

Hilo Institute for Astronomy  
Fac.



UNIVERSITY  
OF HAWAII  
HILO

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Mr. Gary Gill, Director  
Office of Environmental Quality Control  
State of Hawaii  
235 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Final Environmental Assessment - Institute For Astronomy  
Base Facility, Hilo Hawaii, TMK: 2-4-01: Portion 07

We have received only one comment regarding the subject matter. This was a letter from your office, and appropriated revisions were made to the document.

As such, we have determined that this project will not have a significant environmental effect and issue a Finding of No Significant Impact (FONSI). We would appreciate your publishing this notice in the January 23, 1998 OEQC Bulletin.

We have enclosed a complete OEQC Bulletin Publication Form, the computer diskette, and four copies of the Final EA. Please note that a copy of this document will also be made available at the Hilo Library and the University of Hawaii at Hilo library.

Please feel free to contact this office at 974-7595 or our planning consultant, Sidney Fuke at 969-1522 if you have any questions on this matter. Thank you very much.

Sincerely,

Kerwin Iwamoto  
Interim Vice Chancellor of Administrative Affairs

enclosures

cc w/o enclosures:

Dr. Robert McLaren  
Sidney Fuke

Administrative Affairs

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HILO, HAWAII 96720-4091  
PHONE: (808) 974-7445  
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for Astronomy Facility

JAN 23 1998

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**FINAL  
ENVIRONMENTAL ASSESSMENT**

**Use Of State Lands  
for the  
Institute for Astronomy's Hilo Facility  
University of Hawaii**

**Waiakea, South Hilo, Hawaii  
TMK: 3/2-4-01: por 7**

**DECEMBER 1997**

**FINAL  
ENVIRONMENTAL ASSESSMENT**

**Use Of State Lands  
for the  
Institute for Astronomy's Hilo Facility  
University of Hawaii**

**Waiakea, South Hilo, Hawaii  
TMK: 3/2-4-01: por 7**

**DECEMBER 1997**

**FINAL ENVIRONMENTAL ASSESSMENT  
WAIAKEA, SOUTH HILO, HAWAII  
TAX MAP KEY: 3/2-4-001: PORTION OF 7**

**APPLICANT:** INSTITUTE FOR ASTRONOMY  
UNIVERSITY OF HAWAII  
2680 WOODLAWN DRIVE  
HONOLULU, HI 96822  
TELEPHONE: 808/956-8768

**ATTN: DR. ROBERT McLAREN,  
INTERIM DIRECTOR**

**CLASS OF ACTION:** USE OF STATE LANDS

**APPROVING AGENCY:** UNIVERSITY OF HAWAII AT HILO  
ADMINSTRATIVE AFFAIRS  
200 WEST KAWILI STREET  
HILO, HI 96720  
TELEPHONE: 808/974-7595

**ATTN: MR. LO-LI CHIN**

**CONSULTANT:** SIDNEY FUKE, PLANNING CONSULTANT  
100 PAUAHI STREET, SUITE 212  
HILO, HI 96720  
TELEPHONE: 808/969-1522

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FINAL ENVIRONMENTAL ASSESSMENT • USE OF STATE LANDS BY INSTITUTE FOR ASTRONOMY  
 HILO FACILITY UNIVERSITY OF HAWAII • TMK: 3/2-4-01: PORTION OF 7 WAIKAE, SOUTH HILO

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4	Main Level Floor Plan
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### APPENDICES

<u>Appendix</u>	<u>Description</u>
A	Letter from the State of Hawai'i, Office of Hawaiian Affairs, to Sidney Fuke, March 21, 1997.
B	Botanical Survey, University of Hawai'i - Hilo, Proposed Infrastructure for Research and Technology Lots, South Hilo District, Island of Hawai'i, by Char and Associates, December 1992
C	Archaeological Survey and Testing of Lands Proposed for Research and Technology Lots at the University of Hawaii at Hilo (TMK 2-4-01: 7 and 41), by Douglas Borthwick, B.A., Joy Collins, BA, William H. Folk, BA, and Hallett H. Hammatt, Ph. D., for Engineering Concepts by Cultural Surveys, April 1993; Revised Nov. 1993
D	Supplemental Archaeological Survey and Testing of the Proposed University of Hawaii at Hilo Expansion Area, by Cultural Surveys, Nov. 1993
E	Letter, dated November 25, 1997, from OEQC and response, dated December 22, 1997 from Sidney Fuke
E-1	Letters, dated December 2, 1997, to surrounding property owners

## CHAPTER 1: INTRODUCTION

### 1.1 Purpose of Document

The Institute for Astronomy, University of Hawaii is proposing to construct an astronomy base facility and related improvements on State land at the Research and Technology Park of the University of Hawaii at Hilo.

Since the project involves the use of State lands, the environmental review and approval requirements outlined in Hawaii, Revised Statutes, Chapter 343 and Hawaii Administrative Rules, Chapter 11-200 must be complied with. This document is intended to satisfy said requirement.

This document has been compiled from published and unpublished studies, field investigations, and inputs from various public agencies.

### 1.2 Applicant

The applicant is the Institute for Astronomy, University of Hawaii (hereinafter, IfA). The IfA is proposing to construct an astronomy base facility and related improvements at the Research and Technology Park of the University of Hawaii at Hilo, South Hilo, Hawaii. The proposed facility in Hilo would support the operation facilities for the UH telescopes at the summit of Mauna Kea, including the research and maintenance of the telescopes. It would also provide for technical and other support staff for summit activities.

The IfA's proposed Hilo facility is to be located on a portion of a 202.736 acre parcel where other observatories' support service facilities have been recently built. The site is located east or makai of Komohana Street, above of the UH at Hilo campus.

### 1.3 Approving Agency

The approving agency is the University of Hawaii at Hilo, the agency that has the master lease of this State-owned parcel.

### 1.4 Consulting Parties

The following agencies were consulted and/or their previous comments on similar projects were reviewed in the process of preparing this environmental assessment:

- \* State
  - Department of Land and Natural Resources
  - Department of Transportation, Highways



- University of Hawaii at Hilo
- Office of Hawaiian Affairs

- \* County
  - Planning Department
  - Department of Public Works
  - Department of Water Supply

Further, subsequent to the publication of the Draft EA and receipt of comments from the OEQC (**Appendix E**), the surrounding neighbors (which are essentially other astronomy base facilities) were consulted. A copy of a request for comments letter to these property owners are found in **Appendix E-1**. As of December 22, none them responded. It should be noted that the OEQC was the only agency and/or entity submitting comments on the Draft EA.

## **CHAPTER 2: DESCRIPTION OF PARCEL**

### **2.1. Location**

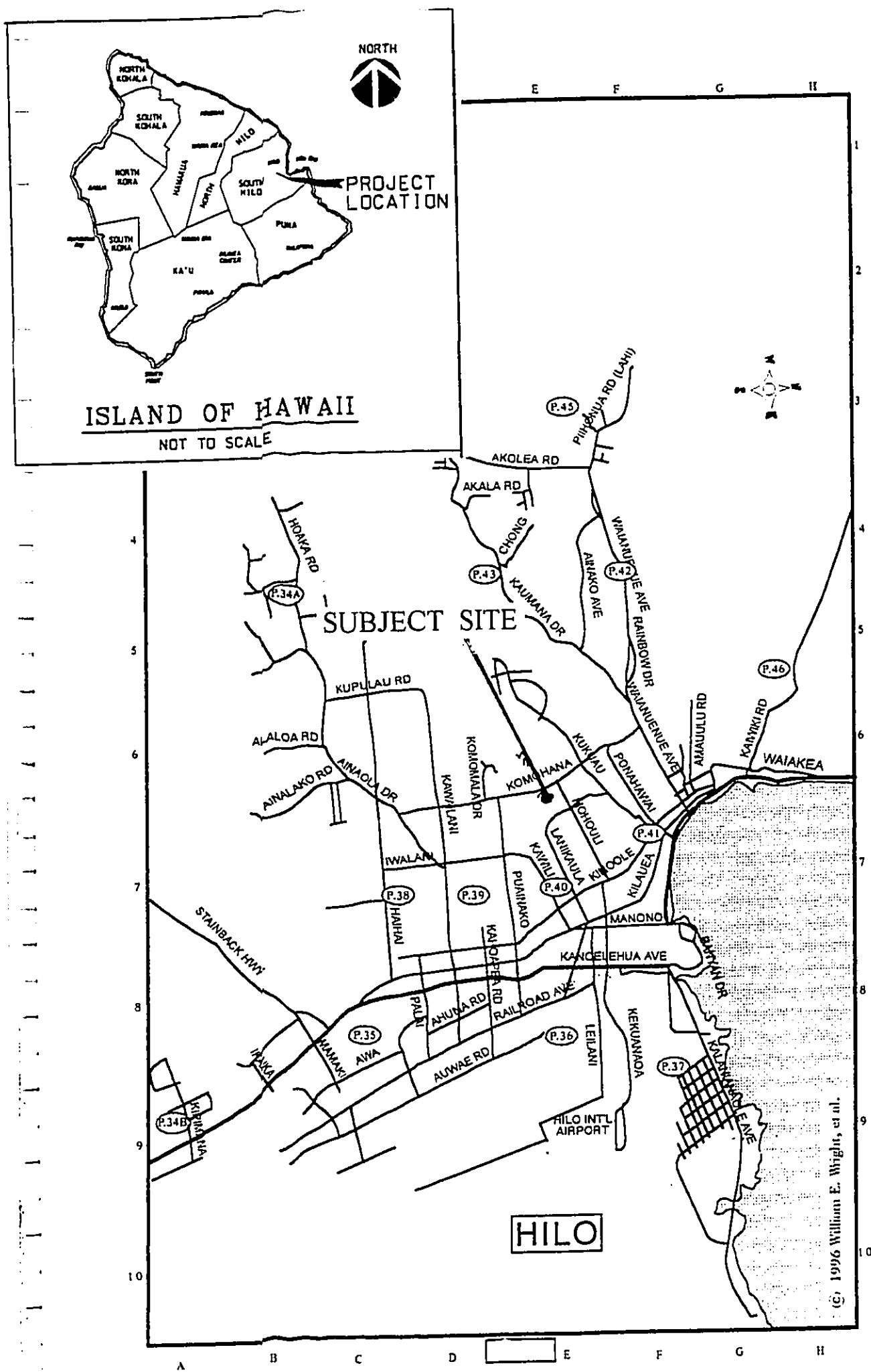
The subject area is located makai of Komohana Street, generally between Puainako and Mohouli Streets, Waiakea, South Hilo, Hawaii, and identified by TMK: 2-4-01: 7. (**Figure 1**) The subject parcel, according to the tax map, is 202.76 acres in size. The specific location of the proposed improvements is an 8.5± acre area located at the terminus of N. Aohoku Place in the University's Research and Technology Park. (**Figure 2**)

Komohana Street is a major cross-town two-lane County-owned roadway with an 80-foot right-of-way in the vicinity of the project.

### **2.2 Land Ownership**

The entire parcel, which is ceded land, is held in trust by the State of Hawaii. (**Exhibit A**) It is leased to and utilized by the University of Hawaii at Hilo with a portion of the total parcel being set aside for the research and development park.

Observatories, sponsored by various nations, have been constructed on the summit of Mauna Kea for astronomy studies and research. Sea-level base facilities that support the observatory staffs working at the higher elevations of the summit have also been built adjacent or proximate to the subject site and within the Research and Technology Park.



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FIGURE 1

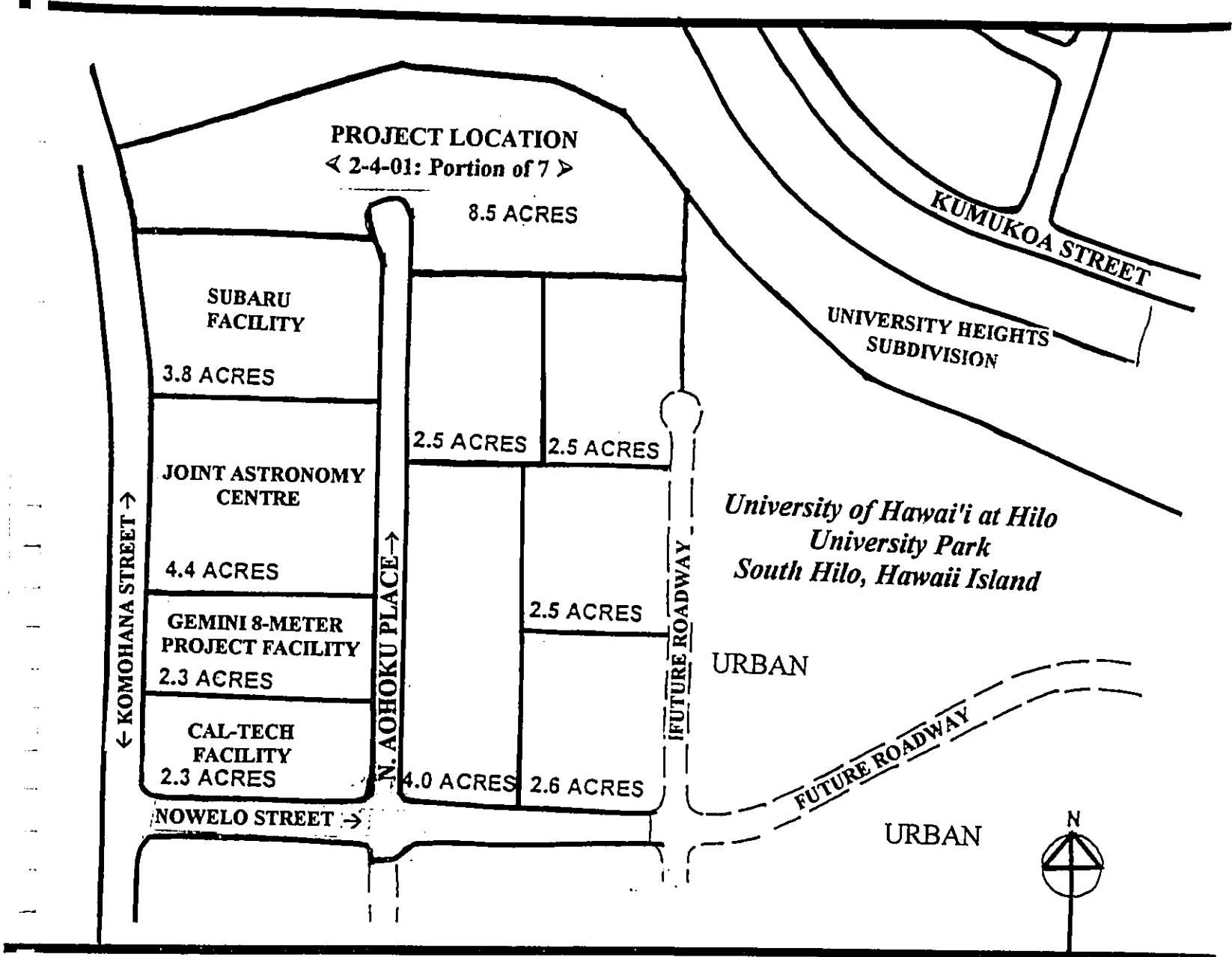


FIGURE 2

## 2.3 Parcel Description

### 2.3.1 Historical Description

The proposed site is presently vacant of any structures or agricultural activity. Historical use, however, has been some form of agricultural use in either sugar cane or cattle grazing.

An Environmental Assessment for the infrastructure of the subject area was prepared in November 1993. A botanical survey, an archaeological survey, and a supplemental archaeological survey were done in conjunction with that assessment. The results of this EA and its supportive reports are used herein for this Assessment.

### 2.3.2 Physical Description

The 8.5+ acre site is currently vacant of any structures. The topography slopes toward the ocean in a westerly to easterly direction. The overall slope of the University Research and Technology Park ranges from 6 to 10 percent.

From east to west or mauka to makai, the subject site is approximately 1,200 feet in length. It is approximately 480 feet wide.

Ohia-uluhe and an introduced mixed forest material dominate the site, as well as the adjoining areas.

### 2.3.3 Surrounding Land Uses

Surrounding land uses include the University of Hawaii at Hilo campus complex and its related student housing; single-family residential areas; and vacant land overgrown with vegetation.

Within the University's Research and Technology Park, there are other observatory staff support facilities located adjacent and/or proximate to the subject site. These include the California Institute of Technology (Cal-Tech), AURA, Inc. for the Gemini project, the Joint Astronomy Centre, and the National Astronomy Observatory of Japan (NAOJ) for the Subaru project.

## CHAPTER 3: PROJECT DEVELOPMENT

### 3.1 Purpose and Objectives of Action

The University of Hawaii's Institute for Astronomy (IfA) was founded in 1964 to support the Mauna Kea summit telescopes that became operational in 1968, 1969, and 1970.

Presently, the IfA headquarters is located on Oahu at the UH Manoa campus. It is housed in a complex which consists of three 2-story buildings constructed in 1976. The headquarters has grown to a point where it cannot accommodate approximately 193 (as of 1995) staff, faculty, and student employees.

Rather than expanding the existing headquarters, the IfA has elected to construct a new facility in Hilo. Some of the existing functions at the Manoa headquarters would be transferred to Hilo. Equally important, it would establish a support facility that can provide more efficient services for the observatory staff located at the summit of Mauna Kea. Over the next ten years, as much as 70 percent of the IfA's operations will be located in this facility.

The Hilo facility would support the UH's Mauna Kea summit observatory staff and include operators, research, administration, and maintenance activities, a staff of approximately 68 people.

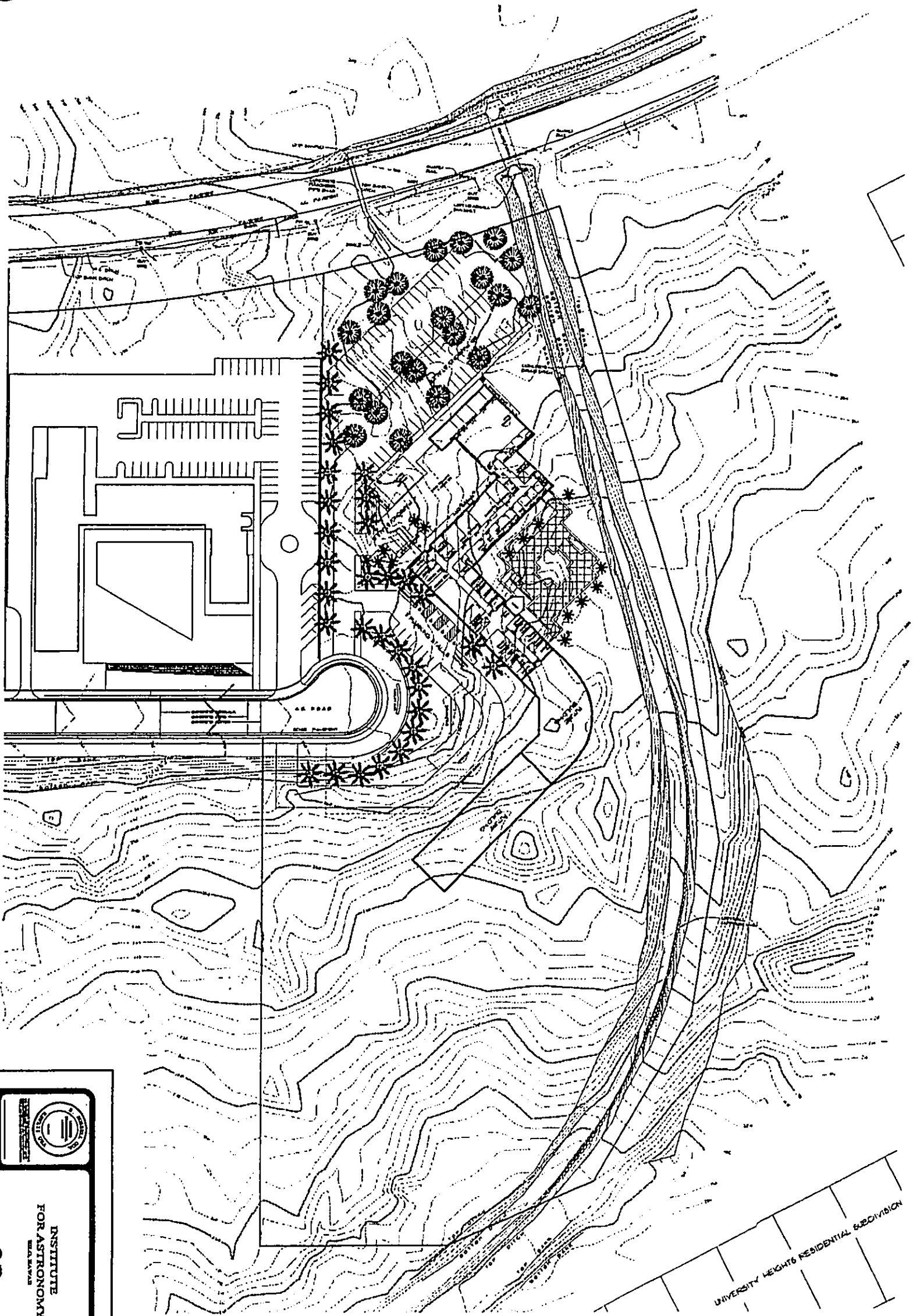
### 3.2 Project Description

It should be emphasized that this environmental assessment is intended to provide an assessment of only the proposed sea-level base facility. It is not designed to address ongoing or planned activities at the summit of Mauna Kea.

The proposed 34,857 ± square foot, split-level structure would have a roof height of approximately 35 feet. The lower level would consist of about 14,500 square feet, and the upper level would contain about 20,357 square feet. (See Figures 3 - 6). The facility would have office space, research labs, library, meeting rooms, and the like.

There would be 85 standard parking stalls, of which a minimum of 4 would be for designed for the handicapped.

It should be noted that proposed facility is intended to be built in phases. The first phase would consist of the 34,857± square foot structure. Also planned are two more segments of this building that when completed, will have about 81,000± square feet of floor space.



A  
1

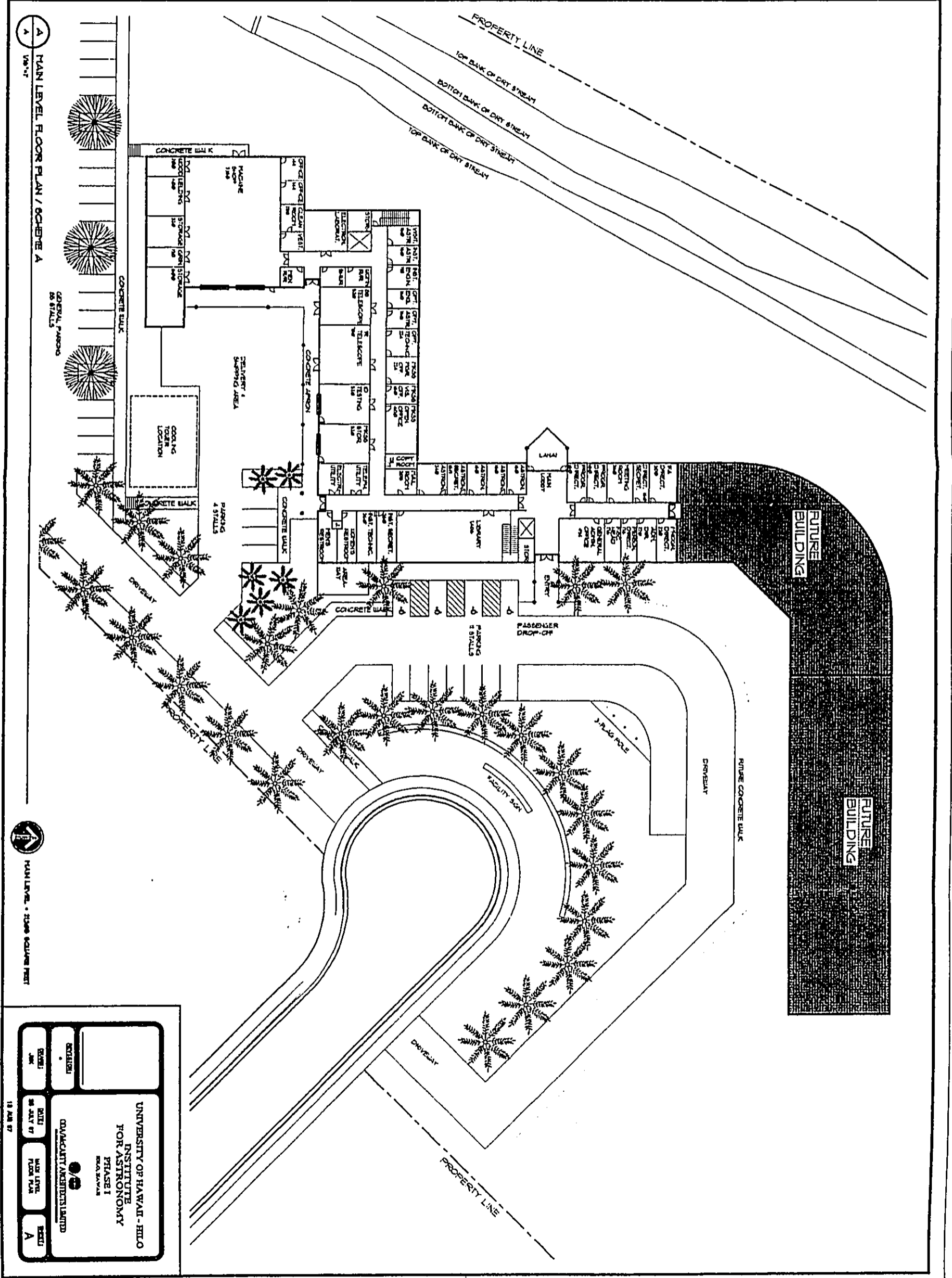
PRE-SCHEMATIC SITE PLAN - SCHEME 1



		<b>INSTITUTE FOR ASTRONOMY</b> WELA, MALAYA	
DESIGN BY	DATE 7 JAN 87	SITE PLAN	SCALE A
		<b>OAMCCASTY AMERICAS LIMITED</b>	
13 JAN 87			

UNIVERSITY HEIGHTS RESIDENTIAL SUBDIVISION

FIGURE 3



A MAIN LEVEL FLOOR PLAN / SCHEME A  
 1/8" = 1'-0"

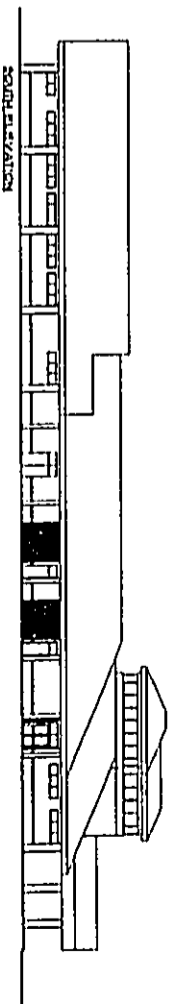
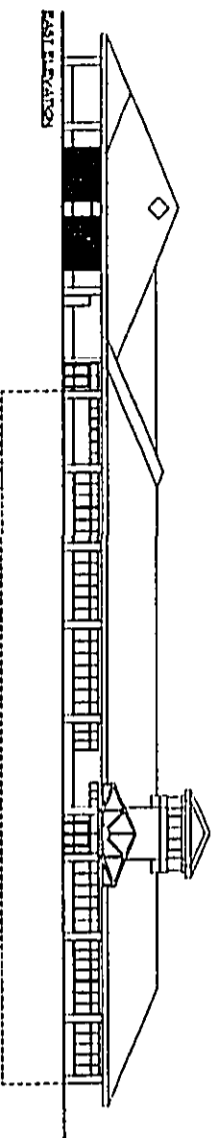
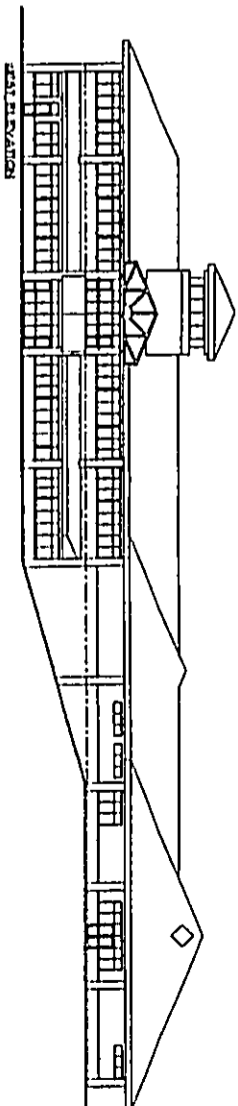
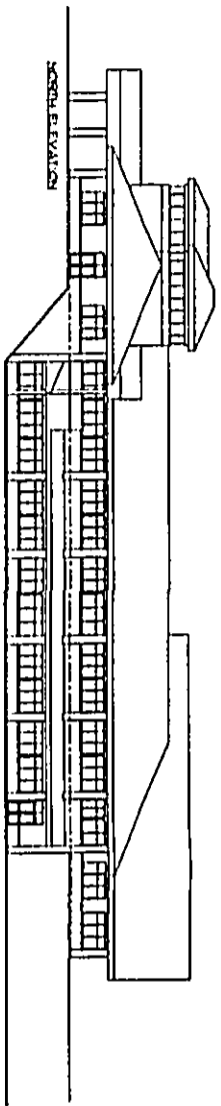
MAIN LEVEL - 32000 SQUARE FEET

UNIVERSITY OF HAWAII - HILO INSTITUTE FOR ASTRONOMY PHASE I HAWAII			QUADCAST ARCHITECTS LIMITED		
DESIGNED BY	DATE	SCALE	DATE	SCALE	DATE
QUADCAST ARCHITECTS LIMITED	11 JAN 87	1/8" = 1'-0"	11 JAN 87	1/8" = 1'-0"	11 JAN 87

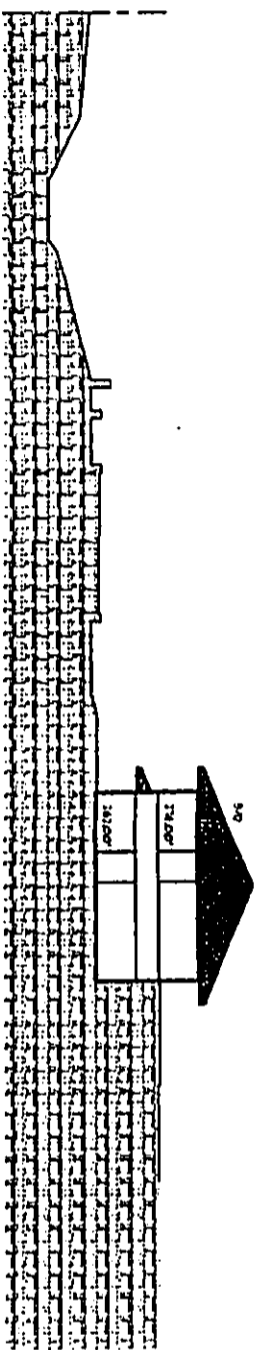
FIGURE 4







**A**  
1  
EXTERIOR ELEVATIONS  
1/8" = 1'



**B**  
1  
SECTION THRU SITE  
1/8" = 1'

UNIVERSITY OF HAWAII - HILO INSTITUTE FOR ASTRONOMY PHASE I REMARKS		DATE 28 JAN 87		DRAWN JAC	
OMAKAHI AMHERST LIMITED		DATE 18 APR 87		SCALE A	
NOTED:		DATE 28 JAN 87		DRAWN JAC	

FIGURE 6

### 3.3 Timetable and Cost

The applicant hopes to begin construction immediately upon securing all necessary permits. Tentatively, this is planned for July 1998. The construction phase is expected to take about 12 months, and the anticipated occupancy is planned for fall of 1999.

The estimated construction cost of this project is \$9.6 million, which will be funded in its entirety by the State of Hawaii. The balance of the project would be initiated upon demand and availability of funds.

## **CHAPTER 4: ENVIRONMENTAL SETTING, IMPACT, AND MITIGATION MEASURES**

### 4.1 Physical Environmental Characteristics

#### 4.1.1 Climate

The mean annual rainfall in this area is estimated at about 141 inches. Rainfall is more frequent during the months of October through April. Hilo, being located on the easterly or windward side of the island, is exposed to the traditional "trade" wind. Daytime Fahrenheit temperatures range between the upper 70's to the low 80's during the days; and from the low 60's to the upper 70's during the evenings.

#### 4.1.2 Topography and Soils

Terrain of the parcel was comprised predominantly of lava flows covered with thick vegetation.

The Land Study Bureau's Detailed Land Classification report designates the site E 306, which is essentially poorly suited for intensive agricultural activities. The soil series is almost bare pahoehoe with very little or no soil material. It is moderately drained, with slopes generally less than 35 percent. It is very poorly suited for machine tillability.

Under the Agricultural Lands of Importance to the State of Hawaii (ALISH) classificatory system, the subject site is not classified.

The U. S. Department of Agriculture's Soil Survey Report classifies the soil types in this area to be of the Keaukaha extremely rocky much, Pahoehoe Lava flows, and the Panaewa very rocky silty clay loam. The actual topography, however, shows an east to west slope. The

elevation ranges from 280 feet to 220 feet. The slope ranges from 6 to 10 percent, although there are areas where the slope may slightly exceed 10 percent.

#### 4.1.3 Natural Hazards

Tsunami, earthquake and subsidence, and lava flow represent the major natural hazards on the island of Hawaii. None of these natural hazards appear to be overly applicable to this site.

The subject site is located more than two miles from the shoreline. As such, it would not be vulnerable to tsunamis and subsidence.

According to the flood Insurance Rate Map (FIRM), the subject site is designated zone X, areas determined to be outside the 500-year flood plain.

The U. S. Geologic Survey report notes that the degree of volcanic hazard in this area is "3" out of a scale of 9. The lower the number, the greater the degree of hazard. While this may be of concern, it should be noted that the entire city of Hilo has been designated Zone 3. In 1881, an historic lava flow from Mauna Loa mountain flowed into Hilo within one mile of Hilo Bay.

#### 4.1.4 Flora

A walk-through field study of the subject parcel and the surrounding area's botanical resources was conducted by Char and Associates in November 1992. The results of this study are attached as **Exhibit B**.

The survey found the site to be characterized by Ohia trees and matted uluhe ferns. Visual observation also suggests guava thicket. Based on the study, none of the plants inventoried were listed as threatened and endangered species; nor were any proposed or candidate for such status. As such, no restrictions, conditions, or impediments, or recommendations, are discussed for this site.

#### 4.1.5 Fauna

No commissioned faunal study was conducted of the site. According to records on file with the State and County, this area does not have any history of serving as a habitat for rare or endangered animal life.

#### 4.1.6 Historic/Archaeological Resources

An archaeological inventory survey was conducted of the subject parcel (December 1992 to January 1993) by Cultural Surveys Hawaii (**Exhibit C**). This survey was done in conjunction with the processing of plans for the constructions of on-site infrastructure improvements within the subject parcel. The survey area covered 163 acres.

The report noted that bulldozing had occurred within the study area for an old water main and an electric power line. In addition, two structures (Agriculture Center and the Joint Astronomy Centre) and their associated parking lots and paved roadways were completed prior to the archaeological survey.

Sites were located within the southern portion of the parcel, of which four were described and mapped. Two agricultural complex sites (18668 and 18669) and a mound feature of a third site (18667) were hand excavated and tested to document stratigraphy in the sites and to search for cultural remains to date the sites. No subsurface cultural deposits were found.

No further archaeological research for the sites found was recommended based on the type and age indicated by the date collected and analyzed.

In September 1993, a supplemental archaeological survey was done by Cultural Surveys Hawaii, covering approximately 11 (eleven) acres within the adjacent flood control channel east (makai) and adjacent to the subject parcel (**Exhibit D**).

Four plantation era (circa 1870 to 1940) rock clearance features (or mounds) and a portion of a rock wall continuing from the state-owned parcel were identified. These features were included in the original survey under State Historic Site No. 50-10-35-18670. Based on subsurface testing of the largest mound within the flood control channel, and another mound located within the state-owned parcel, these features were determined to be part of the commercial sugarcane cultivation of the Waiakea Cane Lots. As such, no further archaeological research was deemed necessary.

Relative to the proposed site, no archaeological features were found.

Should any unanticipated archaeological features be uncovered, the applicant will halt work and notify the proper government agency.

#### 4.1.7. Cultural Resources

Since publication of the Draft Environmental Assessment for this project, the Environmental Council adopted on November 19, 1997 guidelines for assessing Cultural Impacts. This section attempts to discuss the project's impacts to any cultural resources in the area.

The archaeological reports discussed above did not indicate the presence of sites in the general area that require physical preservation. The sites were noted to be more agricultural in nature, some of which were of more recent vintage (i.e., associated with the sugar crop).

The only native Hawaiian agency and/or individuals contacted was the Office of Hawaiian Affairs. No comments were received from this agency. Further, subsequent to publication of the Draft EA, no other comments were received.

Accordingly, this site does not appear to have any significant cultural associations with native Hawaiian or other groups.

#### 4.1.8 Air Quality

The South Hilo district has pollution, natural and man-made. Those associated with the automobile and geothermal development are man-made; while the more significant one is a natural one, coming from the fumes of ongoing volcanic activity.

It is not expected that the proposed building and its use would generate any significant air pollutants. While employees and visitors will come to the site using automobiles, the number of employees and the number of visitors is expected to be small.

It should be noted that air emission pollution within the area is generated by traffic from Komohana Street, which is the main thoroughfare from the Waiakea District to the downtown and mauka areas of Hilo town.

#### 4.1.9 Noise

There will be short-term impact associated with the construction of the facility. That would occur during normal working hours and days, not on weekends. Further, there are no immediate surrounding residential uses.

The subject area is generally associated with ambient noise levels associated with traffic from Komohana Street. Expected noise impact

would be from the area's general location, and not from the use of the proposed building after construction impacts. Noise level of the use of the proposed building is expected to be equivalent to the existing buildings in the park.

## CHAPTER 5: SOCIO-ECONOMIC CHARACTERISTICS

### 5.1 Surrounding Land Uses

The proposed action will not involve the relocation of residents, as the site is currently vacant.

There are other similar uses adjacent and/or proximate to the site. These include the Joint Astronomy Centre and the headquarters/base facility for other astronomy operations at the summit, such as Cal-Tech and Subaru. There are some residential uses makai of the site, but buffered by extensive vegetation.

Properties to the south, east, and west are vacant and planned for a variety of educational/research type of uses by the University of Hawaii.

Although governed by existing zoning and County land use policies, the proposed action is not expected to significantly affect surrounding land values. Most of the surrounding land in the area is essentially owned by the State of Hawaii.

### 5.2 Scenic Resources

The location of the proposed structure will be makai of Komohana Street. As the land slopes makai at that point, there would thus be some interference with the makai viewplane. Further, the existing 25+ foot high stand of trees located on the mauka portion of the site will be retained. As such, the existing visual buffer will continue to provide a natural visual screen between the proposed structure and the Street.

Notwithstanding that natural visual buffer, the proposed structure would be less than thirty five feet high. It should also be noted that the makai view from Komohana Street to this not listed as a critical viewplane in any of the County's published planning documents.

### 5.3 Socio-Economic Aspects

The estimated construction cost of this project is \$9.6 million. This should greatly help the construction industry over the short term.

For the longer term, this project will inject an additional \$6 million to \$7 million to the island's economy annually. This figure represents IfA's annual operating cost of this facility. This would represent new moneys coming into and circulating within the economy of the County of Hawaii.

When completed, the project is expected to operate with a staff of sixty eight (68) persons, of which approximately fifty (50) are expected to be transferred from the Oahu facility. This will translate to additional jobs for the island and some boost to the island's real estate industry, as the relocated employees would have to find new homes in the area.

## **CHAPTER 6: PUBLIC FACILITIES, UTILITIES AND SERVICES**

### **6.1 Roads and Traffic**

Komohana Street would serve as the principal access to the facility. It is a two-lane County-owned roadway with an 80-foot right-of-way in the vicinity of the proposed improvements. There is a left-turn storage lane leading into the subject parcel and the site.

Nowelo Street intersects with Komohana Street (Figure 2) and N. Aohoku Place. Nowelo Street is a divided roadway within a 60-foot right-of-way. N. Aohoku Place is a cul-de-sac, and this road has also been built to County dedicable standards with curb, gutters, and sidewalk.

Anticipated traffic for the facility should not be significant to warrant additional road improvements in the area.

It is anticipated this project will add to the existing ambient traffic levels along Komohana Street. However, with the partially channelized intersection, there should be little impact to vehicular movements entering the site. Approximately 80% or about 50 vehicular movements will occur during normal working hours which would be between 8:00am to 5:00pm, Monday to Friday. The balance would occur during the non-peak hours, as the facility would have to be staffed 24-hours.

### **6.2 Water System**

There is an existing 8-inch County water line along Komohana Street. This line has been extended to a 6-inch line within Nowelo Street and N. Aohoku Place.

The capacity of these lines are such that it can readily accommodate the potable and fire protective requirements of the project. The fire flow requirement calls for 2,000 gallons per minute plus maximum daily flow.

6.3 Wastewater System

Presently, the UH at Hilo is serviced by on-site transmission lines that intersect with an 8-inch County sewer line along Lanikaula Street. The on-site transmission line has been extended to the subject area. The project's wastewater will thus be disposed off into the County system.

6.4 Drainage System

The subject site is designated Zone X, areas of minimal flood hazard and/or drainage hazards. The proposed parking area should increase the area of semi-impervious surface, and the structure's roof should also add to the on-site drainage. Given the existing permeable condition of the land, on-site drainage problems are not anticipated.

Drywells and other drainage systems as may be required by the County will be constructed on site.

6.5 Solid Waste

The use should not generate a significant amount of solid waste. All waste will be disposed of by commercial haulers at the County landfill in Hilo and in the future to the Puuanahulu site in West Hawaii.

6.6 Electrical/Telephone

Electrical and telephone services are currently available to the area. There is an overhead 69kV line along Komohana Street and within the Research Park. This serves the existing facilities and will also serve the proposed facility.

6.7 Other Public Facilities

Additional public services should not be required for the proposed use. Located within an urban environment, this site is readily accessible to fire and police protective services. Further, this proposed use is not expected to significantly add to the demand for those services.

The proposed use may create new jobs, but is not anticipated that there will be any significant demand for school support services.

There are existing schools and the University of Hawaii at Hilo proximate to the proposed site.



**CHAPTER 7:           RELATIONSHIP TO PLANS, POLICIES, AND  
CONTROLS**

7.1    State Land Use Law

The parcel is classified Urban by the State Land Use Commission. No further action and/or land use permit is required by the State.

7.2    Hawaii County General Plan

The subject site is designated for University Use on the County General Plan Land Use Pattern Allocation Guide map. The proposed use would thus be compatible with that designation and no land use amendment would be required.

It should also be noted that in the General Plan document, one of the policies states that *"The County shall encourage the implementation of existing State and University of Hawaii plans for the establishment of a Research and Technology Park on the campus of the University of Hawaii at Hilo."*

7.3    Hilo Community Development Plan

The Community Development Plan was adopted by the Planning Commission in 1975. The land use guide map of this Plan suggests a RS-10 designation for the balance of the University site.

7.4    Zoning

The County zoning of the entire site is split between RS-10 and A-1a. The area of the proposed facility is zoned A-1a. Under the County Zoning Code, schools would be allowed in both of those zones, provided that a Use Permit application is approved by the Planning Commission. In this case; the use would be related to the University. Like the other recently-constructed base facility, there is a possibility that the proposed use may not require a Use Permit as it may be considered an extension of the existing use.

All of the site planning requirements of the zoning code, such as parking, height, and setback will be met.

7.5    Other Requirements

#### 7.5.1 Special Management Area

The subject parcel and this subject site are not located within the County Special Management Area (SMA).

#### 7.5.2 UH at Hilo Long Range Development Plan

The University of Hawaii at Hilo Long Range Development Plan, developed in 1981, includes guidelines for the campus development, including its architecture and landscaping plans to keep consistency of character with the existing campus buildings. Plans for the proposed building will follow the development plan's guidelines as well as the State and County building codes.

#### 7.6 Status of Required Permits

The following permits are required for this project, and to date, none have been applied for:

- Plan Approval
- Underground Injection Control (UIC) Permit
- Grading Permit
- Building Permit

It should be noted that in conjunction with the building permit process, other permits will be needed, such as the electrical, plumbing, and air conditioning.

### **CHAPTER 8:           SUMMARY OF ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES**

#### 8.1 Short-Term Impacts

One short-term impact would be noise and dust from construction of the facility. Construction controls will be implemented during the building period. The associated construction-related economic benefit impact will also result during the building phase of the facility.

#### 8.2 Long Term Impacts

One impact is the associated traffic to and from the facility. However, the number of employees and visitors to the site is not expected to be significant to warrant any improvements to the access and roadway. Komohana Street is a two-lane County-owned roadway with an 80-foot right-of-way in the vicinity of the Park.

There is a left-turn storage lane leading to the parcel and the decreased speed 35 miles per hour speed limit in front of Nowela Street. The existing improvements should not significantly affect movements along Komohana Street.

Increased noise in the area will be limited first to the short-term construction noise, and then decrease to the normal traffic noise patterns within the cul-de-sac. Air quality will also be affected by the vehicular use in the area. *There are no residential developments in the nearby areas both mauka and makai of the site that would be affected by the noise.*

It is not expected that there would be any significant population change or demands on government services, public services, schools, and added infrastructure. Beneficial impacts include long-term employment, and the implementation of the University's plans to develop a research and technology park with benefits to the County and State. The diversification of the County's economic base to the scientific field of astronomy is a significant added long-term benefit.

## CHAPTER 9: ALTERNATIVES

### 9.1 No Action

Most of the Park's facilities, which are related to the astronomy field, enhance the University's and County's economic and educational status and opportunities. No action for the construction of the additional facility would defer or delay the University of Hawaii's astronomical studies because of the overcrowded situation at the Oahu facility.

IfA could rent additional space, either on Oahu or Hilo, but the opportunity for constructing an additional building, especially closer to the source of need, would foster long-term positive benefits to the staff at the observatory and the University of Hawaii at Hilo.

### 9.2 Alternative Site Location

The location of a support staff in Hilo at the subject site would enable IfA to utilize the network of astronomy research and technical facilities located within the vicinity. Additionally, the Park is intended for facilities of research and development, and that should include one facility for the University of Hawaii.

**CHAPTER 10: DETERMINATION WITH SUPPORTING FINDINGS AND REASONS**

The proposed facility is not expected to cause significant impacts to the environment, pursuant to the significance criteria established by the State Environmental Commission as discussed below. As such, the determination is to issue a *Finding of No Significant Impact (FONSI)*.

**The proposed project will not involve an irrevocable commitment to loss or destruction to any natural or cultural resources.**

*The site upon which the proposed facility would be located does not have any significant natural resources. While there are some archaeological features on the property, there are none in the area of the proposed facility.*

**The proposed project will not curtail the range of beneficial uses of the environment.**

*The requested use would not interfere with any of the existing surrounding uses. Its noise and vehicular impacts will be negligible. Any associated drainage and wastewater requirements will be handled in a manner meeting with the requirements of the appropriate government agencies. Thus, environmental options for the surrounding area should still exist in spite of the proposed facility.*

**The proposed project will not conflict with the State's long-term environmental policies.**

*The requested use complies with the environmental policies and standards of the State. All required improvements - wastewater and drainage- will be done in accordance with the requirements of the State and/or County. There should be minimal impacts to air and noise quality.*

**The proposed project will have an affect on the economic and social welfare of the community.**

*During the construction phase, the project will generate construction jobs for an 8-12 month period. When completed, the project is expected to inject \$6 million to \$7 million annually to the island's economy. There will be more than sixty (60) jobs created, although some of these will result in transfers from the Oah'u office. These jobs and funds will mean a lot to the Big Island, which is hovering at the double-digit unemployment figure.*

**The project will also have some measure of impact on public health.**

*While this is not a public health project per se, the creation of jobs that this project represents will mean added measure of employment security and in turn, the community's public health and welfare. It will certainly not have an adverse impact on the public health of the community.*

**The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities.**

*The requested use is part of the University's plans to implement a research and technology park in this area. This park and the growth implications were considered earlier by the State's previous action of creating this park and the construction of the on-site infrastructure. Further, other similar facilities have been built in the immediate vicinity, after having fulfilled all applicable State and County requirements.*

*The facility on Oahu is utilized by approximately 193 people. The proposed action will relocate approximately fifty employees to Hilo, adding may relocate some of that staff, add construction dollars to Hawaii County, and permanent employment positions here.*

*In the effort to strengthen its economic base, support of this technical diversification for the County should be further insured, especially for the Hawaii astronomical teams.*

**The proposed project will not involve a substantial degradation of environmental quality.**

*The requested use will not involve extensive on-site improvements. The land will be cleared, and landscaping will be implemented to enhance visual impact. Any environmental impacts should be negligible.*

**The proposed project is individually limited but cumulatively has considerable effect upon the environment but does not involve a commitment for larger actions.**

*The entire project site covers approximately 8.5 acres. As such, there would be room for expansion, and in that limited sense, this project could involve a commitment for subsequent activities. However, such uses should be generally compatible with the proposed use.*

*Cumulatively, this project has an impact on the environment, as it will provide the needed economies of scale to make this research fully functional. A stand alone project would have a difficult time achieving the desired level of economies; however, with the existing facilities proximate to this site, agglomeration economies can be more possible. It will thus, help to create a more successful and productive research park.*

**The proposed project will not substantially affect any rare, threatened, or endangered species of flora or fauna or habitat.**

*It is not anticipated that any rare or endangered plant or animal life, or its habitats will be endangered by the use. Surveys did not reveal rare, threatened or endangered species of flora or fauna or its habitats in the subject area.*

**The proposed project will not detrimentally affect air or water quality or ambient noise level.**

*The only discernible air quality impact associated with the proposed facility would be from the vehicular traffic. The frequency and volume of traffic should not be substantial; as such, the impacts would be limited to diurnal, intermittent vehicular traffic and should thus not create any appreciable impact to the ambient air quality.*

*Further, no residences are located within the nearby area of the Park.*

*Like the air impact, possible noise impacts would be associated with the automobile. Like the air quality impacts, the noise ambient level should thus not significantly appreciate with the operation of this facility.*

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

*The project is not located in any environmentally sensitive area as indicated in the surveys conducted of the area for the implementation of the Park's infrastructure.*

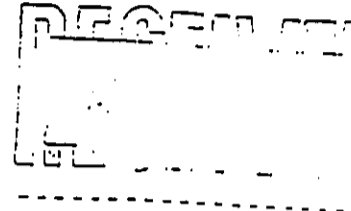
**APPENDICES**

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March 21, 1997

Mr. Sidney Fuke  
Sidney Fuke & Associates  
100 Pauahi Street, Suite 212  
Hilo, HI 96720

Dear Mr. Fuke:

Thank you for the opportunity to review the Draft Environmental Assessment (DEA) for the Proposed Hilo Base Facility of the Gemini North 8-meter Telescope, Island of Hawaii. A consortium of universities are proposing to develop a base facility on 2 acres of ceded land at the University of Hawaii at Hilo Research and Technology Park.

After a review of the DEA and supporting documentation, the Office of Hawaiian Affairs (OHA) has no concerns at this time to the proposed development. Based on information contained in the DEA, the facility bears no significant long-term adverse impacts on adjacent areas nor upon flora and fauna. Furthermore, no known archaeological remains exist and the proposed development will neither significantly affect scenic resources nor air quality or noise level.

But OHA is concerned with statements regarding ownership of the property. In Page 3 of the DEA, it says: "Owned by the State of Hawaii, the entire parcel is leased and utilized by the University of Hawaii..." OHA's records indicate that the subject parcel is ceded land. OHA urges the applicant to correct the ownership statement to reflect the following: "Held in trust by the State of Hawaii, the entire parcel which is ceded land, is leased and utilized by the University of Hawaii..." Please contact Lynn Lee, Acting Officer of the Land and Natural Resources Division, or Luis A. Manrique, should you have any questions on this matter.

Sincerely yours,  
*Martha Ross*  
Martha Ross  
Deputy Administrator

LM:lm

APPENDIX A

DOCUMENT CAPTURED AS RECEIVED



BOTANICAL SURVEY  
UNIVERSITY OF HAWAI'I - HILO  
PROPOSED INFRASTRUCTURE FOR RESEARCH AND TECHNOLOGY LOTS  
SOUTH HILO DISTRICT, ISLAND OF HAWAI'I

by

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Prepared for: ENGINEERING CONCEPTS, INC.

December 1992

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BOTANICAL SURVEY  
UNIVERSITY OF HAWAI'I - HILO  
PROPOSED INFRASTRUCTURE FOR RESEARCH AND TECHNOLOGY LOTS  
SOUTH HILO DISTRICT, ISLAND OF HAWAI'I

INTRODUCTION

The proposed infrastructure for research and technology lots is located within a 116 acre State-owned parcel. The parcel is bounded by Komohana Road to the west, the Wailoa River and the existing University of Hawai'i Hilo (UHH) campus to the east and south, and a small, unnamed stream to the north. An existing 50-foot wide electrical easement runs through the property, roughly in a mauka-makai direction. Portions of the property are currently in use by the UH Agriculture Center (8.0 acres) and by the Joint Astronomy Center (JAC) Facility (4.4 acres). In addition, parts of the main access road (Road "A") and the road below the JAC facility (Road "B") have already been constructed.

Field studies to assess the botanical resources found on the project site were conducted on 06-07 November 1992; a total of three botanists were used for the field studies. The primary objectives of the survey were to: 1) provide a description of the general vegetation types; 2) compile an inventory of the flora; and 3) search for threatened and endangered plant species protected by Federal and State laws.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topo-

graphic maps, the preliminary lot layout map, and soil maps (overlay of soil types on a photobase) were examined to determine access, boundaries, reference points, terrain characteristics, and vegetation cover patterns.

The less disturbed areas, which are more likely to harbor native plant communities, and, perhaps, rare plants were more intensively surveyed. The electrical easement served as the primary access; from the easement a number of surveyor's transects and long overgrown trails can be found.

A walk-through (pedestrian) survey method was used. Notes were made on plant associations and distribution, substrate types, topography, exposure, drainage, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium (UH, Manoa - HAW) and for comparison with the most recent taxonomic treatment of the flora.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time and under varying environmental conditions would no doubt yield slight variations in the species list, especially of the weedy, annual plants.

#### DESCRIPTION OF THE VEGETATION

To our knowledge, there have been no detailed botanical reports dealing specifically with the project site. A short, but incomplete list of the "predominant flora" was compiled for the University of Hawaii Hilo Long Range Development Plan (State of Hawai'i 1977).

The mauka (west) half of the project site, along Komohana Road,

is mapped as "rLW", pahoehoe lava flow (Sato et al. 1973), although, in places, there are jumbled heaps of 'a'a lava outcroppings. This flow is part of the 1881 Mauna Loa flow (Macdonald and Abbott 1970). Along the northern and central portion of the site, the substrate is mapped as "rKFD", Keaukaha extremely rocky muck, 6 to 20% slopes (Sato et al. 1973). This consists of well-drained, thin organic soils overlying pahoehoe lava bedrock. Both the 1881 flow and the Keaukaha soil series support a native-dominated forest of 'ohi'a trees and dense, matted uluhe ferns. Along the south and eastern portion of the site, the substrate is mapped as "PeC", Panaewa very rocky silty clay loam, 0 to 10% slope (Sato et al. 1973). This is a moderately well-drained, dark brown silty clay loam over pahoehoe bedrock; the depth to pahoehoe bedrock ranges from 15 to 20 inches. The vegetation on this soil series is composed largely of introduced species, mostly secondary forest trees, and the area appears to have been cultivated. There are a number of rock terraces and other features on this part of the site.

More detailed descriptions of the 'ohi'a-uluhe forest and the introduced mixed forest are presented below. All the plants inventoried during the field studies are presented in the checklist at the end of this report.

#### 'Ohi'a-Uluhe Forest

The 'ohi'a-uluhe forest occurs on wetter areas of the island, on both 'a'a and pahoehoe substrates. Its general physiognomy is of widely spaced 'ohi'a trees (Metrosideros polymorpha) within an almost continuous mat of uluhe fern (Dicranopteris linearis).

There are three variants of this vegetation type on the project site. On the relatively younger 1881 Lava Flow, around the JAC facility and the Agriculture Center, the forest is typical of the

earlier stages of succession. The majority of the 'ohi'a trees are of about even age and size, ranging from 15 to 25 ft. tall. The uluhe fern is very dense and forms an almost impenetrable mat between the trees, varying in height from 6 to 9 ft.; in places where the fern has climbed onto the trees, the tangled mats can be 12 ft. high. Because the uluhe cover is so dense, there are few other smaller species. Occasionally, a few plants of melastoma (Melastoma candidum), bamboo orchid (Arundina graminifolia), and strawberry guava (Psidium cattleianum) may be observed.

Where the forest occurs on the somewhat geologically older flow which has been mapped as "rKFD", Keaukaha rocky muck, the uluhe mat becomes patchy. Hala or pandanus (Pandanus tectorius) is frequently observed; if left undisturbed, the next step in natural succession would probably be to an 'ohi'a-hala dominated forest. However, the forest in this area supports a number of introduced species. Some fairly large-sized thickets of strawberry guava and melastoma shrubs, 12 to 15 ft. tall, are found here. Emerging above the 25 to 40 ft. tall 'ohi'a are scattered plants of gun-powder tree (Trema orientalis) and melochia (Melochia umbellata). The ground cover consists largely of strawberry guava and melastoma seedlings along with patches of hairy sword fern (Nephrolepis multiflora). Blechnum fern (Blechnum occidentale) and shampoo ginger (Zingiber zerumbet) may be locally common. Moss-covered rocks are also frequent. Lygodium japonicum, a lacy, slender, climbing fern, is locally abundant along the edges of this forest and along the trails cut through the forest, especially along the powerline easement. Lygodium has escaped from gardens around Hilo town and has established itself in surrounding woods and gulches (Char 1992).

The third and minor variant of this vegetation type includes the plants found in the disturbed areas within the 'ohi'a-uluhe forest. The plants in these areas consist of an assortment of

largely introduced grasses, herbs, shrubs, and saplings. These include torpedo grass (Panicum repens), molasses grass (Melinis minutiflora), broomsedge (Andropogon virginicus), partridge pea (Chamaecrista nictitans), sensitive plant or puahilahila (Mimosa pudica), pluchea (Pluchea symphytifolia), melastoma, a number of Desmodium and Crotalaria species, and saplings of melochia and gunpowder tree. Two native species occur in fairly large numbers in these more open, sunny areas. Neneleau (Rhus sandwicensis), a small tree, 6 to 24 ft. tall, belonging to the mango family, is common along the powerline easement. Scleria testacea, a sedge with sharp-edged leaf margins, is locally abundant along "Road B", near the JAC facility. Also found in this area are a few plants of 'akiohala (Hibiscus furcellatus), a native, pink-flowered hibiscus.

#### Introduced Mixed Forest

This vegetation type occurs on the portion of the property with Panaewa soil ("PeC"), a relatively deep, dark brown silty clay loam. The forest consists primarily of large gunpowder and melochia trees, 30 to 50 ft. tall. Other tree species found in this forest type include Chinese banyan (Ficus microcarpa), guarumo (Cecropia obtusifolia), bingabing (Macaranga mappia), African tulip (Spathodea campanulata), satin leaf (Chrysophyllum oliviforme), and avocado (Persea americana). Large groves of Alexandra or king palm (Archontophoenix alexandrae) are common along the western portion of this forest, near the Waiola River and across from the University of Hawai'i Hilo campus. A stand of very old mango trees (Mangifera indica) is also found in this forest type.

The common yellow guava (Psidium guajava) forms somewhat dense shrub layers in some places of the forest. Seabean (Dioclea wilsonii), a large woody liana which produces clusters of dark

purple flowers, is occasionally observed climbing over the trees and shrubs.

Ground cover is variable. Where the tree canopy cover is dense, only the more shade-tolerant plants such as wood fern (Christella parasitica) and Oplismenus compositus can be found, however, much of the ground is barren, wet soil. Where the trees thin out and there is more light available, clumps of palmgrass (Setaria palmifolia), up to 3 ft. tall, and low, rambling prickly shrubs of thimbleberry (Rubus rosifolius) are abundant.

Along the eastern edge of the forest where it abuts the Waiola River, it is open and the ground is covered by a thick blanket of California grass (Brachiaria mutica) and wedelia (Wedelia trilobata). Scattered through the California grass and wedelia are plants of honohono (Commelina diffusa), primrose willow (Ludwigia octovalvis), and a few guava shrubs. Also found along or near the river are clumps of banana (Musa X paradisiaca), ti (Cordyline fruticosa), elephant grass (Pennisetum purpureum), and yellow ginger (Hedychium flavescens).

#### DISCUSSION AND RECOMMENDATIONS

In summary, the native-dominated 'ohi'a-uluhe forest occurs on the younger substrates -- the 1881 Lava Flow and Keaukaha extremely rocky muck. The geologically older Panaewa soil type supports a forest composed primarily of introduced species. The 'ohi'a-uluhe forest represents a fairly early stage in plant succession on wet lava flows, and, although, both of these native species make up the bulk of the vegetation, this type of forest does not have a rich array of other native species.

Of a total of 122 species inventoried on the site, 100 (82%) are introduced or alien species, 6 (5%) are originally of Polynesian



introduction, and 16 (13%) are native. Of the natives, 12 are indigenous, that is, they are native to the Hawaiian Islands and also elsewhere, and 4 are endemic, that is, they are native only to the islands. The majority of the introduced species are weedy plants which prefer open, disturbed sites. The native species can be found in similar environmental habitats throughout the islands. None of the plants inventoried on the State-owned parcel are officially listed threatened and endangered species; nor are any proposed or candidate for such status (U.S. Fish and Wildlife Service 1989, 1990).

Given the findings above, the proposed project is not expected to have a significant negative impact on the botanical resources. Whenever possible native plants should be used for landscaping. The following recommendations are offered. On portions of the property covered by the 'ohi'a-uluhe forest, there are some areas with slopes greater than 10% and it would be difficult to build on these areas without substantial grading. It is suggested that these areas be left intact, and incorporated into the landscape design wherever feasible. These strips of 'ohi'a-uluhe forest would provide a buffer between the different facilities planned for the site; they would function as a noise screen and also protect the visual quality of the site. Costs for grading and then revegetating these areas could be eliminated.

As for landscaping material, it is recommended that some of the more easily cultivated native species found in the general region (Hamakua-Hilo-Puna) be used. These include 'ohi'a, tree ferns (Cibotium), 'ahanui (Machaerina), 'ohe (Tetraplasandra), loulu palm (Pritchardia), etc. Botanists and horticulturists on the UH Hilo and Hilo Community College facility, who are more familiar with the local flora, can also be approached to provide a list of native species suitable for landscaping the project site.

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PLANT SPECIES LIST -- Proposed Infrastructure for Research and  
Technology Lots at UH - Hilo

A checklist of all those terrestrial, vascular plant species inventoried on the project site during the field studies is presented below. The species are arranged alphabetically within each of three groups: Ferns, Monocots, and Dicots. The taxonomy and nomenclature of the Ferns follow Lamoureux (1984); the flowering plants, Monocots and Dicots, are in accordance with Wagner *et al.* (1990), for the most part.

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 Hawaiian Islands and also elsewhere throughout the Pacific
  - P = Polynesian = plants originally of Polynesian introduction prior to Western contact (Cook's discovery of the islands in 1778); not native
  - X = introduced or alien = all those plants brought to the islands by humans, intentionally or accidentally, after Western contact; not native.
4. Presence (+) or absence (-) of a particular species within each of two vegetation types recognized on the project site (see text for discussion):
  - o = 'Ohi'a-Uluhe Forest
  - i = Introduced Mixed Forest

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<u>o</u>	<u>i</u>
FERNS				
BLECHNACEAE (Blechnum Family) Blechnum occidentale L.	blechnum fern	X	+	+
DICKSONIACEAE (Tree Fern Family) Cibotium glaucum (J. Sm.) Hook. & Arnott	hapu'u	E	+	-
GLEICHENIACEAE (Vine Fern Family) Dicranopteris linearis (Burm.) Underw.	uluhe	I	+	+
HEMIONITIDACEAE (Gold Fern Family) Pityrogramma calomelanos (L.) Link	silver fern	X	-	+
LINDSAEACEAE (Lace Fern Family) Sphenomeris chinensis (L.) Maxon	pala'a	I	+	-
LYGODIACEAE (Climbing Fern Family) Lygodium japonicum (Thunb.) Sw.	lygodium	X	+	+
NEPHROLEPIDACEAE (Sword Fern Family) Nephrolepis multiflora (Roxb.) Jarrett ex Morton	hairy sword fern	X	+	+
POLYPODIACEAE (Common Fern Family) Phlebodium aureum (L.) J. Sm. Phymatosorus scolopendria (Burm.) Pic.-Ser. Pleopeltis thunbergiana Kaulf.	laua'e-haole laua'e, lauwa'e pakahakaha, 'ekaha-'akolea	X X I	- - -	+
THELYPTERIDACEAE (Woodfern Family) Christella parasitica (L.) Levl.	woodfern, oakfern	X	+	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			o	i
<b>FLOWERING PLANTS</b>				
<b>MONOCOTS</b>				
AGAVACEAE (Sisal Family) Cordylone fruticosa (L.) A. Chev.	ti, ki	P	+	+
ARACEAE (Aroid Family) Dieffenbachia picta Schott	dieffenbachia	X	+	-
ARECACEAE (Palm Family) Archontophoenix alexandrae (F. v. Muell.) H.A. Wendl. & Drude	king palm, Alexandra palm	X	+	+
COMMELINACEAE (Dayflower Family) Commelina diffusa N.L. Burm.	honohono	X	-	+
CYPERACEAE (Sedge Family) Cyperus halpan L. Fimbristylis dichotoma (L.) Vahl. Kyllinga brevifolia Rottb. Machaerina mariscoides ssp. meyenii (Kunth) T. Koyama	green kyllinga, kili'o'opu 'ahaniu, 'uki	X I X	+	- - -
Pycneus polystachyos (Rottb.) P. Beauv. Scleria testacea Nees		E I I	+	- - -
DIOSCOREACEAE (Yam Family) Dioscorea bulbifera L. Dioscorea pentaphylla L.	bitteryam, pi'oi pi'ia	P P	+	- -
MUSACEAE (Banana Family) Musa X paradisiaca L.	banana, maia	P	-	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<u>o</u>	<u>i</u>
<b>ORCHIDACEAE (Orchid Family)</b>				
<i>Arundina graminifolia</i> (D. Don) Hochr.	bamboo orchid	X	+	-
<i>Spathoglottis plicata</i> Blume	Philippine ground orchid	X	+	+
<b>PANDANACEAE (Hala Family)</b>				
<i>Pandanus tectorius</i> S. Parkinson ex Z.	pandanus, hala	I?	+	-
<b>POACEAE (Grass Family)</b>				
<i>Andropogon virginicus</i> L.	broomsedge	X	+	-
<i>Brachiaria mutica</i> (Forsk.) Stapf	California grass	X	+	+
<i>Coix lachryma-jobi</i> L.	Job's tears	X	+	+
<i>Digitaria</i> sp.	crabgrass	X	+	-
<i>Eragrostis</i> sp.	Hamakua eragrostis	X	+	-
<i>Melinis minutiflora</i> P. Beauv.	molasses grass	X	+	-
<i>Oplismenus compositus</i> (L.) P. Beauv.	Guinea grass	X	-	+
<i>Panicum maximum</i> Jacq.	torpedo grass, Mainaku grass	X	+	-
<i>Panicum repens</i> L.	Hilo grass, mau'u Hilo	X	+	+
<i>Paspalum conjugatum</i> Bergius	ricegrass, mau'u laiki	X	-	+
<i>Paspalum scrobiculatum</i> L.	napier grass, elephant grass	I?	+	-
<i>Pennisetum purpureum</i> Schumach.	Natal redtop	X	+	+
<i>Rhynchelytrum repens</i> (Willd.) Hubb.	Glenwood grass	X	+	-
<i>Sacciolepis indica</i> (L.) Chase	yellow foxtail	X	+	-
<i>Setaria gracilis</i> Kunth	palmgrass	X	+	+
<i>Setaria palmifolia</i> (J. König) Stapf		X	+	+
<b>ZINGIBERACEAE (Ginger Family)</b>				
<i>Hedychium flavescens</i> N. Carey ex Roscoe	yellow ginger	X	-	+
<i>Zingiber zerumbet</i> (L.) Sm.	shampoo ginger, 'awapuhi kuahiwi	P	+	-
<b>DICOTS</b>				
<b>ACANTHIACEAE (Acanthus Family)</b>				
<i>Justicia betonica</i> L.	white shrimp plant	X	+	-

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			o	i
ANACARDIACEAE (Mango Family)				
Mangifera indica L.	mango, manako	X	+	+
Rhus sandwicensis A. Gray	neneleau	E	+	-
Schinus terebinthifolius Raddi	Christmas berry	X	-	+
APIACEAE (Parsley Family)				
Centella asiatica (L.) Urb.	Asiatic pennywort, pohe kula	X	+	-
ARALIACEAE (Ginseng Family)				
Schefflera actinophylla (Endl.) Harms	octopus tree, umbrella tree	X	+	+
ASTERACEAE (Sunflower Family)				
Ageratina riparia (Regel) R. King & H. Robinson	pamakani	X	-	+
Ageratum houstonianum Mill.	maile hohono	X	+	-
Bidens alba var. radiata (Schultz-Bip.) Ballard ex Melchert	white-flowered bidens	X	-	+
Crassocephalum crepidioides (Benth.) S. Moore	crassocephalum	X	+	-
Eclipta alba (L.) Hassk.	false daisy	X	+	-
Emilia fosbergii Nicolson	pua lele	X	+	-
Erechtites valerianifolia (Wolff) DC.	fireweed	X	+	-
Pluchea symphytifolia (Mill.) Gillis	pluchea, sourbush	X	+	-
Sonchus oleraceus L.	sow thistle, pua-lele	X	+	-
Wedelia trilobata (L.) Hitchc.	wedelia	X	+	-
BALSAMINACEAE (Touch-me-not Family)				
Impatiens wallerana J.D. Hook.	impatiens	X	-	+
BEGONIACEAE (Begonia Family)				
Begonia foliosa var. miniata (Planch.) L.B. Sm. & B.G. Schubert	fuschia begonia	X	-	+
Begonia hirtella Link	white-flowered begonia	X	+	-
BIGNONIACEAE (Bignonia Family)				
Spathodea campanulata P. Beauv.	African tulip	X	-	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			o	i
BOMBACACEAE (Bombax Family) Indet. sp.		X	-	+
BUDDLEIACEAE (Butterfly Bush Family) Buddleia asiatica Lour.	Asiatic butterfly bush, huele- 'ilio	X	+	-
CAMPANULACEAE (Bellflower Family) Hippobroma longiflora (L.) G. Don	star-of-Bethlehem	X	+	-
CARYOPHYLLACEAE (Pink Family) Drymaria cordata (L.) Willd. ex Roem.	pipili	X	-	+
CECROPIACEAE (Cecropia Family) Cecropia obtusifolia Bertol.	guarumo	X	-	+
CLUSIACEAE (Mangosteen Family) Clusia rosea Jacq.	autograph tree, copey	X	+	+
CONVOLVULACEAE (Morning-glory Family) Ipomoea alba L. Ipomoea indica (J. Burm.) Merr. Ipomoea triloba L.	moonflower, koali pehui koali 'awahia little bell, pink bindweed	X I X	+	- - -
EUPHORBIACEAE (Spurge Family) Macaranga mappia (L.) Mull. Arg. Phyllanthus debilis Klein ex Willd. Ricinus communis L.	bingabing niruri castor bean, koli, pa'aia	X X X	- + +	+ - -
FABACEAE (Bean Family) Caesalpinia major (Medik.) Dandy & Exell Chamaecrista nictitans (L.) Moench Crotalaria cf. lanceolata E. Mey. Crotalaria pallida Aiton Crotalaria retusa L.	kakalaioa, hihikolo partridge pea, lauki smooth rattlepod, pikakani	X? X X X X	+	- - - - -



<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<u>o</u>	<u>i</u>
Desmodium cajanifolium (Kunth) DC.	tick clover	X		
Desmodium incanum DC.	Spanish clover, ka'imi	X	+	-
Desmodium intortum (Mill.) Urb.		X	+	-
Desmodium tortuosum (Sw.) DC.	Florida beggarweed	X	-	+
Desmodium sp. 1.		X	+	-
Desmodium sp. 2.	sea bean, maunaloa	X	+	-
Dioclea wilsonii Standl.		X?	+	-
Mimosa pudica var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass, pua hilahila	X	+	-
LAMIACEAE (Mint Family)				
Hyptis pectinata (L.) Poit.	comb hyptis	X	+	-
Lauraceae (Laurel Family)				
Persea americana Mill.	avocado, alligator pear	X	-	+
LYTHRACEAE (Loosestrife Family)				
Cuphea carthagenensis (Jacq.) Macbr.	tarweed, Colombian cuphea	X	+	-
MALVACEAE (Mallow Family)				
Hibiscus furcellatus Desr.	'akiohala, 'akiahala, hau hele	I	+	-
Sida rhombifolia L.	Cuba jute	X	+	-
MELASTOMACEAE (Melastoma Family)				
Dissotis rotundifolia (Sm.) Triana	dissotis	X	+	-
Melastoma candidum D. Don	melastoma	X	+	+
MORACEAE (Mulberry Family)				
Ficus microcarpa L. f.	Chinese banyan	X	-	+
MYRTACEAE (Myrtle Family)				
Metrosideros polymorpha Gaud.	'ohi'a, 'ohi'a lehua	E	+	-
Psidium cattleianum Sabine	strawberry guava	X	+	+
Psidium guajava L.	guava, kuawa	X	+	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			o	i
ONAGRACEAE (Evening Primrose Family) Ludwigia octovalvis (Jacq.) Raven	primrose willow, kamole	P?	-	+
OXALIDACEAE (Wood Sorrel Family) Oxalis corymbosa DC.	pink wood sorrel, ihi pehu	X	-	+
PASSIFLORACEAE (Passionflower Family) Passiflora edulis Sims Passiflora foetida L.	passionfruit, liliko'i scarlet-fruited passionflower, pohapoha	X X	-	+
PIPERACEAE (Pepper Family) Peperomia leptostachya Hook. & Arnott	'ala 'ala wai nui	I	-	+
POLYGALACEAE (Milkwort Family) Polygala paniculata L.	bubble-gum plant	X	+	-
POLYGONACEAE (Buckwheat Family) Polygonum sp.		X	-	+
ROSACEAE (Rose Family) Rubus rosifolius Sm.	thimbleberry	X	+	+
RUBIACEAE (Coffee Family) Hedyotis corymbosa (L.) Lam. Paederia scandens (Lour.) Merr. Spermacoce assurgens Ruiz & Pav. Spermacoce mauritiana Gideon	maile-pilau buttonweed	X X X X	+	- + - -
SAPINDACEAE (Soapberry Family) Filicium decipiens (Wight & Arnott) Thwaites ex J.D. Hook.	fern tree	X	-	+
SAPOTACEAE (Sapodilla Family) Chrysophyllum oliviforme L.	satin leaf	X	-	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<u>o</u>	<u>i</u>
SCROPHULARIACEAE (Figwort Family) Castilleja arvensis Cham. & Schlechtend.	Indian paintbrush	X	+	-
STERCULIACEAE (Cacao Family) Melochia umbellata (Houtt.) Stapf Maltheria indica L.	melochia 'uhaloa, hi'aloa, kanakaloo	X I?	+	+
ULMACEAE (Elm Family) Trema orientalis (L.) Blume	gunpowder tree, charcoal tree	X	+	+
URTICACEAE (Nettle Family) Pilea microphylla (L.) Liemb.	artillary plant, rockweed	X	-	+
VERBENACEAE (Verbena Family) Lantana camara L. Stachytarpheta dichotoma (Ruiz & Pav.) Vahl	lantana, lakana owi, oi	X X	+	- -

Archaeological Survey and Testing  
of Lands Proposed for Research and  
Technology Lots at the University of Hawaii at Hilo  
(TMK 2-4-01:7 and 41)

by

Douglas Borthwick, B.A.  
Joy Collins, B.A.  
William H. Folk, B.A.  
and  
Hallett H. Hammatt, Ph.D.

for

Engineering Concepts

by

Cultural Surveys Hawaii  
April 1993  
Revised November 1993

## ABSTRACT

During the weeks beginning December 14, 1992 and January 5, 1993 Cultural Surveys Hawaii conducted an archaeological inventory survey of approximately 163 acres of forested land in Waiākea *ahupua'a*, South Hilo district on the island of Hawai'i. The parcel under study is owned by the University of Hawaii at Hilo. Portions of this parcel are slated for the development of three research and technology lots. Construction of water, sewer, drainage, and electrical systems to service the three lots are proposed. The purpose of the study was to locate, and describe any and all archaeological resources within the survey area.

Two recent structures - the School of Agriculture Building at the southwest corner of the study area, and the Joint Astronomy Building in the central, *mauka* portion - are extant within the study area as well as portions of the access road system. Large swaths have also been bulldozed across the study area in a northwest-southeast orientation for an old water main, and in a generally east-west direction for an electric power line.

Archeological sites were located in the southern portion of the study area. Four sites were described and mapped to scale. Two of the sites - 18668, and 18669 - and a mound-feature within a third site - 18667 - were tested by hand excavations to document stratigraphy in the sites and to search for cultural remains to help in dating the sites.

The larger of the sites are two (2) expansive historic, agricultural fields (sites - 18667 and -18670). Field-rock clearing mounds are dispersed throughout both fields. The two other sites identified - 18668 and 18669 - were tested by excavation and were found to have no subsurface cultural deposits.

Based on the type and age of the sites found, and the data collected and analyzed, no further archaeological research specific to the sites within the study area is recommended.

## Supplemental Inventory Survey

Cultural Surveys Hawaii was requested to conduct an inventory level archaeological survey of an approximately 11-acre parcel adjacent to the 163-acre study area reported on in this report. The parcel is at the *makai* (east) side of the proposed U.H. Hilo Research and Technology Park and includes a section of the Waiakea Flood Control Channel. The survey was done as proposed infrastructure-related construction, associated with the development of the Research and Technology Park, is planned to traverse through this adjoining area.

During the supplemental survey, four (4) plantation-era (ca. 1870s-1940s) rock clearance features (mounds) and a wall were observed and recorded. These features were associated with commercial sugar cane cultivation within the former Waiakea Cane Lots. The four mounds and wall are included under State Historic Site # 50-10-35-18670 which was designated during the original survey.

Subsurface testing was conducted at two mounds within Site -18670 to address functional, chronological, and sampling concerns. Testing confirmed plantation-era style of construction. A supplemental report for the newly surveyed area - which details the survey and testing results is included here as an attachment.

## ACKNOWLEDGEMENTS

Field work for this project was carried out by Cultural Surveys Hawaii crew members Bryce Myers, Tyler Campbell, John Winieski, Tim Barr, Paul Kim and the authors. Each of us learned something new about ourselves from the *uluhe*.

Site descriptions for the report were compiled by Tim Barr. Drafting of field maps was done by Paul Kim and Joy Collins. Dr. Vickie Creed contributed her indefatigable energies and her typing and computer skills to the production of this report.

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## INTRODUCTION

For a period of seven days during the weeks beginning December 14, 1992 and January 5, 1993 Cultural Surveys Hawaii conducted an archaeological inventory survey of approximately 163 acres of forested land in Waiākea *ahupua'a*, South Hilo district on the island of Hawai'i (Figure 1-3). The parcel under study is located north of Waiākea Stream, *mauka* of the University of Hawaii at Hilo campus - a portion of which will be developed into 3 research and technology lots. The bed of Waiākea Stream has been rerouted recently, by mechanized equipment, probably under the name of flood control. The old stream bed is the actual south boundary of the study area, with the new stream bed farther south.

Two structures - the School of Agriculture building at the southwest corner of the study area, and the Joint Astronomy building in the central, *mauka* portion - are extant within the study area as well as portions of the access road system (Figure 4). Two sections of the new access road alignments are completed and in use, while other areas have been bulldozed although they are currently overgrown with vegetation. Large swaths have also been bulldozed around the Joint Astronomy building, across the study area in a northwest-southeast orientation for an old water main, and in a generally east-west direction for an electric power line.

### Study Area Description

The study area comprises approximately 163 acres in the *ahupua'a* of Waiākea. The lands are located within the district of South Hilo on the windward coast of Hawai'i Island. The study area, located in Hilo Town on the campus of the University of Hawai'i at Hilo, is bound by Komohana Street to the west, Waiākea Stream flood control channel

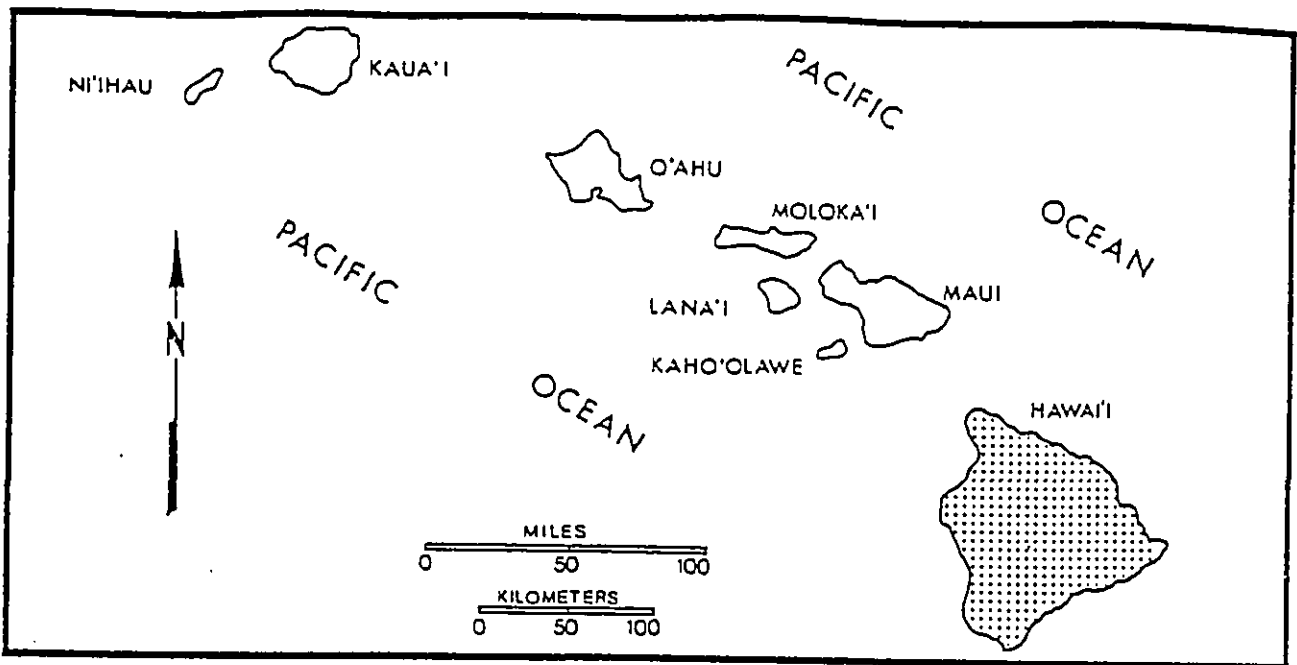


FIGURE 1  
State of Hawai'i

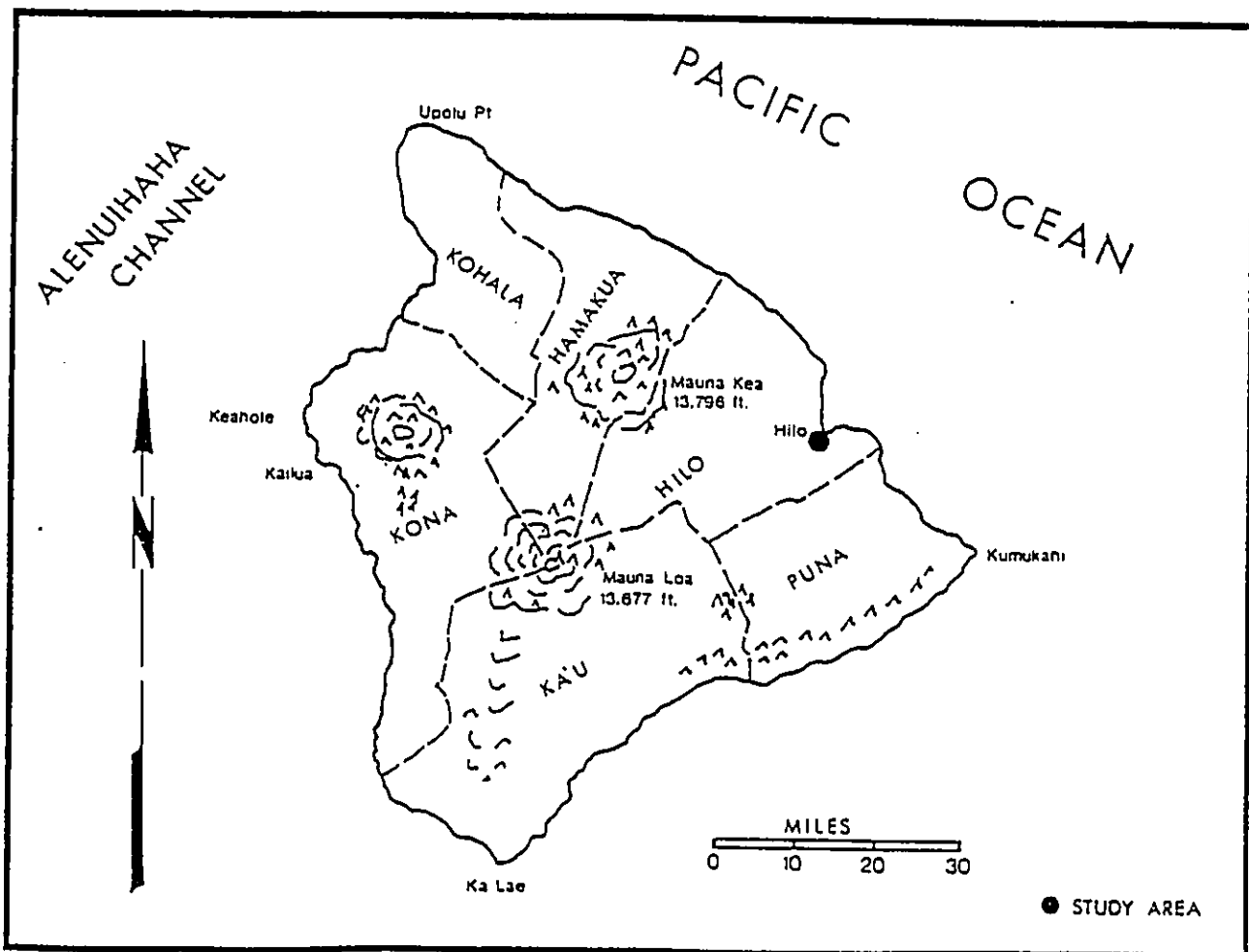


FIGURE 2  
General Location Map, Hawai'i Island

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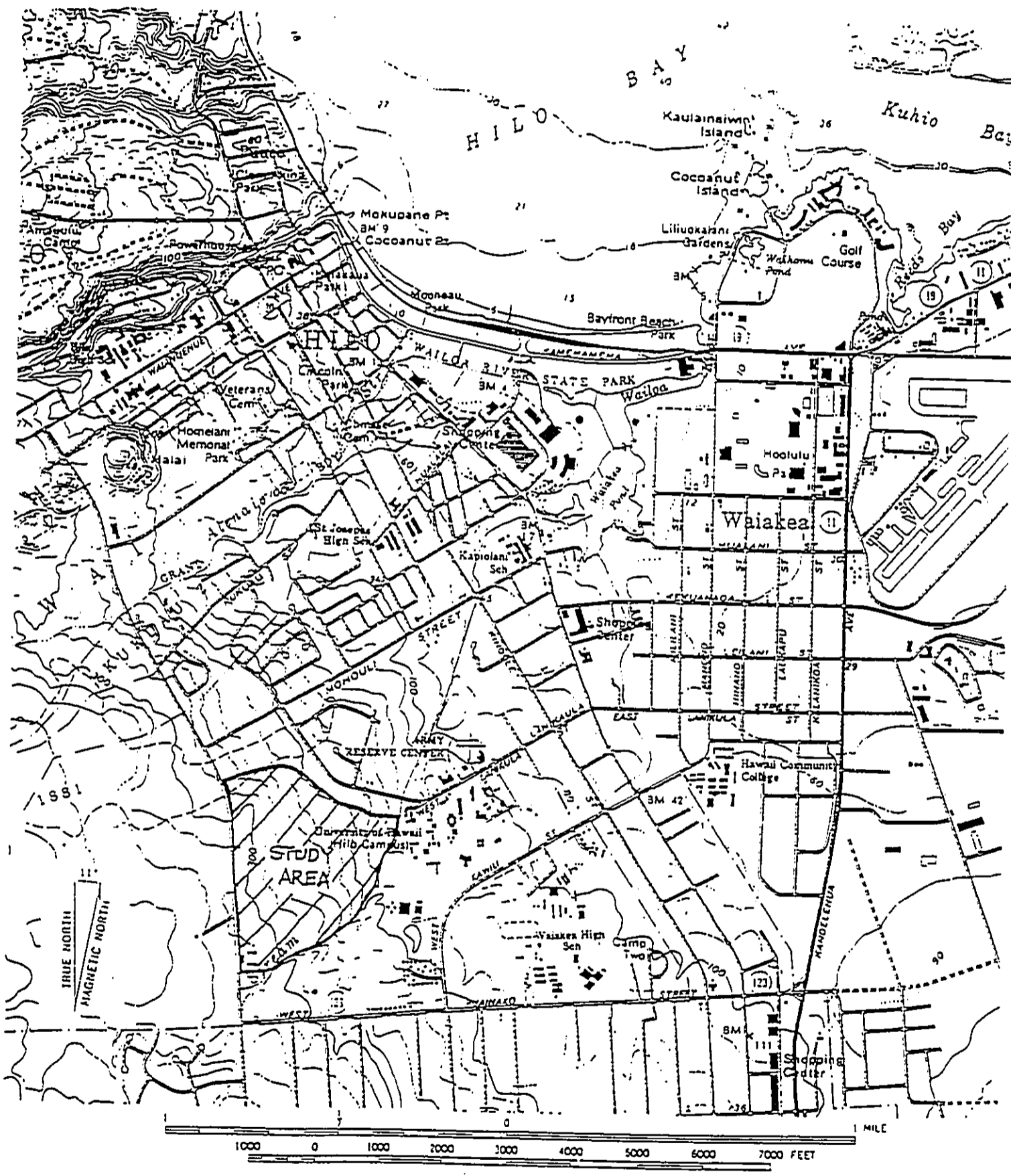


Figure 3 Portion of USGS Topographical Map, 7.5 Minute Series, Hilo Quadrangle, Showing Study Area

to the east, the old Waiākea Stream bed to the south, and a man-made drainage ditch to the north. Elevations within the study area range from roughly 140 ft. a.m.s.l. to 330 ft. a.m.s.l. on the lower east slope of Mauna Loa Volcano.

Several historic flows from Mauna Loa Volcano have affected the terrain along its eastern slope. An 1881 flow affected much of the Waiākea *Ahupua'a*, flowing into Hilo to within a mile of Hilo Bay. A part of the east end of this 1881 flow is present along the north side of the study area.

Rainfall in Waiākea *Ahupua'a* below the 5,000 ft. elevation averages 150 to 200 inches per year (Kelly et al. 1981); *makai* lands above the 5,000 ft. elevation receive an average of 30 inches of rain per year (McEldowney 1979). Waiākea Stream represents the only fresh water source within the study area.

The terrain is comprised predominately of lava flows thickly covered by vegetation. The *Soil Survey of the Island of Hawaii* (Sato et al., 1973) classifies the study area lands in three basic types as follows: 1) Pana'ewa very rocky, silty clay loam, 2) Keaukaha extremely rocky muck, and 3) pahoehoe lava flow. Although lava flows predominate in the study area, vegetation is dense due to the vast amounts of rain on the windward side of Hawaii Island.

The Pana'ewa very rocky, silty clay loam occurs along the southeast side of the study area. The vegetation in this area is characterized predominately by large guava trees (*Psidium cattleianum*) with little or no understory.

The Keaukaha extremely rocky muck which covers the largest portion of the study area, occurs in the central and north sections of the study area. The vegetation is characterized by guava thicket (*Psidium cattleianum*).

The pahoehoe lava flow occurs within the western half of the study area. The

vegetation is characterized by *uluhe* fern.

Development within the study area includes the aforementioned buildings; (Agriculture and Astronomy) associated parking lots, paved roads, and bulldozed swaths. In addition, a path for a water line has been cleared by bulldozing. These recent alterations to the landscape are a marked difference to the "jungle" of the rest of the study area. The speed of re-vegetation is quite evident where the bulldozed areas are in some cases barely discernible from the surrounding "jungle."

## CULTURAL HISTORY

The *ahupua'a* of Waiākea, South Hilo, is large, encompassing some 95,000 acres. It extends from the coast to approximately the 6,000 feet elevation on the windward slope of Mauna Loa (Figure 4). In 1979 Holly McEldowney prepared an "Archaeological and Historical Literature Search and Research Design," as part of a "Lava Flow Control Study" (McEldowney 1979). In her report McEldowney describes five zones of land use and associated resources. The five zones, which are applicable to Waiākea, include: I. Coastal settlement; II. Upland Agricultural; III. Lower Forest; IV. Rain forest; and V. Sub-Alpine or Montaine (*Ibid.*). The zones are described below from *mauka* (Zone V) to *makai* (Zone I) or in order of ascending importance in terms of settlement patterns.

Zone V (Sub-alpine), which is defined as being above the 5,500 ft. elevation, was probably of only marginal importance in terms of land utilization during prehistoric (pre-A.D. 1776) times. As McEldowney indicates "Use of major trails, although important to settlement and land use in all zones, probably dominated the utilization of this zone" (*Op. cit.*:30). Resources probably procured from this zone include birds like *nene* (geese) and *'ua'u* (petrel) for food, timber products, and possibly lithic materials. Though Waiākea extends into this sub-alpine zone it is not one of the major *ahupua'a* associated with this zone or the saddle region like Humu'ula which "cuts off" Waiākea at roughly the 6,000 foot elevation.

Zone IV (Rain Forest) is defined as ranging from 2,500 to 5,500 feet in elevation. Resources of bird feathers, medicinal plants, and possibly some timber products would have been procured from this zone with bird feathers probably of greatest importance. Habitation within this zone was probably exclusively temporary though possibly lava

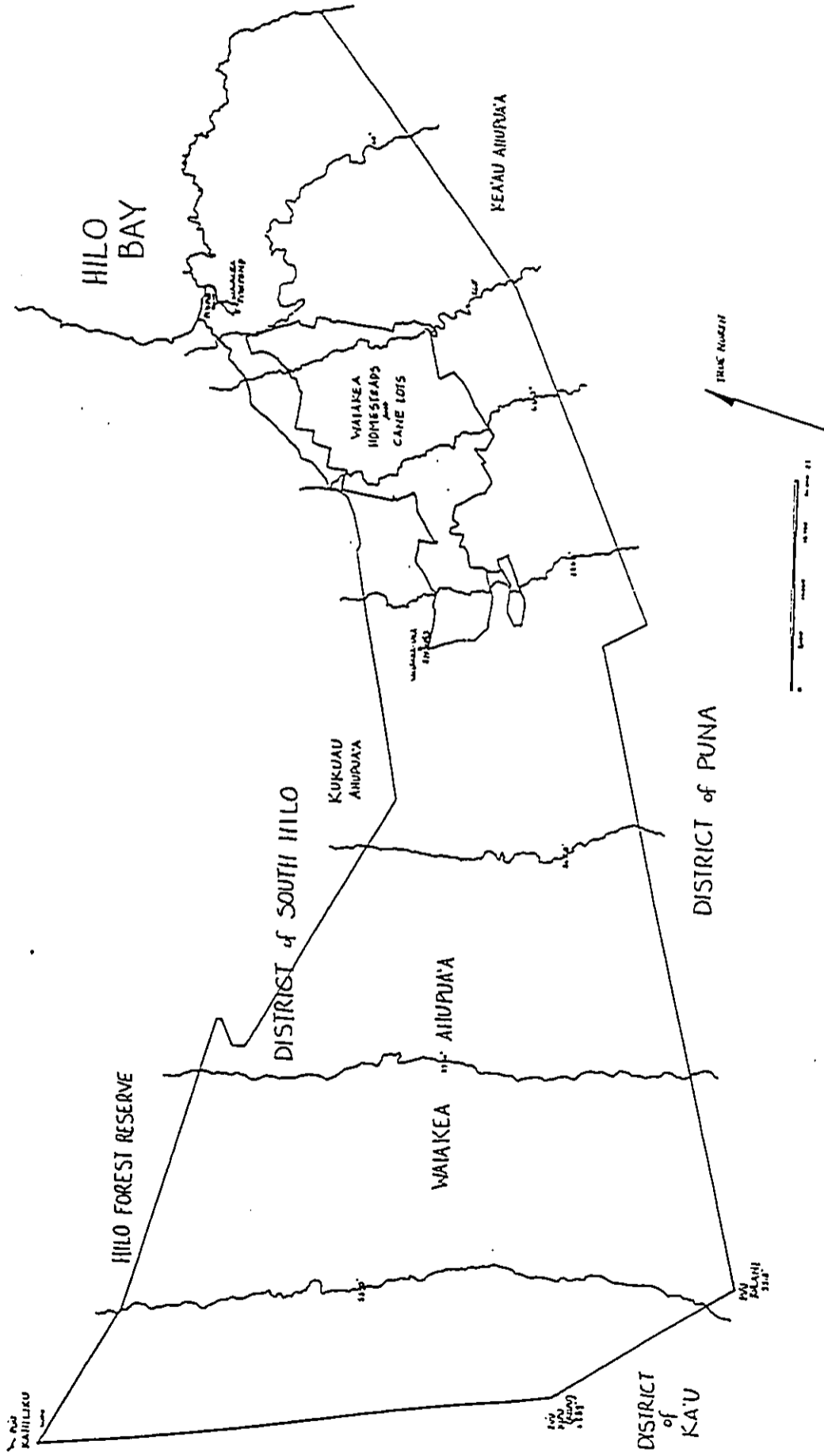


Figure 4 Ahupua'a of Waiakea (after USGS Topographic Map)



tubes or other site areas were utilized recurrently. In general, as McEldowney states because of "the less diversified use of this zone, and the implications of overnight visits rather than extended stays, make the overall potential for sites in this zone even lower" (i.e., compared to Zone III) (*Ibid.*).

Zone III (Lower Forest) is defined as ranging from 1,500 to 2,500 feet in elevation. McEldowney suggests that it is within this zone that the upper limits of the pre-historic farming took place. However, the main usage was probably still resource procurement of naturally occurring forest products. The farming or "supplemental food sources" would have included, "banana, wet and dry-land taro, ti, and yams (*Dioscorea* sp.) which were planted along streams and trails and in small patches of cleared forest" (*Op. cit.*:26). The forest products would have included a variety of timber, including Koa for canoes, bird feathers, dye and medicinal plants, mamaki which was used for a variety of bark cloth or kapa, 'ie'ie for basketry, *olonā* for cordage and a source of famine type foods, such as *hapu'u*. Habitation was still dominantly temporary though recurrent use is indicated by forest cultivation and the probably tending of specific forest products such as *olonā* (*Ibid.*).

Zone II (Upland Agricultural) is defined as ranging from 50 to 1,500 feet in elevation. The zone was described by "early visitors to Hilo Bay" as "an open parkland gently sloping to the base of the woods." ... "an expanse broken by widely spaced cottages" or huts, neatly tended gardens, and small clusters of trees" (*Op. cit.*: 19).

The present study area is situated within this upland agricultural zone. Though described as a vast "expanse" it would appear that only the more agriculturally productive areas were intensively farmed. In the 1820s it was "estimated that 1/20 of the expanse (i.e., zone of cultivation) in N. and S. Hilo was planted in crops" (Goodrich 1826:4 IN McEldowney 1979:21). The reasons for what appeared to the early visitors as a "lack of

more extensive planting " (*Ibid.*) include, the need for fallow periods especially in soils where nutrients are rapidly leached out, but more important to intensive agricultural use in the Hilo area is soil type or lack thereof. Intensive agriculture in Zone II was focused on areas with a soil mantle leaving younger exposed lava areas for plants not needing continuous care (e.g., grasses, ferns).

Habitation within the upland agricultural zone (i.e., Zone II) apparently including some permanent occupation sites but was still dominantly temporary. The descriptions of habitations refer to "scattered huts" with adjacent "garden plots" or "cottages" with "neatly tended gardens " (*Op. cit.*: 18-19) but no descriptions of village complexes like those along the coast.

Zone 1 (Coastal Settlement) is defined as " from sea level to roughly 20 to 50 ft. elevation or 1/2 mile inland" (*Op. cit.*: 15). This zone contained the majority of the population in village settings. The Hilo Bay area, of which Waiākea ahupua'a encompasses the southern half, was described "as a nearly continuous complex of native huts and garden plots interspersed with shady groves of trees, predominately breadfruit (*Artocarpus altilis*) and coconut (*Cocos nucifera*)." (*Op. cit.*:16). Additional sites mentioned included, "canoe sheds, several heiau, and large complexes catering to chiefs and their retainers" (*Ibid.*). Thus the coastal zone included virtually all of the permanent habitation sites and was the focal point of resource utilization procured elsewhere within the ahupua'a.

Based on the above zonal characterization of Waiākea the traditional or pre-contact (i.e., pre-A.D. 1776) settlement pattern included, a heavily populated coastal zone, an upland agricultural zone with forest zones beyond. The coastal zone included the village clusterings of the permanent habitations with direct access to rich and varied marine

resources including fishponds, and probably the majority of agricultural production as well.

The upland agricultural zone was probably expanded into as the prime lands within the coastal zone were intensively utilized. Over time the upland agricultural zone was converted from forest to an "open parkland" where plantings occurred on soil mantled lava flows. Habitation for most part was probably temporary with a few scattered permanent occupation complexes.

Beyond the upland agricultural zone was the forest which ranged from rain forest to sub-alpine forest. In Waiākea these forest zones were quite large which allowed for extensive gathering of forest products. The products in part included, timber, especially Koa for canoes, birds, for consumption (nene, 'ua'u) and feathers, medicinal and dye plants, and famine type foods.

#### Late Prehistoric Early Historic ca. 1790-1840

The rich and varied resources that Waiākea offered made it one of the most important locales on Hawaii Island. Traditional accounts concerning Waiākea include references to it being the seat of chiefly residences as early as ca. A.D. 1550 (Kelly, Nakamura, Barrère 1981). Chiefly associations with Waiākea continued through traditional times and into the historic era. Kamehameha retained Waiākea after he had conquered all of the islands (ca. 1800), and upon " his death his personally held Hilo lands, including Pi'i-honua, Punahoa, and Waiākea, descended to Liholiho, his son and heir to the kingdom,"..additionally " Kamehameha had given the ili kuono of Pi'opi'o to his favorite wife Ka'ahumanu" (*Op. cit.*: 11). The 'ili of Pi'opi'o is in Waiākea and is situated between Hilo Bay and Wailoa River and its associated fishponds.

Land use during the early historic period was still essentially subsistence based though aspects of major changes were occurring. The sandalwood trade, establishment of the American Board of Commissioners for Foreign Missions (ABCFM) station in Hilo, and the arrival of whalers began the shift away from subsistence to a market based economy. Settlement was still focussed on the coastal zone as was most of the agricultural production of both indigenous food crops and newly introduced plants.

During this early historic period the Forest and Sub-Alpine Zones land use was changing also. Besides the more traditional procurement of timber products and even bird feathers for taxes (McEldowney 1979:35). Cattle, goats, and sheep were being hunted in the upper zones. These animals were introduced in the 1790s and after an imposed 10 year prohibition on their killing had spread over large portions of the interior of Hawaii Island, especially the Waimea area. However, "by the 1830s substantial amounts of hides, jerked meat, and tallow were exported from Hilo" (*Op. cit.*:36).

#### Mid 1800s

Traditional land tenure changed during this time span to the privatization of land ownership. Generally referred to as the "Great Mahele" privatization actually included a number of government acts from the late 1840s to the mid 1850s. The Kamehameha dynasty's control over the valuable Waiākea *ahupua'a* was evidenced in that virtually the entire *ahupua'a* became Crown Lands with the *'ili* of Pi'opi'o awarded to Victoria Kamamalu (LCA 7713:16), a granddaughter of Kamehameha I and heir to Ka'ahumanu as well.

Twenty-six (26) Land Commission Awards (LCAs) were granted within Waiākea (Figure 5). None of these LCAs are within the present study area. The LCAs were all

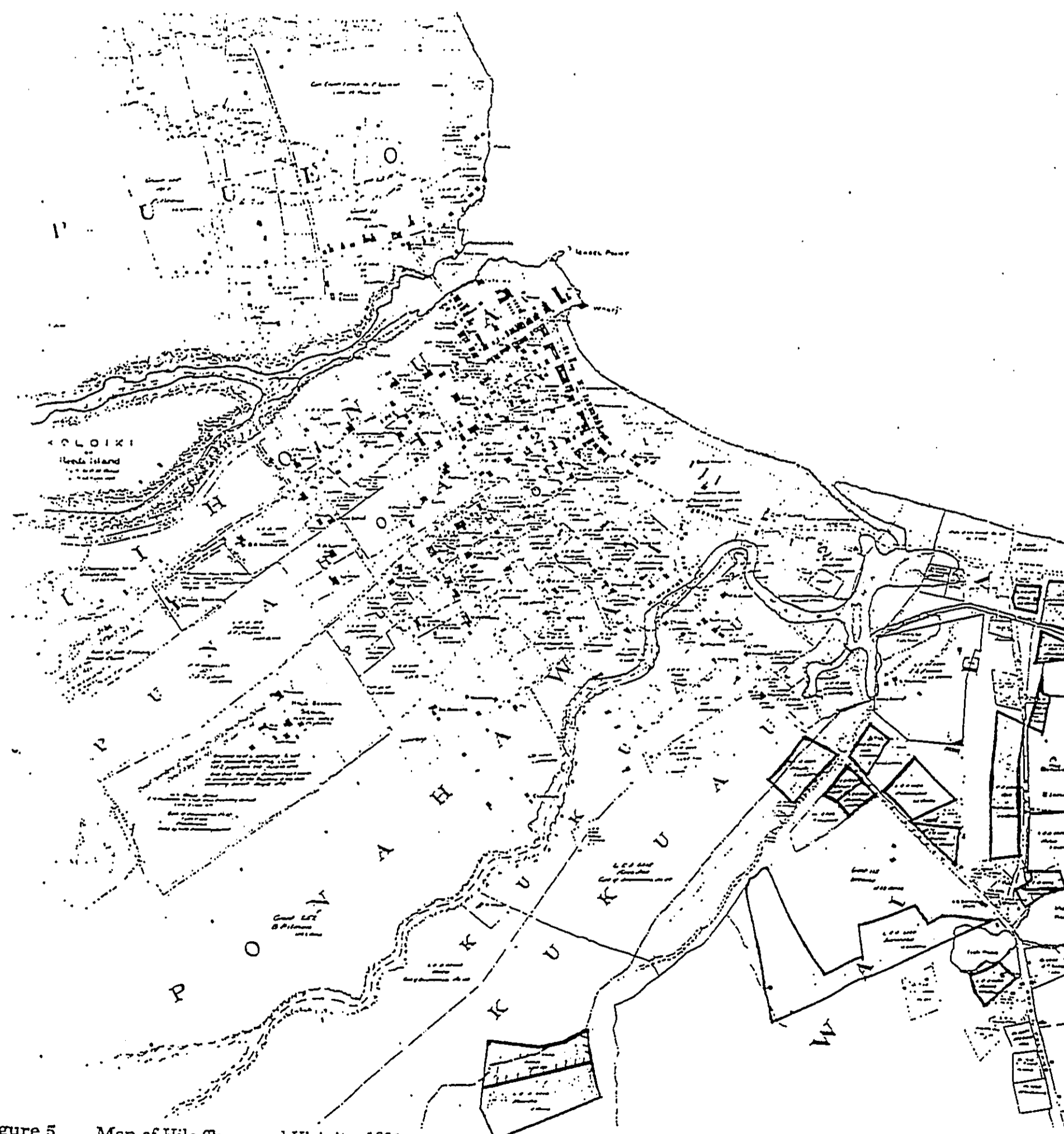
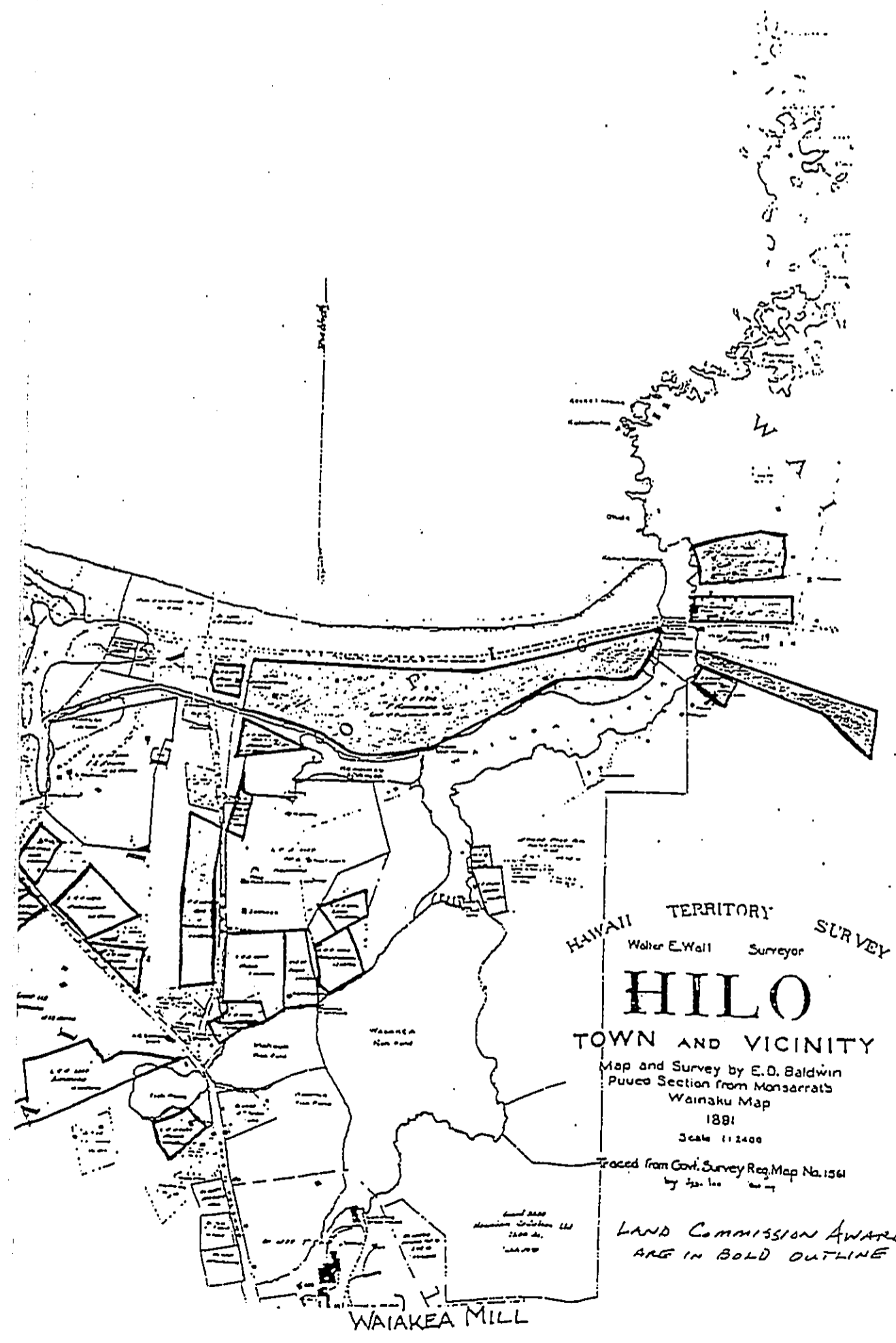


Figure 5 Map of Hilo Town and Vicinity, 1891

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within the coastal zone, except for two (2663 and 2402) which were in the lower portion (i.e., ca. 100 ft. a.m.s.l.) of the upland agricultural zone. The LCAs or *kuleana*(s) were for the most part focussed around the edges of the large fishponds of Waiākea. Land use information of the *kuleana* generally refer to cultivated fields with house lots indicating habitation and agricultural production within the same zone, unlike leeward Hawaii Island where in many cases *kuleana* included coastal house lots with the need of corresponding upland agricultural lots, because of elevation dependent rainfall.

Interior land use during this period was progressing toward more organized ranching, especially cattle ranching. Timber for firewood and housing was also still being exploited, as Hilo was being transformed into an entirely wooden-framed "New Bedford type Whaling Town" (*Op. cit.*:37).

Though the coastal zone still contained the vast majority of the population houses and stores were concentrated in the northern half of the bay, away from Waiākea, because the main pier for Hilo was at the mouth of Wailuku River (See Figure 5). This indicates a substantial change from the traditional settlement pattern of a "nearly continuous complex of native huts" along the bay's shoreline.

#### Late 1800s

During this period commercial sugar cane became the economic mainstay of the Hilo area with Waiākea Mill Company becoming one of the largest. Plantation operations generally developed ca. 1860s and for Waiākea this was on leased Crown lands. Waiākea Mill Company was in operation by the late 1870s and through its agents, Theo H. Davies and Alexander Young, had procured the lease of all of Waiākea by 1888 (Kelly, Nakamura, Barrère 1981:89). The mill was located at the head (*mauka* end) of Waiākea

Fishpond and sugar was transported by barge through the pond and down Wailoa River to Hilo Bay.

Immigrant labor (Chinese, Japanese, Portuguese) were living in "camps" set up by the plantation for its workers. Waiākea Mill Co. would eventually have some 10 camps situated along major rail lines of the plantation (Figure 6).

Land use was dominated by commercial cane activities within Zones I to III (Coast to Lower Rain Forest). Ranching became formalized though not specific to Waiākea. "Other examples of business, not directly related to sugar cultivation, were the continued use of the Waiākea fishponds, an active Chinese fish market, small pastures above Hilo supporting dairy cattle, and scattered vegetable gardens" (McEldowney 1979:39).

#### Early 1900s

Sugar and its associated industries continued to expand during this period. The Hawaii Consolidated Railway was built eventually extending "from Waiākea Mill and wharf through Puna, most of Ōla'a and along the N and S Hilo coast" (*Op. cit.*:41). Many of the immigrant laborers from the late 1800s moved off the plantation, being replaced by new Filipino laborers. Hilo continued to grow and become the second largest urban center in the new Territory of Hawaii.

Ranching in the Hilo areas, but not specifically in Waiākea, came under the control of two large enterprises; the Parker and Shipman Ranches. In Waiākea a large portion of Zone II (Upland Agricultural Zone) too rocky for sugar cane cultivation became available for lease as Waiākea pasture lands. The present study area is mostly former Waiākea pasture land. The specific use of the pasture land is not known but McEldowney indicates that "A substantial amount of grazing land adjacent to Hilo or to sugarcane



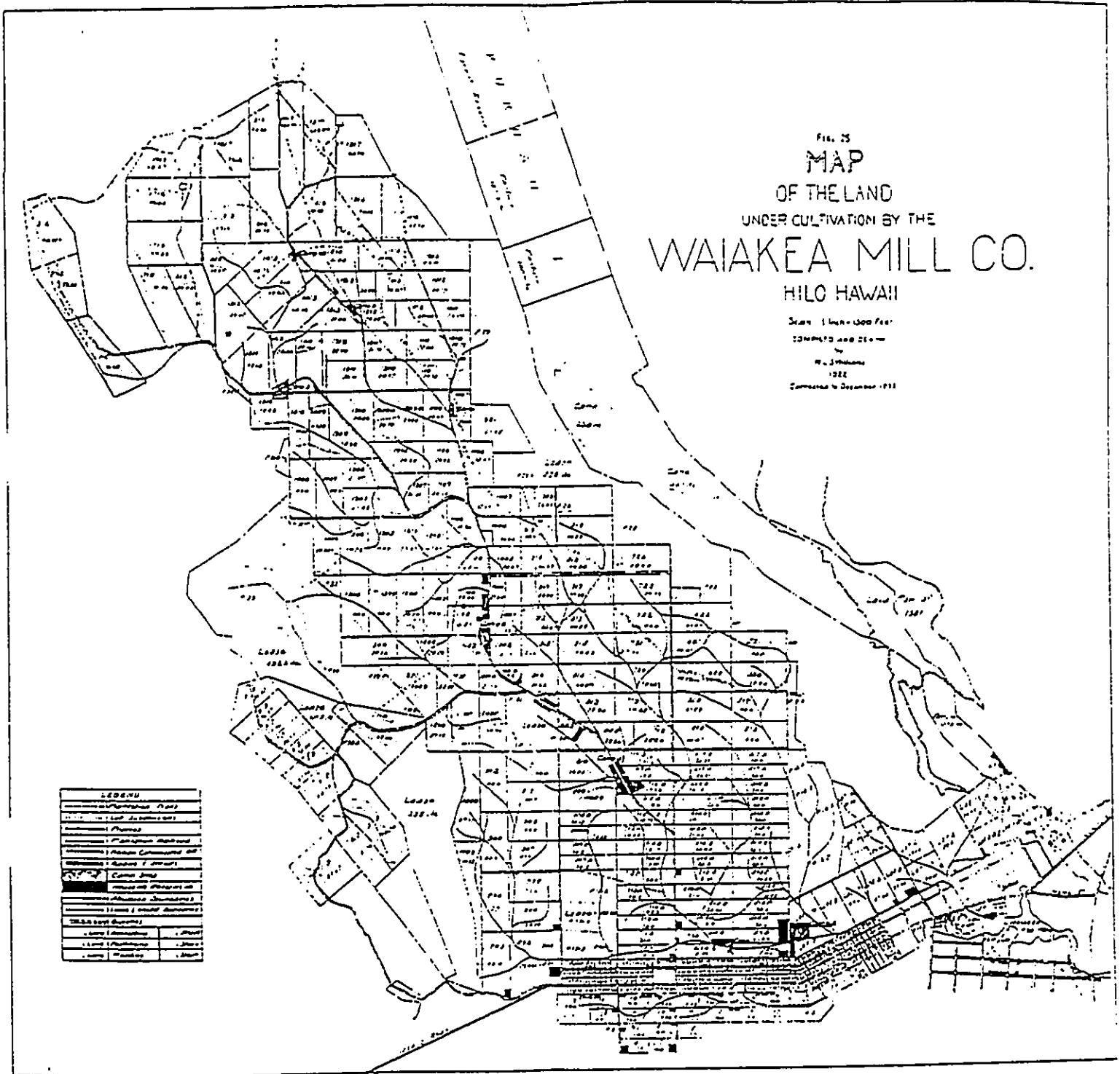


Figure 6 Waiākea Mill Co. Map ca. 1930, Showing Homestead, Cane Lots, and Camps

fields supported dairy cows for Hilo's several dairies" (*Ibid.*).

In 1918 the 30-year lease of the Waiākea Mill Co. expired and because Hawaii had become a Territory the "land fell under homesteading laws that required the government to put some of it up for lease to homesteaders who would be willing to grow sugar cane on it. Waiākea Mill was to grind the crop for them. A total of about 700 acres of land was divided into cane lots (between 10 and 76 acres each) and house lots ranging from 1 to 3 acres..." (Kelly, Nakamura, Barrère 1981:121). The present study area includes a portion of cane lot #16 (refer to Figure 6). The homestead and cane lots eventually reverted to the overall mechanized cultivation of the mill company as the homestead and cane lots "experiment was declared a failure" (*Op. cit.*:121).

By the 1920s the Waiākea Mill Co. had some 7,000 acres in cane production. Also, in the 1920s large tracts of remaining forest in Waiākea were "designated as forest reserve" (McEldowney 1979:42). The main reason appears to have been for maintaining the "forest as a 'watershed' to capture, retain, and support the continuous flow of water necessary to the sugar industry" (*Ibid.*). Clearly, sugar was the dominate economic factor during this period including the formation of settlements (i.e. camps).

#### Mid 1900s till present

Plantation life dominated the early portion of this time span but in 1948 Waiākea Mill Co. was liquidated (Condé and Best 1973:119). However, a major industry associated with cane by-products, canec, was begun in 1928. The canec plant was located adjacent to Waiākea Mill with bagasse, the cane by-product utilized, pumped through pipes from the mill to the plant. The canec plant shut down operations in 1966.

During this period major construction jobs started in the 1920s were completed.

These major construction jobs, in part, included Hilo Bay, wharfs and breakwater and bridges. Some of these projects were actually major reconstruction work from damage during the winter of 1923, which included storm surf in January and a tidal wave in February (Kelly, Nakamura and Barrère 1981:171). During the World War II period in Hilo, expansion and designation of Hilo airport as General Lyman Field and the construction of the Saddle Road were major projects undertaken as part of the military presence on the island, which was very substantial.

Prior to the closing of the Waiākea Mill Co. there were at least 10 "camps" or plantation villages. Only Camp 1 was within the coastal zone with Camps 2 to 10 within the upland agricultural zone with Camp 10 the highest at ca. 1300 ft. a.m.s.l. (Refer to Figure 6). The present study area included active mechanized cane cultivation probably right up until closing (1948), and leased pasture lands. The lease of the Waiākea pasture lands during this period was to a Mr. Kazuo Miyasaki (G.L. #2751 exp. 6/17/60). Specific use of the pasture is not known, but as mentioned previously, dairy cattle pasturage is a distinct possibility.

After statehood (1959) and with the closing of the mill and canec plant, tourism was looked at as the next economic mainstay. In Waiākea, C. Brewer & Co. built a hotel complex at the site of the old canec plant. Other hotels were built along the Hilo Bay frontage of Waiākea near Coconut Island or Mokuola. Large tracts of former Waiākea Homestead and Cane lots were converted to housing or sub-division tracts adjacent to the study area. U.H. Hilo campus was expanded as it continues to do presently. The study area itself ceased to be utilized for pasturage (ca 1960s?) and recently there has been construction of the School of Agriculture building and the Joint Astronomy building.

## Summary

In summary, the traditional settlement pattern included, almost exclusively, permanent coastal habitation with associated intensive agriculture. Immediately upslope of the coastal zone was an area cleared for extensions of agricultural production though not as intensively utilized as in the coastal zone. Beyond or *mauka* of the cleared upland agricultural zone was forest which ranged from dense rain forest to sub-alpine forest at the upper limit of Waiākea (ca. 6,000 feet). Habitation for the zones beyond the coastal zone was essentially temporary in nature, associated with exploitation of forest products. This pattern changed over time as the historically introduced religion(s), economy, and socio-political system replaced the traditional Hawaiian system. The major impetus for change was the development of commercial sugar cane within Waiākea. Settlement patterns during the period from the mid 1800s to the mid 1900s were almost exclusively set by the Waiākea Mill Co. Camps for immigrant laborers were constructed at specific locations based on the plantation organization. Most of these permanent housing locations were in areas previously associated with sparsely scattered temporary habitations in the upland agricultural zone of Waiākea. Because most of the study area was too rocky (i.e. exposed pahoehoe) for commercial cane, associated camps were not present. It appears that historically most of the study area was utilized as pasture land.

Hilo eventually became the second largest urban center in the State of Hawaii. Permanent housing is no longer dependent on a specific set of environmental conditions as it was during traditional Hawaiian times. The large acreage involved in subsistence agriculture and utilization of resources specific to certain elevations is no longer a necessity because of the market-based economy of today.

## PREVIOUS ARCHAEOLOGICAL RESEARCH

There have been a number of archaeological and historic studies that are pertinent to the *ahupua'a* of Waiākea within which the study area lies. Notable among these somewhat regional studies are, Alfred E. Hudson's 1930s East Hawaii Site Survey, Holly McEldowney's "Archaeological and Historical Literature Search and Research Design, Lava Flow Control History," and "Hilo Bay: A Chronological History" (Marion Kelly, Barry Nakamura and Dorothy B. Barrère 1981). Review of these documents, and others, indicated that no previously documented sites with state site numbers were located within the present study area. These regionally oriented studies, however, were the basis for describing the settlement pattern specific to Waiākea *ahupua'a*. The discussion of settlement patterns is contained within Cultural History section of this report.

Additionally, a "Summary of Prior Archaeological Work" compiled by Ms. Jadelyn J. Moniz (1992) for Waiākea list ten studies ranging from field inspections to inventory surveys. The studies include research from 1979 to 1992. The description of each of the ten previous studies includes a basic review of findings and relating "adequacy" for the individual reports in terms of inventory level survey," based on Title 13, Subtitle 6, Chapter 147: Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports" (Moniz 1992).

The following discussion of previous research will focus on work specifically related to the present study area (Figure 7).

There have been no previous inventory-level archaeological surveys specific to the current study area. However, "field inspections" and a reconnaissance-level survey for the proposed Puainako Street Extension (Hunt, 1992) indicate the presence of archaeological sites in an area adjacent to the present study area.

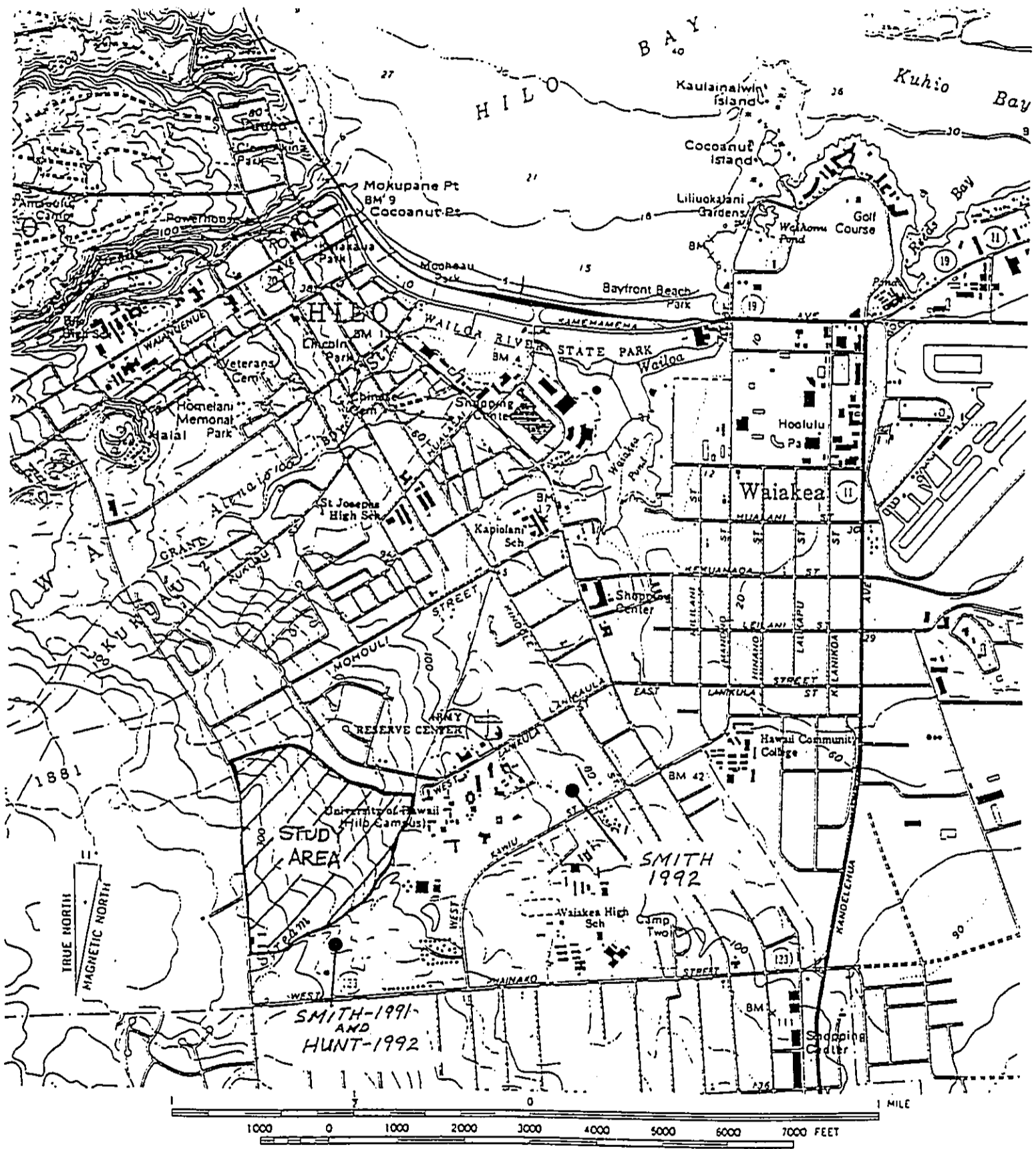


Figure 7 Portion of USGS Topographic Map, Hilo Quadrangle Showing Areas of Study Adjacent to the Present Project Area

Field inspections were conducted by Mr. Marc Smith, a staff member of the State Historic Preservation Division of the Department of Land and Natural Resources (SHPD/DLNR). The locations of the inspections include portions of the present study area and an undeveloped lot (Waiākea Cane Lots) abutting Ululani St.

Field inspections in to the present study area were conducted in October 1991. The impetus for these inspections were "calls from concerned students and faculty of University of Hawaii-Hilo about the possible presence of historic sites in the proposed Research & Technology Park" (SHPD/DLNR 5/7/92). Marc Smith conducted three separate field checks, October 18, 24, and 27, 1991. Observed during the field checks were a number of historic sites including "large faced platforms, modified outcrops, enclosures which may be house sites, and a large walled enclosure" (Smith 11/8/91).

Additionally, Smith noted three different lava flows in the area. The flows include: 1) a portion of the 1881 Mauna Loa pahoehoe flow; 2) a pahoehoe flow "dating to 1.5 - .75 KA (1,500 to 750 B.P)"; and 3) the oldest flow which has "a more level soil surface" and dates to ">4,0 KA (greater than 4,000 B.P.)" (*Ibid.*). The lava-flow age determinations are based on work by Lovelace as referenced in Marc Smith's letter.

The age of the flows has a direct correlation to site distribution. The only sites observed were "on the >4,000 year old flow," except one site which "appears to be constructed along the margin of the 1,500-to-750-year-old flow, suggesting others may exist" (Smith 11/8/91). Based on the field checks it was recommended that an inventory survey be conducted for the proposed area of the construction of utilities.

In December 1991 Marc Smith (SHPD/DLNR) conducted a field inspection for the proposed Department of Water Supply Office project site. The project area, bounded by Ululani, Kawili, and Kapiolani Streets, is located within the former "Waiākea Cane Lots"

with "apparently the same soil type and flow underlying archaeological site types recorded above the University of Hawaii Hilo in the proposed Research and Technology Park" (Smith, 1/3/92). Observed within the parcel were "several stacked stone walls and linear mounds, ... a large rectangular enclosure ... several wall remnants and C-shapes" (*Ibid.*). An inventory level survey was recommended prior to any land disturbance.

The survey for the proposed Puainako Street Extension (Hunt 1992) covered an area approximately 150 ft. wide from the 200 to 1500 feet in elevation, through "multiple *ahupua'a* including Waiākea, Kukuau 1 and 2, and a small part of Pono Hawaii" (*Op. cit.*:5). A total of 48 sites were observed and recorded. Site types included "walls, mounds, platforms, and faced terraces" (*Op.cit.*:9). The highest concentration of sites is "in one area....Alternative B (Lower section) near the University of Hawaii-Hilo" (*Op.cit.*:11). This cluster of sites, which "appear to be associated with Hawaiian occupation and cultivation along the intermittent drainage during prehistoric and historic times" (*Ibid.*), includes some of the same sites observed by Marc Smith during his field inspections of the proposed Research and Technology Park (Smith 11/8/91). The sites are situated within the former Waiākea Cane Lots and also appear to be on the same soil-mantled lava flow (i.e., >4,000 B.P.) as described by Marc Smith (Smith 11/8/91 and 1/3/92).

Based on the field checks by Smith and survey by Hunt, the site distribution (including that within the present study area) correlates to the lava-flow ages. The three different ages and relative degrees of soil development include: 1) a small portion of the 1881 flow with no soil cover or development; 2) the 1500-to-750-year-B.P. pahoehoe flow with no soil or weathering-related development but with some pockets of organically derived soil (i.e., leaf litter) - this flow covers the majority of the study area; and 3) the soil-mantled >4,000- year B.P. flow. Archaeological sites within and near the present



study area are confined to the oldest, soil-mantled flow associated with the former Waiākea Cane Lots. Site types, function and probable ages have ranged from agricultural mounds and platforms, habitation enclosures, and platforms with both prehistoric- and historic-era usage hypothesized.

Based on the information gathered from the field inspections and reconnaissance-level survey discussed above, three expectations regarding site distribution in the current study area can be stated. First, the 1881-flow portion of the study area would contain no sites. Second, the 1500-to-750-year-old pahoehoe flow comprising the majority of the study would contain few sites concentrated along the perimeter or edge of the flow. Third, the oldest flow would contain a higher site density with the understood possibility that earlier (i.e., prehistoric) sites might have been altered for commercial sugar cane cultivation.

## SURVEY RESULTS

### Methodology

The study area was surveyed by traversing the property on foot. The dense vegetation in disturbed areas was a seriously inhibiting factor in visibility, horizontally as well as of the actual ground surface.

The most difficult vegetation to survey through was *uluhe* or false staghorn fern which predominated in the western portion of the study area especially between Komohana Street and the existing "Road B" alignment that extends to the south of existing "Road A" as a previously bulldozed strip. Range of the *uluhe* conforms closely with the reconnaissance soils type of rLW or pahoehoe lava, and with the mechanically disturbed areas. North-south traverses were pushed through the forest north of "Road A" (Figure 8), and east-west traverses through the triangular parcel delineated by Komohana Street, "Road A", and the previously bulldozed powerline easement. The *uluhe* covers as much as 70 percent of this area *mauka of the "Road B"* alignment.

Roughly east-west traverses were walked through the remaining land east or *makai* of "Road B" and north of the powerline easement. The existing "Road A" and the powerline easement were used to guide on through the dense stand of strawberry guava (*Psidium cattleianum*) which covers this portion of the study area. The trees grow on the average less than 12 inches apart making passage extremely difficult, but are only one to 4 or 5 centimeters thick and visibility is surprisingly good. One can see a minimum of 20 to 30 feet horizontally and the ground underfoot is clear except for leaf litter and sphagnum moss on the unweathered pahoehoe lava of low undulating topography.

East-west traverses were also made through the lands south of the powerline easement, which completed the coverage of the entire study area. The undeveloped

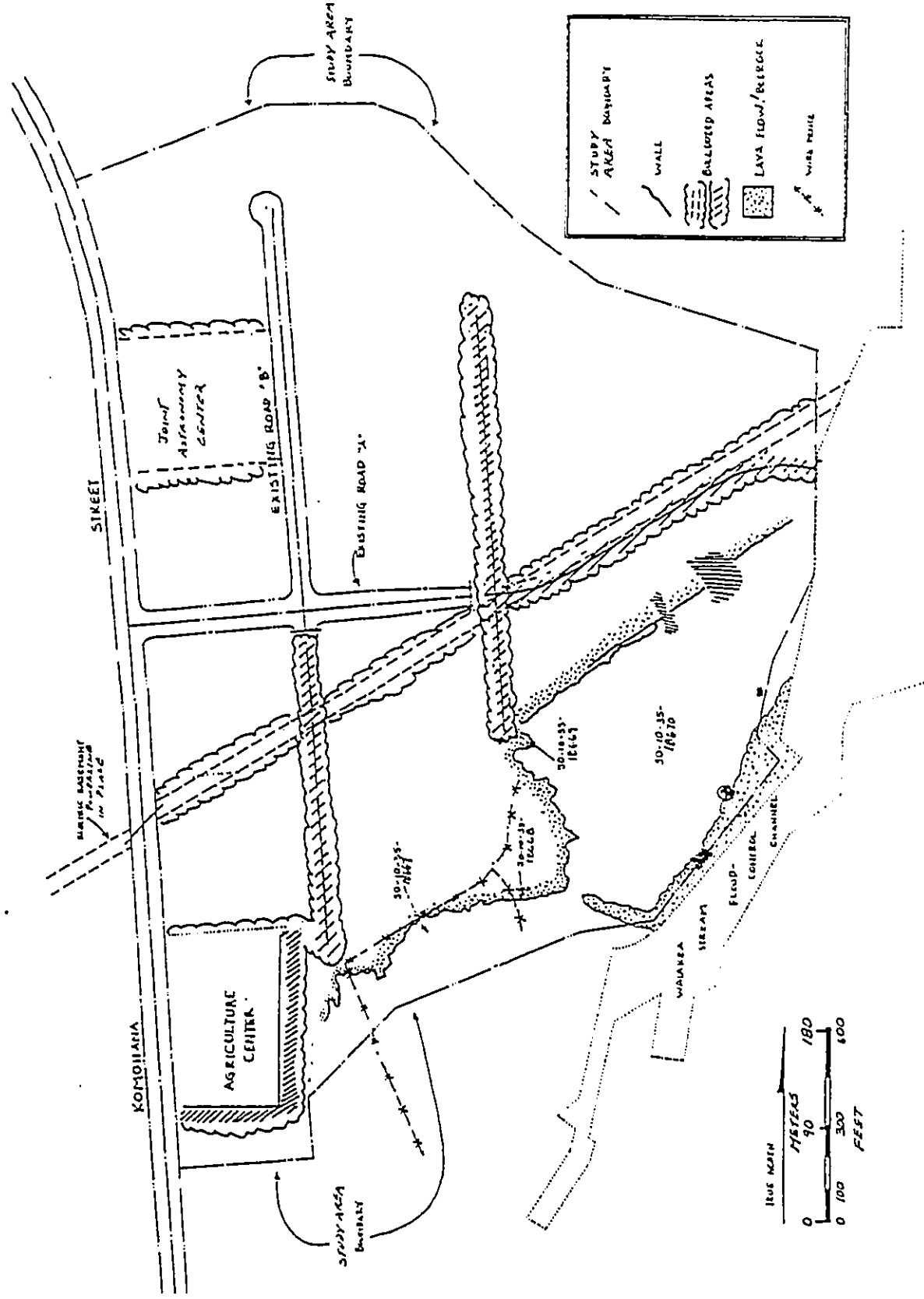


Figure 8 Study Area, Showing Existing Roads, Powerline Easement and Areas of Previous Bulldozing

portion of this land between Komohana Street, the powerline, and the bulldozed extension of the "Road B" alignment is covered with *uluhe*. The undeveloped southern extension of "Road B" and a portion *makai* have been bulldozed and since revegetated. Going *makai* on the south side of the powerline the ground underfoot changes to the undisturbed, little weathered pahoehoe lava supporting the strawberry guava thicket, and visibility of the ground becomes good again.

Traverses throughout the study area were done by two to six individuals at intervals from one another of 20 feet to 100 feet depending upon vegetation.

Test excavations were done and the testing process included: pre-excavation photographs, removal of rocks from the specified test unit; excavation of soil by natural stratigraphic layer (or 10 cm. level within natural strata); screening of all soil sediments through 1/8" mesh screen; recovery of all cultural material (artifacts, midden, charcoal); one profile and stratigraphic description per unit; post excavation photographs; and reconstruction of test unit locale.

The site of the existing School of Agriculture is at the southwest corner of the study area. The Waiakea Stream floodplain and its associated alluvial sediments extends along the southern study area boundary widening to *makai*. This is the old sugarcane field and vegetation here is larger guava trees with almost no understory. As much as 90 percent of the ground is bare with excellent visibility.

### Fieldwork

The archaeological survey and testing located archeological sites in the southern portion of the study area. Four sites were described and mapped to scale. Two of the sites - 18668, and 18669 - and a mound-feature within a third site - 18667 - were tested by hand excavations to document stratigraphy in the sites and to search for cultural

remains to help in dating the sites.

The larger of the sites are two (2) expansive historic, agricultural fields (sites - 18667 and -18670) bounded by low rock walls and fences that follow the natural boundaries of stream bank and unweathered lava flow (Figure 9). Field-rock clearing mounds are dispersed throughout both fields. The two other sites identified were assigned State site numbers 18668 and 18669 and were tested by excavation. These latter two sites each have a low wall defining their interiors and have historic bottles on the surface within the sites. The sites and the test excavation results are described in detail in the following Site Descriptions section.

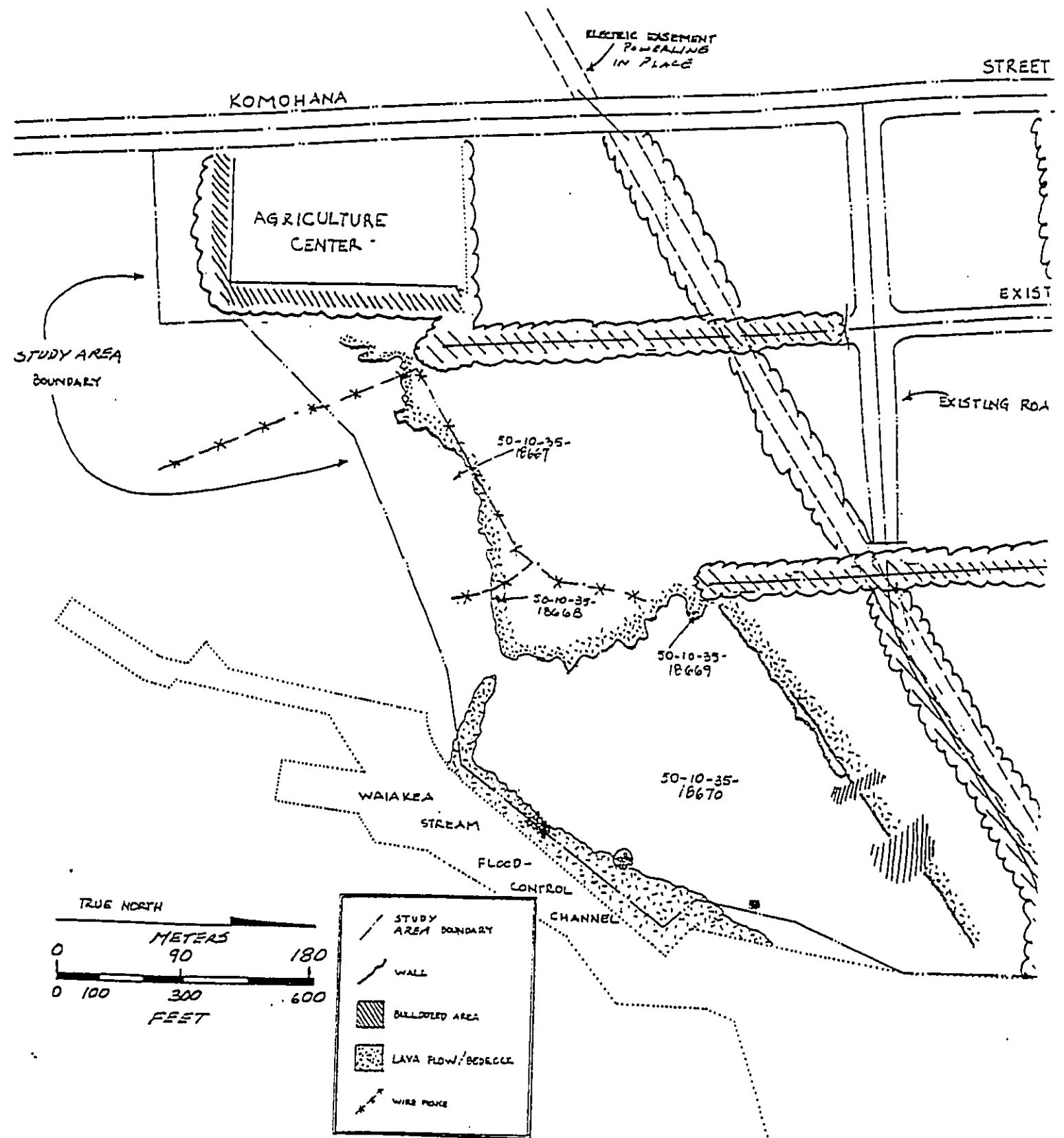


Figure 9 Portion of Study Area Showing Archaeological Sites

## SITE DESCRIPTIONS

The table below summarizes the basic site information. It is followed by a detailed description of sites.

Table: Site Summary of Survey Area

State Site #50-10-35-	CSH Site #	Site Type	Function	Significance	Age	Recommen
18667	10	Field Complex	Agriculture	D	Historic	NFW
18668	11	Enclosure	20 century camp	D	1900s	NFW
18669	40	Enclosure/Wall	Lunch station	D	1900s	NFW
18670	12&13	Field	Agriculture	D	1900s	NFW

D - Site may be likely to yield information important in prehistory or history  
 NFW - No Further Work

State Site #            50-10-35-18667  
 Site Type:            Field Complex  
 Function:             Agriculture  
 Features (#):        3  
 Dimensions:         6500.0 m<sup>2</sup> (21325.2 ft<sup>2</sup>)

CSH Site: 10

**Description:** Site 18667 (Figure 10) is a large area consisting of two discontinuous and separate walls and numerous (approx. 25) mounds. The site is located in the southwest corner of the study area and Feature A, a wall, in part runs along the study area boundary. To the south of Feature A, outside of the study area, there is what appears to be an old stream gulch. A large undulating expanse of guava forested terrain lies to the north of Feature A - dotted intermittently by mounds (Feature B). Feature C is a wall

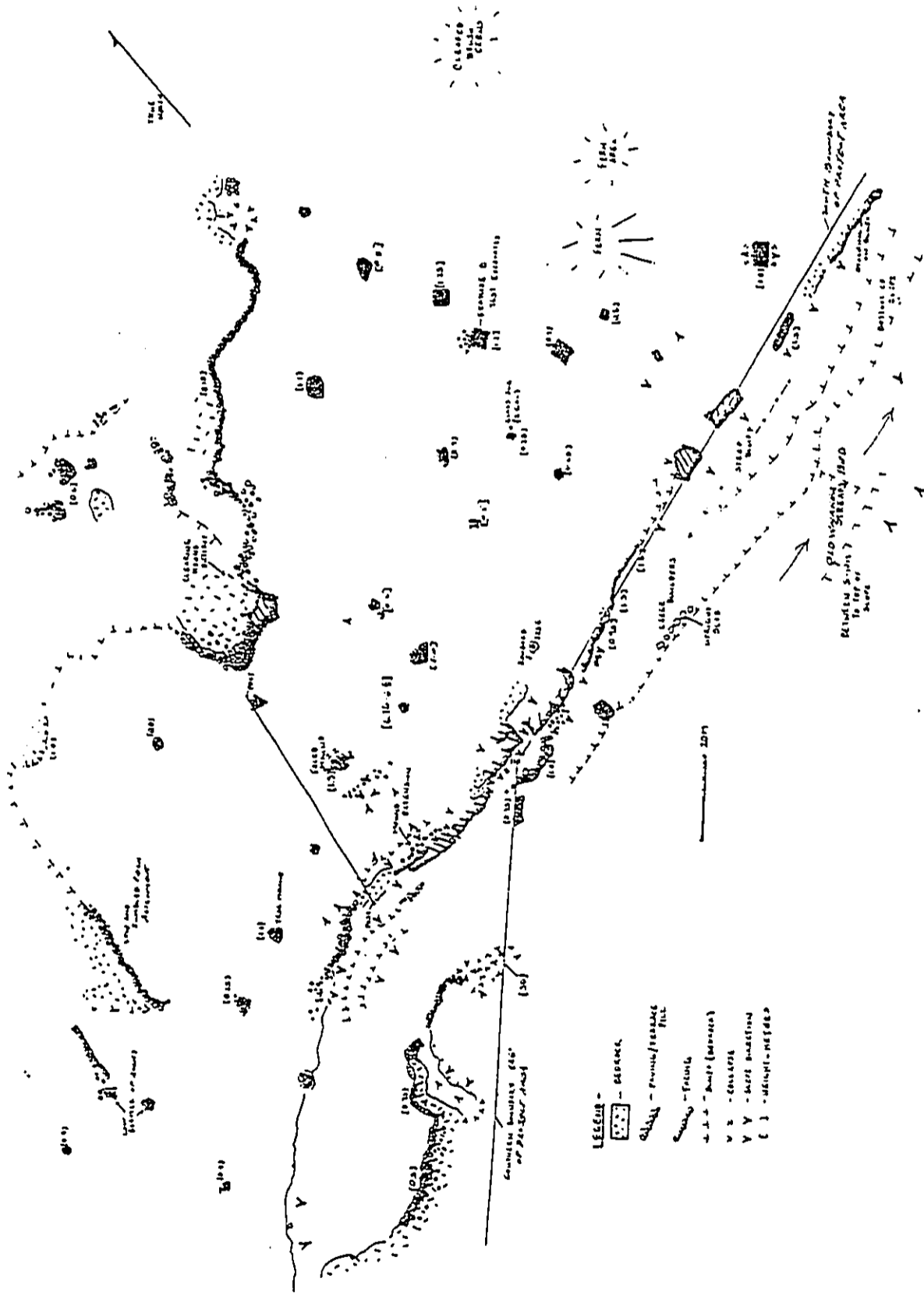


Figure 10 State Site 50-10-35-18667, Plan View



which runs roughly parallel to Feature A but is generally more discontinuous and in poorer condition than Feature A. Feature C lies between 40-60 m. (131.2 ft. to 196.8 ft.) to the north of Feature A. The mounds are located between the walls.

Feature A is a long and discontinuous wall which runs along the upper bank of the old stream gulch. Feature A is oriented roughly northeast/southwest. The entire length of Feature A measures approximately 140.0 m. (459.2 ft.). The wall is generally well-faced to the downslope side, toward the stream. Facing in these sections measures to a maximum height of 1.5 m. (4.9 ft.). Several constructed breaks exist along the wall and appear to serve as pathways through the wall to the stream. Toward the northeast end of the feature the wall becomes thicker and resembles narrow platforms or "ramparts." The wall varies in width from 1.0 m. (3.3 ft.) to 3.0 m. (9.8 ft.) at the "ramparts."

Parallel sections of wall lie to the south of Feature A. One parallel section is located at the southwest end of Feature A in the stream bottom and runs approximately 35.0 m. (114.8 ft.) long, at a distance of 10.0 m. (32.8 ft.) south of Feature A. A second parallel section is located approximately midway along the length of Feature A. This section measures 10.0 m. (32.8 ft.) long and is nearer the top edge of the stream bank.

No midden or artifacts were observed.

Feature A is in fair condition and excavation potential is poor.

Feature B comprises approximately 25 mounds - located primarily between Features A and C. The mounds vary in both size and formality of construction. Several of the larger mounds are well-faced and measure up to 4.0 m.<sup>2</sup> (43.0 ft.<sup>2</sup>). The mounds are arranged randomly; they do not appear to be aligned in rows. The mounds of Feature B range in height from 0.6 m. (2.0 ft.) to 1.4 m. (4.6 ft.). Feature B mounds are probably agricultural clearing mounds.

No midden or artifacts were observed.

The mounds of Feature B are in fair condition and excavation potential is poor (see Testing Results and Figure 11).

Feature C is a second wall feature located to the north of Features A and B. Feature C runs roughly northeast/southwest, but unlike Feature A, this wall follows the edge of a pahoehoe flow. Pahoehoe outcropping connects the discontinuous segments of Feature C. The construction of Feature C is poor compared to Feature A and less vertical facing was observed. Feature C measures approximately 70.0 m. (229.6 ft.) long and ranges in width from 1.0 m. (3.3 ft.) to 2.0 m. (6.6 ft.). The heights range from 0.4 m. (1.3 ft.) to 1.0 m. (3.3 ft.).

No midden or artifacts were observed.

Feature C is in poor condition.

Site 18667 complex is agricultural in function, but the age of the site is difficult to determine. However, based on historical information concerning field boundaries of the Waiākea Mill Co. it would appear that this complex represents sugar cane cultivation practices.

### Testing Results

Subsurface testing was conducted at Site 18667, Feature B (See Figure 11), in an effort to better interpret site function. A 1.0 by 1.5 m. trench was placed in a single mound of Feature B. The excavation demanded that the mound be disassembled. No

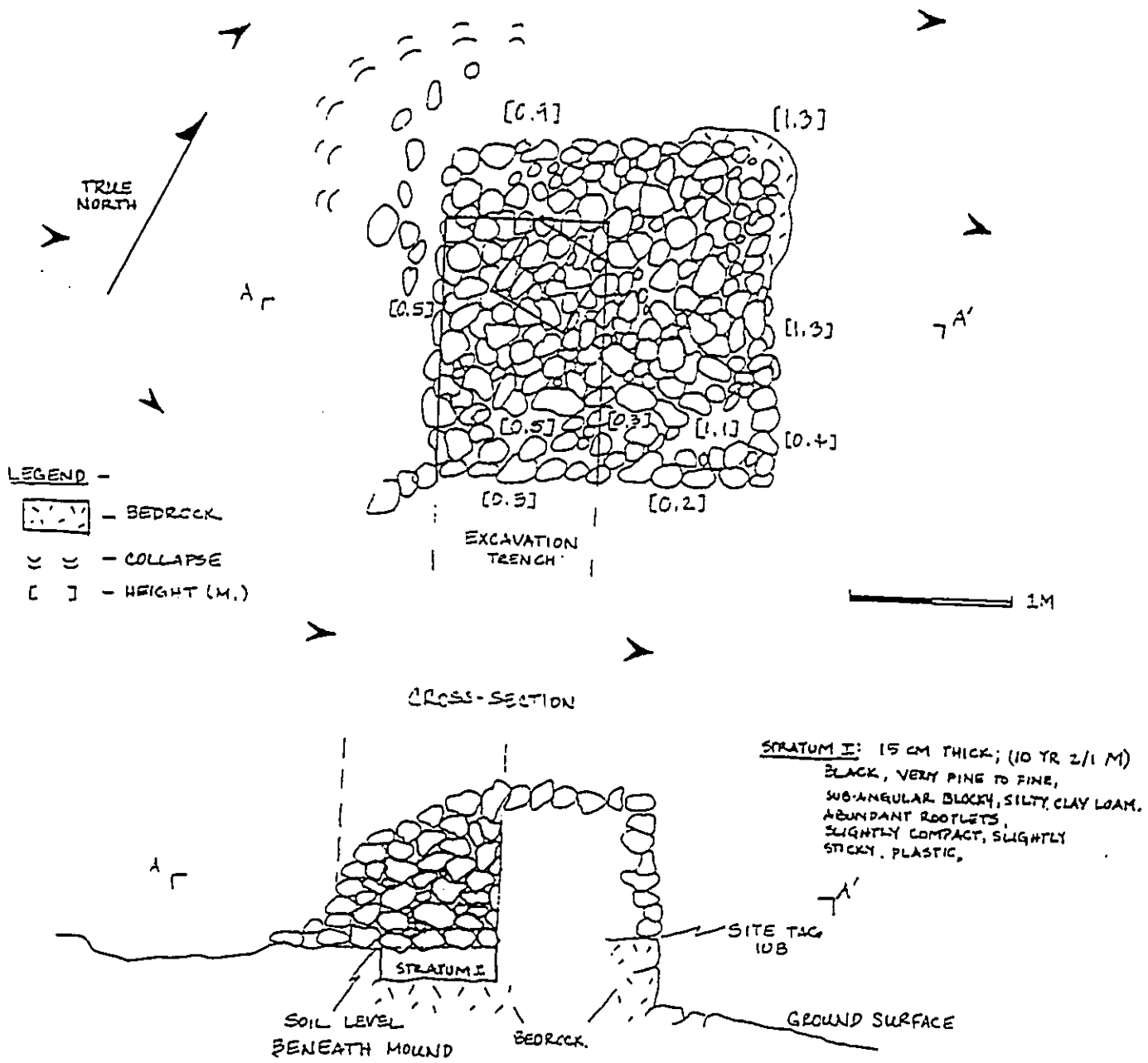


Figure 11 Site 50-10-36-18667 Feature B, Plan View of Mound (Top), and Cross Section Showing Stratigraphic Relationship of Rock Mound to Sediments (Bottom)

midden or artifacts were encountered through the mound construction. At the base of the mound was exposed bedrock and soil. The excavation continued through the 15 cm. thick deposit of soil (Stratum I) until bedrock was encountered there also. Stratum I (Munsell 10 YR 2/1 black) consisted of very fine to fine subangular, blocky, firm, slightly compact and sticky, silty clay loam. No midden or artifacts were observed. The mound was reconstructed subsequent to recording the excavation data. The excavation confirmed the rock clearing functional interpretation.

State Site #: 50-10-35-18668  
Site Type: Enclosure  
Function: 20th century camp  
Features (#): 1  
Dimension: 24.0 m.<sup>2</sup> (258.2 ft.<sup>2</sup>)

CSH Site #: 11

**Description:** Site 50-10-35-18668 (Figure 12) comprises an oval enclosure and adjacent L-shaped wall segment located on the edge of undulating pahoehoe terrain. In the site area, there are shallow soil deposits supporting moderately dense strawberry guava trees, ferns, three mango trees, and one royal palm tree.

The enclosure is a single course alignment of pahoehoe stones measuring 4.0 m. (13.1 ft.) N/S by 3.0 m. (9.8 ft.) E/W. The height of the alignment above the ground surface measures 0.1 m. (0.3 ft.). A pahoehoe outcrop ridge is located to the northeast of the enclosure and is approximately 1.0 m. (3.3 ft.) high. See Testing Results below.

The adjacent L-shaped wall segment lies directly south of the enclosure. The long leg of the wall measures 2.4 m. (7.9 ft.) long N/S and the short leg of the wall extends 1.8 m. (5.9 ft.) to the west from the long leg's south end. The wall measures 0.4 m. (1.3 ft.) thick and (2 to 3 courses) 0.8 m. (2.6 ft.) high, maximum.

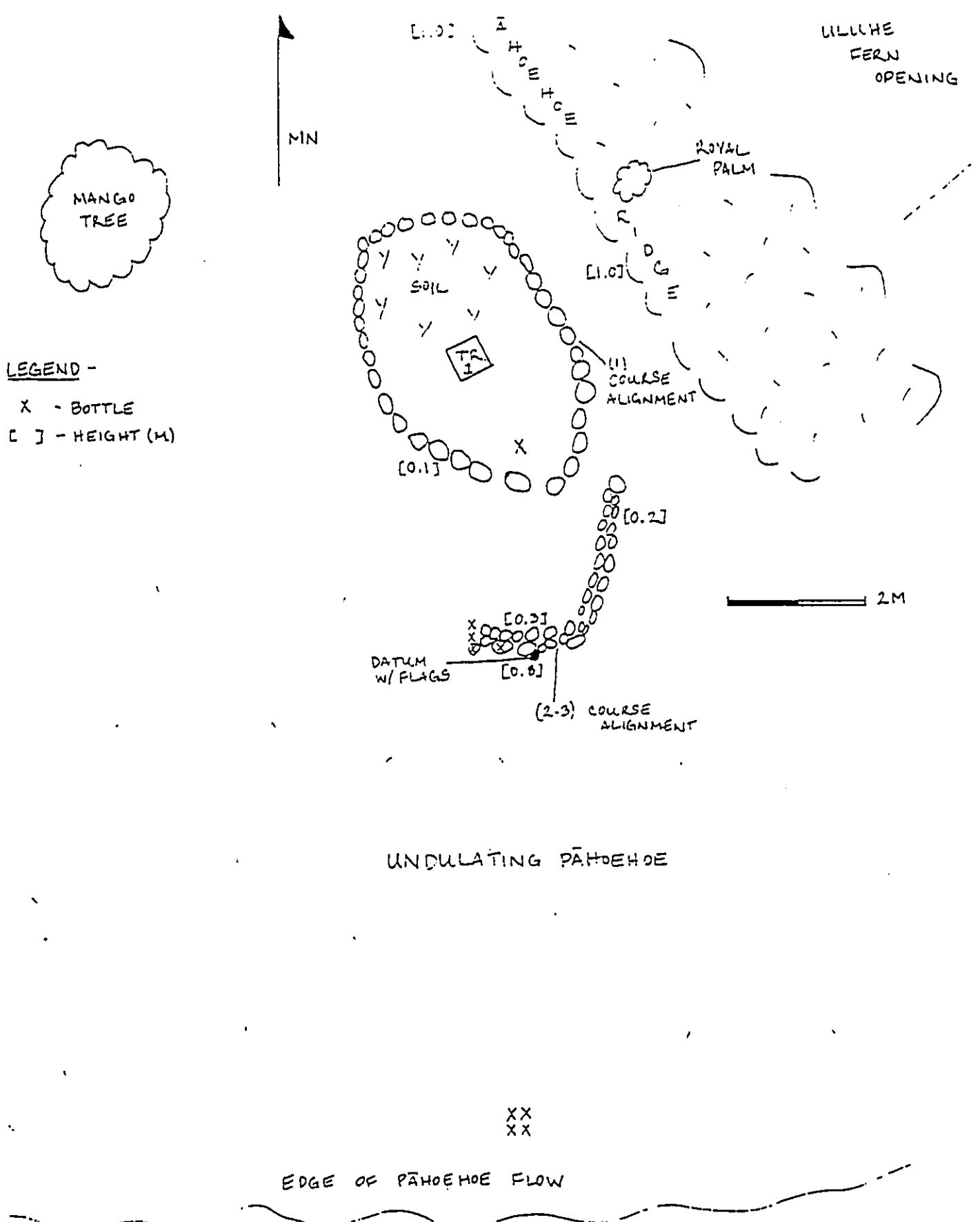


Figure 12 Site 50-10-35-18668, Plan View Showing Excavation Unit

No indigenous artifacts or midden were observed. Several clear and brown liquor glass bottles were observed at this site.

Site 18668 is probably a temporary camp with the oval single course alignment representing the perimeter of a tent pitching site.

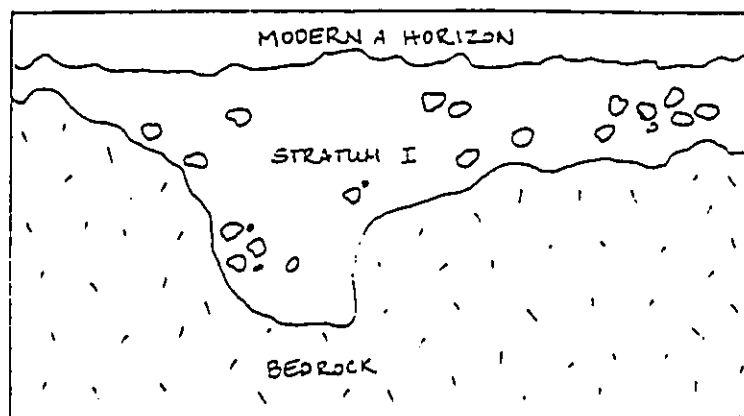
### Testing Results

Subsurface testing was conducted at Site 18668 (Figure 13). A single 0.5 m. by 0.5 m. trench was placed in the center of the enclosure. The trench was excavated through 4 cm. of modern forest litter and through Stratum I to a maximum depth of 25 cm., where bedrock was encountered. Stratum I measured between 4 to 25 cm. below the ground surface. Stratum I consisted of a dark brown to black, compact, moist, silty clay. The soil was organized into small (5 mm. diameter) peds or grains. There was high root and rootlet intrusion. Approximately 10% of Stratum I consisted of small pahoehoe cobbles. No cultural material was observed in this trench.

State Site #:	50-10-35-18669
Site Type:	Site complex
Function:	Lunch station
Features (#):	2
Dimension:	224 m. <sup>2</sup> (2409.9 ft. <sup>2</sup> )

CSH Site #: 40

**Description:** State site 18669 (Figure 14, top) is a site comprised of an enclosure and a wall segment, designated Features A and B. The site is located in gently sloping terrain of moderately deep soil deposits. Vegetation at the site includes guava, ti, royal palm, and hibiscus.



STRATUM I: 25 CM. THICK; BLACK-DARK BROWN, COMPACT,  
STRUCTURELESS, MOIST, ROOTS AND ROOTLETS ABUNDANT,  
10% COBBLE INCLUSION; NO CULTURE

Figure 13 State Site 50-10-35-18668, Trench 1 Profile: East Face

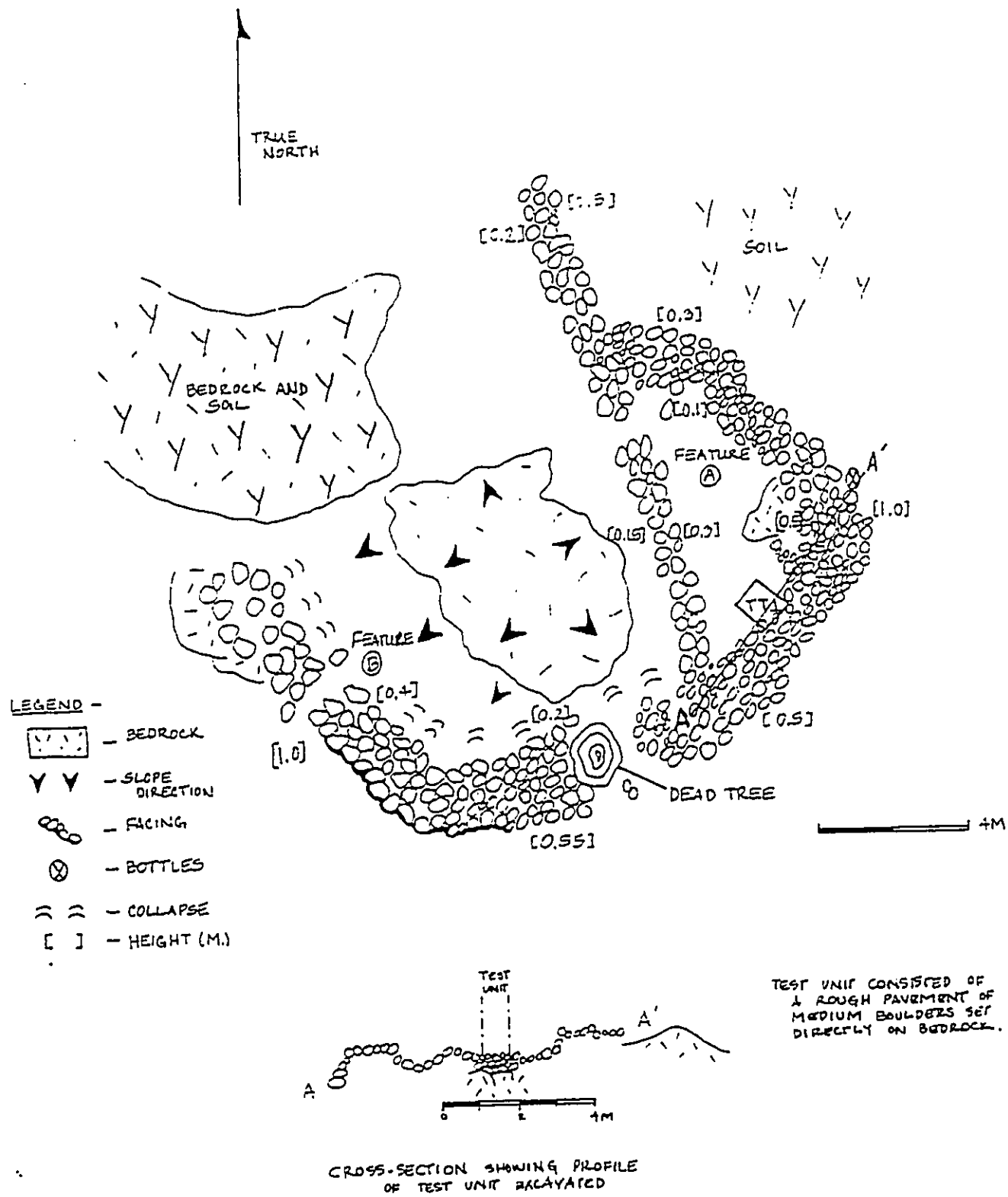


Figure 14 Site 50-10-35-18669, Plan View and Cross Section Showing Excavation Unit



Feature A is a rough, irregular, modified outcrop enclosure, measuring 11.0 m. (36.1 ft.) N/S by 6.4 m. (21.0 ft.) E/W. The walls of this enclosure are generally thick, measuring 1.8 m. (5.9 ft.) maximum, and 1.0 m. (3.3 ft.) average. A maximum wall height of 1.0 m. (3.3 ft.) is measured at the south exterior side of Feature A. The interior of the enclosure consists of a shallow soil deposit covering bedrock. At the north end of the west wall there is a constructed break measuring 0.75 m. (2.5 ft.). A 4.0 m. (13.1 ft.) long wall extends to the northwest off of the north corner of Feature A. See Testing Results below.

Feature B is a wall extension contiguous to the southwest corner of Feature A. The wall extends west for 6.0 m. (19.7 ft.) then doglegs to the north for an additional 2.3 m. (7.5 ft.). The wall measures 2.0 m. (6.6 ft.) thick, and 1.0 m. (3.3 ft.) high. A pahoehoe outcrop lies between Features A and B.

No midden was observed but Soda bottles, three railroad ties, and barbed wire were present at this site.

Site 18669 is in fair condition.

### Testing Results

Subsurface testing was conducted at Site 18669, Feature A (Figure 14, bottom). A single 1.0 m. by 0.8 m. trench was placed in Feature A, against the south wall, near a concentration of 7 "Pacific Sodaworks" bottles. A single soil layer was present, Stratum I, which ranged in depth from 10 to 25 cmbs. Stratum I consisted of a very dark brown (Munsell 10YR 2/2) silty clay soil, slightly compact, and organized into small blocky grains or peds. No cultural materials were observed.

State Site #: 50-10-35-18670  
Site Type: Field  
Function: Agricultural  
Features (#): 1  
Dimension: 36.0 m.<sup>2</sup> (987.8 ft.<sup>2</sup>)

CSE Site #: 12&13

Description: Site 50-10-35-18670 (refer to Figure 9) is a remnant of a commercial sugar cane agricultural field. This site is defined by a pahoehoe lava flow to the north and west by a stream gulch to the south. The lava flow and stream gulch converge at both *mauka* and *makai* ends of the site area, resulting in an "almond" shape. The site is generally level with undulations following the pahoehoe substrate. The field area has a substantial soil deposit and moderately dense guava and fern vegetation. There are also some isolated royal palm trees in areas where pahoehoe bedrock is exposed.

The site area is characterized by long, shallow, and narrow furrows, oriented generally north/south (cross-slope). This cross-slope orientation of the furrows suggest that contour plowing to reduce erosion was being utilized. The furrows measure, from trough to trough, 1.4 m. (4.6 ft.) wide and 0.2 m. (0.7 ft.) deep.

Within the site area there are subfeatures indicative of rock-clearing activity. One subfeature is a square enclosure located in level pahoehoe lava terrain (Figure 15). The enclosure measures 7.0 m. (23.0 ft.) N/S by 6.5 m. (21.3 ft.) E/W. The north and south sides of the enclosure are natural, raised pahoehoe outcrop ridges, measuring 0.7 m. (2.3 ft.) high. The east and west sides are constructed of pahoehoe boulders and cobbles, measuring 0.8 m. (2.6 ft.) thick and to a maximum height of 0.55 m. (1.8 ft.). A constructed break in the west wall measures 1.2 m. (3.9 ft.) wide. Three royal palms are growing within the enclosed area. A single plastic milk crate (Foremost 1979) was observed 3.4 m. (11.2 ft.) to the south of the enclosure.

# CORRECTION

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

DOCUMENT CAPTURED AS RECEIVED

State Site #: 50-10-35-18670  
 Site Type: Field  
 Function: Agricultural  
 Features (#): 1  
 Dimension: 36.0 m.<sup>2</sup> (887.3 a.<sup>2</sup>)

CSH Site #: 12&13

Description: Site 50-10-35-18670 (refer to Figure 9) is a remnant of a commercial sugar cane agricultural field. This site is defined by a pahoehoe lava flow to the north and west by a stream gulch to the south. The lava flow and stream gulch converge at both *mauka* and *makai* ends of the site area, resulting in an "almond" shape. The site is generally level with undulations following the pahoehoe substrate. The field area has a substantial soil deposit and moderately dense guava and fern vegetation. There are also some isolated royal palm trees in areas where pahoehoe bedrock is exposed.

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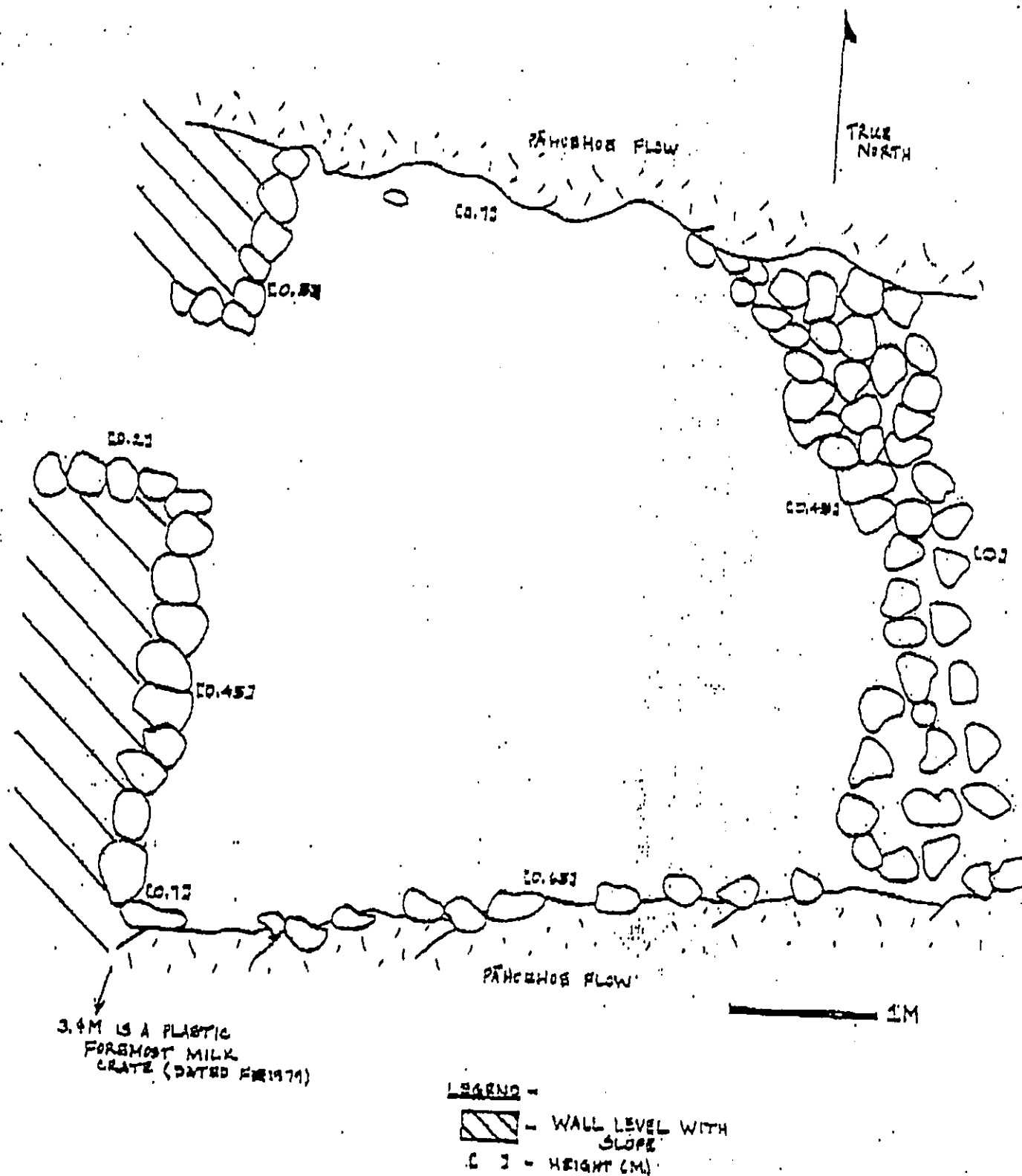


Figure 18 Enclosure Sub-Feature of Site 50-10-35-18670 (CSH12)

Another subfeature (Figure 16) example of rock-clearing is a large, rectangular mound. The mound measures 8.2 m. (26.9 ft.) N/S by 7.5 m. (24.6 ft.) E/W. The top of the mound surface measures approximately 2.5 m. (8.2 ft.) above the surrounding ground surface. Some vertical facing still exists though most of the sides are somewhat collapsed.

Approximately 14 other amorphous rock clearing features exist within the field. These consist of mounds, piled rocks on bedrock ledges and in one case a pile of rocks within a shallow bedrock drainage channel. A large banyan tree grows out of the piled rocks at the head of the channel.

Based on historic research including a review of the Waialakea Mill Co. map (See Fig. 6 in Cultural History Section) Site 12670 field was once Cane Lot #16. Lot 16 encompassed some 22 acres of which .13 was "waste" or areas of rock (i.e., clearing mounds, etc.).

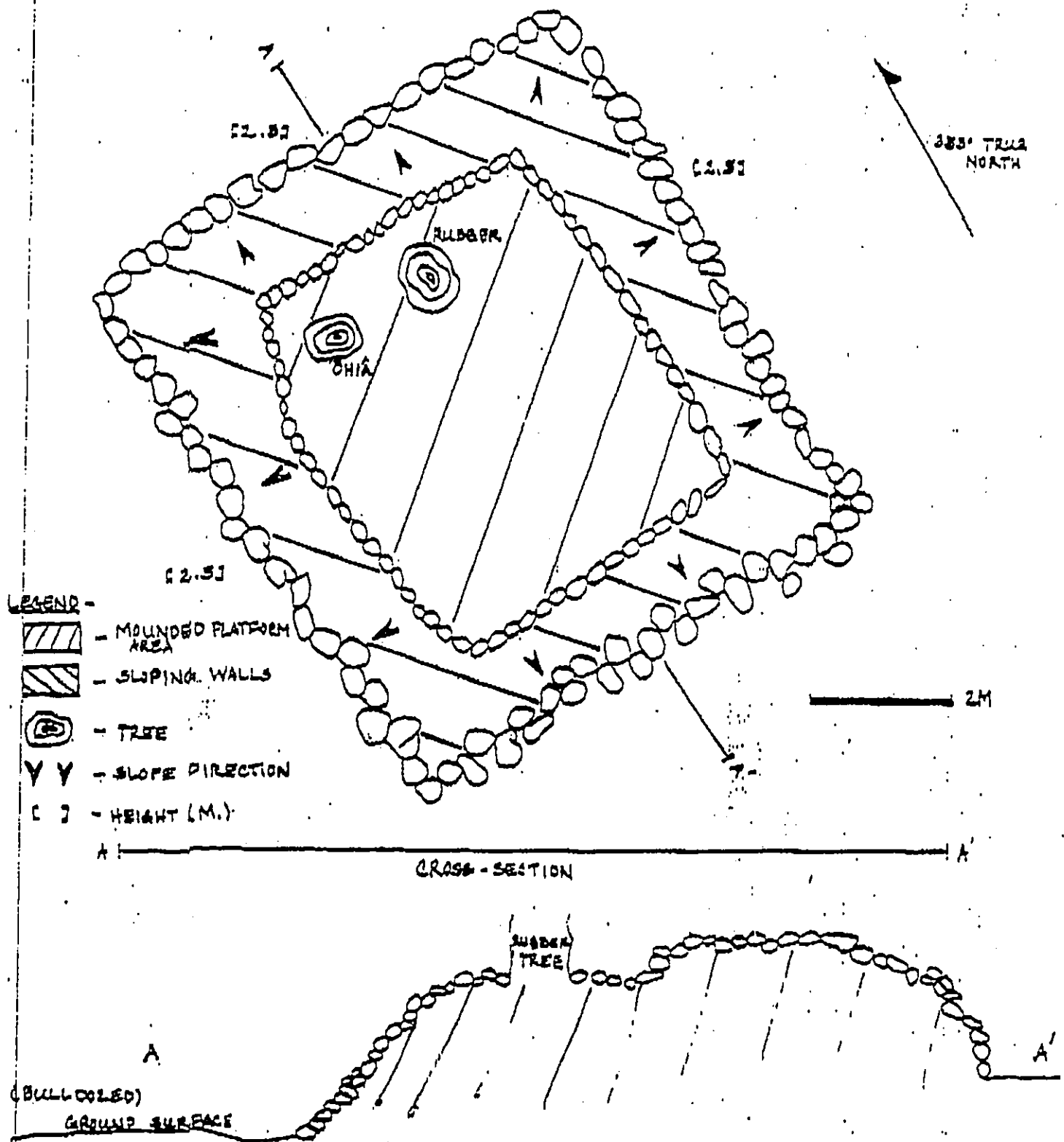


Figure 18 Larger Rock Clearance Mound within Site 560-10-88-18670, Plan View and Cross Section

## SUMMARY AND SIGNIFICANCE

Archaeological survey of the land area *mauka* of the University of Hawaii at Hilo Campus has located definitive evidence that the agriculturally productive land there was plowed and planted in sugar cane as recently as the 1940s. Furrows are still visible in the tillable lands that comprise the south end of the study area, and a sample of the rock mounds tested by excavation contained no cultural material. Stratigraphically the mounds are built upon the sediments of the fields or upon shallow bedrock up-croppings, thus are contemporaneous with sugar planting in the study area - in all probability field-rock clearing mounds. The entire field is bounded by a continuous low rock wall. Along the north field boundary the wall follows the natural edge of tillable soil, delineated by the edge of a pahoehoe flow which has not weathered significantly from its original state. The wall along the south boundary of the field follows the natural edge of the old bed of Waiākea Stream. This wall is essentially the south boundary of the study area. At the west (*mauka*) and east (*makai*) ends of the field the wall is disturbed by the rerouting of the Waiākea Stream bed and construction of the School of Agriculture building, and by the flood control 'improvements' to the stream bed, respectively.

Two small sites - 18668 and 18669 - located along the northern fringe of the tilled land were tested and were found to contain no stratified deposits or cultural material below the surface. On the surface within the sites were twentieth century bottles, for whiskey and soda water at sites 18668 and 18689 respectively. These sites are interpreted as lunch stations - temporary or single use sites - of the sugar field workers, homesteaders, or possible the cowboys or mule skinnners associated with the pasture land.

Site 18667 is nothing more than the constricting *mauka* end of the sugar field.



Furrows were not observed on the bare ground here, which is the primary reason for differentiating it from the *makai* portion of the field. The ubiquitous field-rock clearing mounds are more numerous, but smaller, generally no larger than 2 meters by 2 meters square with maximum heights of and a meter and a half. Their stratigraphic relationship to the surrounding sediments is similar to the mounds in the *makai* portion of the field, that is, of recent historic age and without any cultural material to suggest they are anything other than clearing mounds.

The entire remaining portion of the study area contained no cultural resources related to archaeology. This land is comprised mostly of a pahoehoe lava flow little altered by weathering. Vegetation is supported primarily by quantities of humus and leaf litter deposited by gravity in the low basins of the lava flow's undulating surface, their roots finding moisture ponded in the basins or deep in the natural cracks and fissures of the lava sealed by a thick, but discontinuous carpet of sphagnum moss. It is likely that prehistoric use of this land was for collection of feral or wild plants and animals. Variation between this pahoehoe lava of old and the lavas of the 1881 flow that entered the study area at the northwest corner is not clearly discernable due to the mechanized land alteration and the present heavy, ground-obscuring vegetation.

#### Significance

Archaeological remains in the study area, which are limited to the southern portion where old sediments are present, are borderline to even be considered historical properties in that they were last in use at least as recently as the mid-1940s. Initial homesteading of these "cane lots" occurred around 1918. So it is possible that construction of some of the field-stone clearing mounds had been begun by this time, and the mounds could have

been continuously added to through the years as is the nature of such mounds. Nevertheless, based on the archaeological mapping of the fields, and the testing results of type-mounds we believe all of the archaeological sites and features within the study area to be without other significance than Criterion D (i.e., site is likely to yield information important to prehistory or history) as historical properties, according to National Register significance and State Historic Preservation Division draft rules on significance criteria.

#### Recommendations

Archaeological work accomplished includes, scale mapping of the limits of the cane field and its boundary walls, testing of two peripheral sites, and testing of a field-stone clearing mound feature. Thus, it is felt sufficient data has been collected, analyzed, and reported on to satisfy Criterion D. Therefore, no further archaeological work is recommended for the study area.

Archaeological monitoring is not recommended for site grading and preparation work or other construction activities, based on the results of the archaeological survey and testing in the study area. However, as is the general case with historic preservation concerns in the event inadvertent discoveries are made during any phase of construction the State Historic Preservation Division shall be notified in each incidence to determine an appropriate course of action for mitigation.

Supplemental Archaeological Survey  
and Testing of the Proposed University of Hawaii  
at Hilo Expansion Area  
(TMK 2-4-01:19)

by

Douglas F. Borthwick, B.A.  
and  
Hallett H. Hammatt, Ph.D.

for

Engineering Concepts

by

Cultural Surveys Hawaii  
November 1993

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## INTRODUCTION

Cultural Surveys Hawaii conducted, at the request of Engineering Concepts, an archaeological inventory survey of an approximately eleven (11) acre parcel located adjacent to the proposed U.H. Hilo Research and Technology Park. The purpose of the survey was to locate and describe any archaeological sites and/or features within the specific area through which infrastructure-related construction is proposed.

The present inventory survey project area is situated along the Waiakea Flood Control Channel adjoining (to the east) the larger parcel of the Research and Technology Park previously surveyed by Cultural Surveys Hawaii (Borthwick and Hammatt 1993) (Fig. 1). The need to conduct this additional survey was reached after survey and report production of the larger parcel was completed. The present research is thus included as a supplemental report to the previous Cultural Surveys Hawaii's study which detailed background research pertinent to the entire Research and Technology Park.

## SURVEY RESULTS

### Methodology

The present inventory survey was conducted by two archaeologists, Douglas Borthwick and Dr. Hallett H. Hammatt on Sept 30, 1993. The first phase of the survey included walking roughly north/south-oriented transects to locate any archaeological sites. The space between archaeologists during the transects was never greater than 15 meters and averaged 10 meters. The entire area was covered in four transects. The vegetation ranged from fairly dense grass-covered areas to open terrain under Royal Palms and/or Guava, thus ground visibility ranged from fair to good. A portion of the Waiakea Flood Control Channel is encompassed within the project area. The channel and associated

land alterations generally define the southern and eastern boundaries of the project area. The northern boundary is a bulldozed swath related to existing water and overhead power lines. The western or *mauka* boundary is a surveyed line marked by survey flags, from the previous Cultural Surveys Hawaii's project, and more recently survey work by R.M. Towill Corp. The contour and boundary map developed by R.M. Towill's work was utilized to accurately plot site locations (Fig. 2).

Test excavations were conducted at two rock mounds. The testing process included: pre-excavation photographs, removal of rocks from the specified test unit; excavation of soil by natural stratigraphic layer (or 10 cm. level within natural strata); screening of all soil sediments through 1/8" mesh screen; recovery of all cultural material (artifacts, midden, charcoal); one profile and stratigraphic description per unit; post excavation photographs; and reconstruction of test unit locale.

## Results

Survey of the flood control channel and the area to the east of the channel, indicated that this portion of the project area had been entirely mechanically altered. Mechanical alteration includes bulldozing, cut and fill, and channel embankment construction. Due to these modern alterations no archaeological sites exist within the channel or along the channel's embankment, including the area between the eastern embankment and the existing UH Hilo structures. The existing U.H. Hilo structures include dormitories and associated grounds (i.e., parking lot and landscaped areas).

West of the flood channel four rock clearance mounds and a rock wall were observed and plotted on the survey map (See Fig. 2). The mounds range in size from a

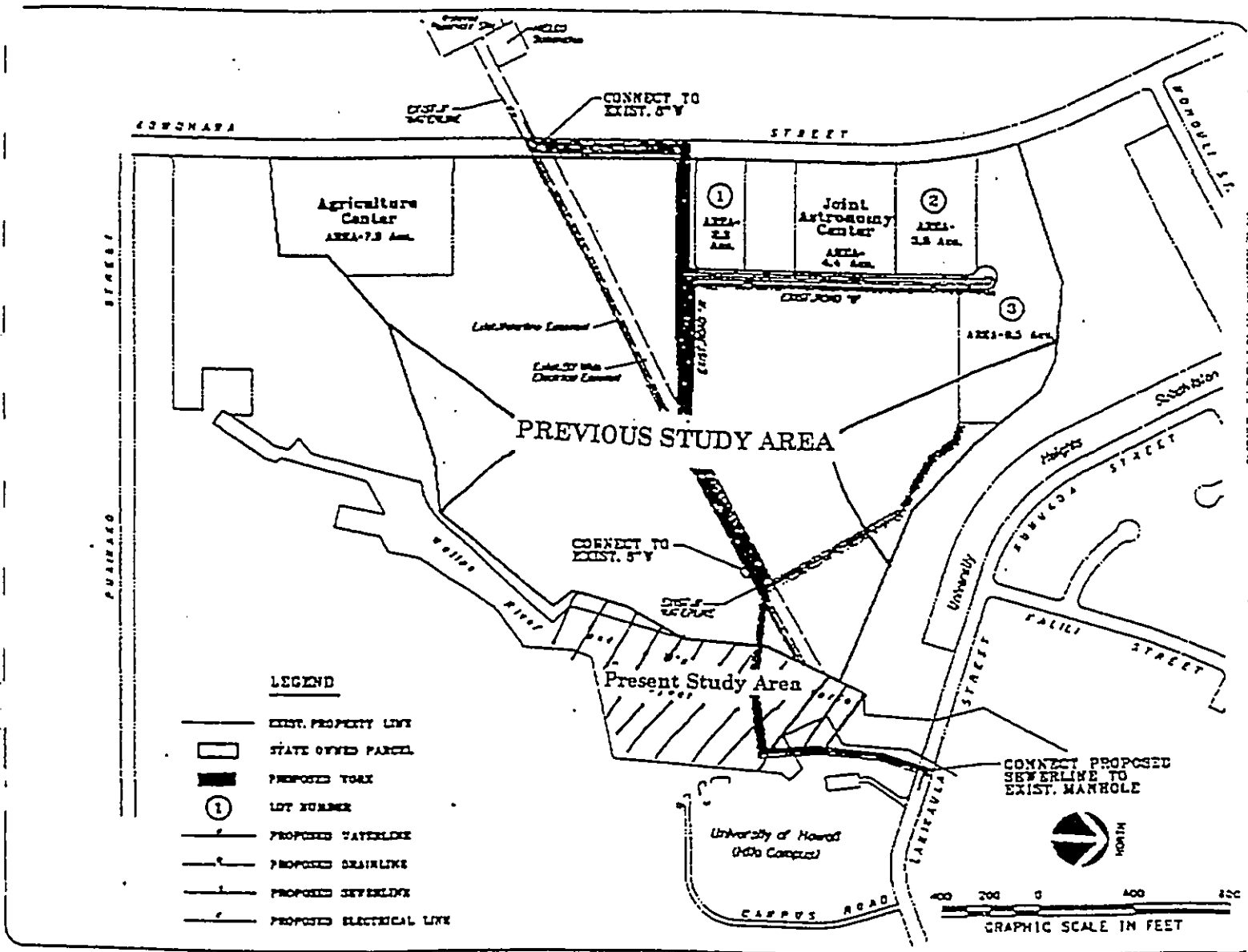


Fig. 1 Locational Map of University of Hawaii Hilo Proposed University Park, Showing Previous and Present Study Areas



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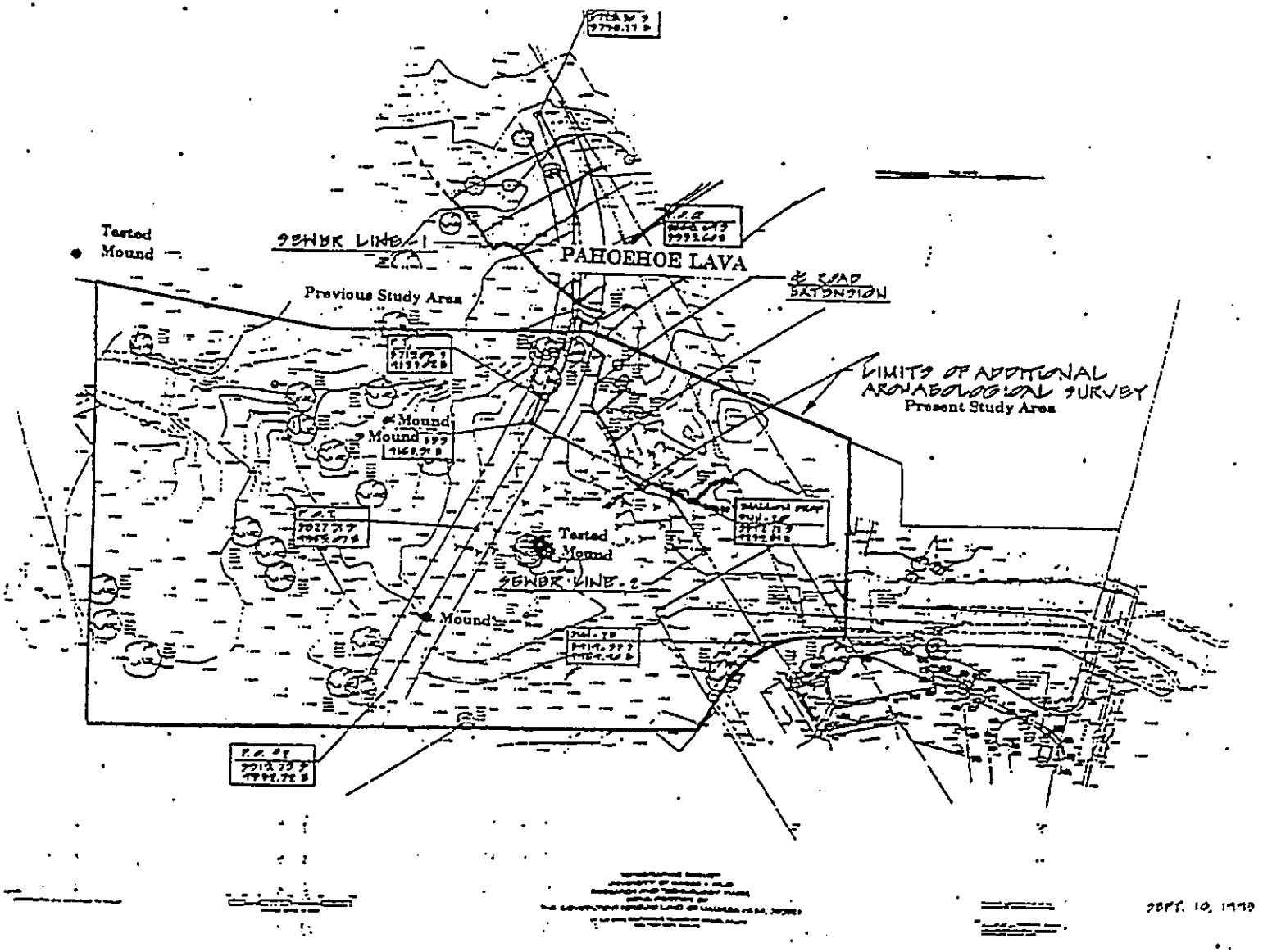


Fig. 2 Project Area Map Showing Archaeological Features

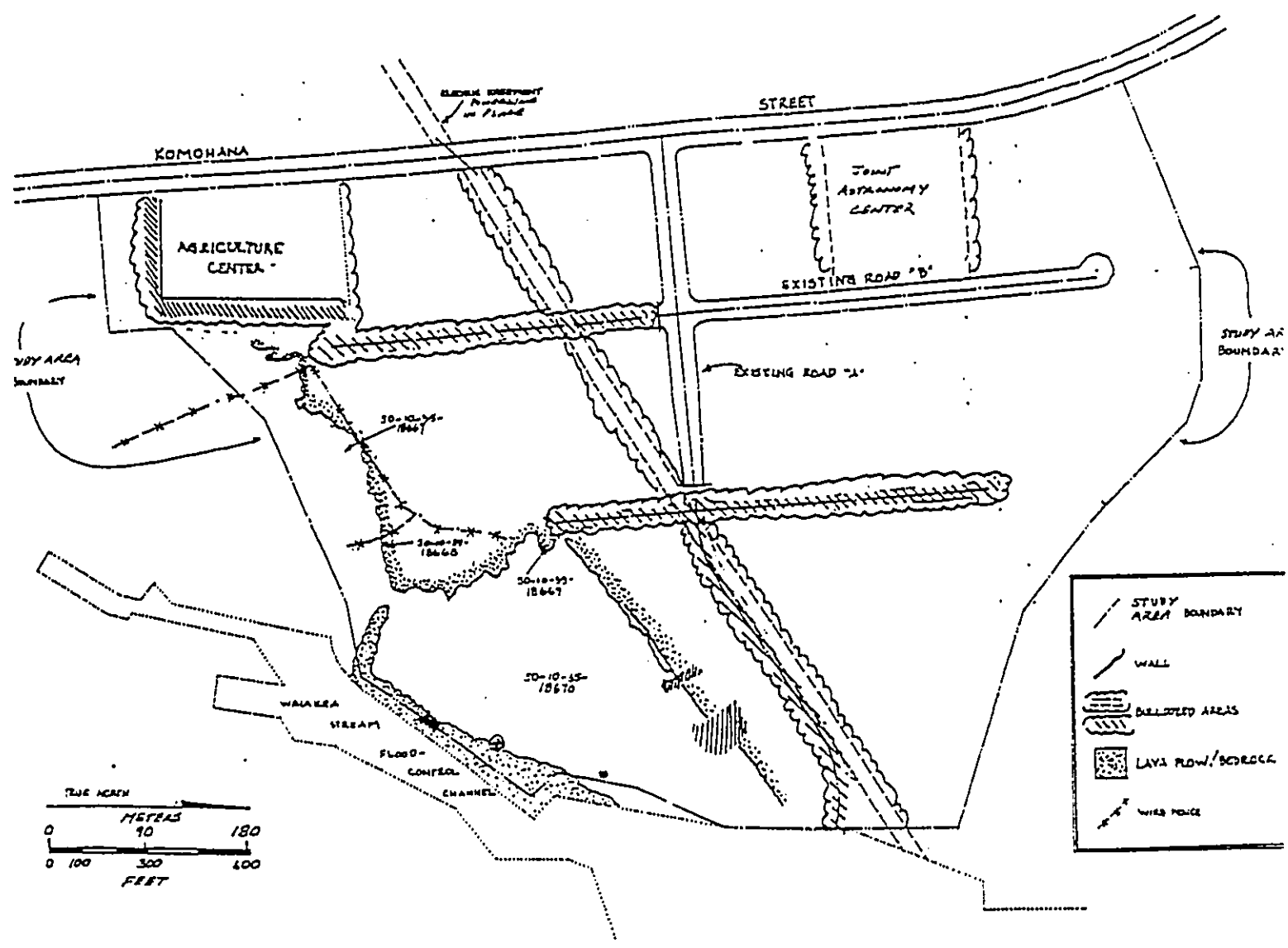


Fig. 3 Previous Study Area Map with Archaeological Sites (Borthwick et al. 1993:Fig. 8)

maximum of 5 meters by 10 meters to 2 meters by 6 meters. The mounds are constructed on high points (i.e., bedrock undulations) in the mostly soil terrain where former cane furrows are still visible. The wall observed, which is of mounded construction, is the *makai* extension of the wall noted and described previously (Borthwick *et al.* 1993:25-27, and 43) (See Fig. 3). The wall defines the interface between soil-mantled terrain to the south, which was formerly under commercial sugar cane cultivation and the non-cultivated soil-less pahoehoe terrain to the north. The wall varies greatly in condition and size throughout its length but averages 1.5 m. wide and .50 m. in height.

The largest, most visibly distinct of the four newly identified mounds, was mapped to scale (Fig. 4), photographed and subjected to limited surface testing. A 1 m. by 2 m. test unit was excavated into the roughly faced west edge of the mound. The excavation revealed a maximum thickness of rock construction of 50 cm. The construction was of loosely piled boulders, of fairly consistent size (15-25 cm. in diameter), with no filtered soil matrix. No cultural material (artifacts, midden, or charcoal) was present within the rock fill. Below the rock structure three soil stratigraphic layers (I, II and III) were encountered (Fig. 5). Stratum I was 2 to 4 cm. thick, and consists of very loose, very dark grayish brown (10YR 3/3) silt loam with a high percentage of organics (leaf litter). Stratum I represents the modern filtered forest litter postdating the mound's construction. Stratum II was a maximum of 25 cm. thick and consists of loose dark brown (7.5YR 3/2) silt loam with 5 to 10 percent rockiness. One fragment of volcanic glass (.9 grams) and a piece of *kukui* nut (.2 grams) were recovered from Stratum II. Stratigraphically, Stratum II represents a natural soil layer predating the construction of the mound, thus the volcanic glass and *kukui* nut fragments are not associated with construction and/or use of the mound. Stratum III consists of slightly compact rocky dark yellowish brown

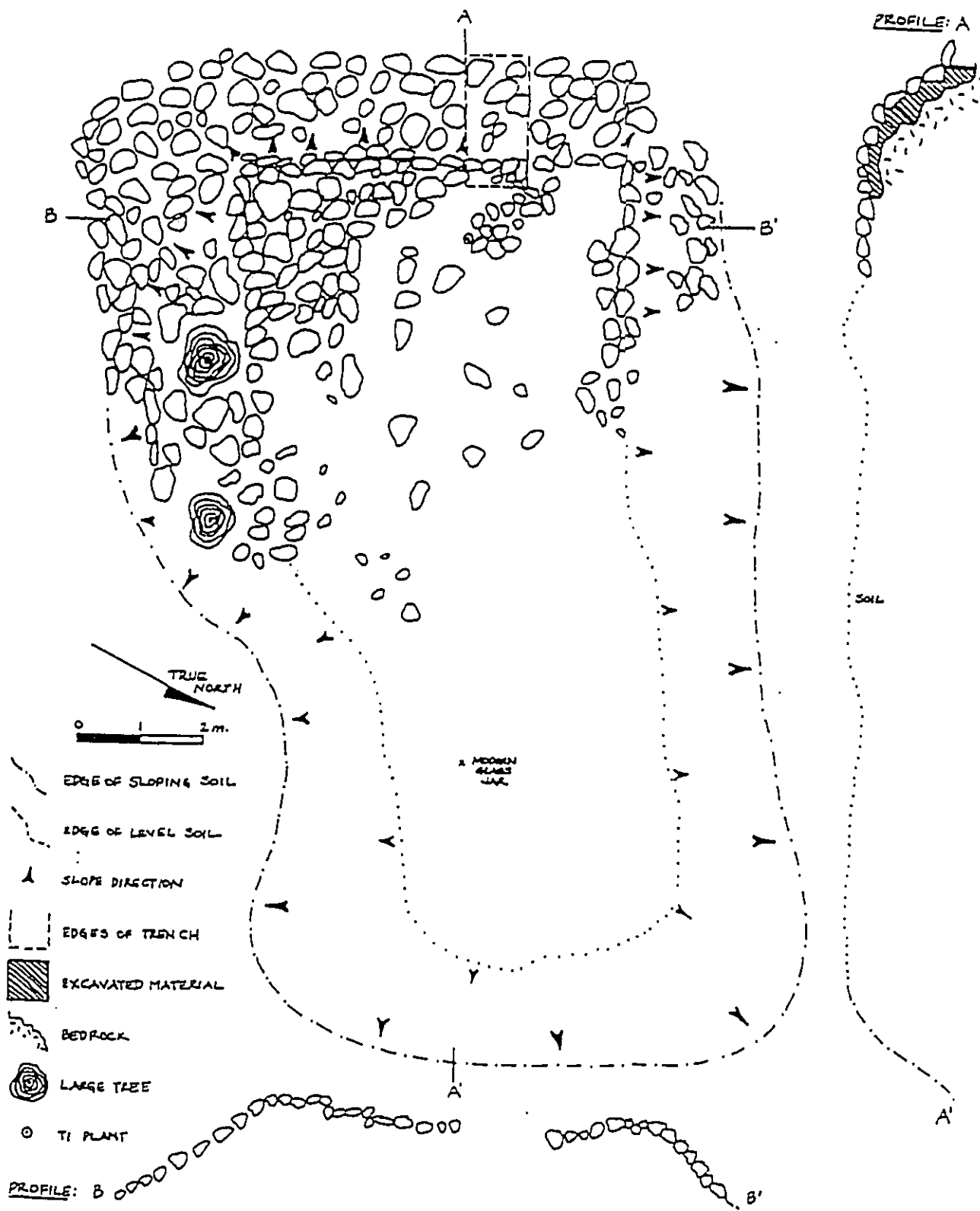


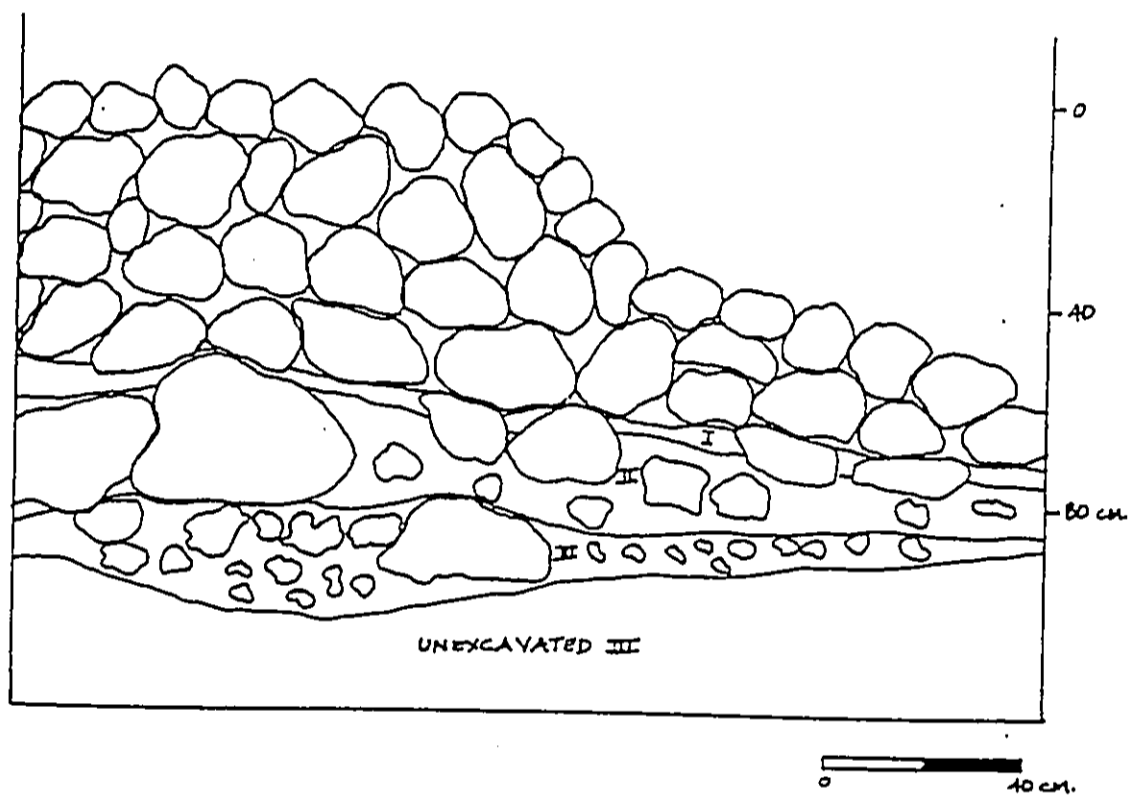
Fig. 4 Plan View and Cross Section of Tested Mound within Present Project Area, Feature of Site -18670

(10YR 3/6) silt loam. Stratum III represents the parent material soil layer or C Horizon which contains a high percentage of soft decomposing rock. No cultural material was within Stratum III.

The survey and testing within the present project area and previous background research for the Research and Technology Park (Borthwick *et al.* 1993:6-23) indicates that the features observed were associated with commercial sugar cane cultivation. Specifically, the features are situated within the former Waiakea Cane Lots (Portion of Lot #16). During the previous study a State Historic Site number (50-10-35-18670) was allotted for the cane lots' associated features within that specific project area (*ibid.*:39-42) (See Fig. 3). Since the four newly identified mounds were also associated with the same lot or sugar cane field we are including these features under the same State site number, 50-10-35-18670.

To further address functional interpretation, feature association, and sampling concerns, another mound within Site -18670 was subjected to sub-surface testing. The particular mound was chosen because of its size and location. The mound represents the largest, best defined stacked stone feature within Site -18670 boundaries (Fig. 6). The mound had been previously noted and drawn to scale (Borthwick *et al.* 1993:41,42), and accurately plotted on the study area map (*ibid.*, Figure 8:25) thus facilitating locational and feature type sampling choices as well as necessary field tasks (i.e., mapping and location).

A roughly 1.5 m. by 1.5 m. test unit was excavated into the southern side of the mound. The excavation revealed that the rock structure of the mound consists of a loose network of small boulders with no paving, no cultural material (i.e., midden or artifacts), and no filtered soil matrix. The mound is essentially sitting on top of underlying soil



STRATUM I: 4 CM. THICK; (10 YR 3/2) VERY DARK GRAYISH BROWN SILT LOAM; HIGH % ORGANICS; VERY LOOSE GRANULAR STRUCTURE; NO CULTURE

STRATUM II: 25 CM. THICK; (7.5 YR 3/2) DARK BROWN SILT LOAM; LOWER % ORGANICS; GRANULAR AND LOOSE; 5-10% ROCKS; ONE PIECE OF VOLCANIC GLASS AND ONE BURNT KUKUI SHELL

STRATUM III: 22 CM. THICK; (10 YR 3/6) DARK YELLOWISH BROWN SILT LOAM; "C HORIZON"; NO CULTURE.

Fig. 5 South Profile of Test Unit within Tested Mound in Present Project Area, Feature of Site -18670

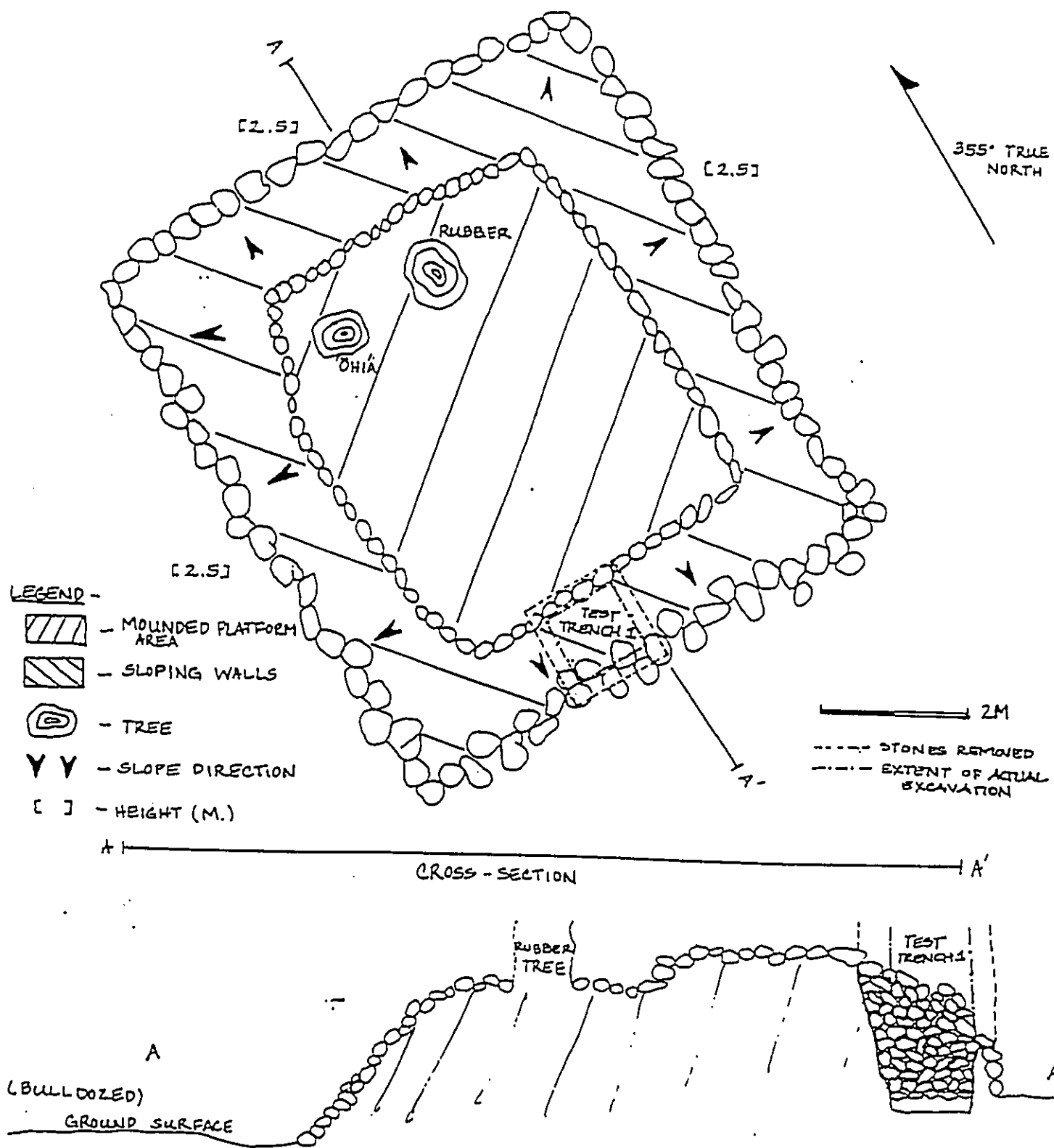


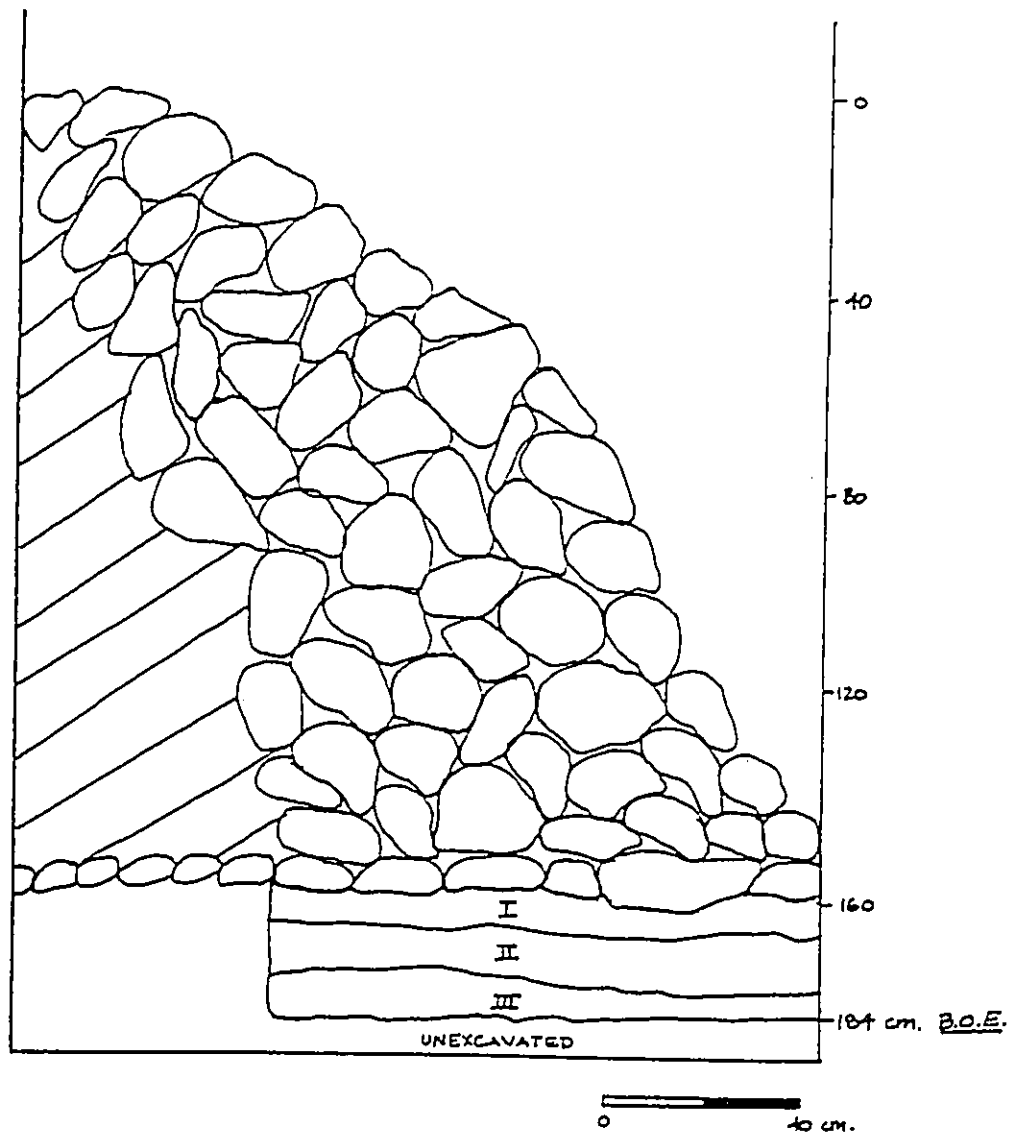
Fig. 6 Plan View and Cross Section of Tested Mound in Previous Study Area Portion of Site -18670 (Based on Figure 16 Borthwick *et al.*:42)

layers which, inclusive of the above-listed attributes, indicates the structure is relatively youthful age as there has not been sufficient time for soil to have filtered through the rocks and accumulated as a soil matrix within the mound. Additionally, the absence of cultural material and surface paving (pebble and/or coarse surface) argues against traditional Hawaiian usage (i.e. habitation and/or ritual).

Below the rock structure three soil stratigraphic layers (I, II and III) were encountered. No cultural material (midden, artifacts or charcoal) was within any of the strata which ranged from very dark brown (10YR 2/2) silty clay loam (Str. I) to dark yellowish brown (10YR 3/4) silty clay loam (Str. III). The degree of rockiness increased with depth ranging from 10% rockiness in Stratum I to a maximum of 40% in Stratum III. The soil layers clearly predate the construction of the mound and the profile represents natural *in situ* soil development (Fig. 7).

The sub-surface testing of this large mound did not reveal any evidence of traditional Hawaiian usage associated with the mound. The rock free, furrowed soil area surrounding the mound, construction style, and absence of cultural material indicate that the mound is a rock clearance feature associated with historic commercial sugar cane cultivation practices.





STRATUM I: 9 cm. THICK; (10 YR 2/2) VERY DARK BROWN SILTY CLAY LOAM TO SILT LOAM; 10% ROCKS

STRATUM II: 10 cm. THICK; (10 YR 3/2) VERY DARK GRAYISH BROWN SILTY CLAY LOAM; 10-20% ANGULAR PEBBLES

STRATUM III: 10+cm. THICK; (10 YR 8/4) DARK YELLOWISH BROWN SILTY CLAY LOAM; 20-40% ANGULAR PEBBLES; STRONG CRUMB STRUCTURE

Fig. 7 East Profile of Test Unit within Previously Located Mound, Site -18670

## SUMMARY AND RECOMMENDATIONS

The present project area includes four rock clearance features (mounds) and a portion of a stacked boulder wall. The features were constructed and maintained historically as part of Waiakea Mill Co.'s sugar cane operations. The construction and maintenance of the mounds and wall were done to increase the cultivatable soil area by removing rocks from the fields and piling them into mounds and/or along field edges (e.g., the wall).

The extremely sparse material collected from the roughly 3 square meters of excavation (1 volcanic glass fragment and 1 *kukui* nut fragment) precludes any meaningful analysis. Both items could be naturally occurring within Waiakea Flood Plain soils. The volcanic glass fragment has not been utilized as a tool, based on absence of edge wear and/or retouching, as well as the poor vesicular quality of the material. The burnt *kukui* nut fragment may indicate previous forest clearing. However, such an assumption (or any other) based on a single .2 gram fragment is tentative at best.

Research for the proposed Pu'ainako Street Extension (Hunt and McDermott 1993), which includes similar stacked stone features within the former Waiakea Cane Lots, also indicated commercial sugar cane-related construction and maintenance of the rock structures. Hunt and McDermott, after "compiling diverse lines of complimentary evidence," which included oral interviews, photographs, newspaper articles, historic map analysis, inventory survey, and sub-surface testing, conclude that "The archaeological structures documented in the inventory survey are plantation-era in origin dating to the late nineteenth and early twentieth" (*ibid.*:93, 94).

The same conclusions were reached independently for the structural features reported on in our original report (Borthwick *et al.* 1993) for the survey of the Research

and Technology Park. The four mounds and wall, noted during the present survey are component features of the furrowed field (portion former Cane Lot #16) given State Site number 50-10-35-18670 (*ibid*:39-42) and thus should be included under the same (-18670) site designation.

Site -18670 was preliminarily (Cultural Surveys Hawaii recommendation) assessed solely under Significance Criterion D (site may be likely to yield information important in prehistory or history) and we are recommending inclusion of the four newly identified mounds (wall is already part of -18670) under the same significance assessment. That is, we are still recommending Criterion D only for Site -18670 and that the four mounds become part of the site.

The present study has neither altered significance assessment nor the recommendations of the original survey, for no further archaeological work specific to Site -18670, inclusive of the four newly-identified mounds. Sufficient data has been collected, analyzed, and reported on to define age and functional interpretation of Site -18670. Therefore it is our opinion that no further archaeological work is necessary. These significance assessments and recommendations are consistent with those made previously, for Site -18670 and described previously in the main body of the report.

## REFERENCES

- Borthwick, Douglas F. and Hallett H. Hammatt  
1993 *Archaeological Survey and Testing of Lands Proposed for Research and Technology Lots at the University of Hawaii at Hilo (TMK 2-4-01:40 and 157)*, Cultural Surveys Hawaii, Kailua, Oahu.
- Hunt, Terry L. and Matthew McDermott  
1992 *Interim Report: Archaeological Inventory Survey Puainako Street Extension Project: Lands of Waiākea, Kukuau 1 and 2, and Pono Hawaii, South Hilo District, Island of Hawai'i.*

BENJAMIN J. CAYETANO  
GOVERNOR



GARY GILL  
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November 25, 1997

Kerwin Iwamoto  
University of Hawaii Institute for Astronomy  
Administrative Affairs  
200 W. Kawili Street  
Hilo HI 96720

Attn: Lo-Li Chih

Subject: Draft Environmental Assessment (EA) for Institute for Astronomy at  
Hilo; TMK: 2-4-1: por. 7

Dear Mr. Iwamoto:

We have the following comments to offer:

1. Contacts: Notify the nearest neighbors or neighboring landowners of the proposed project, allowing them sufficient time to review the draft EA and submit comments. Document all contacts in the final EA and include copies of any correspondence.
2. Funding: The total project cost is given at \$9.6 million, but the source of the funding is not mentioned. If any state or county funds are involved they must be disclosed.
3. Permits and approvals: List all required permits and approvals for this project and their status.
4. Figure 1 needs to have the project site indicated on it.
5. Significance criteria: Chapter 10, *Determination*, analyzes the project according to the significance criteria. However, three criteria were not covered. In the final EA analyze the impacts of the project according to the following criteria:

APPENDIX E

Kerwin Iwamoto  
November 25, 1997  
Page 2

- #4 Substantially affects the economic or social welfare of the community or State;
- #5 Substantially affects public health;
- #8 Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

If you have any questions call Nancy Heinrich at 586-4185.

Sincerely,



GARY GILL  
Director

c: Sidney Fuke

## SidneyFuke&Associates

100 Pepee Street, Suite 212 • Hilo, Hawaii 96720  
Telephone: (808) 969-1522 • Fax: (808) 968-7998

Consulting Land Use Planners

December 22, 1997

Mr. Gary Gill, Director  
Office of Environmental Quality Control  
STATE OF HAWAII  
215 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Dear Mr. Gill:


SUBJECT: Draft Environmental Assessment (EA) for Institute for Astronomy  
at Hilo, IMK 2-4-1, pgs. 7

Thank you very much for your comments on the subject matter. I appreciate your inputs.

As a result of your comments, I have solicited comments from the adjoining properties (see attached letters), and to date none have responded. I further clarified the source of funding (which is the State of Hawaii); included a list of the permits required and their status, as well as expanded on the Significance Criteria section. I have attached a copy of pertinent sections of the final EA relating to these matters for your use and information.

Again, many thanks for your inputs!

Sincerely,

  
SIDNEY M. FUKE  
Planning Consultant

enclosure  
cc Dr. Robert McClaren w/ enclosure

## SidneyFuke&Associates

100 Pauahi Street, Suite 212 • Hilo, Hawaii 96720  
Telephone: (808) 969-1522 • Fax: (808) 969-7996

Consulting Land Use Planners

December 2, 1997

Mr. Richard Chamberlin, Manager  
CalTech Submillimeter Observatory  
111 Nowelu Street  
Hilo, Hawaii 96720

Dear Mr. Chamberlin:

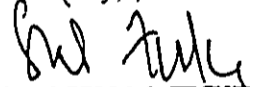
RE: Draft Environmental Assessment - Proposed University of Hawaii's  
Institute for Astronomy's Facility

As you may know, the University of Hawaii Institute for Astronomy is proposing to construct its base facility and related improvements at the end of Aohoku Place, near your projects. Like your facility, there was a requirement to have an Environmental Assessment.

A draft of the Environmental Assessment for the IfA's facility was recently completed by this office. For your information, I am enclosing a copy of the notice that appeared in the Office of Environmental Quality bulletin which summarizes the proposed project. I am also enclosing pertinent maps and plans of the project for your information.

If you have any comments on this project, I would appreciate your sending them to me before December 12. Further, if you need additional information, please feel free to contact me.

Thank you very much.

Sincerely,  
  
SIDNEY M. FUKU  
Planning Consultant

enclosure

APPENDIX E-1



## Sidney Fuke & Associates

100 Pauahi Street, Suite 212 • Hilo, Hawaii 96720  
Telephone: (808) 969-1522 • Fax: (808) 969-7996

Consulting Land Use Planners

December 2, 1997

Mr. Steve Hardash  
Gemini 8-Meter Telescope Project  
660 N. Aohoku Street  
Hilo, Hawaii 96720

Dear Mr. Hardash:

RE: Draft Environmental Assessment - Proposed University of Hawaii's  
Institute for Astronomy's Facility

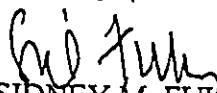
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Thank you very much.

Sincerely, ...

  
SIDNEY M. FUKU  
Planning Consultant

enclosure

## SidneyFuke&Associates

100 Pauahi Street, Suite 212 • Hilo, Hawaii 96720  
Telephone: (808) 969-1522 • Fax: (808) 969-7996

Consulting Land Use Planners

December 2, 1997

Mr. Ian Robson, Director  
Joint Astronomy Centre  
660 N. Aohuku Street  
Hilo, Hawaii 96720

Dear Mr. Robson:

RE: Draft Environmental Assessment - Proposed University of Hawaii's  
Institute for Astronomy's Facility

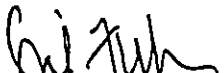
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Sincerely, ...

  
SIDNEY M. FUKÉ  
Planning Consultant

enclosure

## Sidney Fuke & Associates

100 Pauahi Street, Suite 212 • Hilo, Hawaii 96720  
Telephone: (808) 969-1522 • Fax: (808) 969-7996

Consulting Land Use Planners

December 2, 1997

Mr. Norio Kaifu, Director's Office  
National Astronomical Observatory of Japan  
650 N. Aohoku Street  
Hilo, Hawaii 96720

Dear Mr. Kaifu:

RE: Draft Environmental Assessment - Proposed University of Hawaii's  
Institute for Astronomy's Facility

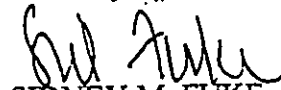
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Sincerely,



SIDNEY M. FUKU  
Planning Consultant

enclosure