	2010
On-Site (1)	360	430	480	480
Off-Site, Elsewhere in Study Area (2)	40	50	60	60
STUDY AREA SUBTOTAL	400	480	540	540
Off-Site, Elsewhere on Island	110	160	180	190
ISLAND SUBTOTAL (3)	500	630	720	730
Off-Site, Other Islands	170	170	180	170
STATE TOTALS (4)	670	800	900	900

NOTES:

(1) Calculated from assumptions in Table 4-D. Slight variation from KPMG Peat Marwick results due to lower assumed staffing ratio in early years of lodge operations.

(2) Assumes 25% of off-site islandwide jobs are in study area (North plus South Kohala).

(3) Calculated from assumptions in Table 4-D according to the same procedures shown in Table 4-C. Islandwide figures vary more widely than statewide figures because the islandwide figures are sensitive to changing assumptions about occupancy in the Mahukona Lodge.

(4) On-site figure times overall statewide tourism multiplier of 1.87 (based on extrapolation of trends noted in State Data Books and roughly consistent with cumulative statewide multiplier used by KPMG Peat Marwick in market study).

Figures represent MAXIMAL impacts, since they are based on assumed 300-unit lodge. In reality, lodge may be somewhat smaller.

slightly from the KPMG Peat Marwick results, due to some small changes in assumptions necessary for the DAHI approach. The variations are significant only for 1995, when CRI assumes lower on-site and statewide employment due to typical low start-up occupancy figures.)

When the lodge achieves its "mature" (maximal expected average) occupancy by 2010, the overall resort will create employment for about 480 on-site workers; 60 workers elsewhere in North and South Kohala (for a study area total of 540); 190 workers elsewhere in the Big Island economy (for an islandwide total of about 730); and 170 workers on other islands (summing to an estimated 900 statewide total). Initial impacts would be slightly less (e.g., 400 study area jobs by 1995) due to the lower expected start-up occupancy rate.

4.4.3 Labor Supply and In-Migration

This part of the analysis focuses on questions about availability of local labor supply for the Mahukona resort from various sources (study area, East Hawaii, off-island). The analysis focuses on operational employment alone. This is because the availability of construction labor will depend on the exact timing of other construction projects, which cannot be predicted at present. (However, given the variety of other announced West Hawaii hotel construction projects, it may be assumed that many off-island construction workers will have to be imported, either for the Mahukona project or for some other project starting soon after Mahukona has absorbed locally available labor.)

The labor supply analysis has both qualitative and quantitative components. The quantitative aspect -- i.e., "About how many in-migrant workers will be needed?" -- depends in part on assumptions derived from the qualitative analysis.

In January and February 1990, CRI interviewed 25 Kohala personnel officers, union representatives, Employment Service officials, and islandwide school counselors (listed in Appendix B) to determine probable answers to the following questions:

Will the Mahukona Resort itself need to import workers to staff up? Despite an expected continued worsening of the West Hawaii labor shortage by 1995, most personnel officers felt that the Mahukona Resort should be able to meet most of its staffing needs (except for management) from the North Kohala population. This would be due primarily to the appeal of jobs close to North Kohala residents' home, of which there are currently few. There is also objective evidence to support this contention. On Maui, many Kaanapali workers living in the Kihei area have recently applied for jobs at the Four Seasons Resort in nearby Wailea (Smith, 1990). Also, surveys taken at the three then-existing South Kohala hotels plus the nearest North Kona resort (Kona Village) in 1987 clearly show a pattern whereby hotel workforces are drawn primarily from nearby communities -- see Table 4-F.

TABLE 4-F: RESORT EMPLOYEE RESIDENTIAL PATTERNS, NORTHWEST HAWAII, 1987

Current Residence	Kona Village (1)	Sheraton Royal Waikoloa (2)	Mauna Lani Resort (3)	Mauna Kea Resort (3)
Puako/Waikoloa/Kawaihae	4%	17%	12%	9%
Kamuela/Waimea	3%	30%	23%	25%
North Kohala	5%	21%	29%	39%
Hamakua	2%	12%	15%	23%
North Kona	73%	17%	18%	3%
South Kona	14%	1%	1%	0%
East Hawaii	0%	1%	2%	1%
	100%	100%	100%	100%
(No. Responding)	(133)	(206)	(371)	(358)
If Choice, Where Live?				
Puako/Waikoloa/Kawaihae	4%	NA (4)	26%	19%
Kamuela/Waimea	7%	NA (4)	28%	30%
North Kohala	6%	NA (4)	22%	31%
Hamakua	1%	NA (4)	6%	14%
North Kona	71%	NA (4)	15%	5%
South Kona	10%	NA (4)	2%	1%
East Hawaii	0%	NA (4)	1%	1%
	100%	NA (4)	100%	100%
(No. Responding)	(134)	NA (4)	(343)	(338)
Where Live 1 Yr. Prior to Starting Hotel Job?				
Puako/Waikoloa/Kawaihae	7%	7%	6%	4%
Kamuela/Waimea	7%	24%	12%	13%
North Kohala	2%	19%	21%	32%
Hamakua	1%	11%	15%	25%
North Kona	50%	12%	15%	4%
South Kona	10%	1%	1%	1%
East Hawaii	5%	5%	12%	7%
Other Island	10%	12%	8%	5%
Other part U.S.A.	13%	8%	8%	6%
Other Country	0%	1%	1%	2%
	100%	100%	100%	100%
(No. Responding)	(135)	(206)	(326)	(326)

NOTES:

(1) Community Resources, Inc., 1987a.
(2) 1987 proprietary survey data - selective information courtesy of Waikoloa Land Co.
(3) Community Resources, Inc., 1987b.
(4) Respondents' choices were not compatible with those available in the other surveys.

This conclusion was subject to some qualifications by the labor supply key informants:

- The need for in-migrant workers would be largely displaced to hotels and other businesses in South Kohala, which might have hired the North Kohala residents going to work at Mahukona. As discussed shortly, these effects will probably be felt more by upcoming new hotels than by existing ones.
- Due to the labor shortage, resort wages and benefits will probably be increasing throughout West Hawaii. The Mahukona Resort will need to match or exceed conditions at other hotels to attract workers.
- North Kohala residents may need additional training in social skills required for highly interactive jobs such as food and beverage positions.

Will the Mahukona Resort harm existing hotel or sugar operations? Although government officials expect new hotels to "steal" workers from other hotels, South Kohala personnel officers interviewed for this report said the effect of the Hyatt Regency Waikoloa opening on their own workforces was much slighter than originally expected. They said the Mahukona Resort could have some effect on them, but expressed no serious concern.

Basically, the most important employees for established hotels are longtime workers filling key positions. Recent history indicates these workers are unlikely to sacrifice seniority and associated benefits to move to another hotel. Employees most likely to move are those in more junior positions, where turnover is usually high even under normal conditions. The personnel officer for the hotel with the most current North Kohala workers (the Mauna Kea Beach Hotel) expressed the most confidence about retaining his longtime workers.

Resort personnel officers said the Mahukona lodge will probably draw most of its workforce from North and South Kohala workers either entering the workforce for the first time or else currently holding junior positions and seeking advancement. They also felt North Kohala residents with more senior positions in South Kohala may be interested in additional part-time work at Mahukona.

Regarding sugar, the personnel officer for Hamakua Sugar Company said that company draws its workforce primarily from East Hawaii, not Kohala. He said the company has been losing some workers to South Kohala resorts and other service businesses. Golf course development could also attract a certain number of sugar workers. However, he also felt that the underlying problem is an attitudinal one -- a growing Big Island unwillingness to take jobs requiring outdoors manual labor -- which is largely independent of resort development.

Where will the labor come from for the planned other West Hawaii resorts? This question is still relevant for Mahukona because of the tentative conclusion that need for in-migrant (or commuter) labor will be mostly displaced to South Kohala or North Kona.

Few people had any definite answers to this question. Basic points raised were:

- In the South Kohala area, there are few if any untapped pools of willing workers. North Kohala probably has a small number of available workers who need training in basic skills and work habits.

- Lack of affordable West Hawaii housing is preventing in-migration from anywhere at present. It is a barrier both to systematic importation of workers and to natural movement of job-seekers.

- The only recent examples of systematic worker importation by employers have involved agricultural companies bringing in seasonal workers. This has had the effect of making importation "thinkable" for hotels -- but none say they are giving it any serious thought, due both to housing shortages and to standard high turnover rates which make it uneconomical to bring in workers.

- Long-term labor sources are highly speculative. One possible source is a government program to relocate Southeast Asian refugees from Oahu (or, ultimately, California). However, this is in the very preliminary stages and is more oriented to agriculture.

  Other targets of speculation include Filipino immigrants, Samoans, Tongans, and West Coast residents (including Hispanics and other "ethnics"). There is little consensus on the practical availability or theoretical relative desirability of any of these groups. However, one or two people thought that, if plantations on other islands succeed in getting Immigration Service waivers to bring in foreign immigrants for "unskilled" agricultural work, it could establish a statewide precedent for hotels and other businesses as well.

- In the short term, hotels and other employers are doing more "sharing" of employees (i.e., facilitating mutual "moonlighting" by workers) and concentrating on retention of valued employees through improved benefits and more sensitive management practices.

- Kona is <u>not</u> considered a productive labor source by South Kohala resort employers, because Kona residents reportedly are uninterested in commuting to South Kohala.

- There is much more interest in resort employment among residents of the Hamakua, Hilo, and even Puna areas.

Several resort personnel officers say they are pinning their hopes for the foreseeable future on new workers from <u>East Hawaii</u>.

Will East Hawaii residents actually meet <u>future</u> West Hawaii labor needs to any great extent? Answers were complex and dependent on some future public- or private-sector actions, but they tended to be positive on balance:

- <u>Commuting</u> from Hilo and Puna is on the increase, although nobody had any estimated total number of commuters. At the time of the interviews, the Hyatt Regency Waikoloa was running four buses a day from Hilo; the Mauna Lani Bay Hotel, one. However, the Mauna Kea Beach Hotel, the Royal Waikoloan, and the Mauna Lani had just reached a tentative agreement with the County for a "pilot" daily public bus from Hilo to Waimea and the South Kohala coast. There was cautious optimism that more public transportation will mean more commuters from Hilo.

- Perceptions were mixed as to whether current Hilo commuters to South Kohala are adjusting well or are "burning out" because of the long travel time and (for auto drivers) cost of gasoline. Several people felt that older workers are adapting to the routine of the commute, while younger ones are more likely to be unhappy.

  Hamakua commuters are reportedly very content with the drive to nearby South Kohala. Their numbers could increase greatly if the sugar plantation shuts down.

- Several people also felt that Saddle Road improvements would induce more commuting from Hilo, since the Saddle Road route cuts some 20 miles from the total distance to Hilo.

- <u>Relocation</u> (i.e., moving to South or North Kohala) was generally considered an unlikely alternative for older Hilo-area residents with established families. The primary reason was housing (lower East Hawaii housing costs and the probability that such people already owned a home in Hilo or Puna). But even if more West Hawaii affordable housing becomes available, it was generally felt that older East Hawaii workers had deep family and social "roots" in East Hawaii; were accustomed to that climate; and disliked the "Mainland-style" social structure evolving in the Kona area.

- However, South Kohala personnel officers (two of whom had themselves grown up in Hilo) and most East Hawaii school counselors agreed that <u>younger people would be willing to relocate to West Hawaii if affordable housing becomes available there</u>. Young singles and couples with very young children were felt to be more mobile and attracted to the higher wages now being paid in West Hawaii

compared to East Hawaii.

- The various business, union, and school informants were also asked which parts of West Hawaii would be most attractive to East Hawaii relocatees, if housing availability were equal. Most people felt that young singles would be most attracted to Kailua-Kona or Waimea, as centers of excitement or activity.

- However, many also felt that North Kohala would be very attractive to younger East Hawaii residents just starting families, if affordable housing is available. In climate, architecture, and social structure, the Hawi-Kapaau area is perceived as far more compatible with East Hawaii than is the Kona area. The major qualification to this perception involved the need to upgrade the quality of public schools in North Kohala.

- Several South Kohala informants felt that Chalon has a unique advantage in attracting workers (from anywhere) because of the land it could make available for affordable housing. One individual stated, "Whoever solves the housing problem solves the labor problem. If Chalon is going to be both a resort developer and a housing developer, they can do things that nobody else can do to make sure their workers get housing."

Quantitative Analysis: Labor supply can come from the following sources --

- Natural increase and higher labor force participation rates: Because the population is naturally growing due to excess of births over deaths, the workforce is also growing. Additionally, Hawaii census data clearly show that more people enter the workforce as rural job-poor areas become job centers. Labor force participation rates tend to rise particularly for women, as well as certain other groups (such as the elderly, who are most attracted to part-time jobs, which are plentiful in resorts and other components of the service industry.)

  CRI has developed an age-cohort population projection model (Community Resources, Inc., 1987d) which forecasts future population from the "aging" of current population alone. The model incorporates statewide labor force participation rates from the State of Hawaii's own model for forecasting population and labor force (Hawaii State Department of Business and Economic Development, 1988b, 1988c). Because the statewide rates exceed historical North Kohala and Big Island rates, this means the CRI model implicitly assumes increasing labor force participation in response to more job opportunities. This assumption reflects recent survey measurements establishing much higher participation rates in Neighbor Island resort areas (Community Resources, Inc., 1989).

The CRI age-cohort model indicates that natural increase of the combined North and South Kohala population from 1990 to 1995 could produce 425 new labor force entrants. In reality, many maturing young people will leave the area. (Surveys of recent North Kohala high school seniors indicated 30% to 50% planned to obtain either higher education or go into the military.) But community informants indicate many of these eventually return. Also, out-migrants are replaced by some in-migrants.

- Net in-migration with or without resort development: Table 4-G shows components of North and South Kohala population growth for both the 1970's and 1980's -- natural increase (births minus deaths) and "net" in-migration (total in-migration minus out-migration). The ratio of net in-migration to natural increase in North Kohala varied from the 1970's (when there was net out-migration) to the 1980's. However, the ratio for South Kohala was almost identical in the 1970's and the 1980's.

  The significance of this finding lies in the fact that no new South Kohala hotels were built during the 1970's, and there was very little other economic expansion during that time. This indicates the study area is attracting in-migration with or without resort development -- most likely "urban refugees" from Oahu or the Mainland who value the rural environment but must still find employment in order to subsist.

- Natural Increase in East Hawaii Labor Force: Based on historical trends, the labor force from Hamakua through Hilo and Puna to Ka'u should grow by about 2,100 persons over the next five years through natural increase alone.

  Except for possible Ka'u resort development, there are few prospects for significant expansion of East Hawaii's primary job base. (However, additional jobs will be created in the Hilo area because of indirect employment generated by West Hawaii job growth.)

  Based on the previous key informant assessment of East Hawaii worker willingness to commute or relocate (and on figures for indirect employment generated outside the study area by new resorts), it is tentatively assumed that new study area jobs from South Kohala resorts can capture about 20% of the increase in East Hawaii's labor force. This would of course vary by exact area; it would be significantly higher for Hamakua, lower for Puna or Ka'u.

Assuming that natural increase in East Hawaii will be adequate to fill the new indirect resort jobs there, needed off-island in-migration would then focus on filling new jobs located in South Kohala (including displaced impacts of the Mahukona

TABLE 4-G: BASIS FOR PROJECTING IN-MIGRATION WITH OR WITHOUT PROJECT

	NORTH KOHALA		SOUTH KOHALA		TOTAL KOHALA	
	Births	Deaths	Births	Deaths	Births	Deaths
1970-79	560	227	695	195	1,255	422
Natural Increase for 1970's:		333		500		833
Annual Rate:		1.0%		2.0%		1.4%
1970 Population:		3,328		2,310		5,638
1980 Population:		3,249		4,607		7,856
Total Growth:		(77)		2,297		2,220
Net In-Migration:		(410)		1,797		1,387
Ratio, Net In-Migration to Natural Increase:		-1.23		3.59		1.67

	Births	Deaths	Births	Deaths	Births	Deaths
1980-88	553	277	1,022	310	1,575	587
Natural Increase for 1980's:		276		712		988
Annual Rate:		1.0%		1.8%		1.4%
1980 Population:		3,249		4,607		7,856
1988 Population:		3,700		7,900		11,600
Total Growth:		451		3,293		3,744
Net In-Migration:		175		2,581		2,756
Ratio, Net In-Migration to Natural Increase:		0.63		3.63		2.79

	Births	Deaths	Births	Deaths	Births	Deaths
1970-88	1,113	504	1,717	505	2,830	1,009
Natural Increase for 1970-88:		609		1,212		1,821
Annual Rate:		0.9%		2.3%		1.5%
1970 Population:		3,328		2,310		5,638
1988 Population:		3,700		7,900		11,600
Total Growth:		374		5,590		5,964
Net In-Migration:		(235)		4,378		4,143
Ratio, Net In-Migration to Natural Increase:		-0.39		3.61		2.28

SOURCES: Hawaii State Data Book, 1989; State Health Department Research & Statistics Reports 12 and 33; State DBED District Statistics (CTC-65 and SR 211).

Lodge). Table 4-H presents results of the labor supply/demand analysis.

The combined 1995 study area labor demand from South Kohala resorts (2,870 from Table 4-C) and the Mahukona Resort (540 from Table 4-E) would be 3,410. (NOTE: The Mahukona figure of 540 is actually taken from buildout, rather than 1995, as a conservative measure to reflect Mahukona's full impact.) Mahukona's share of this demand is about 16%. The combined expected labor supply from study area natural increase, in-migrants coming anyway, and East Hawaii relocatees/commuters would be 1,555, leaving a shortfall of about 1,850 workers for all the new South and North Kohala resort development by 1995. Applying Mahukona's 16% share, this comes to 290 new in-migrant workers attributable to Mahukona Resort alone. This is equivalent to 54% of the study area employment generated by Mahukona Resort.

A more conservative approach would be to include the in-migrant workers expected to come anyway, on the basis that they would need jobs to remain. Given this approach, about 410 (or 76%) of the ultimate employment would be taken by off-island in-migrants, although the jobs filled by in-migrants are expected to be displaced from North Kohala to South Kohala.

As previously indicated, the source of these off-island workers cannot currently be predicted with accuracy. If the housing shortage is not solved, the labor shortage may not be solvable. Thus, the success of planned public- and private-sector housing projects will help determine if imported labor is available, and from where it will come. For example, if the Department of Hawaiian Home Lands moves rapidly to develop Kawaihae, the "off-island labor" could be native Hawaiians from other islands. As a hypothetical opposite extreme, total failure to develop housing for new South Kohala might lead new hotels there to build worker dormitories, and the imported workers could be largely young single people from the Mainland or Asian immigrants living cheaply in order to send money home to families.

Recommended Labor Supply Mitigations: The following are consultant recommendations, and do not imply any commitment on the part of Chalon International. It should be noted that the company has five years to assess the actual extent of the regional labor shortage as of 1995, and to develop mitigation measures which meet the true needs of that time.

(1) **Participate in regional public-private partnership efforts to address the labor supply questions:** A number of organizations have initiated plans or actions to address labor concerns --

- o The Private Industry Council (PIC) advising the State Employment Service has formed an Ad Hoc Committee on

TABLE 4-H: WAIKOLOA LABOR SUPPLY VS. DEMAND (REQUIRED IN-MIGRATION) FOR 1995

LABOR SOURCES		Component Totals	Cumulative Totals
Natural Increase in Study Area Civilian Labor Force, 1990-95 (1)		425	425
Expected Worker Net In-Migration With or Without Resort Development (2)		710	1,135
Natural Increase in East Hawaii Labor Force (3)	2,100		
Assumed Capture Rate for Kohala Area Employment (4)	20.0%		
POTENTIAL EAST HAWAII IN-MIGRANTS OR COMMUTERS		420	1,555

LABOR DEMAND	Total Study Area	Kahukona Share (5)
Study Area Labor Demand (6)	3,410	540
	100%	16%
Demand Minus Expected Islandwide Labor Supply		
-- Including In-Migrants		
Expected Anyway	1,855	290
(Pct. of All Workers Thus Expected to Be New In-Migrants)	54%	54%
-- Excluding In-Migrants		
Expected Anyway	2,565	410
(Pct. of All Workers Thus Expected to Be New In-Migrants)	75%	76%

NOTES:

(1) Based on CBI Age-Cohort Model for North plus South Kohala.

(2) Historical ratio of 1.67 from 1970's -- see Table 4-G.

(3) Countywide natural population increase minus West Hawaii natural increase (both computed at recent historical rates of 10 per 1,000), times assumed 49% overall labor force participation rate.

(4) CBI estimate based on discussions with West Hawaii personnel officers.

(5) Kahukona proportion, based on share of study area jobs. To be conservative, Kahukona job figure is from 2010 rather than 1995.

(6) Study area total of 2,870 non-Kahukona (Table 4-C) plus Kahukona total of 540. Figures are based on study area alone due to assumption that jobs elsewhere on island can be filled by natural increase in East Hawaii labor force.

Tourism Training which conducted islandwide workshops prior to the Hyatt Regency Waikoloa opening, and which continues to stage exploratory seminars and workshops.

- The State Employment Service itself has initiated new efforts to help immigrants become job-ready and is also working with State Department of Human Services to train welfare clients for permanent jobs.

- The Kohala Coast Resort Association (KCRA) -- comprised of developers and hotel operators in the three major South Kohala resorts -- has drawn up a "menu" of possible actions for addressing labor supply concerns, contingent on assistance from various public or private agencies.

- Agencies with particular constituencies (e.g., Alu Like for native Hawaiians, or the Hawaii County Economic Opportunity Council [HCEOC] for low-income residents) have expanded communication linkages with current or prospective employers. For example, the HCEOC has reached tentative agreement with a prospective Ka'u resort development on facilitating a resident job training program there.

It is recommend that Chalon International establish preliminary contacts with agencies such as Alu Like, HCEOC, and the State Employment Service. It is also recommended that Chalon explore the feasibility of membership in the PIC's tourism training committee and/or the KCRA. The purpose would be to participate in solving labor shortage concerns in a wider area than North Kohala itself.

(2) Fund training programs for North Kohala residents: Resort projects such as Kuilima, Ko Olina, and Lanai (Castle and Cooke) have funded programs to help immediate area residents become more job-ready. It should be noted that resort operators generally prefer to train employees according to their own methods after they have been tentatively hired. Therefore, developer-sponsored programs have focused instead on pre-employment training, to help residents overcome any deficits in basic skills, work habits, appearance, or job interview skills -- that is, to help them become more qualified to be hired by the resort operators.

In addition to this goal of helping disadvantaged residents become more job-ready for entry-level positions, an overall program might also focus on:

- Assisting already qualified workers to gain additional skills needed to move up to supervisory or management positions;

- o Publicizing availability of both jobs and training, in order to attract current commuters to jobs located closer to home; and

- o Providing small business assistance so that current or prospective entrepreneurs can capture off-site business opportunities generated by the resort.

(3) Providing assistance to Kohala High School: The school is the most important source of future workers. It is currently overcrowded, and several key informants for this analysis stressed the need to improve quality of education there.

The exact form of assistance -- whether facilities, equipment, scholarships, or vocational programs -- would best be determined through consultation with the school staff, Department of Education, and Parent-Teacher Association. However, linkages with Kohala Elementary and High School should be a critical component of any labor supply program worked out for Mahukona Resort.

(4) Work with existing Kohala families to encourage the return of former residents who have moved elsewhere: Some of the potential off-island "in-migrants" could well be returning residents. Some of these might be able to share housing with family members still in the area.

Kohala families can be expected voluntarily to inform their out-migrant family members of new job opportunities. However, the developer can assist by providing standard information and compiling records of potentially interested former residents and their concerns about returning.

On Lanai, RockResorts (which will operate both new Lanai hotels to open this year) put a brief survey in a community newspaper which current residents could send to family members living elsewhere. As a result of this effort and natural family communication, about 10% of the first Lanai hotel's tentative workforce consists of returning former residents. This amounts to one-third of all the "off-island" people hired for the hotel (personal communication, Lindy Valentin, Koele Lodge Personnel Director, February 6, 1990).

(5) Consider targeting new affordable housing for resort employees: At present, in response to community desires, Chalon is planning to build only enough affordable housing to meet the existing needs of current community residents -- with no regard to whether or not these residents will work at the Mahukona Resort.

However, it should be noted that South Kohala resort development may so increase regional housing pressures that many workers from elsewhere in West Hawaii will compete for

new affordable units in North Kohala. Given federal anti-discrimination laws, it may be difficult to assure that the new units actually go to North Kohala residents. Therefore, targeting at least some of the units for actual resort employees could both (a) help the resort to recruit and retain workers, and (b) meet the community goal of housing for current residents, since most Mahukona Resort staff are expected to come from the North Kohala community itself. Such housing should probably be a mix of:

- o Rental units, and

- o Starter fee-simple housing, in which initial rental or leasehold payments would be credited toward eventual purchase price if the individual remained an employee for a specified number of years.

4.5 POPULATION IMPACTS

Population impacts are of two types -- (1) on-site at the resort and (2) off-site, through induced in-migration.

4.5.1 On-Site Population

As part of its market and fiscal impact analysis, KPMG Peat Marwick estimated the number of average daily visitors at Mahukona Resort to increase from 310 in 1995 to 450 in the year 2010. Full- and part-time resort residents would increase their numbers from 20 in 1995 to 200 by 2010. The combined figures thus begin at 330 for 1995, approximately doubling to 650 by 2010. These figures represent new population in the area staying on-site at the resort.

Another type of "on-site" population is de facto population, which means the total number of bodies present at any one time. This would include workers and golfers who are not resort guests or residents.

Table 4-I presents CRI estimate of the maximum daytime de facto population at final buildout. The table indicates that roughly 940 people would be on-site at any given time, once all residential lots have been built upon.

4.5.2 Off-Site and Total Population

Off-site population "supported" means the total number of people dependant on employment at the Mahukona Resort (i.e., workers and their families). This would include people already living on the island. Off-site population "impacts" would mean

TABLE 4-I: DE FACTO POPULATION AT MAHUKONA RESORT

	Population at Buildout (1)
Visitors	
At Lodge	428
House Rentals	21
Project Residents	
Full-time	153
Part-time	85
Staff (2)	240
Golfers (3)	12
TOTAL	939

NOTES:

(1) Based on KPMG Peat Marwick estimates of occupancy in 2010. (Adapted to reflect full buildout on 170 lots.)

(2) Based on assumption that 60% of staff are present.

(3) In addition to project residents and visitors.

the number of people expected to move onto the island due to this project -- i.e., actual population growth.

Table 4-J shows estimates of both types of population figures.

Population Supported: Based on expected overall labor force participation rates of 49% in 1995, the population "supported" by Mahukona Resort employment would be about twice the number of workers, both on-site and off-site. Thus, in 1995, the number of workers and dependents supported by Mahukona Resort employment would be about 800 for the study area; 1,000 for the Big Island in total; and 1,340 statewide. By the year 2010, those figures would increase to 1,080 for the study area; 1,470 for the Big Island overall; and 1,800 statewide.

Population Impacts: Past research by CRI has established that recent in-migrants working at South Kohala resorts have fewer dependents than long-time residents. Over time, however, their family patterns may be expected to approximate those of other residents. Therefore, the lower portion of Table 4-J presents both "Early" and "Settled" estimates.

In 1995, the Early off-site population impacts -- assumed to take place mostly within the South Kohala portion of the study area -- would be about 440 in-migrant workers and families. With resort residents and visitors, the total actual 1995 impact is expected to be just around 770 additional people.

As more in-migrant workers arrive in later years and as their family sizes grow, the Settled off-site population impacts from development in place by 2010 would eventually reach about 820. With an expanded on-site resort population, the total Settled population impact from development in place by 2010 would be about 1,470.

(NOTE: Both the population impact calculations of Table 4-J and the subsequent housing impact figures of Table 4-K are somewhat conservative, in that they include impacts of in-migrants who are expected to move into the area anyway. This is done on the assumption that most such in-migrants must eventually find jobs in order to remain, even if their reasons for moving to the area were not primarily related to available employment opportunities.)

Another theoretical source of population growth from resort development consists of people who (1) are attracted to the area through exposure during their stays as resort visitors; (2) are not dependent on local employment; and (3) choose to purchase full- or part-time residential homes in Hawaii. The majority of these who settle in the study area are expected to purchase residential lots at the resort itself. However, an unknown number of others could purchase off-site property -- most likely in existing subdivisions such as Waiu Ridge, Puakea Bay Ranch, or Kohala Ranch.

TABLE 4-J: POPULATION SUPPORTED AND POPULATION IMPACTS FROM MAHUKONA-KAPAANUI RESORT, 1995 - 2010

OFF-SITE POPULATION SUPPORTED (1)	1995	2000	2005	2010
Study Area	790	960	1070	1080
Elsewhere on Island	210	310	370	380
ISLAND SUBTOTAL	1010	1270	1440	1470
Off-Site, Other Islands	330	330	360	330
STATE TOTALS	1340	1600	1800	1800
POPULATION IMPACTS (2)				
Early (3)				
Resort Residents (4)	20	110	170	200
In-Migrant Workers and Families (5)	440	530	600	600
RESIDENTIAL SUBTOTAL	460	640	770	800
Daily Visitors (6)	310	390	440	450
TOTAL IMPACTS	770	1030	1210	1250
Settled (3)				
Resort Residents (4)	20	110	170	200
In-Migrant Workers and Families (5)	610	730	820	820
RESIDENTIAL SUBTOTAL	630	840	990	1020
Daily Visitors (6)	310	390	440	450
TOTAL IMPACTS	940	1230	1430	1470

NOTES:

(1) Workers (on-site and off-site) and dependents, @ 1 dependent/worker. Includes workers already living in study area and/or on-island. (These would be "Settled" figures, as per assumptions below.)

(2) New population, excluding those already living there. All population impacts are expected to be confined to study area.

(3) "Early" means immediate impacts upon initial arrival of in-migrants, when they have fewer dependents. "Settled" refers to eventual impacts, as family sizes grow.

(4) Estimated by KPMG Peat Marwick. Includes both full- and part-time resort residents present on average day.

(5) Study Area workers from Table 4-E, times percentage in-migrant from Table 4-H, times (one plus assumed number dependents/worker). "Early" assumption is 0.46 dependents/worker, based on Community Resources, Inc. (1987c) survey of South Kohala resort workers. "Settled" assumption is 1.0 dependent/worker, based on projected overall labor force participation rates.

NOTE: The "percentage in-migrant" taken from Table 4-H is 76%, which INCLUDES in-migrants expected anyway, with or without resort development. If these people were excluded, the year 2010 "Settled" figure would be decreased by about 240 people.

4.6 OFF-SITE HOUSING IMPACTS

Housing effects can also be categorized as "households supported" (i.e., number of households with workers filling direct or indirect/induced Mahukona Resort jobs) and "housing impacts" (actual growth in housing units). Required new housing units (housing "impact") occurs primarily through in-migrant demand for new housing, but also because some existing residents in larger households are expected to establish their own separate households as a result of increased income from new employment.

Table 4-K provides estimates of these various types of housing outcomes.

The ultimate number of "households supported" is roughly a third of the total "population supported" from Table 4-J -- 350 islandwide households (and 460 statewide) by 1995; 510 islandwide (and 620 statewide) by 2010.

Housing "impacts" -- new housing units required -- may, like population impacts, be categorized into both Early and Settled. In the short term, new in-migrants tend to share housing units, and relatively fewer existing resident households split apart right away. Over time, however, in-migrants are less willing to share, and more existing residents form separate households.

In 1995, the Early study area impacts are expected to be about 115 required new housing units -- mostly for in-migrants and probably mostly needed in South Kohala. Existing residents would require another 30 new units throughout the island and the state.

The Settled study area impacts from development put in place by 2010 would about 220 required new housing units; 40 elsewhere on the island; and 30 elsewhere in the state.

It has been assumed here that most of the in-migration effects (including housing impacts) generated by the Mahukona Resort would be felt in South Kohala, rather than North Kohala. That does not, however, mean that housing pressures in North Kohala will not continue to increase.

If affordable housing is not developed on a timely basis for workers at new South Kohala resorts, the demand will be region-wide, affecting North Kohala as well. If land and/or rentals in North Kohala continue to be relatively cheaper than elsewhere in West Hawaii, people from outside the district will be attracted to North Kohala, bidding up the price of housing there. This pattern is already evident on the Big Island in districts such as Puna or South Kona, which have witnessed "spillover" population and housing effects from economic growth in nearby districts of Hilo and North Kona, respectively.

Thus, the tentative conclusions in this report that housing and population effects will be primarily felt in South Kohala are contingent on the assumption that affordable housing will be soon

TABLE 4-K: OFF-SITE STUDY AREA HOUSING IMPACTS FROM MAHUKONA-KAPAAKU RESORT, 1995 - 2010

HOUSEHOLDS SUPPORTED (1)	1995	2000	2005	2010
Study Area	270	330	370	370
Elsewhere on Island	70	110	130	130
ISLAND SUBTOTAL	350	440	500	510
Off-Site, Other Islands	110	110	120	110
STATE TOTALS	460	550	620	620
OFF-SITE STUDY AREA HOUSING IMPACTS (2)				
Early (3)				
Study Area In-Migrant Workers (4)	110	130	150	150
New Household Formation, Existing Study Area Population (5)	5	10	10	10
STUDY AREA SUBTOTAL	115	140	160	160
New Households, Existing Population Elsewhere on Island (5)	10	20	20	20
ISLAND SUBTOTAL	125	160	180	180
New Households, Other Islands (5)	20	20	20	20
STATE TOTALS	145	180	200	200
Settled (3)				
Study Area In-Migrant Workers (4)	150	180	210	210
New Household Formation, Existing Study Area Population (5)	10	10	10	10
STUDY AREA SUBTOTAL	160	190	220	220
New Households, Existing Population Elsewhere on Island (5)	20	30	40	40
ISLAND SUBTOTAL	180	220	260	260
New Households, Other Islands (5)	30	30	40	30
STATE TOTALS	210	250	300	290

NOTES:

(1) Workers (on-site and off-site) and dependents, @ 2.9 people/house. Includes already existing households and housing units. (These would be "Settled" figures, as per assumptions below.)

(2) New housing units, excluding those already there.

(3) "Early" means immediate impacts upon initial arrival of in-migrants, when they have fewer dependents AND more workers sharing houses. "Settled" refers to eventual impacts, as family sizes grow.

(4) Early assumption is 4.1 people/house, based on Community Resources, Inc. (1987c) survey of South Kohala resort workers. Settled assumption is 2.9 people/house, based on statewide trends for declining household sizes.

(5) Early 15% household formation rate; Settled, 30%

provided either in South Kohala itself or in North Kona. If this is not the case, it may be expected that there will be increasing regional pressure for housing development anywhere, including North Kohala.

Consultant-Recommended Mitigation: In the preceding labor supply discussion, Community Resources, Inc. recommended that Chalon International consider targeting some of its planned North Kohala affordable housing for actual Mahukona Resort employees.

On an even more tentative basis, CRI recommends consideration of affordable housing development on a larger scale than currently being discussed by Chalon or its Citizens Participation Committee. Such housing would not be linked to employment at the Mahukona Resort but would help to meet regional housing needs generated by both the Mahukona Resort and (to an even greater degree) other planned new West Hawaii resorts.

CRI recognizes that the North Kohala community is split on the issue of additional growth. As discussed in Section 3, some older residents recall days when North Kohala did have a larger population; many feel the community was more vital then, and could today support more services and amenities with a somewhat larger population base. Other residents feel they have sacrificed various opportunities in life precisely because they wanted to move to, or remain in, a community of North Kohala's present size.

However, additional infill of established North Kohala towns such as Hawi and Kapaau could help to meet regional housing needs while still retaining the "feel" of present-day North Kohala. It could help assure that current North Kohala residents with housing needs (not just those working at the Mahukona Resort) would gain new housing without fierce competition from outsiders due to limited supply. The existing sense of community, climate, and architectural style of North Kohala make it more likely that the people attracted to additional housing opportunities in the area would be families from areas such as East Hawaii, rather than young singles interested in the "action" of a Kailua-Kona or even a Waimea. It could be a moderately expanding population center which "still feels like Hawaii, not California."

The exact amount of additional housing and population growth would obviously be subject to continued community discussion. However, it may be noted that a doubling of the present population over a 20-year period would amount to less than a 4% per year growth rate -- a figure which met with community approval in the context of the 1984 North Kohala Community Development Plan. Realistically, infrastructure development to support new housing would require growth to occur in increments rather than in a steady stream. If the currently contemplated South Kohala resort development actually takes place, the 1990's could be a desirable period for several such increments.

H-47

4.7 IMPACTS ON PROPERTY VALUES AND DEVELOPMENT

4.7.1 Anticipated Impacts

Residents have expressed concern over potential impacts of the project on land values and uses in North Kohala, notably:

- Increased property taxes due to resort development;
- Decreased property values in existing North Kohala communities due to new housing provided by Chalon; and
- Additional resort development in North Kohala, due to the project serving as a catalyst for other developments.

Questions about future valuations and development cannot be answered with absolute certainty. Still, likely answers can be identified on the basis of available evidence and expert judgments. The major findings (presented in the next sections) are:

- Property values have risen in North Kohala because demand has grown far faster than supply. Appreciation in residential property values (and hence in tax assessments) is likely to continue, with or without the project.
- The creation of a resort will have no direct impact on residential property values in the settled communities of North Kohala.
- Since the project's labor force is expected to be largely recruited among study area residents, the project is not likely to have much of an indirect effect of increasing demand for residential housing.
- The development of affordable housing in or near existing residential areas could meet some of the pent-up demand for housing, and hence affect the rate of increase in value of existing properties. No decrease in value seems likely.
- The speed of development of South Kohala residential communities is likely to be a major determinant of North Kohala residential values in the coming decades.
- In the near term, government processes stand in the way of further resort development along the North Kohala coast. Over the long term, such development could only occur after extensive permit processes in which both government and community perspectives on the proposed developments could be expressed. Also, further resort development along the North Kohala coast runs against current government policy.

4.7.2 Property Taxes

General Considerations: Both market forces within the study area and government decisions applied countywide can raise property taxes. Future taxes cannot be predicted with certainty, since they depend on decisions of elected officials as well as market forces.

The value of a property can increase mainly due to --

(a) improvements on the property itself;

(b) amenities which make the property more attractive to buyers; and

(c) general market trends, usually identified through experts' studies of sales in the "neighborhood" -- an area of similar properties -- around the property.

A resort development could conceivably affect the assessment of nearby properties, either by providing amenities to some immediately adjacent properties or by making the area more valuable to potential buyers, leading to higher market prices. ("Nearby" properties would be located within a mile or so of a resort at most.)

Assessors do not assume that the value of new properties automatically carries over to existing ones. Nor do they compute the value of residential property on the basis of resort properties in the area. Instead, value is estimated on the basis of sales of properties similar in type (e.g., residential), location, and amenities.

The appraiser responsible for valuing North Kohala real estate for the County of Hawaii clarified several points relevant to the project (personal communication, Les Brown, Real Property Tax Appraiser IV, Department of Finance, Hawaii County, February 20, 1990):

- In North Kohala, demand for housing was low after the closing of Kohala Sugar. Over time, demand has increased, and it continues to increase, since relatively little new housing for area residents has been added to the inventory.
- With the price of residential land increasing, North Kohala residents have been more apt than others on the Big Island to develop ohana units.

- In the next few years, values and tax assessments in Hawi are likely to continue to rise, as market transactions showing current and emerging increases in value occur.

- The project would not have any direct effect on residential land assessments.

- The project's impact on values would be limited to other resort areas, and to nearby property in tax map zone 5-7 (stretching from Kapaanui south to Paoo -- an area with little development except an upland ranch).

- The project could have an indirect effect on residential values, if it stimulates increased demand (from resort workers, presumably) for housing in North Kohala. That demand would affect tax assessments when and if market prices provide evidence of increased value.

In the Hawi area, residential land assessments increased in spurts between 1980 and 1989. The uneven pattern was due to the small number of sales in the area, making it difficult to establish value, rather than any slowing of increase in value. Over time, the rate of increase of residential assessments has not kept pace with increase in demand, as study area residents seek housing (personal communication, Les Brown, February 20, 1990).

It appears that North Kohala properties have increased in value as part of a larger island market, but that changes in the trend of assessments -- increases or decreases in value -- are experienced about a year or two later in North Kohala than in more populated parts of the County.

Impacts of Project Development: The project is expected to have little impact on residential land values in the settled communities of North Kohala.

The County appraiser interviewed for this report noted that North Kohala property tax assessments could well rise sharply about the time that the project opens. Such a rise would not be attributable to the project -- any indirect effects of the project would not be felt so quickly. Instead, it would follow from increases in value that had already occurred but had not been registered in tax assessments.

The potential indirect impact of project development -- increased demand for housing from new resort workers -- is expected to be small in scale, since the project will be able to recruit the large majority of its employees in the study area. (See Section 4.4.) Also, Chalon's affordable residential projects will provide new housing in amounts equal to or greater than those needed by project employees.

A review of employment and housing trends in West Hawaii (in Section 2.3) shows a clear long-term trend towards population growth due to in-migration of resort workers for North Kona and South Kohala resorts. That trend has begun, and will probably be felt throughout the next two decades. Its impact on housing in the study area can be limited, if new planned communities provide housing in South Kohala for that district's workforce. If, however, new communities are not developed or are built after the new workforce comes to the study area, increases in demand for existing housing will be felt throughout the region, independent of the Mahukona project.

Recent studies of the value impacts of golf course development and upscale single-family residential areas support the finding that value impacts of the project will be limited. (While the project is a resort, not just a golf course, it is on a small scale, compared to other Hawaii resort projects, and hence roughly comparable to the cases studied.) Golf and exclusive residential projects were found to have little effect on existing residential areas:

- Locations, Inc. (1988, 1989) has examined Multiple Listing Service information on property sales in areas on Maui, O'ahu, the Big Island, and Kaua'i. The result was that no impact of particular golf courses could be found on nearby residential areas. Nor did the introduction of upscale residential areas have an impact on nearby existing residential areas. Islandwide trends account for increases in property values in the areas studied.

- Studies by Community Resources, Inc. (1988, 1989b) similarly found little evidence that golf development would affect the value of residential properties (other than immediately adjacent lots with golf course views).

The two approaches reach similar findings from different analytical starting points. The Locations, Inc. studies dealt with areas such as tax map (TMK) zones. These studies used quantitative data only. The Community Resources, Inc. studies dealt with both communities and smaller areas, and combined quantitative data with expert assessments.

Impacts of Chalon's New Residential Projects: Some residents have expressed concern that new affordable housing projects, especially a multifamily project in Hawi, could lower the value of nearby properties.

Similar concerns have emerged among neighbors of proposed State planned communities. Studies by real estate experts and assessors indicated in one such case (PBR Hawaii, 1990) that the new housing would tend to slow the rate of increase of nearby property values, by increasing supply, but would not depress those values. The provision of new affordable units could tend to stabilize or lower rental prices.

The project could affect amenities now afforded to a few immediately adjacent homes because the site is undeveloped, if views and/or noise levels change markedly. (Also, should a new project be poorly designed, managed, and maintained so it became an eyesore, adjacent property values could be affected. Chalon's housing developments, which are intended as contributions to the wider North Kohala community, are not expected to have these failings.)

As noted above, the major factor affecting residential values will be the level of demand for housing for South Kohala resort workers. Potential impacts on properties immediately adjacent to new multifamily housing projects could be partly mitigated through careful design and management of the site.

4.7.3 Impacts of the Project for Property Development in North Kohala

Some area residents are concerned that the project will serve as an "icebreaker" or catalyst for further development of the North Kohala coast. Evidence is available that the project could encourage some additional development, but probably not the large coastal resorts (with marinas, man-made beaches, and other major changes in the land and viewplanes) opposed by North Kohala residents. Instead, it may support the buildout of upscale projects already under way or proposed for North Kohala.

Major North Kohala landowners will certainly reassess their plans for land use after the Mahukona/Kapaanui project is developed (personal communications, Herbert "Monty" Richards, Owner, Kahua Ranch, January 31, 1990, Mel Hewett, Land Consultant to Parker Ranch, January 31, 1990, and Sidney Kelipuleole, Land Manager, Bishop Estate, February 21, 1990).

The project could spur development by:

- Improving Kohala Ditch's delivery of irrigation water to the "dry" side of North Kohala, allowing further landscaping;
- Exposing North Kohala to tourists who may later wish to return or to own property; and
- Providing a restaurant and entertainment center enjoyed by visitors in (as yet non-existent) condominiums or part-time residents in estate lot developments.

These factors are not spurs to <u>resort</u> development, so much as amenities which could marginally encourage sales of vacation and visitor lodgings at sites without full resort facilities. Prospects for existing and already proposed developments at Kohala Ranch, Kahua Makai, Kahua Shores, and Kohala Makai could be improved as a result of the project.

Again, the project's amenities could conceivably complement those of a mountain lodge or bed-and-breakfast facility. Such a facility has been proposed in the North Kohala Community Development Plan (Phillips, Brandt, Reddick & Assoc. (Hawaii), Inc., 1984), and is identified in the Chalon Master Plan for North Kohala as a possibility for further consideration.

On the other hand, the project's impact on future development will be limited by several factors:

- The project's resort facilities will be developed to serve project guests and residents, rather than a large population of visitors. The project is a small-scale resort, not a major destination area such as Waikoloa.
- The development likely to be most affected by the Mahukona Lodge is the residential component of the project, rather than off-site developments.
- Community and government opposition to additional coastal resort development (described in Sections 2.3 and 3.3).
- Permit processes in which future resort proposals will be examined in terms of such considerations as:
  - available infrastructure and resources such as water;
  - impacts on the community, possibly including the creation of non-resort jobs; and
  - fit with community and government policies for the area.

  Any proposed resort would be subject to public hearings in which community views could be expressed and to review by elected and appointed officials.

To respond to resident concerns about future development, Chalon International could consider giving pre-emptive rights or priority to agricultural enterprises in the allocation of Kohala Ditch water, assuring that future developments dependent on that water would not compete with agriculture for scarce resources.

4.8 IMPACTS OF PROJECT JOBS FOR NORTH KOHALA COMMUNITIES

The project will depend on study area residents for its workforce. Some employees will likely live in South Kohala, but the resort will be especially convenient for North Kohala residents. Also, the resort will strive to give North Kohala residents first crack at jobs.

In conditions of very high employment, such as now exist on Maui and are emerging in West Hawaii, employers are at pains to

find and retain staff (First Hawaiian Bank, 1989; Hooper, 1989; Aleshire and Smith, 1989). In interviews conducted by Community Resources, Inc. staff, visitor industry employers on Maui, Oahu, and the Big Island have all said they prefer residents of areas near their establishments as employees, on the grounds that they are likely not to suffer stress due to commuting, and are likely to want to keep a job near home.

The labor shortage has led to higher pay and improved benefits for hotel workers. Employers report changing management practice to be sensitive to workers' needs and morale. Resort workers have largely benefitted from the shortage. Many small businesses, however, have found it difficult to find and retain staff, or to offer wages and benefits comparable to those of hotel workers.

While recent State figures suggest that unemployment is fairly low in North Kohala and almost absent in South Kohala, Census and survey data point to two local pools of potential employees -- persons now commuting long distances, who would prefer to work closer to home, and some adults who might enter (or re-enter) the labor force since employment at the project would be near home and/or would offer attractive working conditions (part-time work, or work on a particular schedule).

(In Hawaii County, labor force participation has been notably lower than elsewhere in Hawaii. Official projections have largely assumed that participation will remain low (Hawaii State Department of Business and Economic Development, 1988b, 1988c). However, the statewide trend, visible in parts of West Hawaii, is for labor force participation to increase as the visitor industry grows. Accordingly, the project is expected to draw employees from adults now outside the labor force as well as those who are now resort workers.)

Also, young people joining the labor force may be counted among potential employees of the project. (For detailed discussion, see Section 4.4.)

However, the Chalon North Kohala Master Plan calls for expansion of agriculture and, to an extent, commercial activity in North Kohala. These sectors will also provide new jobs for North Kohala residents. For the period from 1995 to 2010, North Kohala residents will likely be able to choose between resort jobs and other ones.

Impacts: With up to 480 employees working in North Kohala, rather than resort areas to the south, up to a quarter of the North Kohala workforce could benefit from a shorter commute. Also, project employment may lead some South Kohala residents to relocate to North Kohala, and will bring a few new residents to the study area. The overall impact of these changes is likely to be positive for North Kohala social life.

Family Life: With less time spent commuting, many North Kohala adults will have more time to spend in family and community activities. Resort hiring will also encourage North Kohala young people to stay near home.

With growing participation in the labor force, Hawaii's working families have increasingly needed help with child care. If the Mahukona Lodge is to hire people not now in the job market, the demand for child care in North Kohala will likely increase.

The idea that resort employment has disruptive impacts on rural family life has been examined in studies of North Kohala (Cottington, 1969, Hawaii State Department of Planning and Economic Development, 1972, Smith, 1972). The introduction of resort employment in a plantation society was thought to bring marital tensions, child care problems, and increased delinquency, when wives took on new roles as resort workers. However, most families adapted to the new situation, so disruption, if it occurred, was short-lived (Smith, 1972). A psychiatric study done in Kahuku, on Oahu (Young and Kinzie, 1973), and community interviews in Kahuku and in Kilauea, on Kauai (Community Resources, Inc., 1985, Belt Collins & Associates, 1983), found little or no family or mental health problems at the time rural women took resort jobs.

By now, resort employment is widespread in North Kohala, and ex-plantation communities are no longer isolated. Currently, new employment near home is more likely to lower family tensions than to cause these.

Community Life: Resort workers living in North Kohala are likely to have more time for community involvement due to the project. However, resort employment may involve changing and/or unusual work hours, making participation in community activities difficult.

Some study area residents have expressed concern that the project will bring additional in-migrants to the area, compounding existing tensions between long-term residents and newcomers. However, the analysis in Section 4.4 showed that few persons not now living in the study area will come because of project jobs. Resort workers could come to live in North Kohala in appreciable numbers if housing is not available in South Kohala for workers in that district's resorts -- but that possible change would not be an impact of the Mahukona-Kapaanui project.

Job Satisfaction: In surveys, many study area (and statewide) residents view visitor industry jobs critically (as shown in Table 3-8). Also, visitor industry jobs commonly involve weekend and/or evening work. Nonetheless, when over 5,000 hotel employees were surveyed in 1986, respondents said:

- o They were proud to work in the hotel business (88%);
- o They liked their jobs (87%);
- o Most employees of their hotels had a sense of pride in their work (71%); and
- o They were paid fairly (57%).

Most of the hotel employees thought that supervisors from outside Hawaii did not understand the needs of workers from Hawaii (55%). (This survey, conducted by Strategic Information Research Corporation for the Council of Hawaii Hotels, is reported in Belt Collins & Associates, 1987b.)

Potential Mitigations: The labor shortage will make hiring and retention of employees harder for small businesses in the study area, independent of the project. In North Kohala, Chalon's involvement in regional planning and development can be directed to minimize disruption for other businesses (as discussed above, in Section 4.4).

If child care proves to be a problem for project employees, the resort could sponsor or support a child care center. Alternatively, the resort could consider providing child care benefits to employees, leaving them to arrange the form of child care that suits their situation best. Currently, pilot child care projects are under way at Waikoloa and Mauna Lani.

The resort can support community involvement on the part of its employees by several means, notably

- o flexible scheduling;
- o release time given for employee participation in charitable activities; and
- o contributions given to match employee contributions to or participation in community groups.

4.9 ADDITIONAL IMPACTS OF THE PROJECT ON NORTH KOHALA'S SOCIETY AND ECONOMY

The statewide survey on the impacts of tourism showed that Hawaii residents largely take a tolerant view of visitors (Community Resources, Inc., 1989a). Most people do not see tourists as behaving badly, and many enjoy interactions with visitors. The visitor industry is associated with some perceived benefits -- notably, jobs and amenities such as restaurants -- and with negative impacts of some concern -- increased cost of living, traffic congestion, and crime.

4.9.1 Impacts of Demographic and Economic Growth

Many North Kohala residents interviewed for this report welcomed growth as a source of new amenities. The project will support the district's economy and provide a stable source of income for many residents. Retail operations in North Kohala will likely find additional customers among project visitors and residents.

However, the project is a small-scale resort. It is not likely to generate enough income, for the developer or for the community at large, to support major expansion of either public facilities or commercial sites. It will provide amenities on-site (dining, entertainment) that are now lacking in North Kohala, and it will support Master Plan improvements, as detailed in Section 4.1 above.

4.9.2 Interactions Between Area Residents and Visitors

Currently, visitors are not present in North Kohala in great numbers. The resort population will not increase visitor numbers greatly (see Table 4-I). Still, Mahukona Lodge guests and residents will be far more likely to visit other parts of North Kohala than visitors to resorts in other districts of West Hawaii.

Based on the 1988 tourism impact survey (Community Resources, Inc., 1989), it seems likely that residents will be most affected by the increased presence of visitors on the roads. Respondents reported that visitors cause them "irritation" in traffic far more often than in other situations. (However, with Mahukona Harbor and Beach Park inside the project site, residents could feel they have been pushed out from a valued area, unless care is taken to preserve access, as discussed in Section 4.3.)

North Kohala residents already express some concern over traffic, especially on the Mountain Road, and parking. (See Section 3.2). Improvements included in the Chalon Master Plan will respond to some of those concerns. In addition, the Mahukona Lodge could lower the number of visitors and resort residents driving in areas where the potential for friction is greatest by providing minivan service to Hawi, and/or to various scenic points on the coast and along the Mountain Road.

Interactions between area residents and resort guests will also occur at the resort. Residents, especially residents of the estate developments along the "dry" coast, could well find the resort a social center, offering fine dining and other amenities. However, a few key informants have suggested that those residents will feel out of place in the Lodge itself, and will not use the resort, if the Lodge's guests are mainly from Japan.

At this point, such a conclusion seems hasty. The Lodge's clientele is expected to come mostly from Hawaii, the Mainland U.S., and Japan (KPMG Peat Marwick, 1990a). Also, the extent of

resident involvement at the resort will no doubt depend on amenities offered (such as golf and tennis rates) and the resort management's attitude toward customers from the district.

4.8.3 Public Safety

Residents repeatedly expressed concern that the proposed resort will increase crime in the area. Such an increase could occur, but it would mostly affect the resort area itself, tourists, and traffic. Public safety impacts on settled communities could be mitigated by co-operative efforts of the developer and the community.

Residents' concern is in part due to reports of major increases in crime in South Kohala associated with the opening of the Hyatt Regency Waikoloa. According to that district's police commander, much of the Hyatt's impact on crime is related to the sudden influx of a large number of new residents (personal communication, Captain Lawrence Mahuna, Waimea Police Station Commanding Officer, February 22, 1990). Large personnel needs and the current labor shortage led to the hiring of many workers from outside Kohala.

In South Kohala, drug use has been increasingly frequent, leading to other crimes. Much of the crime increase has occurred on-site at the Hyatt -- in the hotel and in the employee parking lot -- rather than in residential areas.

Burglaries in bedroom communities such as Waikoloa Village, Puako, and Kawaihae have increased since the Hyatt has opened. Many living in these areas are resort workers and transient. In the settled Waimea community, burglaries are not a major problem.

Hotel employees traveling to work have been a large factor in an increase of traffic accidents and violations in South Kohala. Workers travel from distant parts of the island. Speeding and drivers that make misjudgement when passing slower vehicles on the Queen Kaahumanu Highway are problems. In 1989 four traffic fatalities were resort workers commuting to work.

Impacts of the Mahukona Lodge are not expected to be comparable to those of the Hyatt Regency Waikoloa's early days. Personnel needs of the proposed resort are much smaller than that of the Hyatt. Few non-Kohala residents will have to be recruited.

Crime statistics of West Hawaii provide a long-term view of the problem. Table 4-L shows that crime rates increased significantly during the 1970's when the tourist population was growing much more rapidly than the resident population. Rates decreased slightly in the 1980's as both resident and tourist populations have continued to grow. Thus, the evidence of long-term trends is that additional resident and tourist population growth may generate less crime per person than does the current

TABLE 4-L: ESTIMATED WEST HAWAII CRIME RATES

Year	Resident Pop. (1)	Estimated Average Visitor Count (2)	Total DeFacto Pop.	Total No. of Type I Crimes (3)	Rate Per 10,000 DeFacto Pop.
1970	14,472	2,015	16,487	656	397.9
1980	27,518	4,853	32,371	2,026 *	625.8
1984	34,524	6,221	40,745	2,132	523.3
1985	35,771	6,554	42,325	2,425	572.9
1986	37,000	7,961	44,961	2,564	570.3
1987	38,500	8,232	46,732	2,131	456.0
1988	40,700	9,001	49,701	2,689	541.0
% Increase, 1970 - 80	90.1%	140.8%	96.3%	208.8%	57.3%
% Increase, 1980 - 88	47.9%	85.5%	53.5%	32.7%	-13.5%

Year	Total No. Violent Crimes	Rate Per 10,000 DeFacto Pop.	Total No. Larceny	Rate Per 10,000 DeFacto Pop.
1970	140	84.9	333	202.0
1980	285 *	88.0	1137 *	351.1
1984	393	96.5	1250	306.8
1985	459	108.4	1396	329.8
1986	546	121.4	1397	310.7
1987	466	99.7	1292	276.5
1988	518	104.2	1558	313.5
% Increase, 1970 - 80	103.6%	3.7%	241.3%	73.9%
% Increase, 1980 - 88	81.8%	18.4%	37.1%	-10.7%

NOTES:

* 1980 Crime numbers are three-year averages (1979 - 81), because of particularly marked fluctuations during this period.

(1) 1970 and 1980 populations from U.S. Census; 1984 - 1988 figures are based on State DBED estimates.

(2) Estimated by Community Resources from Hawaii Visitors Bureau data on West Hawaii visitor units, islandwide occupancies, party sizes.

population, though there is considerable historic variation in this regard.

This does not conclusively disprove any link between crime and tourism in Kohala. Statistical relationships are complex and can be masked by other variables. However, the evidence does show that any such relationship (if it exists) is not a simple one. Also, building new visitor units will not automatically lead to increased crime, except for expected increase as a function of increased population.

To investigate the impacts of smaller resorts (such as the proposed Mahukona Lodge) on public safety, telephone interviews were conducted with police officers of stations near such resorts. The Hanalei Sub-station on Kauai, Hana Station on Maui, and the Molokai Police Station were contacted:

- Theft from hotel rooms, burglary of part-time residences, and theft from cars are the most common crimes in Hanalei. Perpetrators of such crimes are usually individuals that steal to support a drug habit or the unemployed (personal communication, Sgt. Hanz Martin, Hanalei Sub-Station, Kauai, February 22, 1990).

- In Hana, very few crimes are committed at resort areas. Hana's largest crime problem is theft from cars of tourists that make daytrips to the area. Tourists unfamiliar with the winding Hana Road have caused traffic accidents (personal communication, Sgt. Robert Fernandez, Hana Police Station, February 23, 1990).

- Much of the crime in Kaunakakai, Molokai is attributed to drug and alcohol problems. Thefts from cars at beaches and parks and burglary of homes and business are generally committed by those that need money for drugs. Resorts areas and tourists have not been singled out for such crimes. Drinking at parks and other areas is the cause for many assaults (personal communication, Sgt. Timothy Meyer, Special Investigator, Molokai Police Department, February 26, 1990).

From these interviews, it can be concluded that crime related to the presence of resorts has generally affected tourists and part-time residences. Neighborhoods consisting of long-time residents, and long-time residents themselves, have not been the targets of crime.

As in Hanalei, Hana, and on Molokai, the proposed resort may increase theft from cars and burglaries in North Kohala. Visitors that leave their cars to sightsee may be easy targets for theft from cars. Burglaries may increase if the resort homes are occupied by part-time residents.

Several measures can be taken to minimize or avoid crime impacts:

- Recruitment of North Kohala residents at the resort (reducing the number of transients and reducing the commuting time for employees);

- Project design and resort security measures (to avoid crime-vulnerable areas, such as the Hyatt employee carparks);

- Support for anti-drug programs in the study area; and

- Support for neighborhood watch programs in established communities. (Such programs are now being begun in South Kohala communities.)

APPENDIX A:

KEY INFORMANTS INTERVIEWED FOR COMMUNITY ISSUES AND CONCERNS

(NOTE: Persons interviewed provided their comments as individuals and were not speaking on behalf of their organizations. Organizational affiliations are provided only to indicate the interests and networks of those interviewed.

Name	Organization/Affiliation
Lani Apodaca	Kohala Community Association North Kohala Business Association
Glen Au	President, Kawaikae Homesteader's Association
Ed Austin	Past President, Puako Community Association
Betty Bowman	Kohala Resident
Pierre Bowman	Kohala Resident
John Broussard	Kohala Resident
Alan Brown	President, Kohala Business Association
Christopher Brown	Teacher, Kohala High School
Frank Caravalho	President, Kohala Puerto Rican Club Kohala Community Athletic Association Kohala Trollers
Georgiana Caravalho	Facilitator, Parent and Community Network Center Fire Chief, North Kohala Volunteer Fire Department Recreation Committee, Citizen Participation Committee
Salvacion Castillo	President, Kohala Filipino Club
Robert Duby	General Manager, Haikai Auto Parts
A.L. Gaddis	Principal, Kohala High School Member, Citizen Participation Committee

Mike Gomes	Past President, Kohala Community Association Vice President, North Hawaii Community Hospital Inc. Member, Citizen Participation Committee
Bill Graham	President, Kohala Community Association Big Island Director, Life of the Land
Tsutomu Hanano	Kohala Lions Club
Mel Hewett	Land Consultant to Parker Ranch
Harold Higa	Shige's Service Station
Ikuo Hisuoka	Former County Council Member Member, Citizen Participation Committee
Philip D. Hooton	Past Chair, Kohala Community Association Planning Committee Member, Kohala Senior Citizens Past Plantation Supervisor for Kohala Sugar
Jeanne Hughes	Kohala Foundation, Inc. The Friends of Kohala Member, Citizen Participation Committee
Frank Johnson	Kohala Resident
Marion Johnson	Teacher, Kohala High and Elementary School
Roger Keller	Hawi Resident
Mel Levine	Kohala Contractor
Mike Luce	Chairperson, Hawaii County Planning Commission Member, Citizen Participation Committee
Colin Mallard	Psychotherapist, State Child and Family Services
Dennis Matsuda	President, Kohala Ken Jin Kai

Ginger Nakamura	Income Maintenance Supervisor, State Department of Human Services, Kohala/Kamuela Units
Minoru Nakasato	Owner, Nakasato Macadamia Nut Farm President, North Kohala Macadamia Nut Growers
Harry Otsuji	Project Manager, Kohala Ranch Development President, Kohala Ranch Community Association
Albert Pagador	President, Kohala Visayan Club Postleader Troop 47, Boy Scouts of America President, Young Men's Program, Honamakau Latter Day Saints Church
Andrew Perez	President, Kohala Athletic Association
Mel Pobre	Branch Manager, Federal Credit Union Member, Citizen Participation Committee
Kelly Pomeroy	Kohala Resident
Herbert Richards	Kahua Ranch Owner Big Island Representative, University of Hawaii Board of Regents
George Robertson	Administrative Assistant to the Governor, West Hawaii
Jessie Rosenblum	Administrator, West Hawaii Family and Adult Services Section, State Department of Human Services
Naves Santiago	Kohala Senior Citizens Kohala Puerto Rican Club
Kelii Sine	Owner, Maikai Auto Parts Member, Citizen Participation Committee
Cheryl Sproat	Kohala Resident
Kindy Sproat	Kohala Resident
Marlenajon Stafford	Field Supervisor, North Kohala Complex, Division of State Parks, Department of Land and Natural Resources Member, Citizen Participation Committee
Pauline Vinta	Kohala Resident
Dan Winters	General Manager, Kohala Plantations, Inc.
Take Yamanaka	Kohala Lion's Club
Elmer Yoneda	President, Kohala Trollers
Peter Young	President, Waimea-Kawaihae Community Association President, Kona-Kohala Chamber of Commerce
Steve Weinstein	Kohala Resident
Toni Withington	Kohala Outdoor Supply, Inc. Vice-President and Planning Committee Chair, Kohala Community Association Member, Citizen Participation Committee

APPENDIX B:
LIST OF PERSONS INTERVIEWED ON LABOR SUPPLY ISSUES

A. Employers, Unions, and Employment Services

Kimo Chu	Business Agent, Kohala, ILWU
Mari Day	Director of Human Resources, Hyatt Regency Waikoloa
Gabriella Canabas	Personnel Management Specialist, County of Hawaii
Francine Duncan	Vice President, Mauna Lani Resort
Eric Gill	Director of Organizing, Hotel Employees & Restaurant Employees Union Local 5
Therese Glowiana	Director of Personnel, The Royal Waikoloan Hotel
Roy Kagawa	Hawaii Island Branch Manager, Hawaii State Employment Service
Del Kleckner	President, Hawaii County Private Industry Council (PIC) Director of Human Resources, Mauna Loa Macadamia Nuts
Geordine Nahoopii	Personnel Manager, Waikoloa Land Company
Brian Nishimura	Planner, Hawaii County Office of Housing and Community Development
Albert C. Price	Director of Human Resources, Mauna Kea Beach Hotel
Casey Tanimoto	West Hawaii Office Manager, Hawaii State Employment Service
George "Skip" White	Industrial Relations Director, Hamakua Sugar Company
Noelani Whittington	Executive Director, Kohala Coast Resort Association
Fred Yamashiro	Chairman, Ad Hoc Committee for Tourism Training, Big Island PIC
Patricia M. Yoshioka	Director of Personnel, Mauna Lani Bay Hotel

(Continued)

B. Educational Institutions

Lynn Arakawa	Special Education Teacher, Director of Occupational Skills Program, Pahoa High School
James DeMello	Job Placement Counselor, UH Hilo Counseling and Testing
A. L. Gaddis	Principal, Kohala High School
Robert Hill	Counselor, Waiakea High School
Richard MacQuiston	Senior Counselor, Pahoa High School
Miles Nakamura	Counselor, Honokaa High School
Miles Nakanishi	DLIR Transition Center Coordinator, Hilo High School
JoAnn Paiva	College Administration Counselor, St. Joseph's High School
Herb Wagner	Counselor, Waiakea High School

H-57

APPENDIX C:

REFERENCES

Aleshire, I., and K. Smith. "Isle Jobless Few, Far Between." Honolulu Advertiser. October 4, 1989, p. A-1.

Anderson, R., G. Vieth, B. Seidenstein, and B. Bradshaw. Kauai Socioeconomic Profile. University of Hawaii Center for Nonmetropolitan Planning and Development. Honolulu, Hawaii, 1974.

Belt Collins & Associates. Draft Environmental Impact Statement for the Mauni Lani Resort. Prepared for the Ritz-Carlton Hotel Company. Honolulu, Hawaii, 1987a.

Belt Collins & Associates. Final Environmental Impact Statement for South Kohala Resort. Prepared for Mauna Kea Properties. Honolulu, Hawaii, 1987b.

Belt Collins & Associates. Environmental Impact Statement for the Proposed Princeville Phase Two Development. Prepared for Princeville Development Corporation. Honolulu, Hawaii, 1983.

Belt Collins & Associates. Revised Environmental Impact Statement for the Proposed Mahukona Resort. Prepared for Mahukona Properties. Honolulu, Hawaii, 1981.

Community Resources, Inc. " A Socio-Economic Impact Assessment of Proposed Additional Development at the Kuilima Resort." Prepared for Group 70. Honolulu, Hawaii, 1984.

Community Resources, Inc. "Social Impact Assessment for Kohala Ranch Project IV." Prepared for Kohala Ranch. Honolulu, Hawaii, 1987a.

Community Resources, Inc. "Housing Need Study and Survey of Employee Characteristics for the Kona Village Resort." Prepared for Kona Operating Partners. Honolulu, Hawaii, 1987b.

Community Resources, Inc. "Survey of Employee Characteristics and Housing Patterns: Westin Mauna Kea and Mauna Lani Resort." Prepared for Mauna Kea Properties and Mauna Lani Resort, Inc. Honolulu, Hawaii, 1987c.

Community Resources, Inc. "Description of Micro-Computer Models for Determining Socio-Economic Impacts of West Hawaii Resort Development." Prepared for Mauna Kea Properties, Ritz-Carlton Hotels, and Mauna Lani Resort, Inc. Honolulu, Hawaii, 1987d.

Community Resources, Inc. "Socio-Economic Impact Assessment for Proposed Waikane Golf Course." Prepared for Waikane Development Co. Honolulu, Hawaii, 1988.

Community Resources, Inc. 1988 Statewide Tourism Impact Core Survey: Summary and Detailed Findings. Prepared for Hawaii State Department of Business and Economic Development, Tourism Branch. Honolulu, Hawaii, 1989a.

Community Resources, Inc. "Socio-Economic Impact Assessment for the Country Courses at Kahuku, Oahu, Hawaii." Prepared for Kuilima Resort Company. Honolulu, Hawaii, 1989b.

Cottington, F. "Socio-Psychiatric Effects of Luxury Hotel Growth and Development on a Rural Population." Unpublished photocopied manuscript available at University of Hawaii, Hamilton Library, Hawaiian Collection. 1969.

First Hawaiian Bank. "Maui County in 1989." Economic Indicators. July/August 1989.

Hawaii, County of, Department of Research and Development. 1989 County of Hawaii Data Book. Hilo, Hawaii. 1989.

Hawaii State Department of Business and Economic Development. State of Hawaii Data Book, 1988. Honolulu, Hawaii, 1988a.

Hawaii State Department of Business and Economic Development. Revised Long-Range Economic and Population Projections to 2010, State of Hawaii (Series M-K), Preliminary Report. Honolulu, Hawaii, 1988b.

Hawaii State Department of Business and Economic Development. Population and Economic Projections for the State of Hawaii to 2010 (Series M-K). Honolulu, Hawaii, 1988c.

Hawaii State Department of Business and Economic Development. Quarterly Statistical and Economic Report, First Quarter 1989. Honolulu, Hawaii, 1989.

Hawaii State Department of Business and Economic Development. State of Hawaii Data Book, 1989, (prepublication draft). Honolulu, Hawaii, 1989.

Hawaii State Department of Business and Economic Development, Tourism Branch. 1988 Statewide Tourism Impact Core Survey: Summary (Draft Version). Honolulu, Hawaii, 1989.

Hawaii State Department of Education, Office of Business Services, Information System Services Branch. Public and Private School Enrollment, September 12, 1989. Honolulu, Hawaii, 1989.

Hawaii State Department of Planning and Economic Development. Tourism in Hawaii: Hawaii Tourism Impact Plan, Volume I.: Statewide. Honolulu, Hawaii, 1972.

Hawaii State Department of Planning and Economic Development. Community Profiles for Hawaii. Honolulu, Hawaii, 1973.

Hawaii State Office of State Planning. West Hawaii Regional Plan. Honolulu, Hawaii, 1989.

Hawaii Visitors Bureau. Visitor Unit Inventory, February 1989. Honolulu, Hawaii, 1989.

Honolulu, City and County of, Department of Finance, Property Technical Office, Real Property Assessment Division. Real Property Tax Valuations, Tax Rates, & Exemptions: 1989-1990 Tax Year, State of Hawaii. Honolulu, Hawaii. (Annual, 1981 to 1989).

Hooper, S. "Up in the Air." Hawaii Business, May 1989.

KPMG Peat Marwick. Market Assessment for the Mahukona Resort Community (DRAFT). Prepared for Chalon International of Hawaii, Inc. Honolulu, Hawaii, 1990.

KPMG Peat Marwick. Market Assessment for Kealakehe Planned Community. Prepared for Belt Collins & Associates. Honolulu, Hawaii, 1990.

Kwon, B. "Golf's Gold Coast Adds New Glitter." Honolulu Star-Bulletin January 31, 1990, p. D-1.

Locations, Inc. Market Study of Lihi-Lani Recreational Community. Honolulu, Hawaii, 1988.

Locations, Inc. Market Study for Proposed Waikane Valley Golf Course. Honolulu, Hawaii, 1989.

Locations, Inc. Hawaii Real Estate Indicators. First Quarter, 1990.

Pang, G. "Isle Real Estate Market Booming." West Hawaii Today January 7, 1990, p. 1A.

PBR Hawaii. Lahaina Master Planned Project Final Environmental Impact Statement. Prepared for State of Hawaii Housing Finance and Development Corporation Department of Budget and +Finance. Honolulu, Hawaii, 1990.

Phillips, Brandt, Reddick & Associates (Hawaii), Inc. North Kohala Community Development Plan (Preliminary Draft). Prepared for County of Hawaii. Honolulu, Hawaii, 1984.

Smith, M.H. "Socioeconomic Transition in North Kohala." In R.W. Armstrong and H.T. Lewis (Eds.), Preliminary Research in Human Ecology, 1970: North Kohala Studies. University of Hawaii, Social Science Institute. Honolulu, Hawaii, 1972.

Smith, R. "Four Seasons Opening will Mark First of 17 'Luxury' Hotels to Enter Hawaii Market by '92." Pacific Business News. February 12, 1990, p. 1.

Sunderland Smith Research Associates, Inc. The Hawaii State Plan Survey 1989: Summary. Prepared for Office of State Planning. Honolulu, Hawaii, 1989.

Towill, R. M., Corporation Keahole to Kailua Development Plan (Draft). Prepared for County of Hawaii Planning Department. Honolulu, Hawaii, 1989.

United States Department of Commerce, Bureau of the Census. Fifteenth Census of the United States: 1930. Population Bulletin, First Series, Hawaii, Number and Distribution of Inhabitants. Washington, D.C., 1930.

United States Department of Commerce, Bureau of the Census. Population, First Series: Number of Inhabitants, Hawaii. Washington, D.C., 1942.

United States Department of Commerce, Bureau of the Census. Census of Population, 1950: Number of Inhabitants, Hawaii. Report P-A52. Washington, D.C., 1952.

United States Department of Commerce, Bureau of the Census. Census of Population, 1960: Number of Inhabitants, Hawaii. Washington, D.C., 1960.

United States Department of Commerce, Bureau of the Census. 1970 Census of Population and Housing -- Census Tracts -- Honolulu, Hawaii. Publication PHC (1)-88. Washington , D.C. 1972.

United States Department of Commerce, Bureau of the Census. Census of Population and Housing, 1980: Summary Tape File 1-A, Hawaii. Available on microfiche, State of Hawaii Department of Business and Economic Development library, Honolulu, HI. Washington, D.C. 1981a.

United States Department of Commerce, Bureau of the Census. Census of Population and Housing, 1980: Summary Tape File 3-A, Hawaii. Available on microfiche, State of Hawaii Department of Business and Economic Development library, Honolulu, HI. Washington, D.C. 1981b.

Young, B.C., and Kinzie, J.D. "Psychiatric Consultation to a Rural Community in Hawaii." Unpublished photocopied manuscript available at Kahuku Housing Corporation, Kahuku, Hawaii. N.D., ca. 1973.

Mahukona

Appendix I: *Economic and Fiscal Impact Assessment for the Planned Mahukona Resort Community, North Kohala, Hawaii*

KPMG Peat Marwick

Certified Public Accountants

Economic and Fiscal Impact Assessment

for the

Planned Mahukona Resort Community

North Kohala, Hawaii

Prepared for

CHALON INTERNATIONAL OF HAWAII

April 1990

KPMG Peat Marwick

Certified Public Accountants

P.O. Box 4150
Honolulu, HI 96812-4150

Telephone 808 531 7286
Telex 723615

Telecopier 808 536 8338

April 19, 1990

Mr. D. Paul Sennett
Vice President
Chalon International of Hawaii
Hawi, Hawaii 96719

Dear Mr. Sennett:

We are pleased to present the findings and conclusions of our economic and fiscal impact assessment of the planned resort residential and recreational community at Mahukona, district of North Kohala, island of Hawaii, as requested by PBR Hawaii.

The attached report, entitled "Economic and Fiscal Impact Assessment for the Planned Mahukona Resort Community", is organized into five chapters as follows:

I Introduction and Executive Summary
II Project Overview and Regional Setting
III Economic Impacts
IV Population Impacts
V Fiscal Impacts

We have appreciated this opportunity to assist you in the planning of this project, and have enjoyed working with you and all the other members of your project team.

Very truly yours,

KPMG Peat Marwick

Enc.

Economic and Fiscal Impact Assessment

for the

Planned Mahukona Resort Community

North Kohala, Hawaii

Prepared for

CHALON INTERNATIONAL OF HAWAII

April 1990

I-2

CHALON INTERNATIONAL OF HAWAII

Table of Contents

CHALON INTERNATIONAL OF HAWAII

List of Exhibits

I - INTRODUCTION AND EXECUTIVE SUMMARY

This chapter presents the background and objectives of the assistance provided to Chalon International of Hawaii (Chalon), in this engagement and summarizes the study's conclusions. More detailed findings and conclusions are presented in subsequent chapters.

STUDY BACKGROUND AND OBJECTIVES

Chalon owns property at Mahukona and Kapaanui in the district of North Kohala, on the island of Hawaii, which it seeks to develop as a master-planned resort residential and recreational community. A portion of the property at Kapaanui has already been approved for subdivision into one-acre lots.

The preliminary concept for the Mahukona and Kapaanui property would create a relatively low-density resort community, including:

- A resort lodge of 250 to 300 units
- Residential lots of about 1 acre in size
- Golf course

Development of the resort community could require a number of government development approvals, including state land use boundary amendment, county zoning and special management area permit. An environmental impact assessment could be required prior to submission of land use applications.

KPMG Peat Marwick was engaged for the following purposes:

- To assess the market potential of the planned uses at the proposed resort residential and recreational community.

- To assess the economic and fiscal impacts of the proposed development.

Market assessment conclusions are presented in a separate report.

ECONOMIC IMPACTS

Development of the Mahukona resort community could be expected to impact the economy by generating additional visitor expenditures, jobs in construction and operation of the resort, additional personal income and possible population growth.

Visitor Expenditures

Development of lodge hotel and single-family residential units at the resort would contribute to additional visitor spending, to the extent that these units are used by visitors. The average daily population of visitors in lodge hotel and residential units is projected to reach 450 by 2010 under the plan. Direct visitor spending is expected to be about $43 million in 2010 under the plan.

Construction Employment

Resort development would generate employment in construction of facilities over the period corresponding to the development program. Resort completion under the plan is estimated to require 730 person-years of construction labor from 1993 to 2010.

An annual average of about 56 construction workers would be needed from 1993 to 2010.

Total employment associated with resort construction, including induced and indirect positions, would total about 2,050 person-years.

Operational Employment

Permanent jobs at the resort would be generated as facilities are completed and occupied. Direct jobs at the resort are projected to consist of about 470 operational positions.

Total employment, including indirect and induced jobs, would be about 890 positions.

Personal Income

Wages and salaries paid to those directly employed in resort development and operation are expected to represent about $153 million through 2010.

Wage and salary income figures do not include potential wages paid to holders of indirect and induced jobs associated with the project, nor do they reflect income of proprietors whose businesses service the project. Total household income is expected to be considerably greater than direct wages and salaries, and could amount to about $701 million.

Population

Development of the Mahukona resort community could add to the population of Hawaii County in several ways. Visitors staying at the resort would add to the de facto population of the county. Full- and part-time residents living at the resort would increase the county's resident population. To the extent that the island's available labor supply proves insufficient to fill new operational jobs, in-migrants would be needed for the resort's labor force. Temporary increases in resident population could also be associated with in-migration of construction workers during project development.

Projected population impacts of the resort in 2010 are summarized below:

At resort:	
Average daily visitors	420
Average daily residents	200
Off-site:	
In-migrant employees and dependents	800
Total projected population impact	1,420

FISCAL IMPACTS

The fiscal impacts of the Mahukona resort community are determined by comparing anticipated government revenues from the project with the government service costs associated with project population.

Government Revenues and Expenditures

Fiscal benefits, as measured by additional government revenues, are anticipated to exceed additional government operating expenditures. Projected net additional revenues and the ratio of projected government revenues to expenditures in 2010 are summarized below, as calculated in millions of 1990 dollars:

County of Hawaii:	
Annual net additional revenues	$ 0.89
Revenue/expenditure ratio	2.1
State of Hawaii:	
Annual net additional revenues	$ 1.15
Revenue/expenditure ratio	1.4

II - PROJECT OVERVIEW AND REGIONAL SETTING

This chapter describes the proposed Mahukona resort community (resort) and reviews economic and demographic trends in the west Hawaii region that are pertinent to the outlook for development in this area.

PROJECT DESCRIPTION

Chalon owns a 254-acre site at Mahukona and an adjacent 233-acre site at Kapaanui in the district of North Kohala on the island of Hawaii. A master plan is being created to develop these two parcels into a resort residential and recreational community. Development of this community could require a number of government development approvals, including a state land use boundary amendment, county zoning change and a special management area permit. A portion of the property at Kapaanui has already been approved for subdivision into one-acre lots.

REGIONAL ECONOMIC AND DEMOGRAPHIC SETTING

The Mahukona resort community is located in the North Kohala district, part of the west Hawaii region. The Kohala area was formerly an agrarian community dominated by sugar plantations and pasture lands, while Kona was an area of coastal fishing villages and independent farmers on the mountain slopes. The economy and demography of this region has changed considerably in recent years.

The west Hawaii region began to host an increasing number of visitors in the years following statehood and the introduction of jet service to the islands. In the 1960s and 1970s, tourism fueled a building boom that spread to South Kohala and resulted in hundreds of new hotel and condominium units and residential dwellings.

Today the region is primarily supported by its real estate and visitor industries. The Kohala and Kona districts have ideal weather conditions, a black lava coastline with scattered white sandy beaches and important historical sites. Among the major visitor attractions of the region are the City of Refuge, Captain Cook monument and Kona billfishing.

The availability of large parcels of land under single ownership and the establishment of horizontal property regime laws have permitted high-quality development in several resort areas along this coast. Four master-planned resorts currently exist in South Kohala:

- Waikoloa Beach and Village Resorts
- Mauna Kea Resort
- Mauna Lani Resort

CHALON INTERNATIONAL OF HAWAII

Location Map of the Proposed Mahukona Resort Community

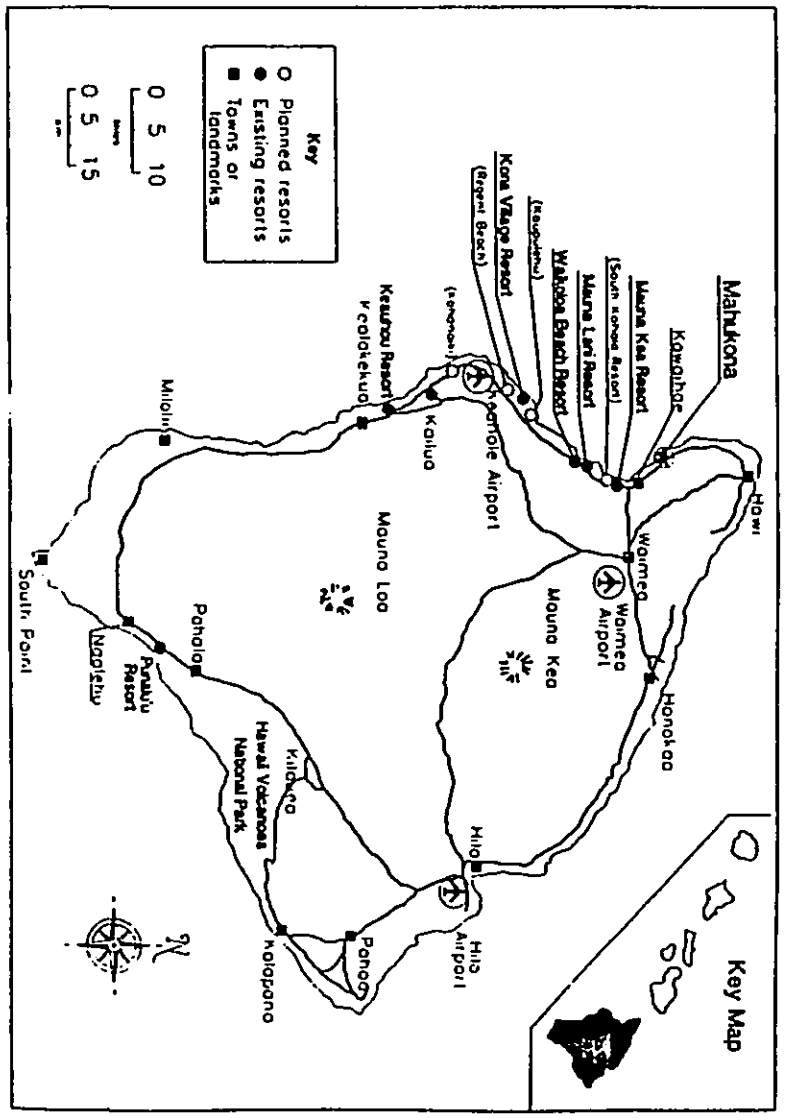


Exhibit II-A

The North Kona district includes the Kailua-Kona resort area and two master-planned resorts:

- Keauhou Resort
- Kona Village Resort

Population

The resident population of North/South Kohala and North Kona was 21,604 in 1980, as shown in Exhibit II-B. From 1970 to 1980, the resident population for the area increased at an annually compounded rate of growth of 7.5% per year, or nearly twice the 3.8% rate for the county as a whole. The North Kona district experienced rapid population growth at 11% per year, followed by the South Kohala district, at 7.1% per year.

Resident population growth on the island since 1980 has been more gradual than during the 1970s and continues to be most rapid in the North Kona and South Kohala districts. Between 1980 and 1987, population grew 5.8% and 7.0% per year in North Kona and South Kohala, respectively, compared to about 3.1% for the island, as also shown in Exhibit II-B.

Growth in the island's de facto population, including visitors present but excluding residents absent, has also slowed since the 1970s. De facto population grew about 3.1% per year between 1980 and 1987, almost same as resident population growth during the period, as also shown in Exhibit II-B.

Employment Patterns

Labor force participation rates increased significantly in the North Kona district between 1970 and 1980 but declined in the North and South Kohala districts, as shown in Exhibit II-C. Female labor force participation, however, has increased throughout the region, with increases ranging from 18.5% over the ten years in North Kona to 4.3% and 2.7% increases in North and South Kohala, respectively.

Overall declines in labor force participation in the two Kohala districts were due to their more modest increases in female participation and declining rates in male labor force participation over the period, as also shown in Exhibit II-C. This is attributed primarily to erosion in Kohala's traditionally male-dominated economic base of sugar cultivation and processing, coupled with the rise of resort- and tourism-related centers of employment in North Kona and South Kohala which provided many new work opportunities for women.

Information on labor force characteristics since 1980 is not available by district, but the State of Hawaii, Department of Labor and Industrial Relations (DLIR) prepares labor force estimates for the county as a whole. The DLIR estimates that in the 1980s, the civilian labor force has increased by 3.2% per year to about 54,700 persons in 1988, as shown in Exhibit II-D. However, county employment appears to have stabilized behind labor force growth, resulting in an estimated 5.0% rate of unemployment in 1988, or slightly lower than in 1980.

Exhibit II-B

CHALON INTERNATIONAL OF HAWAII

Resident and De Facto Population of the
North Kohala, South Kohala and North Kona
Districts and County of Hawaii

1970 to 1988

	April 1		July 1,	Average annual percent change	
	1970	1980	1988	1970 - 1980	1980 - 1988
Resident population:					
North Kohala	3,326	3,249	3,700	(.2)%	1.6%
South Kohala	2,310	4,607	7,900	7.1	7.0
North Kona	4,832	13,748	21,600	11.0	5.8
Total region	10,468	21,604	33,200	7.5 %	5.5%
County of Hawaii:					
Resident population	63,468	92,053	117,500	3.8%	3.1%
De facto population(1)	65,700	98,700	126,300	4.2%	3.1%

(1) Includes all persons physically present in area; includes visitors present but excludes residents who are temporarily absent.

Sources: U.S. Bureau of the Census, 1980 Census of Population, "Number of Inhabitants, Hawaii," PC80-1-A13 (October 1981), Table 4; Hawaii State Department of Business and Economic Development, "Quarterly Statistical and Economic Report," 4th Quarter 1989, pg. 58 and 59.

Exhibit II-D

CHALON INTERNATIONAL OF HAWAII

Average Annual Labor Force Estimates
for the County of Hawaii

1980 and 1988

	1980	1988	Average annual percent change 1980 - 1988
Civilian labor force	43,550	54,700	3.2 %
Percent unemployed	6.2%	5.0%	-
Nonagricultural wage and salary jobs by industry:			
Construction	1,800	2,000	1.3)
Manufacturing	2,800	2,550	(1.2)
Transportation, communications and utilities	1,950	2,200	1.5
Trade:	6,850	9,900	4.7
Wholesale	1,250	1,600	3.1
Retail	5,600	8,800	5.8
Finance, insurance and real estate	1,200	1,800	5.2
Services and miscellaneous:	7,050	10,500	5.1
Hotels	3,150	4,700	5.1
Health and other services	3,900	5,800	5.1
Government	6,550	7,750	2.1
Total	28,200	37,200	3.5%

Sources: State of Hawaii, Department of Labor and Industrial Relations, Labor Force Data Book (March 1978), as revised annually through April 1989.

CHALON INTERNATIONAL OF HAWAII

Labor Force Characteristics of the North Kona and Kohala Districts and County of Hawaii 1970 and 1980

	North Kona (census tracts 215 and 216)		North Kohala (census tract 218)		South Kohala (census tract 217)		County of Hawaii	
	1970	1980	1970	1980	1970	1980	1970	1980
Potential labor force (aged 16+)	3,262	10,115	2,240	2,286	1,446	3,290	43,075	67,205
Civilian labor force	2,022	7,292	1,355	1,355	951	2,110	25,889	41,006
Percentage distribution:								
Armed services	-%	.1%	1.1%	1.0%	-%	-%	.4%	.3%
Civilian labor force	62.0	72.1	60.5	59.3	65.8	64.1	60.1	61.0
Not in labor force	38.0	27.8	38.4	39.7	34.2	35.9	39.5	38.7
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Civilian labor force participation rates:								
Male	78.5	82.0	71.6	66.6	84.4	78.3	63.6	70.5
Female	43.5	62.0	47.8	52.1	46.3	49.0	36.4	51.3
Average	62.0%	72.1%	60.5%	59.3%	65.8%	64.1%	60.1%	61.0%

Sources: U. S. Bureau of the Census, Census of Population and Housing, 1970, Census Tracts (Final Report, PHC(1)88, Honolulu, Hawaii, SMSA), 1972; and Summary Tape Files 1-A and 3-A, 1980; and State of Hawaii, Department of Planning and Economic Development, Community Profiles for Hawaii, 1973; and The Geographic Distribution of Hawaii's Racial Groups, 1970 and 1980 (SR #T52), 1982.

Exhibit II-C

Job losses between 1980 and 1988 occurred in the manufacturing industry, while relatively high job increases were noted in the areas of retail trade, services, finance, insurance and real estate, as also shown in Exhibit II-D.

Since 1986, construction employment has increased greatly. The Hyatt Regency Hotel at Waikoloa spurred construction employment which has been sustained through increases in residential, commercial and industrial development. In addition, the possibility of several other hotel developments to be built in the west Hawaii region should further strengthen the labor force in the years ahead.

Social Characteristics

Exhibit II-E summarizes social characteristics of the regional population in terms of education, ethnicity and age in 1970 and 1980. All three districts of the region have exhibited increasing levels of educational achievement over the intercensal decade, as shown in the exhibit. This change was most pronounced in North Kona and South Kohala where development during the 1970s brought new economic opportunities. All districts also showed increases in the share of population of working force age; North Kohala and South Kohala also showed relative growth in the population aged 65 or older.

Comparison of 1970 and 1980 U. S. Census data on ethnicity, unfortunately, is not productive because of significant differences in the means employed in classifying ethnicity at the two census periods.

Economic and Demographic Outlook

On the island of Hawaii, much of the future economic growth will occur in the west Hawaii region. It has been estimated that over one billion dollars will be spent on developing new hotels and resort areas in this region. Hotel employment will be a major component of this growth with an estimated 3,900-person hotel work force increasing at a strong annual growth rate of 8.6% to 13,500 by the end of the century, as shown in Exhibit II-F.

The County of Hawaii employment projections reflect this overall strength with total job counts growing at a projected 5.2% annual rate from 42,800 in 1985 to 92,000 by the year 2000. Accordingly, the Hawaii General Plan projects a doubling of the island's resident population by 2000 with a 4.7% annual average increase from 106,000 in 1985 to a projected 212,000, as also shown in Exhibit II-F.

In summary, the west Hawaii region is expected to lead the growth that the island of Hawaii is anticipated to experience in the years ahead. The addition of major capital investment in existing and new resort areas will help future expansion exceed historical growth rates for the island.

CHALON INTERNATIONAL OF HAWAII

Social Characteristics of the Kona and Kohala Districts and County of Hawaii

1970 and 1980

	North Kona (census tracts 215 and 216)		South Kona (census tracts 213 and 214)		North Kohala (census tract 218)		South Kohala (census tract 217)		County of Hawaii	
	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
Total population	4,832	13,748	4,004	5,914	3,326	3,249	2,310	4,607	63,468	92,053
Education (aged 25+)(1):										
Less than 8 years	28.8%	8.0%	48.0%	23.6%	44.2%	29.0%	24.1%	8.6%	37.2%	20.1%
12 years	66.0	40.9	45.7	33.8	30.0	39.0	34.2	37.0	31.6	35.5
16 or more years	8.8	18.8	6.3	12.4	5.9	8.1	13.1	20.7	7.5	15.2
Ethnicity(1):										
Hawaiian	19.3	22.1	14.7	23.5	15.3	24.7	26.5	28.5	12.3	18.8
Japanese	23.1	11.8	39.6	27.5	23.8	16.1	24.4	14.6	37.5	26.6
Caucasian	44.0	53.8	17.7	30.0	25.6	27.8	39.2	46.5	28.8	35.0
Chinese	3.7	1.6	.8	.8	4.3	1.0	1.3	1.4	2.9	1.7
Filipino	8.4	7.2	26.3	13.0	29.2	23.9	6.6	5.6	16.5	13.9
Other	1.5	3.5	.9	5.2	1.8	6.5	2.0	3.4	2.0	4.0
Age:										
Under 5 years	9.1	9.1	8.5	9.8	10.0	9.2	9.3	10.2	8.6	9.1
5 to 17 years	27.0	20.3	26.6	17.2	29.4	22.9	28.3	23.6	27.8	21.5
18 to 64 years	55.7	63.9	55.3	62.4	51.1	54.3	56.0	58.6	54.4	59.2
65 or older	8.2	6.7	9.6	10.6	9.5	13.6	6.4	7.6	9.2	10.2

Exhibit II-E

(1) Estimates based on 15% sample.

Sources: U. S. Bureau of the Census, Census of Population and Housing, 1970, Census Tracts (Final Report, PHC(1)88, Honolulu, Hawaii, SMSA), 1972; Census of Population and Housing, 1980, Census Tracts (PHC 80(2)13), 1983; and Summary Tape Files 1-A and 3-A, 1980; and State of Hawaii, Department of Planning and Economic Development, Community Profiles for Hawaii, 1973; and The Geographic Distribution of Hawaii's Racial Groups, 1970 and 1980 (SR #152), 1982.

Exhibit II-F

CHALON INTERNATIONAL OF HAWAII

Population and Employment Projections
for the County of Hawaii

1985 to 2000

	Resident population	Employment: Hotel industry	Employment: Total jobs
1985	106,000	3,900	42,800
1990	129,000	7,700	58,000
1995	167,000	11,000	76,900
2000	212,000	13,500	92,000

Source: County of Hawaii, "Hawaii General Plan,".

III - ECONOMIC IMPACTS

The proposed Mahukona resort community is expected to generate significant positive economic benefits to the county and state of Hawaii. This chapter describes the expected economic impacts of the planned development in terms of expenditures, employment, resident income and population.

CONSUMER EXPENDITURES

The resort community would contribute to direct, indirect and induced consumer expenditures in Hawaii. Visitors to and residents of the resort would make direct expenditures for food, accommodations, gift items and other goods and services. These expenditures would, in turn, require those establishments serving direct visitor demands to purchase goods and services from other establishments in the state. The latter expenditures are considered indirect effects of the original visitor expenditures. Induced expenditures are those made by employees and proprietors with income derived from establishments benefiting from these new direct and indirect expenditures.

Direct Expenditures

Direct visitor expenditures are projected based on the expected average daily visitor population, as shown subsequently in Exhibit IV-B and as based on visitor expenditure patterns as reported by the Hawaii Visitors Bureau (HVB).

Direct expenditure impacts are shown in Exhibit III-B and as presented below:

- Direct annual visitor expenditures are projected to reach:
  - $30 million in the three-year period of 1993 to 1995.
  - $37 million from 1996 to 2000.
  - $42 million during 2001 to 2005.
  - $43 million from 2006 to 2010.

Indirect and Induced Expenditures

The Hawaii State Department of Business and Economic Development (DBED) input/output model estimates the economic activity generated in the state by various types of visitor-related direct expenditures. The all-industries multiplier of 1.66 was used from the most recent (1987) DBED model.

The projected direct expenditures could be expected to generate indirect and induced expenditures throughout the state, as also shown in Exhibit III-B and as listed below:

- Indirect and induced annual expenditures are projected at:
  - $20 million in the three-year period from 1993 to 1995.
  - $25 million in the period from 1996 to 2000.
  - $28 million during 2001 to 2005.
  - $28 million from 2006 to 2010.

Exhibit III-A

CHALON INTERNATIONAL OF HAWAII

Projected Cumulative Maximum Facility Development
at Mahukona Resort Community

1995 to 2010

Facility type	1995	2000	2005	2010
Lodge hotel:				
Number of units	300	300	300	300
Golf course development:				
Number of holes	18	18	18	18
Single-family development:				
Lots with homes	15	76	115	138
Remaining sold lots	115	94	55	32

Exhibit III-B

CHALON INTERNATIONAL OF HAWAII

Projected Total Annual Visitor Expenditures
Attributable to Mahukona Resort Community

1995 to 2010

(in millions of 1990 dollars)

Expenditures	1995	2000	2005	2010
Direct(1)	$ 29.7	37.3	42.1	43.0
Indirect and induced	19.6	24.6	27.8	28.4
Total expenditures(2)	$ 49.3	61.9	69.9	71.4

(1) Based on Hawaii Visitors Bureau 1988 expenditure data for westbound hotel visitors at $167 per day, for westbound condominium visitor expenditures at $152 per day and at $586 per day for Japanese visitors.

(2) Projected at $1.66 per $1.00 in direct expenditures based on Department of Business and Economic Development Input-Output Model, 1987.

Total Direct, Indirect and Induced Expenditures

Expenditures attributable to the resort including direct, indirect and induced effects, are also shown in Exhibit III-B and are listed below:

- Direct, indirect and induced total annual expenditures are projected at:
  - $49 million during the three-year period from 1993 to 1995.
  - $62 million in the period from 1996 to 2000.
  - $70 million during 2001 to 2005.
  - $71 million from 2006 to 2010.

EMPLOYMENT IMPACT

Planned development at the resort will generate short-term employment during the construction of new facilities and long-term employment in the operation and support of those facilities. Employment effects may also be classified as being direct, indirect or induced. Direct employment is that supported by expenditures at the community, such as the employment at facilities that serve visitors and residents. Most of the direct employment effects would occur at the resort. As for expenditures, however, indirect and induced employment resulting from the development may be supported throughout the state's economy.

This section projects the direct, indirect and induced effects of the proposed development on construction and operational employment.

Direct Construction Employment

Direct (on-site) construction employment is that which would be supported directly by the construction of the various facilities. Such employment includes on-site laborers, operatives and craftsmen, as well as the professional, managerial, sales and clerical workers whose usual places of employment may be elsewhere on the island or in the state.

Construction employment projections are shown in Exhibit III-C and presented below:

- Average annual direct construction employment is expected to reach these levels:
  - 160 person-years from 1993 to 1995.
  - 30 person-years during 1996 to 2000.
  - 10 person-years from 2001 to 2005.
  - 10 person-years from 2006 to 2010.
- Direct construction employment could reach a total of 730 person-years from 1993 to 2010.

Exhibit III-C

CHALON INTERNATIONAL OF HAWAII

Projected Maximum Direct Employment for Facility Construction

1995 to 2010

(Average annual person-years)

Facility type	1993 - 1995	1996 - 2000	2001 - 2005	2006 - 2010
Lodge hotel and facilities(1)	100	-	-	-
Golf course(2)	10	-	-	-
Single family homes:				
Lot development(3)	10	-	-	-
Home construction(4)	20	20	10	10
Infrastructure(5)	20	10	-	-
Total	160	30	10	10

(1) Demand calculated at 0.5 full-time equivalent jobs per year per room, and average two-year construction period.

(2) Employment demand estimated at 15 to 20 full-time equivalent jobs per year, and average two-year construction period based upon comparable golf construction projects.

(3) Demand calculated at 0.2 full-time equivalent jobs per year per lot, and average one-year construction period per lot.

(4) Demand calculated at 2.0 full-time equivalent jobs per year per home, and average one-year construction period per home with certain areas of lot development anticipated to be included in infrastructure construction.

(5) Based on estimated construction cost of $38 million provided by PBR-Hawaii.

Indirect and Induced Construction Employment

Direct construction employment will stimulate additional purchases of goods and services on the island and elsewhere in the state. The indirect and induced employment is supported by the direct construction employment as shown in Exhibit III-D and as listed below:

- Average annual indirect and induced employment generated is expected to be:
  - 290 person-years from 1993 to 1995.
  - 50 person-years from 1996 to 2000.
  - 20 person-years during 2001 to 2005.
  - 20 person-years from 2006 to 2010.
- Total indirect and induced jobs from construction employment is expected to be about 1,320 total person-years from 1993 to 2010.

Total Construction Employment

Total construction employment is the summation of direct construction employment and its indirect and induced effects as shown in the previous exhibit and as listed below:

- Average annual direct, indirect and induced employment from facility construction is expected to be:
  - 450 person-years from 1993 to 1995.
  - 80 person-years from 1996 to 2000.
  - 30 person-years during 2001 to 2005.
  - 30 person-years from 2006 to 2010.
- Total construction-related employment could amount to 2,050 person-years from 1993 to 2010.

Direct Operational Employment

The resort will generate additional employment to operate the new facilities, as shown in Exhibit III-E, and as presented below:

- Full-time equivalent direct on-site operational employment is projected as follows:
  - 460 positions in 1995.
  - 470 positions in 2000.
  - 470 positions in 2005.
  - 470 positions in 2010.

Indirect and Induced Operational Employment

The direct operational positions created would also indirectly generate employment beyond the resort community site.

Exhibit III-D

CHALON INTERNATION OF HAWAII

Projected Total Employment for Facility Construction

1993 to 2010

(Average annual person-years)

Type of employment	1993 - 1995	1996 - 2000	2001 - 2005	2006 - 2010
Direct(1)	160	30	10	10
Indirect and Induced(2):				
On-island	100	20	10	10
Elsewhere in state	190	30	10	10
Subtotal	290	50	20	20
Total, rounded	450	80	30	30

(1) From Exhibit III-C.
(2) As estimated by Community Resources, Inc.

Exhibit III-E

CHALON INTERNATIONAL OF HAWAII

Projected Maximum Direct Employment
for Mahukona Resort Community

1995 to 2010

Facility type	1995	2000	2005	2010
Golf course(1)	35	40	40	40
Lodge hotel(2)	420	420	420	420
Single family residences(3)	-	2	3	4
Facilities administration(4)	5	5	5	5
Total operational employment (rounded)	460	470	470	470

(1) Operational employment based upon employment patterns at similar resort courses.

(2) At 1.4 full-time equivalent direct jobs per visitor unit, including workers employed at project ancillary facilities.

(3) Projected at 0.15 full-time equivalent jobs per rental unit.

(4) Category includes other new employment such as resort administration, property development, sales and management and other groundskeeping and maintenance of developed facilities.

The indirect and induced operational employment is projected as shown in Exhibit III-F and as listed below:

- Average annual indirect and induced operational employment generated to be:
  - 320 person-years in 1995.
  - 380 person-years in 2000.
  - 420 person-years in 2005 and in 2010.

Total Operational Employment

Total operational employment is the summation of direct operational employment and its indirect and induced effects as also shown in Exhibit III-F and as listed below:

- Total direct, indirect and induced operational employment is estimated to be:
  - 780 positions in 1995.
  - 850 positions in 2000.
  - 890 positions in 2005.
  - 890 positions in 2010.

RESIDENT INCOME

The resort community would generate resident income in the form of employee wages, salaries and benefits, and income to business proprietors. The income effects of the development are summarized in Exhibit III-G.

Personal Income

The planned resort community would have an impact on personal income for residents of the island and state through employee wages, salaries and fringe benefits, as well as through proprietors' income. Personal income is defined as the wages and salaries paid to the direct construction and operational employees of the development. Personal income is projected on the basis of average industry wages and salaries for the various types of employment anticipated and on the projected future employment demand.

- Annual personal income is expected to reach the following levels:
  - $12.1 million in 1995
  - $ 8.2 million in 2000.
  - $ 7.6 million in 2005.
  - $ 7.6 million in 2010.

Total personal income could amount to $153 million per year from 1993 to 2010.

Exhibit III-F

CHALON INTERNATIONAL OF HAWAII

Projected Direct, Indirect and Induced Operational Employment
at Mahukona Resort Community

1995 to 2010

Type of Employment	1995	2000	2005	2010
Maximum on-site employment(1)	460	470	470	470
Indirect and induced(2):				
On-island	150	210	240	250
Elsewhere in state	170	170	180	170
Subtotal (rounded)	320	380	420	420
Total	780	850	890	890

(1) As shown in Exhibit III-E.
(2) As estimated by Community Resources, Inc.

Exhibit III-G

CHALON INTERNATIONAL OF HAWAII

Projected Total Annual Personal Income from Direct Employment

1995 to 2010

(in millions of 1990 dollars)(1)

Type of Employment	1995	2000	2005	2010
Construction(2)	$ 4.9	0.9	0.3	0.3
Operational(3)	7.2	7.3	7.3	7.3
Total personal income	12.1	8.2	7.6	7.6
Total household income(4)	$18.1	22.8	25.7	26.2

(1) Adjusted for inflation at annual average of 4.7% from 1989 to 1990.

(2) Average annual income for the construction industry in the county of Hawaii estimated at $29,419 in 1988.

(3) Weighted average of hotels and recreation services sector wages in the county of Hawaii estimated at $14,868 in 1988.

(4) Based on State Department of Business and Economic Development estimate of $0.61 total household income for each direct dollar spent by visitors to the state of Hawaii, 1987.

Sources: Department of Labor and Industrial Relations, "Employment and Payrolls in Hawaii," September, 1989.

Household Income

The dispersion of indirect and induced employment effects among many industries make it difficult to project the total income effects of the proposed development. However, estimates of total household income effects based on visitor expenditure levels permits a perspective on the statewide income benefits that could result from the resort community.

Total household income generated by visitor expenditures would include fringe benefits and proprietors' income from establishments selling goods and services to visitors, as well as the wages and salaries estimated previously. Household income also includes income generated through the multiplier effect of indirect and induced visitor expenditures.

The OBED reports that each direct dollar spent by visitors generates an estimated $ 0.61 in total income to households in Hawaii.

Annual direct expenditures of resort visitors were previously shown in Exhibit III-B. Based on visitor spending estimates, annual projected household income from the development is presented in Exhibit III-G and as listed below:

- $18.1 million in 1995.
- $22.8 million in 2000.
- $25.7 million in 2005.
- $26.2 million in 2010.

IV - POPULATION IMPACTS

This chapter describes the projected impact of the proposed Mahukona resort community on population growth.

POPULATION IMPACTS OF DEVELOPMENT

The Mahukona resort could contribute to population increase at the resort and elsewhere on the island. People would be residing during most or parts of each year in the residential portion of the community, while visitors at rental accommodations would contribute to the average daily population. Operational and construction employees could also add to the off-site population of the region and the island. As estimated by Community Resources, Inc., in-migrant labor demand in Mahukona is calculated based on labor demand and available labor supply in the north and south Kohala area.

Visitor Population Impact

The on-site visitor population projections have been derived from the proposed facilities as previously shown in Exhibit III-A and unit usage, average occupancy and party size assumptions as listed in Exhibit IV-A.

Based on these assumptions, the projected visitor population in the resort are as shown in Exhibit IV-B and as follows:

- Visitor population created by the resort could be expected to be:
  - 310 visitors by 1995.
  - 410 visitors by 2000.
  - 410 visitors by the year 2005.
  - 420 visitors by 2010.

On-Site Resident Population Impact

Resident population at the community was also projected using the assumptions concerning single-family development shown in Exhibit III-A, assumptions about unit usage and build-out shown in Exhibit IV-A and as summarized by Exhibit IV-B. Resident population associated with the resort are shown below:

- Resident population associated with the resort is expected to be:
  - 20 residents by 1995.
  - 110 residents by 2000.
  - 170 residents by the year 2005.
  - 200 by 2010.

Exhibit IV-A

CHALON INTERNATIONAL OF HAWAII

Assumptions for Mahukona Resort Community
On-Site Population Projections

Population component	Number of units	Percent distribution	Occupancy rate	Persons per unit
Lodge guests	250 - 300		55% - 1995 60 - 1996 64 - 1997 67 - 1998 70 - 1999 70 - 2000	1.9
Single-family residences:				
Visitor rentals		20%	25%	2.5
Part-time residents		40	50	2.5
Full-time residents		40%	95%	2.5

(1) Lodge anticipated to open in 1995 reaching stabilized occupancy in 1999.

Exhibit IV-B

CHALON INTERNATIONAL OF HAWAII

Projected Maximum Daily Population at Mahukona Resort Community

1995 to 2010

	1995	2000	2005	2010
Visitors:				
Lodge hotel				
Rooms	300	300	300	300
Occupancy rate	55%	70%	70%	70%
Average party size	1.9	1.9	1.9	1.9
Lodge visitors(1)	310	400	400	400
Single family visitor rentals:				
Homes	15	76	115	138
Percentage of visitor rentals	20%	20%	20%	20%
Occupancy rate	25%	25%	25%	25%
Persons per unit	2.5	2.5	2.5	2.5
Visitors in rental units(1)	-	10	10	20
Total average daily visitor population(1)	310	410	410	420
Single family residents:				
Part-time residents				
Homes	15	76	115	138
Percentage of part-time residents	40%	40%	40%	40%
Occupancy rate	50%	50%	50%	50%
Persons per unit	2.5	2.5	2.5	2.5
Part-time residents(1)	10	40	60	70
Full-time residents				
Homes	15	76	115	138
Percentage of full-time residents	40%	40%	40%	40%
Occupancy rate	95%	95%	95%	95%
Persons per unit	2.5	2.5	2.5	2.5
Residents(1)	10	70	110	130
Total average daily resident population(1)	20	110	170	200
De facto population:				
Average daily visitors	310	410	410	420
Average daily residents	20	110	170	200
Total de facto population(1)	330	520	580	620

(1) Numbers are rounded.

Source: Based on discussions with developers, realtors and property managers at similar resort developments.

Total On-Site Population Impact

The total on-site population impact is the summation of the projected visitor and resident population generated by the resort as shown in Exhibit IV-B and as listed below:

- Total visitor and resident on-site population impact is expected to be:
  - 330 on-site population by 1995.
  - 520 on-site population by 2000.
  - 580 on-site population by the year 2005.
  - 620 on-site population by 2010.

In-migrant Population Impact

In-migrant on-site residents are based on the resident population figures and the assumption that all are expected to be new residents of Hawaii County.

Estimates by Community Resources, Inc. of operational and construction employee and dependent immigrant population impacts are shown in Exhibits IV-C and IV-D, respectively, and are summarized in Exhibit VI-E as listed below:

- Total in-migrant population impact is expected to be:
  - 820 in-migrants by 1995.
  - 910 in-migrants by 2000.
  - 970 in-migrants by the year 2005.
  - 1,000 in-migrants by 2010.

Exhibit IV-C

CHALON INTERNATIONAL OF HAWAII

Estimated Labor Supply and Demand
Impacts of Mahukona Resort Community

	Mahukona	Total study area(1)
Labor demand:		
Study area labor demand(2)	540	3,410
Available labor supply:		
Projected growth in labor force from natural increase, 1990 - 1995(3)	70	425
Potential east Hawaii commuters(4)	70	420
Total available labor supply	140	845
In-migrant labor demand:		
Total in-migrant labor demand(5)	400	2,565

(1) Study area includes North and South Kohala.
(2) Mahukona share of employment demand estimated at 15.8%.
(3) Estimated from age-cohort population projections.
(4) Based on 33% capture rate of projected increase in east Hawaii labor force.
(5) Total labor demand minus on-island supply.
Source: Community Resources, Inc.

Exhibit IV-D

CHALON INTERNATIONAL OF HAWAII

Estimated In-Migrant Population Associated with
Mahukona Resort Community Operational Employment

1995 to 2010

	1995	2000	2005	2010
Resort-associated employment:				
Total employment(1)	780	850	890	890
In-migrant population:				
In-migrant employees(2)	400	400	400	400
Dependents(3)	400	400	400	400
Total in-migrant population	800	800	800	800

(1) Maximum on-site, indirect and induced employment from Exhibit III-F.
(2) From Exhibit IV-C; as estimated by Community Resources, Inc.
(3) At 1.0 dependents per labor force member.

Exhibit IV-E

CHALON INTERNATIONAL OF HAWAII

Projected Maximum Resident Population Impact
for the Island of Hawaii

1995 to 2010

(Average daily population)

	1995	2000	2005	2010
On-site community residents	20	110	170	200
Off-site in-migrant employees(1)	400	400	400	400
Dependents	400	400	400	400
Subtotal	800	800	800	800
Total in-migrant population impact	820	910	970	1,000

(1) As estimated by Community Resources, Inc.

V - FISCAL IMPACTS

The proposed Mahukona resort community is expected to generate significant positive fiscal benefits for the county and state of Hawaii. These fiscal impacts have been evaluated by comparing the tax revenues and operating expenditures which are projected to result from project development and operation.

GOVERNMENT REVENUES

The resort would bring additional tax revenues to the county and state governments. County government revenues would be principally in the form of real property taxes on the developed acreage and new facilities. Revenues to the state government would be composed principally of general and specific excise taxes and personal income taxes paid by new state residents, and the general excise tax on sales revenues attributable to visitors.

The following sections project the additional revenues that could be generated for the county and state governments as a result of the development.

County

Real property in the county of Hawaii is currently taxed at from $8.50 to $10.00 per $1,000 of assessed value for the different land and improvement classes.

Net additional real property taxes were estimated according to the average estimated prices of the various units and assessed values for other comparable parcels based on information from the Hawaii County Real Property Tax Department, less the current property taxes generated by the undeveloped site.

Based on these rates and estimated assessed values, the resort could be expected to generate, in net, new property tax revenues as shown in Exhibit V-A and as listed below:

- Projected annual net new property tax revenues for the county are expected to be:
  - $1.2 million in the initial three-year period from 1993 to 1995.
  - $1.5 million during the 1996 to 2000 time period.
  - $1.6 million in the 2001 to 2005 time period.
  - $1.7 million from 2006 to 2010.
  - $27.4 million in total for the entire period from 1993 to 2010.

State

New revenues to the state government would be generated by the 4% general excise tax on direct, indirect and induced expenditures by visitors to the community.

Exhibit V-A

CHALON INTERNATIONAL OF HAWAII

Annual Projected Real Property Tax Revenues
to the County Government Attributable to the Mahukona Resort Community

1995 to 2010

(In millions of 1990 dollars)

Source of property tax revenue	1995	2000	2005	2010
Lodge hotel:				
Estimated assessed value	$ 47	47	47	47
Real property rate ($/$1,000)	9	9	9	9
Property tax revenue	$0.42	0.42	0.42	0.42
Golf course:				
Estimated assessed value	$ 36	36	36	36
Real property rate ($/$1,000)	10	10	10	10
Property tax revenue	$0.36	0.36	0.36	0.36
Clubhouse:				
Estimated assessed value	$ 9	9	9	9
Real property rate ($/$1,000)	8.5	8.5	8.5	8.5
Property tax revenue	$0.08	0.08	0.08	0.08
Single family lots:				
Lots	130	170	170	170
Estimated assessed value per lot	$ 0.3	0.3	0.3	0.3
Real property rate ($/$1,000)	8.5	8.5	8.5	8.5
Property tax revenue	$0.35	0.45	0.45	0.45
Single family homes:				
Homes	15	76	115	138
Estimated assessed value per homes	$ 0.3	0.3	0.3	0.3
Real property rate ($/$1,000)	8.5	8.5	8.5	8.5
Property tax revenue	$0.04	0.20	0.31	0.37
Total new property tax revenues	$1.25	1.52	1.62	1.68
Less current property revenues(1)	$0.02	0.02	0.02	0.02
Net new property tax revenues, rounded	$1.22	1.49	1.60	1.66

(1) Current property taxes estimated at $21,555.70 per year as adjusted to 1990 dollars.

In addition, new residents attracted to the state by the employment or residential opportunities of the project would bring in additional excise sales taxes, individual income taxes and other state taxes such as liquor, tobacco, fuel, inheritance, estate and conveyance taxes.

State tax receipts, individual income and other taxes mentioned above excluding general excise taxes, averaged about $920 per state resident in 1990. Thus, new total tax revenues to the state government attributable to the expansion are shown in Exhibit V-B and summarized as:

- Annual new tax revenues for the state are expected to be:
  - $2.8 million in each year of the initial three-year period from 1993 to 1995.
  - $3.4 million during the 1996 to 2000 time period.
  - $3.8 million in the 2001 to 2005 time period.
  - $3.9 million from 2006 to 2010.
  - $64.2 million in total for the entire period from 1993 to 2010.

GOVERNMENT OPERATING EXPENDITURES

New visitors and residents attracted to the resort would also necessitate additional expenditures of state and county public resources.

In-migrant residents would incur public costs in terms of public safety, maintenance of highways, recreational facilities and natural resources, health and sanitation measures, special cash capital improvements, education, retirement and pension funds, public welfare and other government functions.

Visitors would also increase the average daily population of the community and would also require public expenditures in terms of public safety, maintenance of highways, health and sanitation, recreation and special cash capital improvements.

County

The various county government operating expenditures for fiscal year 1988 were analyzed with respect to the relevant population served by each of the government functions. This analysis indicates that Hawaii County government expenditures in 1988 totaled about $580 per resident and $340 per visitor, as shown in Exhibit V-C. A 4.1% and 4.7% increase, equivalent to the increase in the Honolulu Consumer Price Index between 1988 and 1989 and between 1989 and 1990 would be equal to expenditures in 1990 dollars of about $620 and $360 per capita for residents and visitors, respectively.

Based on these county government outlays, public expenditures by the county on behalf of the service population for the resort are as shown in Exhibit V-D and as listed below:

Exhibit V-B

CHALON INTERNATIONAL OF HAWAII
Projected Annual Revenues to the State Government
Attributable to the Mahukona Resort Community
1995 to 2010
(In millions of 1990 dollars)

Revenue source	1995	2000	2005	2010
Visitors:				
Projected annual expenditures	$ 49	62	70	71
Tax rate	4.0%	4.0%	4.0%	4.0%
General excise tax on sales revenue	1.96	2.48	2.80	2.84
In-migrant residents:				
Part-time resort community residents(1)				
Homes	12	61	92	110
Percentage part-time residents	40%	40%	40%	40%
Occupancy rate	50%	50%	50%	50%
Number of household	2	12	18	22
Average household income ($1,000)	$ 120	120	120	120
Expenditure ratio	38%	38%	38%	38%
Average household expenditures	$ 45.6	45.6	45.6	45.6
Tax rate	4.0%	4.0%	4.0%	4.0%
General excise tax	$ -	0.02	0.03	0.04
Full-time new community residents(1)				
Homes	12	61	92	110
Percentage full-time residents	40%	40%	40%	40%
Occupancy rate	95%	95%	95%	95%
Number of household	5	23	35	42
Average household income ($1,000)	$ 60	60	60	60
Expenditure ratio	38%	38%	38%	38%
Average household expenditures	$ 22.8	22.8	22.8	22.8
Tax rate	4.0%	4.0%	4.0%	4.0%
General excise tax	$ -	0.02	0.03	0.04
In-migrant employees(2)				
Off-site employees	360	360	360	360
Average household income ($1,000)	$ 30	30	30	30
Expenditure ratio	38%	38%	38%	38%
Average household expenditures	11.4	11.4	11.4	11.4
Tax rate	4.0%	4.0%	4.0%	4.0%
General excise tax	$ 0.16	0.16	0.16	0.16
Sub total	$ 0.17	0.21	0.23	0.24

Exhibit V-B (Cont.)

CHALON INTERNATIONAL OF HAWAII
Projected Annual Revenues to the State Government
Attributable to the Mahukona Resort Community
1995 to 2010
(in millions of 1990 dollars)

Revenue source	1995	2000	2005	2010
Individual income and other taxes				
Resort community residents(1)	20	90	140	160
Tax amount per year	$ 923	923	923	923
Individual income and other taxes	0.02	0.08	0.13	0.15
In-migrant employees(2)	720	720	720	720
Tax amount per year	$ 923	923	923	923
Individual income and other taxes	$ 0.66	0.66	0.66	0.66
Sub total	$ 0.68	0.75	0.79	0.81
Total	$ 2.82	3.44	3.82	3.89

(1) Not including 20% estimated to have relocated from elsewhere in state.
(2) Not including 10% estimated to have relocated from elsewhere in state.

Sources: Department of Planning and Economic Development, "The State of Hawaii Data Book," 1988; Tax Foundation of Hawaii, "Government in Hawaii," 1989.

Exhibit V-C

CHALON INTERNATIONAL OF HAWAII

County of Hawaii Per Capita Government Expenditures

(in millions of 1990 dollars)

Function	Expenditures (000's)(1)	Service population(2)	1988 annual expenditure Per resident	Per visitor
General government	$ 9,527	117,500	$ 81.08	-
Public safety	27,747	126,300	219.69	219.69
Highways	5,116	126,300	40.51	40.51
Health and sanitation	2,963	126,300	23.46	23.46
Economic and urban development	3,079	117,500	26.20	-
Recreation	6,050	126,300	47.90	47.90
Interest	4,850	117,500	41.28	-
Bond redemption	2,120	117,500	-	-
Retirement and pension	8,703	117,500	74.07	-
Mass transit	600	117,500	5.11	-
Cash capital improvements	1,044	126,300	8.27	8.27
Miscellaneous	1,895	117,500	16.13	-
Total, 1988 dollars	$ 73,694		$ 583.70	339.83
Total, 1990 dollars			$ 620	360

(1) County government operating expenditures for fiscal year ended June 30, 1989 as reported in Tax Foundation of Hawaii, Government in Hawaii, 1989.

(2) Resident or de facto population estimates for the county as of July 1, 1988.

(3) Inflation adjusted at annual average of 4.1% for 1988 and 4.7% for 1989.

Exhibit V-D

CHALON INTERNATIONAL OF HAWAII

Projected Annual County Government Expenditures
Attributable to Service Population at the Mahukona Resort Community

1995 to 2010

(in millions of 1990 dollars)

Population and expenditure type	1995	2000	2005	2010
Service population:				
Average daily visitors	310	410	410	420
Resort community residents	20	110	170	200
In-migrant employees and dependents	800	800	800	800
Total	1,130	1,320	1,380	1,420
Expenditures (millions):				
Average daily visitors(1)	$ 0.11	0.15	0.15	0.15
Resort community residents(2)	0.01	0.07	0.11	0.12
In-migrant employees and dependents	0.50	0.50	0.50	0.50
Total expenditures	$ 0.62	0.72	0.76	0.77

(1) Visitors require $360 per capita, in 1990 dollars.

(2) Residents to require $620 per capita, in 1990 dollars.

- Annual county government operating expenditures are estimated at:
  - $0.6 million beginning in 1993 through 1995.
  - $0.7 million from 1996 to 2000.
  - $0.8 million during the 2001 to 2005 time period.
  - $0.8 million from 2006 to 2010.

State

A similar analysis of state government operating expenditures and the relevant populations for the various government services indicate that expenditures in 1988 totaled about $2,650 per resident and $560 per visitor, as shown in Exhibit V-E. This is equivalent to about $2,830 per resident and $590 per full-time equivalent visitor when adjusted to 1990 dollars.

Based on these operating costs, state government expenditures are projected as shown in Exhibit V-F and as presented below:

- Annual state government operating expenditures are estimated at:
  - $2.3 million in the three-year 1993 to 1995 period.
  - $2.5 million beginning in 1996 through 2000.
  - $2.7 million during the 2001 to 2005 time period.
  - $2.7 million from 2006 to 2010.

REVENUE AND EXPENDITURE ANALYSIS

The net fiscal impacts of the resort on county and state operating budgets are estimated by comparison of the projected revenues and expenditures.

County Cost/Benefit

Comparison of projected public revenues and expenditures attributable to the resort indicates that the county government could expect positive fiscal benefits as also shown in Exhibit V-G and as detailed below:

- Annual net additional county revenues are expected to be:
  - $0.6 million during the 1993 to 1995 period.
  - $0.8 million from 1996 to 2000.
  - $0.8 million between 2001 and 2005.
  - $0.9 million from 1996 to 2010.

The analysis also indicates that additional county government revenues generated by the resort and its facilities would be about two times county operating expenditures as also shown in Exhibit V-G.

State Cost/Benefit

Based on a similar analysis, net fiscal benefits to the state government in 1990 dollars are as shown in Exhibit V-H and as listed below:

Exhibit V-E

CHALON INTERNATION OF HAWAII

State of Hawaii Per Capita Government Expenditures

(In millions of 1990 dollars)

Function	Expenditures (000's)(1)	Service population(2)	1988 annual expenditure: Per resident	1988 annual expenditure: Per visitor
General government	$ 227,088	1,098,200	$ 206.78	-
Public safety	112,668	1,218,800	92.44	92.44
Highways	78,624	1,218,800	64.51	64.51
Natural resources	36,032	1,218,800	29.56	29.56
Health and sanitation	126,174	1,218,800	103.52	103.52
Hospitals and institutions	104,934	1,098,200	95.55	-
Public welfare	380,823	1,098,200	346.77	-
Education	886,244	1,098,200	807.00	-
Recreation	19,222	1,218,800	15.77	15.77
Utilities and other enterprises	194,075	1,218,800	159.23	159.23
Debt service	279,665	1,098,200	254.66	-
Retirement and pension	131,079	1,098,200	119.36	-
Employee's health insurance	442	1,098,200	0.40	-
Unemployment compensation	55,827	1,098,200	50.84	-
Grants-in-aid to counties	32,867	1,098,200	29.93	-
Urban redevelopment and housing	146,462	1,098,200	133.37	-
Cash capital improvements	109,636	1,218,800	89.95	89.95
Miscellaneous	58,878	1,098,200	53.61	-
Total, 1988 dollars	$ 2,980,740		2,653.25	555.00
Total, 1990 dollars			$ 2,830	590

(1) State government operating expenditures for fiscal year ended June 30, 1988, as reported in Tax Foundation of Hawaii, Government in Hawaii, 1989.

(2) Resident or de facto population estimates for the state as of January 1, 1988.

(3) Inflation adjusted at annual average of 4.1% for 1988 and 4.7% for 1989.

Exhibit V-F

CHALON INTERNATIONAL OF HAWAII

Projected Annual State Government Expenditures
Attributed to Service Population at the Mahukona Resort Community

1995 to 2010

(In millions of 1990 dollars)

Population and expenditure type	1995	2000	2005	2010
Service population:				
Average daily visitors	310	410	410	420
Resort community residents(1)	20	90	140	160
In-migrant employees and dependents(2)	720	720	720	720
Total	1,050	1,220	1,270	1,300
Expenditures (millions):				
Average daily visitors(3)	$ 0.18	0.24	0.24	0.25
Resort community residents(4)	0.06	0.25	0.40	0.45
In-migrant employees and dependents	2.04	2.04	2.04	2.04
Total expenditures	$ 2.28	2.53	2.68	2.74

(1) Not including 20% estimated to have relocated from elsewhere in state.
(2) Not including 10% estimated to have relocated from elsewhere in state.
(3) Visitors require $590 per capita, in 1990 dollars.
(4) Residents to require $2,830 per capita, in 1990 dollars, in state government expenditures.

Exhibit V-G

CHALON INTERNATIONAL OF HAWAII

County Government Revenue and Expenditure Comparison

1995 to 2010

(In millions of 1990 dollars)

	1995	2000	2005	2010
New revenues	$ 1.22	1.49	1.60	1.66
New expenditures	0.62	0.72	0.76	0.77
Net additional revenues	$ 0.60	0.77	0.84	0.89
Revenues/expenditure ratio(1)	2.0	2.1	2.1	2.1

(1) New revenues divided by new expenditures.

Exhibit V-H

CHALON INTERNATIONAL OF HAWAII

State Government Revenue and Expenditure Comparison

1995 to 2010

(In millions of 1990 dollars)

	1995	2000	2005	2010
New revenues	$ 2.82	3.44	3.82	3.89
New expenditures	2.28	2.53	2.68	2.74
Net additional revenues	$ 0.54	0.91	1.14	1.15
Revenues/expenditure ratio(1)	1.2	1.4	1.4	1.4

(1) New revenues divided by new expenditures.

- Annual net additional state revenues are expected to be:

  - $0.5 million in the two-year 1993 to 1995 period.
  - $0.9 million during the 1996 to 2000.
  - $1.1 million from 2001 to 2005.
  - $1.1 million between 2006 and 2010.

Additional state government revenues generated by the resort would generally be about 140% operating expenditures incurred by the state government by 2010, as also shown in Exhibit V-H.

I-26

Mahukona

Appendix J: *Traffic Impact Analysis Report*

TRAFFIC IMPACT ANALYSIS REPORT

FOR

MAHUKONA LODGE

NORTH KOHALA, HAWAII

J-1

JUNE 21, 1990

M & E Pacific, Inc.
Engineers & Architects
1001 Bishop Street
Suite 500, Pauahi Tower
Honolulu, Hawaii 96813

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

MAHUKONA LODGE

TABLE OF CONTENTS
(CON'T)

LIST OF TABLES

J-2

TRAFFIC IMPACT ANALYSIS REPORT

FOR

MAHUKONA LODGE

NORTH KOHALA, HAWAII

GENERAL

Mahukona Lodge is a proposed resort hotel and residential subdivision in North Kohala, Hawaii. This report documents the results of a study conducted to evaluate the traffic impacts of the proposed project.

PROJECT DESCRIPTION

Chalon International of Hawaii proposes to develop a resort/lodge, golf course and residential lots in Kapaanui, Hawaii, adjacent to the Mahukona Harbor. The proposed project schedule calls for the project to be incrementally developed over a 25 year period, with expected completion in the year 2015.

The resort will consist of 44 units in the Main Lodge, 188 units in the Villas, and include a fitness facility, specialty restaurants and retail shops. The hotel is expected to be operational by 1995 and to have an average occupancy rate increasing from 55% in 1995 to 70% in 2000 and thereafter.

There will be a total of 140 to 170 residential lots developed according to the following cumulative schedule: 1995-14 lots, 2000-71 lots, 2005-112 lots, 2010-135 lots, and 2015-170 lots.

The golf course is expected to be ready for play by 1995 with the opening of the hotel. It will be open to the public for play. Portions of the golf course will be built mauka of the Akoni Pule Highway and will be reached via two underpasses. Therefore, golf cart vehicles will not have to cross at-grade on the Akoni Pule Highway. The golf course is projected to have the following total daily golf rounds: 1995 - 80, 2000 - 120, 2005 and thereafter - 140.

Public access will be permitted to the Mahukona Harbor and County Beach Park. Additional public access will be permitted to the historic Kapaanui Village area through the residential subdivision. The road to the park and harbor is currently maintained by the County.

The proposed layout of the project is shown on Figure 1. An interior roadway system will connect the various land uses on the project site and channel the traffic to one access point at the Akoni Pule Highway. The proposed intersection will provide for acceleration/deceleration lanes and a separate left turn lane on the highway.

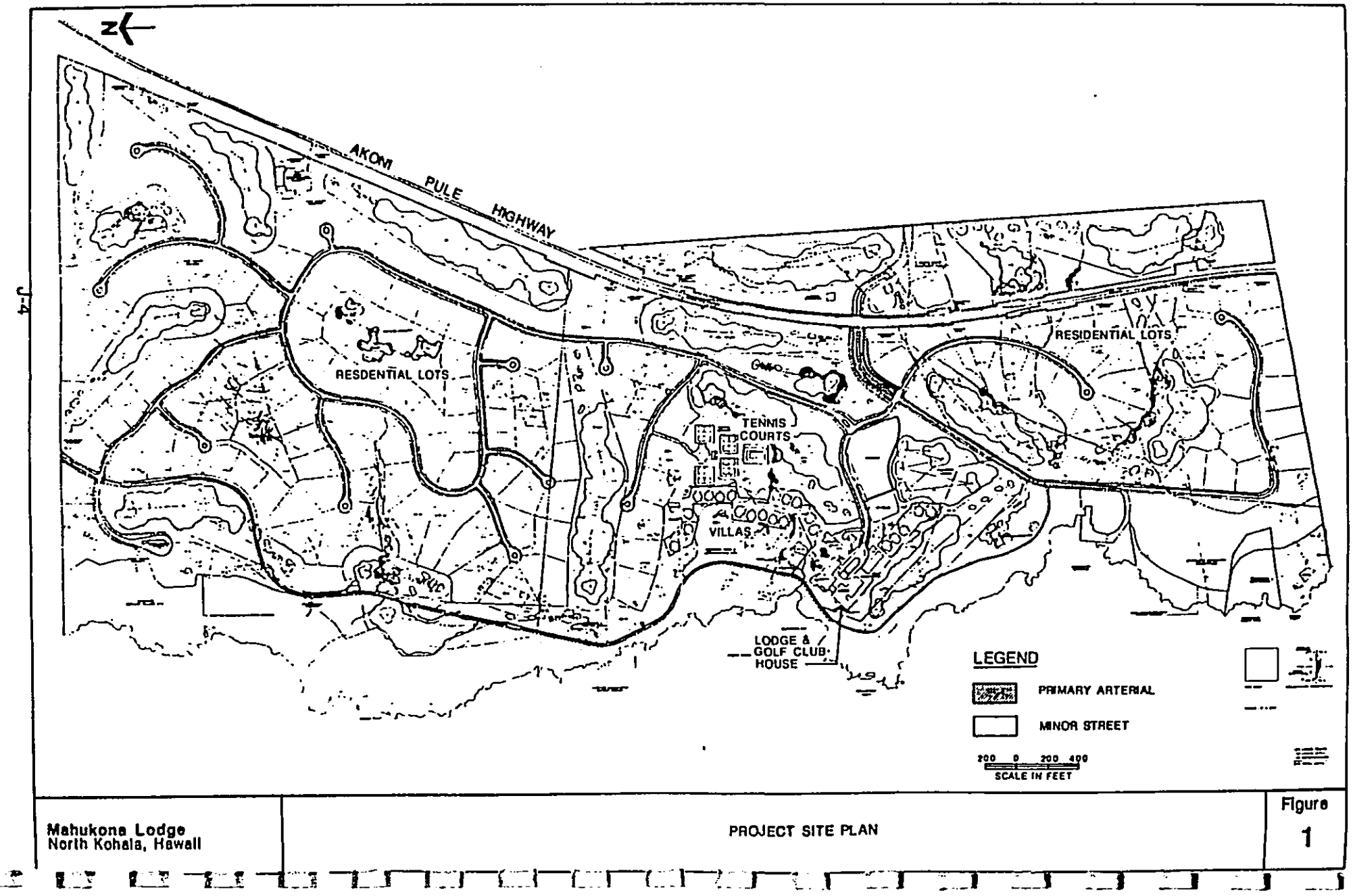
EXISTING CONDITIONS

An inventory of existing conditions was conducted to evaluate the traffic impact of the proposed project. The review included the roadway in the area and traffic volumes.

The Akoni Pule Highway is a two-lane State highway providing access between the towns of Hawi and Kawaihae. It is the only roadway serving the project site. There is relatively little development along the highway although several agricultural subdivisions are being developed just north of the North Kohala boundary. The highway passes through rolling terrain and is posted for a 55 mile per hour speed limit in the vicinity of the project.

Traffic volumes were counted by the State Department of Transportation in May 1988 at two points on the Akoni Pule Highway: to the north in the town of Hawi and in the south just north of the Kawaihae Pier. These counts were deemed to be applicable to the project site in view of the sparse development along this highway. The AM and PM peak volumes at both locations were similar and the counts at the Hawi intersection are summarized below:

	Southbound	Northbound	Total
6:00-7:00 AM	130	120	250
3:30-4:30 PM	145	195	340



Mahukona Lodge
North Kohala, Hawaii

PROJECT SITE PLAN

Figure
1

This highway displays a characteristic of many rural highways in the State of Hawaii in that there is no real morning peak hour. Traffic generally rises to one daily peak in the afternoon. The morning peak hour was also analyzed since the residential lots are expected to be major traffic generators in the morning and afternoon peak periods.

TRAFFIC FORECASTS

The traffic which would be generated by the proposed project was added to the ambient traffic forecasts to obtain the total traffic forecasts. Traffic forecasts were developed for the years 1995, 2000, 2005, 2010, and 2015. It should be noted that traffic impact studies for specific projects are generally intended to be short-term in nature, particularly in the absence of a long range plan forecast on which to base ambient traffic forecasts. For this reason, the traffic forecasts beyond a 10 year time frame (year 2000 and beyond) should be considered tentative.

There are no official long-range traffic forecasts on which to base the ambient traffic forecasts for this study. The Ritz-Carlton Traffic Impact Report Study (1987) prepared by Belt Collins and Associates developed 1993 and 1998 PM peak hour forecasts at the intersection of Kawaihae Road (which becomes the Akoni Pule Highway) and the Queen Kaahumanu Highway (See Appendix 'C'). However, the derived growth rates are very high since these forecasts primarily reflect the impact of the agricultural subdivisions being developed between Mahukona and Kawaihae. It is doubtful that ambient traffic volumes fronting the traffic site will increase to the forecasted levels since the traffic increases would be primarily in the Kawaihae area.

In lieu of any traffic forecasts, a four percent annual growth rate was assumed for the through traffic. When applied to the above-mentioned 1988 SDOT traffic volumes, the resultant ambient traffic volumes are shown on Table 1. In all traffic is expected to increase more than twofold from 1988 to 2015.

The traditional procedure of trip generation, distribution and assignment was used to estimate the number of vehicle trips which would be generated by the proposed project in the AM and PM peak hours, the distribution of these trips, and the specific turning movements affected.

TABLE 1

AMBIENT TRAFFIC FORECAST

YEAR	GROWTH FACTOR	AM PEAK SB	AM PEAK NB	PM PEAK SB	PM PEAK NB
1988	1.00	130	120	145	195
1990	1.08	140	130	155	210
1995	1.28	165	155	185	250
2000	1.48	190	180	215	290
2005	1.68	220	200	245	320
2010	1.88	245	225	275	365
2015	2.08	270	250	300	405

SB = South Bound
NB = North Bound

Trip generation rates for single-family dwelling units (AM: 0.20 in, 0.55 out; PM: 0.63 in, 0.37 out) from the ITE Trip Generation Handbook (Fourth Edition, 1987) were used for the residential lots. It should be noted that the rates used for the residential lots represent national averages for single family homes in typically suburban areas. Based on observations at other Hawaii island resorts, the trip generation rates for resort residential units are thought to be lower that typical suburban residential units. Therefore, the trip generation for the proposed residential units is probably overstated.

The trip generation rates for occupied hotel rooms (AM: 0.36 in, 0.06 out; PM: 0.31 in, 0.45 out) from the County Planning Commission accepted Ritz-Carlton Traffic Impact Study were utilized. The 224 hotel units were factored by the previously described average occupancy rates to obtain the number of occupied rooms for each forecast year.

The following mathematical model was developed with data from Oahu golf courses and used to forecast hourly vehicle trips from the proposed golf course based on average hourly rounds played:

$$\text{Hourly trips} = \frac{2 \times (\text{rounds})}{1.8} \div 30$$

where, 2 accounts for in and out movements for each golfer, 1.8 is the average auto occupancy, and 30 is an adjustment factor. The projected daily rounds were divided by eight to obtain an hourly rate. Eighty percent of the AM peak trips were assumed to be inbound and 80 percent of the PM peak trips were assumed to be outbound.

The park and harbor were expected to have negligible trips generated during the weekday peak periods. The results of the trip generation analysis are shown on Table 2.

The trip distribution assumptions are summarized below.

For the residential lots, 70% of their trips were to/from south (Kawaihae) and 30% were to/from north (Hawi), since most employment opportunities are along the South Kohala coast. An equal 50%/50% distribution between the north and south was assumed for the hotel trips, since most trips during the peak periods are expected to be employee trips. The golf trips external to the project were entirely to/from the south of the project site. The primary market is expected to be the resorts along the Kohala Coast. The amount of players from north of the project is expected to be negligible.

The trip distribution step also included the impact of internal trips within the resort, primarily residential and hotel trips to/from the golf course. Visitors to the park and tennis facilities are assumed to be negligible. It was assumed that half the outbound AM trips and half the inbound PM trips would be diverted to the golf course from the residences and hotel and would not travel outside of the resort. The results of the trip distribution analysis are shown on Table 3. The results of assigning these volumes to the specific turning movements at the access road intersection are shown on Figure 2.

The ambient through traffic forecast volumes (Table 1) were added to the project generated forecast volumes (Figure 2) to obtain the total forecast volumes shown on Figure 3.

TABLE 2

TRIP GENERATION ANALYSIS

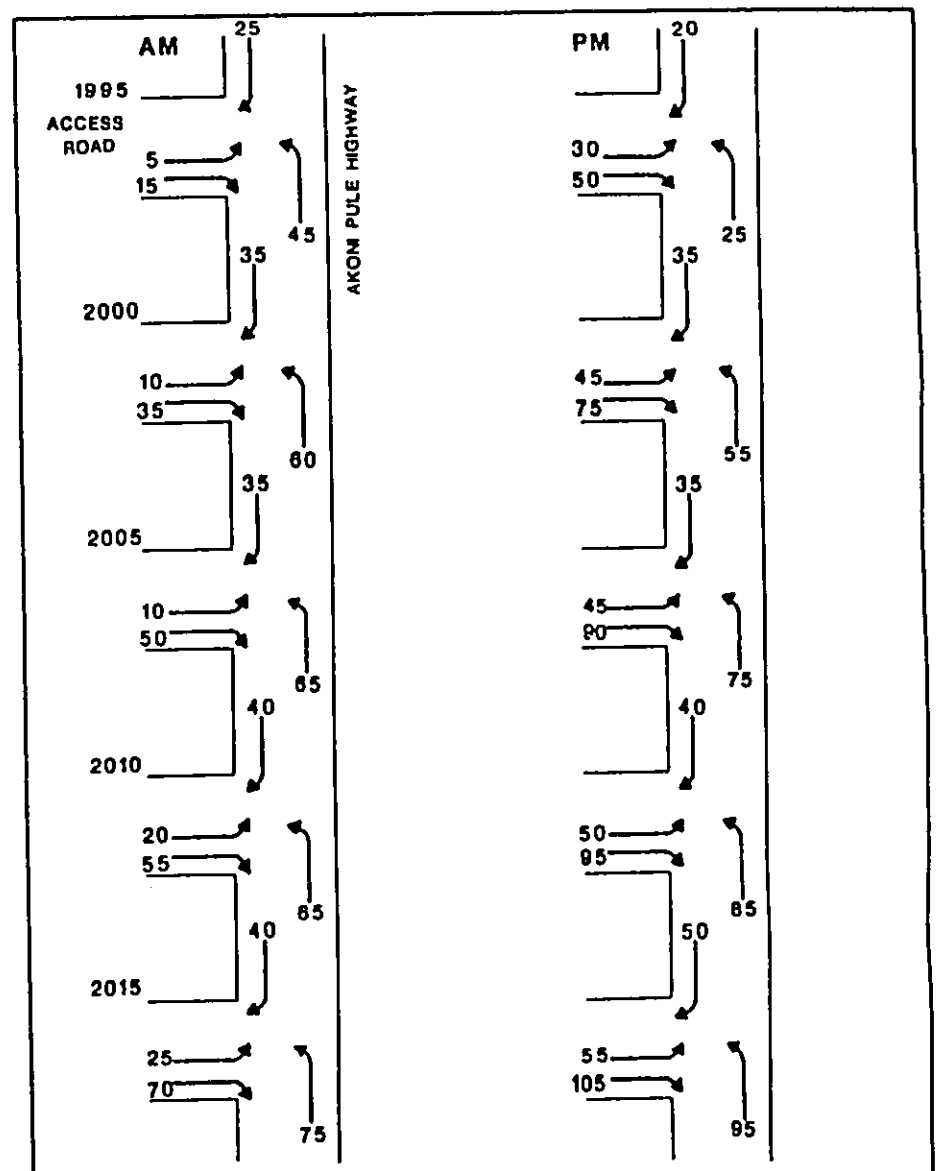
YEAR	OCCUPIED HOTEL UNITS OCC. RATES	# UNITS	AM PEAK IN	AM PEAK OUT	PM PEAK IN	PM PEAK OUT
1995	55%	135	50	10	40	60
2000+	70%	170	60	10	50	75
# OF RESIDENTIAL UNITS						
1995		14	5	10	10	5
2000		71	15	40	45	25
2005		112	20	60	70	40
2010		135	25	75	85	50
2015		170	35	95	105	65
GOLF COURSE (# OF ROUNDS)/DAY						
1995	80		30	10	10	30
2000	120		35	10	10	35
2005+	140		40	10	10	40

TABLE 3

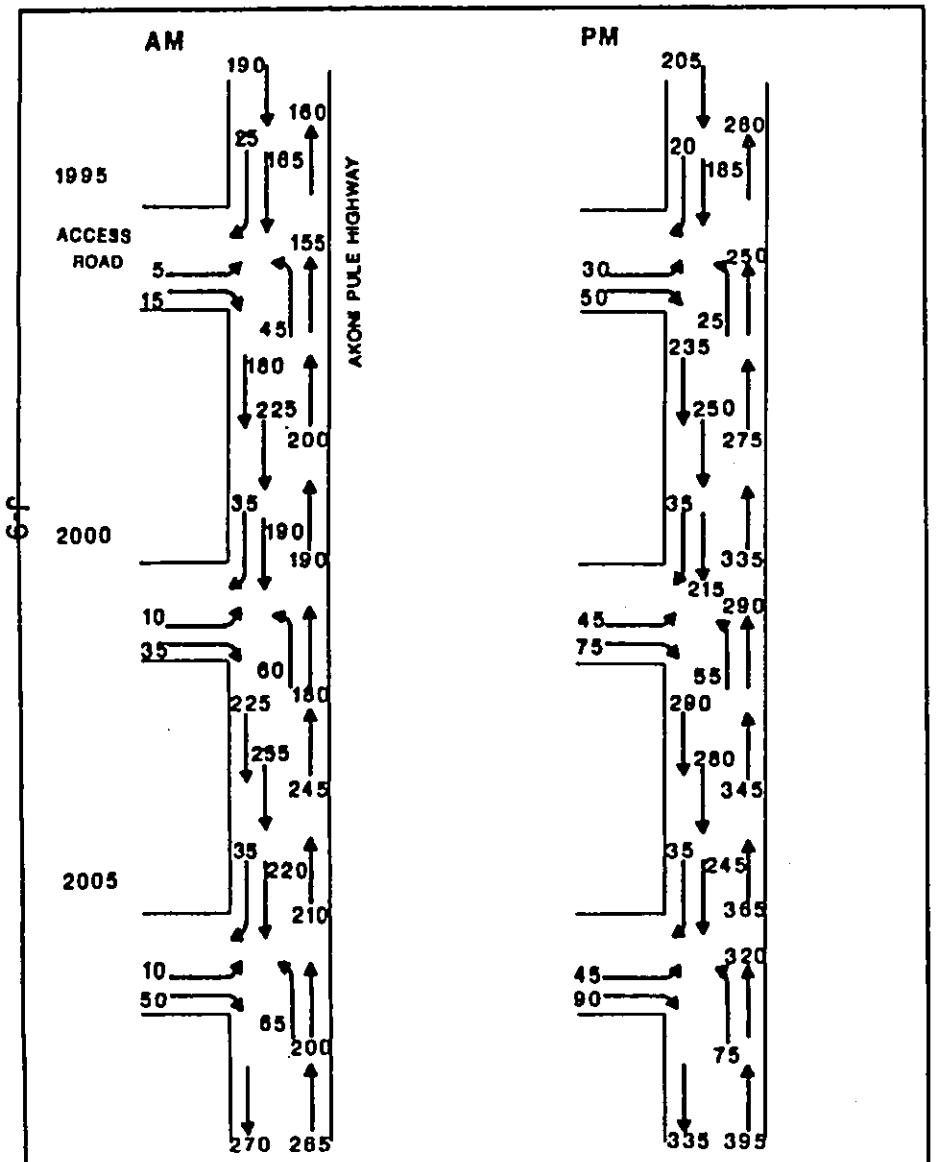
TRIP DISTRIBUTION ANALYSIS

	AM PEAK IN	N	S	AM PEAK OUT	N	S	PM PEAK IN	N	S	PM PEAK OUT	N	S
1995												
Hotel	50	25	25	10	5	5	40	20	20	60	30	30
Res	5		5	10	5	5	10	5	5	5		5
	55	25	30	20	10	10	50	25	25	65	30	35
Less int golf				-15	-5	-10	-15	-5	-10			
	55	25	30	5	5	0	35	20	15	65	30	35
Plus ext golf	15	0	15	10		10	10		10	15		15
	70	25	45	15	5	10	45	20	25	80	30	50
2000												
Hotel	60	30	30	10	5	5	50	25	25	75	35	40
Res	15	5	10	40	10	30	45	15	30	25	10	15
	75	35	40	50	15	35	95	40	55	100	45	55
Less int. golf				-15	-5	-10	-15	-5	-10			
				35	10	25	80	35	45			
Plus ext. golf	20		20	10		10	10		10	20		20
	95	35	60	45	10	35	90	35	55	120	45	75
2005												
Hotel	60	30	30	10	5	5	50	25	25	75	35	40
Res	20	5	15	60	15	45	70	20	50	40	10	30
	80	35	45	70	20	50	120	45	75	115	45	70
Less int. golf				-20	-10	-10	-20	-10	-10			
				50	10	40	100	35	65			
Plus ext. golf	20		20	10		10	10		10	20		20
	100	35	65	60	10	50	110	35	75	135	45	90

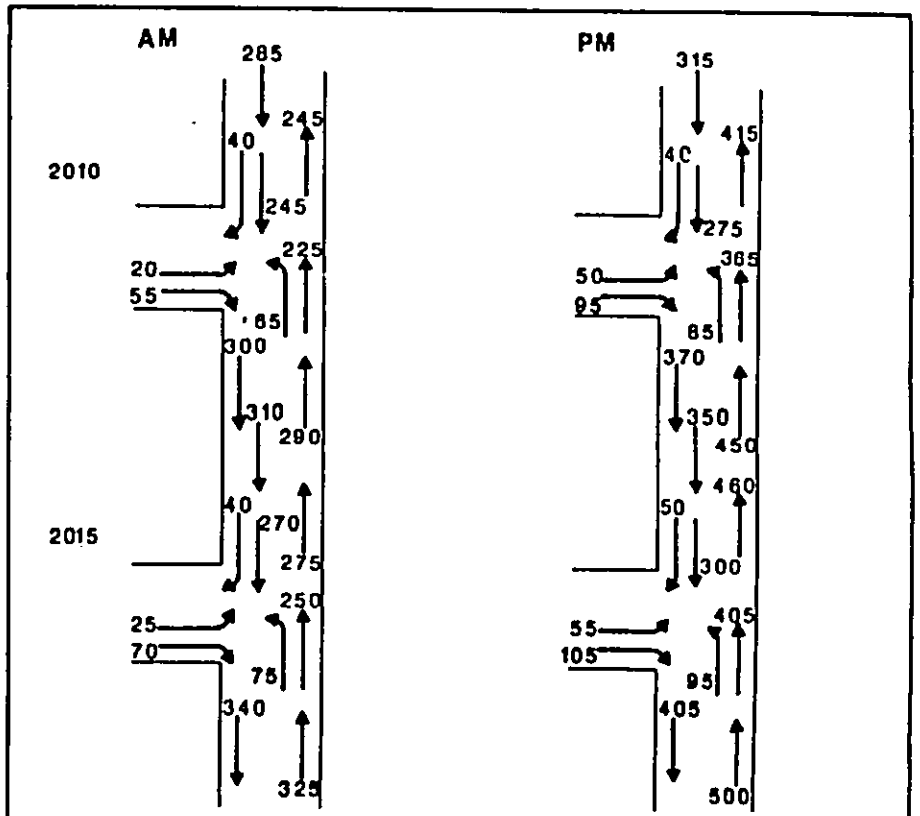
2010													
	Hotel	60	30	30	10	5	5	50	25	25	75	35	40
	Res	25	10	15	75	25	50	85	25	60	50	15	35
		85	40	45	85	30	55	135	50	85	125	50	75
Less int. golf					-20	-10	-10	-20	-10	-10			
					65	20	45	115	40	75			
Plus ext. golf		20		20	10		10	10		10	20		20
		105	40	65	75	20	55	125	40	85	145	50	95
2015													
	Hotel	60	30	30	10	5	5	50	25	25	75	35	40
	Res	35	10	25	95	30	65	105	35	20	65	20	45
		95	40	55	105	35	70	155	60	95	140	55	85
Less int. golf					-20	-10	-10	-20	-10	-10			
					85	25	60	135	50	85			
Plus ext. golf		20		20	10		10	10		10	20		20
		115	40	75	95	25	70	145	50	95	160	55	105



Mahukona Lodge North Kohala, Hawaii	PROJECT GENERATED TRAFFIC FORECASTS	Figure 2



Mahukona Lodge North Kohala, Hawaii	TOTAL FORECAST ASSIGNMENTS	Figure 3



Mahukona Lodge North Kohala, Hawaii	TOTAL FORECAST ASSIGNMENTS	Figure 3

TRAFFIC IMPACT ANALYSIS

Procedures from the TRB Highway Capacity Manual (1985) were used with the forecast peak hour volumes to determine the traffic impacts of the proposed project. Methodologies for analyzing two lane highways and unsignalized intersections were used to estimate levels of service (LOS) as indicators of relative traffic impact.

The methodology for analyzing two lane highways yields levels of service based on the density of traffic on the roadway. The different levels of service are described in the Appendix B. Comparison of results shown on Table 4 for the ambient and total (with project) forecast highway volumes are indicative of the relative traffic impact of the proposed project.

The levels of service with the total forecast do decrease from that of the ambient forecasts for several years in the AM peak and PM peak. For the AM peak in the year 2005, level of service decreases from LOS B to LOS C, which is still a desirable condition. For the PM peak in the years 2010 and 2015, level of service decreases from LOS C to LOS D, which is an acceptable but less desirable condition. Therefore, the proposed project is expected to have only a minor adverse impact on highway operations, particularly in the PM peak.

The methodology for analyzing unsignalized intersections yields levels of service for critical turning movements at the intersection. The description of the methodology and different levels of service are in the Appendix. Only the total (with project) forecasts were analyzed since the subject intersection would not exist under ambient conditions.

The results shown on Table 5 indicate that the left turn movement from the access road is the only pertinent movement, the other two movements are at LOS A for all forecast years. The left turn movement is at acceptable levels of service for each analysis year, although the 2010 and 2015 PM peak are at LOS D. LOS D is considered an acceptable but less desirable condition. Again, this shows that the proposed project will not have an adverse traffic impact on the roadway system.

TABLE 4

HIGHWAY ANALYSIS

LEVEL OF SERVICE SUMMARY

	AMBIENT FORECAST		TOTAL FORCAST	
YEAR	AM	PM	AM	PM
1988	A	B	NA	NA
1995	A	B	B	C
2000	B	C	B	C
2005	B	C	C	C
2010	C	C	C	D
2015	C	C	C	D

TABLE 5

TOTAL FORECAST

UNSIGNALIZED INTERSECTION ANALYSIS

LEVEL OF SERVICE SUMMARY

YEAR	MOVEMENT	AM	PM
1995	1. Left Turn from Access Road	A	B
	2. Right Turn from Access Road	A	A
	3. Left Turn into Access Road	A	A
2000	1. Left Turn from Access Road	A	C
	2. Right Turn from Access Road	A	A
	3. Left Turn from Access Road	A	A
2005	1. Left Turn from Access Road	B	C
	2. Right Turn from Access Road	A	A
	3. Left Turn fro Access Road	A	A
2010	1. Left Turn from Access Road	B	D
	2. Right Turn from Access Road	A	A
	3. Left Turn from Access Road	A	A
2015	1. Left Turn from Access Road	C	D
	2. Right Turn from Access Road	A	A
	3. Left Turn from Access Road	A	A

CONCLUSIONS

The results of this study indicate that the proposed project will have a minor traffic impact on the operation of Akoni Pule Highway. The highway will continue to operate at acceptable levels of service and the intersection operations should not have a large negative impact. However, due to the high speeds on the highway, the access intersection should be fully channelized and be provided with a separate left turn lane for safety. Based on the number of left turns forecast, the storage length of the left turn lane should accommodate two cars until 2010, after which storage for three cars will be required.

APPENDIX A

ABSTRACT OF METHODOLOGY
for the
CAPACITY ANALYSIS FOR UNSIGNALIZED INTERSECTIONS

ABSTRACT FOR METHODOLOGY
for the
CAPACITY ANALYSIS OF UNSIGNALIZED INTERSECTIONS

This abstract summarizes the procedures for analyzing the capacities of unsignalized intersections. These procedures are described in the Highway Capacity Manual, Special Report 209 (1985) by the Transportation Research Board. This manual "is a collection of techniques for estimating highway capacity that have been judged, through consensus, as the best available at the time of publication." This manual does not set legal standards for highway design but the procedures have become widely accepted and used in the traffic engineering profession.

The capacity analysis procedure is based on a German method originally published in 1972 and translated in 1974, and modified for U. S. conditions by the TRB. It is intended for two-way STOP- and YIELD-controlled intersections and calculates the capacities of movements which cross or turn through the major traffic stream. The capacity of each movement is based on two factors: the gap distribution in conflicting traffic streams and the gap acceptance behavior of drivers at such intersections.

The basic steps in methodology are as follows:

1) Define intersection geometry and traffic volumes.

2) Determine the "conflicting conflicts" through which every minor street movement and major street left turn must cross.

3) Determine the size of the gap in the conflicting stream needed by vehicles in each movement crossing a conflicting traffic stream.

4) Determine the capacity of the gaps in the major traffic stream to accommodate each of the subject movements that will utilize these gaps.

5) Adjust the capacities to account for impedance and the use of shared lanes.

Tables and charts, as well as computer programs, have been developed to facilitate using this methodology.

INTERSECTION DATA

Key geometric factors include: number and use of lanes, channelization, percent grade, curb radii and approach angle, and sight distances. One hour volumes are specified by movement and converted to passenger cars per hour using the passenger car equivalents in TABLE 10-1.

CONFLICTING TRAFFIC

The conflicting movements each turning movement faces is summarized on Figure 10-2. The right turn movement from the minor street faces the least number of conflicting movements, the left turn movement from the minor street the most. Adjustments to the conflicting traffic volumes are shown on Figure 10-2.

CRITICAL GAP SIZE

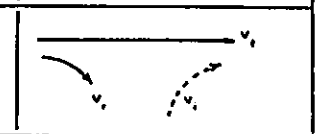
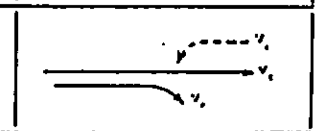
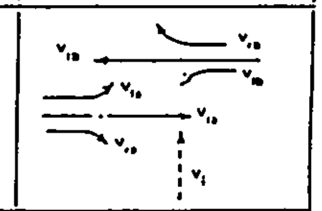
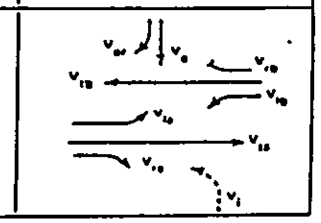
"The 'critical gap' is defined as the median time headway between two successive vehicles in the major traffic stream that is accepted by drivers in a subject movement that must cross and/or emerge with the major street traffic." It is dependent upon a number of factors, including:

2.

TABLE 10-1. PASSENGER-CAR EQUIVALENTS FOR UNSIGNALIZED INTERSECTIONS

TYPE OF VEHICLE	GRADE (%)				
	−4%	−2%	0%	+2%	+4%
Motorcycles	0.3	0.4	0.5	0.6	0.7
Passenger Cars	0.8	0.9	1.0	1.2	1.4
SU/RV's*	1.0	1.2	1.5	2.0	3.0
Combination Veh.	1.2	1.5	2.0	3.0	6.0
All Vehicles*	0.9	1.0	1.1	1.4	1.7

* [illegible]
* [illegible]

Subject Movement	Conflicting Traffic, V_{ci}	Illustration
1. RIGHT TURN from minor street.	$1/2 V_r$** + V_t*	
2. LEFT TURN from major street.	V_r*** + V_t	
3. THROUGH MVT from minor street.	$1/2 (V_r)$*** + V_t + V_l + V_r + V_t + V_l	
4. LEFT TURN from minor street.	$1/2 (V_r)$*** + V_t + V_l + V_r*** + V_t + V_l + V_t + V_r	

* V_t includes only the volume in the right hand lane.
** Where a right turn lane is provided on major street, eliminate V_r or V_r.
*** Where the right-turn radius into minor street is large and/or where these movements are STOP/YIELD controlled, eliminate V_r (Case 3), and V_r and/or V_r (Case 4). V_r may also be eliminated on multilane major streets

Figure 10-2. Definition and computation of conflicting traffic volumes

3.

1) The type of maneuver being executed.

2) STOP or YIELD sign control.

3) The average running speed on the major street.

4) The number of lanes on the major street.

5) The geometrics and environmental conditions at the intersection.

The value of the critical gap is selected from Table 10-2. The basic critical gap is selected and adjustments and modifications made.

POTENTIAL CAPACITY FOR MOVEMENT

"The potential capacity is defined as the 'ideal' capacity for a specific movement," and is selected from Figure 10-3. It is based on the conflicting traffic volume and the critical gap. The result is read in passenger cars per hour.

IMPEDANCE EFFECTS

The methodology assumes that vehicles use gaps at an unsignalized intersection in a prioritized manner. Thus, when traffic becomes congested in a high-priority movement, it can reduce the potential capacity of lower priority traffic movements. Given the priority of gap usage:

1) Left turn from the major street impede both through movements and left turns from the minor street.

2) Through movements from the minor streets impede left turns from the minor street.

The impact of impedance is addressed by multiplying the potential capacity of a movement by a series of impedance

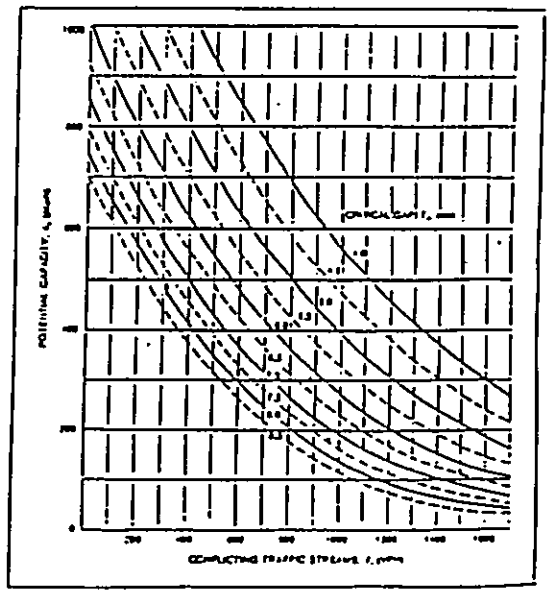
TABLE 10-2. CRITICAL GAP CRITERIA FOR UNSIGNALIZED INTERSECTIONS

BASIC CRITICAL GAP FOR PASSENGER CARS, SEC				
VEHICLE MANEUVER AND TYPE OF CONTROL	AVERAGE RUNNING SPEED, MAJOR ROAD			
	30 MPH		35 MPH	
	NUMBER OF LANES ON MAJOR ROAD			
	2	4	2	4
RT from Minor Road				
STOP	5.5	5.5	6.5	6.5
YIELD	5.0	5.0	5.5	5.5
LT from Minor Road	5.0	5.5	5.5	6.0
Cross Major Road				
STOP	6.0	6.5	7.5	8.0
YIELD	5.5	6.0	6.5	7.0
LT from Minor Road				
STOP	6.5	7.0	8.0	8.5
YIELD	6.0	6.5	7.0	7.5

ADJUSTMENTS AND MODIFICATIONS TO CRITICAL GAP, SEC	
CONDITION	ADJUSTMENT
RT from Minor Street: Curb radius > 50 ft or two lanes < 30'	−1.5
RT from Minor Street: Acceleration lane provided	−1.0
All movements: Population ≥ 250,000	−0.5
Restricted sight distance.*	up to −1.0

*[illegible]

Figure 10-3. Potential capacity based on conflicting traffic volume and critical gap size.



factors for each higher priority impeding movement. Impedance factors are derived using Figure 10-5.

SHARED LANE CAPACITY

The methodology has assumed to this point that each minor street movement has an exclusive lane. In reality, most minor street approaches have two or three movements sharing one lane. An equation is used to compute the capacity of the shared lane.

LEVEL OF SERVICE CRITERIA

The above computations yield a capacity solution for each lane on the minor street approaches and for left turn movements from the major streets. This figure is used to derive the reserve capacity, the difference between the capacity solution and the volume of traffic using the lane. Level of service criteria are stated in general terms for general ranges of reserve capacity and delay, as follows:

Reserve Capacity	Level of Service	Expected Delay
> 400	A	Little or no delay
300-399	B	Short traffic delays
200-299	C	Average traffic delays
100-199	D	Long traffic delays
0- 99	E	Very long traffic delays
a/	F	a/

a/ When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement to the intersection.

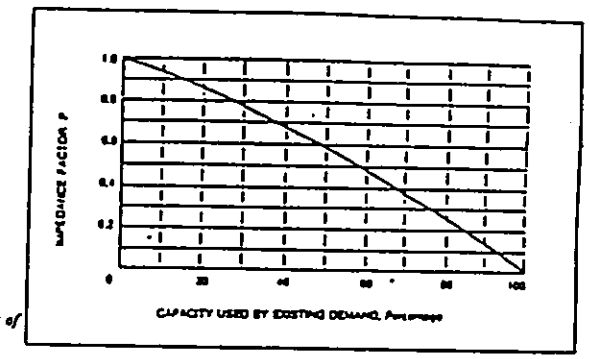


Figure 10-5. Impedance factors as a result of conflicted movements.

A P P E N D I X B

LEVELS OF SERVICE FOR MULTILANE
AND TWO LANE HIGHWAYS

APPENDIX B

LEVELS OF SERVICE FOR MULTILANE AND TWO LANE HIGHWAYS

Level of service A - Free flow conditions where the operations of vehicles are virtually unaffected by the presence of other vehicles and operations are constrained only by geometric features and driver preferences. The maximum density is 12 passenger cars/mile/lane.

Level of service B- Free flow conditions but the presence of other vehicles begins to be noticeable. Average speed diminished from LOS A, and maximum density of 20 passenger cars/mile/lane.

Level of service C- Influence of traffic density on operations becomes marked and the ability to maneuver within the traffic stream, select an operating speed, is affected by other vehicles. Minor disruptions may be expected to cause serious deterioration in service. The maximum density is 30 passenger cars/mile/lane.

Level of service D- Borders on unstable flow, speed and ability to maneuver severely restricted due to traffic congestion. The maximum density is 42 passenger cars/mile/lane.

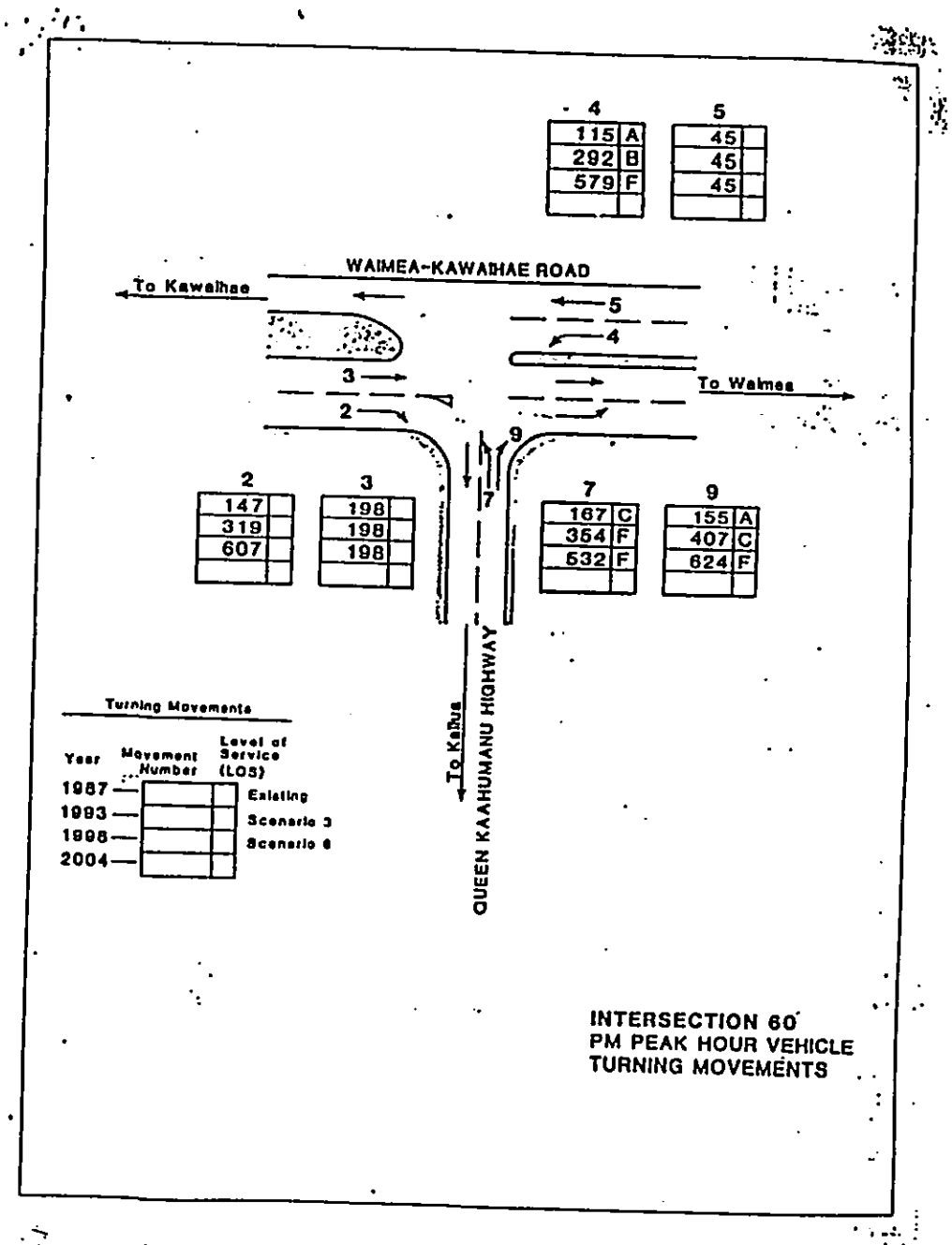
Level of service E- Unstable operations at or near capacity. The minimum spacing at which uniform flow can be maintaqined. The maximum density is 67 passenger cars/mile/lane.

Level of service F- Forced or breakdown flow where vehicles arrive either at a rate greater than that which they are discharged or at a point where demand exceeds capacity. Queues form behind breakdowns and operations within queues are highly unstable. The density exceeds 67 passenger cars/mile/lane.

SOURCE: Transportation Research Board, Highway Capacity Manual, Special Report 209, page 7-6 (1985)

APPENDIX C

TURNING MOVEMENTS AT INTERSETION 60



References:

RITZ-CARLTON TRAFFIC IMPACT
REPORT STUDY
by
Belt, Collins and Associates

Mahukona

Appendix K: *Preliminary Engineering Report*

K-1

PRELIMINARY ENGINEERING REPORT

FOR

MAHUKONA LODGE

NORTH KOHALA, HAWAII

JUNE 21, 1990

M & E Pacific, Inc.
Engineers and Architects
1001 Bishop Street
Suite 500, Pauahi Tower
Honolulu, Hawaii 96813

MAHUKONA LODGE

TABLE OF CONTENTS

MAHUKONA LODGE

TABLE OF CONTENTS
(CON'T)

LIST OF FIGURES

LIST OF TABLES

K-2

PRELIMINARY ENGINEERING REPORT

FOR

MAHUKONA LODGE

NORTH KOHALA, HAWAII

ROADWAY SYSTEM

Existing Conditions

The major roadway serving the proposed Mahukona Lodge and residential lots is the Akoni Pule Highway, a two-lane State Highway, designed for a 55-mile per hour vehicle speed. It is a limited access highway within a right-of-way that varies between 80'and 180' with 12-foot wide lanes constructed of asphaltic concrete pavement and bordered by stabilized shoulders. The estimated daily peak hour count along the Akoni Pule Highway fronting the project site is approximately 335 vehicles (M&E Pacific, Inc., 1989).

Proposed Improvements

The proposed development (See Figure 1) will generate vehicular traffic both internally and on the Akoni Pule Highway. The traffic impact analysis report prepared for the Mahukona Lodge (M&E Pacific, Inc. 1989) indicates the need for a fully channelized intersection to assure that the efficiency, safety, speed, cost of operation, and capacity of the highway is maintained. The intersection improvements will be similar to other developments in the South Kohala area. Typically, these improvements will involve: 1) acceleration and deceleration lanes to and from the southbound lanes of Akoni Pule Highway; 2) separate left turn storage lane for traffic entering the development; and 3) separate left turn merging lane for traffic exiting the development into the northbound lane of the highway (See Figure 2). In addition, appropriate pavement markings and traffic signs will be installed along the highway to provide further guidance to traffic, control the movement of vehicles, reduce the hazard of traffic operation and improve the quality of flow.

The proposed roadway system within the project area will be composed of streets classified into two categories: 1) primary arterial (major), and 2) local (minor). Each class of street requires sufficient right-of-way to contain the elements of pavement, utilities and graded shoulders.(See Figure 3.) The entrance road will be the major roadway and connects into Akoni Pule Highway. The entrance roadway will separate the incoming and outgoing traffic with a landscaped median. The minor roadway will be designated for the lodge, villas and residential areas.

The proposed design speed and design vehicle for major streets will be 35 miles per hour and the WB-50 (tractor and semi-trailer vehicles), respectively. Roadway geometrics, including horizontal and vertical alignment, and sight and stop distance requirements will be designed according to these parameters.

TABLE 3
OFFSITE DRAINAGE RUNOFF

DRAINAGE BASIN	AREA (ACRES)	CULVERT NO.	CULVERT TYPE	100 YEAR RUNOFF (CFS)
1	16	1	30" CMP	18
2	464	2	2-8'-2" x 5'-9" SPA	510
3	1272	3	2-11'-5" x 7' - 3" SPA	1400
4	10	4	24" CMP	12
5	55	5	42" CMP	60
6	35	6 7	24" CMP 6'-1" x 4'-7" SPA	40
7	278	8	24" CMP	300
8	2015	9 10	120" SPA 16'-7" x 10'-1" SPA	2210
9	115	11	54" CMP	130
TOTAL	4260			4680

*CMP - Corrugated Metal Pipe
*SPA - Sectional Plate Arch

SOLID WASTE

The present 13-acre Kealakehe Landfill, which is operated by the County of Hawaii to service West Hawaii (North and South Kona and North and South Kohala), and should reach its capacity in late 1991. A new 177 acre Sanitary Landfill is proposed for a site which lies in the Puu Waawaa District and close to the boundary of Puu Anahulu in North Kona, Tax Map Key 7-1-02:01 (See Figure 7)

The Environmental Impact Statement for the new West Hawaii Sanitary Landfill has been submitted and accepted on August 4, 1989 and plans are currently underway to have the new Landfill in operation by August, 1991.

The estimated population for the proposed Mahukona Lodge and residential lots is 5,021, as shown on Table 2, Projected Wastewater Flows. The solid waste generation rates is estimated at approximately 6 pounds per capita per day (lbs/cd) and would result in 15 ton/day (T/d) of solid waste for the development. The new landfill will be able to accommodate initial solid waste volumes of 46,300 tons per year and more as the population in the area increases. The projected rates of solid waste generated by the development would equal approximately 12 percent of projected solid waste volumes for the district. The solid waste generated by the Mahukona Resort will not have an impact on the landfill.

ELECTRICAL SERVICE

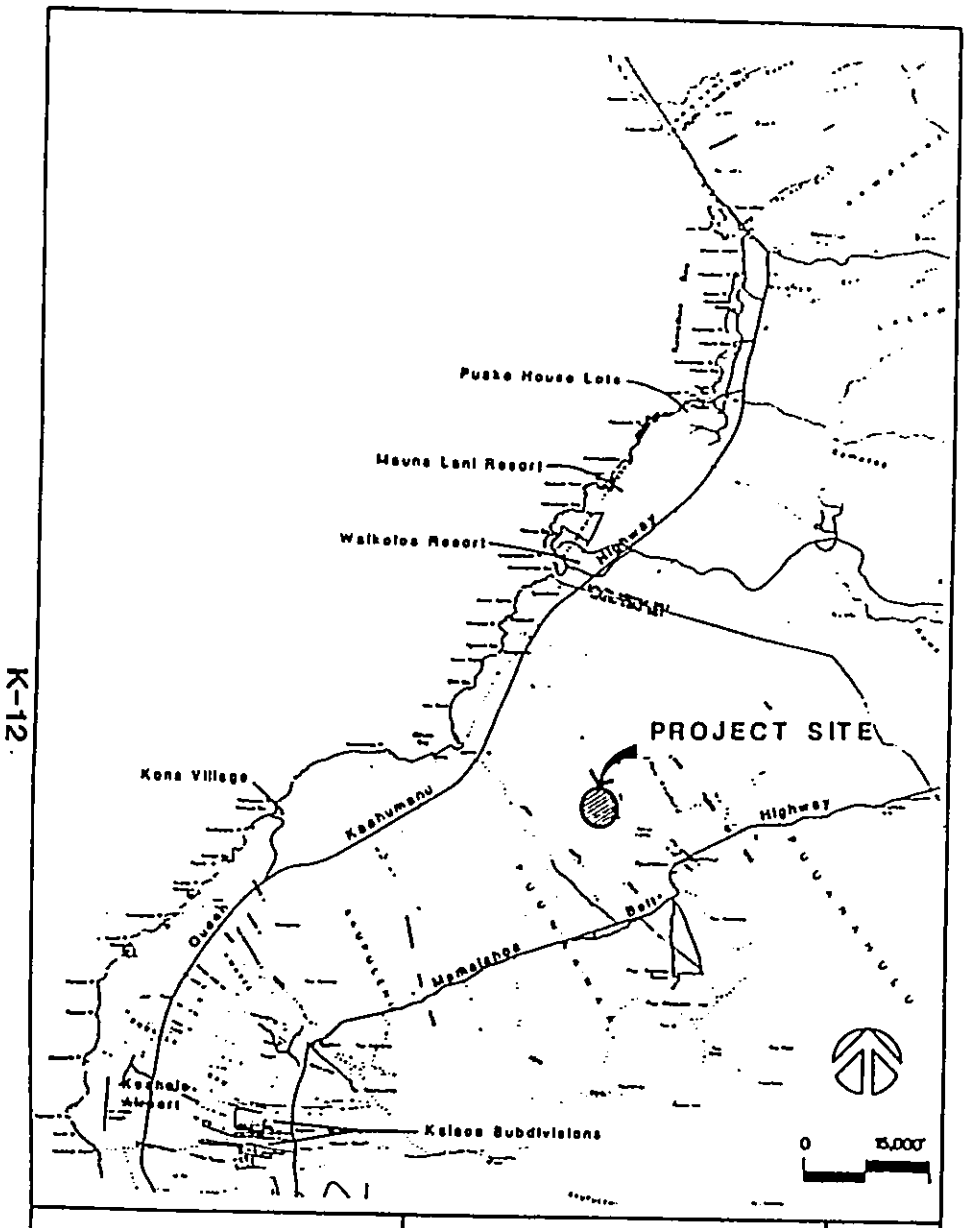
The electrical requirement for the development will be approximately 1.3 MW (See Table 4). The new 69 kV electrical service to the resort, consisting of three overhead lines, will be provided by the Hawaii Electric Light Company (HELCO). The lines will be installed along the mauka side of the Akoni Pule Highway, from the Kohala Ranch substation to the proposed substation located within the subdivision.

The substation location will consist of a transformer and switchgears which will be required to handle the ultimate demands of the resort. The plans for the substation will be developed by HELCO. On-site installation will include, distribution cables and underground ducts.

COMMUNICATIONS

Presently, the area is not serviced by telephone or cable television. Telephone service to the resort will be provided by the Hawaiian Telephone Company. Once the lines have been brought into the area, they will be fed into the on-site underground duct system for the subdivision. The planned site of entry is the electrical substation. The cost of extending the present system will be paid for by the Hawaiian Telephone Company.

Sun Cablevision provides cable television service in the Kona-Kailua Region. New cables will have to be routed along Akoni Pule Highway. Television cables will be installed in the electrical and telephone duct system. Sun cablevision will provide the new cables.



K-12

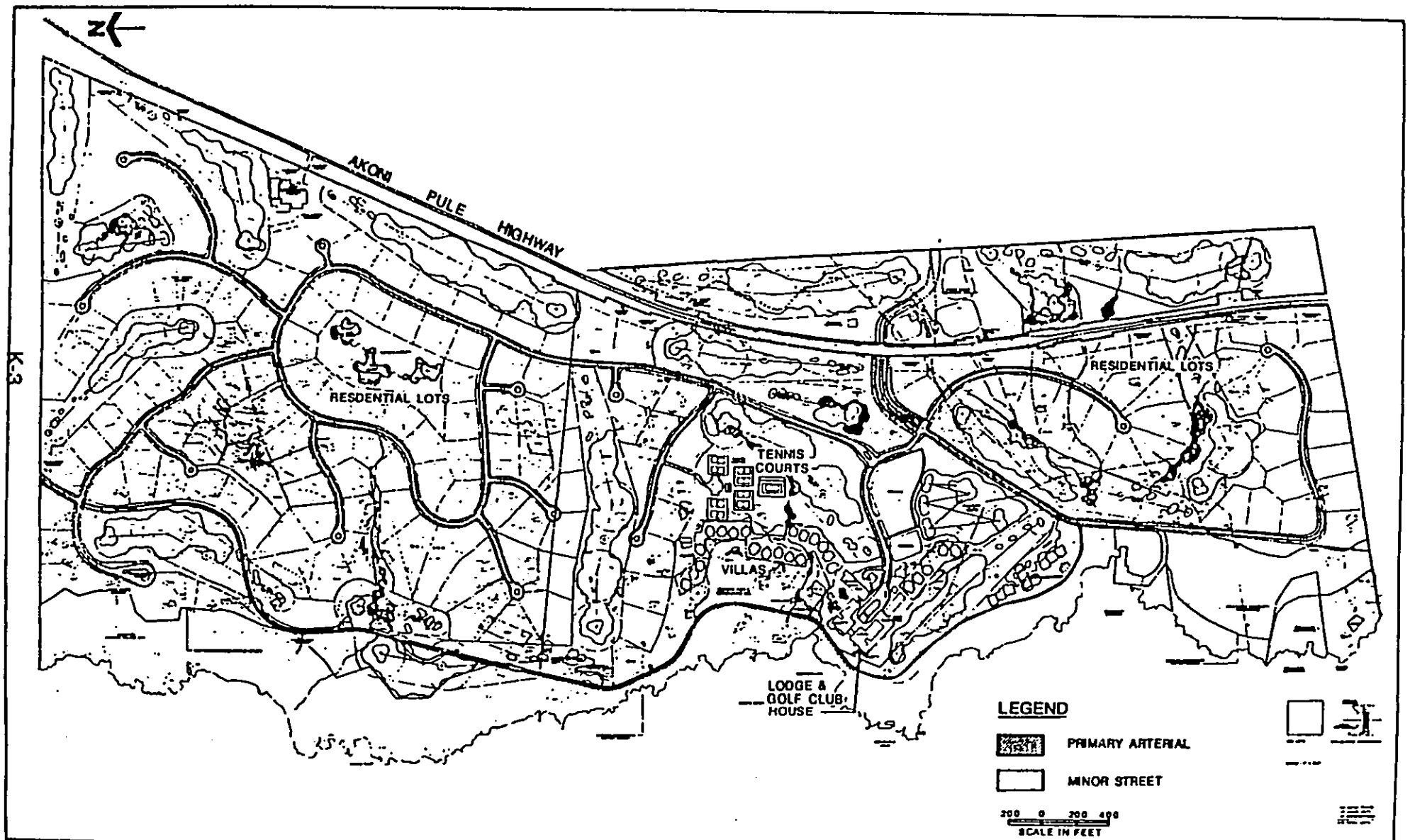
Mahukona Lodge North Kohala, Hawaii	PROPOSED SANITARY LANDFILL SITE	Figure 7

TABLE 4
PROJECTED ELECTRICAL LOADS

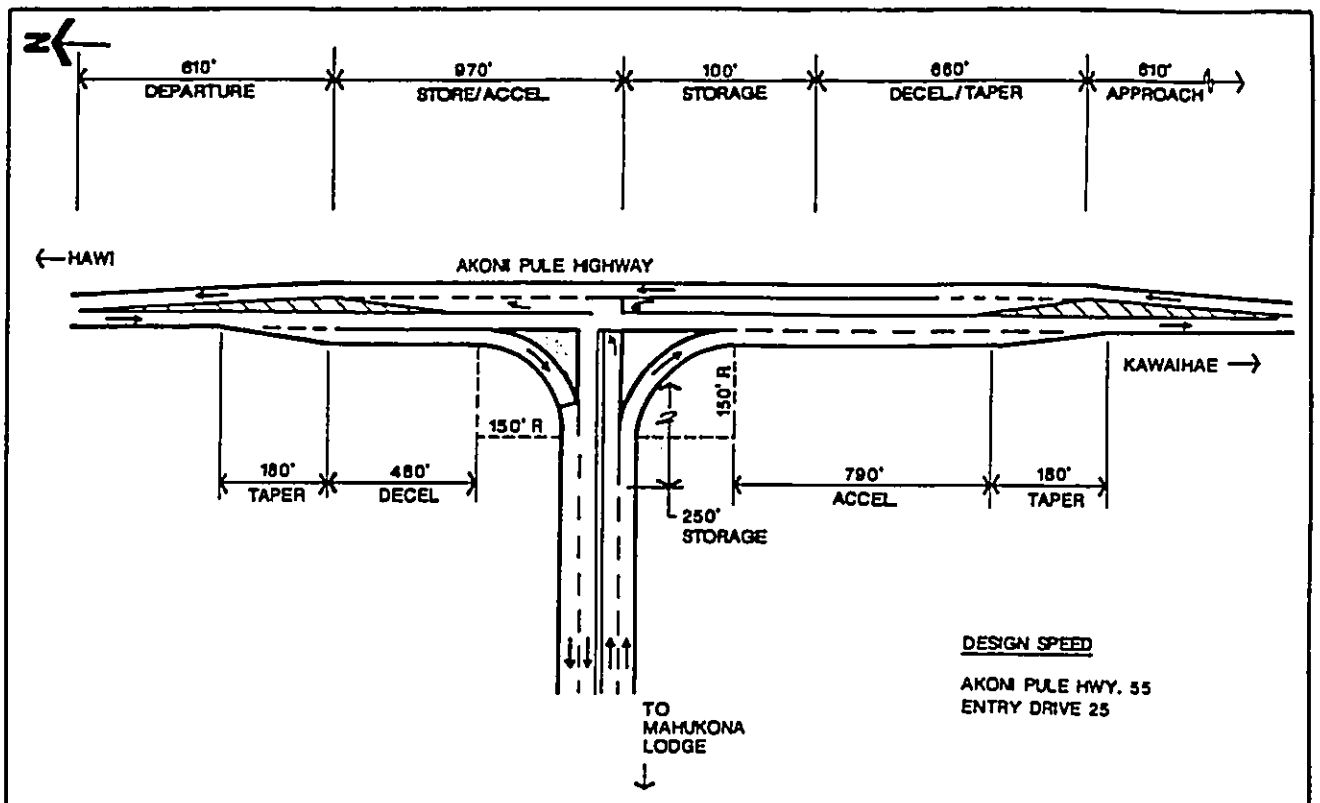
			KVA DIVERSIFIED DEMAND (KVA)
1.	LODGE		
	A. 20 Units P= 20 x 3.5 KVA/Unit	=	70
	B. Restaurant & Bar (9,200 Sq. Ft.) 9200 x 4.8 KVA	=	45
2.	GOLF CLUBHOUSE & RESTAURANT		
	A. Restaurant & Bar 3280 x 4.8	=	16
3.	VILLAS		
	A. 240 Units x 3.5	=	840
4.	STREET LIGHTING (100W HPS)		
	A. 140 x 0.125	=	17.5
5.	WASTEWATER TREATMENT PLANT		
	A. 1800 Sq. Ft. x 7.5 w/Sq. Ft. (Legs & Plugs)	=	15
	B Treatment Plant	=	300
	TOTAL =		1303.5

* KVA - Kilovolt Ampere

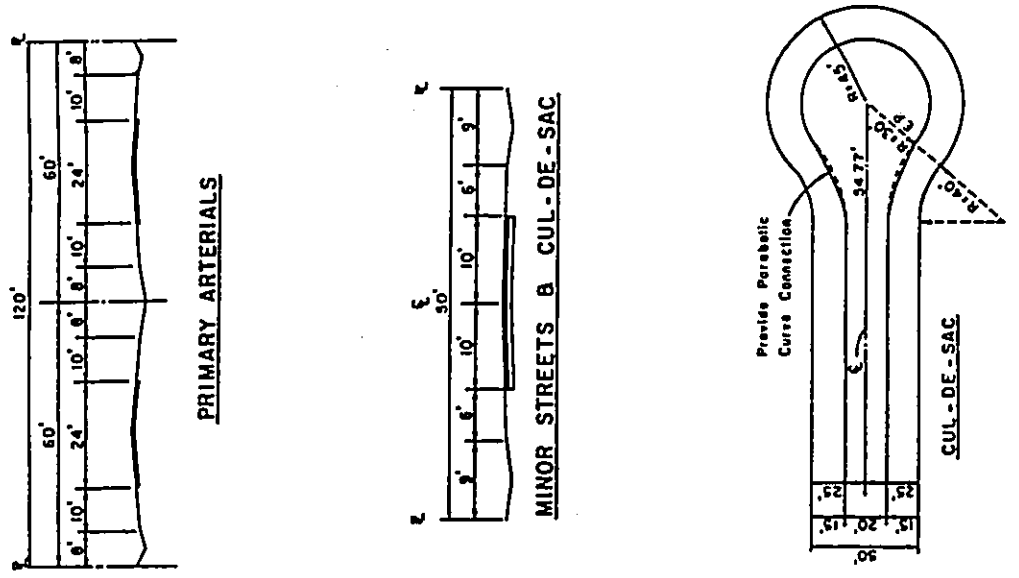
** HPS - High Pressure Sodium



Mahukona Lodge North Kohala, Hawaii	PROJECT SITE PLAN	Figure 1



Mahukona Lodge North Kohala, Hawaii	AKONI PULE INTERSECTION IMPROVEMENTS	Figure 2



Mahukona Lodge North Kohala, Hawaii	TYPICAL ROADWAY SECTIONS	Figure 3

K-5

WATER SYSTEM

Domestic Potable Water

Domestic water comes from one of two sources in North Kohala, perched aquifers or basal wells. The following five major areas are served by the Department of Water Supply:

- Kaauhuhu
- Hawi-Kokoiki
- Kynnersley-Kapaau
- Halaula
- Makapala-Keokea

The Proposed project will be served from the Hawi-Kokoiki system. The Hawi-Kokoiki area gets its water from the Watt tunnel and the Hawi Well, which are capable of supplying 751,000 gallons per day of potable water. The present water demand within this service district is 125,000 gallons per day.

The average daily and maximum daily potable water demands for the resort are estimated at approximately 235,000 gallons per day and 352,000 gallons per day, respectively as presented in Table 1. These water demands are based on consumption guidelines recommended in the Water System Standards by the Department of Water Supply, County of Hawaii.

Irrigation Water

In 1906, the Kohala Ditch tapped several mountain streams, diverting millions of gallons of water each day into the combination ditch, tunnel and pipe system which runs approximately 22.5-miles. The Kohala Ditch has been the primary source of irrigation water in the district. It is capable of delivering approximately an average daily flow of 26.7 million gallons of water.

Although the Kohala Ditch system is considered adequate for the agricultural demands of the North Kohala area, the delivery system from the ditch to the user is deteriorating and in need of repair. A report on the condition of the Ditch, delivery system, and existing demands on the system is being finalized.

The proposal is to use the Kohala Ditch water to dilute and supplement the treated sewage effluent from the project thereby conserving the potable water. The irrigation system will be a dual water system comprised of a potable and non-potable piping system. The treated effluent will be used strictly for the irrigation of the golf course and not in close proximity to occupied areas.

The average daily irrigation demands for the Lodge and two offsite properties (Mahukona and Kapaa Park) are estimated at 2.7 million gallons per day as presented in Table 1. Approximately 8 Acre-Feet of storage volume is required to handle the daily irrigation needs of the resort. These storage ponds will be incorporated as part of the golf course water hazards.

TABLE 1

PROJECTED WATER DEMANDS

DOMESTIC DEMANDS

Description	Units	Gallons per Day per Unit	Estimate Demand
Lodge	15 Ac.	4,000	60,000
Villas	240 rooms	400	96,000
Employees	341 staff	35	12,000
Residential lots	150 lots	400	60,000
Mahukona Park			
o Camp Sites	13 sites	400	5,200
o Caretaker	1 house	400	400
Kapaa Park			1,000
Total Average Daily Flow			234,600
Maximum Daily Demand (1.5 x Average Flow)			351,900
Peak Hour Flow (5 x Average Flow)			1,173,000

IRRIGATION DEMANDS

Description	Units	Gallons per Day per Unit	Estimated Demand
Golf Course	120 acres	10,000	1,200,000
Mahukona Park	15 acres	4,000	60,000
Kapaa Park	2 acres	4,000	8,000
Residential Lots	150 lots	10,000	1,500,000
Total Average Daily Flow			2,768,000

Proposed Water Transmission Lines and Storage Reservoirs

Potable water demands of the Lodge will be met by constructing approximately 16,000 L.F. of 6" and 8" water line to the proposed Kapaa Reservoir located in a portion of State of Hawaii lands situated at Kapaa, North Kohala, TMK: (3) 5-6-01:35 (Portion). Chalon will acquire the agreements from the State of Hawaii for the reservoir site. Should negotiations with the State of Hawaii not be successful, Chalon will develop the reservoir site on their own landholding. The development will utilize water supplied by the DWS system located near Hawi. The 500,000 gallon concrete reservoir will be dedicated to the DWS upon completion of construction.

The 500,000 gallon reservoir was sized based on the Maximum Daily Consumption for the resort in accordance with the Water System Standards by the Department of Water Supply, County of Hawaii. The 500,000 gallon reservoir is adequate for the fire protection requirements of the project. The fire flow requirement is a 2,000 gpm flow for a duration of 2 hours.

Development of all new water sources and distribution facilities will be subject to all applicable terms and conditions of Potable Water Systems, Title 11, Chapter 20, Administrative Rules, Department of Health, State of Hawaii and regulations of the Department of Water, County of Hawaii.

Potential Impacts

Water limitations in the region are a problem of development and transmission rather than source availability. Over pumping or inadequate well spacing may result in upconing and seawater intrusion. Operation of wells within the sustainable yield of the basal lens and adequate well spacing will prevent potential adverse impacts.

WASTEWATER SYSTEM

Recommended Treatment System

The average daily wastewater flows expected to be generated by the project is estimated at 205,000 gallons per day as summarized in Table 2. The wastewater flows are based on the Design Standards of the Division of Wastewater Management, Department of Public Works, City and County of Honolulu, as adopted by the County of Hawaii, Division of Wastewater Management. Development of the wastewater system and facilities will be subject to all applicable terms and conditions of Wastewater Systems, Title 11, Chapter 62, Administrative Rules, Department of Health, State of Hawaii.

Wastewater from the development will be collected and pumped to an on-site treatment facility. The wastewater will be screened and biologically treated. The effluent will then be filtered and disinfected, and utilized as an irrigation source for the golf course. Precise sewer and force main alignments outside of the main roadway system have not been determined at a this time. These corridor alignments will be coordinated with the archaeological consultant to prevent potential adverse impacts to historic sites.

The proposed waste stabilization pond treatment system will consist of a series of ponds: two aerated ponds that are approximately one (1) acre each in size; "polishing ponds" and storage ponds (see Figure 4). The stabilization ponds will be sized for storage of the sludge. The ponds will be aerated by a submerged diffused air system. This will result in biological treatment by stabilization of organic matter in the wastewater. The wastewater will receive additional treatment in aerated

"polishing ponds," which will be located within a portion of the golf course, subject to the rules and regulations of the Department of Health. Aquatic plants in the "polishing ponds" will reduce algae by blocking out sunlight and assist in the removal of excess nutrients in the effluent. From time-to-time, the aquatic plants will need to be harvested.

The effluent from the treatment process will be disinfected and stored in ponds located within the golf course. The approximate minimum required area for the storage ponds is 0.5 acres. The effluent stored in ponds will be used for golf course irrigation, subject to the rules and regulations of the Department of Health.

Potential human contact with aerosols from effluent irrigation could be minimized by buffer zones, trees, shrubs, use of low trajectory sprinklers, nighttime irrigation and perhaps avoiding irrigation during windy periods.

Provisions will be included in the design of the wastewater facility to minimize adverse effects to the surrounding environment that may result from power failure and maintenance shutdown. A standby power generating unit will be installed and, in general, redundancy will be built into the wastewater facility.

Alternative Treatment System

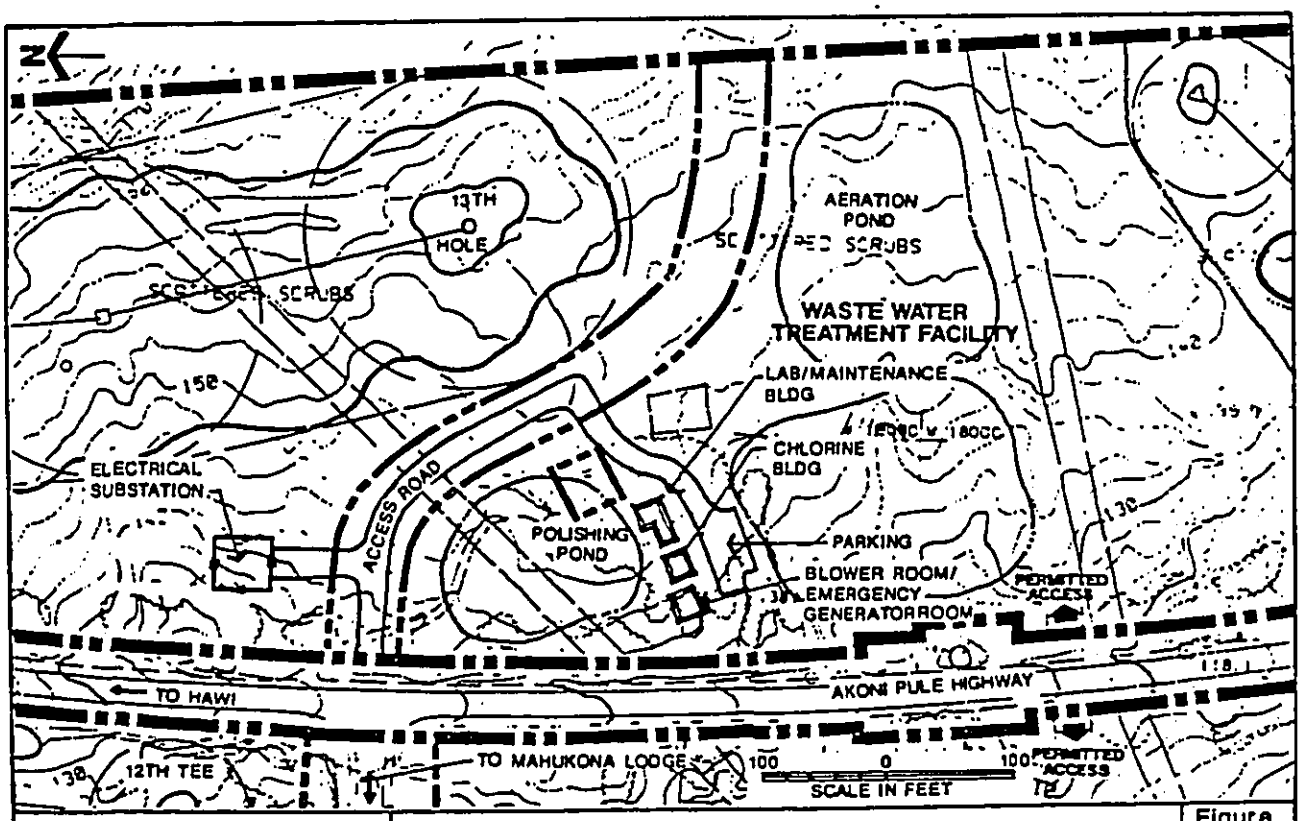
A mechanical treatment system such as Sequencing Batch Reactor (SBR) system could be used. The approximate area required for this system is 1.6 acres. The SBR system is a fill and draw activated sludge system in which one or more reaction basins are filled and processed in a batch treatment mode. After treatment, the mixed liquor is allowed to settle and the clarified supernatant is drawn, then refilled, and is sequentially repeated. The SBR system performs equalization, aeration, and clarification in a single reactor basin. The SBR system is flexible and adaptable; by varying the operating parameters - aerobic, anaerobic, or anoxic conditions can be achieved. The SBR system is able to handle wide variations in flow and/or influent quality, yet produce satisfactory effluent. The sludge removed from the SBR will be aerobically digested and dewatered on sludge drying beds. The dewatered sludge will be either hauled for landfill disposal or composted on site and used for soil conditioning.

TABLE 2

PROJECTED WASTEWATER FLOWS

Description	No. of Units	Units	Persons per unit	Persons Served	Gallons per person per day (gpcd)	WW Generated (gpd)	lb BOD per person per day (ppcd)	BOD Generated (ppd)
Lodge	20 rooms		2	40	100	4,000	0.17	7
Lodge Restaurants	360 seats		6	2,160	10	21,600	0.06	130
Lodge Bar	166 seats		2	332	2	664	0.02	7
Golf Clubhouse Restaurant	100 seats		3	300	10	3,000	0.06	18
Club Room/Private Dining	40 seats		3	120	10	1,200	0.06	7
Club Bar	40 seats		2	80	2	160	0.02	2
Villas	374 rooms		2	748	100	74,800	0.17	127
Employees	341 persons		1	341	30	10,230	0.10	34
Residential Ag Lots	150 lots		6	900	100	90,000	0.17	153
				5,021	WW Gen.	205,654	BOD Gen.	484

Reference: HAR, Title 11, DOH, Chapter 62, Wastewater Systems



Mahukona Lodge North Kohala, Hawaii	TYPICAL STABILIZATION PONDS	Figure 4

K-7

STORM DRAINAGE SYSTEM

General Description

The existing North Kohala watershed contains an area which extends from elevation 2400' to mean sea level (See Figure 5). Average ground slope in the watershed is approximately 5-10 percent in the upper reaches and increases to greater than 15 percent in the lower reaches along the coastal area. The site exhibits a large number of rock outcrops.

The soils in the project area are of the Kawaihae series and are underlain by pahoehoe and fragmental Aa lavas. Soils of this series are moderately permeable.

The project site, located on the semi-arid leeward side of the island, is sheltered from the rain-producing northeast tradewinds by the Kohala Mountain. The mean annual rainfall within the coastal project site is less than 14 inches. The wettest period of the year extending from May to September receives more than half of the total annual rainfall.

Offsite Drainage

The estimated existing storm runoff quantities herein have been based on the Storm Drainage Standards, Department of Public Works, County of Hawaii (See Table 3). Peak flows from drainage areas greater than 100 acres were determined from design curve Zone D on Plate 6, 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.

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 Akoni Pule Highway. The total storm runoff from the 4,260 acre watershed above the Highway is approximately 4,680 cfs. Eleven(11) culverts ranging in size from a 24" diameter corrugated metal pipe culverts to a 16'-7" x 10'-1" sectional plate arch along Akoni Pule Highway convey the mauka storm runoff into the project site (See Figure 6). The offsite storm runoff will be routed through the project site and incorporated into the general water features of the proposed golf course. The majority of the runoff will flow into the ocean, with some of the runoff to be routed through detention basins and allowed to percolate into the porous soil.

Onsite Drainage

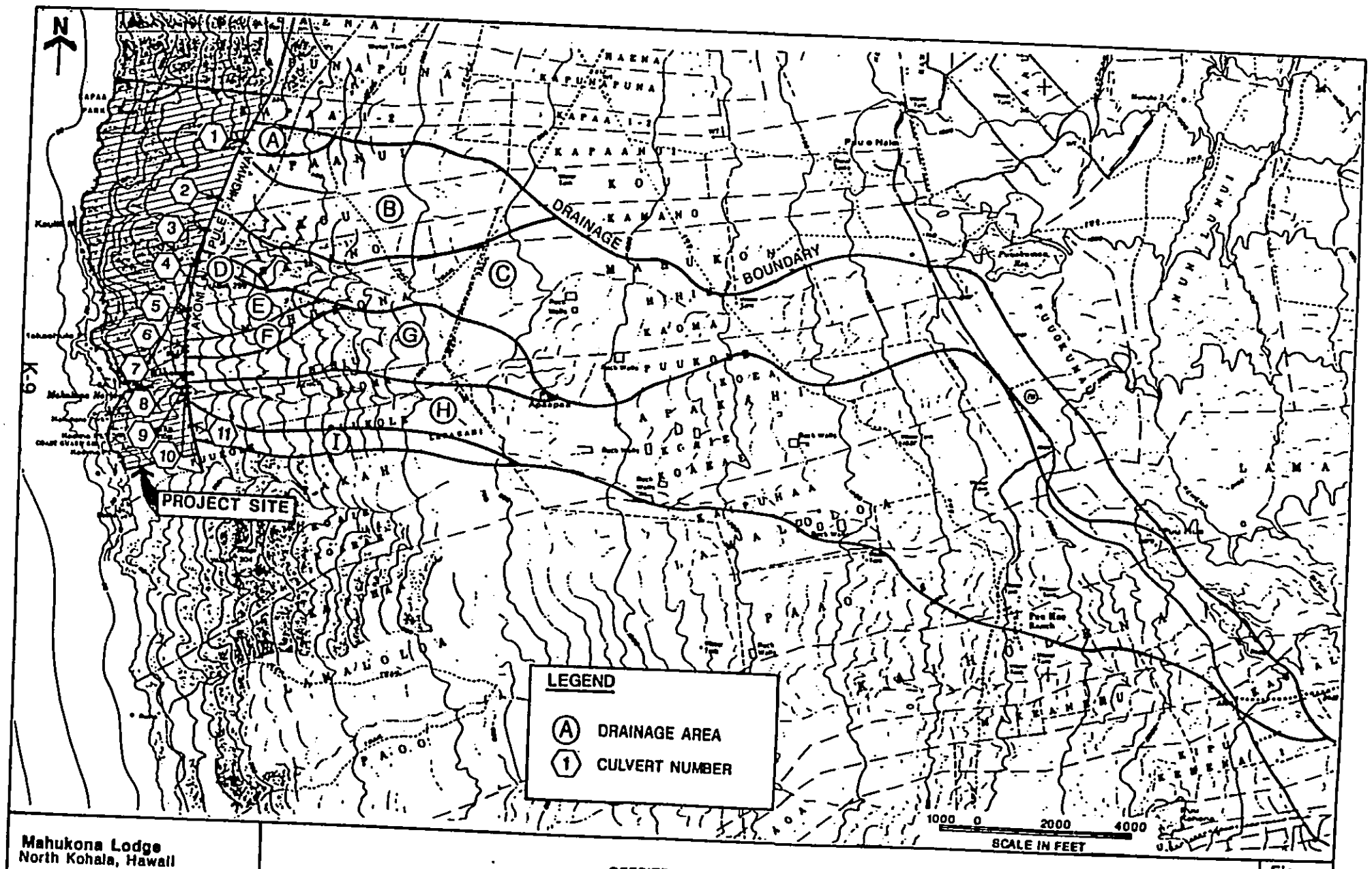
The onsite area is approximately 490 acres, of which 47.5 acres is in the conservation area along the shoreline and does not contribute to the onsite drainage. The anticipated existing runoff from this conservation area is 70 cfs. The remaining 442.5 acres will generate approximately 800 cfs. The golf course and residential areas will represent approximately 428 acres and will generate approximately 750 cfs. It is proposed that runoff from this area be directed into retention ponds located within the golf course, where it will be collected and allowed to infiltrate into the soil.

Runoff from the Lodge, Villas, golf and tennis facilities, and parking areas, will generate approximately 50 cfs from the 14.5 acres site. Runoff from these areas will be directed into retention ponds, located within golf course or into drywells through a series of culverts, grassed swales, catch basins and underground drain pipes.

Drywells will be utilized along the roadways throughout the residential areas to collect the storm runoff. These drywells will handle nearly all generated on-site flow, except for the areas which normally flow directly off the project site in the conservation (shoreline) areas, and areas which flow directly into the central floodway. These drywells have a planned capacity of approximately 6 cfs and will be registered with the State Department of Health in compliance with the requirements of Underground Injection Control, Title 11, Chapter 23, Administrative Rules, Department of Health, State of Hawaii.

Culverts will be utilized to pass storm runoff across roads where a drywell inlet flow exceeds 6 cfs. Culverts will be designed for a storm recurrence interval of 50 years; drainage areas less than 100 acres.

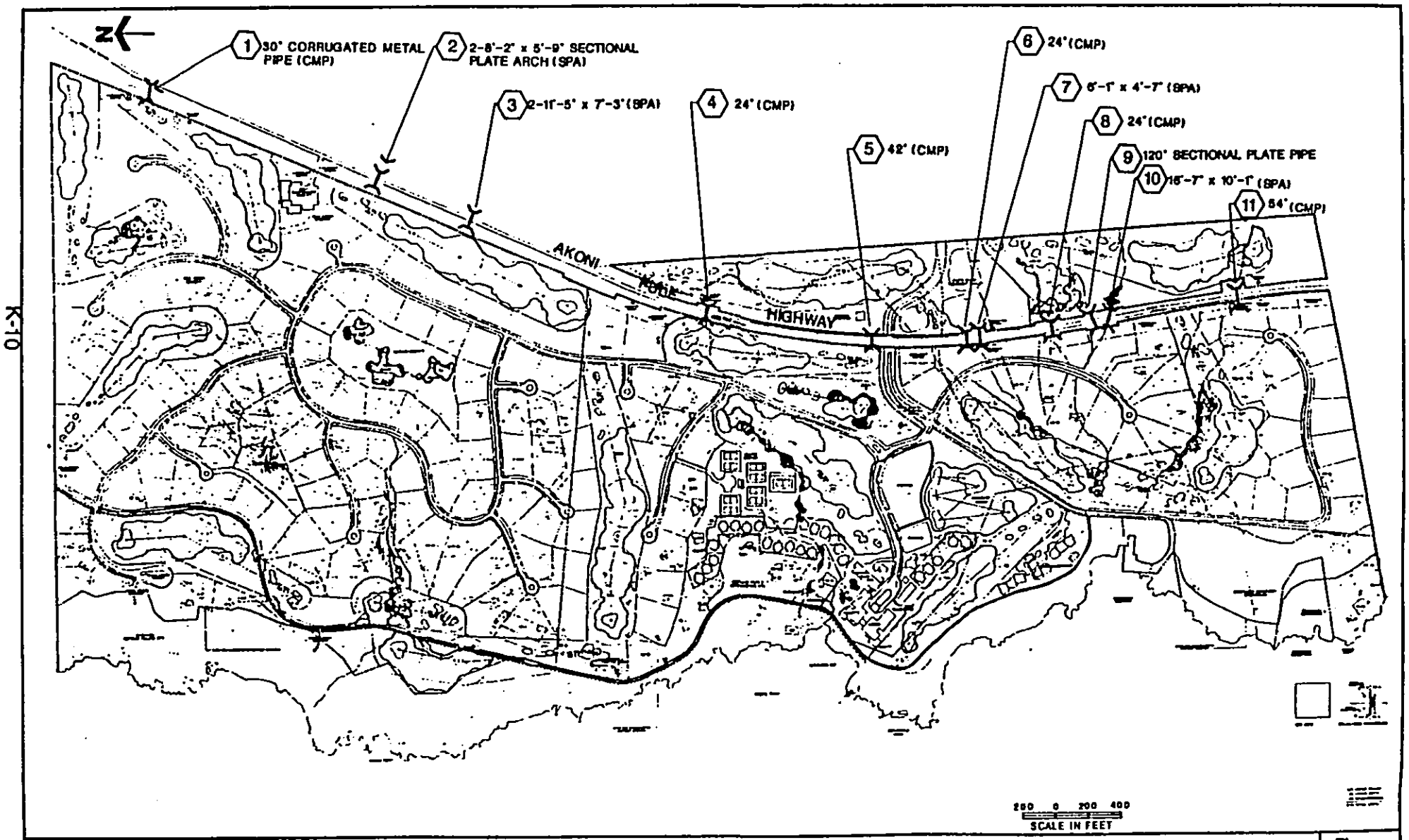
To reduce runoff flowing into the roadway drywell system, backlot channels are necessary to route storm runoff to the retention ponds located within the golf course. For major portions of these channels, a recurrence interval of 50 years will be utilized.



Mahukona Lodge
North Kohala, Hawaii

OFFSITE DRAINAGE MAP

Figure 5



K-10

Mahukona Lodge North Kohala, Hawaii	OFFSITE DRAINAGE CULVERTS	Figure 6