



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

AQUACULTURE DEVELOPMENT PROGRAM  
 AQUATIC RESOURCES  
 BOATING AND OCEAN RECREATION  
 CONSERVATION AND RESOURCES ENFORCEMENT  
 CONVEYANCES  
 FORESTRY AND WILDLIFE  
 HISTORIC PRESERVATION  
 LAND DIVISION  
 STATE PARKS  
 WATER RESOURCE MANAGEMENT

Ref.PB:EAH

FEB - 8 2000

FILE NO.: CDUA HA-2968B

MEMORANDUM

TO: Ms Genevieve Salmonson, Director  
 Office of Environmental Quality Control

FROM: Dean Uchida, Administrator  
 Land Division *Uchida*

SUBJECT: Finding of No Significant Impact (FONSI) for the Pali-K Ranch Single Family Dwelling, TMK: (3) 8-01-010: 05, Ka'awaloa, South Kona, Island, County and State of Hawaii.

The Department of Land and Natural Resources, Land Division, has reviewed the comments received during the 30-day public comment period which began on December 23, 2000. The agency has determined that this project will not have significant environmental effects and hereby issues a Finding of no Significant Impact (FONSI) for the subject project. Please publish this notice in the February 23, 2000 OEQC Environmental Notice. ✓

We have enclosed a completed OEQC Publication Form, a completed OEQC Publication form on computer disk and four copies of the final EA. Please call Eric Hill at 587-0383 if you have any questions.

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

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2000-02-23-HI-FEA - Pali-K Ranch  
Single Family Residence

**FINAL ENVIRONMENTAL ASSESSMENT**

**CONSTRUCTION OF SINGLE-FAMILY RESIDENCE AND RELATED  
IMPROVEMENTS**

**Applicant: Pali-K Ranch LLC, a Washington Limited Liability Company, on  
Lot 10-A, a portion of R.P.Nos. 4386 & 7532, L.C.Aw. 8452, Apana 10 to Keohokalole,  
Ka'awaloa, District of South Kona, Hawaii TMK: (3) 8-1-10:05  
Conservation District General Subzone #G-372**

For Submittal to:

State of Hawaii  
Department of Land & Natural Resources

February, 2000

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Kona, Hawaii

**APPENDIX A: Draft EA Comments and Responses**

**FINAL ENVIRONMENTAL ASSESSMENT**

**1.0 IDENTIFICATION OF APPLICANT**

The Applicant is the Pali-K Ranch LLC, a Washington limited liability company, registered to do business in the State of Hawaii, whose mailing address is 845 Bellevue Place East, Suite 101, Seattle, Washington 98102 (hereinafter the "Applicant") is the fee owner of the subject parcel. Pali-K Ranch LLC is a single member LLC which is the sole proprietorship of Christopher Norrie, and which was created for the protection of other assets from potential liability resulting from the existing and continuing ranching operation on the subject parcel. Mr. Norrie intends to use the proposed residence as his ranch headquarters and retirement home.

**2.0 IDENTIFICATION OF APPROVING AGENCY**

**2.1 Purpose of this Document**

This environmental assessment is being submitted in support of and in conjunction with Applicant's application to the Board of Land & Natural Resources ("BLNR") for a Conservation District Use Application ("CDUA"), in accordance with Sections 13-5-14, 13-5-25(a), 13-5-24/R-8 and R-5 of the Department of Land and Natural Resources ("DLNR") Administrative Rules for approval to construct a single-

family home in the Conservation District. A copy of CDUA HA-2968B is on file with the Land Division of the Department of Land & Natural Resources.

**2.2 Approving Agency**

The approving agency for this assessment is the Department of Land & Natural Resources

**3.0 IDENTIFICATION OF AGENCIES CONSULTED IN MAKING ASSESSMENT**

The following agencies provided assistance or information in preparing this assessment:

**3.1 State Agencies**

DLNR, Land Division  
DLNR, State Historic Preservation Division  
DLNR, State Parks  
Department of Agriculture

**3.2 County Agencies**

Planning Department  
Department of Public Works  
Department of Water Supply

**4.0 GENERAL DESCRIPTION OF THE ACTION'S TECHNICAL, ECONOMIC, SOCIAL, AND ENVIRONMENTAL CHARACTERISTICS**

**4.1 Project Description**

The Applicant is seeking approval for the construction of a proposed single-family residence, installation of appropriate landscaping and lap pool, the paving a 10' wide asphalt driveway over an existing ranch road and the extension of essential

public utility service on approximately 2.4 acres of the Property, which is located entirely within the State Land Use Conservation District's (G) or "general subzone" and at least 50' from the boundary with the (L) or "limited subzone". Specifically, the Applicant proposes to build a new single-family residence of post-and-pier construction consisting of approximately 2,986 square feet in living area, together with lanais of approximately 583 square feet and an attached two-story garage/workshop/loft covering approximately 1,120 square feet with a lap pool of approximately 256 square feet. See, Exhibit E 1, Survey and Location Map, and Exhibit E 2, Site Plan, Floor Plan, Elevations and Site Profile by Piper Designs for single-family residence and attached garage structure.

The proposed residential improvements include the following:

- a) The Construction of a 4,945 sq ft single-family residence. The residence will consist of 4 bedrooms 3 1/2 baths, and a 2 car garage with a workshop;
- b) Landscaping in an area directly around the proposed residence surrounded by a cattle fence as generally shown on Site Plan of Exhibit E 2.
- c) The Construction of a ten-foot wide asphalt driveway over 260 feet of the existing dirt ranch road which runs through the subject property from Easement A-17 over adjoining properties to the proposed single-family residence; and
- d) The extension of an overhead utility line from the terminus of the present Helco line on TMK 8-1-09:27 as shown on Helco project number 97-A-106IE, in the easements provided and continuing over and across Easement A-17 to the Subject Property to serve the proposed residence.

#### **4.2 Project Area Location**

##### **4.2.1 Primary Location**

The Project Area is proposed to be located within a portion of land designated by State of Hawaii Tax Map Key Nos. (3) 8-1-10:5 (Lot 10-A) at Ka'awaloa in the District of South Kona and is approximately 11.5 miles south of Kailua-Kona on the island of Hawai'i (hereinafter the "Property"). The whole of the subject parcel, TMK 8-1-10:5, is 31.234 acres in size and lies entirely within a State Land Use Conservation District, however, the Primary Location for the project is proposed within that portion of Lot 10-A within the General subzone (# G-372) which is approximately 2.4 acres in size, and Easement A-17, approximately 1.425 acres in size. The remaining portion of the Property, not in #G-372, is in Limited subzone (#L-295). The Property is a portion of R.P. 4386 and 7532, L.C. Aw. 8452, Apana 10 to Keohokalole. The Project Area is *makai* of the intersection of the Hawaii Belt Road (Route 11) and Napo'opo'o Road (old Government Road), and further borders Ka'awaloa Road on the Kailua side. The subject parcel does not border the shoreline. The closest part of the proposed residence is 850 to 900 feet *mauka* of Kealakekua Pali (see Survey and Location map attached as part of Exhibit E 1).

#### **4.2.2. Alternate Location**

In addition to and separately from the approval of the "Primary Location", the Applicant has also requested the BLNR's approval of an alternate location ("Alternate Location"). Approval of such Alternate Location shall be conditional on the Applicant first obtaining a rule change from the DLNR, moving the boundary of subzone L-295. The Alternate Location as shown on page 1B of Exhibit E 2 straddles the present line between subzone G-372 and L-295 and the *makai* edge of the landscaping is entirely within the area of the archeological survey prepared by PHRI (particularly "30-Meter

wide strip of Conservation Subzone L") attached as Exhibit E 3. One of the reasons for the request for the approval of the Alternate Location is the avoidance of impacting SHIP site # 13659. While "data recovery" is recommended as the primary mitigation measure for this site, and will be pursued if the residence cannot be located in the Alternate Location, the Applicant would prefer to preserve site # 13659 as a mitigation measure. A letter from Robert Rechtman, Senior Archeologist at PHRI, regarding this issue is attached as Exhibit E 4.

**4.3 Existing Uses and Activities**

There are no existing structures on the property but has been long used for cattle grazing (See, page 4 of Exhibit E 5). The Applicant has continued the active grazing use on the Property through various related entities since 1983 although prior owners of the subject property had previously used the area as an active part of its ranching operations since the 1800's.

**4.4 Regulatory Requirements for the Project**

This Environmental Assessment (EA) process was conducted in accordance with Chapter 343 of the Hawaii Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawaii Administrative Rules (HAR), is the basis for the environmental impact process in the State of Hawaii. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures and to determine whether any of the impacts are significant according to specific criteria. The list of criteria and the preliminary findings are set out in Section 10 herein. If no impacts are considered significant, then the proposing or approving agency will issue a Finding of No Significant Impact

(FONSI). Furthermore, the approval of a CDUA for the construction the single-family dwelling and related improvements proposed by Applicant is required pursuant to HAR § 13-5-25(c)(4). The subject parcel is also located within the County's Special Management Area (SMA), however, the construction of a single family residence that is not part of a larger development is excluded from the definition of a "development" under HRS Chapter 205A. A letter dated July 22, 1999 from the Hawaii County Planning Department which determined that the proposed action is exempt from further Special Management Area review is attached as Exhibit E 6. The proposed project does not front the ocean nor is it within the shoreline setback area.

#### **4.5 Timetable for Development**

The Applicant proposes to begin work on the driveway and utility line within three (3) months after receipt of all required permits from the State and County. The construction of the single-family residence and related improvements should be commenced upon completion of the driveway and utility line though not more than one year of receipt of the CDUP with completion within one (1) year of the start of construction of the single-family residence.

#### **4.6 Surrounding Area and Land Uses**

The surrounding land area is characterized by agricultural and residential uses, especially those parcels along Makahiki Lane which is the main access to the subject property from Napo'opo'o Road. The surrounding parcels include other privately-owned lots of comparable size which are similarly classified as SLU "Conservation" and "Agricultural" and are zoned "Unplanned", "Agricultural-5 acres", "Residential-Agricultural", "Open" and "Agricultural Project District" by the County of Hawaii (hereinafter the "County"). It is directly *mauka* of a portion of the Kealakekua Bay

State Park (TMK 8-1-10:1) and is within the Kealahou Bay Historic District.

**4.7 Existing Access, Utilities and Other Public Services:**

Access to the Project Area will be provided by a driveway extending from the existing private road known as Makahiki Lane extending off of Napo'opo'o Road, a County roadway. Makahiki Lane serves eighteen other Lots *mauka* of the subject parcel. Electrical and telephone service by Hawaii Electric Light Company and GTE Hawaiian Tel is available up to its present terminus on TMK No. 8-1-09:27 as shown on Helco project number 97-A-106IE. Applicant proposes to extend this overhead utility lines, which are essential public utility services, to the proposed single family residence as shown on Exhibit E 2 over Easement A-17 that is depicted on the survey map attached as Exhibit E 1. Water service is already provided to the subject parcel by way of a 1.5 inch polyurethane line connected to Hawaii County Department of Water Supply meter #9781-5856 (account # 900-14484-0) assigned to the property. There is no municipal sewage system in this part of South Kona, however, Applicant proposes to handle wastewater by means of a solid septic tank and leach field to be professionally engineered by Leonard Jacobi, P.E., in accordance with State Department of Health standards. A septic system will be used instead of a cesspool to assure that there will be no impact on the lands *makai* or on Kealahou Bay. The contractor of the residential improvements will be responsible for the removal of all waste construction material and debris. All residential solid waste will be disposed of by the owner-Applicant at the nearest County transfer station. A transfer station is situated at Keei and the landfill for the West Hawaii area is located at Puuanahulu in North Kona. To mitigate potential impacts, the Applicant will practice recycling measures to the greatest extent possible. Organic debris generated by the residence and landscaping will be mulched on site and recycled as compost.

The Project Area is less than a mile from the fire station and the police substation in Captain Cook. There is an existing fire hydrant located on Napo'opo'o Road near the primary access road (Makahiki Lane) to the Property. Hookena School in Captain Cook serves the area families with children in grades K to 8. Konawaena High School serves students in grades 9 to 12. There is only one neighborhood recreation center in South Kona, the County's Arthur L. Greenwell Park in Captain Cook. There are also four developed beach parks and two beach park reserves in this district. Recreational facilities are crowded, and the State and County have plans to provide additional facilities.

#### **4.8 Socio-Economic Characteristics**

The Project Area lies just south of the boundary between North and South Kona and immediately *makai* of the community of Captain Cook. In 1990, the population of South Kona was calculated to be 7,658 persons with 33.8% of the district's population living in the community of Captain Cook.

The Project Area lies on the fringe of the center of density of the Captain Cook community, where small house lots give way to small farm lots. The area mauka of the Property has been developed into three-acre and two-acre orchard rural residential lots, while the area between Napo'opo'o Road and Route 11 (Hawaii Belt Highway) provides a transition from commercial uses to an agriculture zoning district, with a minimum lot size of one-acre, along with the smaller house lots, as shown on the vicinity map on Exhibit E 1.

The major agricultural uses in the area include the cultivation and production of coffee and macadamia nuts, with some vegetables, flowers and tropical fruit production, and ranching. Many of these farming and ranching operations are part-time and provide families with a second source of income with families often residing

the property which is being utilized for such agricultural activities. This settlement pattern is entirely consistent with the proposed action to site the ranch residence on the same parcel that is actively used for grazing.

Besides farming and some fishing in Napo'opo'o, the economic resources of the area are limited to the retail and the state government activities still present in Captain Cook. Employment opportunities are limited and a substantial portion of the population commutes to Kailua-Kona. Land values have fluctuated wildly in the past decade. There was a land boom in the early eighties, followed by a downtrend and another boom that ended in 1990. Since that time, land values have decreased, and in some cases land is presently valued at less than half of its peak value.

Short-term employment is contemplated for local building contractors for design and construction of the single-family dwelling, the installation of a 10' wide pavement over the existing dirt ranch road, extension of the utility service line, construction of the septic system, and landscaping. The construction of the ranch dwelling would further support the ranching activity currently conducted on the Property. The proposed action does not anticipate the use or expenditure of any State or County funds as the construction of the single-family residence and the related improvements shall be privately financed. No adverse economic impact is anticipated as the result of the project

#### **4.9 Historical/Cultural Characteristics**

The Property lies within the boundaries of the Kealakekua Bay Historic District (SIHP No. 50-10-47-7000<sup>1</sup>), and within the Kona Field System (SIHP No.

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<sup>1</sup> State Inventory of Historic Places (SIHP) numbers. SIHP numbers (usually 5 digit) for this Project Area are prefixed by 50-10-47 (50=State of Hawaii; 10=Island of Hawaii; 47=USGS 7.5' series quad map [Honaunau, Hawaii]).

6601), an extensive complex of aboriginal habitation and dryland agriculture covering an area 3 miles wide and 18 miles long extending from Kealakekua Bay northward beyond the town of Kailua-Kona. The Property and Project Area has been surveyed and cultural resources identified as described hereinbelow.

## 5.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

### 5.1 Flora

There are no threatened or endangered species on the subject parcel or in the Project Area proposed for construction of the single family residence and related improvements. In an earlier botanical survey<sup>2</sup> of the Property, the proposed action is within a plant community referred to as "Opiuma Savanna". The vegetation in this zone is composed primarily of a dense cover of exotic grasses such as guinea grass (*Panicum maximum*) and introduced shrubs such as lantana (*Lantana camara*) and castor bean (*Ricinus communis*) with an overstory of widely-spaced trees dominated by 'opiuma (*Pithecellobium dulce*), koa haole (*Leucaena leucocephala*) and monkeypod (*Samanea saman*) A copy of the survey report is attached as Exhibit E 7. The only plant of any concern in the report was the native caper or *paupilo'* (*Capparis sandwichiana*) which was found in another vegetation zone ("Lava Flow Scrub") on separate parcel (Lot 10-B), some 2,000 feet north of the Project Area. The Lava Flow Scrub zone is separated from the subject parcel by yet another vegetation zone ("E Koa Shrubland") and the Ka'awaloa Road, and will not be impacted by the proposed

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<sup>2</sup> Char, W. P., May 1990. *Botanical Survey, Kealakekua Ranch Golf Course Project, North Kona, Island of Hawaii.*

action.

## 5.2 Fauna

As with the flora, no endangered species of avifauna or mammals are to be found inhabiting the Project Area. A faunal survey was conducted in 1989 of a much larger area, including the subject parcel, for another project. A Survey of Avifauna and Feral animals prepared by Philip Bruner 1989 is attached as Exhibit E 8. The only endemic species recorded was a single sighting of an adult I'o or Hawaiian Hawk (*Buteo solitarius*) on another parcel to the east of the Property. Dr. Bruner observed no endangered animal species, and the single sighting of the endangered Hawaiian Hawk was not entirely unexpected. This species ranges widely over ranch and farm lands as well as forested areas on the Island of Hawaii. With respect to the avifauna, the short winged owl or pueo (*Asio flammeus sandwichensis*) is the only other endemic species which might occur at this site because it is relatively common in Hawaii, particularly at higher elevations. However, there is no evidence of nesting of either species within the larger area surveyed. No other endemic birds would be expected at the site given the elevation and location of the site and nature of the habitats available. No waterbirds should be found within the Project Area as there are no wetlands. Exotic birds which are most abundant in the area include the Japanese white eye (*Zosterops japonicus*), common myna (*Acridotheres tristis*), house finch (*Carpodacus mexicanus*), zebra dove (*Geopelia striata*), nutmeg manikin (*Lonchura punctata*) and yellow fronted canary (*Serinus mozabicus*). Mammals in the vicinity of the Project Area include the small Indian mongoose (*Herpestes auropunctus*), which is found in the day along with feral cats. There is evidence of rats appearing at night. The area is also inhabited by feral pigs.

### **5.3 Historical and Archaeological Resources**

Previous archaeological surveys identified and recorded five archaeological sites in the Project Area (SIHP 13657, 13658, 13659, 14160 and 14161). All five of the sites were found significant for information content only and recommended for further data collection with the exception of SIHP 13657, for which no additional work was recommended<sup>3</sup>. Three of the sites (13657, 14160 and 14161) will not be impacted by the proposed residential improvements and will be preserved in place. The proposed residence will impact portion of two archaeological sites, SIHP Nos. 13658 and 13659, which have been recommended for data recovery that will be completed, in coordination with the State Historic Preservation Office, prior to commencement of any construction activity. A copy of this archaeological inventory survey report specifically addressing the archaeological resources in the Project Area was prepared by PHRI, Inc. and is attached as Exhibit E 3.

### **5.4 Topography and Soils**

The subject property is gently sloping with a southwestern exposure. The elevation of the Project Area ranges between 750 to 800 feet above mean sea level. The United States Department of Agriculture, Soil Conservation Services, Soil Survey Report classifies the soil on the Project Area as Waiaha extremely stony silt loam (State designation "WHC"). In a representative profile the surface layer is very dark brown extremely stony silt loam about 4 inches thick. The subsoil is dark brown very stony silt loam about 14 inches thick. The substratum is *pahoehoe* lava bedrock. The

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<sup>3</sup> See, Walker, A. T., L. Kalima, and S.T. Goodfellow, February, 1991. *Archaeological Inventory Survey Kealakekua Ranch Development - Ka'awaloa Parcel, Land of Ka'awaloa, South Kona District, Island of Hawaii (TMK:3-8-1-10: Por.2)*. PHRI Report No. 770-02191.

surface layer is slightly acidic. The subsoil is neutral to mildly alkaline. In places, the surface layer is nonstony. Permeability is moderately rapid, runoff is slow, and the erosion factor is slight. The slope ranges from 6 to 12 percent. The USGS classifies the Project Area as being in Lava Flow Hazard Zone 3, on an ascending scale of risk, with 8 being the zone having the lowest risk and 1 being the zone with the highest risk. Zone 3 areas include the lower slopes of Mauna Loa, where lava flows have covered approximately 15 to 20 percent of the area during the past 750 years. The Land Study Bureau soil rating is C52 which is further described as: Volcanic Ash Rocky, well drained, and unsuited for machine tillability, with slope of 11 - 20 percent.

#### **5.5 Shoreline, Coastal and Scenic Resources**

The Property does not border the shoreline as the Project Area is approximately 900 feet *mauka* of *Pali Kapu-O-Keoua*, an escarpment along the shoreline of Kealakekua Bay which angles 300 feet back from the shoreline to a height of approximately 600 feet. The proposed single-family dwelling and landscaping should not be visible from any roads, scenic look-outs or other likely public viewpoints. The Project Area is situated on a moderate slope rising in a northeastern direction from the top of *Pali Kapu-O-Keoua*. Any view-planes from the shoreline of Kealakekua Bay are limited by the topography of the area and the Property, in particular the steepness and height of *Pali Kapu-O-Keoua*, which rises 600 feet above and 300 feet inland from the waters edge. No part of the proposed residence will be visible from either the Captain Cook's monument at Ka'awaloa (see page 2 of Exhibit E 5) or from the Napo'opo'o County Park at the shoreline near Hikiau Heiau (see page 3 of Exhibit E 5, figure B) because of the intervening feature of the *Pali Kapu-O-Keoua*. The Project Area is also 3,000 feet *makai* of the Napo'opo'o Road and due to the distance, downhill slope, intervening windbreak plantings and other vegetation,

the proposed single-family residence will not be visible from Napo'opo'o Road or any other road except for Ka'awaloa Road. Ka'awaloa Road is an unimproved dirt road accessible primarily by foot and horseback and is used to visit the area around Cooks monument. The intervening distance (1,300 feet), topography and vegetation between the Project Area and Ka'awaloa Road will preclude any views of the proposed single-family dwelling within the Project Area from the roadway. The roof of the proposed dwelling will be discernible (through binoculars) from Palemano Point and from Keei beach (see page 4 of Exhibit E 5), from which many of the residential structures in the Captain Cook area are also visible. However, given the distance from Palemano Point or Keei beach (1.75 miles), the roof of the structure will be barely visible to the naked eye. The roof line of the proposed dwelling will be masked by the mass of the continuing upward slope of Mauna Loa and the existing trees and vegetation both below and above the proposed residence. This minor visual impact will be further mitigated by use of a non-reflective, light green finish on the roofing material. Thus, the scenic coastal resources will not be impacted by reason of the proposed single-family dwelling.

#### **5.6 Flood and Tsunami Hazards**

The U.S. Corps of Engineers, Flood Insurance Rate Map (FIRM) designates the Project Area as being within Zone X. Zone X is designated for those areas outside the 500 year flood plain. The County of Hawaii Civil Defense Agency notes that although the Property carries a "X" designation, this rating is not indicative of "flood hazards". The Property is not located in a "coastal high hazard area" nor subject to tsunami inundation.

#### **5.7 Lava and Seismic Hazard Zones**

The entire island of Hawaii is subject to geologic hazards, especially lava flows and earthquakes. The United States Geological Survey (USGS) classifies the Project Area as being in Lava Flow Hazard Zone 3, on an ascending scale of risk, with 8 being the zone having the lowest risk and 1 being the zone with the highest risk. Zone 3 areas include the lower slopes of Mauna Loa, where lava flows have covered approximately 15 to 20 percent of the area during the past 750 years. As such, there is only a small risk of lava inundation over a relatively short time scale. In terms of seismic risk, the entire island of Hawaii is rated Zone 4 Seismic Probability Rating. Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built. However, all structures will be built in conformance with the Uniform Building Code (Hawaii County Code Chapter 25) and approved by the Building Division of the Hawaii County Department of Public Works to mitigate any risk resulting from such earthquake hazard. The proposed action presents no additional hazard to the public and is not imprudent for the Applicant.

## **6.0 SUMMARY OF MAJOR IMPACTS AND ALTERNATIVES CONSIDERED**

### **6.1 Summary of Major Impacts**

The scope of the proposed construction of a single family residence is not expected to contribute to any economic, social or environmental concerns, or cause adverse environmental impacts, except minor temporary noise or dust inconveniences during the construction period which can be mitigated by implementation of control measures standard to the industry. It will not impact any rare or endangered native species within the Property or the surrounding area. The proposed residence would not impact the scenic quality of the area as it would not be visible from any road, scenic lookouts, or other public viewpoints. Moreover, the home and landscaping will be

blended into the background of the property to mitigate any visual impact. The proposed single-family dwelling will impact portions of two archaeological sites, SIHP Nos. 13658 and 13659, which have been recommended for data recovery pursuant to a mitigation plan completed in coordination with the State Historic Preservation Office of the Department of Land & Natural Resources. However, one of these archaeological features can be preserved in place without impacting any other identified archaeological sites if the residential improvements are relocated to the Alternate Location, slightly *makai* of the present Project Area within the Property, as discussed below.

## **6.2 Alternatives to Proposed Development**

The alternatives to the proposed development would be to (a) discontinue ranching operations, (b) find an alternative use for the Property, (c) sell the Property. None of these alternatives is reasonable to the Applicant, as discussed below.

### **6.2.2 Alternative of Discontinuing the Ranching Operations:**

In its present form, the ranching operation provides no realistic economic return. Grazing the Property has become a practical necessity just to keep the Property open, passable and to mitigate the risk of fire hazard. The motivation for continuing the ranching operation without the ability to directly oversee the operation from a residence on the Property becomes increasingly unrewarding. Good environmental stewardship of the land is promoted by the direct interest and attention of the Property's owner.

### **6.2.3 Alternative of finding an alternative use for the Property:**

Because of the Property's location in the Conservation Zone, finding an alternate use for which permitting could be obtained would be impractical.

# CORRECTION

THE PRECEDING DOCUMENT(S) HAS  
BEEN REPHOTOGRAPHED TO ASSURE  
LEGIBILITY  
SEE FRAME(S)  
IMMEDIATELY FOLLOWING

The entire island of Hawaii is subject to geologic hazards, especially lava flows and earthquakes. The United States Geological Survey (USGS) classifies the Project Area as being in Lava Flow Hazard Zone 3, on an ascending scale or risk, with 8 being the zone having the lowest risk and 1 being the zone with the highest risk. Zone 3 areas include the lower slopes of Mauna Loa, where lava flows have covered approximately 15 to 20 percent of the area during the past 750 years. As such, there is only a small risk of lava inundation over a relatively short time scale. In terms of seismic risk, the entire island of Hawaii is rated Zone 4 Seismic Probability Rating. Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built. However, all structures will be built in conformance with the *Uniform Building Code* (Hawaii County Code Chapter 25) and approved by the Building Division of the Hawaii County Department of Public Works to mitigate any risk resulting from such earthquake hazard. The proposed action presents no additional hazard to the public and is not imprudent for the Applicant.

## **6.0 SUMMARY OF MAJOR IMPACTS AND ALTERNATIVES CONSIDERED**

### **6.1 Summary of Major Impacts**

The scope of the proposed construction of a single family residence is not expected to contribute to any economic, social or environmental concerns, or cause adverse environmental impacts, except minor temporary noise or dust inconveniences during the construction period which can be mitigated by implementation of control measures standard to the industry. It will not impact any rare or endangered native species within the Property or the surrounding area. The proposed residence would not impact the scenic quality of the area as it would not be visible from any road, scenic lookouts, or other public viewpoints. Moreover, the home and landscaping will be

blended into the background of the property to mitigate any visual impact. The proposed single-family dwelling will impact portions of two archaeological sites, SIHP Nos. 13658 and 13659, which have been recommended for data recovery pursuant to a mitigation plan completed in coordination with the State Historic Preservation Office of the Department of Land & Natural Resources. However, one of these archaeological features can be preserved in place without impacting any other identified archaeological sites if the residential improvements are relocated to the Alternate Location, slightly *makai* of the present Project Area within the Property, as discussed below.

## **6.2 Alternatives to Proposed Development**

The alternatives to the proposed development would be to (a) discontinue ranching operations, (b) find an alternative use for the Property, (c) sell the Property. None of these alternatives is reasonable to the Applicant, as discussed below.

### **6.2.2 Alternative of Discontinuing the Ranching Operations:**

In its present form, the ranching operation provides no realistic economic return. Grazing the Property has become a practical necessity just to keep the Property open, passable and to mitigate the risk of fire hazard. The motivation for continuing the ranching operation without the ability to directly oversee the operation from a residence on the Property becomes increasingly unrewarding. Good environmental stewardship of the land is promoted by the direct interest and attention of the Property's owner.

### **6.2.3 Alternative of finding an alternative use for the Property:**

Because of the Property's location in the Conservation Zone, finding an alternate use for which permitting could be obtained would be impractical.

**6.2.4 Alternative of Selling the Property:**

The Applicant has had a hands-on relationship with the Property for over fifteen years and does not wish to be forced to sell the land. The Applicant believes that as a landowner, he is entitled to a reasonable use of his property and that the construction of a homestead is fundamental to such "reasonable use". Furthermore the Applicant, because of his longstanding relationship with the Property and his understanding of its history and environment is more likely to be a better steward of the land than a new purchaser who does not have the benefit of this fifteen year relationship.

**6.3 Alternative Analysis**

The only reasonable alternative is the construction of the proposed single-family residence and related improvements to serve as the Applicant's ranch headquarters and retirement home.

**6.3.1 Mitigation Measures and Alternative Analysis for "Alternate Site":**

In addition to and separately from the approval of the "Primary Location" for the proposed single-family residence, which lies entirely within Subzone #G-372, the Applicant is also requesting that the Land Board consider and approve an alternate location (the "Alternate Location"). Approval of the Alternate Location will be conditional on first obtaining a subzone boundary amendment to move the *mauka* boundary of Subzone #L-295. The Alternate Location, as shown on page 1B of Exhibit E 2, straddles the present line, as surveyed on the ground by Wes Thomas & Associates, between the two subzones, #G-272 and #L-295. The *makai* edge of the landscaping would be contained completely within the survey area of the archeological inventory study prepared by PHRI (particularly the "30-Meter wide strip of

Conservation Subzone L") attached as Exhibit E 3. One of the reasons for the request for the approval of the alternate site is the avoidance of impacting SHIP No. 13659. While "data recovery" is recommended as the primary mitigation measure, and will be pursued if the residence cannot be located in the Alternate Location, the Applicant would prefer to preserve SIHP No.13659 as a mitigation measure. A letter from Robert Rechtman, Senior Archeologist at PHRI is attached as Exhibit E 4. The foregoing discussion of Mitigation Measures and Alternate Analysis for the Primary Location is the same as it would be for the Alternate Location, except that in the case of the Alternate Location:

1) The Proposed Residence will be positioned approximately 100' North East of the Primary Location (See, pages 1A and 1 B of Exhibit E 2). This will not materially change the visual impact or other impacts identified for the proposed single family residence in this EA.

2) The impact on SIHP site # 13659 will be mitigated by preservation instead of by data recovery.

In all other respects the impacts of the Primary Location and Alternate Location are substantially similar and the preceding discussion of the impacts of the Primary Location are incorporated herein by reference as being applicable to the Alternate Location, except as noted above.

**6.4 Relationship between Local Short Term Use of Environment and Maintenance and Enhancement of Long Term Productivity**

The proposed construction of a single family residence will increase the productivity of the existing grazing operation because the proposed residence will act as a ranch headquarters from which the ranching operation can be more precisely managed. The proposed development of a relatively small portion of the entire

Property does not constitute a substantial change in use but will enhance the management of the Property. By introducing a residential component to the land, the financial viability of the ranching operation is increased, because it will allow the owner to take a more active hands on role in the ranching operation.

The motivation for the long-term stewardship of the land is increased because the preservation of Property and improvement of the pasturage is not only motivated by its economic return but by the aesthetic benefits and rural lifestyle afforded the homesteader.

The preservation of the grazing operation is a clear environmental preference to its discontinuation and reversion of the land to an impassable jungle of exotic grasses and environmentally detrimental plant species. The grazing operation is a prerequisite to keeping the Property open and accessible, as well as to preclude a substantial brush fire hazard. Moreover, a permanent ranch residence would maximize the effective and feasible management of the ranching operations.

**7.0 RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS FOR THE Project Area**

**7.1 State Land Use Law**

All lands within the State have been classified into one of our land use districts: Urban, Rural, Agricultural and Conservation, by the State Land Use Commission, pursuant to Chapter 205, HRS. The entire Project Area lies within the Conservation District. Lands located within the State land use Conservation Districts are administered by DLNR, pursuant to Chapter 183C, HRS.

**7.2 State Administrative Rules Governing Land Uses within Conservation Districts**

Title 13 of the Hawaii Administrative Rules ("HAR"), for the Department of Land and Natural Resources, under Subtitle 1, Chapter 5, regulates land uses within the Conservation District. The rules establish five subzones within the Conservation District.

The Project Area for the Primary Location is entirely within the General or (G) subzone. Section 13-5-14, HAR, provides that the objective of this subzone is to designate open space where specific conservation uses may not be defined but where urban use would be premature" The rule also provides that the (G) subzone encompasses: "lands suitable for farming flower gardening, operation of nurseries or orchards, grazing including facilities accessory to these uses....." Section 13-5-25, by extension of Section 13-5-24 specifically allows the construction of a single family residence "that conforms to the design standards of this chapter".

**7.3 Special Management Area/Shoreline Setback**

The Project Area is located within the Special Management Area ("SMA") as defined by Chapter 205A, and Rule 9 of the County of Hawaii Planning Commission Rules. However, single-family residences are considered to be an exempt action under the Special Management Area (SMA) guidelines. A letter dated July 22, 1999 from the Hawaii County Planning Director providing an exemption for this action is attached as Exhibit E 6.

**7.4 Environmental Impact Statement**

Section 343-5(a)(2), HRS, provides that any use that is proposed within any land classified as Conservation District land by the State land use commission under Chapter 205, is subject to the Environmental Impact Statement law, Chapter 343, HRS. Section 343-5(c), HRS, provides that Applicants proposing actions subject to Chapter 343, HRS.

" . . . shall prepare an environmental assessment of such proposed action at the earliest practicable time to determine whether an environmental impact statement shall be required."

This environmental assessment has been prepared to fulfill these requirements.

## **8.0 PROPOSED MITIGATION MEASURES**

### **8.1 Mitigation Measures to Avoid, Minimize, Rectify or Reduce Impacts**

The siting of the Proposed at the mauka edge of Lot 10-A some 900' from the edge of *Pali Kapu-O-Keoua* and over 1,200' from the shoreline is a significant mitigation measure. The choice of non-reflective building materials in colors naturally occurring in the environment is a further mitigation measure to the already minimal visual impact. As the Applicant only intends to landscape the area directly surrounding the proposed single family residence and leave the remainder of the Lot in it's present grazing use, the impact on the archeological features of the area will be minimized. The eventual use of the Alternate Location would further minimize such impact by avoidance of an additional archeological site.

Short term impacts during construction will be mitigated by Applicant's compliance with all applicable governmental regulations for noise abatement and dust, drainage and sedimentation control. The use of a solid concrete or plastic septic tank and leach field to be professionally engineered by Leonard Jacobi, P.E., in accordance

with State Department of Health standards will avoid assure that there is no impact on the lands *makai* or on Kealakekua Bay as a result of waste water from the proposed single family residence.

**9.0. DETERMINATION AND FINDINGS OF NO SIGNIFICANT IMPACT**

**9.1 Irreversible and Irrecoverable Commitments of Natural Resources that would be Involved if Proposed Action was Implemented**

There are no known irreversible and irretrievable commitments of natural resources that would be involved if the proposed action was implemented, particularly since there will not be any substantial change of the present grazing use of the land.

**9.2 Determination**

The project will not have a significant effect on the environment and it is anticipated that a Finding of No Significant Impact (FONSI) will be issued.

**9.3 Reasons**

Chapter 11-200-12, HAR, outlines those factors agencies must consider when determining whether a project has significant effects. The following outlines the evaluation for significance according to each factor:

**(1) *Involve the loss of destruction of any natural or cultural resource.***

The proposed action will not lead to a loss or destruction of any significant natural or cultural resource. The Project Area does not contain any significant natural resources. While situated in the Kealakekua Bay Historic District, the Archeological Survey attached suggests that the impact of the proposed action on the historic resources identified can be adequately mitigated.

**(2) *Curtail the range of beneficial use of the environment.***

The proposed project would not interfere with any of the surrounding areas which is a mix of agricultural and residential uses. . The proposed action will complement the agricultural setting and enhance the ranch lifestyle of the surrounding area.

**(3) *Conflict with the State's long-term environmental policies.***

The proposed project does not conflict with long-term environmental policies, goals and guidelines of the State of Hawaii. Temporary impacts, including the construction of the single-family dwelling, can be mitigated by compliance with all governmental requirements.

**(4) *Substantially affect the economic or social welfare of the community.***

The proposed project will provide long-term benefits to the agricultural community by supporting the continued ranching and grazing use of the Property, ensuring the viability of existing ranching operations in the South Kona area.

**(5) *Substantially affect public health.***

The proposed action will not affect public health.

**(6) *Involve substantial secondary effects, such as population changes or infrastructural demands.***

No substantial secondary effects are anticipated

**(7) *Involve a substantial degradation of environmental quality.***

Neither the construction of the residential improvements nor the proposed use are anticipated to significantly impact the surrounding environment.

**(8) *Cumulatively have considerable impact upon the environment.***

The proposed project is not anticipated to have a considerable cumulative impact upon the environment.

**(9) *Substantially affect a rare, threatened or endangered species or habitat.***

There are no known rare, threatened or endangered flora or fauna on the property that could be affected by the proposed project.

**(10) *Detrimentially affect air or water quality or ambient noise levels.***

Air quality and ambient noise levels will not be affected by the proposed project. No significant impacts to water quality are anticipated as an individual septic system using a solid septic tank will be built in accordance with State Department of Health standards. There may be temporary noise or air quality impacts during the construction of residential improvements, however, such impacts will be mitigated by the contractor's compliance with all government regulations relating to noise, fugitive dust and erosion control.

**(11) *Affect or likely to cause damage to an environmentally-sensitive area.***

The proposed project is not located in an environmentally-sensitive area.

**(12) *Substantially affect scenic vistas and viewplanes.***

The Project would not be visible from any public highway, scenic lookout or public viewpoint nor will the proposed action substantially affect any scenic vistas or viewplanes identified in county or state plans or studies.

**(13) *Require substantial energy consumption.***

The proposed project will not require substantial energy consumption.

**10.0 LIST OF REQUIRED PERMITS AND APPROVALS**

Aside from the CDUA approval from the Board of Land & Natural Resources, the Project will require a building permit issued by the County of Hawaii. The driveway improvement for the existing ranch road extending to and within the Project Area may require

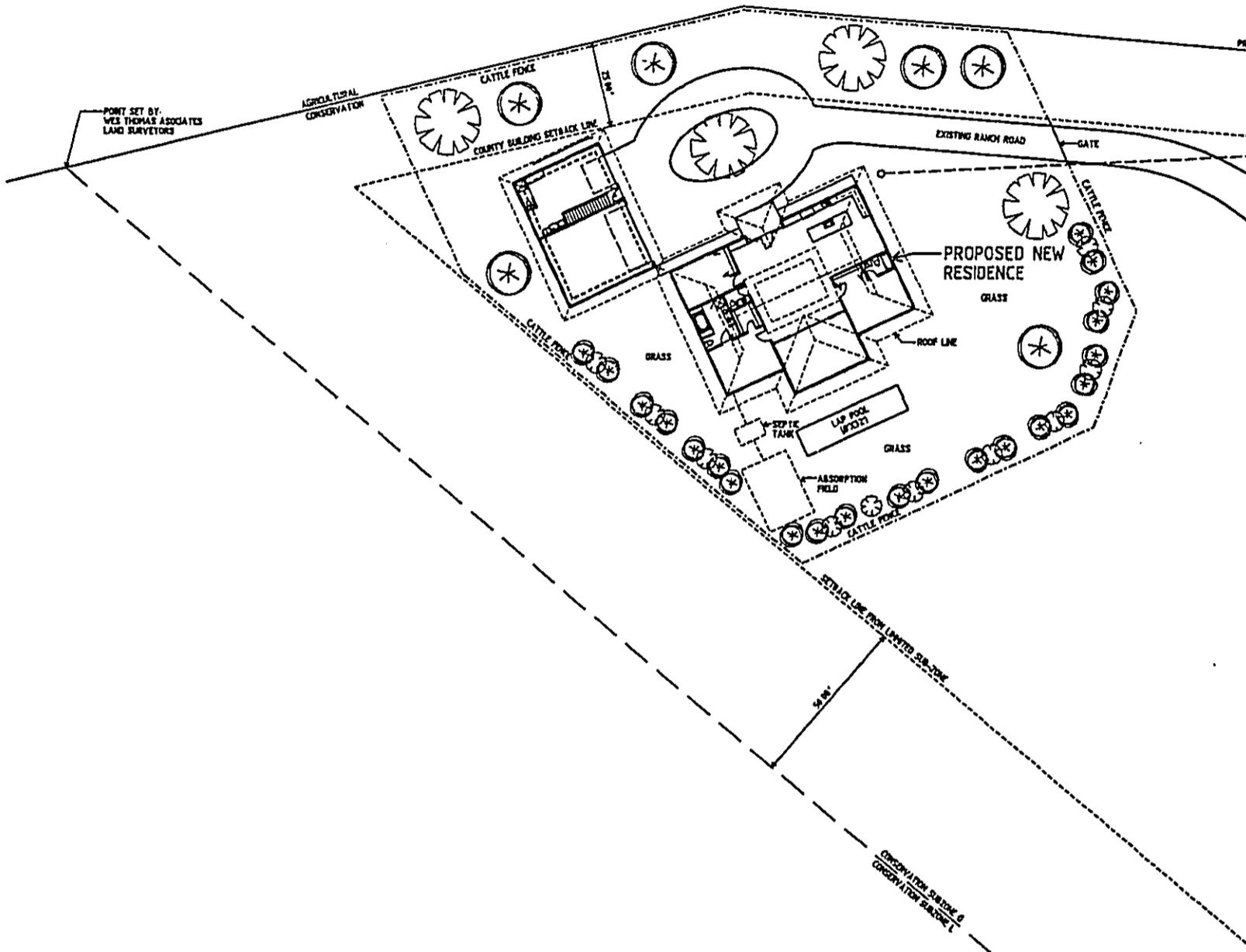
the issuance of grading permit.

**11.0 WRITTEN COMMENTS AND RESPONSES DURING PUBLIC REVIEW PERIOD**

Agency comments were received from the Office of Environmental Quality Control (OEQC), the Division of State Parks of the Department of Land and Natural Resources and the State of Hawaii Department of Health regarding the Draft EA or the CDUA (HA-2968B) filed by the Applicant for the proposed single family residence. Copies of the written agency comments and the Applicant's respective responses are attached an appendix to the Final EA. (See, Appendix A, Draft EA Comments and Responses)

# MAP/DRAWING#

0098

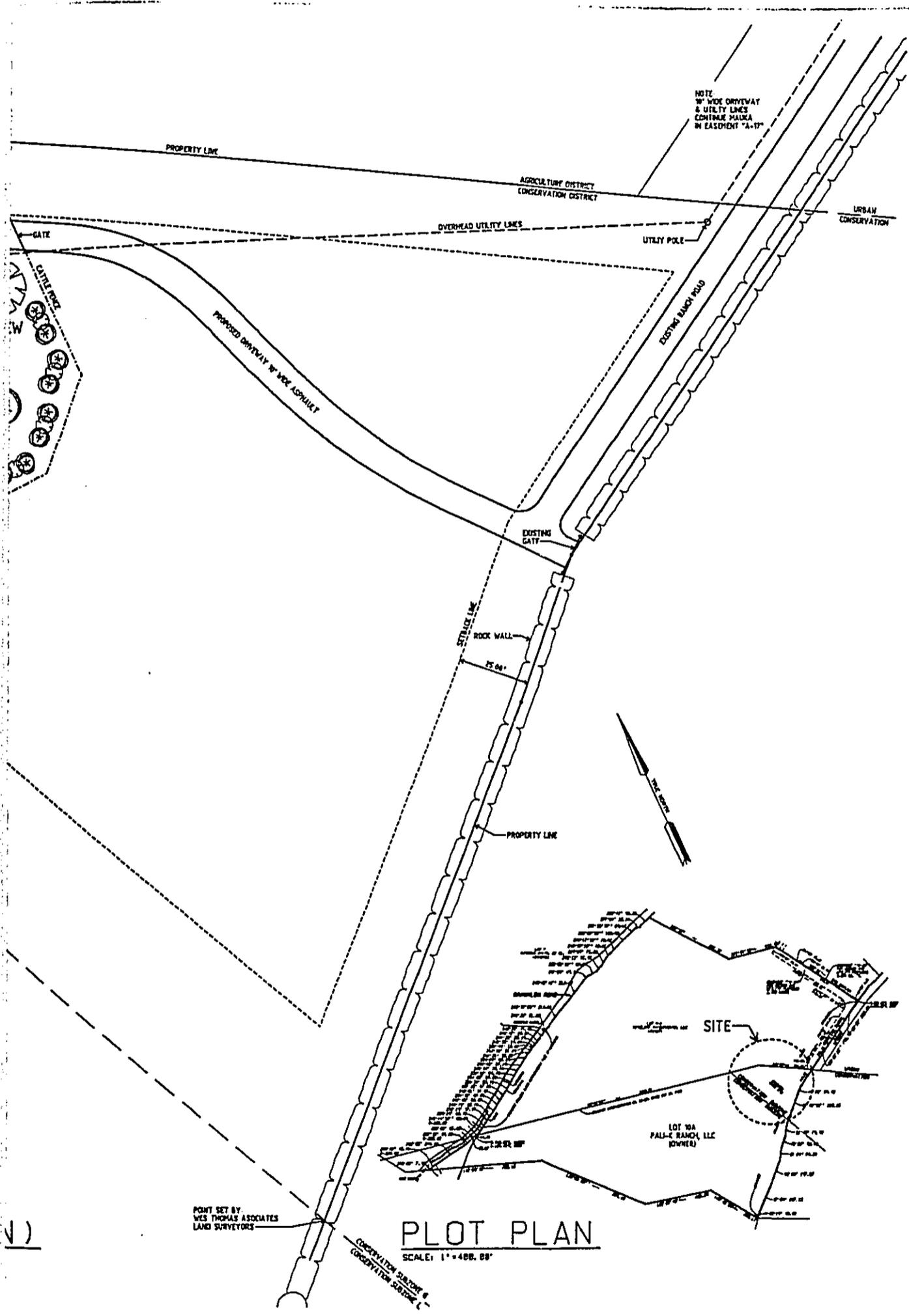


**SITE & LANDSCAPE PLAN (PRIMARY LOCATION)**

SCALE: 1" = 20.00'

**EXHIBIT E 2**

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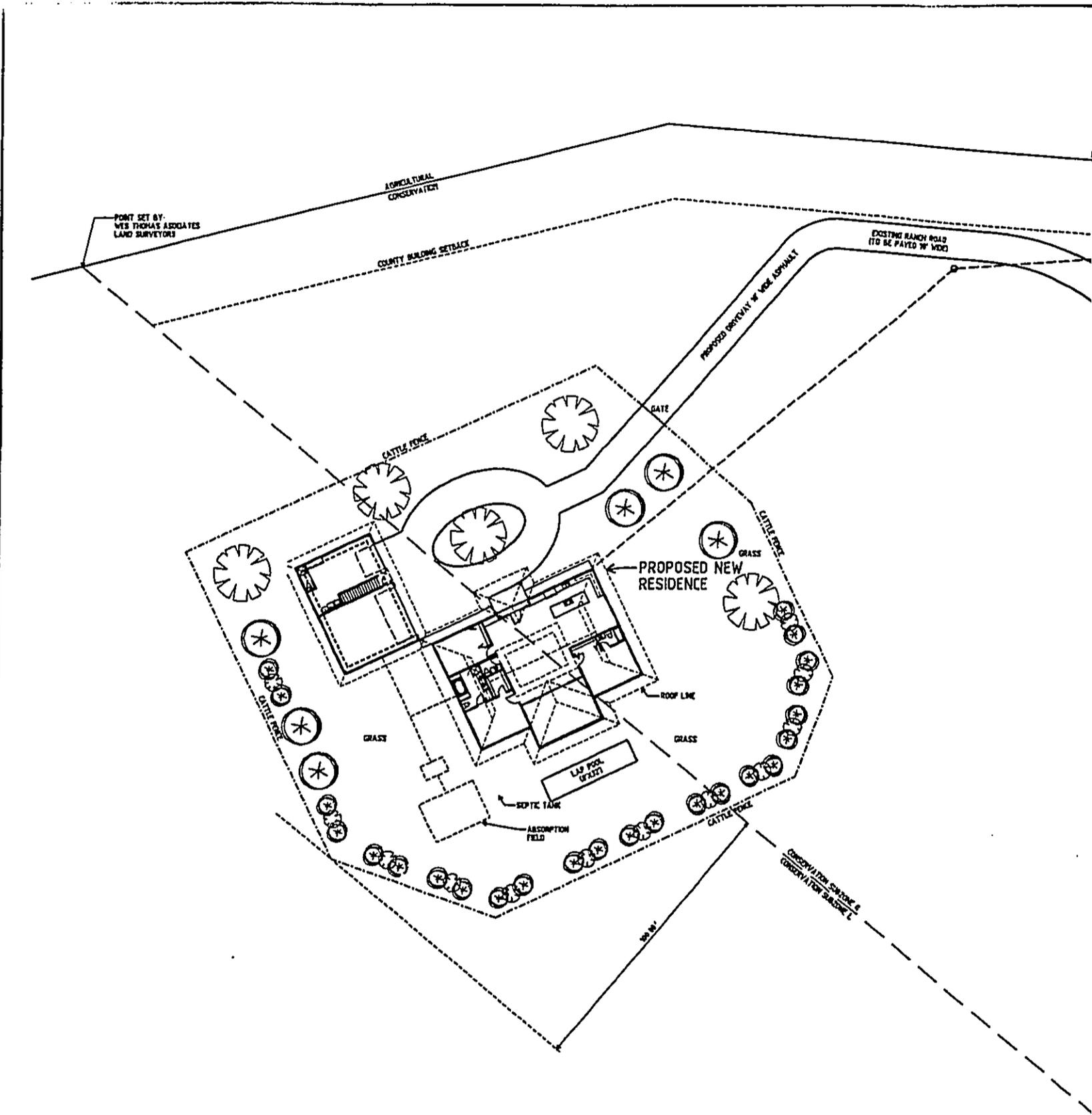
REVISIONS	BY

**PIPER DESIGNS**

Pala Piper  
72-108 Mamalahoe Hwy.  
Kula, Hawaii 96710  
331-2244

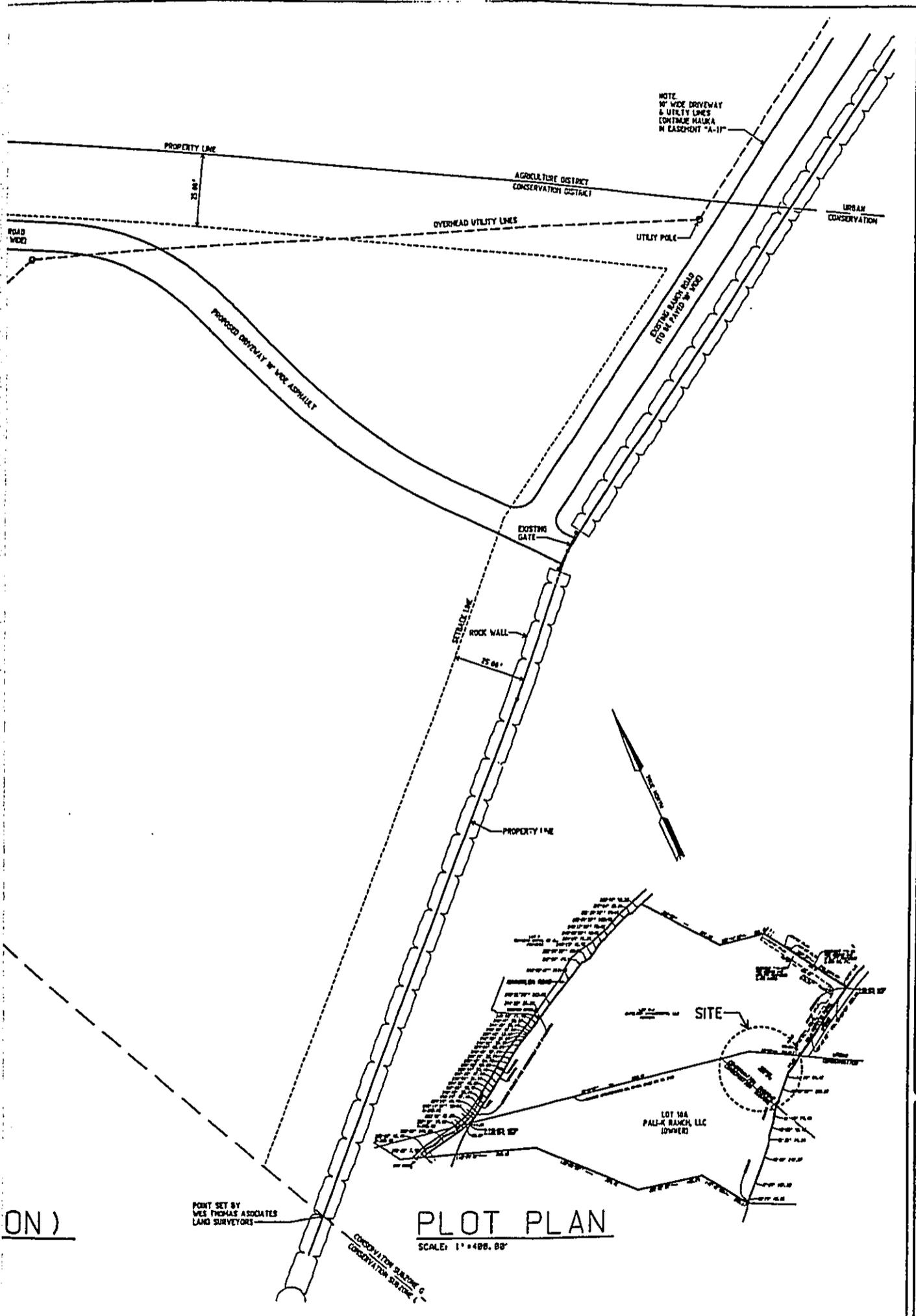
A PROPOSED NEW RESIDENCE FOR:  
**PALI-K RANCH, LLC**  
 KAAWALOA S.-KONA, ISLAND, COUNTY & STATE OF HAWAII  
 T.M.K. (3) 8-1-10-5

DRAWN BY PJP	JOB # P91038
DATE: 11/15/99	
SCALE: 1" = 20.00'	
DRAWING: SITE & LANDSCAPE PLAN	
SHEET	
1a	



**SITE & LANDSCAPE PLAN (ALTERNATE LOCATION)**

SCALE: 1" = 20.00'



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**PIPER DESIGNS**

Pete Piper  
72-108 Hanalei Hwy.  
Kauai, HI 96710  
331-2244

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**PALI-K RANCH, LLC**  
 KAAWALO A S.-KONA, ISLAND, COUNTY & STATE OF HAWAII  
 T.M.K. (3) 8-1-10:5

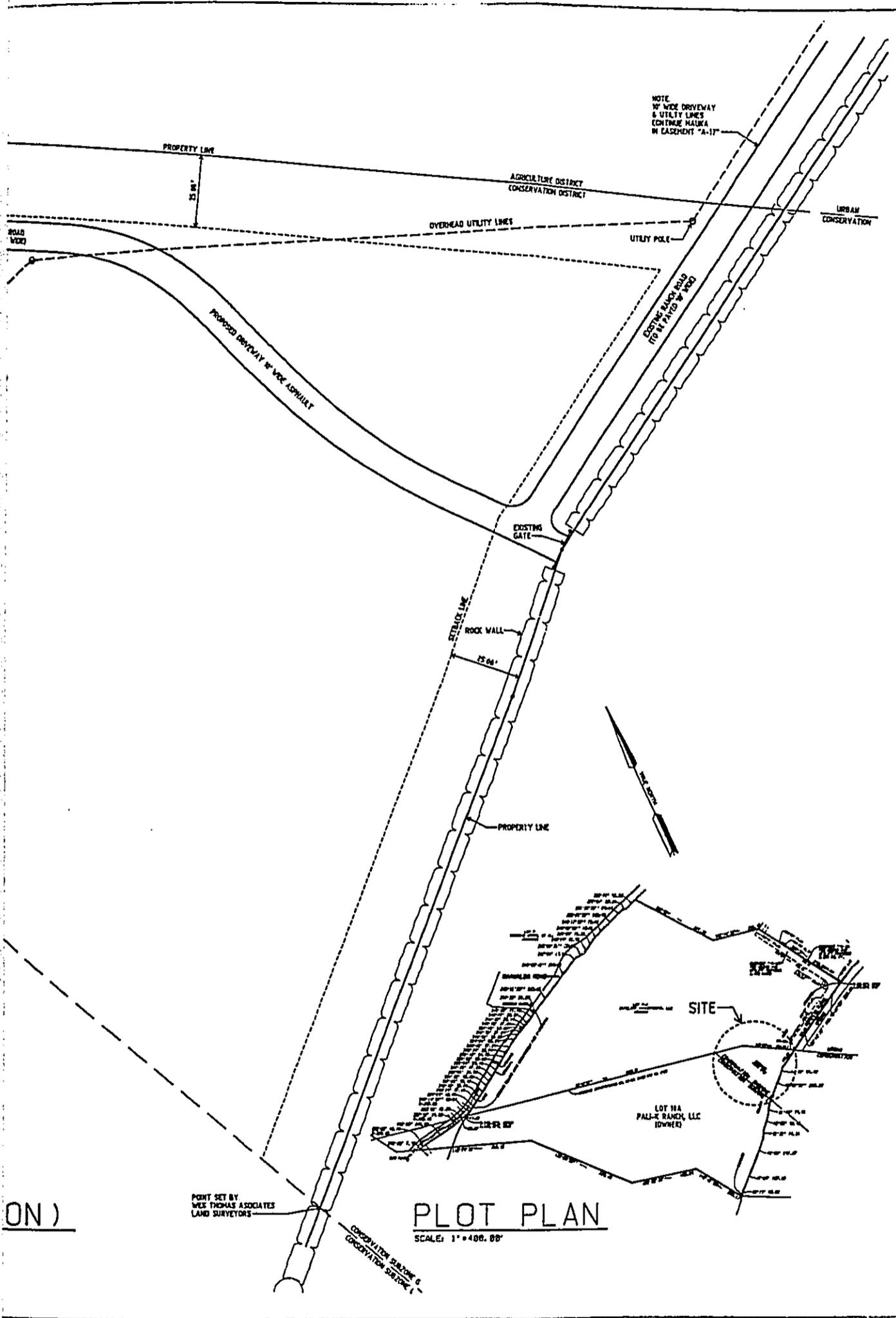
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3 OF 4 SHEETS	

ON )

**PLOT PLAN**  
SCALE: 1" = 480.00'

# CORRECTION

THE PRECEDING DOCUMENT(S) HAS  
BEEN REPHOTOGRAPHED TO ASSURE  
LEGIBILITY  
SEE FRAME(S)  
IMMEDIATELY FOLLOWING



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 Patn Piper 331-2244  
 72-408 Monroeville Hwy. Kula, Hawaii, HI 96740

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 KAAWALOA S.-KONA, ISLAND, COUNTY & STATE OF HAWAII  
 T.M.K. (3) 8-1-10-5

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DATE: 11/15/99

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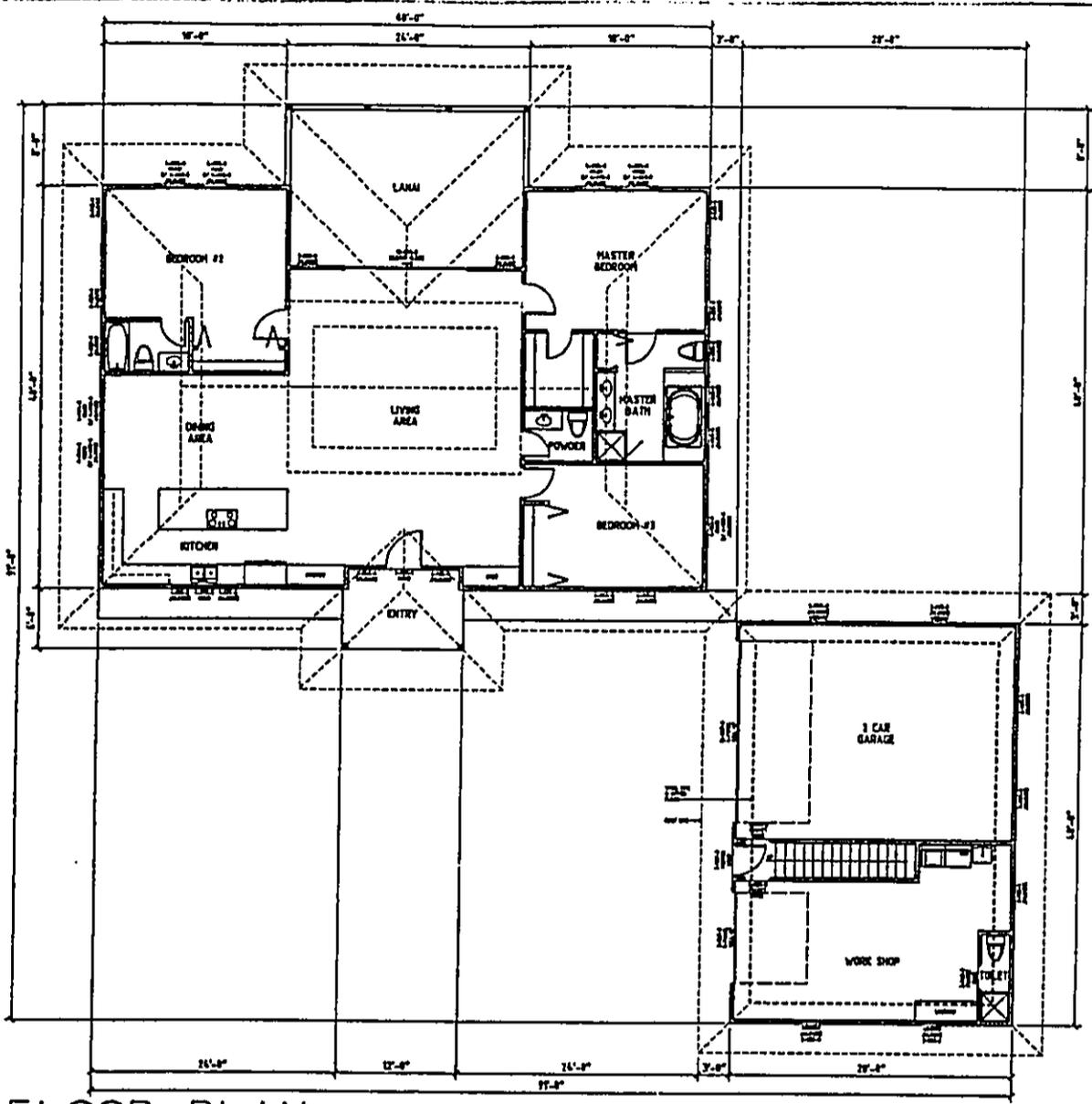
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SHEET

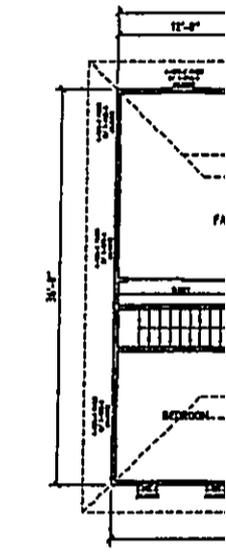
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3 OF 4 SHEETS

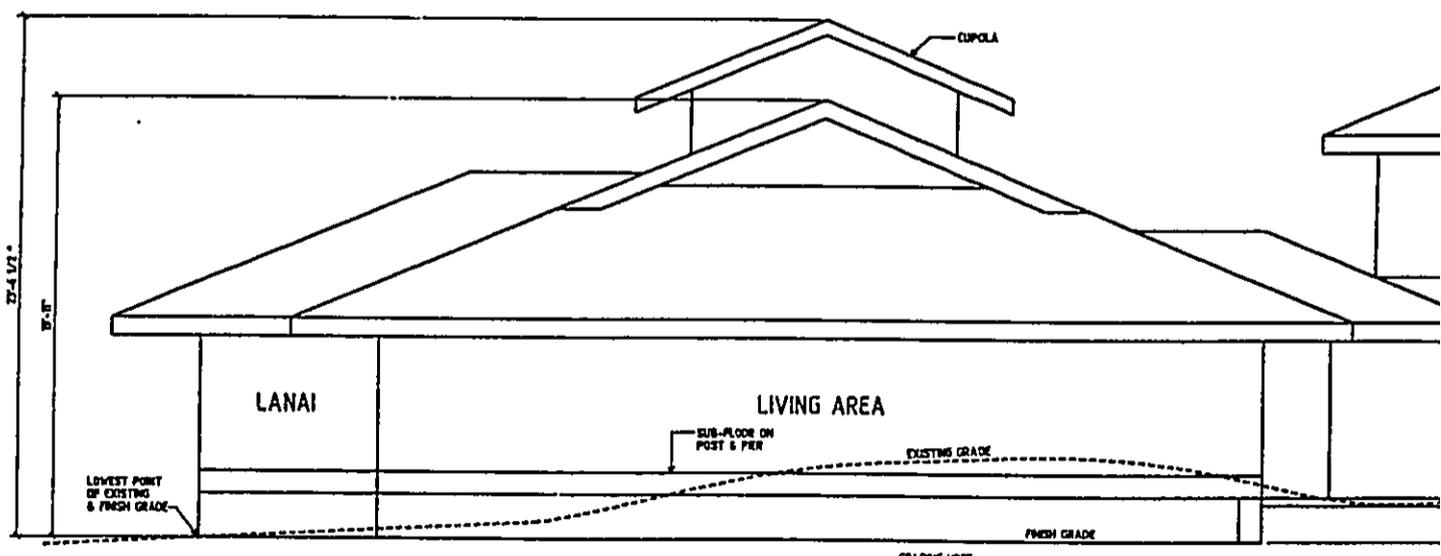
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**FLOOR PLAN (MAIN FLOOR)**  
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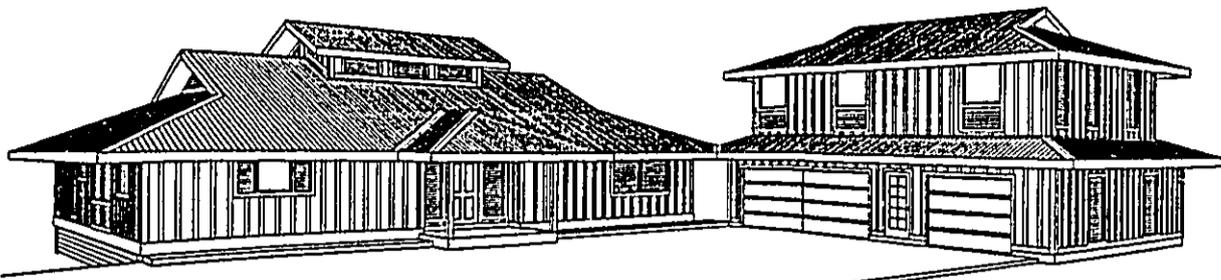


**FLOOR P**  
SCALE: 1/8"=1'-0"

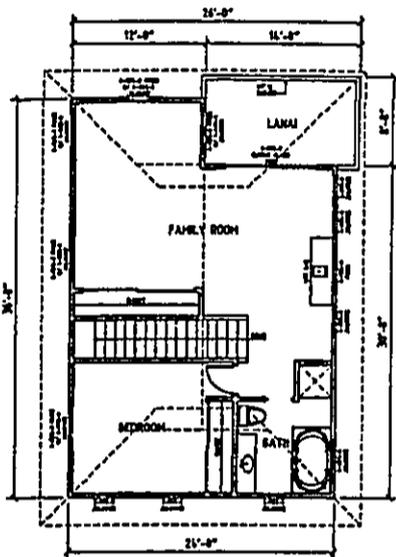


**SITE PROFILE**  
SCALE: 1/4"=1'-0"

**GRADING NOTE:**  
THE HIGHEST POINT OF THE EXISTING GRADE  
IF LESS THAN 3" FROM THE LOWEST POINT OF  
EXISTING OR FRESH GRADE, CUT AND FILL TO  
FRESH GRADE WILL BE FURTHER INDICATED  
BY USING POST & PIER UNDER MAIN STRUCTURE.  
ALL CUT MATERIAL WILL BE USED AS FILL ON  
SITE.

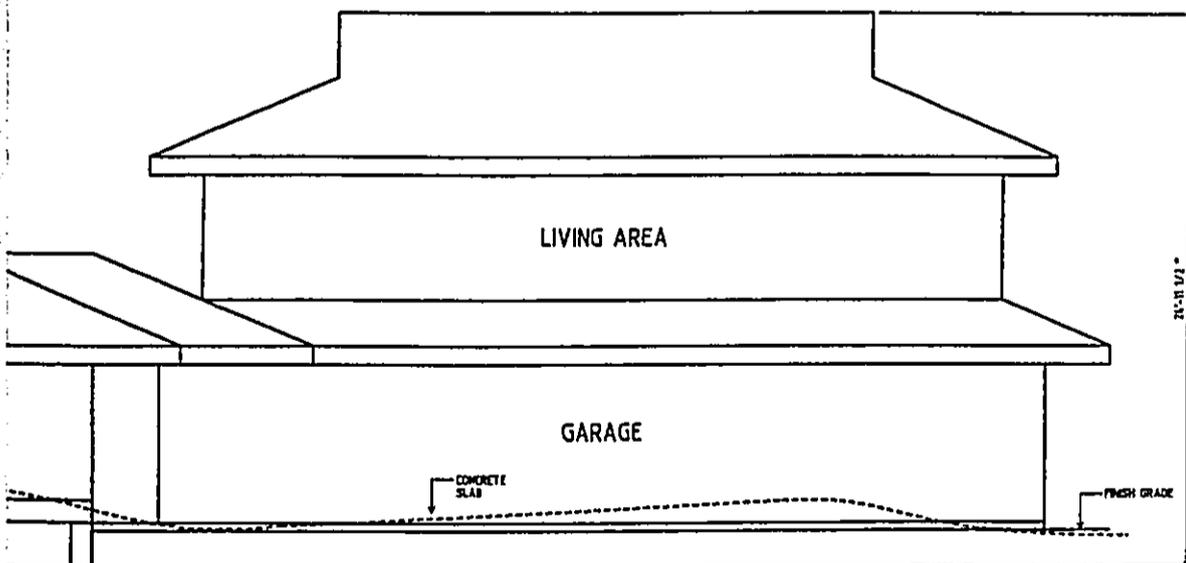


A NEW RESIDENCE FOR:  
**PALI-K RANCH, LLC**



**FLOOR PLAN (UPPER FLOOR)**  
 SCALE: 1/8" = 1'-0"

PROJECT DATA	
LOT AREA	31.234 ACRES
SETBACKS	25'-0"
MAX BUILDING HEIGHT	25'-0"
BUILDING HEIGHT	16'-11 1/2"
LIVING AREA	2,796 S.F.
LANAI AREA	579 S.F.
GARAGE AREA	1,120 S.F.
SWIMMING POOL	256 S.F.
TOTAL AREA	6,945 S.F.



REVISIONS	BY

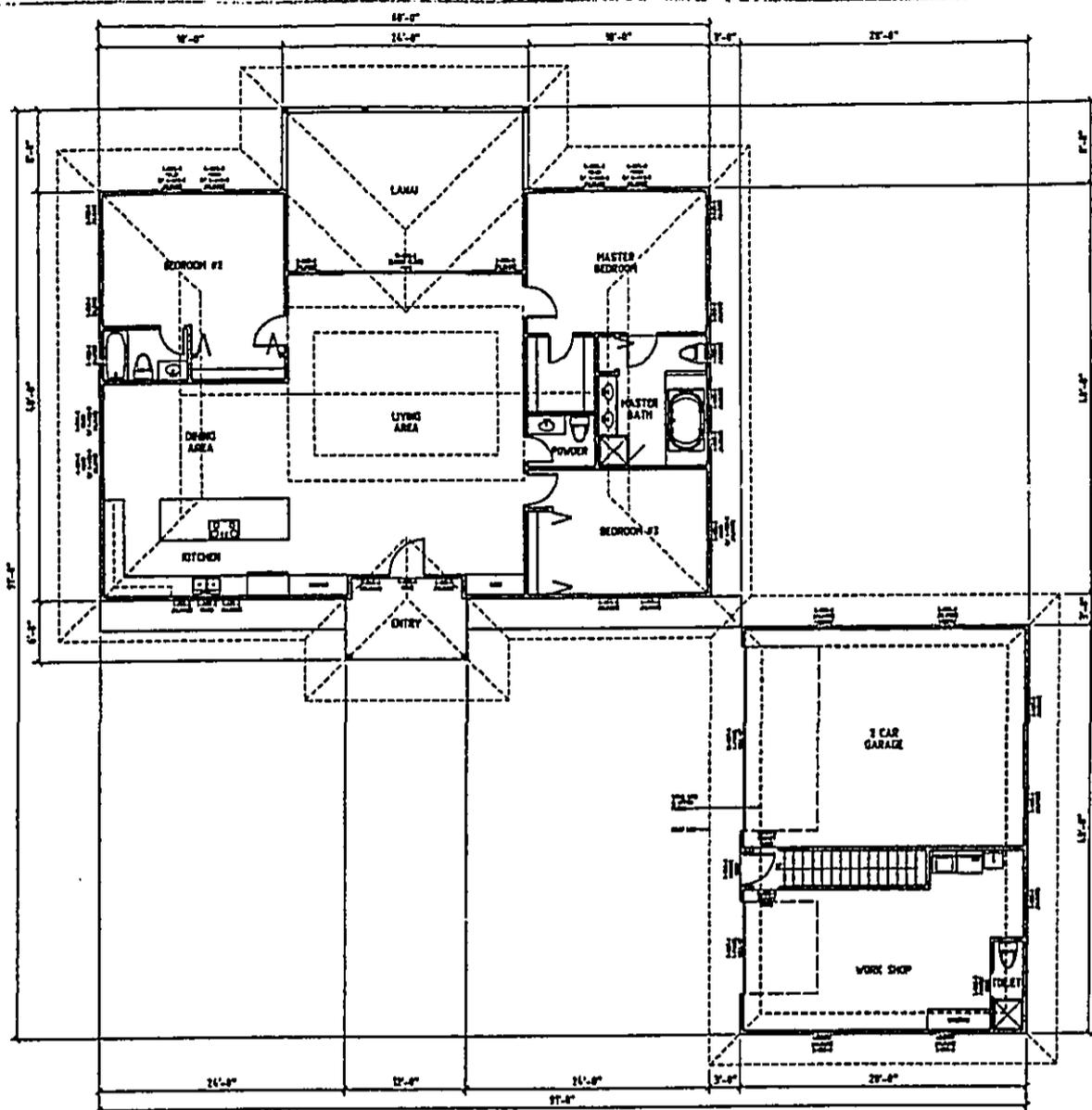
**PIPER DESIGNS**  
 Pete Piper  
 77-008 Kamehameha Hwy.  
 331-2244  
 Kalaheo, HI 96810

A PROPOSED NEW RESIDENCE FOR:  
**PALI-K RANCH, LLC**  
 KAAWALO A S.-KONA, ISLAND, COUNTY & STATE OF HAWAII  
 T.M.K. (3) 8-1-10:5

DRAWN P.P.	JOB # P99038
DATE: 11/15/99	
SCALE: AS NOTED	
DRAWING: AS NOTED	
SHEET <b>2</b>	
3 OF 4 SHEETS	

# CORRECTION

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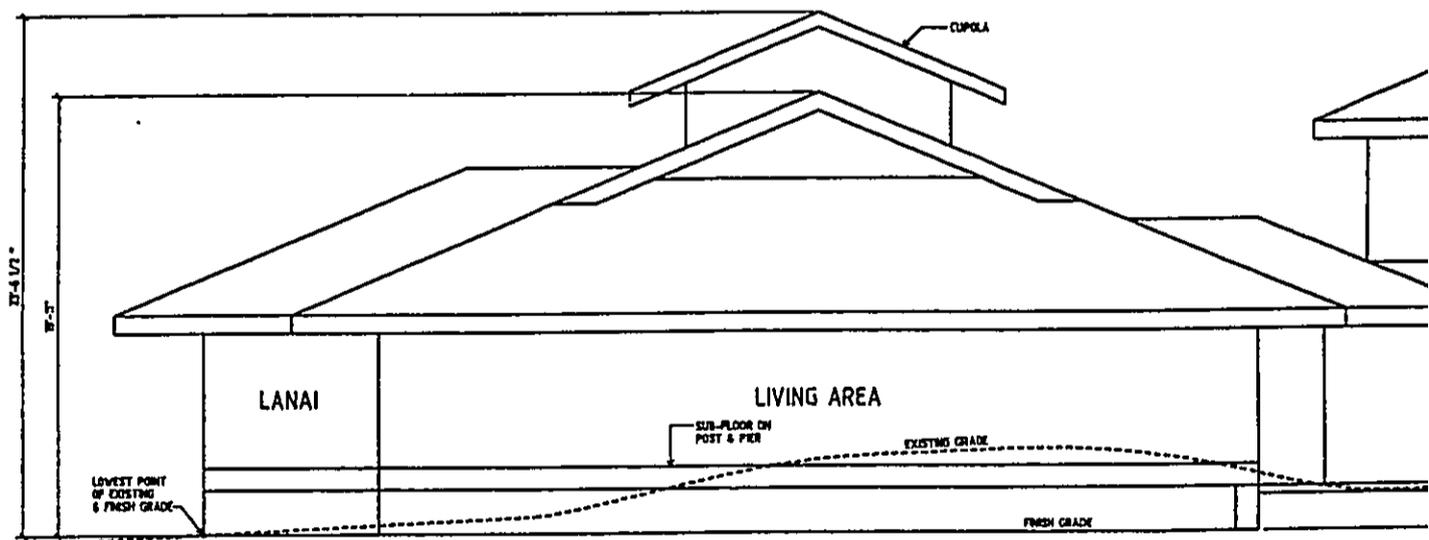


FLOOR PLAN (MAIN FLOOR)

SCALE: 1/8" = 1'-0"

FLOOR P

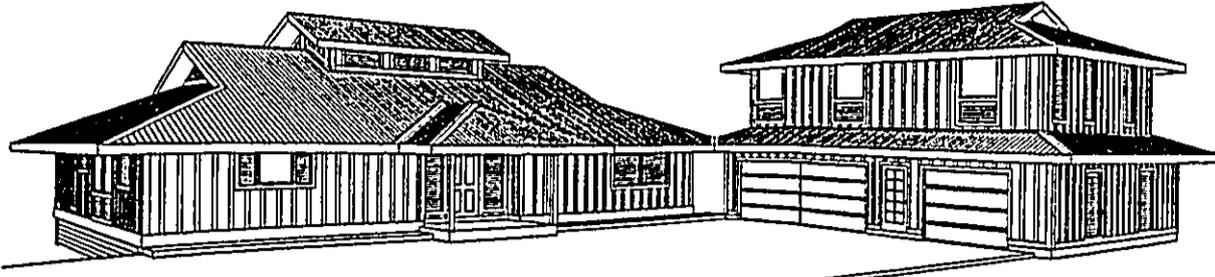
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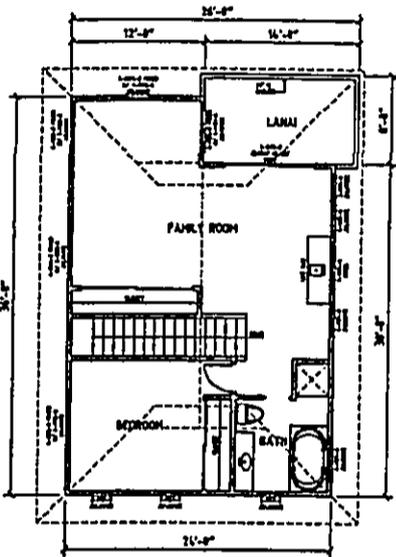
SITE PROFILE

SCALE: 1/4" = 1'-0"

GRADING NOTE:  
 THE HIGHEST POINT OF THE EXISTING GRADE IS LESS THAN 4" FROM THE LOWEST POINT OF EXISTING OR FINISH GRADE. CUT AND FILL TO FINISH GRADE WILL BE FURTHER MINIMIZED BY USING POST & PIER UNDER MAIN STRUCTURE. ALL CUT MATERIAL WILL BE USED AS FILL ON SITE.

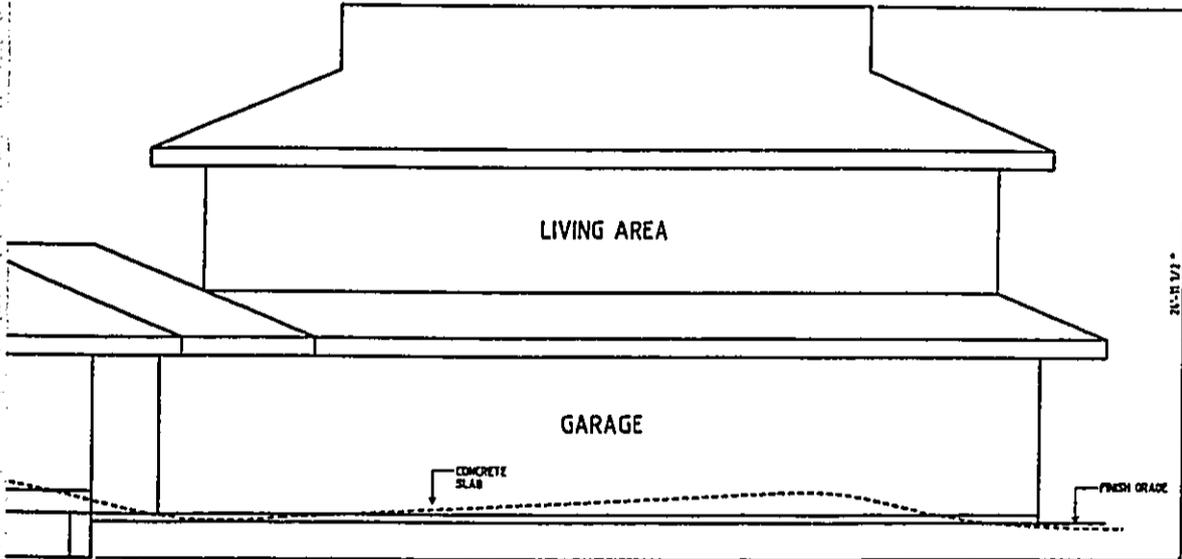


A NEW RESIDENCE FOR:  
**PALI-K RANCH, LLC**



**FLOOR PLAN (UPPER FLOOR)**  
 SCALE: 1/8" = 1'-0"

PROJECT DATA	
LOT AREA	11,234 ACRES
SETBACKS	25' 0"
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SWIMMING POOL	256 S.F.
TOTAL AREA	4,334 S.F.

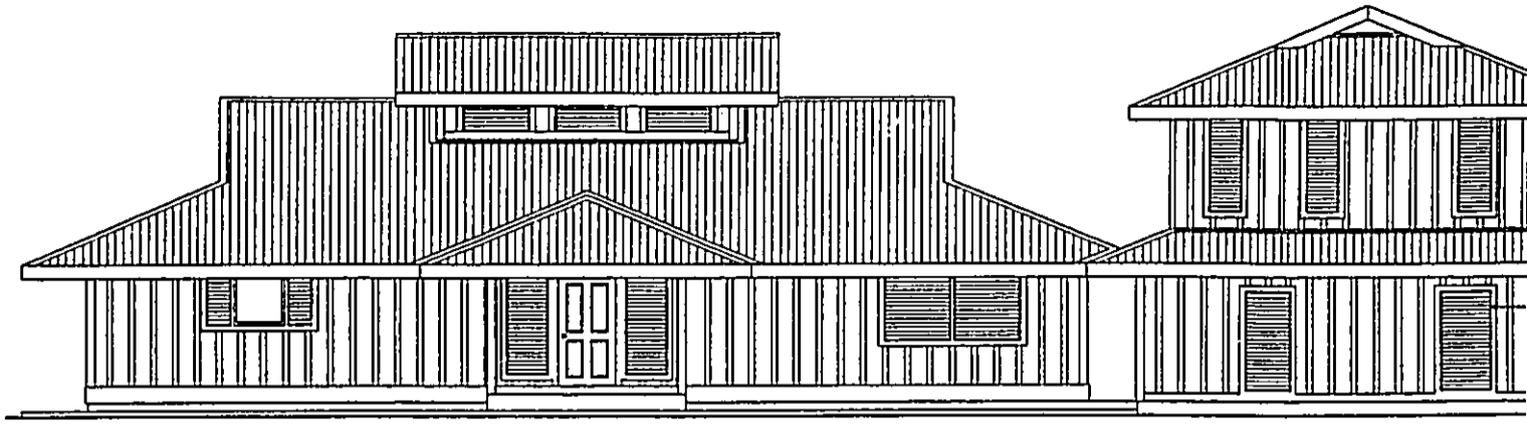


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**PIPER DESIGNS**  
 Pete Piper  
 72-4018 Honolulu Hwy.  
 331-2244  
 Kula, Hawaii, 96710

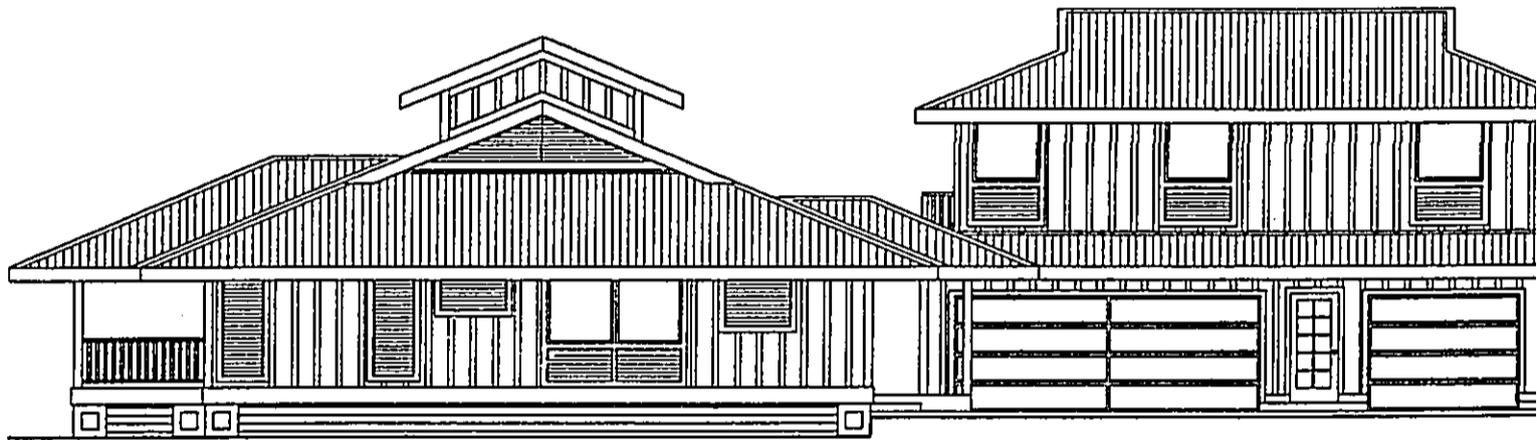
A PROPOSED NEW RESIDENCE FOR:  
**PALI-K RANCH, LLC**  
 KAAWALOA S.-KONA, ISLAND, COUNTY & STATE OF HAWAII  
 T.M.K. (3) 8-1-10:5

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SCALE: AS NOTED	
DRAWING: AS NOTED	
SHEET <b>2</b>	
3 OF 4 SHEETS	



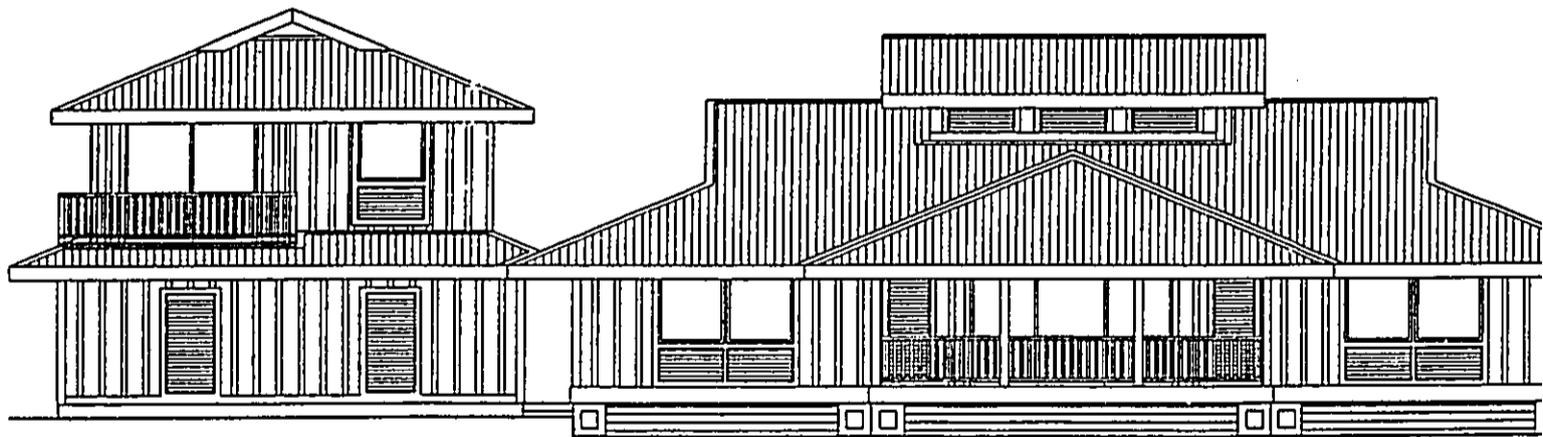
NORTH ELEVATION (FRONT)

SCALE: 1/8" = 1'-0"



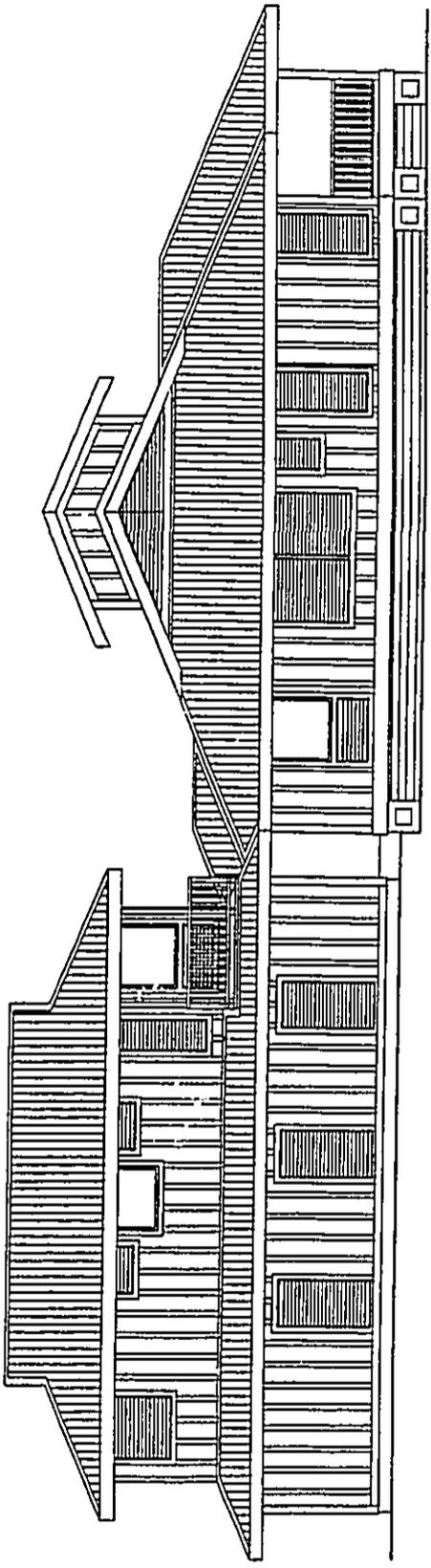
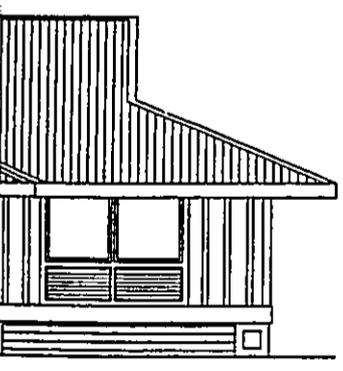
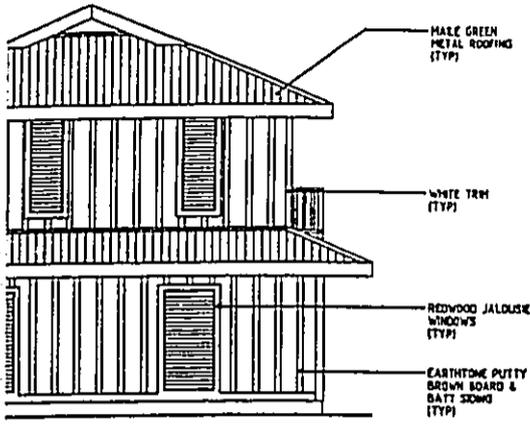
EAST ELEVATION (LEFT)

SCALE: 1/8" = 1'-0"



SOUTH ELEVATION (REAR)

SCALE: 1/8" = 1'-0"



WEST ELEVATION (RIGHT)  
SCALE: 1/8"=1'-0"

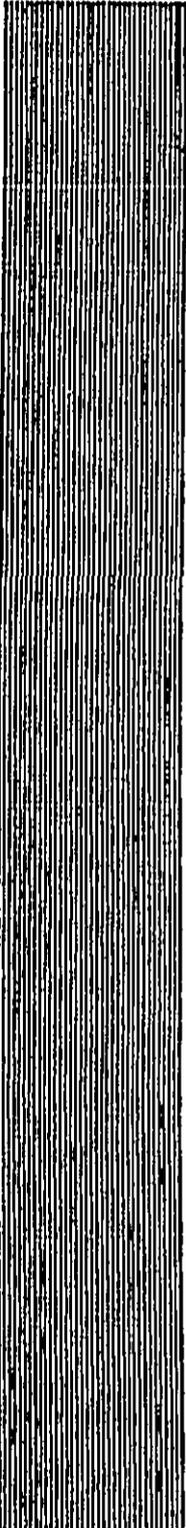
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**PIPER DESIGNS**  
 Peta Piper  
 72-006 Honolulu Hwy.  
 331-2244  
 Kula-Kona, HI 96740

A PROPOSED NEW RESIDENCE FOR:  
**PALI-K RANCH, LLC**  
 KAAWALOA S.-KONA, ISLAND, COUNTY & STATE OF HAWAII  
 T.M.K. (3) 8-1-10:5

DRAWN: P.P.	JOB #: P99038
DATE: 11/15/99	
SCALE: 1/4" = 1'-0"	
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SHEET	
4 OF 4 SHEETS	

Report 1978-071399



## Archaeological Inventory Survey of the Norrie Property

Ka'awaloa Ahupua'a  
South Kona, Island of Hawai'i  
(TMK: 3-8-1-10:por. 05)

**PHRI**

Paul H. Rosendahl, Ph.D., Inc.

*Archaeological • Historical • Cultural Resource Management Studies & Services*

**EXHIBIT E 3**

Report 1978-071399

## Archaeological Inventory Survey of the Norrie Property

Ka'awaloa Ahupua'a

South Kona, Island of Hawai'i

(TMK: 3-8-1-10:por. 05)

BY

*Robert B. Rechtman, Ph.D. • Senior Archaeologist*

PREPARED FOR

*Mr. Christopher Norrie  
Pali-K Ranch, LLC  
Captain Cook, Hawai'i*

JULY 1999

# PHRI

Paul H. Rosendahl, Ph.D., Inc.

Archaeological • Historical • Cultural Resource Management Studies & Services

204 Wai'anuenue Avenue, Hilo, Hawai'i 96720 (808)969-1763 • P.O. Box 23305, G.M.F., Guam 96921 (671) 472-3117

## EXECUTIVE SUMMARY

At the request of Mr. Christopher Norrie, Paul H. Rosendahl, Ph.D., Inc (PHRI) conducted an archaeological inventory survey of a portion of TMK:3-8-1-10:05 in the *ahupua'a* of Ka'awaloa, South Kona District, Island of Hawai'i (Figure 1). This work was undertaken in support of state permitting requirements for the residential use of Conservation District designated land. The landowner proposes to construct a single-family dwelling with an associated vehicle and utility access corridor. It is the landowner's intention to preserve any archaeological sites within the project area through avoidance if practical. Where it is determined impractical, data recovery will be proposed for significant sites. The project area is 225-265 meters (740-870 feet) above sea level, roughly 500 meters (1,640 feet) inland of the steep cliff known as *Pali Kapu O Keoua* that overlooks Kealahou Bay. The project area is part of a larger area that had been previously inventoried by PHRI (Walker et al. 1991). Five sites were previously recorded in the project area, and six additional sites were identified during the current survey. Only two of these eleven sites will be impacted by the proposed development, and both are recommended for data recovery. The remaining nine sites will be avoided and thereby preserved for future investigation.

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## INTRODUCTION

At the request of Mr. Christopher Norrie, Paul H. Rosendahl, Ph.D., Inc (PHRI) conducted an archaeological inventory survey of a portion of TMK:3-8-1-10:05 in the *ahupua'a* of Ka'awaloa, South Kona District, Island of Hawai'i (Figure 1). This work was undertaken in support of state permitting requirements for the residential use of Conservation District designated land. The current project area is part of a larger project area that had been previously inventoried by PHRI (Walker et al. 1991) for a prior landowner. The current landowner proposes to construct a single-family dwelling with an associated vehicle and utility access corridor. The current inventory survey includes the access corridor, a triangular portion of the parcel designated as Conservation Subzone G (Subparcel G), and a 30-meter-wide buffer area within the adjacent Conservation Subzone L along the western Subzone G boundary (Figure 2). It is the landowner's intention to preserve any archaeological sites within the project area through avoidance if practical. Where it is determined impractical, data recovery will be proposed for significant sites.

## BACKGROUND

Walker et al. (1991) conducted an archaeological study of the current project area as part of a larger inventory survey. They provide a comprehensive background discussion relative to the project area's physical setting, regional cultural context, and prior archaeological investigations. The brief discussions presented below are abstracted from that report (Walker et al. 1991:2-8).

### PHYSICAL SETTING

The project area is 225-265 meters (740-870 feet) above sea level, roughly 500 meters (1,640 feet) inland of the steep cliff known as *Pali Kapu O Keoua* that overlooks Kealakekua Bay. The terrain is relatively level and possesses shallow, well-drained, stony silt loam of the *Waiaha Series* (Sato et al. 1973). Temperature in the area fluctuates annually with a mean high of about 80 degrees and a mean low of about 60 degrees Fahrenheit; rainfall averages fifty inches a year, with the heaviest rain in the summer months (Armstrong 1983). Current temperature is higher and rainfall lower in the area than would have been the case prior to the extensive deforestation that occurred in the region following European contact. The pre-contact temperature and rainfall patterns were obviously well suited for the cultivation of a variety of Polynesian economic crops. Current vegetation within the project area includes various introduced grasses and weeds, Christmas-berry (*Schinus terebinthifolius*), *koa-haole* (*Leucaena leucocephala*), *lantana* (*Lantana camara*), monkeypod (*Samanea saman*), an *'opiuma* (*Pithecellobium dulce*).

The project area is within the boundaries of the Kona Field System (SIHP Site 6601) and the Kealakekua Bay Historic District (SIHP Site 7000). Determined eligible for listing on the National Register of Historic Places (NRHP), the Kona Field System is a complex of dryland agricultural and habitation features covering approximately 60 square miles minimally between Kailua-Kona and Hookena. Listed on the NRHP in 1974, the Kealakekua Bay Historic District, among other things, is noted as the location of the death of Captain James Cook in AD 1779.

### CULTURAL CONTEXT

The *ahupua'a* of Ka'awaloa is recognized (Kalima 1991) as having been home to many important *ali'i*, including: Kalani'opu'u, king of the island and uncle of Kamehameha I; Kekuaokalani and Manono, a chief and chiefess who were killed during the famous battle of Kuamo'o in AD 1819 (Kuykendall 1968); and

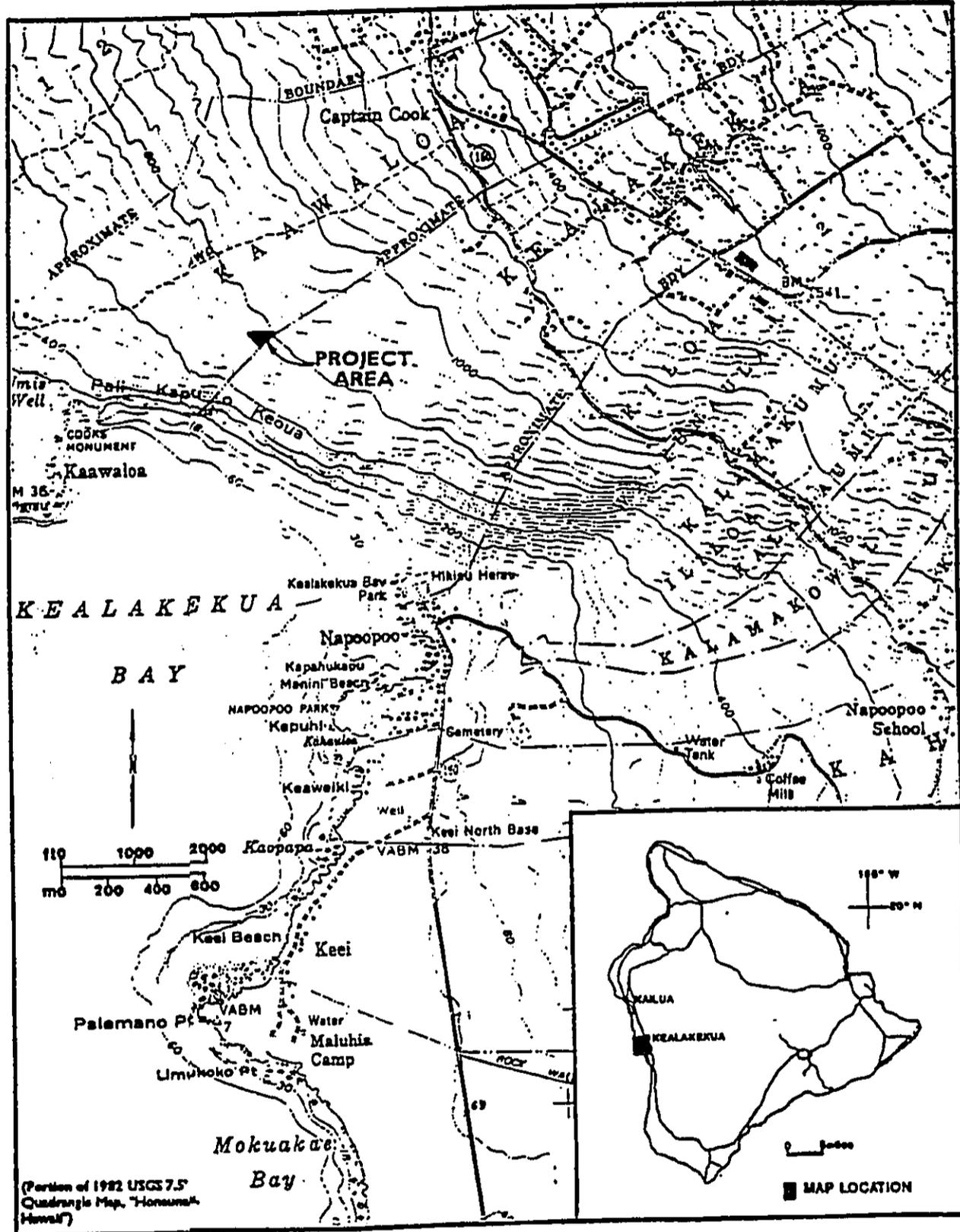


Figure 1. Project Area Location

Revised

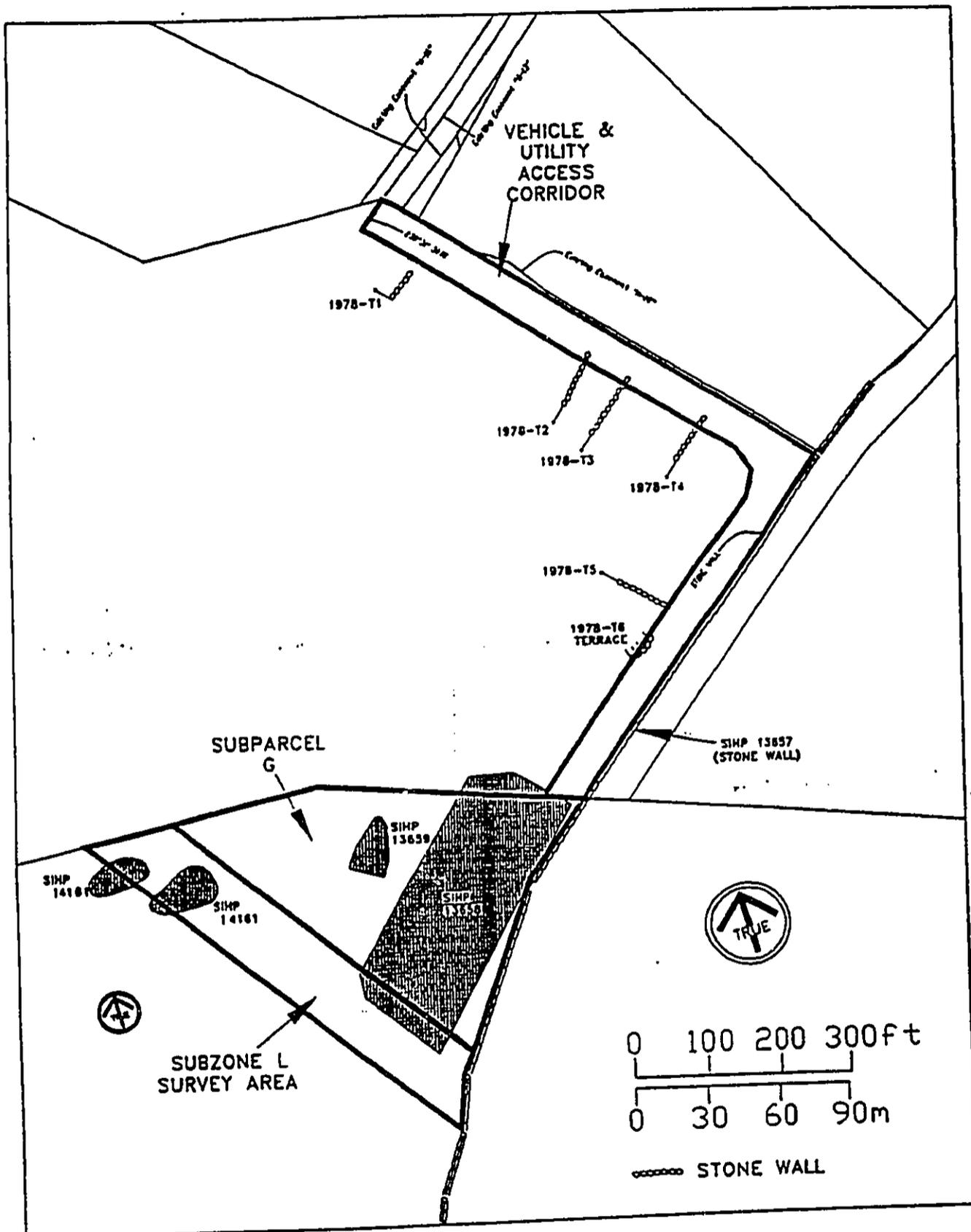


Figure 2. Limits of Current Survey

Chief Naihe and his wife, Chiefess Kapi'olani, known for her defiance of Pele in the days of the missionaries. The etymology of the name Ka'awaloa supports this assertion. Pukui et al. (1974:61) define the name as meaning "the distant kava," which refers to runners being sent to Puna or Waipi'o on the other side of the island to acquire *awa* for the Ka'awaloa chiefs.

During early historic times the area above *Pali Kapu O Keoua*, above Kealakekua Bay, was noted for the presence of extensive agricultural fields (Ellis 1782, Ledyard 1863, Menzies 1920). Many different crops were observed in the patchwork of lava rock-bordered fields, including sweet potatoes, breadfruit trees, plantains, bananas, taro, ginger, sugarcane, and paper mulberry. It seems likely that these fields supported chiefly interests as very few claims for Ka'awaloa land were filed during the Great Mahele. The *ahupua'a* was listed as government land, and a large grant of 2,100 acres, including the current project area, was awarded to Keohokalole, mother of King David Kalakaua. Two other Land Commission Awards (LCA) were made within Ka'awaloa, distant from the current project area: LCA 6750 to 'Awahua (the *konohiki*) and LCA 9446 to Mano'auwa'a. This suggests that any residential sites within the project area were of a temporary nature, occupied by individuals actively working the agricultural fields.

### PRIOR ARCHAEOLOGICAL INVESTIGATIONS

The current study area was part of a larger regional study conducted by Soehren and Newman (1968). They identified fifteen sites and site complexes, and numerous intact linear features associated with vast agricultural fields above Kealakekua Bay, which are recognized as part of the extensive Kona Field System. The features were initially identified with the aid of aerial photographs, and their presence was verified during limited field checks. The bulk of their report is devoted to discussions of the Kona Field System, and the importance of preserving *en masse*, portions of the system's features as part of the significant Kealakekua Bay Historic District.

The only other archaeological study that included the project area was an inventory survey conducted by PHRI in 1990 (Walker et al. 1991). These investigators surveyed the bulk of current study area as part of a larger survey. They recorded five sites in the current study area (SIHP Sites 13657, 13658, 13659, 14160, and 14161), and recommended data recovery for four of the five. Although Site 13657 was considered to be "important for information content," no further data recovery was recommended (Walker et al. 1991:32).

## FIELDWORK AND FINDINGS

On June 9, 1999, Robert B. Rechtman, Ph.D. and Jack D. Henry, B.A. performed a 100% surface reconnaissance of the 15-meter wide access and utility corridor and an inspection of the sites in the previously inventoried triangular-shaped Subparcel G. On June 17, 1999, Dr. Rechtman conducted additional fieldwork that included a reconnaissance of a 30-meter wide, also previously inventoried, strip along the western boundary of Subparcel G. This 30-meter strip is completely outside the proposed project area, and any sites within this strip will not be impacted by the development of the proposed project.

### ACCESS AND UTILITY CORRIDOR

Within the 15-meter wide access and utility corridor (known as Easement A-17) roughly seven meters consist of a previously graded ranch road, the remaining eight meters being disturbed only by grazing cattle and horses. Portions of six features were recorded in this previously unsurveyed area. Five of the features are wall segments and one is a terrace and enclosure (see Figure 2). All of these features are likely components of the prehistoric Kona Field System (SIHP 6601), and as only those portions of the features within the project area were documented, formal site numbers were not obtained. Temporary field designations are used in this report.

Sites 1978-T1 through T4 are stone alignments running *mauka/makai*; only about six meters of each are within the project area. Site 1978-T5 is a stone alignment running perpendicular to the others, only about 50 centimeters of which is within the study area. All are constructed of piled angular basalt and appear to be boundary walls associated with the Kona Field System (SIHP Site 6601). *Table 1* provides metric data for each of these walls. Site 1978-T6 is a terrace and enclosure, only the extreme southern portion of the terrace is within the study area. The terrace is formed by a 70-centimeter wide, 60-centimeter (two course) high stone alignment along its southern edge. The northern, eastern, and western edges are level with the surrounding soil. Only the stone edge of this terrace falls within the project area.

**Table 1. Sites 1978-T1, T2, T3, T4, and T5**

Site No.	Width (m)	Height (m)	Construction
1978-T1	0.8	0.4	Piled
1978-T2	1.0	0.6	Stacked
1978-T3	1.5	0.6	Stacked
1978-T4	2.0	0.5	Stacked
1978-T5	1.2	0.6	Stacked

### SUBPARCEL G

Three sites had been previously recorded in the triangular area known as Subparcel G (SIHP Sites 13657, 13658, and 13659; see *Figure 2*). Site 13657 is a boundary wall that extends the length of the project area and beyond. The site was originally described by Walker et al. (1991:A1) as "weathered subangular basalt boulders stacked five to six courses high." This wall is 60 to 75 centimeters wide and 80 to 110 centimeters high and is not core-filled. This wall may represent the prehistoric Ka'awaloa/Kealākōkua Ahupua'a boundary, but it appears to have been rebuilt during historic times.

Site 13658 was recorded by Walker et al. (1991) as a complex of 14 agricultural features, including linear field boundary walls, terraces, and stone clearing or planting mounds (*Figure 3*). The site was interpreted as a relatively intact sample of the larger Kona Field System (SIHP 6601). This site was examined during the current field effort, and found to be in a further degraded state than when recorded by Walker et al. (1991). The stone-faced edges of the downslope sides of the terraces (Features C, E, F, G, H, I, and K) appear to have been somewhat dispersed by grazing livestock, and the linear field boundary walls were less intact than indicated on the earlier site map.

Walker et al. (1991) described Site 13659 as a temporary habitation complex consisting of two features, A and B; a third feature was recorded during the current field investigation (*Figure 4*). Features A and B are both roughly rectangular in plan and are constructed of low stacked walls forming terraces. Feature A is the larger of the two, measuring 11.5 by 9.0 meters. Its southwestern edge is 70 centimeters above the surrounding ground surface and 20 centimeters above the inner ground surface, forming a slightly enclosed terrace. Feature B is 7.0 by 2.0 meters and is constructed of loosely piled cobbles on top of and adjacent to an outcrop. Habitation debris, in the form of marine shell (cowry and 'opihi) was observed on the surface at both features. During the current field investigation a third feature, Feature C, was identified and recorded. Feature C is a small platform, roughly 3 by 2 meters. It is constructed of stacked 'a'a cobbles, is 50 centimeters high, and is faced on all sides. The formal characteristics of this feature are suggestive of a burial function. As it is the landowner's intention to preserve this feature, PHRI conducted no further evaluation of it during the current field project.

### 30-METER WIDE STRIP OF CONSERVATION SUBZONE L

Two sites had been previously recorded within the 30-meter wide strip along the western boundary of Subparcel G: SIHP Site 14160 and SIHP Site 14161. These sites were identified and reexamined as part of the current project. Both were found to be in a further state of ruin than noted during the previous survey (Walker et al. 1991). Site 14160 is an oval enclosure roughly 20 meters by 7 meters. The walls are

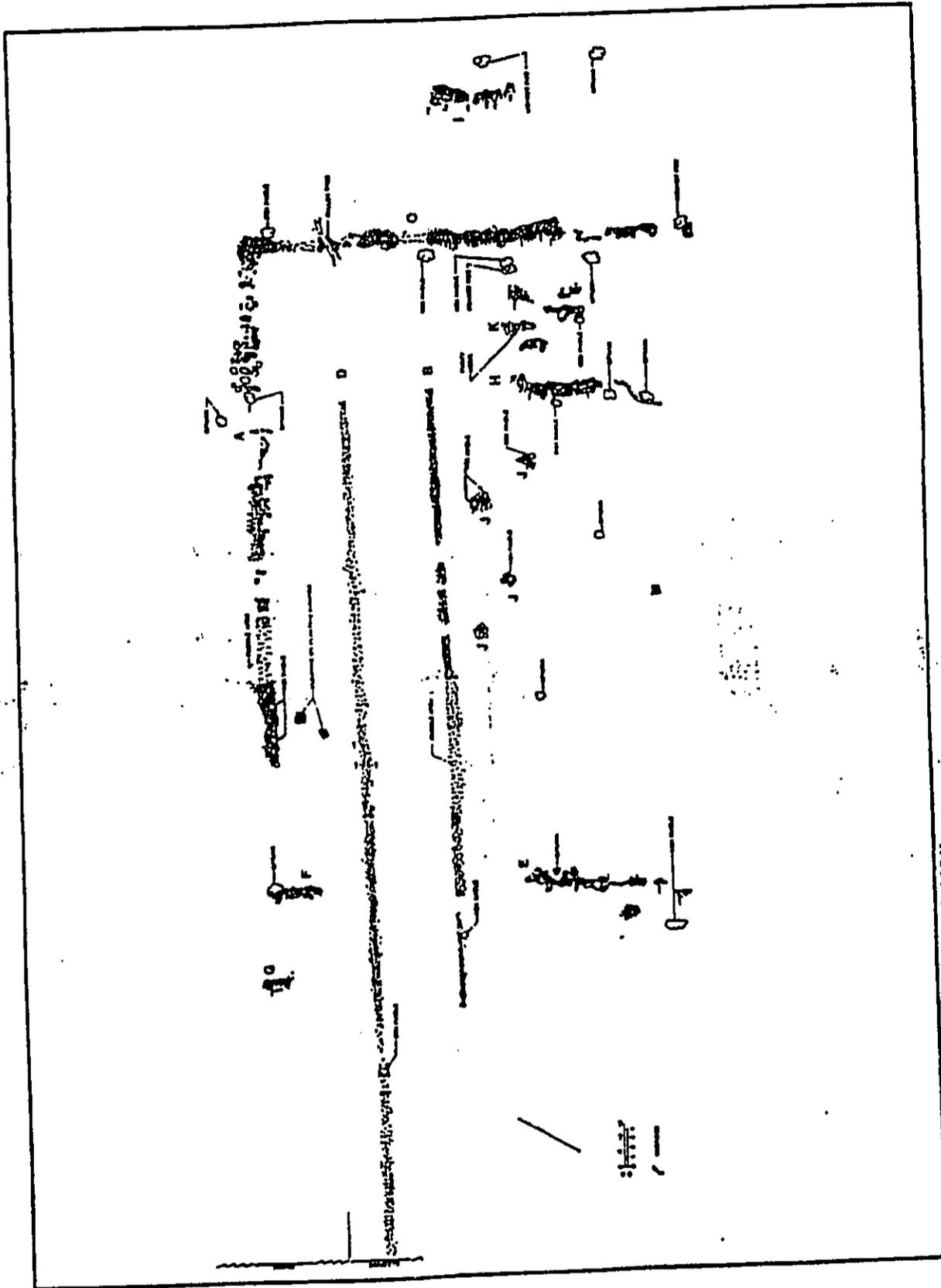


Figure 3. Site 13658 (after Walker et al. 1991)

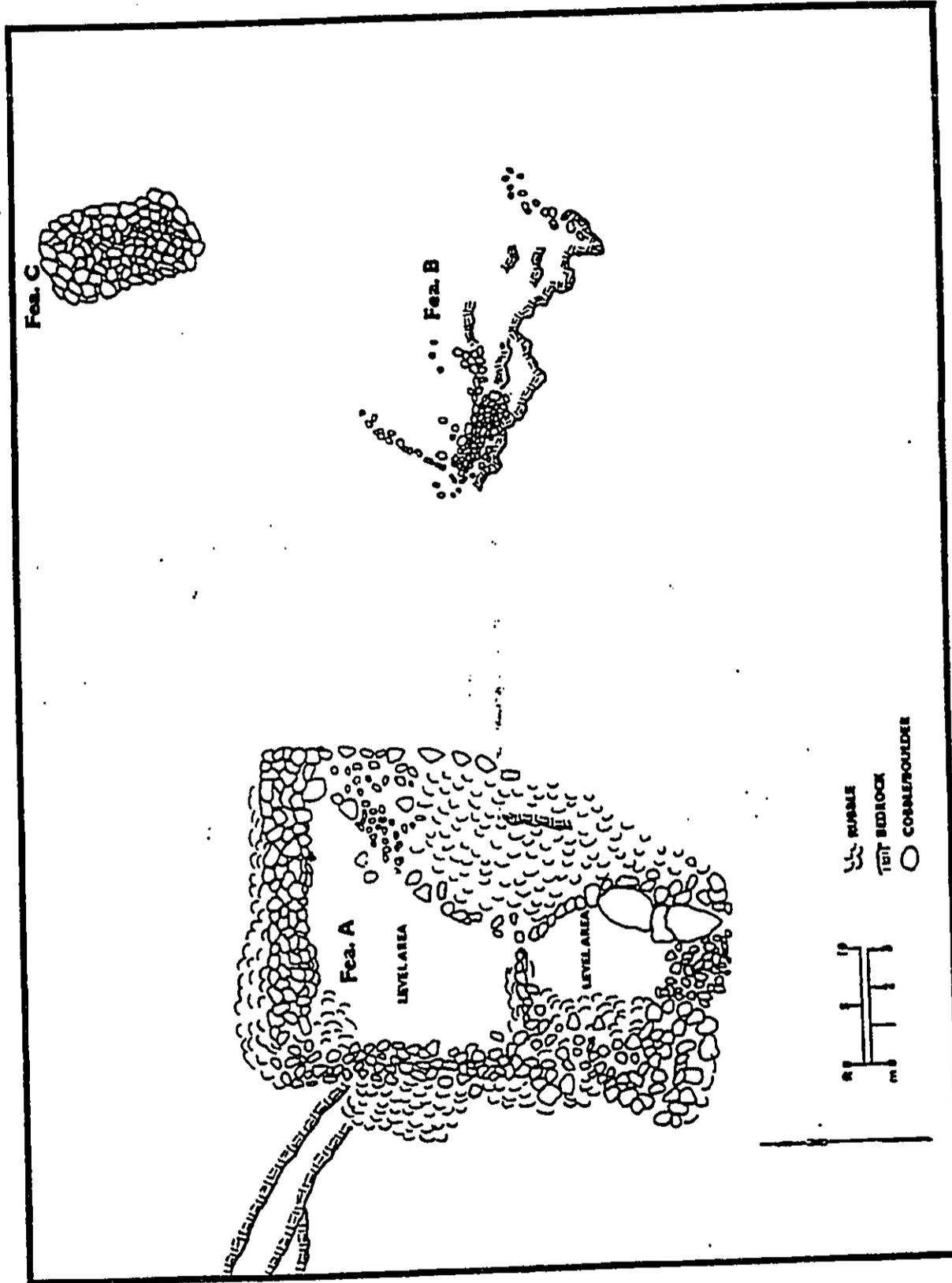


Figure 4. Site 13659

roughly stacked *pāhoehoe* cobbles and boulders originally recorded as three to five courses high. During the current fieldwork the highest wall was noted to only be three courses, and the northeast wall appeared to be collapsed. In the field records from the previous investigation several other features were noted but not recorded. These include presumed agricultural mounds, terraces, and walls, and a possible burial feature. During the current survey the area was examined to identify the limits of these additional features, many of which could not be relocated. The extent of the observed features is shown on *Figure 2*. As this site will not be impacted by the proposed project and left in place in its present condition, no further investigation of the features was conducted during the current field project.

Site 14161 was recorded as a habitation terrace adjacent to a wire cattle fence. The dimensions of the somewhat circular shaped terrace were recorded as 7.5 by 7.0 meters, with a height above the surrounding ground surfaces of between 21 and 90 centimeters. Walker et al. (1991) observed additional linear mounds and walls that extended from the terrace *mauka* for about 20 meters. During the current survey the terrace appeared to have been partially destroyed and the linear mounds and walls further dispersed. *Figure 2* shows the extent of the site's features.

This area also contains many scattered stones that could have come from agricultural features that were destroyed in the past. The current ranch manager explained how in the past the area was repeatedly chain-dragged to make pasturage easier for livestock; agricultural boundary walls most likely existed but were spread around by the chain-dragging process. Wall remnants that may have survived the chain-dragging were subsequently damaged by grazing animals.

*Figure 5* (transparency) is a copy of a portion of the map produced by Soehren and Newman (1968) as a result of their study of the field boundary walls of the Kona Field System (which included an interpretation of aerial photographs). The current project area is depicted in *Figure 6*, and when overlaid by *Figure 5*, there is a good correlation between the air photograph information and the sites recorded during the past and present surveys. What is also evident is the degree of disturbance that has occurred over the years, primarily due to the above-cited ranching activities.

In summary, the sites and features recorded within the study area are typical for the Kona Field System in this region, temporary habitations and special purpose features associated with large-scale agricultural practices. The previous PHRI survey (Walker et al. 1991) and the current field effort produced similar results with respect to identification and documentation, only one new feature was identified among the previously recorded sites. The agricultural field system walls recorded during the current and previous PHRI surveys correlate well with the field system wall documented by Soehren and Newman (1968) as a result of their aerial photograph interpretation.

## SIGNIFICANCE EVALUATIONS AND TREATMENT RECOMMENDATIONS

The previously recorded and newly encountered resources are assessed for their significance based on criteria established and promoted by the DLNR-SHPD and contained in the draft *Hawaii Administrative Rules 13613-275-6*, dated 1998. These significance evaluations should be considered as preliminary until DLNR-SHPD provides concurrence. For resources to be considered significant they must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

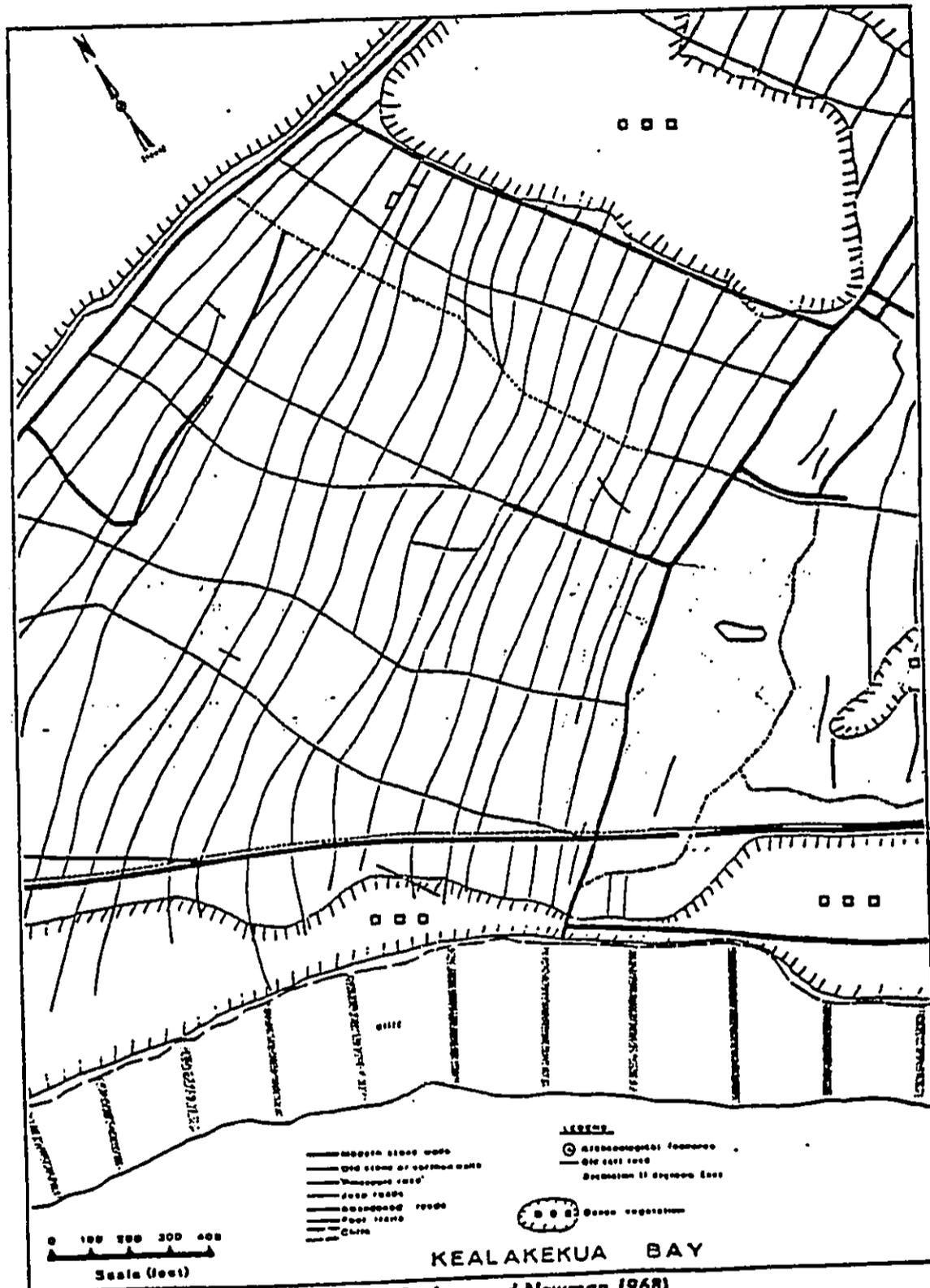


Figure 5. Field Boundary Walls (after Soehren and Newman 1968)

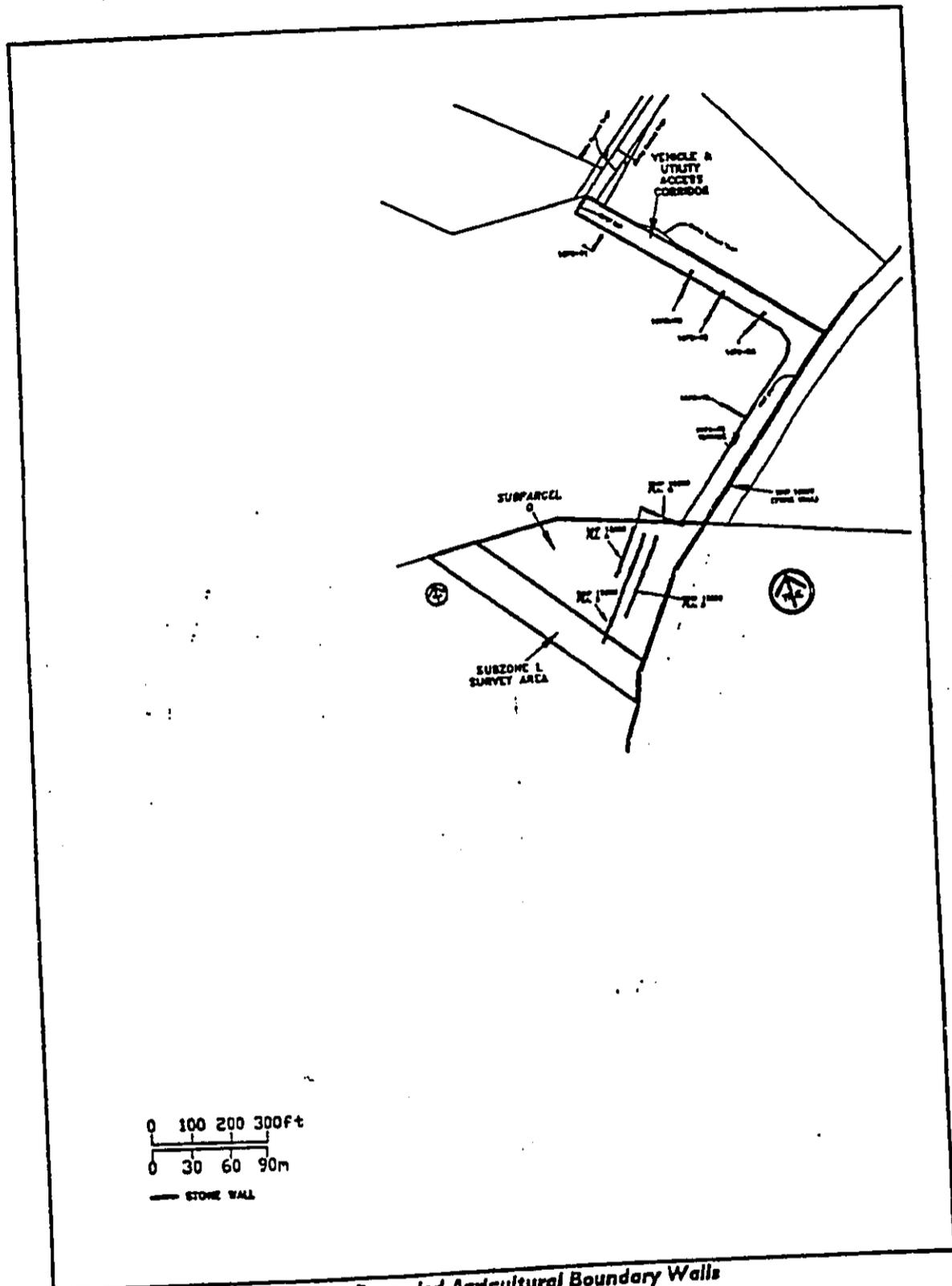


Figure 6. Project Area Showing Recorded Agricultural Boundary Walls

- (1) Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;
- (2) Criterion "b". Be associated with the lives of persons important in our past;
- (3) Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
- (4) Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history;
- (5) Criterion "e". Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

The significance of the newly recorded features and previously recorded sites is discussed below. As previously indicated, the landowner intends to preserve any archaeological sites within the project area through avoidance. If a resource cannot be avoided, and it is significant for information content only, data recovery will be recommended. Table 2 presents a summary of site significance and recommended treatments based on the proposed development plans (See also Figure 7).

**Table 2. Site Significance and Treatment Recommendations**

Site No.	Function	Significance	Treatment
1974-T1	Agricultural	Criterion d	Preservation by Avoidance
1974-T2	Agricultural	Criterion d	Preservation by Avoidance
1974-T3	Agricultural	Criterion d	Preservation by Avoidance
1974-T4	Agricultural	Criterion d	Preservation by Avoidance
1974-T5	Agricultural	Criterion d	Preservation by Avoidance
1974-T6	Agricultural	Criterion d	Preservation by Avoidance
SIHP 13657	Boundary Wall	Criterion d	Preservation by Avoidance
SIHP 13658	Agricultural	Criterion d	Data Recovery
SIHP 13659	Hab/Poss. Burial	Criterion d, e?	Data Recovery/Preservation
SIHP 14160	Hab/Ag/Poss. Burial	Criterion d, e?	Preservation by Avoidance
SIHP 14161	Hab/Ag.	Criterion d	Preservation by Avoidance

## **SIGNIFICANCE EVALUATIONS**

Of the newly recorded features within the road and utility access corridor, four of the walls run mauka/makai and appear to be agricultural field boundary walls (see Figure 6 overlay). The remaining wall is likewise a field system wall, running perpendicular to the others. The terrace feature also appears to have served an agricultural function, and is the only part of that site within the survey corridor. Being within the greater National Register-listed Kealahou Bay Historic District (SIHP 7000), and as elements of the National Register eligible Kona Field System (SIHP 6601), these features are considered significant for information content under Criterion d.

*Revised*

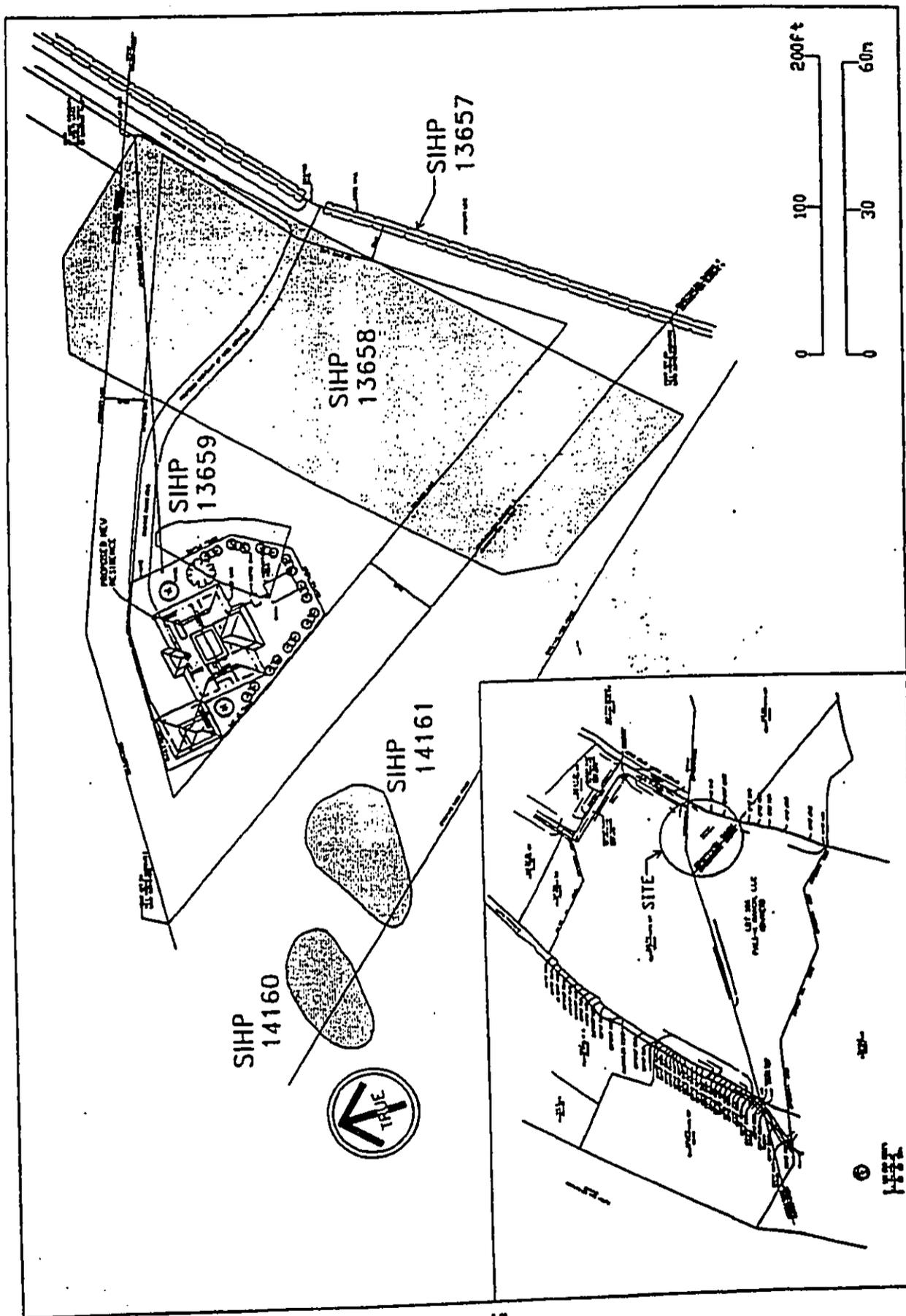


Figure 7. Location of Proposed Residence and Archaeological Sites

As a possible historically modified *ahupua'a* boundary wall, Site 13657 is considered significant for information content under Criterion d. The agricultural Site 13658 is also considered significant for information content under Criterion d. Site 13659 is considered significant under Criterion d as a temporary habitation and possibly under Criterion e, as Feature C of the site might be a burial feature. Similarly, Site 14160 may have a burial feature associated with the habitation and agricultural features; therefore it is also considered significant under Criterion d and possibly Criterion e. SIHP Site 14161 is considered significant for information content under Criterion d.

### TREATMENT RECOMMENDATIONS

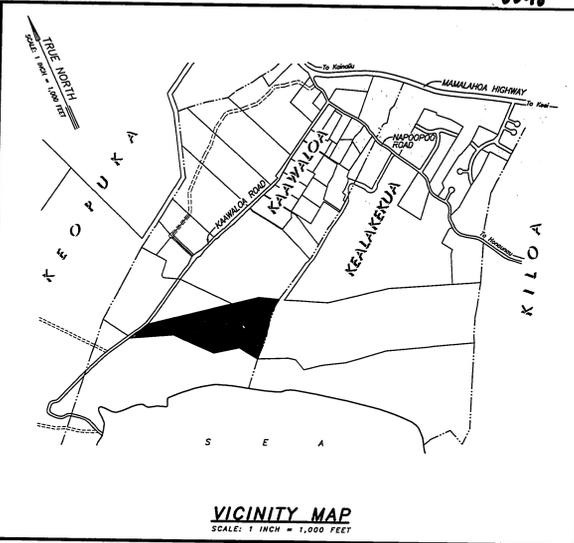
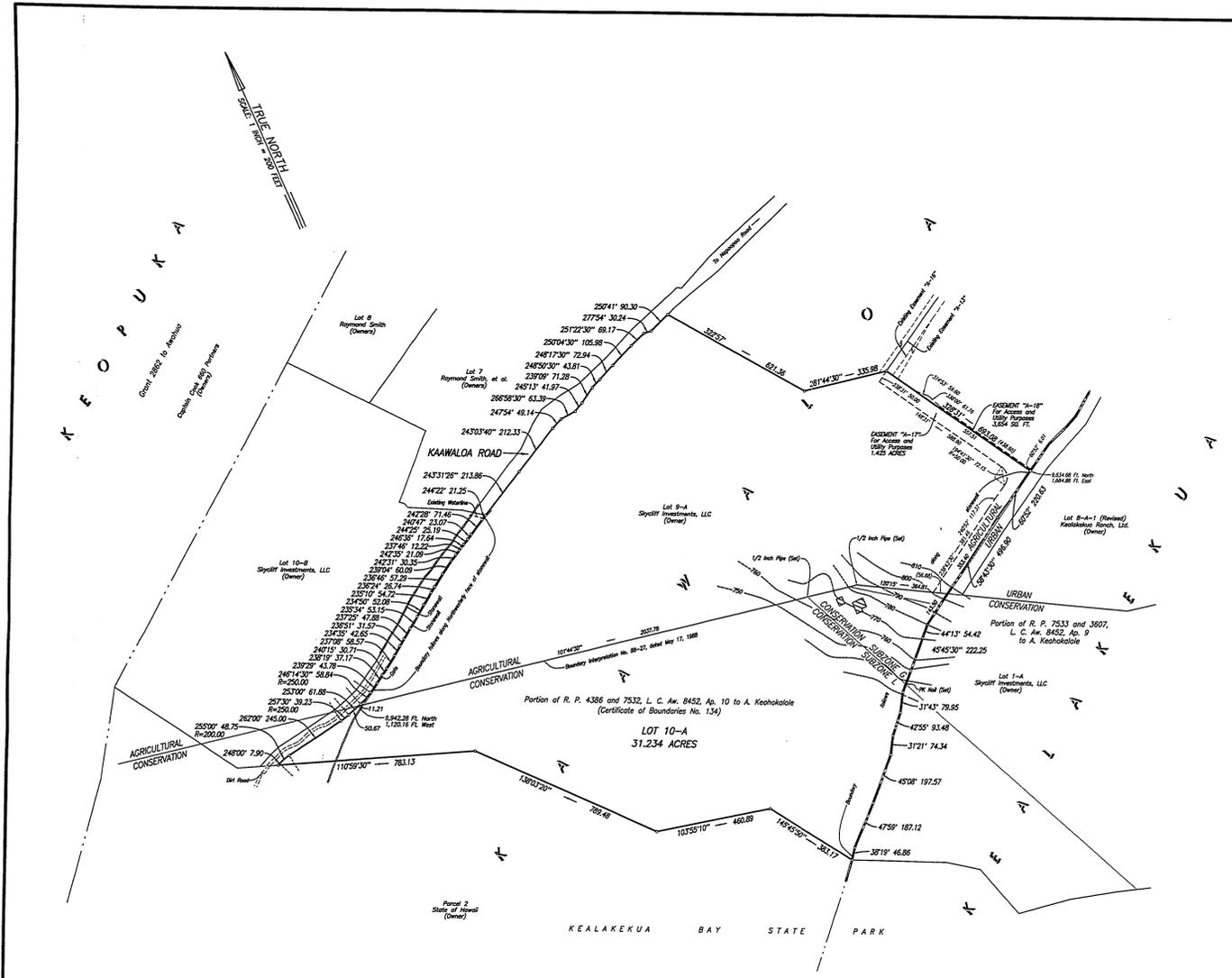
As the proposed access road will be placed within the existing graded ranch road, there will be no direct impact to any of these features from its construction. The placement of utility poles alongside the proposed road will likewise be designed to avoid impacting any of these features. Therefore, a strategy of avoidance and preservation in place is recommended for these six features.

Site 13657 will not be directly impacted by the proposed development project. Preservation is therefore recommended for this boundary wall. Portions of Site 13658 will be directly impacted by the planned development, and as the site appears to be losing integrity with the passage of time, data recovery is recommended. Portions of this habitation site will be directly impacted by the planned development; therefore, data recovery is proposed for Features A and B of the site. The newly recorded Feature C at this site will not be directly impacted by the proposed development, and as the landowner has expressed an interest in preserving this small platform, preservation of this feature is recommended. Neither Site 14160 nor Site 14161 are within the proposed project area and will therefore not be directly impacted by the proposed development. Because these sites will be completely avoided, the recommendation is preservation as is.

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1991 *Archaeological Inventory Survey, Kealahou Ranch Development - Kaawaloa Parcel, Land of Kaawaloa, South Kona District, Island of Hawaii (TMK:3-8-1-10:Por.2).* PHRI Report 770-021391. Prepared for Royal Coast Development Corporation.



MAP SHOWING  
LOT 10-A

Being a Portion of  
Royal Patents 4386 and 7532,  
Land Commission Award 8452,  
Apana 10 to Keohokalole

At Kaawaloa, South Kona  
Island and County of Hawaii, State of Hawaii

- NOTES:
1. Azimuths and coordinates are referred to Government Survey Triangulation Station "PALEMANO".
  2. Names of owners of adjoining parcels are from available Tax Map records.
  3. The line between Subzone C and Subzone L shown hereon, was scaled from the Board of Land and Natural Resources map.



Prepared For:  
PALI-K RANCH, LLC (OWNER)  
845 Bellevue Place Estates, Suite 101  
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Prepared By:  
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— Land Surveyors —  
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This map was prepared by me or under my direct supervision.

*Christie Thomas Yamasaki*  
CHRISTIE THOMAS YAMASAKI  
Licensed Professional Land Surveyor  
State of Hawaii Certificate Number LS-4331

PROJECT NO.: . . . . . 06056.2  
DATE: . . . . . MARCH 4, 1999  
FIELD BOOK NO.: . . . 1056  
DISK NO.: . . . . . 719  
TAX MAP KEY: . . . . . 8-1-10: Portions of 02 and 03 (3RD DIVISION)  
REVISED: April 26, 1999 (Technical changes)

# PHRI

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99-1978

November 15, 1999

Christopher Norrie  
Pali-K Ranch  
P.O. Box 339  
Capt. Cook, HI 96704  
Fax (808) 329-1021

*Via fax (Original mailed)*

*Subject: Pali-K Residential Site Location*

Dear Christopher:

I trust you enjoyed your Durango excursion. I am sending you this note to show you the positive (from a historic preservation point of view) implication of shifting your proposed residential development slightly to the southwest. In doing so you could avoid impacting the habitation site, SIHP 13659. This alternative location, positions the house on the Conservation Subzone G/L boundary, the ramification of which I am not qualified to assess. However, it seems likely that the State Historic Preservation Division of the Department of Land and Natural Resources would rather see archaeological sites avoided than impacted. In addition to this being a preferable mitigation measure of "preservation by avoidance," you would not incur the substantial cost associated with the data recovery of SIHP 13659.

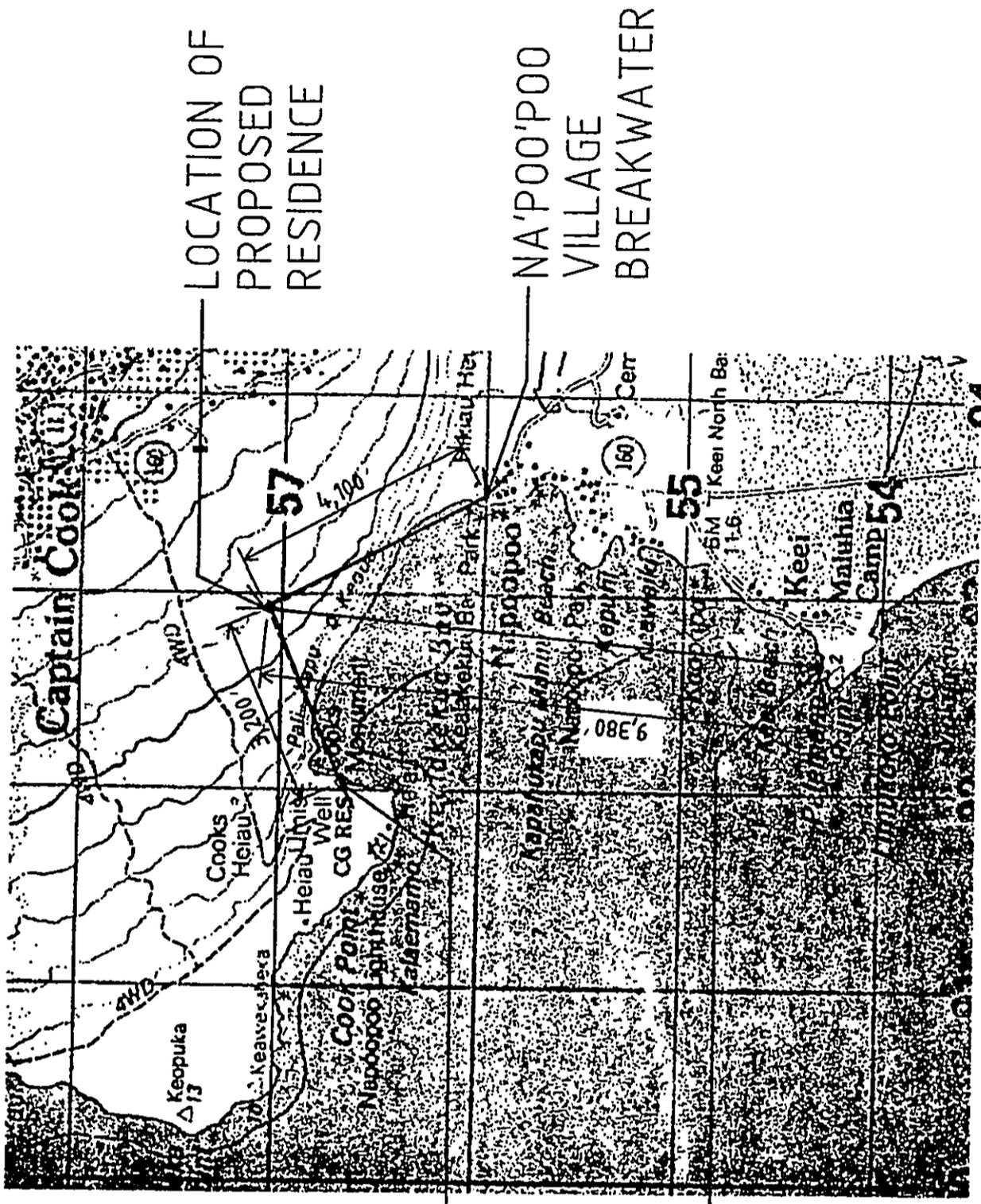
If you have any questions or concerns, please feel free to contact me at our Hilo Office 969-1763, or by e-mail at [phrirbr@interpac.net](mailto:phrirbr@interpac.net).

Regards,



Bob Rechtman, Ph.D.  
Senior Archaeologist

**EXHIBIT E 4**



LOCATION OF  
PROPOSED  
RESIDENCE

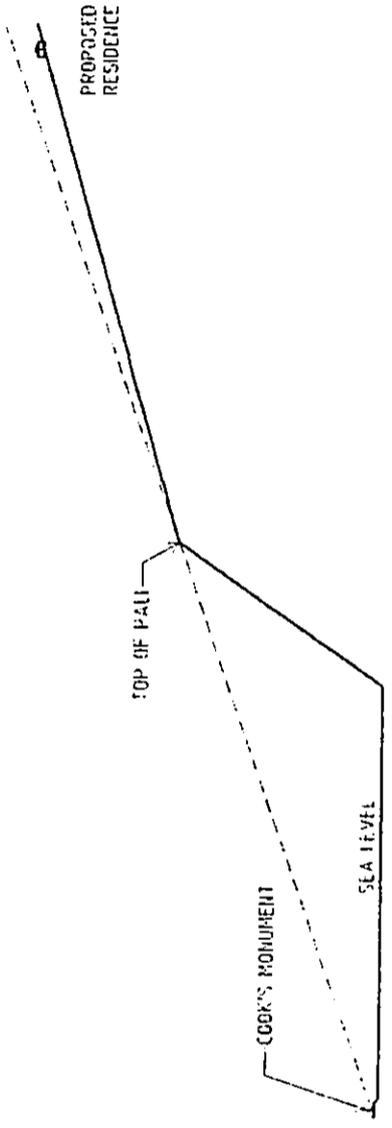
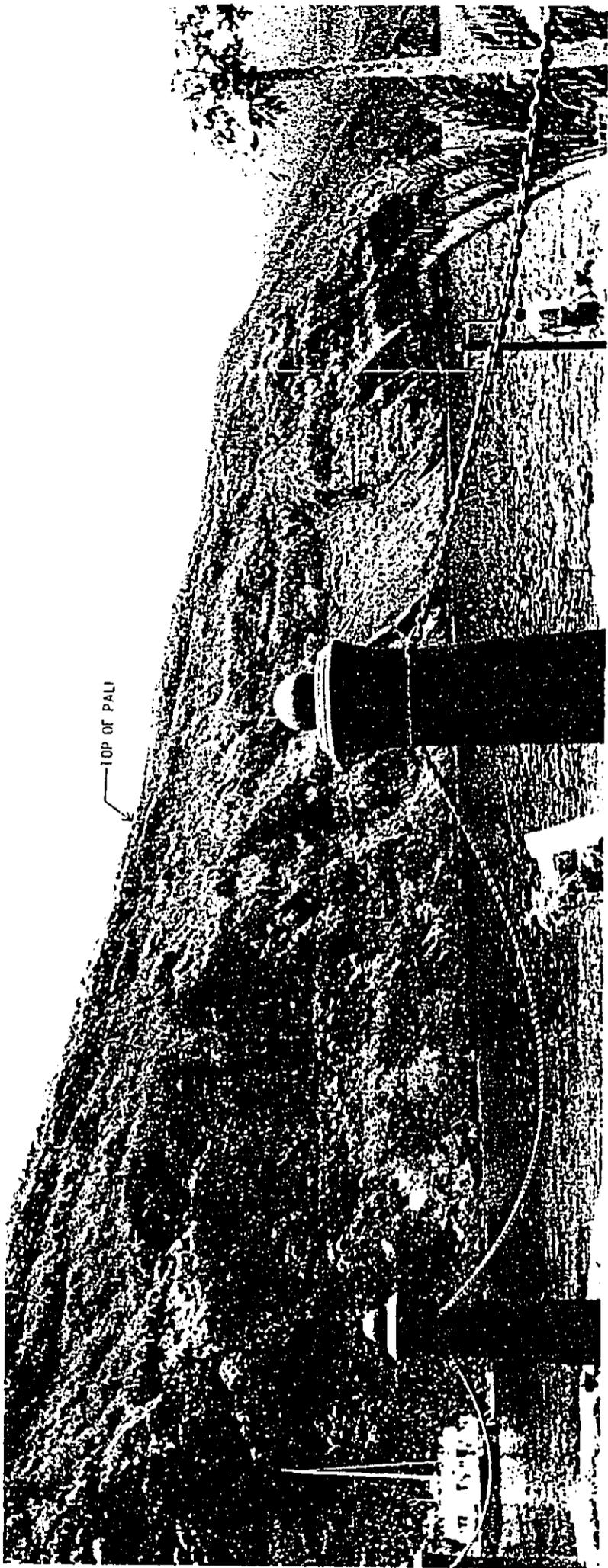
NA'POO'POO  
VILLAGE  
BREAKWATER

KA'AWAKOA  
AT COOK'S  
MONUMENT

KEEI BEACH

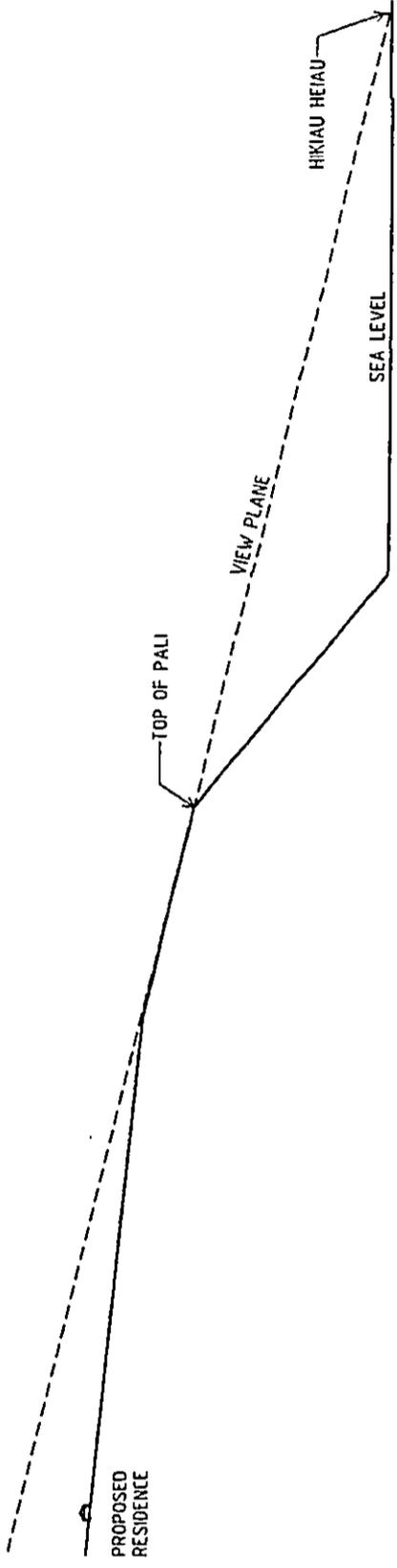
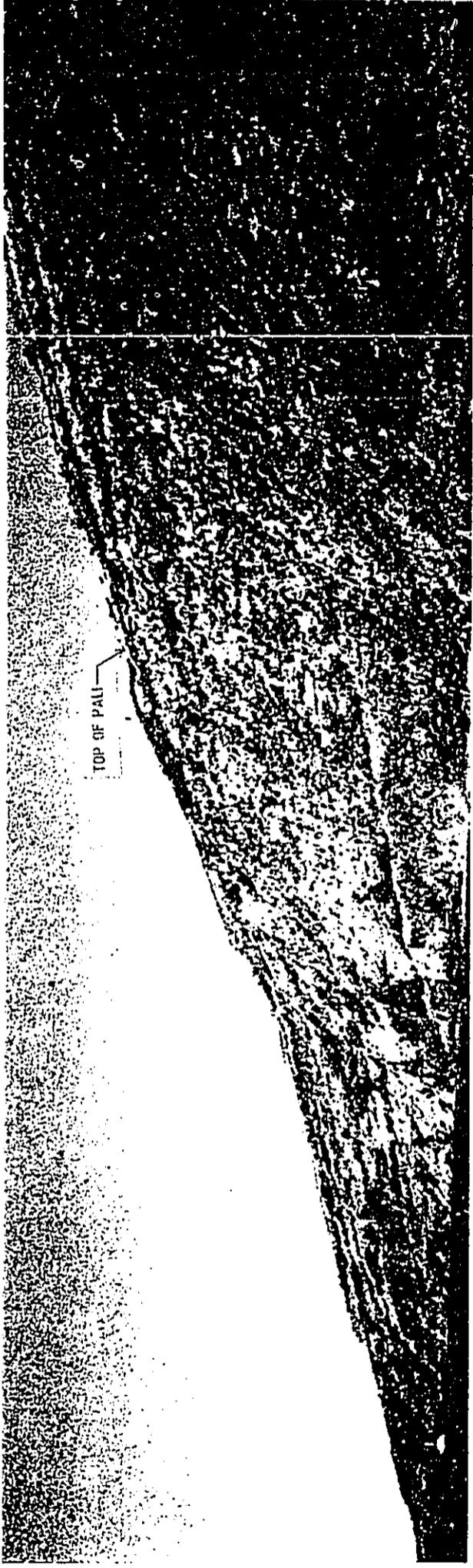
VIEW PLANE MAP

**EXHIBIT E 5**



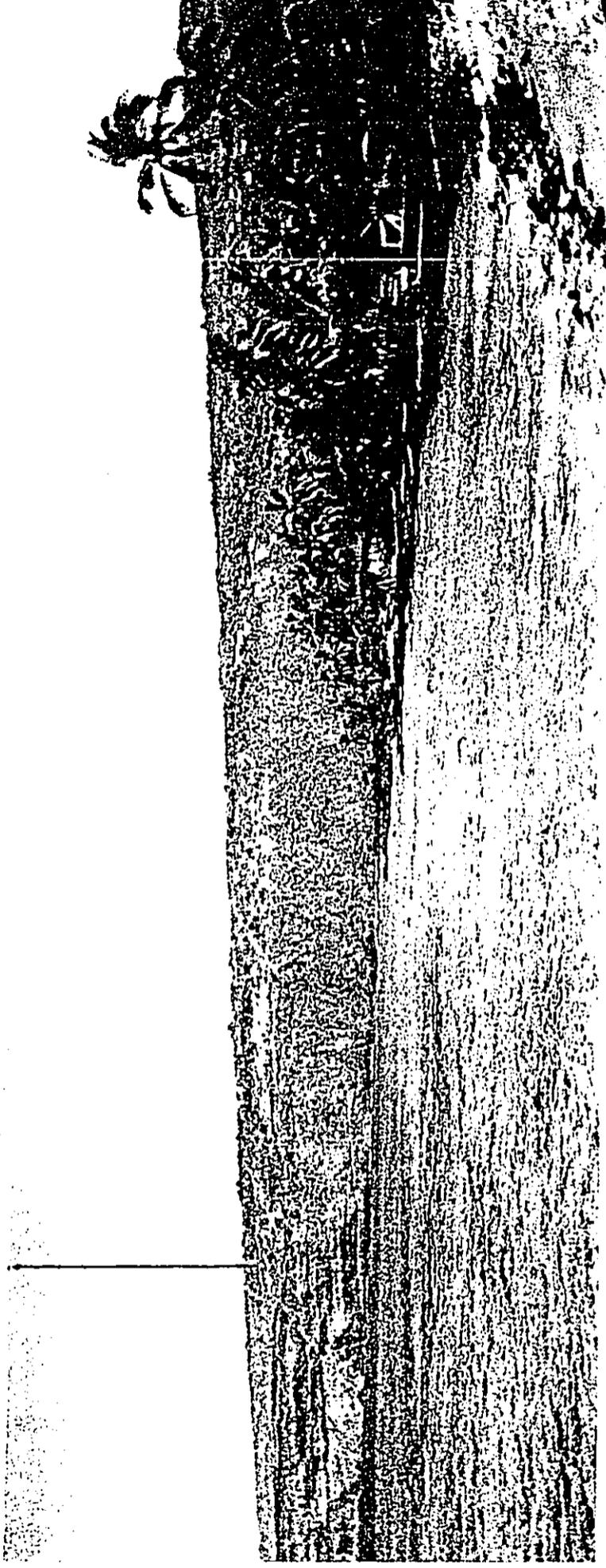
VIEW PLANE PROFILE FROM COOK'S MONUMENT  
SCALE 1:500

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



**VIEW PLANE PROFILE FROM NA'POO'POO BREAKWATER**  
SCALE: 1"=50'

Approximate Location of Proposed Residence



View from Ke'ei Beach (above)



View West from Easement A-17 (below)



View from Proposed House Site Mauka (above)

View from Proposed House Site Makai (below)



Stephen K. Yamashiro  
Mayor



Virginia Goldstein  
Director

Russell Kokubun  
Deputy Director

## County of Hawaii

### PLANNING DEPARTMENT

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252  
(808) 961-8288 • Fax (808) 961-8742

July 22, 1999

Mr. Tim Lui Kwan, Attorney-at-Law  
Carlsmith Ball  
Pacific Tower, Suite 2200  
1001 Bishop Street, P.O. Box 656  
Honolulu, HI 96809-0656

Dear Mr. Lui-Kwan:

Special Management Area (SMA) Use Permit Assessment  
Application (SMAA 99-23)  
Applicant: Tim Lui-Kwan, Attorney-in-Fact for  
Landowner, Christopher Norrie & Pali-K Ranch (Ref. No. 024248-9)  
Request: Single Family Dwelling with  
Accessory & Related Improvements in SLU: "Conservation" District  
Subd. No. 7038 (for. TMK: 8-1-10: 03)  
TMK: 8-1-10: 05, Lot 10-A, Kaawaloa, S. Kona, Hawaii Island

**Findings: Declaration of Exemption from SMA Rules.** Pursuant to Hawaii County Planning Commission SMA Rule 9-4(10)C, the Director has determined that the proposed construction of one single family dwelling with accessory and related improvements are exempt from the SMA definition of "development". Our findings confirm that this project is exempt under Rule 9-4(10)B(i) because it constitutes the construction of a dwelling that is not part of a larger development. In accordance with Rule 9-10G, the Planning Director declares that the proposed dwelling improvements are exempt from the SMA rules and regulations.

**Scope of Exemption.** The exemption is granted for the proposed improvements consistent with the description presented in the SMA assessment application materials and the submitted site plan. While the proposed construction is exempt from further SMA review it is still subject to all other applicable State and County regulations, including the Building Permit application process of the County Department of Public Works - Building Division and Engineering Division.

## EXHIBIT E 6

Mr. Tim Lui Kwan, Attorney-at-Law  
Carlsmith Ball  
Page 2  
July 22, 1999

**Shoreline Survey: Not Required.** Because this parcel does not abut the ocean shoreline a shoreline survey is not required.

**Jurisdictional Authority in State Land Use: "Conservation" Districts.** Parcel 05 is located in the SLU: "Conservation" district where the County has no administrative jurisdiction. Land use jurisdiction in this district is governed by the State DLNR (Department of Land & Natural Resources). Haw. Rev. Stat. sec. 205-5(a). Consequently, the residential use of parcel 05 is subject to the State DLNR's conditional use permitting procedures, the CDUA (Conservation District Use Application). Haw. Admin. R. 13-2-1 (1990).

However, where "Conservation" lands are within the County's SMA zone then SMA review and approval is required before approval of the State CDUA, according to Haw. Rev. Stat. sec. 205A-29(b) and the guidance stated in the letter from the Director, State of Hawaii - OEQC (Office of Environmental Quality Control)(July 14, 1992). Processing of the SMA exemption is pursuant to and consistent with this State law.

Any questions on this matter can be discussed with staff planner, Earl Lucero.  
Ph: 961-8288.

Sincerely,

  
VIRGINIA GOLDSTEIN  
Planning Director

EML:gp  
f:\wp60\earl\sma\smaa9925.eml

cc: SMA Section

BOTANICAL SURVEY  
KEALAKEKUA RANCH GOLF COURSE PROJECT  
NORTH KONA, ISLAND OF HAWAI'I

by

Winona P. Char  
CHAR & ASSOCIATES  
Botanical/Environmental Consultants  
Honolulu, Hawai'i

Prepared for: BELT COLLINS & ASSOCIATES

May 1990

**EXHIBIT E 7**

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BOTANICAL SURVEY  
KEALAKEKUA RANCH GOLF COURSE PROJECT  
NORTH KONA, ISLAND OF HAWAI'I

INTRODUCTION

The proposed golf course project site consists of approximately 280 acres of land located between Captain Cook town and Kealakekua Bay. The site lies immediately above the steep cliff known as Pali Kapu-o-Keoua, overlooking Kealakekua Bay. A large part of the irregularly-shaped property, about 190 acres, is used for grazing cattle by Kealakekua Ranch; the additional ±90-acre parcel, or Norrie property, is also used for grazing except for the northern most section which contains a rough 'a'a lava flow. Past uses of the project site have included pineapple and coffee cultivation. The proposed 18-hole golf course will include a clubhouse, parking area, landscape and maintenance facilities, possibly an inn site, and other amenities.

Field studies to assess the botanical resources on the proposed golf course site were conducted on January 14-15, 1990. A total of three botanists were used to gather the technical data contained in this report. The objectives of the field studies were to (1) describe the major plant communities; (2) inventory the terrestrial, vascular flora; and (3) search for threatened and endangered species protected by federal and/or state laws.

SURVEY METHODS

Prior to the field studies, a search was made of the pertinent

literature to familiarize the principal investigator with other biological studies conducted in the general area. Topographic maps as well as recent colored aerial photographs were examined to determine vegetation patterns, terrain characteristics, access, boundaries, and reference points.

Access onto the site is from the main ranch road off the lower Government Main Road to Napo'opo'o. From the main ranch road, a number of jeep roads cross the property, some more overgrown than others.

A walk through survey method was used with areas less disturbed, as the area adjacent to the cliff and the lava flow, more intensively examined. Notes were made on plant associations and distribution, substrate types, topography, exposure, etc. Species which could not be positively determined were collected for later identification in the herbarium and for comparison with the most recent taxonomic literature.

#### DESCRIPTION OF THE VEGETATION

On the project site, the vegetation is dominated by introduced species with Guinea grass (Panicum maximum) being the most abundant plant cover along with a varied mixture of tree species and ekoa (Leucaena leucocephala) shrubs. This, in large part, is due to past disturbances. A major portion of the Kealakekua Ranch parcel supports soils of the Kainaliu series (Sato et al. 1973); these sites were cultivated for pineapple and coffee at one time. Since then both the Kealakekua Ranch parcel and the Norrie property have been used for grazing cattle. Native species occur most frequently on the 'a'a lava flow on the northern portion of the proposed golf course site and near the coastal cliff area where there has been less disturbance.

Four plant communities or vegetation types can be recognized on the project site and are discussed in detail below. Vegetation associated with homes and other maintained areas was not surveyed. All those plant species inventoried during the field studies is presented in the checklist at the end of the report.

#### 1. Open Mixed Forest

This plant community is found on the mauka half of the Keala-kekua Ranch parcel from about the 900-foot elevation. Average annual rainfall is slightly higher on this portion of the property; about 50 inches/year on the mauka half and roughly 40 inches/year on the makai half. Because of this difference in rainfall, the mauka portion supports denser vegetation cover and many more tree species. The canopy of the forest is open, that is tree cover is from about 30 to 60% and in most places the crowns of the trees do not interlock.

Large trees of monkeypod (Samanea saman), from 25 to as much as 40 ft. tall, are the primary components. Scattered stands of kukui trees (Aleurites moluccana) are frequent. Jacaranda trees (Jacaranda mimosifolia), with their purplish-blue colored flowers are easy to spot in the spring, however, when they are not flowering, they tend to blend in with the rest of the canopy especially with the chinaberry trees (Melia azedarach). Two tree species which were originally experimental plantings obtained from the University of Hawai'i (pers. comm. S. Greenwell) can be found on the property; these are bella sombra (Phytolacca dioica) and Ceylon gooseberry (Dovyalis hebecarpa). The gooseberry produces numerous purplish, velvety fruits with juicy, edible, purplish pulp and several seeds. The fruits along with the seeds are eaten by birds and feral (wild) pigs, thus, it is not uncommon to find saplings or young trees scattered over the property. Two other species which have become naturalized on the site and other areas along the Kona coast are papaya (Carica papaya) and

mulberry (Morus alba). One small former planting of coffee (Coffea arabica) was found during the survey but we did not find any plants naturalized on the site; this may be because this particular site is too dry for coffee to establish itself.

Among the shrubs, koa-haole (Leucaena leucocephala), or ekoa as it is more commonly called on the big island, may form fairly large, scattered thickets in places. Other shrubs which are locally common to occasional are lantana (Lantana camara), Senna septemtrionalis, burbush (Triumfetta rhomboidea), and hairy abutilon (Abutilon grandifolium). In most places, Guinea grass (Panicum maximum) forms a dense cover in between the shrubs and trees. Areas with deeper soil or with slightly damper conditions, as along drainages and in small gullies, support very tall, 7 to 8 ft., and very dense Guinea grass, making botanizing difficult. Wild pigs also tend to favor these areas.

## 2. 'Opiuma Savanna

This vegetation type consists of widely spaced trees of 'opiuma (Pithecellobium dulce) and generally occurs below the 900-foot elevation; tree cover may be as little as 5% to as much as 30%. Again Guinea grass is the dominant ground cover, although, in places, Bermuda grass or manienie (Cynodon dactylon) may be more common. Scattered patches of kikuyu grass (Pennisetum clandestinum) can also be found, usually associated with somewhat more stony soils.

Other tree species associated with the savanna include kiawe (Prosopis pallida), chinaberry, and monkeypod. Large trees of monkeypod are more frequent on the Kealakekua Ranch parcel. Scattered through the savanna are shrubs of Christmas berry (Schinus terebinthifolius), up to 15 ft. tall; these tend to be rounded and tree-like with the usual tangle of lower branches absent. Ekoa shrubs form small narrow strips, usually following

along ancient lava flow ridges or sometimes in drainageways. Among the ground cover plants, two, sensitive plant or puahila-hila (Mimosa pudica) and West Indian beggar's-tick (Bidens cynapiifolia), appear to be more abundant during the rainy season. A few plants occur on what appear to be former house sites; these plants are para rubber tree (Hevea brasiliensis), red hibiscus (Hibiscus rosa-sinensis), and mango (Mangifera indica).

Where the savanna adjoins the coastal cliff, rocky areas support a few natives such as the kumu niu fern (Doryopteris decora), koali (Ipomoea indica), spur flower (Plectranthus parviflorus), 'ala 'āla wai nui (Peperomia leptostachya), and 'uhaloa (Waltheria indica).

### 3. Ekoa Shrubland

This plant community occupies a relatively small area, roughly less than 10 acres, on the Norrie property. On the aerial photos it appears as a wedge-shaped piece, located between the 'opiuma savanna and the lava flow scrub. Ka'awaloa Road, identified as a 4-WD road on most topographic maps, runs along one side of the shrubland. Ekoa shrubs, 12 to 15 ft. tall, form a dense thicket on very stony soil. As on other portions of the project site, Guinea grass is the dominant ground cover although it may be less dense in this shrubland. Locally common on the ekoa shrubs is wild bittermelon (Momordica charantia), an annual high-climbing vine. Along the stonewall which runs parallel to Ka'awaloa Road, airplant (Kalanchoë pinnata) replaces Guinea grass as the most abundant ground cover plant. A few tamarind trees (Tamarindus indica) can also be found near Ka'awaloa Road.

### 4. Lava Flow Scrub

To the north of the proposed golf course is a large 'a'a lava flow, a portion of which is included within the subject property.

Plants occur as scattered patches over the rough surface of the flow, usually in depressions or in crevices. Plant cover is about 20% and is composed of low thickets of ekoa, Christmas berry, and lantana, from 3 to 6 ft. tall. A few scattered trees of 'opiuma are also found on the flow.

Most of the native species found on the project site occur within this plant community. These include a few plants of the native caper or puapilo (Capparis sandwichiana), spur flower, ilima (Sida fallax), huehue (Cocculus trilobus), 'ala 'ala wai nui, and 'uhaloa. The koali, a member of the morning-glory family, is locally common, forming a dense tangle over the shrubs. One small tree of mamane (Sophora chrysophylla), about 12 ft. tall, can also be found on the 'a'a flow.

#### THREATENED AND ENDANGERED PLANTS

Vegetation on the project site is dominated by introduced or alien species, which make up the major components of the four plant communities recognized on the site. Of a total of 108 species inventoried, 92 (85%) are introduced species, 5 (5%) are originally of Polynesian introduction, and 10 (10%) are native. Of the native species, 8 are indigenous, that is, they occur naturally throughout the Hawaiian Islands and the Pacific, and, 3 are endemic, that is, they occur naturally only within the islands. These 3 endemics are puapilo (Capparis sandwichiana), mamane (Sophora chrysophylla), and kumu niu (Doryopteris decora).

None of the native species are considered officially listed threatened and endangered species protected by endangered species laws nor are any currently being proposed for such status (U. S. Fish and Wildlife Service 1989, 1990). The native caper or puapilo is considered a Category 2, candidate endangered species (U. S. Fish and Wildlife Service 1990). Category 2 plants are those for

which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time.

Puapilo is a low, somewhat sprawling shrub with bluish-green leaves. Flowers are large, fragrant, white and open after sunset. Fruits resemble small cucumbers and contain an orange pulp. Plants can be found in leeward coastal and lowland situations on all of the main Hawaiian Islands and a few of the northwest islands -- Midway, Pearl and Hermes Atoll, Laysan.

#### DISCUSSION AND RECOMMENDATIONS

Four major plant communities are described from the property. These are open mixed forest, dominated by monkeypod as well as several other tree species; 'opiuma savanna; ekoa shrubland; and lava flow scrub. Guinea grass is the dominant ground cover species in the first three plant communities. Open mixed forest and 'opiuma savanna together cover roughly 75% of the property. Introduced or alien species are the dominant components in all of the plant communities. Of a total of 108 plants inventoried, 85% (92) are introduced species. Native species occur primarily on the coastal cliff adjoining the 'opiuma savanna and on the 'a'a lava flow on the northern portion of the property. One Category 2, candidate endangered species, the puapilo or native caper, occurs on the lava flow area.

The majority of the property is vegetated with introduced species and the proposed development is not expected to have a significant negative impact on these areas. Of some concern, is the lava flow area as it does contain plants of one candidate endangered species, although of low priority. It is recommended that as much of the flow be left intact and incorporated into the landscaping; this has been done for other courses such as the world-famous Mauna

Lani course. In addition, use of native plants for landscaping should be considered. Native lowland species already adapted to local environmental conditions such as low rainfall would require less water. Some natives of landscape value include the puapilo, wiliwili (Erythrina sandwicensis), naio or false sanadalwood (Myoporum sandwicensis), ohe (Reynoldsia sandwicensis), mamane, kolomona (Senna gaudichaudii), 'ihi (Portulaca villosa, P. lutea, P. molokiniensis), etc.

#### LITERATURE CITED

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- Porter, J. R. 1972. Hawaiian names for vascular plants. College of Tropical Agriculture, Hawaii Agricultural Experimental Station, Univ. of Hawaii, Dept. Paper No. 1. March 1972.
- Sato, H. H., W. Ikeda, R. Paeth, R. Symthe, 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. 1973. 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. 1989. Endangered and threatened wildlife and plants. 50 CFR 17.11 & 17.12.
- U. S. Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants; Review of plant taxa for listing as Endangered and Threatened Species; Notice of review. Federal Register 55(35): 6184-6229.
- Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. Univ. of Hawaii Press and B. P. Bishop Museum Press, Honolulu.

PLANT SPECIES LIST -- KEALAKEKUA RANCH GOLF COURSE PROJECT

Following, is a list 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); the flowering plants, Monocots and Dicots, are for the most case in accordance with Wagner *et al.* (1990). Common English and/or Hawaiian names used 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 four plant communities (or vegetation types) recognized on the project site; see text for discussion.
  - 1 = Open Mixed Forest
  - 2 = 'Opiuma Savanna
  - 3 = Ekoa Shrubland
  - 4 = Lava Flow Scrub

SPECIES LIST

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMUNITY			
			1	2	3	4
<b>FERNS</b>						
Nephrolepidaceae (Sword fern family)						
<i>Nephrolepis multiflora</i> (Roxb.) Jarret ex Morton	sword fern	X	+	-	+	
Polypodiaceae (Common fern family)						
<i>Phlebodium aureum</i> (L.) J. Sm.	laua'e haole	X	+	-	-	
<i>Phymatosorus scolopendria</i> (N. E. Burm.) Pichi-Serm.	laua'e	X	-	-	+	
<i>Pleopeltis thunbergiana</i> Kaulf.	pakahakaha	I	+	-	-	
Sinopteridaceae (Cliff-brake family)						
<i>Doryopteris decora</i> Brack.	kumu niu, 'iwa'iwa	E	-	+	-	
Thelypteridaceae (Downy wood-fern family)						
<i>Christella dentata</i> (Forssk.) Brownsey & Jermy	oak fern	X	+	-	-	
<b>MONOCOTS</b>						
Commelinaceae (Spiderwort family)						
<i>Commelina diffusa</i> N. L. Burm.	honohono	X	+	-	+	
Cyperaceae (Sedge family)						
<i>Kyllinga brevifolia</i> Rottb.	kyllinga	X	+	-	-	

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMUNITY			
			1	2	3	4
Poaceae (Grass family)						
<u>Cynodon dactylon</u> (L.) Pers.	Bermuda grass	X	-	+	-	-
<u>Eleusine indica</u> (L.) Gaertn.	goose grass	X	-	+	-	-
<u>Eragrostis tenella</u> (L.) Beauv. ex R. & S.	love grass	X	-	+	-	-
<u>Melinis minutiflora</u> P. Beauv.	molasses grass	X	+	+	-	+
<u>Panicum maximum</u> Jacq.	Guinea grass	X	+	+	+	-
<u>P. maximum</u> var. <u>trichoglume</u> Eyles ex Robyns	green panic grass	X	-	+	-	-
<u>Pennisetum clandestinum</u> Chiov.	kikuyu grass	X	+	-	-	-
<u>Pennisetum purpureum</u> Schumach.	elephant grass	X	-	+	-	-
<u>Rhynchelytrum repens</u> (Willd.) Hubb.	Natal reedtop	X	-	+	-	+

#### DICOTS

Amaranthaceae (Amaranth family)						
<u>Amaranthus spinosus</u> L.	spiny amaranth	X	+	+	-	-
Anacardiaceae (Cashew family)						
<u>Anacardium occidentale</u> L.	cashew	X	+	-	-	-
<u>Mangifera indica</u> L.	mango	X	+	+	-	-
<u>Schinus terebinthifolius</u> Raddi	Christmas berry	X	+	+	-	+
<u>Spondias dulcis</u> Parkins.	Otaheite apple	X	+	-	-	-
Annonaceae (Custard-apple family)						
<u>Annona muricata</u> L.	soursop	X	+	-	-	-
Apocynaceae (Dogbane family)						
<u>Catharanthus roseus</u> (L.) G. Don	periwinkle	X	-	+	-	-

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>	<u>COMMUNITY</u>			
			1	2	3	4
<u>Plumeria rubra</u> L.	plumeria, frangipani	X	+	-	-	-
Asclepiadaceae (Milkweed family)						
<u>Asclepias curassavica</u> L.	milkweed	X	-	-	-	+
Asteraceae (Sunflower family)						
<u>Ageratum conyzoides</u> L.	ageratum	X	-	-	-	+
<u>Bidens cynapiifolia</u> Kunth	West Indian beggar's-tick	X	+	+	+	+
<u>Emilia fosbergii</u> Nicholson	emilia	X	-	+	-	+
<u>Pluchea symphytifolia</u> (Mill.) Gillis	pluchea	X	-	+	-	+
<u>Synedrella nodiflora</u> (L.) Gaertn.	synedrella	X	+	-	-	-
<u>Tithonia diversifolia</u> (Hemsl.) A. Gray	tithonia	X	+	-	-	-
Begoniaceae (Begonia family)						
<u>Begonia</u> cf. <u>heracleifolia</u> Schlecht. & Cham.	begonia	X	+	-	-	-
Bignoniaceae (Catalpa family)						
<u>Jacaranda mimosifolia</u> D. Don	jacaranda	X	+	-	-	-
<u>Spathodea campanulata</u> P. Beauv.	African tulip tree	X	+	-	-	-
Cactaceae (Cactus family)						
<u>Opuntia ficus-indica</u> (L.) Mill.	panini, cactus	X	-	-	-	+
Capparaceae (Caper family)						
<u>Capparis sandwichiana</u> DC.	puapilo, maiapilo	E	-	-	-	+

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMUNITY			
			1	2	3	4
Caricaceae (Papaya family)						
<u>Carica papaya</u> L.	papaya	X	+	+	+	+
Clusiaceae (Mangosteen family)						
<u>Mammea americana</u> L.	mammee apple	X	+	-	-	-
Convolvulaceae (Morning-glory family)						
<u>Ipomoea alba</u> L.	moon flower	X	+	-	-	-
<u>Ipomoea indica</u> (J. Burm.) Merr.	kowali	I	+	+	-	+
<u>Stictocardia tillifolia</u> (Desr.) H. Hallier	stictocardia	X	+	-	-	-
Crassulaceae (Orpine family)						
<u>Kalanchoë pinnata</u> (Lam.) Pers.	air plant	X	-	+	+	-
Cucurbitaceae (Gourd family)						
<u>Cucumis dipsaceus</u> Ehrenb. ex Spach	wild cucumber	X	-	+	-	-
<u>Momordica charantia</u> L.	balsam pear	X	+	+	+	-
Euphorbiaceae (Spurge family)						
<u>Aleurites moluccana</u> (L.) Willd.	kukui, candlenut	P	+	+	-	-
<u>Chamaesyce hirta</u> (L.) Millsp.	garden spurge	X	+	+	-	-
<u>Chamaesyce hypericifolia</u> (L.) Millsp.	-----	X	-	+	-	+
<u>Hevea brasiliensis</u> (H. B. K.) Muell. Arg.	para rubber tree	X	-	+	-	-
<u>Ricinus communis</u> L.	castor bean	X	+	+	-	-

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMUNITY			
			1	2	3	4
Fabaceae (Pea family)						
<u>Acacia farnesiana</u> (L.) Willd.	klu	X	+	+	-	+
<u>Caesalpinia bonduc</u> (L.) Roxb.	gray nickers, kakalaioa	I	+	+	-	-
<u>Chamaecrista nictitans</u> (L.) Moench	partridge pea, lauki	X	-	-	-	+
<u>Crotalaria pallida</u> Aiton	smooth rattlepod	X	+	+	-	+
<u>Desmodium incanum</u> DC.	Spanish clover	X	+	-	-	-
<u>Desmodium tortuosum</u> (Sw.) DC.	Florida beggarweed	X	+	-	-	-
<u>Glycine wightii</u> (Wight & Arn.) Verdc.	-----	X	+	-	-	-
<u>Indigofera suffruticosa</u> Mill.	wild indigo	X	+	+	-	+
<u>Leucaena leucocephala</u> (Lam.) de Wit	koa haole	X	+	+	+	+
<u>Mimosa pudica</u> L.	sensitive plant	X	+	+	-	-
<u>Pithecellobium dulce</u> (Roxb.) Benth.	'opiuma	X	+	+	+	+
<u>Prosopis pallida</u> (Humb. & Bonpl. ex Willd.) Kunth	kiawe, mesquite	X	-	+	-	-
<u>Samanea saman</u> (Jacq.) Merr.	monkeypod	X	+	+	+	-
<u>Senna occidentalis</u> (L.) Link	coffee senna	X	+	+	-	-
<u>Senna septemtrionalis</u> (Viv.) H. Irwin & Barneby	-----	X	+	+	-	+
<u>Sophora chrysophylla</u> (Salisb.) Seem. Seem.	mamane	E	-	-	-	+
<u>Tamarindus indica</u> L.	tamarind, wi 'awa'awa 'ahuhu	X	-	+	+	-
<u>Tephrosia purpurea</u> (L.) Pers.		P	-	-	-	+
Flacourtiaceae (Flacourtia family)						
<u>Dovyalis hebecarpa</u> (Gardn.) Warb.	Ceylon gooseberry	X	+	+	-	-

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMUNITY			
			1	2	3	4
Lamiaceae (Mint family)						
<u>Plectranthus parviflorus</u> Willd.	spur flower	I	-	+	-	+
<u>Salvia occidentalis</u> Sw.	West Indian sage	X	+	-	-	-
Lauraceae (Laurel family)						
<u>Persea americana</u> L.	avocado	X	+	-	-	-
Malvaceae (Mallow family)						
<u>Abutilon grandifolium</u> (Willd.) Sweet	hairy abutilon	X	+	+	-	-
<u>Hibiscus rosa-sinensis</u> L.	red hibiscus	X	-	+	-	-
<u>Malvastrum coromandelianum</u> (L.) Garcke	false mallow	X	+	+	+	-
<u>Sida acuta</u> N. L. Burm.	sida	X	+	-	-	-
<u>Sida cordifolia</u> L.	-----	X	-	+	-	+
<u>Sida fallax</u> Walp.	'ilima	I	-	-	-	-
<u>Sida rhombifolia</u> L.	cuba jute	X	+	+	-	-
Meliaceae (Mahogany family)						
<u>Melia azedarach</u> L.	chinaberry	X	+	+	-	-
Menispermaceae (Moonseed family)						
<u>Cocculus trilobus</u> (Thunb.) DC.	huehue	I	-	-	-	+
Moraceae (Mulberry family)						
<u>Artocarpus altilis</u> (Parkins.) Fosb.	breadfruit	P	+	-	-	-
<u>Ficus microcarpa</u> L. f.	Chinese banyan	X	+	-	-	-
<u>Morus alba</u> L.	mulberry	X	+	+	-	+

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>	<u>COMMUNITY</u>			
			1	2	3	4
Myrtaceae (Myrtle family)						
<u>Psidium</u> <u>guajava</u> L.	guava	X	+	+	-	+
<u>Syzygium</u> <u>cumini</u> (L.) Skeels	Java plum	X	+	-	-	-
Nyctaginaceae (Four-o'clock family)						
<u>Boerhavia</u> <u>coccinea</u> Mill.	-----	X	-	+	-	-
<u>Mirabilis</u> <u>jalapa</u> L.	four-o'clock	X	+	-	-	-
Oxalidaceae (Wood-sorrel family)						
<u>Averrhoa</u> <u>carambola</u> L.	star fruit	X	+	-	-	-
<u>Oxalis</u> <u>corniculata</u> L.	wood sorrel	P	+	-	-	-
Passifloraceae (Passion-flower family)						
<u>Passiflora</u> <u>edulis</u> Sims	passionfruit, yellow lilliko'i	X	+	-	-	-
<u>Passiflora</u> <u>foetida</u> L.	wild passionfruit	X	+	-	-	+
<u>Passiflora</u> <u>suberosa</u> L.	huehue haole	X	+	+	-	+
Phytolaccaceae (Pokeweed family)						
<u>Phytolacca</u> <u>dioica</u> L.	bella sombra	X	+	-	-	-
<u>Rivina</u> <u>humilis</u> L.	coral berry	X	+	+	-	-
Piperaceae (Pepper family)						
<u>Peperomia</u> <u>leptostachya</u> Hook. & Arn.	'ala'ala wai nui	I	+	+	-	+
Proteaceae (Protea family)						
<u>Grevillea</u> <u>robusta</u> A. Cunn. ex R. Br.	silk oak	X	+	-	-	-
<u>Macadamia</u> <u>ternifolia</u> F. Muell.	macadamia nut	X	+	-	-	-

SCIENTIFIC NAME	COMMON NAME	STATUS	COMMUNITY			
			1	2	3	4
Rubiaceae (Coffee family)						
<u>Coffea arabica</u> L.	coffee	X	+	-	-	-
<u>Morinda citrifolia</u> L.	Indian mulberry, noni	P	+	+	-	+
Rutaceae (Citrus family)						
<u>Citrus grandis</u> (L.) Osbeck	pummelo, shaddock	X	+	-	-	-
<u>Citrus limonia</u> Osbeck	rough lemon	X	+	-	-	-
Solanaceae (Nightshade family)						
<u>Capsicum frutescens</u> L.	chili pepper	X	-	+	-	-
<u>Solantra hartwegi</u> N. E. Br.	cup of gold	X	+	-	-	-
Sterculiaceae (Cocoa family)						
<u>Waltheria indica</u> L.	'uhaloa, hi'aloa	I?	+	+	-	+
Tiliaceae (Linden family)						
<u>Triumfetta rhomboidea</u> Jacq.	burbush	X	+	+	-	-
Verbenaceae (Verbena family)						
<u>Lantana camara</u> L.	lantana	X	+	+	-	+
<u>Stachytarpheta dichotoma</u> (Ruiz & Pav.) Vahl	Cayenne vervain	X	+	-	-	-

STATUS: E = Endemic; I = Indigenous; P = Polynesian introduction; X = Alien.

SURVEY OF THE AVIFAUNA AND FERAL MAMMALS ON  
KEALAKEKUA RANCH PROPERTY, SOUTH KONA, HAWAII

Prepared for

Belt Collins & Associates

By

Phillip L. Bruner  
Assistant Professor of Biology  
Director, Museum of Natural History  
BYU-H  
Laie, Hawaii 96762

22 November 1989

**EXHIBIT E 8**

SURVEY OF THE AVIFAUNA AND FERAL MAMMALS ON  
KEALAKEKUA RANCH PROPERTY, SOUTH KONA, HAWAII

INTRODUCTION

The purpose of this report is to summarize the findings of a two day (18-19 November 1989) bird and mammal field survey of Kealakekua Ranch Property, South Kona, Hawaii (see Fig.1). Also included are references to pertinent literature as well as unpublished reports.

The objectives of the field survey were to:

- 1- Document what bird and mammal species occur on the property or may likely occur given the range of habitats available.
- 2- Provide some baseline data on the relative abundance of each species.
- 3- Determine the presence or likely occurrence of any native fauna particularly any that are considered "Endangered" or "Threatened".
- 4- Determine if the property contains any special habitats that if lost or altered by development might result in a significant impact on the fauna in this region of the island.

## GENERAL SITE DESCRIPTION

The project site is located on approximately 198 acres at Kealahou, South Kona, Hawaii (see Fig.1). The property is primarily a parkland habitat with scattered trees and grass. The mauka portion of the site contains larger trees and taller grass. The lower (makai) areas are more open and also more heavily grazed by cattle. Some of the common trees on the property are: Kukui (Aleurites moluccana), Monkeypod (Samanea saman) and Koa Haoli (Leucaena leucocephala).

Weather during the field survey had clear mornings and high overcast afternoons. Both days of the survey had NE winds.

## STUDY METHODS

Field observations were made with the aid of binoculars and by listening for vocalizations. These observations were concentrated during the peak bird activity periods of early morning and late afternoon. Attention was also paid to the presence of tracks and scats as indicators of bird and mammal activity.

All existing ranch roads were walked and at various locations along these roads eight minute counts were made of all birds seen or heard (see Fig.1 for locations of count stations). Between these census stations observations of birds seen or heard were also noted. These data provide the basis for the relative abundance estimates given in this report. Published and unpublished reports

of birds known from similar habitat elsewhere in West Hawaii were also consulted in order to acquire a more complete picture of the possible species that might occur in the area (Bruner 1988, 1989a, 1989b; Pratt et al. 1987; Hawaii Audubon Society 1989). Observations of feral mammals were limited to visual sightings and evidence in the form of scats and tracks. No attempts were made to trap mammals in order to obtain data on their relative abundance and distribution. Two evenings were devoted to searching for the presence of owls and the Hawaiian Hoary Bat (Lasiurus cinereus semotus).

Scientific names used herein follow those given in the most recent American Ornithologist's Union Checklist (A.O.U. 1983), Hawaii's Birds (Hawaii Audubon Society 1989), A Field Guide to the Birds of Hawaii and the Tropical Pacific (Pratt et al. 1987), Mammal Species of the World (Honacki et al. 1982), Hawaiian Forest Plants (Merlin 1977) and Tropical Trees of the Pacific (Hardgreaves and Hargreaves 1970).

#### RESULTS AND DISCUSSION

##### Resident Endemic (Native) Land and Water Birds:

Only one endemic species was recorded during the course of the field survey. An adult dark phase Hawaiian Hawk (Io) (Buteo solitarius) was observed on 18 November flying over the eastern sector of the property. This hawk is endemic to the island of Hawaii and is also listed as an endangered species. Io are widespread over agricultural lands and forests. The Short-eared

Owl or Pueo (Asio flammeus sandwichensis) is the only other species which might occur at this site. This owl is relatively common on Hawaii particularly at higher elevations (Berger 1972, Hawaii Audubon Society 1989, Pratt et al, 1987). No other endemic birds would be expected at this site given the elevation and location of the site and the nature of the habitats that are available. No waterbirds should be found on the property as there are no wetlands.

Migratory Indigenous (Native) Birds:

Migratory shorebirds winter in Hawaii between the months of August through May. Some juveniles will stay through the summer months as well (Johnson and Johnson 1983). Of all the shorebirds species which winter in Hawaii the Pacific Golden Plover (Pluvialis fulva) is the most abundant. Plover prefer open areas such as mud flats, lawns, pastures and plowed fields. They arrive in Hawaii in early August and depart to their arctic breeding grounds during the last week of April (Johnson et al. 1981). Bruner (1983) and Johnson et al. (1989) have also shown plover are extremely site-faithful on their wintering grounds and many establish foraging territories which they defend vigorously. Such behavior makes it possible to acquire a fairly good estimate of the abundance of plover in any one area. These populations likewise remain relatively stable over many years (Johnson et al. 1989). Only two plover were recorded during this field survey. The grass is too tall and there are very few barren areas suitable for plover on this property.

Resident Indigenous (Native) Birds:

No indigenous species were recorded nor would any be expected at this site.

Resident Indigenous (Native) Seabirds:

No seabirds were observed on the actual property. One White-tailed Tropicbird (Phaethon lepturus) was seen along the sea cliff face makai of the property line.

Exotic (Introduced ) Birds:

A total of 12 species of exotic birds were recorded during the field survey. Table One shows the relative abundance of each species. The most abundant species at Kealahou were Japanese White-eye (Zosterops japonicus), House Finch (Carpodacus mexicanus), Zebra Dove (Geopelia striata) and Nutmeg Mannikin (Lonchura punctulata). Given the range of habitats found on the property as well as data from surveys elsewhere in West Hawaii (Bruner 1988, 1989a, 1989b) and information provided in Berger (1972), Hawaii Audubon Society (1989) and Pratt et al. (1987) the following exotic birds species might also be expected to occur on or near the property: Common Barn Owl (Tyto alba), Northern Mockingbird (Mimus polyglottos), Black Francolin (Francolinus francolinus), Lavender Waxbill (Estrilda caerulea) and Yellow-fronted Canary (Serinus mozambicus).

Feral Mammals:

Small Indian Mongoose (Herpestes auropunctatus) were seen and heard during the survey. Feral cats were also observed. Cattle were concentrated on the lower (makai) section of the property. No evidence of rats and mice was discovered but these ubiquitous mammals undoubtedly occur in this area. No trapping was attempted in order to assess the relative abundance of mammals on this property.

Records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) are sketchy but the species has been reported from West Hawaii (Bruner 1984, Tomich 1986). None were observed on this field survey despite two nights of observations. This species roosts solitarily in trees. Much remains to be learned about the natural history of this bat and its ecological requirements here in Hawaii.

CONCLUSIONS

A brief field survey can at best provide only a limited perspective of the wildlife present in any given area. Not all species will necessarily be observed. The number of species and the relative abundance of each species may vary throughout the year due to available resources and reproductive success. Species which are migratory will quite obviously be a part of the faunal picture only at certain times during the year. Exotic species sometimes prosper for a time only to later disappear or become a

less significant part of the ecosystem (Williams 1987). Thus only long term studies can provide a comprehensive view of the bird and mammal populations in a particular area. However, when brief field studies are coupled with data gathered from other similar habitats the value of the conclusions drawn can be significantly increased.

The following are some general conclusions relating to bird and mammal activity on the property.

- 1- All representative types of habitat found on the property were censused. The more densely vegetated mauka section contained many more birds than the open habitat on the lower slope.
- 2- The present habitats provide a limited range of living spaces which are utilized by the typical array of exotic species of birds one would expect at this elevation and in this type of environment in Hawaii. However, some species normally found in this habitat were not recorded. This could have been due to the fact that the survey was too brief or that their numbers are so low that they went undetected or a combination of these and other factors.
- 3- The single sighting of the endangered Hawaiian Hawk was not entirely unexpected. This species ranges widely over ranch and farm lands as well as forested areas on the island of Hawaii, but is somewhat less common in West Hawaii.
- 4- The low numbers of migratory birds at this site is due entirely to an absence of suitable habitat. If large lawn areas are developed on this property the number of Pacific Golden Plover

utilizing the area will undoubtedly increase.

- 5- The proposed development of this property will alter the existing habitats. Some exotic species of birds such as the Nutmeg Mannikin will decline in abundance as the pasture grass is replaced by more residential vegetation. The Common Myna (Acridotheres tristis) and the House Sparrow (Passer domesticus) will likely increase in abundance following urbanization of this site.
- 6- In order to obtain more definitive data on mammals, a trapping program would be required. No endangered species were observed.

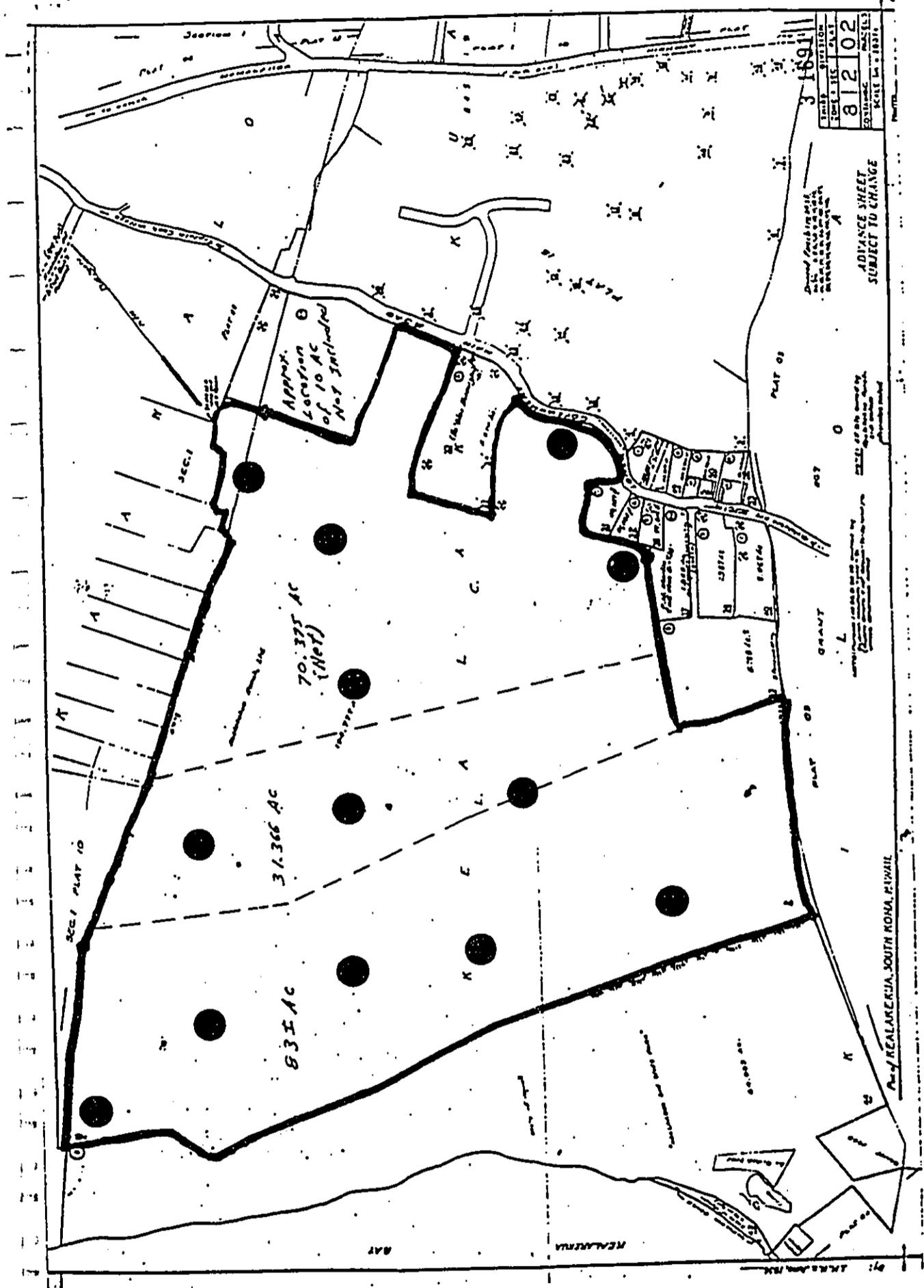


Fig. 1. Project site with eight minute count (census) stations indicated by solid circles.

TABLE 1

Exotic species of birds recorded on Kealahou Ranch Property, South Kona, Hawaii

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE *
Ring-necked Pheasant	<u>Phasianus colchicus</u>	R = 3
Gray Francolin	<u>Francolinus pondicerianus</u>	R = 2
Spotted Dove	<u>Streptopelia chinensis</u>	U = 3
Zebra Dove	<u>Geopelia striata</u>	A = 11
Common Myna	<u>Acridotheres tristis</u>	U = 4
Yellow-billed Cardinal	<u>Paroaria capitata</u>	U = 2
Northern Cardinal	<u>Cardinalis cardinalis</u>	C = 5
Japanese White-eye	<u>Zosterops japonicus</u>	A = 14
Nutmeg Mannikin	<u>Lonchura punctulata</u>	A = 15
Warbling Silverbill	<u>Lonchura malabarica</u>	R = 6
House Finch	<u>Carpodacus mexicanus</u>	A = 18
House Sparrow	<u>Passer domesticus</u>	R = 8

\* (see page 11 for key to symbols)

KEY TO TABLE 1

Relative abundance = number of times observed during survey or average number on eight minute counts in appropriate habitat.

A = abundant (ave. 10+) number which follows is average of data from all survey days

C = common (ave. 5-10) number which follows is average of data from all survey days

U = uncommon (ave. less than 5) number which follows is average of data from all survey days

R = recorded (seen or heard at times other than on 8 min. counts. number which follows is the total number seen or heard over the duration of the survey).

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**APPENDIX A:**

**DRAFT EA COMMENTS AND RESPONSES**

DEPARTMENT OF LAND AND NATURAL RESOURCES  
Division of State Parks

January 12, 2000

MEMORANDUM

TO: Dean Uchida, Administrator  
Land Division

FROM: Ralston H. Nagata, Administrator

SUBJECT: Review and Comment: CDUA HA-2968B, Norrie Residence at Ka'awaloa, South Kona, Hawaii. TMK: 81-10-05

SEARCHED  
SERIALIZED  
INDEXED  
FILED  
JAN 14 2000  
FBI - HONOLULU

Thank you for the opportunity to comment on the CDUA for the proposed Pali-K Ranch LLC (Norrie) single family residence at Ka'awaloa, South Kona, Hawaii.

The applicant's proposed construction site is located approximately 900 feet from the boundary of Kealakua Bay State Historical Park. This park is one of the most significant historical areas in the State, and its protection and proper development is extremely important. As such, development of surrounding lands should not detract from the Park's historical significance nor visually impact the park in any way.

The Division of State Parks has recently completed, and the Board of Land and Natural Resources has accepted, the conceptual plan for Kealakua Bay State Historical Park. The Division is now in the process of completing the phase I development plan for the Napo'opo'o Section and an interim plan for management of the Ka'awaloa Section. In a subsequent phase, the State plans to construct its Kealakua Bay State Historical Park Visitor Center on the park at a location approximately 900 feet south of the applicant's proposed primary home site. This location is shown on the attached Conceptual Plan for the park. The applicant has stated that his home will not be visible from the Captain Cook Monument at Ka'awaloa nor from Napo'opo'o. However, it will be visible from the future Park Visitor Center and from the bay, especially if there is a 2-story structure. The applicant will likely also be able to see the Visitor Center from his future home.

The applicant has indicated that the roof of his proposed home will be painted a light green to blend with the landscape and that his landscaping will harmonize with the surrounding *opihina* shrubland, yet, the applicant proposes to install visually intrusive overhead utility lines. The applicant should consider burying the utility lines to minimize visual impact.

Kealakua Bay is heavily used by snorkelers, kayakers, and boaters, and provides habitat for marine life, including dolphins and coral. The project site is only 900 feet from the park. A sill curtain or fence should be installed around the construction site to insure that no silt or debris washes or falls down slope and over the edge of the park.

We noted that there were some inconsistencies in the CDU application and the Draft EA. Although it is stated that the proposed structures are single story in the CDU application, the drawings provided in the DEA, (Sheet 3, Elevations) clearly indicate that two story structures are proposed. The actual developable area of the residence site ranges from 3,484 square feet to 4,945 square feet, as stated in the CDU application. Clarification is needed before approval of the CDUP.

CARLSMITH BALL

A PARTNER IN INCLUSIVE LAW CONVICTIONS

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January 26, 2000

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OUR REFERENCE NO.  
0243449

Ralston H. Nagata, Administrator  
Department of Land & Natural Resources  
Division of State Parks  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809

Re: Draft Environmental Assessment for the Pali-K Ranch Single Family Residence;  
CDUA HA-2968B; Ka'awaloa, South Kona Hawaii; TMK: 81-10-05

Dear Mr. Nagata:

Thank you for your memorandum of January 12, 2000 to the Land Division of the Department of Land & Natural Resources regarding your comments on Conservation District Use Application ("CDUA") HA-2968B and the above-referenced Draft Environmental Assessment ("DEA"). We provide the following responses to your concerns:

1. Proximity to Park Boundary. While the proposed single family dwelling is located approximately 900 feet from the boundary of the Kealakua Bay State Historical Park, the Applicant's proposal places the subject improvements in a confined area on that portion of Lot 10-A that is farther away from the park's boundaries than anywhere else on this parcel. Since the Applicant proposes no further development or other activities on this parcel other than its longstanding ranching operations, the siting of the residence at that location would support the continued grazing uses over the remainder of this parcel, further insulating the park from encroaching development. Moreover, there are many other residences that are much closer to the existing boundaries of the park especially in the Napo'opo'o Section (Subzone B) where portions of the park nearly envelops the residential area. We assume that you are not suggesting that the construction of single family residences be prohibited on lands surrounding the park as this may constitute a

regulatory taking especially if not uniformly applied. However, if the basis of your concern is the need for encouraging reasonable use of adjacent parcels, we believe that the siting of the proposed single family dwelling and continued ranching uses on this parcel would not detract from the park's historical significance or visually impact the adjacent park lands. As noted at pages 4 and 58 of the Conceptual Plan, the ranching operations on these Ka'iawaloa lands have been an integral part of the rich cultural tapestry of Kalaheka Bay since the mid-1800's.

2. **Visibility from Proposed Park Visitor Center:** Given the distance, topography, and vegetation, the proposed residential improvements should not be visible from the park's conceptual visitor center as shown in the Conceptual Plan. It is our understanding that the visitor center at the edge of the *Pali Kapu o Keoua* in the adjoining *ahupua'a* of Kalaheka is still conceptual at this point, as neither its specific position nor final design has been fixed. Also the private lands for construction of or access to this visitor center have not been acquired, nor has funding for either the development or acquisition been appropriated. In any event, the visual impact of the proposed dwelling on this facility should be no greater than other structures in the Captain Cook/Napo'opo'o area which would be visible from this location, especially those in the SLU urban district directly upslope of the conceptual visitor center and parking. We note that the location of the visitor center as shown in the Conceptual Plan (Figure 2.1 on page 11) is only half the distance from the urban lands directly upslope than from the Applicant's proposed residence.

3. **Overhead Utility Lines:** As noted in our preceding response, the Applicant does not believe that the overhead utility lines and poles will be visible from proposed visitor center given the distance, cross-country terrain and vegetation between this location and the proposed residential improvements, especially within this relatively small section of the Conservation District we have sited the improvements. Although the Applicant believes that the impact and costs of installing underground utilities would make the proposed dwelling unfeasible, we will review and consider this alternative and other mitigating measures that may minimize visual impact.

4. **Silt Curtain during Construction:** The Applicant will comply with all applicable governmental regulations for sedimentation control during construction of the proposed improvements including the precautionary use of a silt curtain or fence during the construction phase.

5. **Typographic Error in the CDUA:** You are correct in noting that the typographic error at 5X on page 10 of the CDUA, the result of changes to the Applicant's

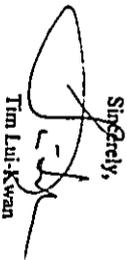
earlier plans. The developable area should be 4,945 square feet as set out page 9 and not the 3,484 square feet stated on page 10 of the CDUA. You are also correct in noting that the construction plans do call for second floor above the attached garage although the main living area remains a single story structure. The first sentence of the second paragraph on page 4 of the CDUA should more accurately read:

"Specifically, Applicant proposes to build a new single family residence of post-and-pier construction consisting of approximately 2,986 square feet in living area, together with a lanai of approximately 583 square feet within a single-story structure and an attached two-story garage/workshop/loft covering approximately 1,120 square feet and a lap pool covering approximately 256 square feet."

However, the height of all structures are within the 25' limit set out in the Board's guidelines for single family residences within the Conservation District.

We appreciate your review and participation in this matter. Your letter will be reproduced in the Final Environmental Assessment.

Sincerely,



Tim Lui-Kwan

cc: Department of Land & Natural Resources, Land Division  
Pali-K Ranch LLC

**CARLSMITH BALL**

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OUR REFERENCE NO.  
024248-9

January 26, 2000

Gary Gill, Deputy Director  
Department of Health  
State of Hawaii  
P.O. Box 3370  
Honolulu, Hawaii 96801

Re: Draft Environmental Assessment for the Pali-K Ranch Single Family Residence;  
CDUA HA-29688B; Ka'awaia, South Kona Hawaii; TLK: 3/8-01-10-05

Dear Mr. Gill:

Thank you for your letter of January 14, 2000 to the Department of Land & Natural Resources regarding your comments on Conservation District Use Application ("CDUA") HA-29688B and the above-referenced Draft Environmental Assessment ("DEA").

The Applicant proposes the handling of wastewater by means of a solid septic tank and leach field constructed in conformance with State Department of Health ("DOH") standards for wastewater systems as noted at §VII-B on page 6 of the CDUA, as well as §§ 4.7 and 9.3(10) on pages 7 and 24 of the DEA. The individual wastewater system for the proposed single family residence will be professionally engineered and designed by Leonard Jacobi, P.E. and plans for the solid septic tank will be submitted for DOH approval as provided by HAR Chapter 11-62.

We appreciate your review and participation in this matter. Your letter will be reproduced in the Final Environmental Assessment.

Department of Health  
State of Hawaii  
January 26, 2000  
Page 2

cc: Department of Land & Natural Resources, Land Division  
Pali-K Ranch LLC

Sincerely,  
  
Tim Lui-Kwan



BENJAMIN J. CAVEYANO  
DIRECTOR



STATE OF HAWAII  
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GENEVIÈVE SALMONSON  
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TELEPHONE 808-531-4110  
FACSIMILE 808-531-4110  
January 24, 2000

Mr. Tim Johns, Chair  
Department of Land and Natural Resources  
P.O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Johns:

Subject: Draft Environmental Assessment for the Pali-K Ranch  
Single Family Residence, Hawaii

Thank you for the opportunity to review the subject document. We have the following questions and comments.

1. Please list the total land area of the parcel designated by TRK (3) 8-1-10:05.

Should you have any questions, please call Jeyan Thirugnanam at 586-4105.

Sincerely,

*Genevieve Salmonson*  
Genevieve Salmonson  
Director

c: Tim Lui-Kwan

JAN 25 3 58 PM '00

JAN 25 12:44 PM '00

**CARLSMITH BALL**

A PARTNERSHIP INCLUDING LAW CORPORATION

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January 26, 2000

OUR REFERENCE NO.  
024248-9

Ms Genevieve Salmonson, Director  
Office of Environmental Quality Control  
State of Hawaii  
235 S. Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Re: Draft Environmental Assessment for the Pali-K Ranch Single Family Residence,  
Kahaloa, South Kona, Island County and State of Hawaii. TMK: 3/8-1-10-05

Dear Ms. Salmonson:

Thank you for your letter of January 24, 2000 regarding your comments on the subject Draft Environmental Assessment ("DEA"). The total land area of the parcel designated by TMK (3) 8-1-10:05 (Lot 10-A) is 31.234 acres as set out at §4.2.1 on page 4 of the DEA, as well as on page 5 of the Conservation District Use Application ("CDUA") HA-2968B at §VII-A.

We appreciate your review and participation in this matter. Your letter will be reproduced in the Final Environmental Assessment.

Sincerely,

*Tim Lui-Kwan*  
Tim Lui-Kwan

cc: Department of Land & Natural Resources, Land Division  
Pali-K Ranch LLC