

Univ. Park Gemini-8  
Meter Telescope



UNIVERSITY  
OF HAWAII  
HILO

April 9, 1997

RECEIVED

'97 APR 11 P1:37

OFFICE OF ENVIRONMENTAL  
QUALITY CONTROL

Mr. Gary Gill, Director  
Office of Environmental Quality Control  
235 South Beretania Street, Room 702  
Honolulu, HI 96813-2437

Dear Mr. Gill

Re: Negative Declaration - Proposed Base Facility at University Park  
of Gemini North 8-Meter Telescope for the Association  
of Universities for Research in Technology  
TMK: (3) 2-4-01: Portion of 7, South Hilo, Island of Hawaii

We have received only one comment regarding the subject matter. This was a letter from the Office of Hawaiian Affairs asking that the document reflect the fact that the subject site is ceded land. The comment was incorporated into the EA.

As such, the University of Hawaii at Hilo has determined that this project will not have significant environmental effect and has issued a Negative Declaration. Please publish this notice in the May 8, 1997 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four (4) copies of the Final EA.

Should you have any questions, please feel free to contact me at ext. 47595.

Sincerely,

Lo-Li Chih  
UH Registered Architect I

encl

CC: Interim Chancellor Pearman  
Director DeMello  
Steve Hardash  
Sidney M. Fuke

*Facilities Planning & Construction*

200 W. KAWILI STREET  
HILO, HAWAII 96720-4091  
PHONE: (808) 974-7595  
FAX: (808) 974-7609

An Equal Opportunity/Affirmative Action Institution

49

1997-04-23-HI- FEA- University Park

Gemini-8 Meter Telescope

APR 23 1997

FILE COPY

**FINAL ENVIRONMENTAL ASSESSMENT**

**FOR THE PROPOSED**

**HILO BASE FACILITY OF THE GEMINI NORTH 8-METER TELESCOPE**

**BY**

**ASSOCIATION OF UNIVERSITIES FOR RESEARCH IN ASTRONOMY (AURA)**

**WAIAKEA, SOUTH HILO, HAWAII  
TAX MAP KEY (3) 2-4-01: PORTION OF 7**

**This document is prepared pursuant to Chapter 343, HRS**

**PROPOSING AGENCY:**

**University of Hawai'i at Hilo  
Office of the Chancellor  
200 W. Kawili Street  
Hilo, Hawai'i 96720**

**PREPARED BY:**

**Sidney Fuke, Planning Consultant  
100 Pauahi Street, Suite 212  
Hilo, Hawai'i 96720**

**April 1997**

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- Appendix A - Botanical Survey, University of Hawai'i - Hilo, Proposed Infrastructure for Research and Technology Lots, South Hilo District, Island of Hawai'i, by Char & Associates, December 1992
- Appendix B - 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, April 1993; Revised Nov 1993
- Appendix C - Supplemental Archaeological Survey and Testing of the Proposed University of Hawaii at Hilo Expansion Area, by Cultural Surveys, Nov 1993
- Appendix D - Letter, dated March 21, 1997, from the State Office of Hawaiian Affairs to Sidney Fuke and Associates and response letter from Sidney Fuke and Associates, dated April 9, 1997, to the State Office of Hawaiian Affairs

## INTRODUCTION

### 1.1 Applicant

The applicant, Association of Universities for Research in Astronomy, (hereinafter, AURA), is the developer and operator of the Gemini North 8-Meter telescope on the summit of Mauna Kea under a cooperative agreement with the U.S. National Science Foundation (NSF). In conjunction with that project, AURA is also proposing to construct its astronomy base facility, with related improvements, on 2+ acres of land at the University of Hawai'i at Hilo's Research and Technology Park. This park is located in the city of Hilo.

The Gemini North 8-Meter telescope is presently under construction on the summit of Mauna Kea with funding from the governments of the United States, United Kingdom, Canada, Chile, Argentina, and Brazil. The proposed base facility will provide the necessary space for technical and clerical support staff for the project.

An Environmental Assessment (EA) is required as the proposed action involves the use of State land which is leased to the University. Further, pursuant to the National Environmental Policy Act (NEPA), an EA is required whenever an agency proposes an action. The National Science Foundation (NSF) is proposing to partially fund the Gemini North 8-Meter telescope project on the island of Hawaii. The telescope will be located on the summit of Mauna Kea and the project's base facility will be located in Hilo. In this particular instance, the EA is ONLY for the construction of the base facility.

This Draft EA (DEA) is being prepared pursuant to the requirements of Chapter 343, Hawaii Revised Statutes, relating to Environmental Impact Statement (EIS) and Title 40, Chapter V, Part 1500 to 1508 of the National Environmental Policy Act (NEPA) and their associated rules.

### 1.2 Approving Agency

The approving agencies of the EA are the University of Hawai'i at Hilo for the State EIS process

and the National Science Foundation for the NEPA process.

### 1.3 Agencies Consulted

As the document will be published for public review and comment in the State Office of Environmental Quality Commission's (OEQC) bulletin, public and additional agency comments have been incorporated in the Final EA. In the preparation of this draft Environmental Assessment, however, the following agencies were consulted:

- \* State
  - Department of Land & Natural Resources
  - Department of Transportation, Highways
  - University of Hawai'i at Hilo
  
- \* County
  - Planning Department
  - Public Works Department
  - Department of Water Supply

## 2. DESCRIPTION OF PROPOSED ACTION

### 2.1 Location and Ownership

The proposed area is located in Waiakea, District of South Hilo, Hawai'i, Tax Map Key: (3) 2-4-01: portion of 7. It consists of a 2+ acre portion of a 202.736 acre parcel. Held in trust by the State of Hawaii, the entire parcel which is ceded land, is leased and use by the University of Hawaii at Hilo.

The subject parcel is located along the east side of Komohana Street, generally between Puainako and Mohouli Streets, and west of the University of Hawai'i complex. The specific location of the proposed improvements is along North Aohoku Place, between the base facilities of California Institute of Technology (CALTECH) and the Joint Astronomy Centre (Figure 1). North Aohoku Place intersects with Nowela Street, which in turn intersects with Komohana Street.

It should be noted that there is a discrepancy relative to the size of the total acreage of parcel 7. According to the files at the Planning Department (Figure 2), a consolidation and resubdivision action

Water Reservoir Site  
HECO Substation

SUBJECT PARCEL

TAX MAP KEY 2-3-01: POR 7

KOMOHANA STREET

AGRICULTURE CENTER

NOWELA ST  
EXIST. ROAD 'N'

CAL-TECH

JOINT ASTRONOMY CENTRE

SUBARU

EXIST. ROAD 'E' N. AOHOKU PT

URBAN

Exist. Waterline Easement

Exist. 50' Wide Electrical Easement

URBAN

PUAINAKO STREET

Wailoo River

115  
115  
Flood Control Project Tributaries

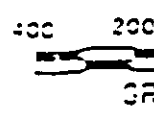
University

STREET

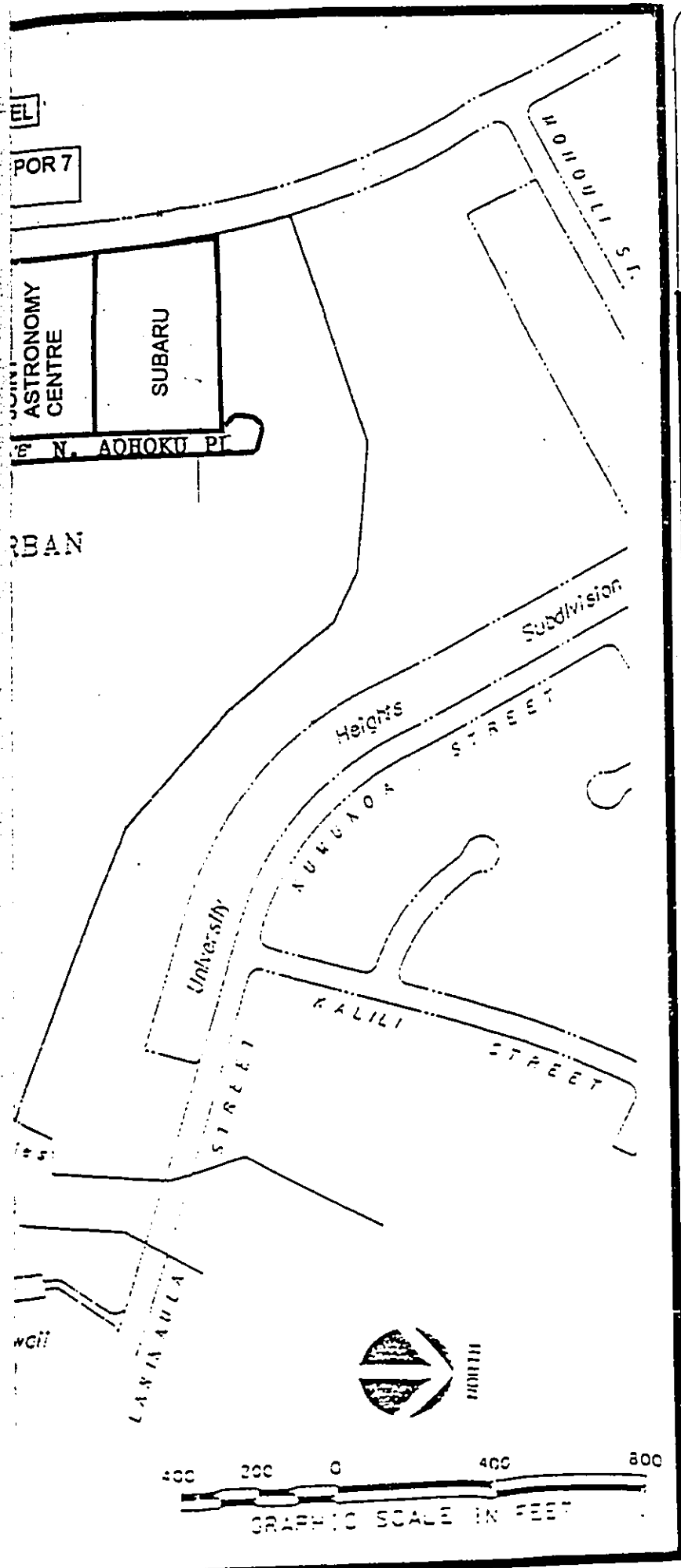
LEGEND

- EXIST. PROPERTY LINE
- ▭ STATE OWNED PARCEL

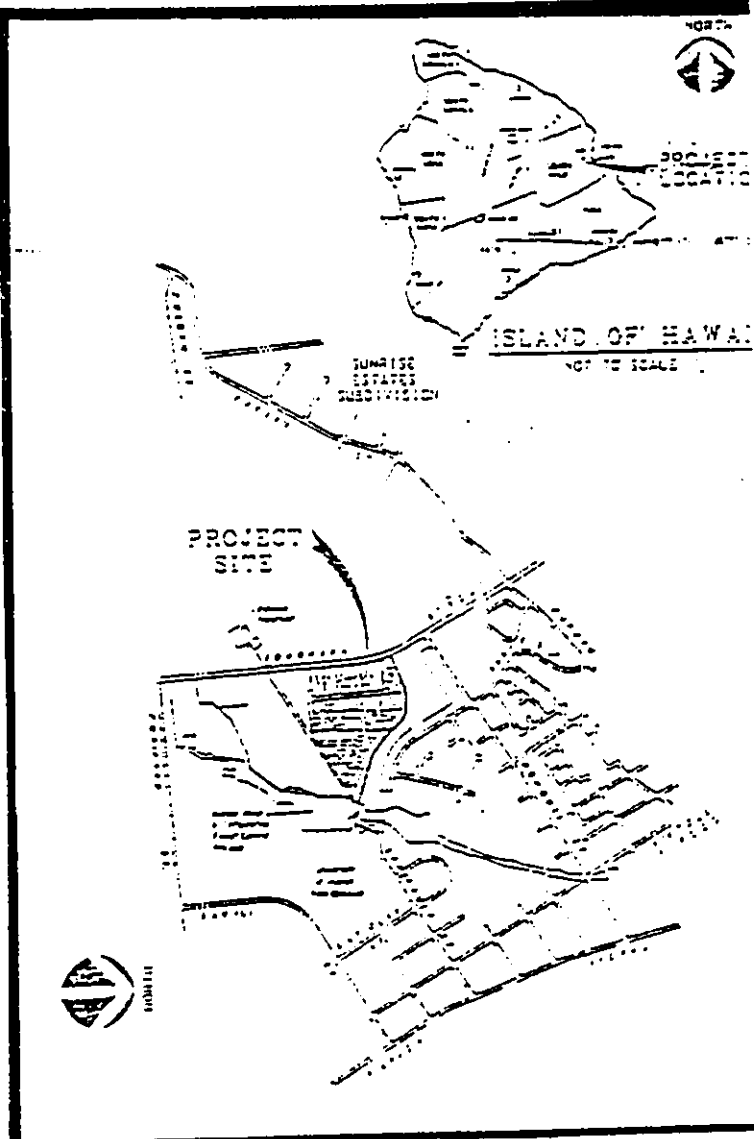
University of Hawaii  
(Hilo Campus)





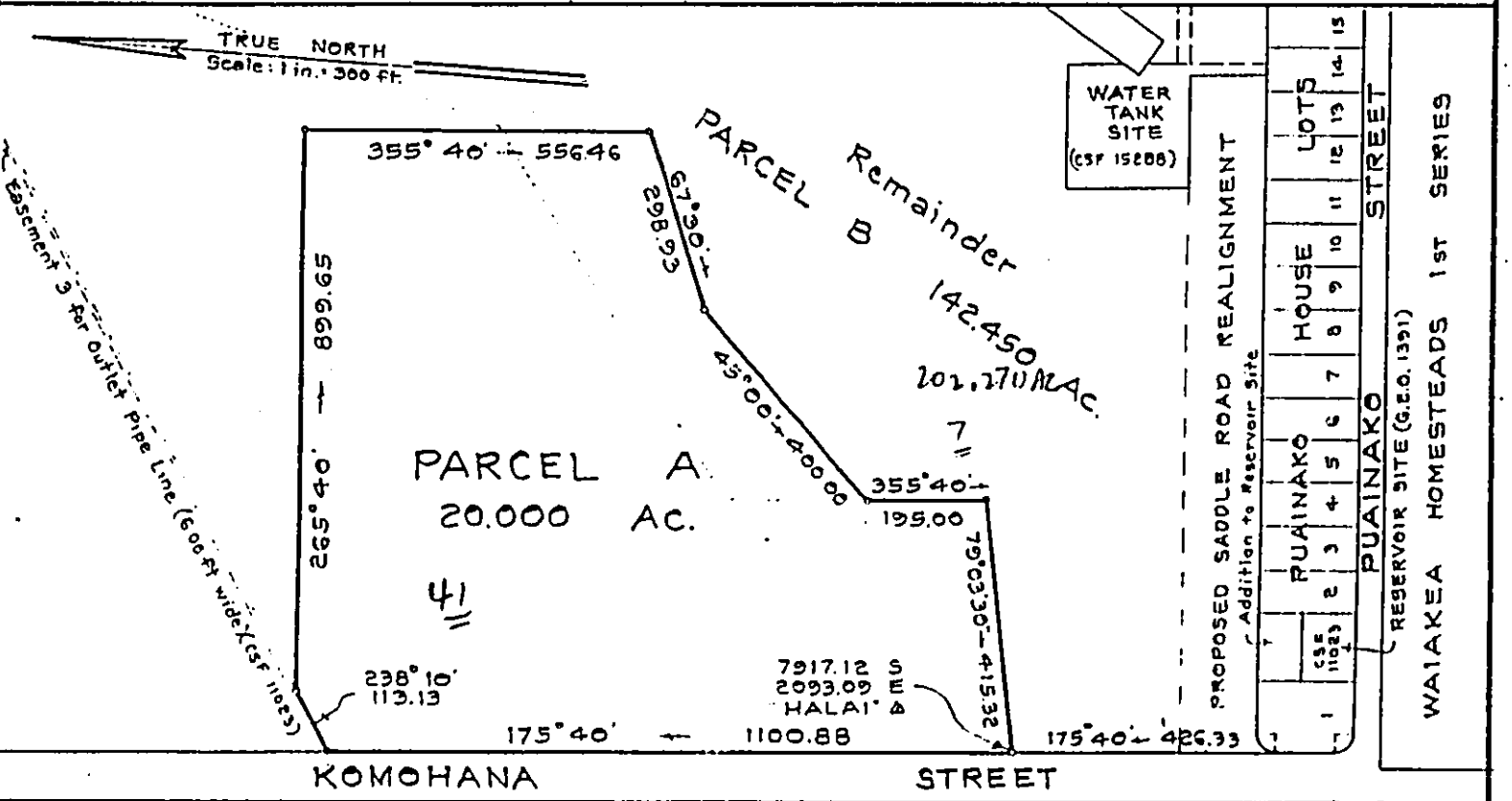
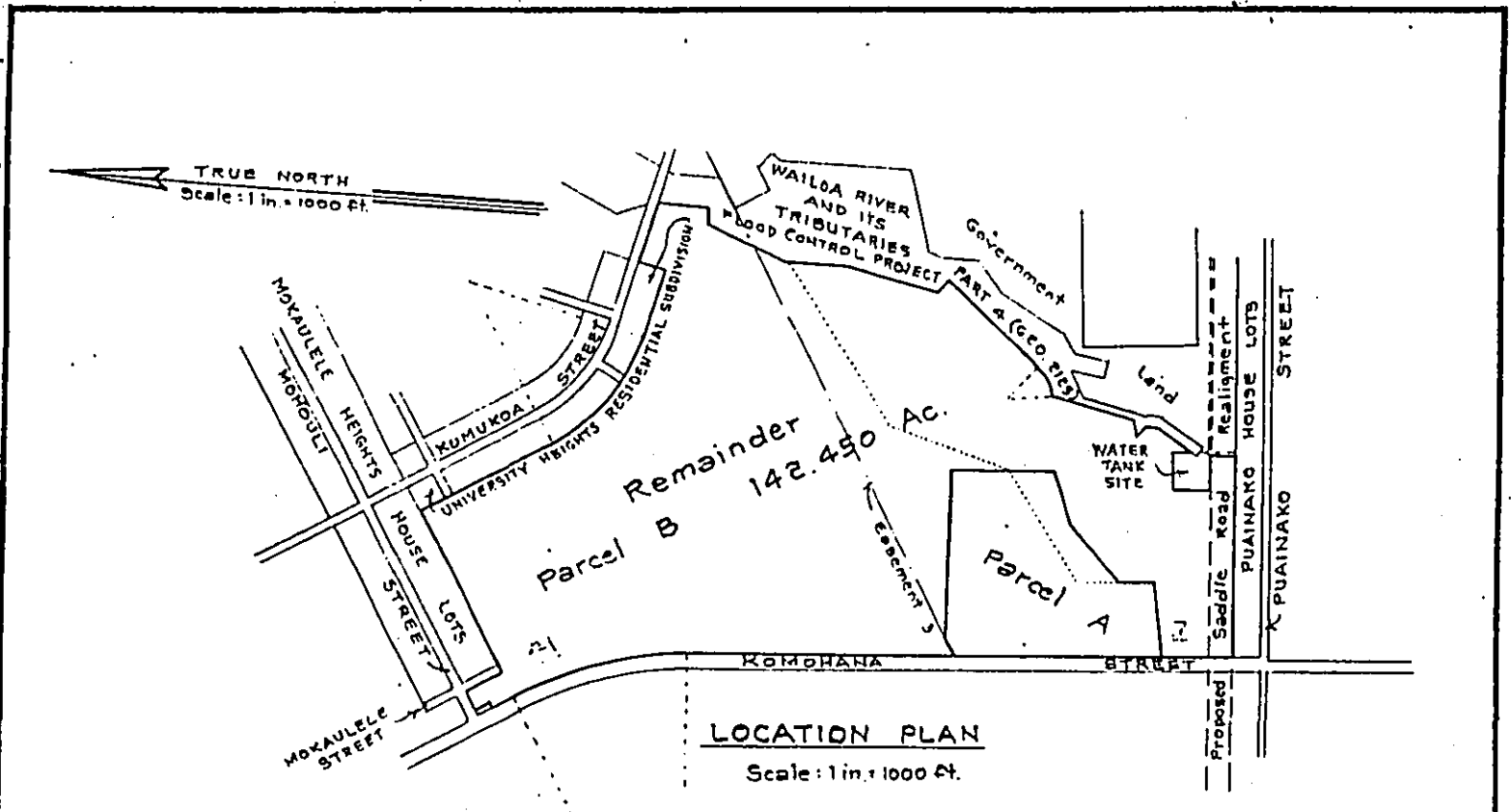


Prepared By:  
**ENGINEERING  
 CONCEPTS, INC.**  
 Honolulu, Hawaii



**GEMINI  
 8-METER  
 TELESCOPE  
 PROJECT**

**FIGURE 1**



Plan Showing  
 Consolidation of Parcels 7 and 41 of Tax Map Key 2-4-01  
 and Resubdivision of said Consolidation  
 Into Parcels A and B  
 Waiakea, South Hilo, Island of Hawaii, Hawaii  
 Scale: 1 inch = 300 feet



*Ichiro Sakamoto*  
 1151 Punchbowl Street  
 Room 210  
 Honolulu, Hawaii 96819

JOB H-8000  
 C. BK

State of Hawaii - Owner  
 Portions of Tax Map Key 2-4-01: 7 and 41

TAX MAP SURVEY DIVISION DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES STATE OF HAWAII

C. S. F. No. 15 February 3, 1977

FIGURE 2

resulted in the creation of two parcels, a 20.0 acre parcel (parcel 41) and the remaining parcel (parcel 7). This occurred on June 16, 1977, file number 3965.

In the consolidation/resubdivision action of the entire parcel, parcel 7 was identified as consisting of an area of 142.450 acres. The current tax map, however, shows a parcel consisting of approximately 202.763 acres, with two lots. One of the lots consists of 152.5 acres, and the other has 36.08 acres (Figure 3).

In an Environmental Assessment prepared in 1993 for the proposed infrastructural improvements of this parcel, the area was described as having 116 acres.

For this EA, however, it will be assumed that the area of the entire parcel is 202.76 acres, consistent with the existing tax maps. Further, this EA will cover only the 2+ acre portion of the entire parcel for the proposed Gemini astronomy base facility.

As noted earlier, the property is ceded land and is held in trust by the State of Hawaii. It is leased to the UH-H for a research and technology park. The Joint Astronomy Centre and the CALTECH base facility are located adjacent to the proposed facility. The National Astronomy Observatory of Japan's (NAOJ) base facility for the Subaru telescope is located adjacent and to the north of the Joint Astronomy Centre, while the University Agriculture Center is located further south on the same parcel.

As noted previously, funding for the telescope is being provided by the governments of the United States, United Kingdom, Canada, Chile, Argentina, and Brazil. The U. S. National Science Foundation, acting as the executive agency for the project, has entered into a cooperative agreement with AURA for the operation of the Gemini Project and is providing 50% of the funding for this project.

## 2.2 Existing Uses

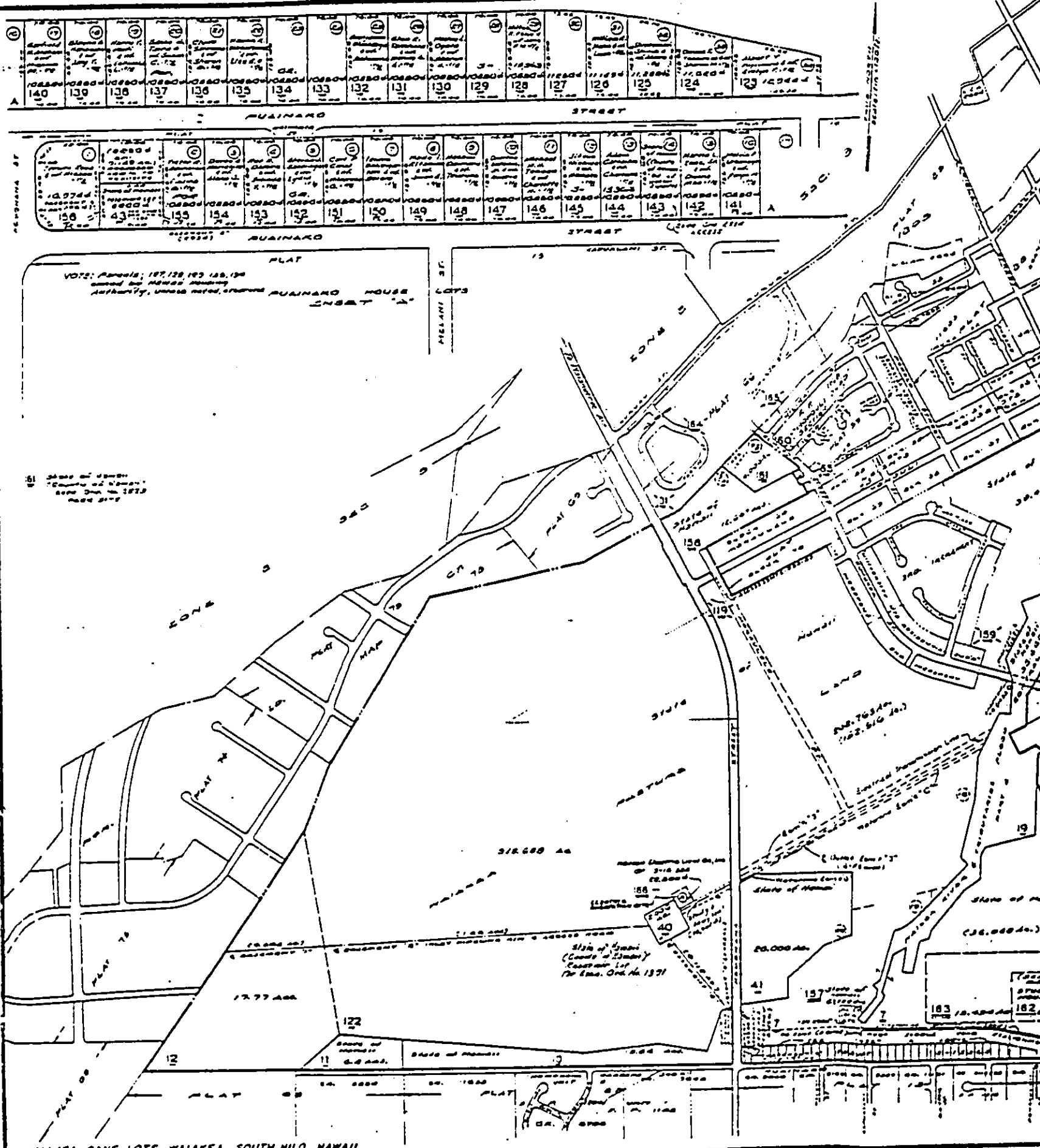
The subject area is currently vacant of any structures. The topography is fairly level, with less than a 10% change in elevation, running in a westerly to easterly direction. Ohia-uluhe and an introduced

140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123
156	155	154	153	152	151	150	149	148	147	146	145	144	143	142	141	140	139

PLAT  
 VOTS: 187, 128, 123, 120, 124  
 issued by Hawaii Building  
 Authority, unless noted, created BUAINARD HOUSE  
 INSET "A"

51 State of Hawaii  
 County of Honolulu  
 Date Dec. 1972  
 Page 207

MEMO CITY ENGINEER TO COMMISSIONER, 1967  
 12445 For more reason  
 BILL HARVEY, COMMISSIONER, 1967



WAIAKAA CANE LOTS, WAIAKAA, SOUTH HILO, HAWAII

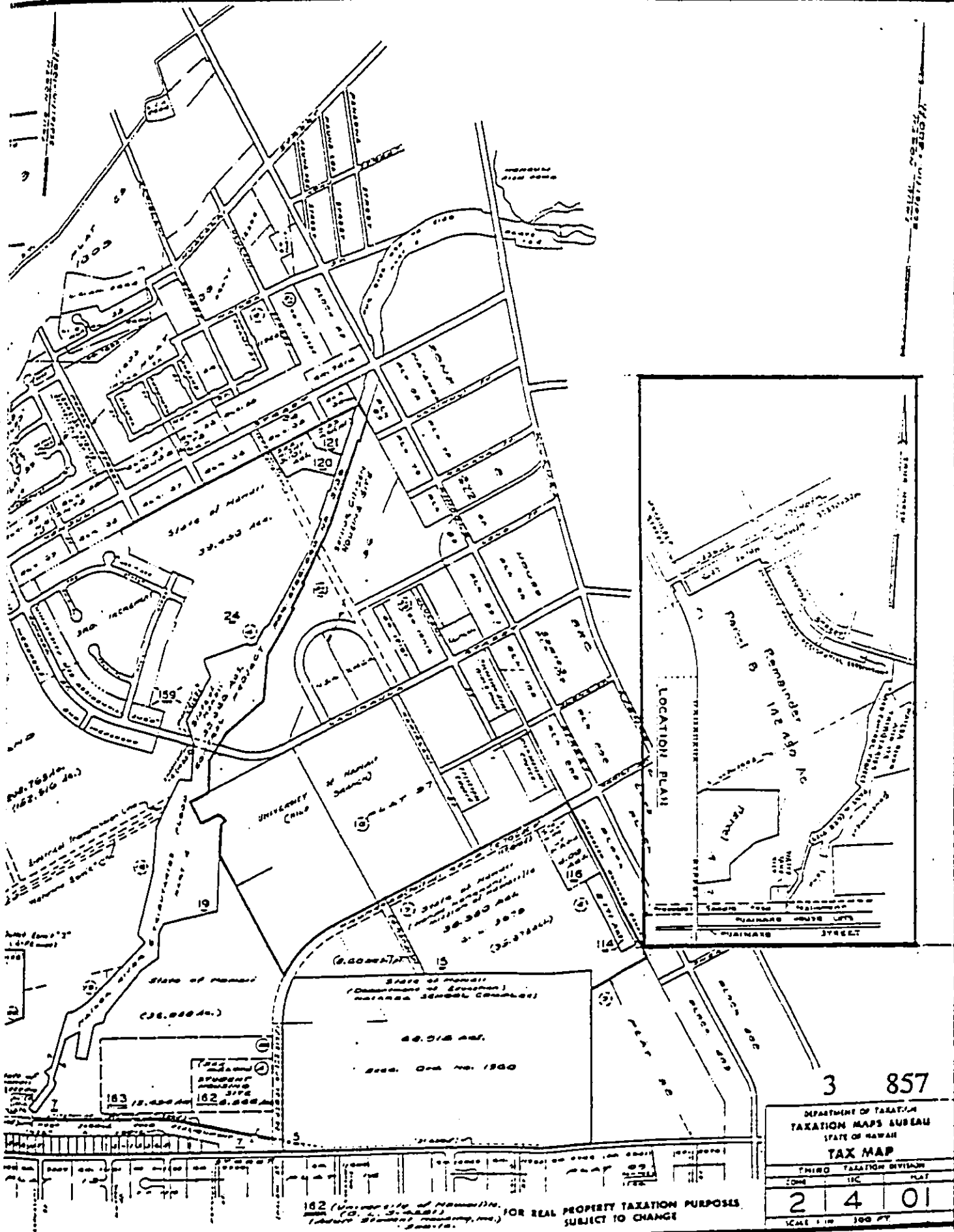


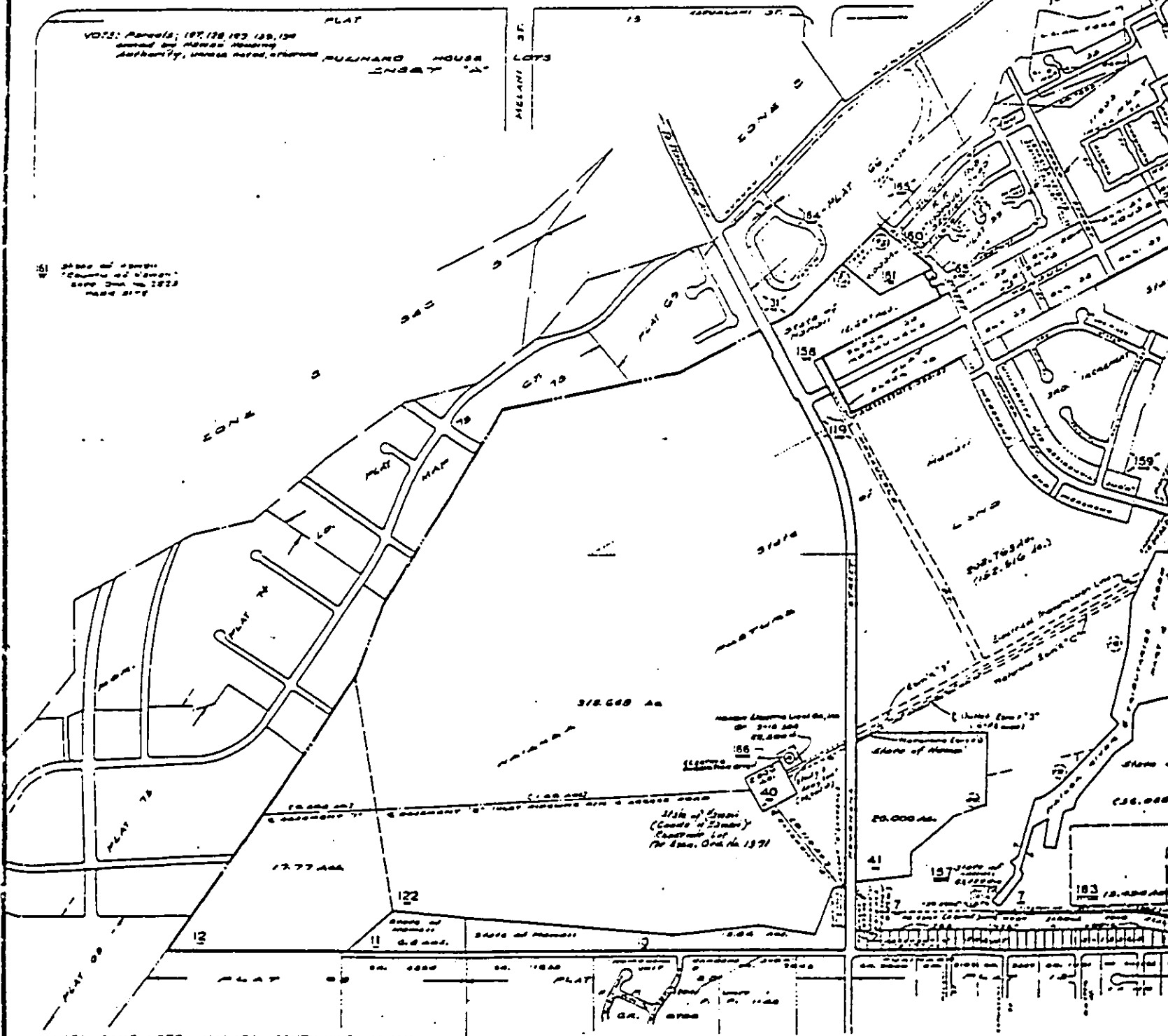
FIGURE 3

# CORRECTION

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

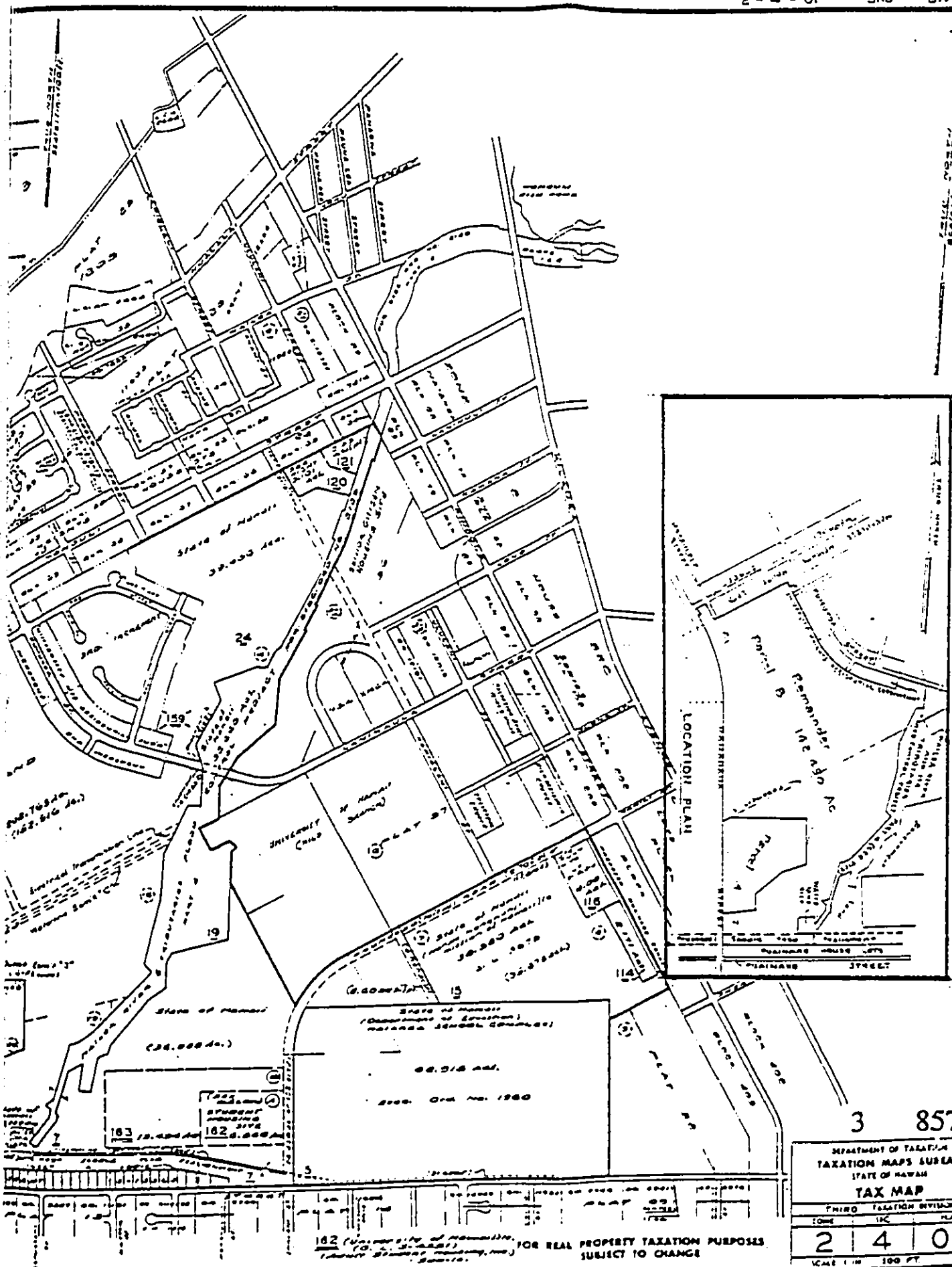
140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
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156	155	154	153	152	151	150	149	148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
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ENGINEERED BY  
 HAWAIIAN ENGINEERING CO.  
 1111 KALANIAN'OLUHANA ST.  
 HONOLULU, HAWAII

WAIAKEA CANE LOTS, WAIAKEA, SOUTH HILO, HAWAII



3 857

DEPARTMENT OF TAXATION  
TAXATION MAPS BUREAU  
STATE OF HAWAII

TAX MAP

THIRD	TAXATION DIVISION
2	4 01

SCALE 1" = 100 FT.

FOR REAL PROPERTY TAXATION PURPOSES  
SUBJECT TO CHANGE

FIGURE 3



mixed forest material dominate the property, as well as the nearby properties.

Surrounding land uses include the CALTECH base facility to the south and the existing Joint Astronomy Centre and the NAOJ facility sites to the north; vacant State-owned lands west of Komohana Street; the University Agriculture Center generally to the south (Puna) side of the proposed site; and the University complex east of the site.

### 2.3 Project Description

#### 2.3.1 Historical Description

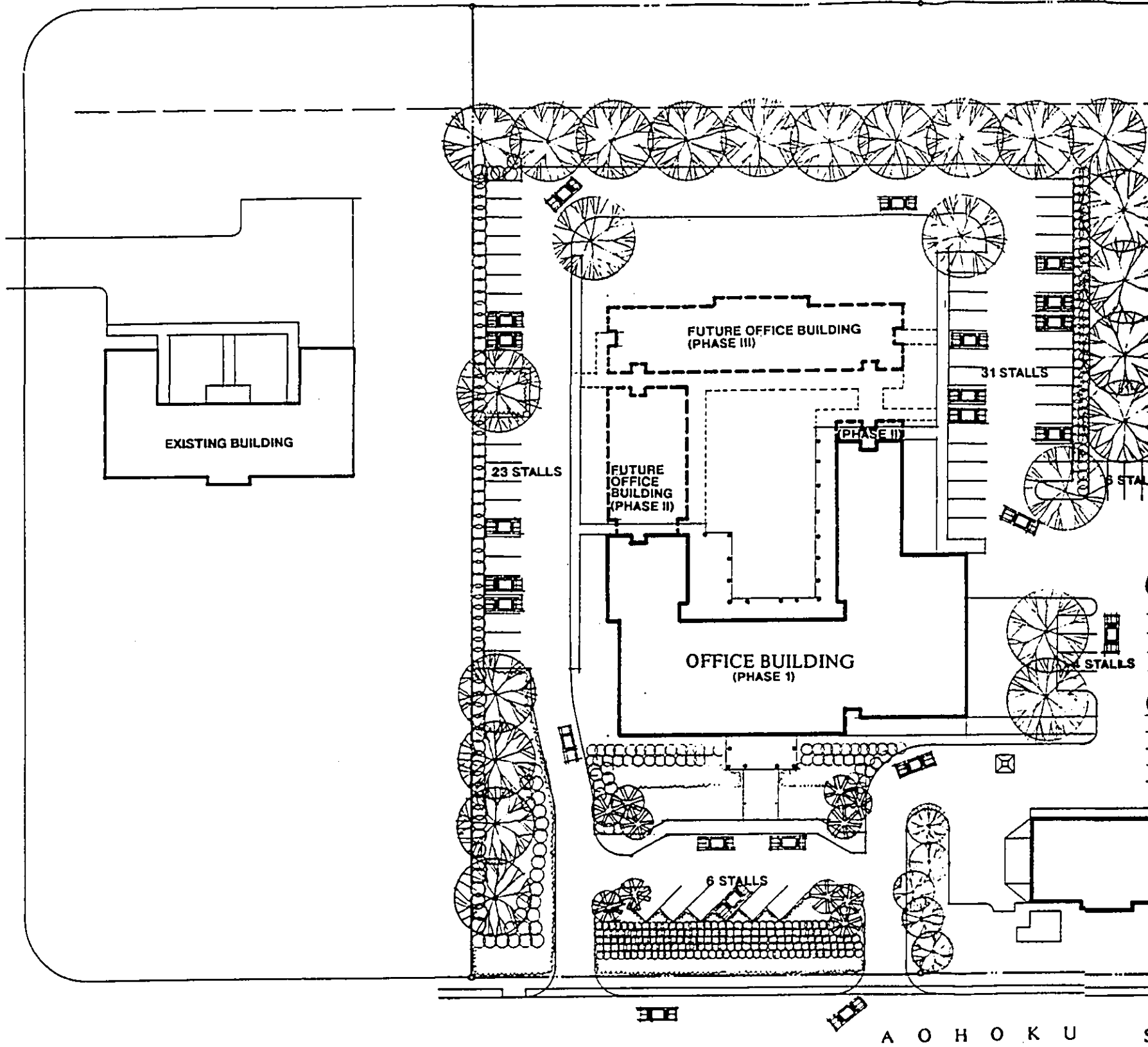
The proposed site is currently vacant. Its historical use has been associated with agricultural uses, sugar cane field or pasture.

An Environmental Assessment of the subject site and balance of the parcel was prepared in November 1993. This was for the construction of the infrastructure (road, water, etc.) of this area of the University research park. A botanical survey, an archaeological survey, and a supplemental archaeological survey covering the subject area were conducted in 1992 and 1993 in conjunction with that assessment.

#### 2.3.2 Physical Characteristics and Proposed Construction

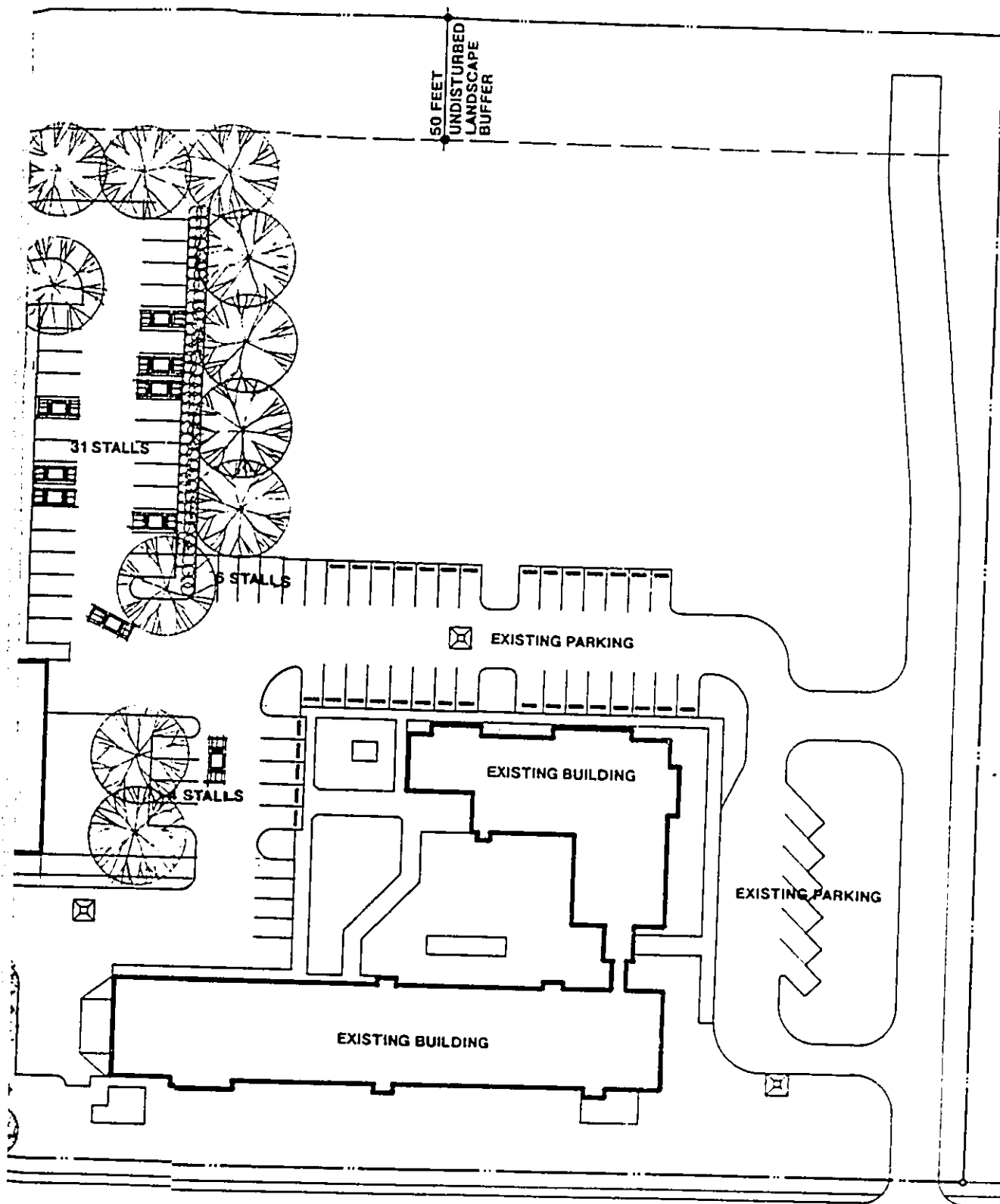
The applicant intends to construct a 21,280± square foot, one-story office building, with parking and landscaping improvements, to serve as its headquarters for base support and research personnel of the observatory (Figure 4) Construction would be completed over three phases.

The first phase would consist of the 13,896± square foot building, plus related parking and landscaping improvements. The second phase would consist of a 2,974± square foot expansion; and the last phase, a separate office building consisting of 4,410± square feet. (Figures 5-7)



# SITE PLAN

SCALE 1"=60'



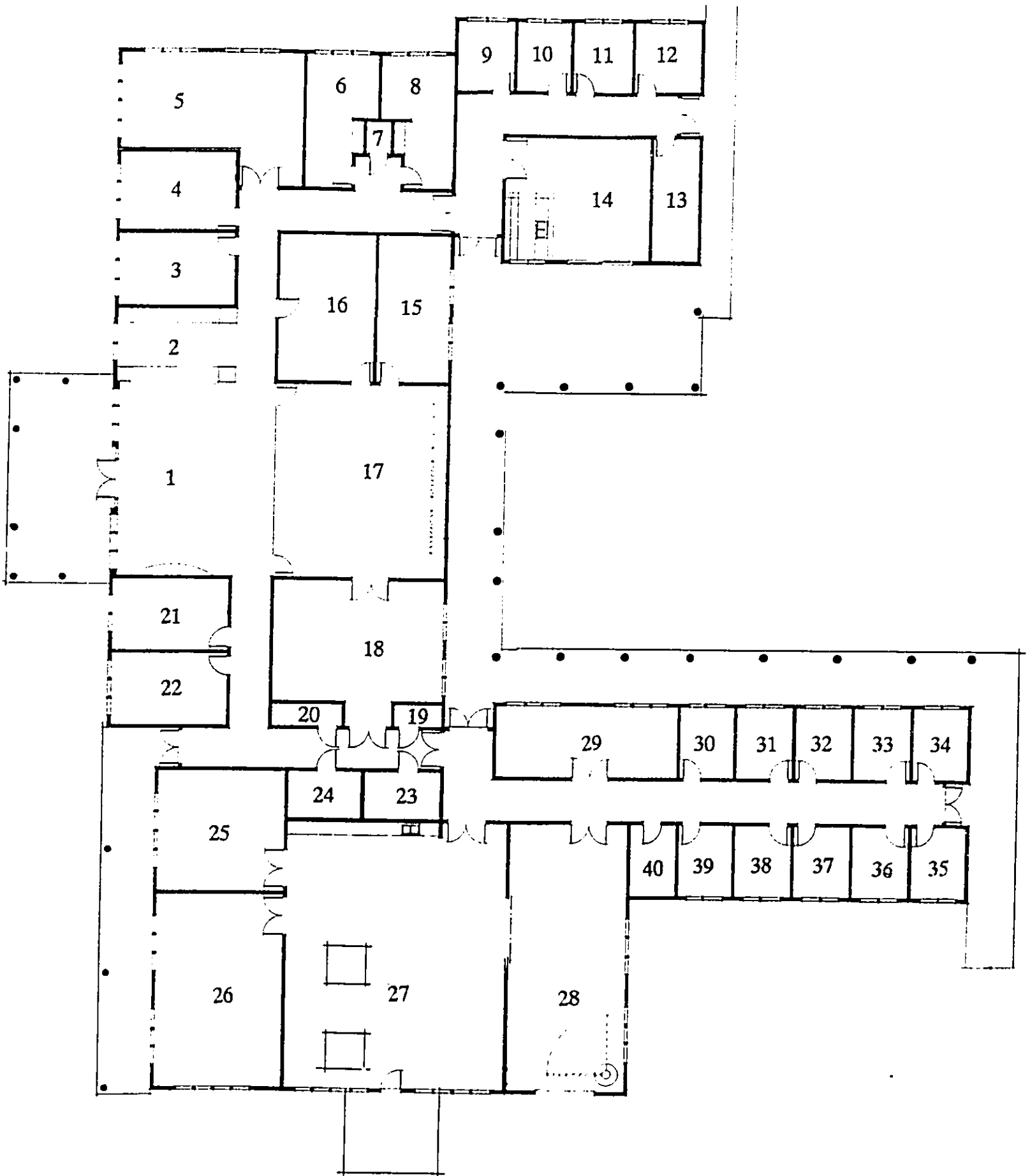
H O K U S T R E E T

**GEMINI**  
**HILO BASE FACILITY**  
 HILO, HAWAII



FIGURE 4

**ODA/McCARTY ARCHITECTS LIMITED**  
 21 JUNE 1996  
 REVISE 29 JULY 1996



# FLOOR PLAN / PHASE I

SCALE 1"=20'

SUMMARY OF AREAS

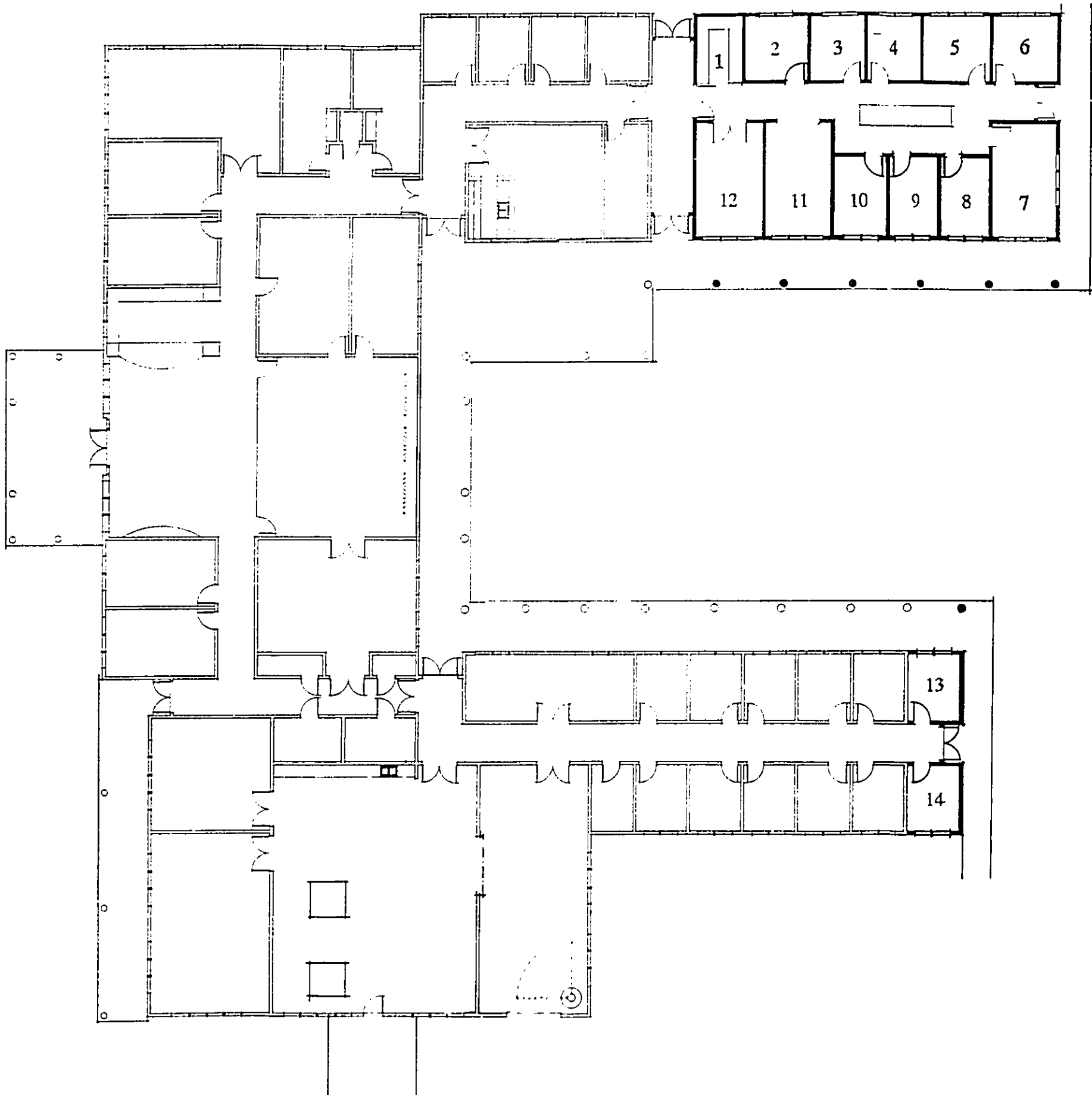
<u>AREA NO.</u>	<u>NAME OF SPACE</u>	<u>AREA</u>		
1	ENTRY/WAITING	624		
2	SECRETARIAL/RECEPTION	234		
3	OFFICE	234		
4	OFFICE/SYSTEMS MANAGER	253		
5	CONFERENCE ROOM	554		
6	WOMEN	230		
7	JANITOR	25		
8	MEN	230		
9	OFFICE	120		
10	OFFICE	120		
11	OFFICE	120		
12	OFFICE	120		
13	ELECTRICAL ROOM	160		
14	STAFF LOUNGE	480		
15	T/O OFFICE	288		
16	COMPUTER ROOM	384		
17	OPERATIONS ROOM	896		
18	LIBRARY/ARCHIVE	592		
19	TELEPHONE ROOM	32		
20	ELECTRICAL ROOM	48		
21	OFFICE	234		
22	OFFICE	234		
23	STORAGE	100		
24	STORAGE	100		
25	ARRAY LABORATORY	420		
26	OPTO-MECHANICAL LABORATORY	672		
27	INSTRUMENT ASSEMBLE/ DISASSEMBLY ROOM	1,584		
28	STORAGE/SHIPPING & RECEIVING	880		
29	DESIGN ROOM	366		
30	OFFICE	114		
31	OFFICE	114		
32	OFFICE	114		
33	OFFICE	114		
34	OFFICE	114		
35	OFFICE	114		
36	OFFICE	114		
37	OFFICE	114		
38	OFFICE	114	CORRIDORS	2,326
39	OFFICE	114	COVERED LANAIS & ENTRY	2,916
40	ELECTRICAL ROOM	96	BUILDING AREA	
	<b>TOTAL AREA</b>	<b>11,570</b>	<b>(ROOMS + CORRIDORS)</b>	<b>13,896</b>

**GEMINI**  
**HILO BASE FACILITY**  
**HILO, HAWAII**



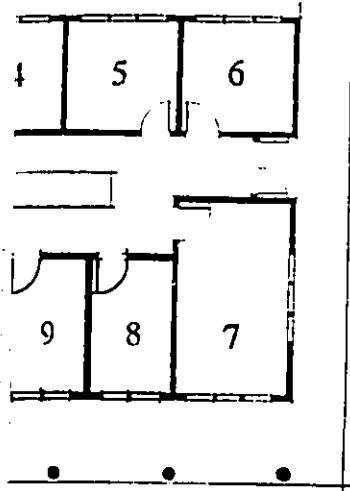
FIGURE 5

**ODA/McCARTY ARCHITECTS LIMITED**  
17 JULY 1996  
REVISE 29 JULY 1996



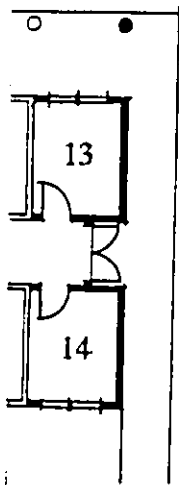
# FLOOR PLAN / PHASE II

SCALE 1"=20'



SUMMARY OF AREAS

AREA NO.	NAME OF SPACE	AREA
1	SECRETARIAL/RECEPTION	102
2	OFFICE	138
3	HUMAN RESOURCE OFFICE	120
4	OUTREACH OFFICE	120
5	CHIEF ENGINEER	144
6	ASSOCIATE DIRECTOR	144
7	DIRECTOR	240
8	OFFICE	130
9	OFFICE	130
10	OFFICE	130
11	ACCOUNTING	240
12	CONFERENCE ROOM	240
	<b>TOTAL AREA</b>	<b>1,844</b>
	CORRIDORS	864
	COVERED LANAI	668
	<b>BUILDING AREA</b> (ROOMS + CORRIDORS)	<b>2,708</b>



AREA NO.	NAME OF SPACE	AREA
13	OFFICE	114
14	OFFICE	114
	<b>TOTAL AREA</b>	<b>228</b>
	CORRIDORS	38
	COVERED LANAI	76
	<b>BUILDING AREA</b> (ROOMS + CORRIDORS)	<b>266</b>

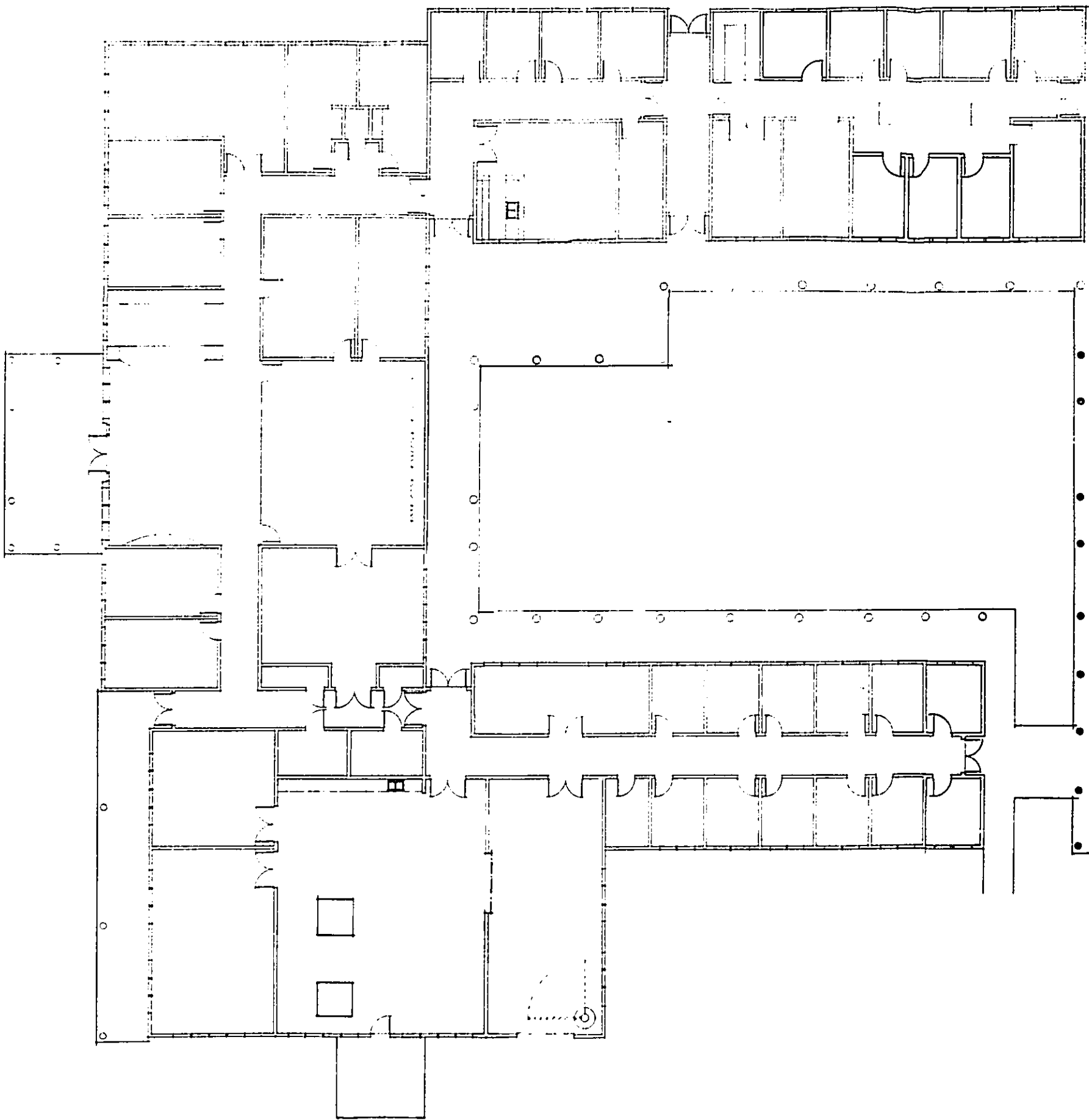
TOTAL BUILDING AREA  
(PHASE I & PHASE II) 16,870

**GEMINI**  
**HILO BASE FACILITY**  
HILO, HAWAII



FIGURE 6

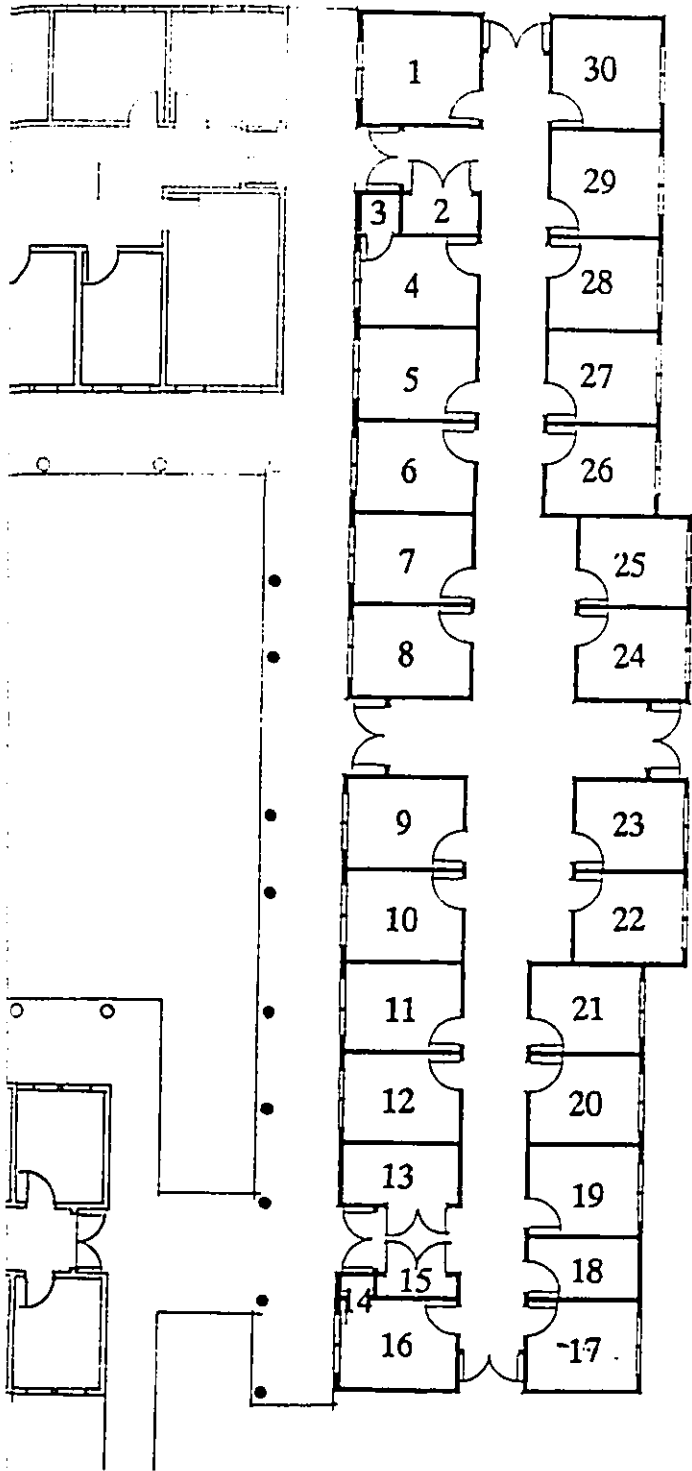
**ODA/McCARTY ARCHITECTS LIMITED**  
17 JULY 1996  
REVISE 29 JULY 1996



**FLOOR PLAN / PHASE III**

SCALE 1"=20'





SUMMARY OF AREAS

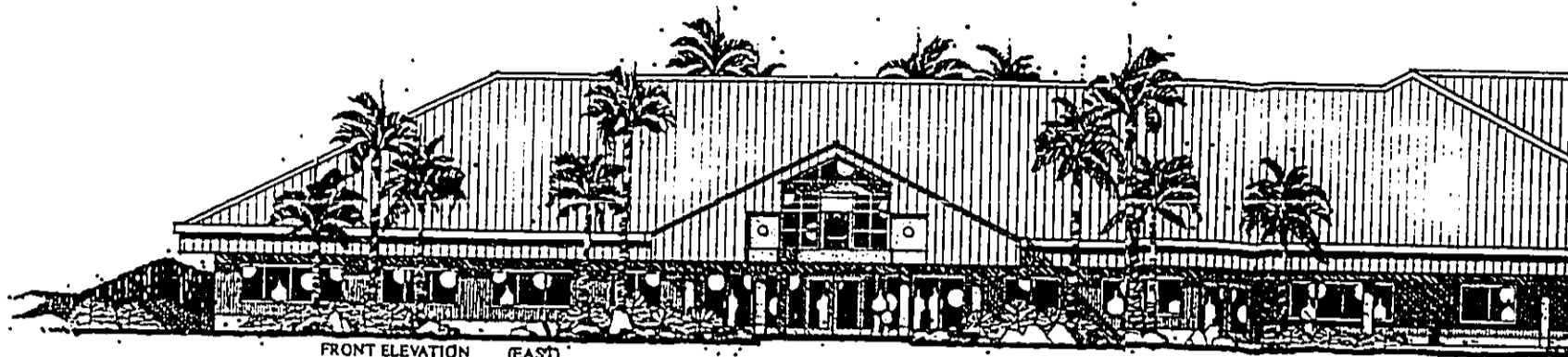
AREA NO.	NAME OF SPACE	AREA
1	OFFICE	144
2	ELECTRICAL ROOM	36
3	STORAGE	18
4	OFFICE	114
5	OFFICE	114
6	OFFICE	114
7	OFFICE	114
8	OFFICE	114
9	OFFICE	114
10	OFFICE	114
11	OFFICE	114
12	OFFICE	114
13	STORAGE	72
14	STORAGE	10
15	STORAGE	20
16	OFFICE	114
17	OFFICE	114
18	ELECTRICAL ROOM	72
19	OFFICE	114
20	OFFICE	114
21	OFFICE	114
22	OFFICE	114
23	OFFICE	114
24	OFFICE	114
25	OFFICE	114
26	OFFICE	114
27	OFFICE	114
28	OFFICE	114
29	OFFICE	138
30	CONFERENCE ROOM	144
<b>TOTAL AREA</b>		<b>3,048</b>
CORRIDORS		1,362
COVERED LANAI		1,600
<b>BUILDING AREA</b> (ROOMS + CORRIDORS)		<b>4,410</b>

**GEMINI**  
**HILO BASE FACILITY**  
HILO, HAWAII

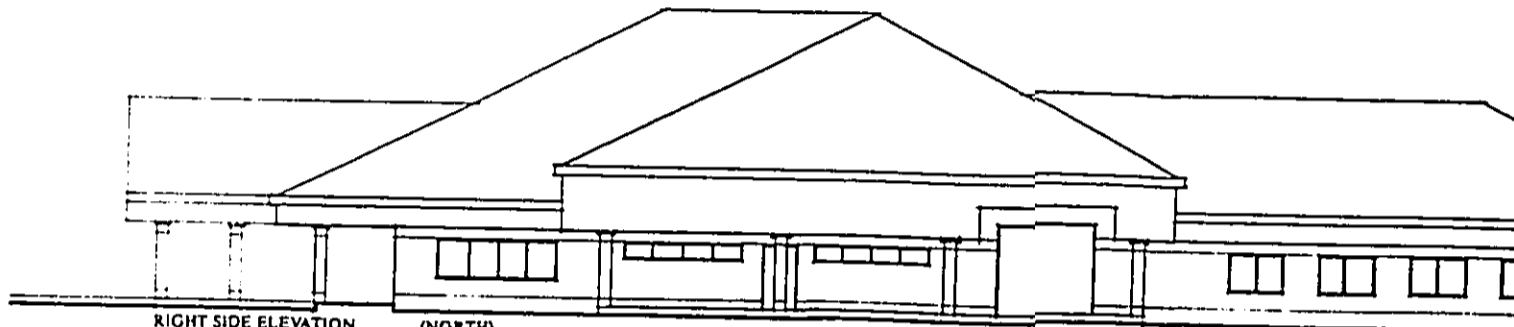


FIGURE 7

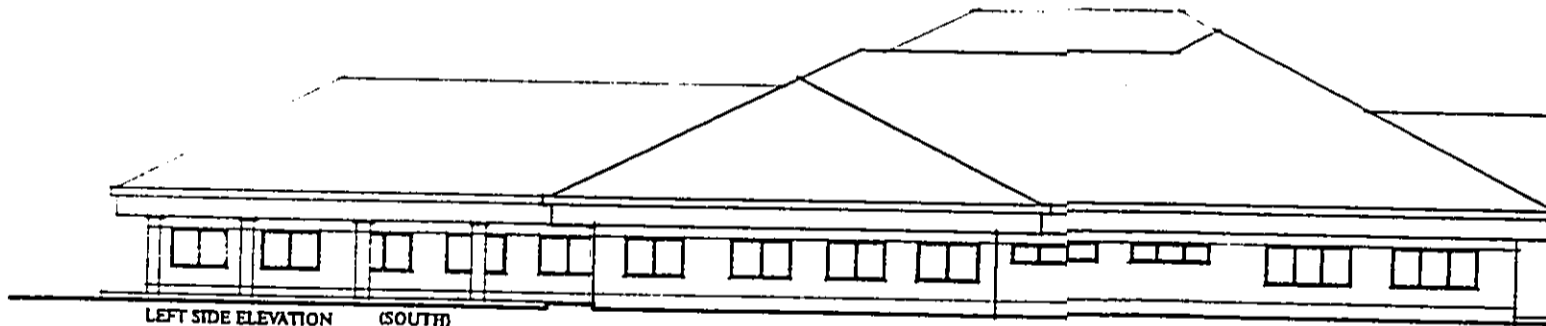
**ODA/McCARTY ARCHITECTS LIMITED**  
17 JULY 1996  
REVISE 29 JULY 1996



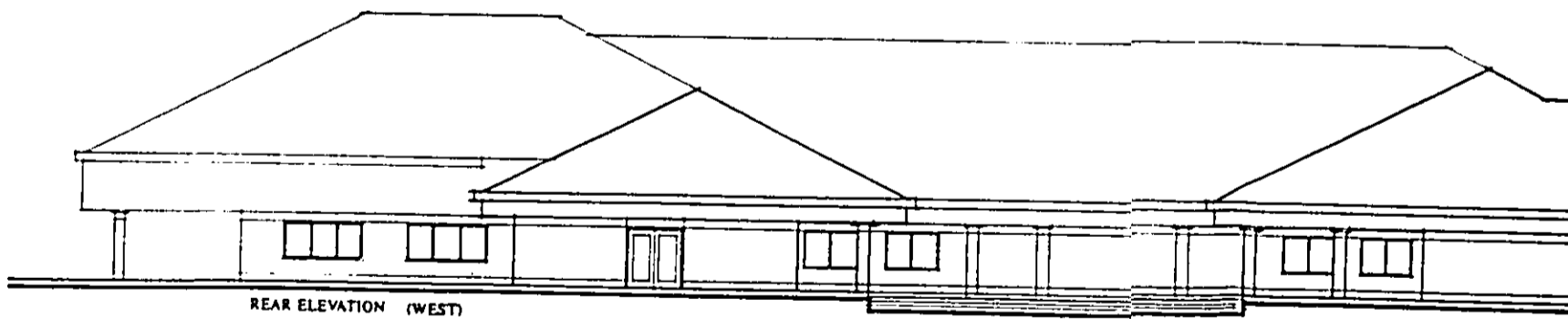
FRONT ELEVATION (EAST)



RIGHT SIDE ELEVATION (NORTH)



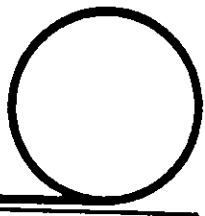
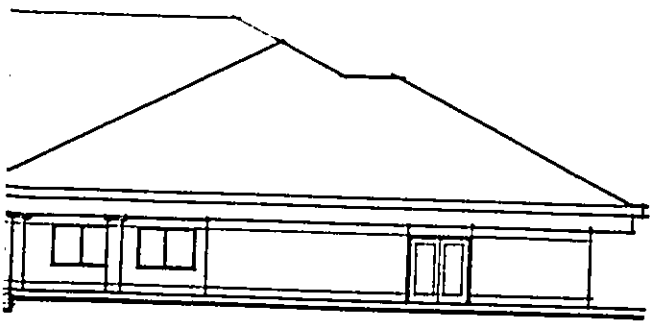
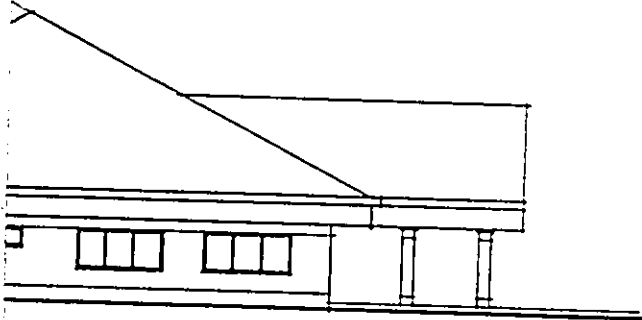
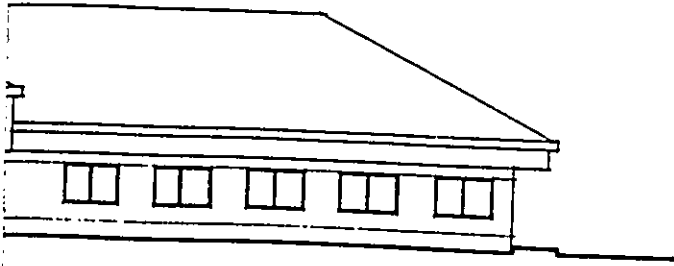
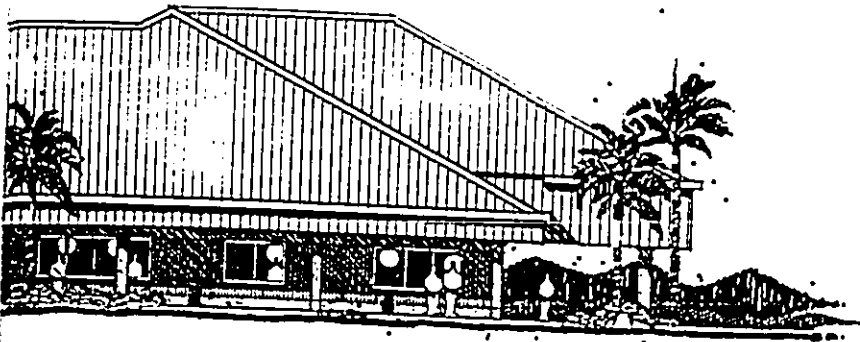
LEFT SIDE ELEVATION (SOUTH)



REAR ELEVATION (WEST)

# EXTERIOR ELEVATIONS (PHASE I)

SCALE 1"=20'



**GEMINI  
HILO BASE FACILITY  
HILO, HAWAII**



FIGURE 8

**ODA/McCARTY ARCHITECTS LIMITED  
29 JULY 1996**

The structure will include research and clerical support offices and receiving, conference, library, and laboratory areas.

The basic building elevations (Figure 8) will be about thirty (30) feet. The maximum height within the single-family residential zone is 35 feet, thus making this height consistent with this zoning.

The project's parking area and that of the adjoining Joint Astronomy Centre will be interconnected. This arrangement will create a consistent theme between projects, as well as facilitate vehicular movements between these facilities.

Setback from North Aohoku Place will be in excess of 100 feet. Setback from Komohana Street will also be in excess of 100 feet, even upon the completion of the Phase III building. It should be noted that there is a 50-foot wide undisturbed natural landscape buffer between Komohana Street and the subject site. (Figure 4)

Also proposed is the provision of seventy (70) paved parking stalls on the site. The minimum requirement for the 21,280 square foot building according to the County Zoning Code is 53 (1 stall for every 400 square feet of gross building area).

Landscaping will be added around the building and the site.

### 2.3.3 Timetable and Cost

Construction of the first phase is expected to begin after all necessary permits are secured, and hopefully, within the first quarter of 1997. The first phase is anticipated to be completed within a year of that period. The second and third phases would be constructed and completed over the next five (5) years.

The construction cost of phase I is estimated at \$2 million in 1996 dollars.

An estimated thirty one (31) personnel are expected to be employed to provide clerical staff and technical support work for the observatory located at the summit.

The majority of the base facility employees are expected to work Monday through Friday, generally between the hours of 7:00 AM to 5:00 PM. There may be a continued presence of staff 24-hours a day, with a reduced number of staff working during the night in support of observation activities on Mauna Kea.

### 3 ENVIRONMENTAL SETTING, IMPACT, & MITIGATION

#### 3.1 Physical Characteristics

##### 3.1.1 Climate

The mean annual rainfall in this area is estimated at 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 and from the low 60's to the upper 70's during the evenings.

##### 3.1.2 Topography & Soils

Terrain of the subject area is 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 actual topography shows an east to west slope.

The elevation is about 320 feet, and the slope ranges from 6 to 10 percent, although there are areas where the slope may slightly exceed 10 percent.

### 3.1.3 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 uniquely applicable to this site.

The subject site is located more than 2 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. Thus, the subject site does not appear vulnerable to flooding.

The US Geologic Survey report identifies the degree of volcanic hazard of this area to be "3" out of a scale of 9. The lower the number, the greater the degree of hazard. It should be noted that the entire city of Hilo has been designated Zone 3. In 1881, a historic lava flow from Mauna Loa flowed into Hilo within one mile of Hilo Bay.

### 3.1.4 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 Appendix A.

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 as candidates for such status. As such, no restrictions, conditions, impediments or recommendations are discussed for this site.

#### 3.1.5 Fauna

No commissioned faunal survey was conducted of this site. According to records on file with the State and County - particularly EA's performed for other projects in the vicinity - however, this area does not have any history of serving as a habitat for rare or endangered animal life.

#### 3.1.6 Historic/Archaeological Resources

An archaeological inventory survey was conducted (December 1992 to January 1993) of the subject parcel by Cultural Surveys Hawaii (Appendix B). This survey was done in conjunction with the processing of plans for the construction of on-site infrastructural 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 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.

Based on the type and age indicated by the data collected and analyzed, no further archaeological research was recommended.

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

During this survey, four (4) 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 sugar cane cultivation of the Waiakea Cane Lots. As such, no further archaeological research was deemed necessary.

Relative to the area of the proposed 2+ acres of improvement, no archaeological features were found. Figure 9 shows the extent of the surveyed area, and the report noting this finding is found in Appendix B. As such, there should be little or no adverse archaeological impacts resulting from the proposed improvements.

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

#### 3.1.7 Air Quality

The South Hilo district has moderate levels of air 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 fumes of the ongoing volcanic activity.

It should be noted that there is a very moderate amount of air emission pollution within the area due to the site's proximity to Komohana Street, a main thoroughfare from the Waiakea





district to the downtown and mauka areas of Hilo town. However, the amount is negligible, due to the tradewinds and the amount of vehicular traffic.

The project should generate at least 60 trips to and from the site on a daily basis. These trips will essentially be split between the morning and afternoon work hours, although they should have about 10 non-employee trips to the site. Given the usual tradewind patterns, the projected volume of vehicles generated by this project, and cars now being equipped with higher vehicular emission control systems, the impact to the existing ambient air quality should not be significant.

#### 3.1.8 Noise

There are no residences proximate to the site. Surrounding land uses are similar to the project, i.e., other telescope base facilities.

There will be short-term noise impact associated with the construction of the project during normal working construction hours. When completed, the project's noise impact should be negligible, except for noise associated by vehicles frequenting the site.

A compressor and air conditioning unit will be located outside. However, they will be screened and enclosed to help muffle associated noise.

Generally, noise in this area is associated with traffic from Komohana Street. The project's noise impact should not affect the ambient noise level. As such, the noise impact resulting from the operation and use of this project should be negligible.

#### 3.1.9 Scenic Resources

The location of the proposed structure will be east of Komohana Street. As the land slopes towards the ocean, there could thus be some interference with the makai viewplane.

However, there is an existing 50-foot wide natural vegetation between the subject area and Komohana Street which provides a natural visual shield between the proposed structure and the street.

Notwithstanding that natural buffer, the structure would be less than thirty five (35) feet high. And that height is equal to or less than the maximum allowed for a typical residence.

Further, the view from this area is not listed as a critical viewplane in any of the County's published planning documents, the General Plan and Hilo Community Development Plan.

#### 3.1.10 Hazardous Material and Waste

Although the project will have laboratory areas, they will not be used for research and development activities where chemical are needed for either the development, testing, or cleaning of the product. Instead, the laboratories will be used for repair and testing of electronic equipment, and the assembly and "troubleshooting" of scientific instruments.

As such, the only hazardous material or dangerous chemicals that will be used will be limited to alcohol and acetone in extremely small amounts. They will be used essentially to clean the electronic equipment prior to assembly. Then, too, there will be some occasional use of the solder to assemble the equipment, but the quantities should be so negligible that fume hoods or extraction would not be required.

No fuel tanks will be needed for the project.

However, refrigeration system will be needed. In that regard, the required compressors will be located outside and properly screened to accommodate noise and visual concerns. Any coolant required to chill the compressors and electronic equipment and any oil used in some vacuum pumps will be stored, used, and disposed off in a manner consistent with governing State

and Federal regulations. As these material will be used only to support the cooling operation, their quantity should not be significant.

The impacts resulting from the use and disposal of hazardous waste associated with the project's laboratories should thus minimal, if at all.

### 3.2 Socioeconomic Characteristics

No relocation of residents will be involved, as the site is currently vacant. Short-term construction employment benefits will be generated throughout the three phases of work; the longer-term employment will be for the estimated thirty one (31) employees.

Estimated annual income expected to be generated for the County of Hawaii is \$ 3 million, exclusive of the construction activities.

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

### 3.3 Public Facilities, Utilities and Services

#### 3.3.1 Roads

Komohana Street is a two-lane, County-owned roadway with an 80-foot right-of-way in the vicinity of the proposed improvements. It serves as one of several major cross-town roads.

There is a left-turn storage lane along Komohana Street at its intersection with Nowela Street. Nowela Street serves as the University Park's entry from Komohana Street. Nowela Street has been constructed to County dedicable standard and has a right-of-way of 60 feet with at least 20+ feet of pavement.

The subject site fronts both Komohana Street and North Aohuku Place. No direct access is planned from Komohana Street. Access is

planned from North Aohoku Place, a County-standard cul-de-sac road with a 50-foot right-of-way. Aohoku Place intersects with Nowela Street.

Both Aohoku Place and Nowela Street road are improved with curbs, gutters, and sidewalks. The utilities are also underground within the road right-of-way.

The overall road condition of Komohana Street, Nowela Street and North Aohoku Place comports to County standards.

Anticipated traffic for the facility should not be significant to warrant additional road improvements in this area. The project is expected to generate thirty one (31) jobs at the facility. It is estimated that a least twenty five (25) will work during the day. Trip generations to and from the site should thus approximate 50-60 during a normal work day.

As access to the site is already via a County standard road with a channelized intersection, coupled with a traffic signal light at the Komohana Street/Mohouli Street intersection, traffic movements to and from the site should not be significantly adverse. Thus, the traffic impacts resulting from the use of the proposed structure should not be significant.

### 3.3.2 Water System

There is an existing 12-inch County water line along Komohana Street. This 12-inch line has been extended to Nowela Street and North Aohoku Place, fronting the subject site. Potable County water is thus available for the proposed use.

### 3.3.3 Wastewater System

Likewise, an 8-inch sewer line within Nowela Street and North Aohoku Place up to the subject site has been completed. This line connects to the University system; and the University's system is tied into two lines - one is a 12-inch line along Kawili Street, and the

other, a 10-inch line along Lanikaula Street.

#### 3.3.4 Drainage System

The subject site is designated Zone X, area of minimal flood 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 load of on-site drainage.

However, given the existing permeable condition of the land and the construction of County-approved drywells and related on-site drainage systems, on- and off-site drainage problems associated with this project are not anticipated.

#### 3.3.5 Solid Waste

The proposed use should not generate a significant amount of waste. Nonetheless, generated waste will be hauled by commercial haulers to the County's landfill. As may be needed, any hazardous waste (such as oil) associated with the project will be disposed off in a manner consistent with the appropriate Federal and State disposal requirements.

#### 3.3.6 Electrical/Telephone

Both services are currently sized, adequate, and available to supply the area and parcel.

#### 3.3.7 Other Public Facilities

Additional public services will not be required for the proposed use. This area is already accessible and being served by fire and police protective services. Further, the proposed use is not expected to significantly increase demand for the services.

As the proposed use will create new direct and indirect jobs, it is possible that there may be additional demand for school support services, either for relocated workers or out-of-

state workers.

However, there are existing schools and the University of Hawai'i at Hilo proximate to the proposed site. Those facilities would be adequate to accommodate any projected enrollment increases.

#### RELATIONSHIP TO PLANS, POLICIES, AND CONTROLS

##### 4.1 State Land Use Law

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

##### 4.2 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 amendments would be required.

##### 4.3 Community Development Plan

The Hilo Community Development Plan was adopted by the Planning Commission in 1975. The land use guide map of this Plan suggests a RS-10 designation, a designation that is also similar to the balance of the University site.

##### 4.4 Zoning

The County zoning of the subject parcel is split between RS-10 and A-1a. The area of the proposed improvement is zoned A-1a. Under the County Zoning Code, schools would be allowed in both of those zones, provided that a Use Permit is secured from the Planning Commission. In this case, the proposed use would be related to the University. There is a possibility, however, that the proposed use may not require a Use Permit, as it amounts to an extension of the existing uses. That is a determination to be made by the Planning Department.

#### 4.5 Other Regulations

The subject area is not located within the County Special Management Area (SMA).

Beyond the possibility of a Use Permit, other permits required would be Plan Approval and applicable building and related construction permits.

The Code also requires vehicular parking at a ratio of one (1) stall for every four hundred (400) square feet of space. Based on a 21,280+ square foot building, preliminary plan calls for the provision of seventy (70) stalls. This would be in excess of the minimum requirement of fifty three (53).

### 5 ALTERNATIVES

#### 5.1 No Action

The installation of the infrastructure allowed the orderly development of the balance of the research and technology park for the University of Hawai'i at Hilo. This park is to integrate the University's research and technical activities with good access to communications between the University and the community.

The availability of public services; good on- and off-site infrastructure; and the site's proximate location to the University, community, and other astronomy-related facilities are positive factors for the proposed location of the base facility.

This facility would be considered a permanent site, which in turn would foster long-term economic benefit to the island. The observatory and its support staff could generate approximately \$3 million annually to the island's economy.

As the observatory is already under construction on the summit of Mauna Kea, a base facility - such as the one being proposed - is already needed. Thus, whether the facility is located in Hilo or other parts of the island, it still will be needed.

Thus, a "no action" would result in the loss of this economic addition to the Hilo area. It could



also diminish the University's efforts to create a viable research park that can also be supportive of the University.

## 5.2 Alternate Site

The location of the facility and staff close to an area with related research and technical facilities (University of Hawai'i at Hilo, the Joint Astronomy Centre, CALTECH, and NAOJ-Subaru) will provide immediate resources for this project.

While alternate sites on this island could have been considered, those alternate sites would not provide immediate and continuous resources of scientific nature for the facility staff.

Fulfillment of the University's research and technology park plans could provide a catalyst for an academic landmark for astronomy, and further, a resource for economic diversity in South Hilo.

## 6 DETERMINATION WITH SUPPORTING FINDINGS AND REASONS.

The proposed facility is not expected to cause significant impacts to the environment. Pursuant to this environmental assessment and in accordance with the laws and regulations of the National Environmental Policy Act (NEPA) of 1969, the National Science Foundation has decided to proceed with the funding of its share of the base facility of the Gemini North 8-Meter Telescope project.

Further, pursuant to the significance criteria established by the State Environmental Commission as discussed below. As such, the determination is to issue a Negative Declaration.

Specifically:

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

The site does not have any significant natural resources. While there are some archaeological features on portions of the entire property, none were located in the area of the proposed improvements.

- \* 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. Except during construction, anticipated related noise and vehicular impacts should be negligible. Drainage and wastewater will be handled in a manner meeting with the requirements of the appropriate governmental 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 will be reviewed to comply with the environmental policies and standards of the State. All State and County regulations will be followed. Minimal impacts to air and noise quality is expected.

- \* 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 by the State's previous action of creating this park and the construction of the required on-site infrastructure.

Notwithstanding the foregoing, the proposed facility would employ about thirty one (31) persons. As such, it would help to strengthen and diversify the County of Hawai'i's economic base.

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

The requested use will not require extensive on-site and off-site improvements. No major excavations will be required to construct the building, as the structure will be built almost at grade.

Then, too, while the land will be cleared for the proposed improvements, landscaping will be provided in selected areas to minimize the impact. Further, a buffer zone of natural vegetation will be preserved between the proposed structure and Komohana Street.

All other environmental impacts (noise, air, etc.) should be negligible.

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

It is not anticipated that rare or endangered plant or animal life would be threatened by the requested use.

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

The only discernible air quality impacts associated with the proposed facility would be from the vehicular traffic. The frequency and volume of traffic to be generated by this project, however, will be insignificant. The impacts should thus not be substantial.

Like the air quality impact, possible noise impacts would be attributable to the vehicular traffic. Traffic would not be high as a commercial area, but more in the pattern of a business office. The noise ambient level should thus not be significantly affected, particularly in light of the existing use of Komohana Street.

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

The project is not located in any environmentally sensitive area.

## 7 FINAL ENVIRONMENTAL ASSESSMENT

A negative declaration of significant environmental impacts was expected by the proposed action of the construction of the Hilo base facility of the Gemini North 8-Meter Telescope. As such, a Draft Environmental Assessment was submitted to the Office of Environmental Quality Control

(OEQC) for publication in its bulletin of March 8, 1997 for public comment.

During this period, only one comment was received from the State Office of Hawaiian Affairs. This comment related to a clarification of the ownership of the property. Said comment and its response are contained in Appendix D.

Further, some measure of discussion regarding the use of the laboratory was made to allay any potential concerns regarding the use of chemicals.

Finally, since this document is intended to satisfy the technical requirements of the National Environmental Policy Act (NEPA), appropriate technical changes were made.

Therefore, the University of Hawaii'i at Hilo has prepared a Negative Declaration determination for the proposed action.

This Final Environmental Assessment is submitted, with the appropriate revisions, and a Negative Declaration for publication in the OEQC Bulletin for comment on the University of Hawaii'i at Hilo's determination.

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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CHAR & ASSOCIATES  
Botanical Consultants  
Honolulu, Hawai'i

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 mappa), 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	+	-
GLEICHERIACEAE (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.	laua'e-hao'le	X	-	+
Phymatosorus scolopendria (Burm.) Pic.-Ser.	laua'e, lauwa'e	X	-	+
Pleopeltis thunbergiana Kaulf.	pakahakaha, 'ekaha-'akolea	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>	
			<u>o</u>	<u>i</u>
<b>FLOWERING PLANTS</b>				
<b>MORCOCOTS</b>				
AGAVACEAE (Sisal Family) Cordyline 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.		X	+	-
Fimbristylis dichotoma (L.) Vahl.		I	+	-
Kyllinga brevifolia Rottb.	green kyllinga, kili'o'opu	X	+	-
Machaerina mariscoides ssp. meyenii (Kunth) T. Koyama	'ahaniu, 'uki	E	+	-
Pycneus polystachyos (Rottb.) P. Beauv.		I	+	-
Scleria testacea Nees		I	+	-
DIOSCOREACEAE (Yam Family) Dioscorea bulbifera L.	bitteryam, pi'oi	P	+	-
Dioscorea pentaphylla L.	pi'ia	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>
ORCHIDACEAE (Orchid Family)				
<i>Arundina graminifolia</i> (D. Don) Hochr.	bamboo orchid	X	+	-
<i>Spathoglottis plicata</i> Blume	Philippine ground orchid	X	+	+
PANDANACEAE (Hala Family)				
<i>Pandanus tectorius</i> S. Parkinson ex Z.	pandanus, hala	I?	+	-
POACEAE (Grass Family)				
<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	yellow foxtail	X	+	-
<i>Setaria palmifolia</i> (J. König) Stapf	palmgrass	X	+	+
ZINGIBERACEAE (Ginger Family)				
<i>Hedychium flavescens</i> N. Carey ex Roscoe	yellow ginger	X	-	+
<i>Zingiber zerumbet</i> (L.) Sm.	shampoo ginger, 'awapuhi kuahiwi	P	+	-
DICOTS				
ACANTHACEAE (Acanthus Family)				
<i>Justicia betonica</i> L.	white shrimp plant	X	+	-

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<u>o</u>	<u>i</u>
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 (Wolf) 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>	
			<u>o</u>	<u>i</u>
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.	moonflower, koali pehui	X	+	-
Ipomoea indica (J. Burm.) Merr.	koali 'awahia	I	+	-
Ipomoea triloba L.	little bell, pink bindweed	X	+	-
EUPHORBIACEAE (Spurge Family) Macaranga mappia (L.) Mull. Arg.	bingabing	X	-	+
Phyllanthus debilis Klein ex Willd.	niruri	X	+	-
Ricinus communis L.	castor bean, koli, pa'aila	X	+	-
FABACEAE (Bean Family) Caesalpinia major (Medik.) Dandy & Exell	kakalaipa, hihikolo	X?	+	-
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	+	-
Crotalaria cf. lanceolata E. Mey.	smooth rattlepod, pikakani	X	+	-
Crotalaria pallida Aiton		X	+	-
Crotalaria retusa L.		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 hilahi'a	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	+	-
MELASTOMATACEAE (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>	
			<u>o</u>	<u>i</u>
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 Waltheria indica L.	melochia 'uhaloa, hi'aloa, komakaloa	X ?	+	+
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	+	- -

APPENDIX B

ARCHAEOLOGICAL SURVEY AND TESTING  
OF LANDS PROPOSED FOR RESEARCH AND TECHNOLOGY LOTS  
AT THE UNIVERSITY OF HAWAII AT HILO

BY

CULTURAL SURVEYS HAWAII



**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.  
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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

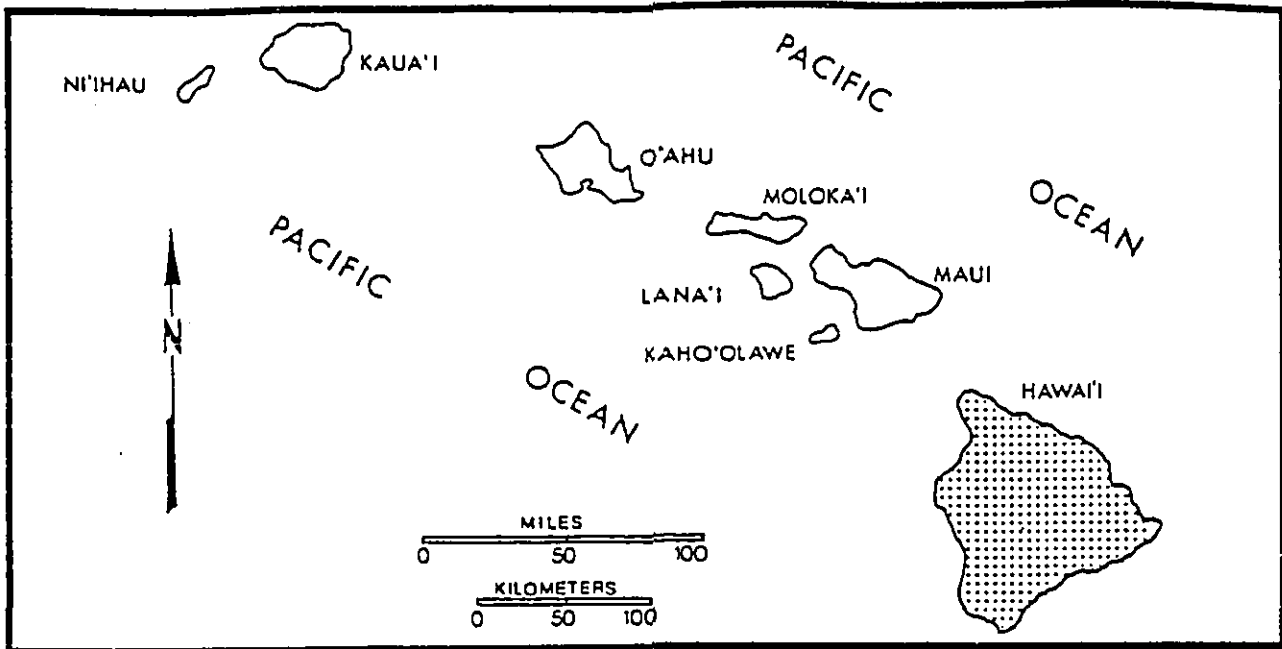


FIGURE 1  
State of Hawai'i

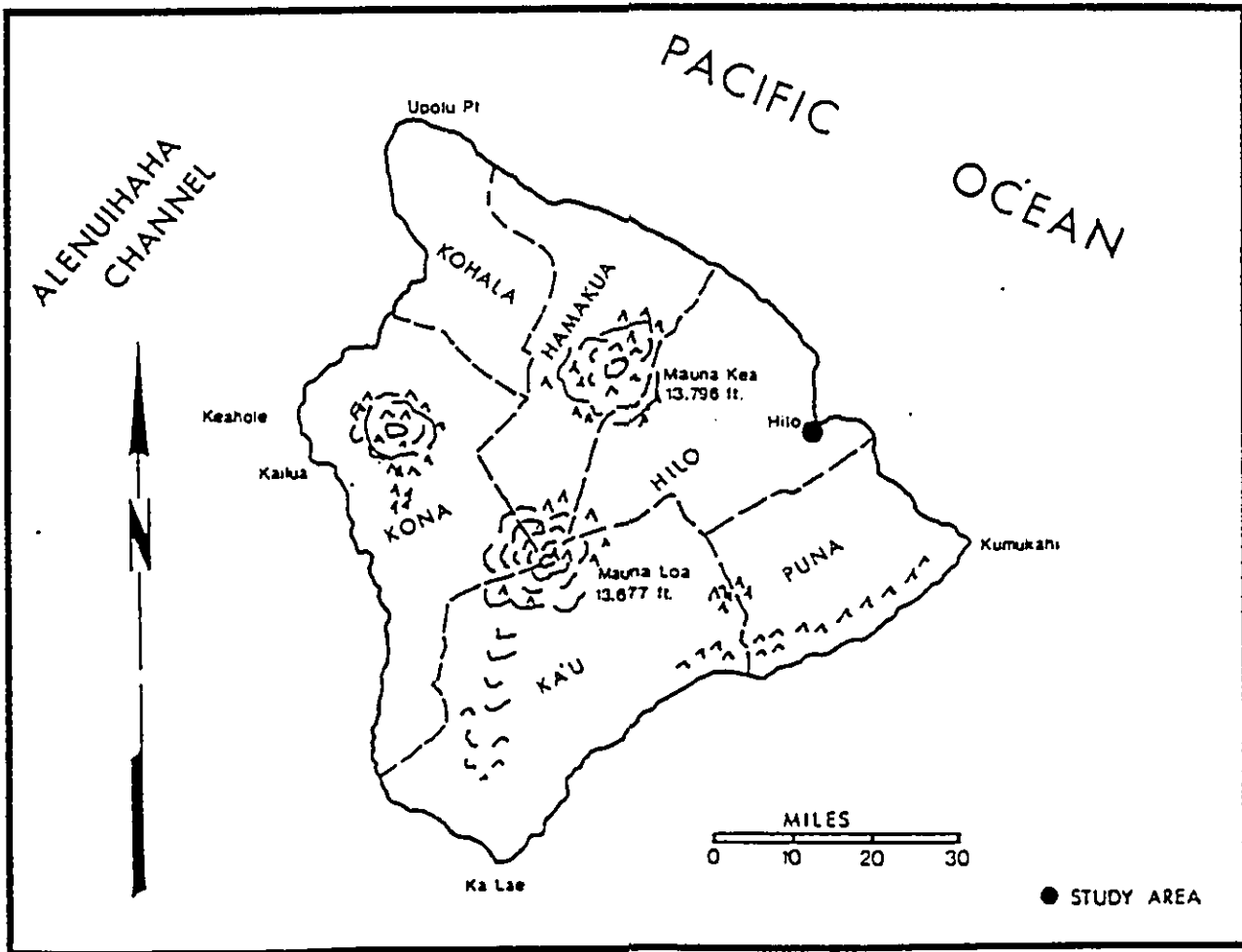


FIGURE 2  
General Location Map, Hawai'i Island



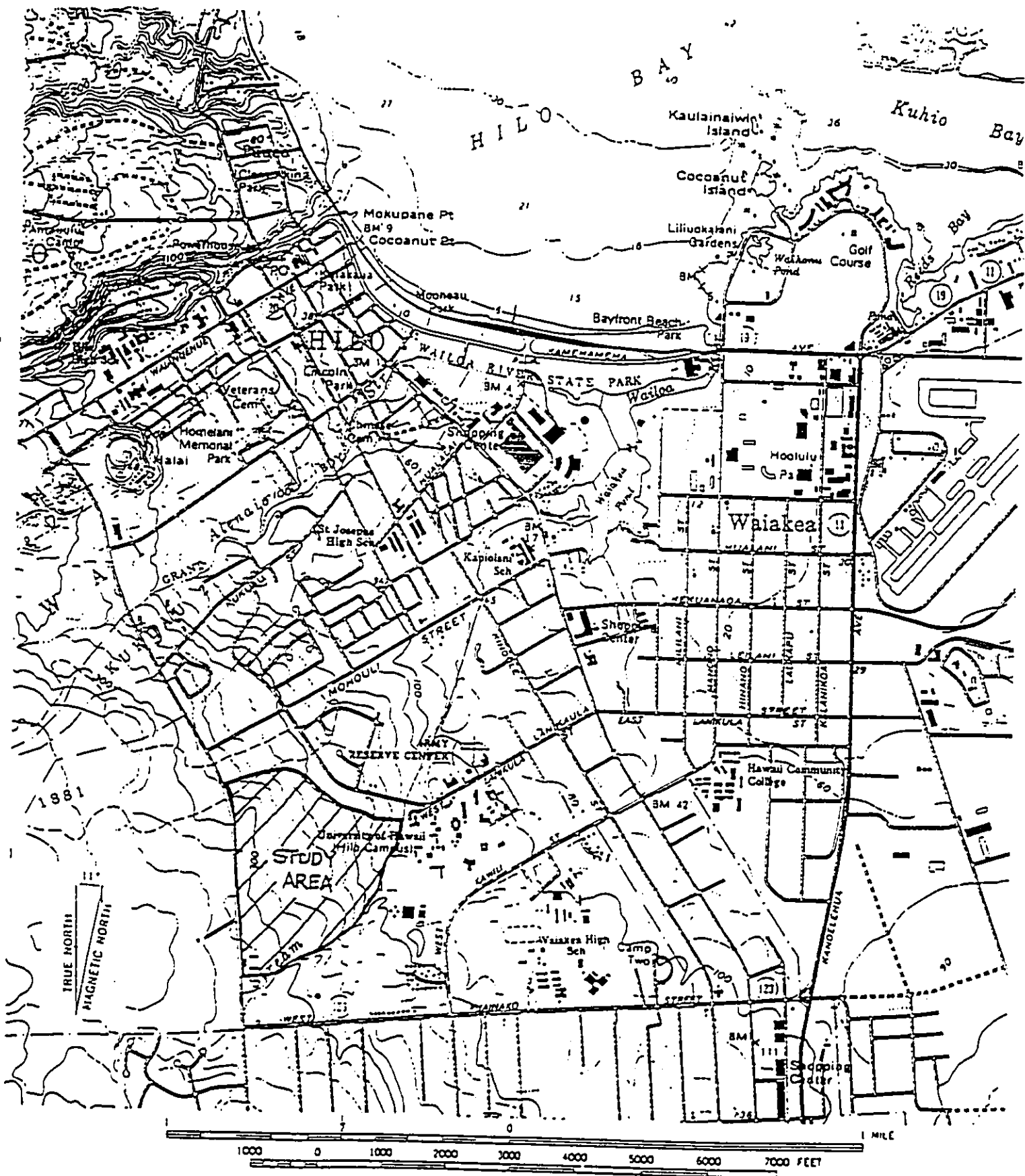


Figure 3 Portion of USGS Topographical Map, 7.5 Minute Series, Hilo Quadrangle, Showing Study Area

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

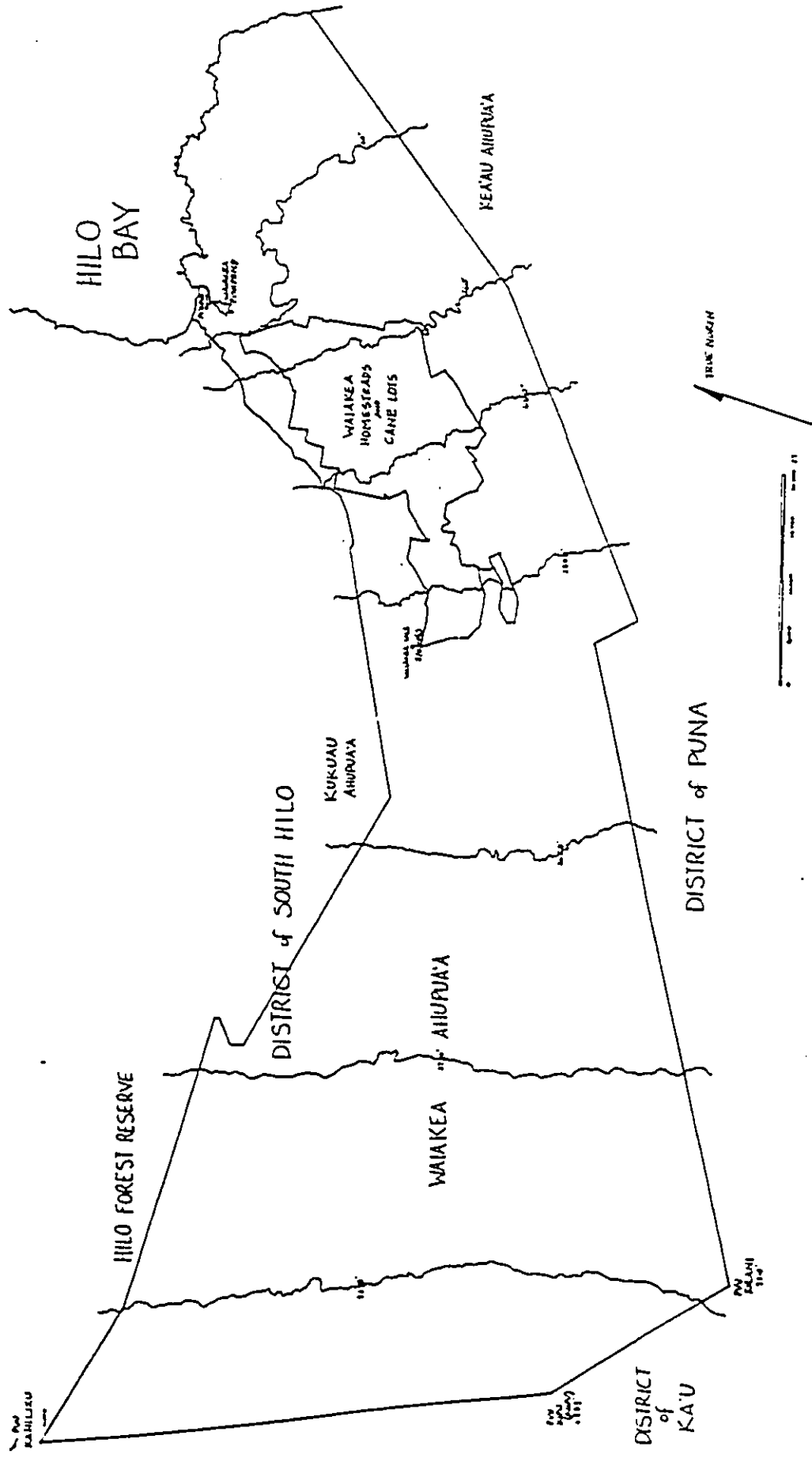


Figure 4 *Ahupua'a* of Waiakea (after USGS Topographic Map)

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 there of. Intensive agricultural in Zone II was focused on area 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 description 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 tradition 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 kupono 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

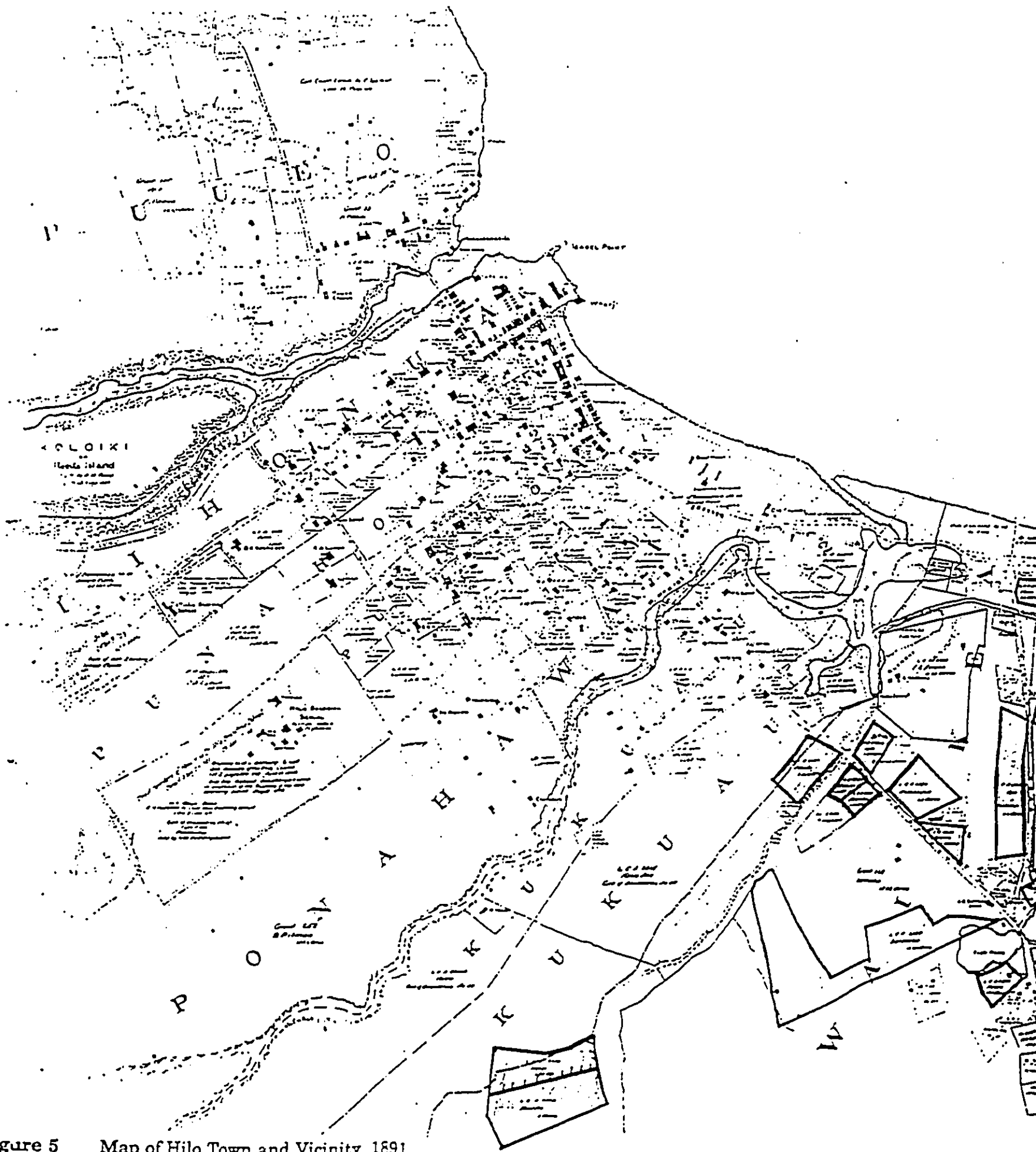
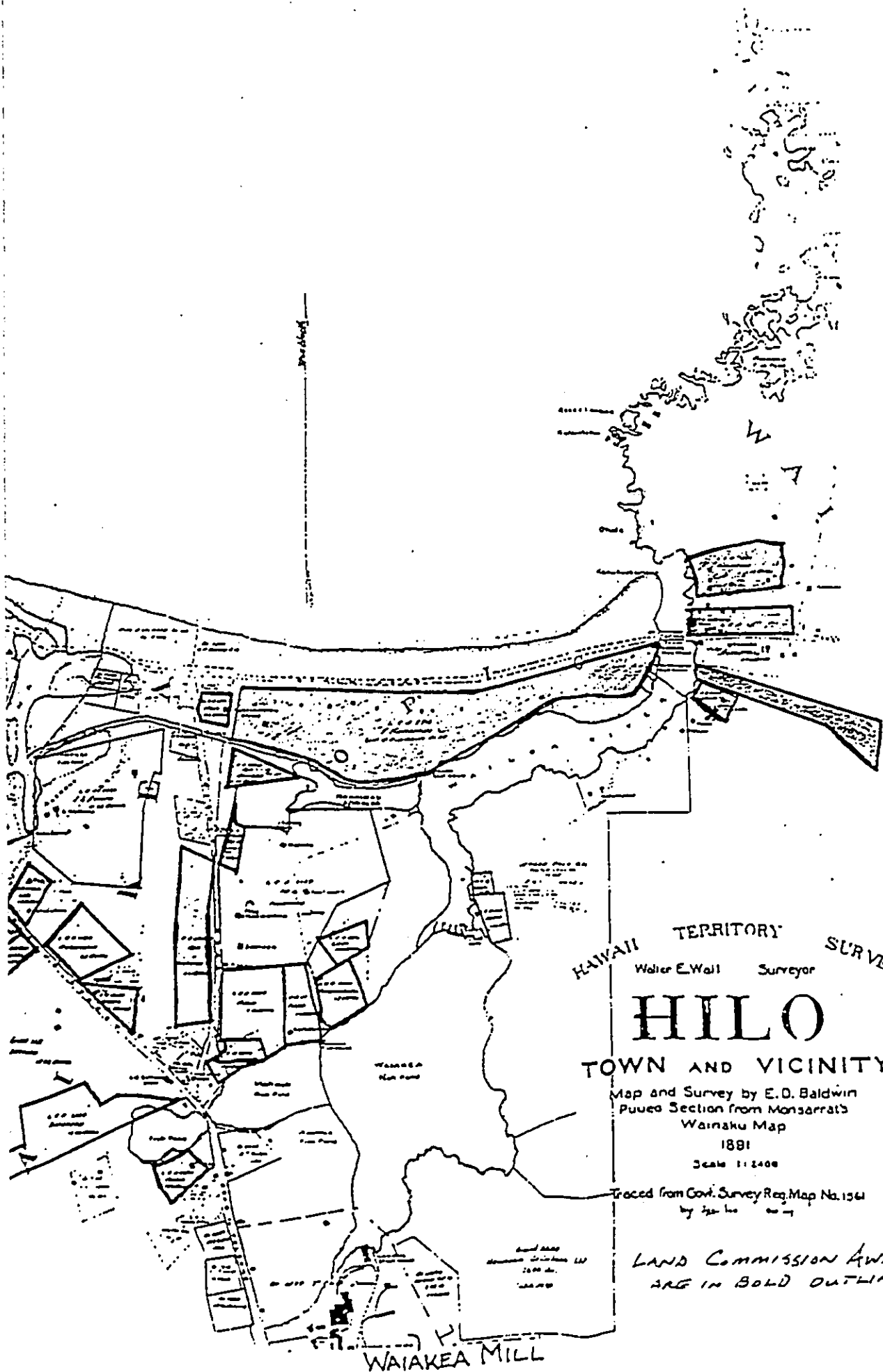


Figure 5 Map of Hilo Town and Vicinity, 1891



HAWAII TERRITORY SURVEY  
 Water E. Wall Surveyor

# HILO

TOWN AND VICINITY

Map and Survey by E. D. Baldwin  
 Puuea Section from Monsarrat's  
 Wainaku Map  
 1891

Scale 1:2400

Traced from Govt. Survey Reg. Map No. 1561  
 by [unclear]

LAND COMMISSION AWARDS  
 ARE IN BOLD OUTLINE

WAIAKEA MILL

Waiakea Mill Pond

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

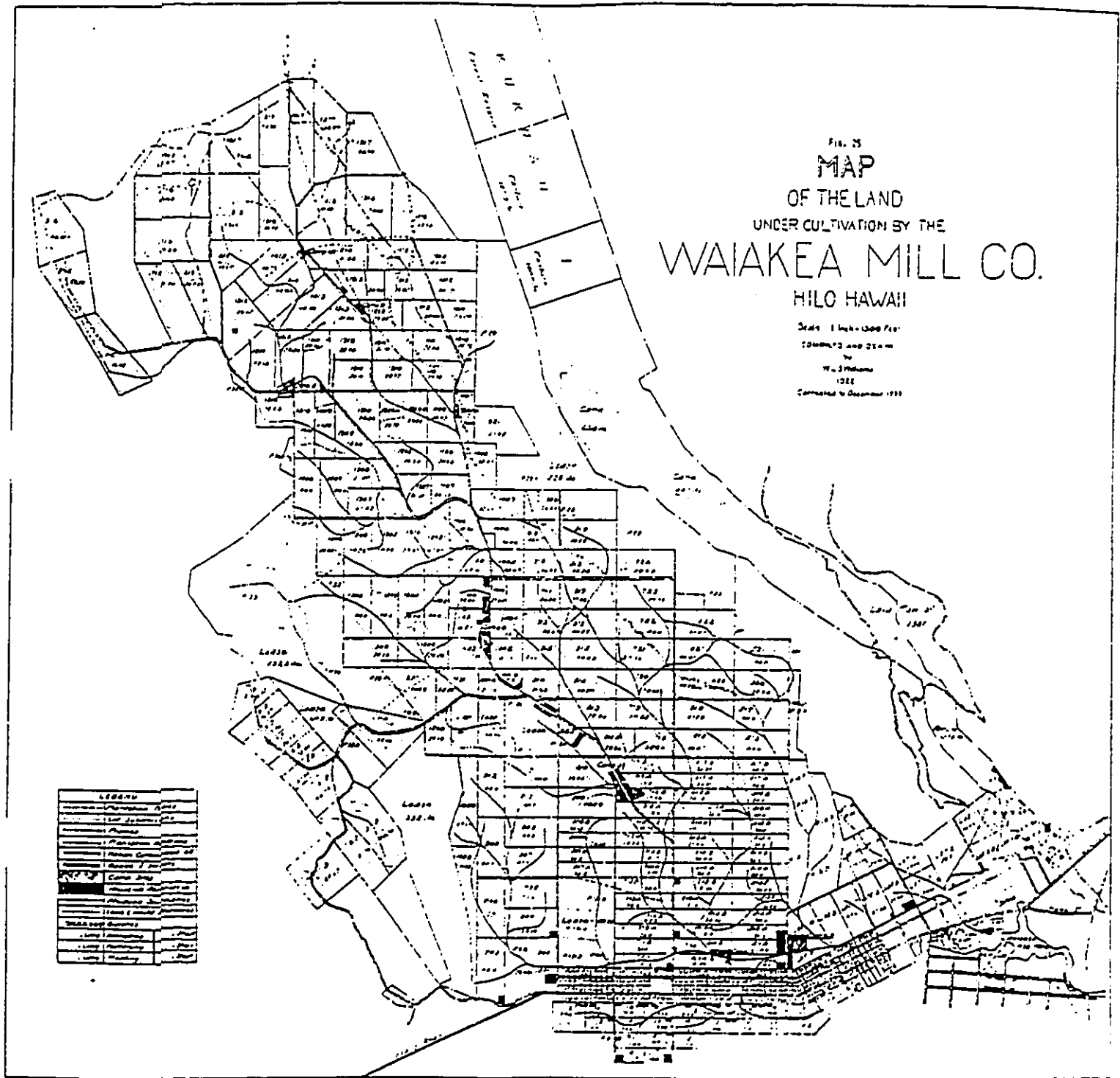


Figure 6 Waiākea Mill Co. Map ca. 1930, Showing Homestead, Cane Lots, and Camps

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.

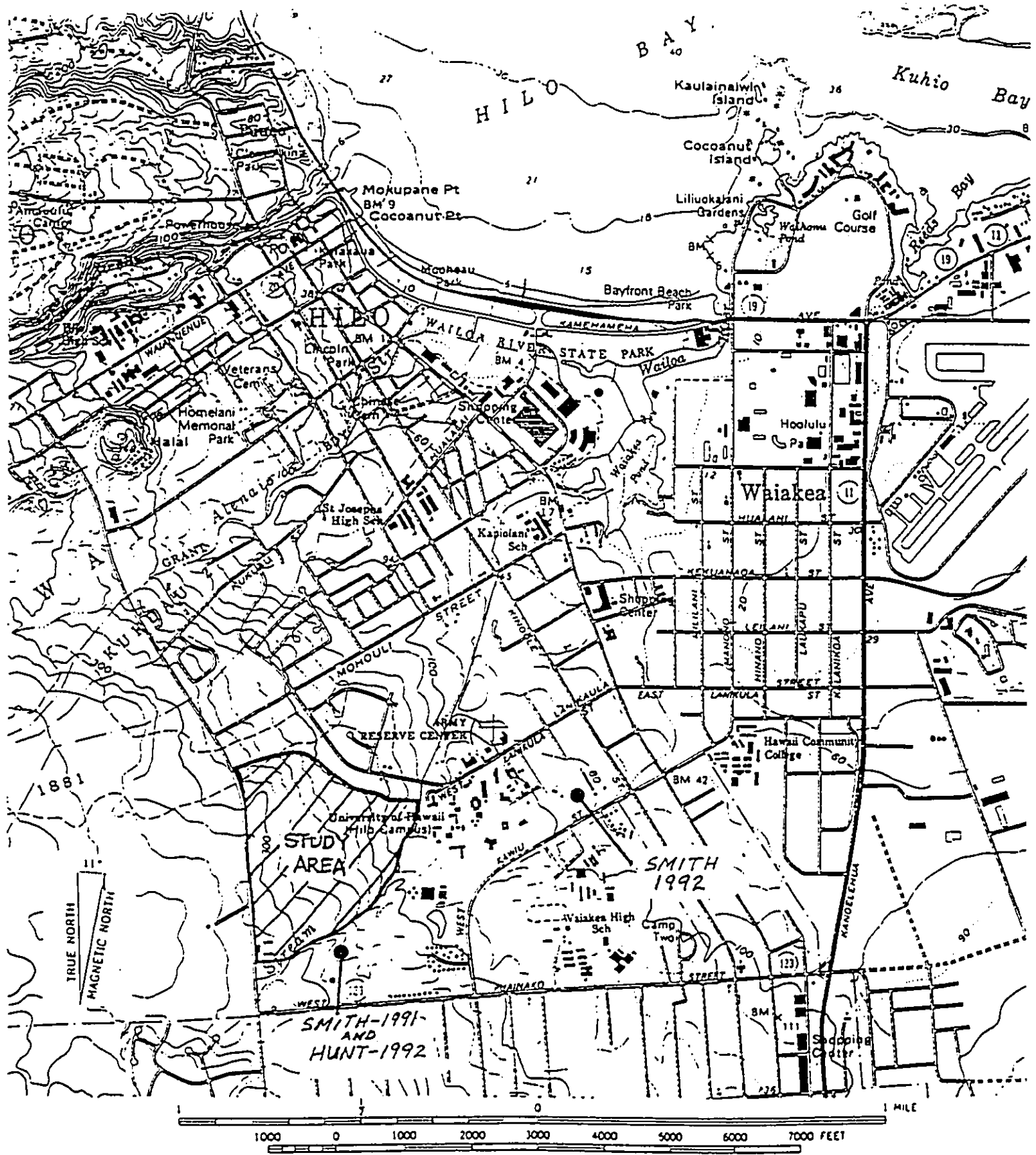


Figure 7 Portion of USGS Topographic Map, Hilo Quadrangle Showing Areas of Study Adjacent to the Present Project Area

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

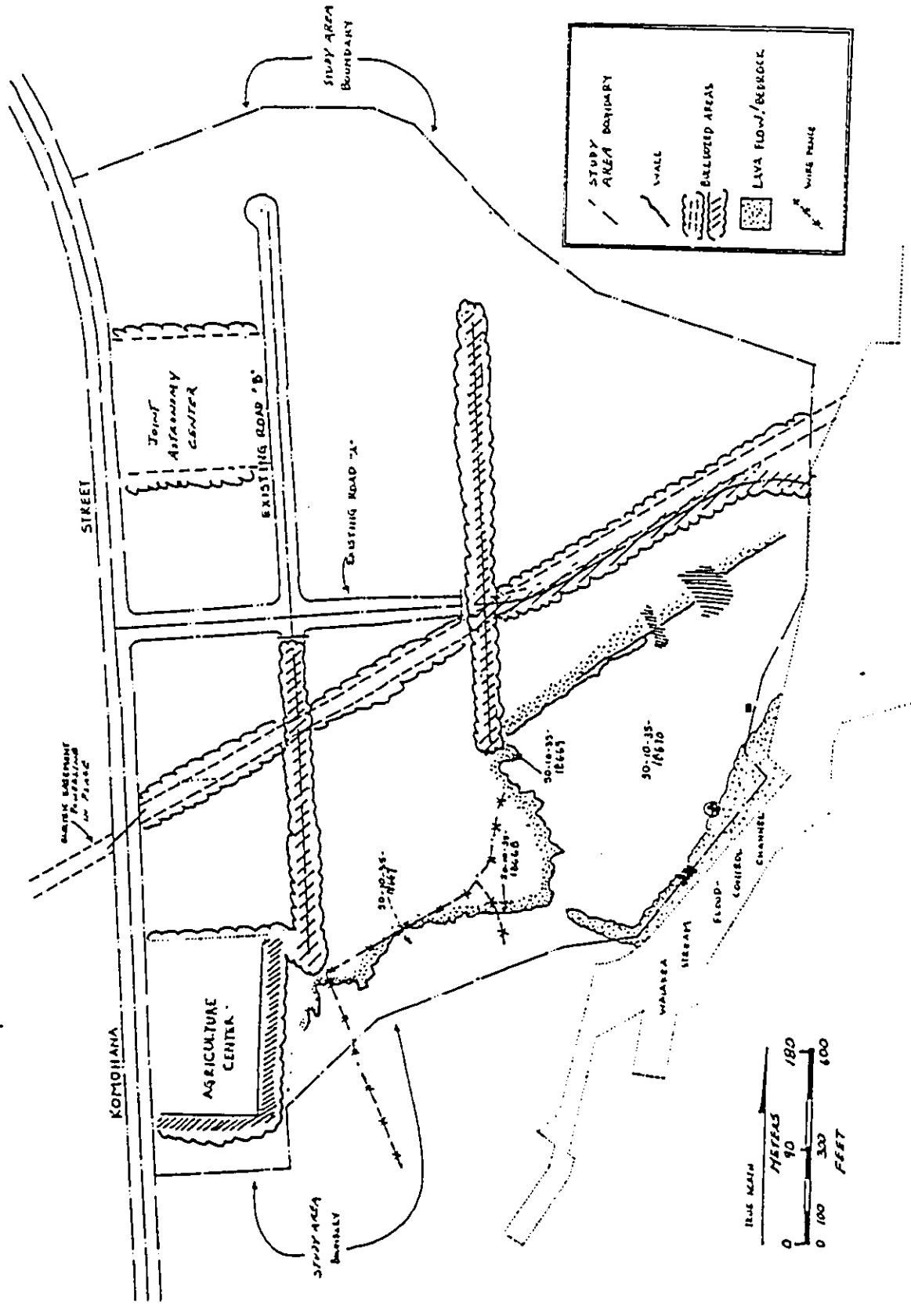


Figure 8 Study Area, Showing Existing Roads, Powerline Easement and Areas of Previous Bulldozing



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.

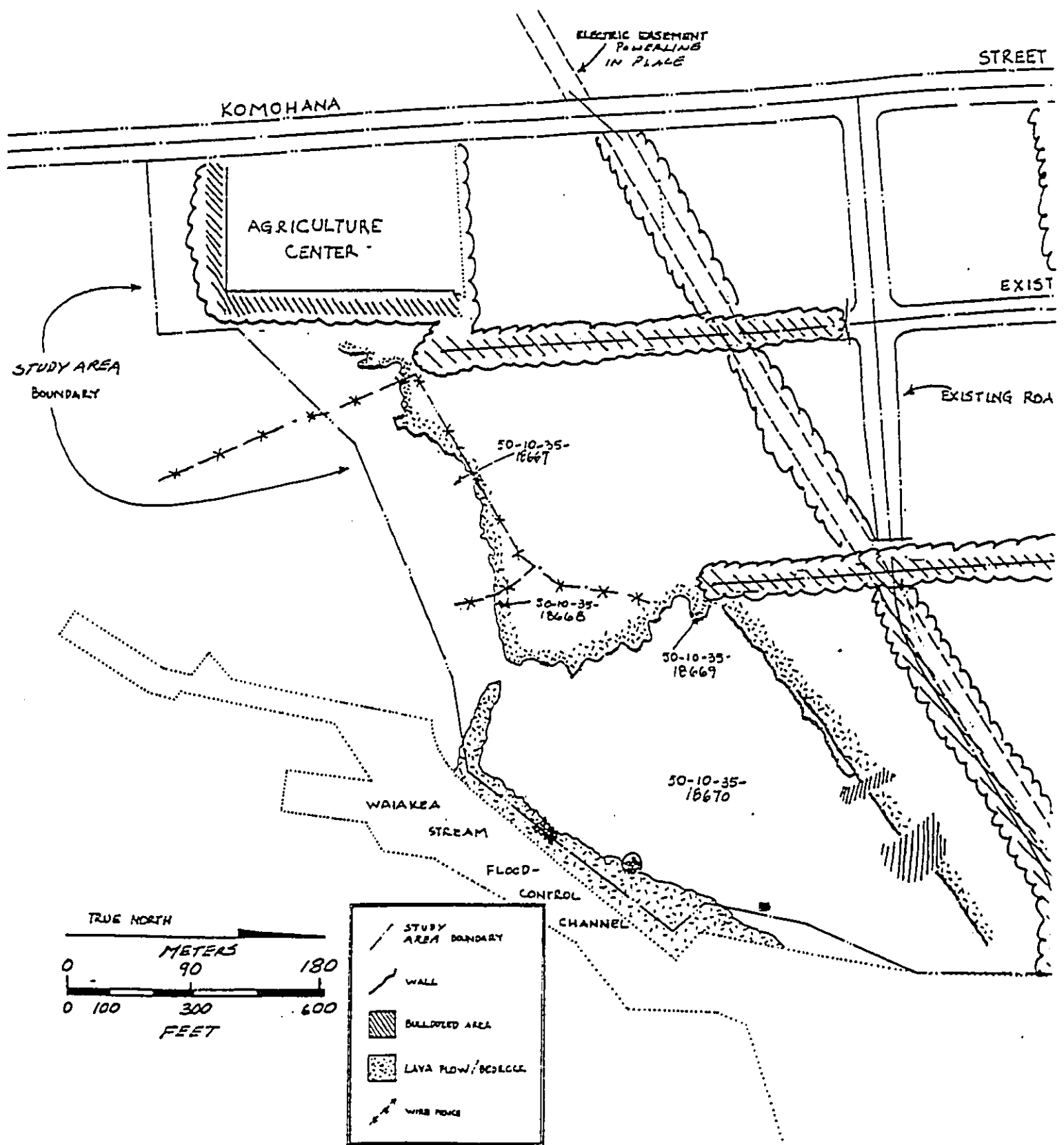


Figure 9 Portion of Study Area Showing Archaeological Sites

## 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



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

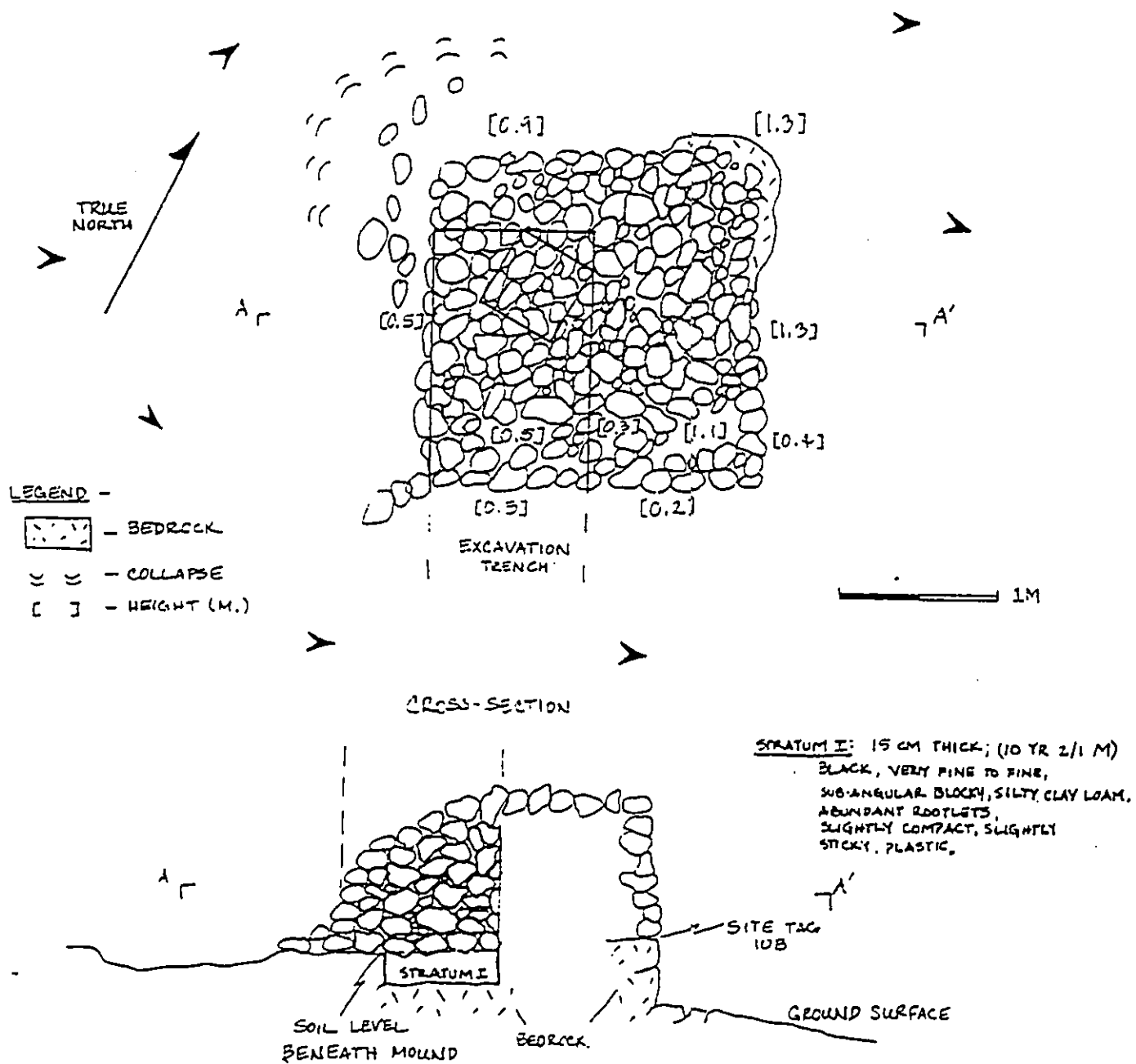


Figure 11 Site 50-10-36-18667 Feature B, Plan View of Mound (Top), and Cross Section Showing Stratigraphic Relationship of Rock Mound to Sediments (Bottom)



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.

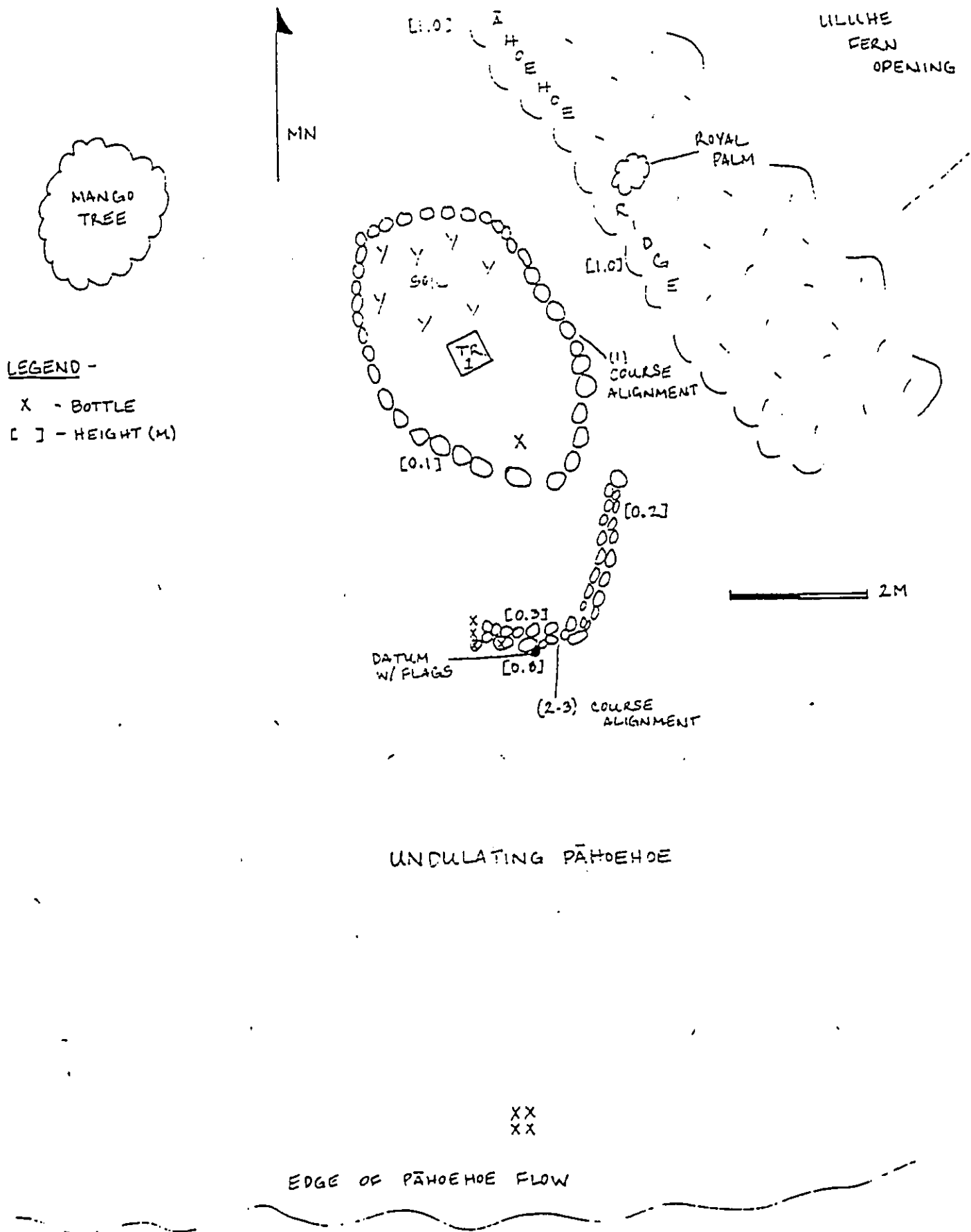


Figure 12 Site 50-10-35-18668, Plan View Showing Excavation Unit

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.

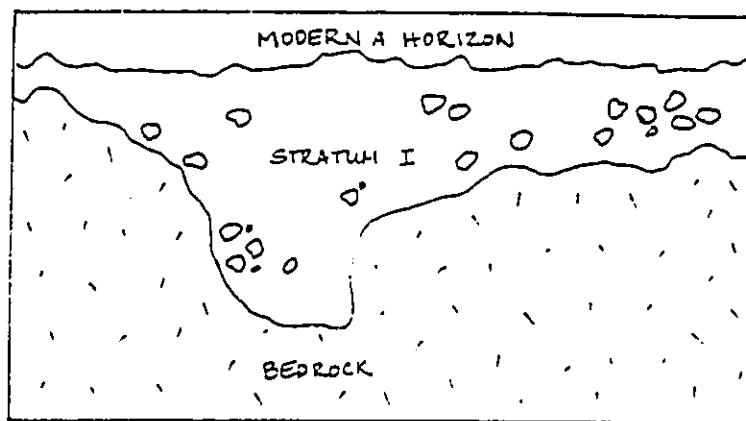
### Testing Results

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

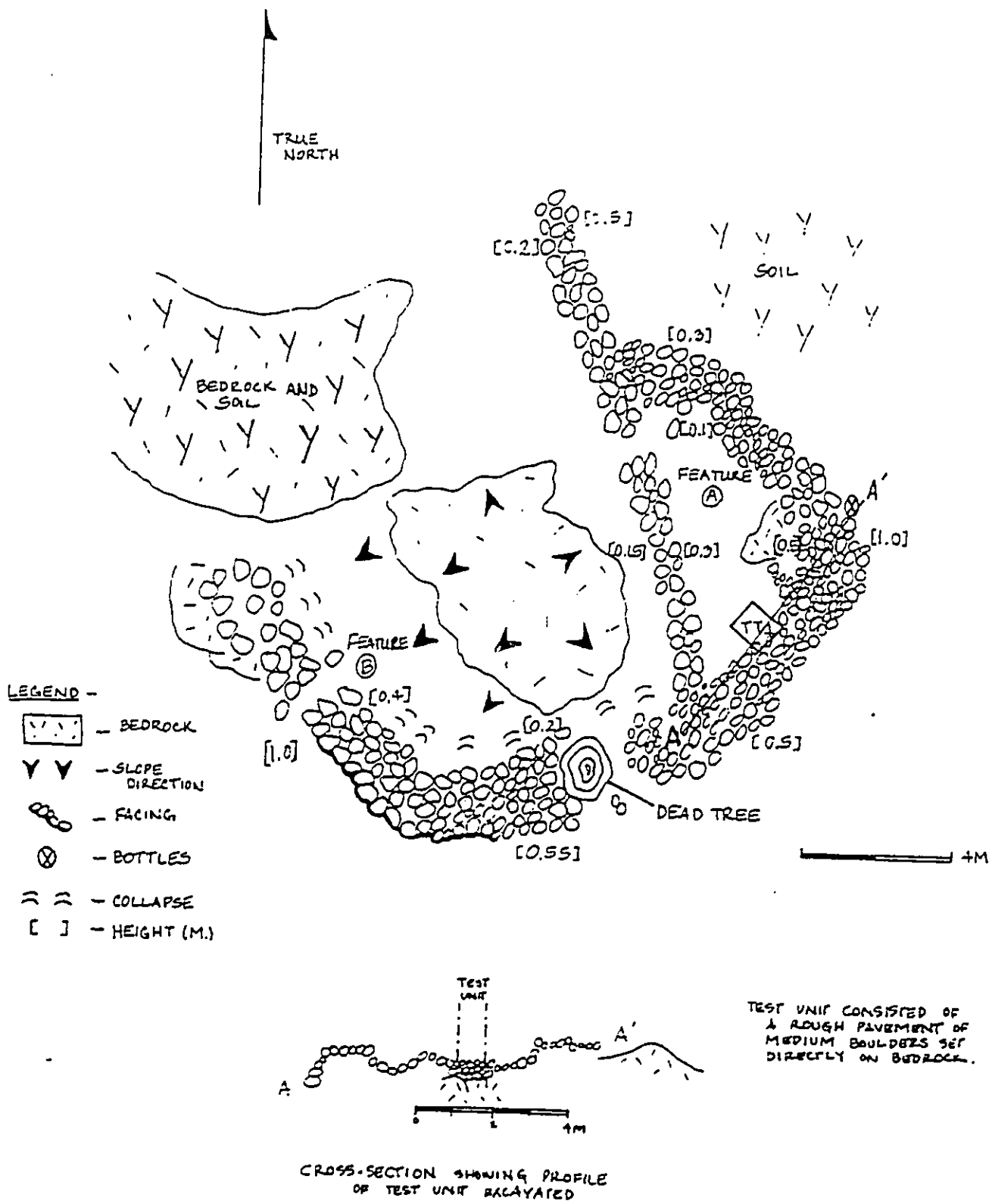


Figure 14 Site 50-10-35-18669, Plan View and Cross Section Showing Excavation Unit

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> (387.3 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.

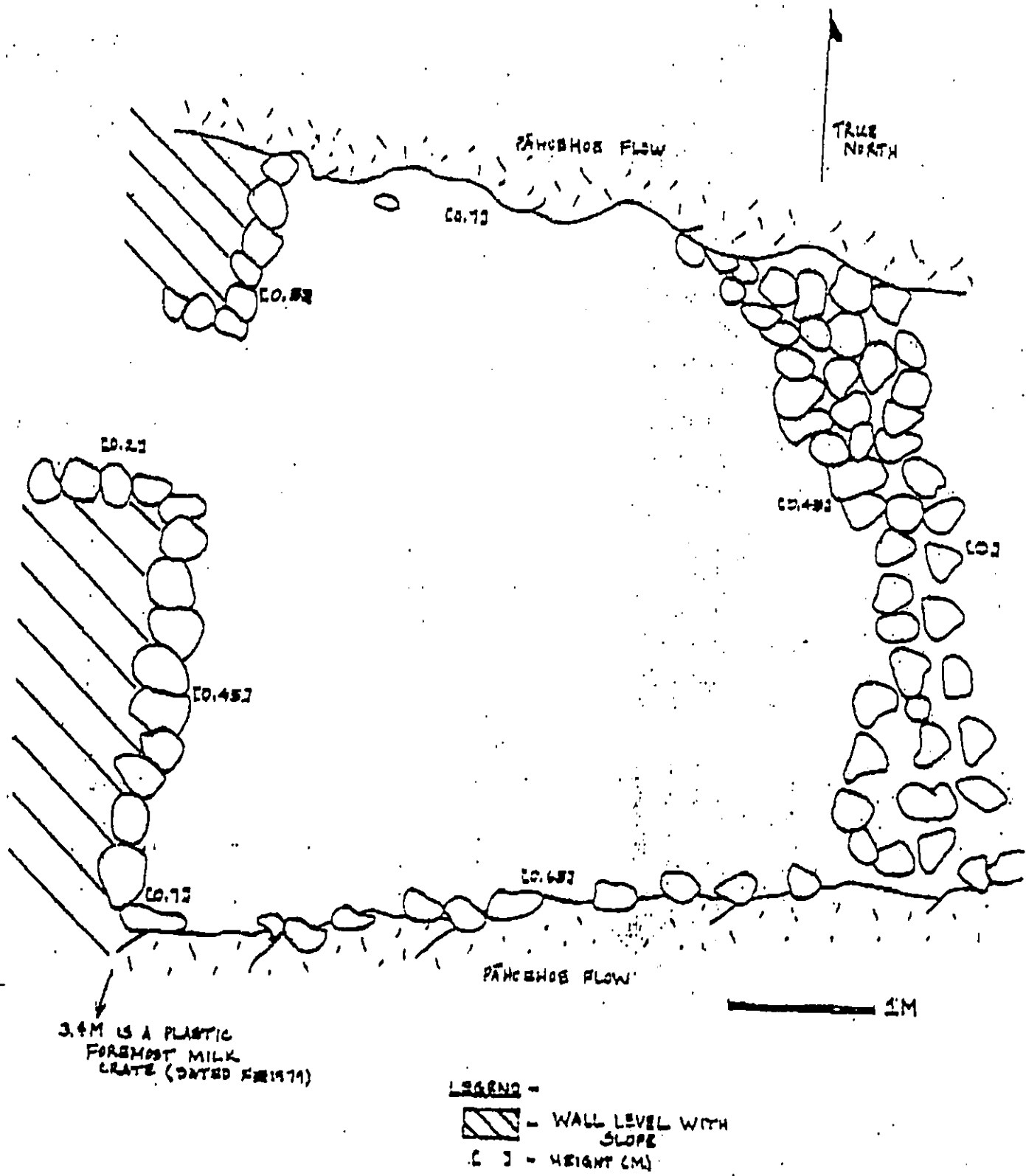


Figure 18 Enclosure Sub-Feature of Site 80-10-35-18870 (CSH12)



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 18670 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.).

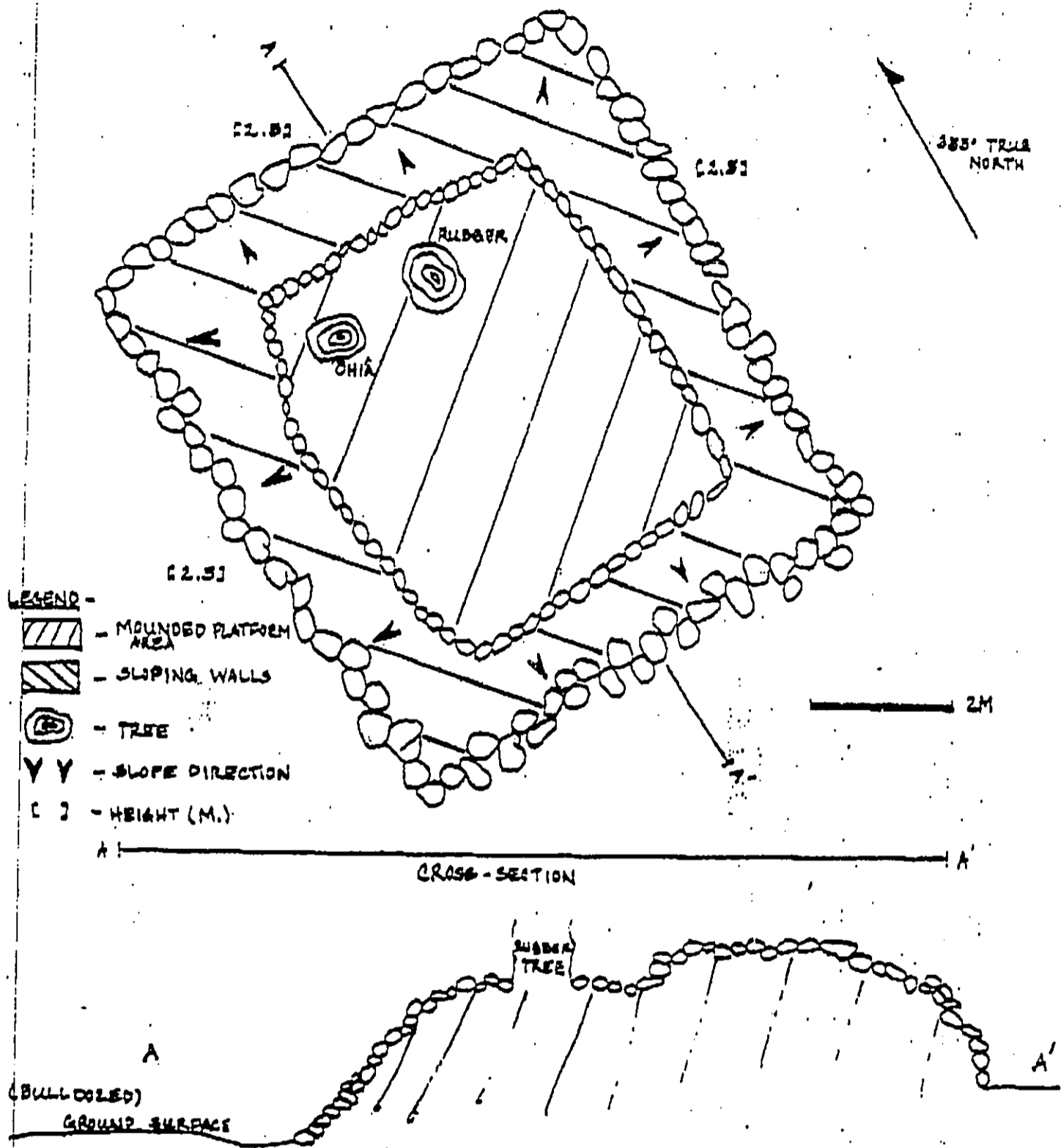


Figure 18 Larger Rock Clearance Mound within Site 860-10-86-18670, Plan View and Cross Section

## 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 skimmers 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.

APPENDIX C

SUPPLEMENTAL ARCHAEOLOGICAL SURVEY AND TESTING  
OF THE PROPOSED UNIVERSITY OF HAWAII AT HILO EXPANSION AREA

BY

CULTURAL SURVEYS HAWAII

**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



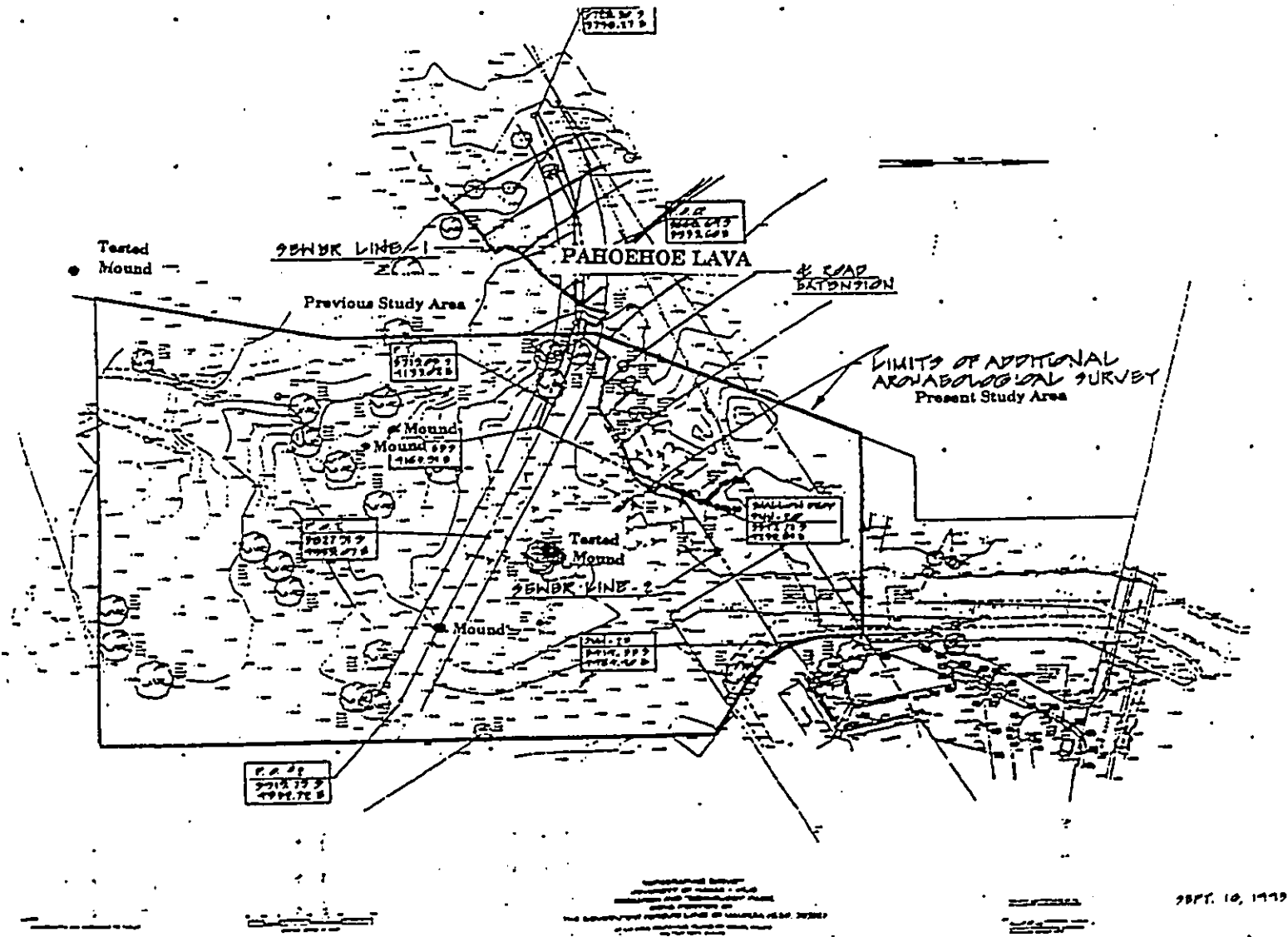


Fig. 2 Project Area Map Showing Archaeological Features



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

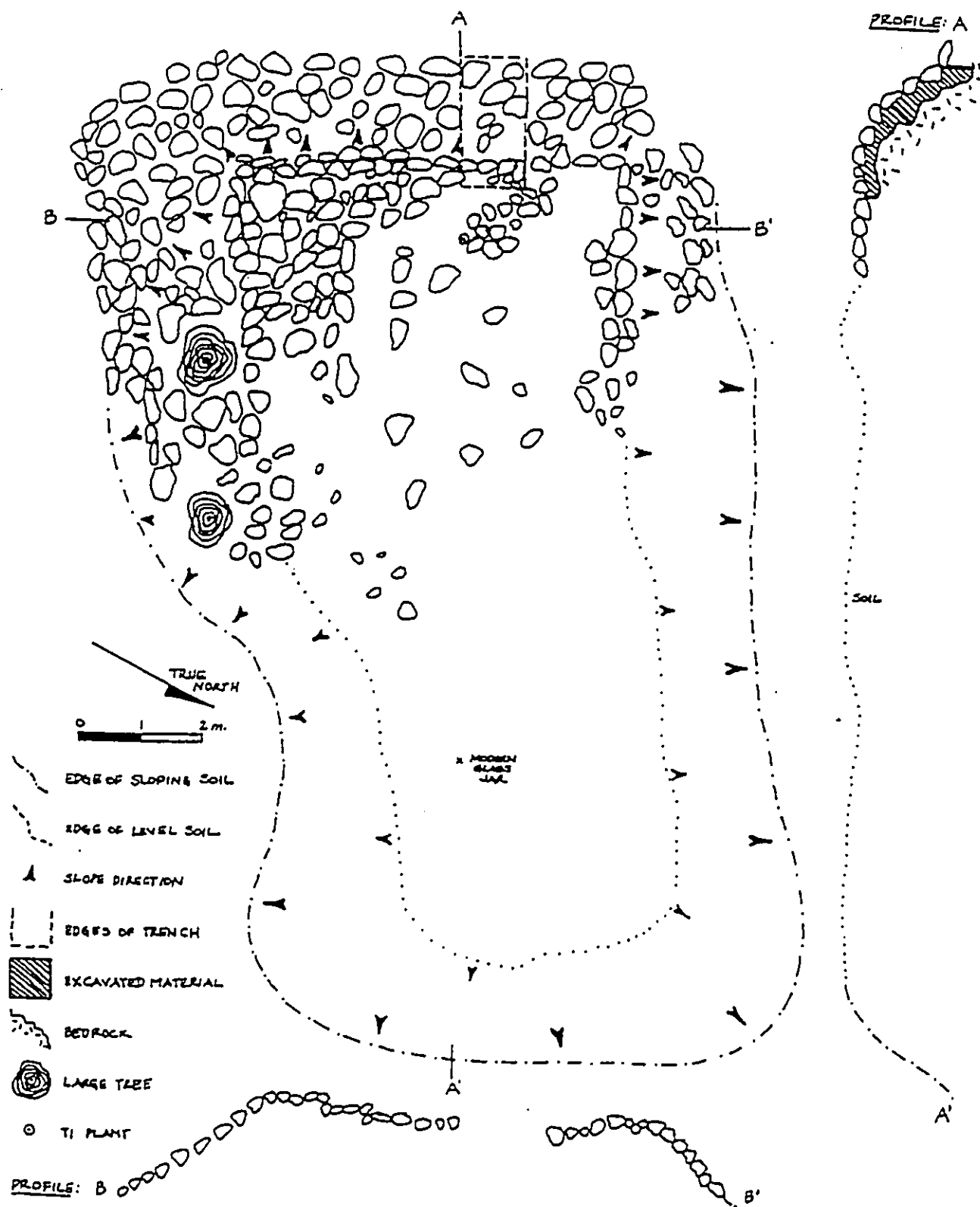


Fig. 4 Plan View and Cross Section of Tested Mound within Present Project Area, Feature of Site -18670

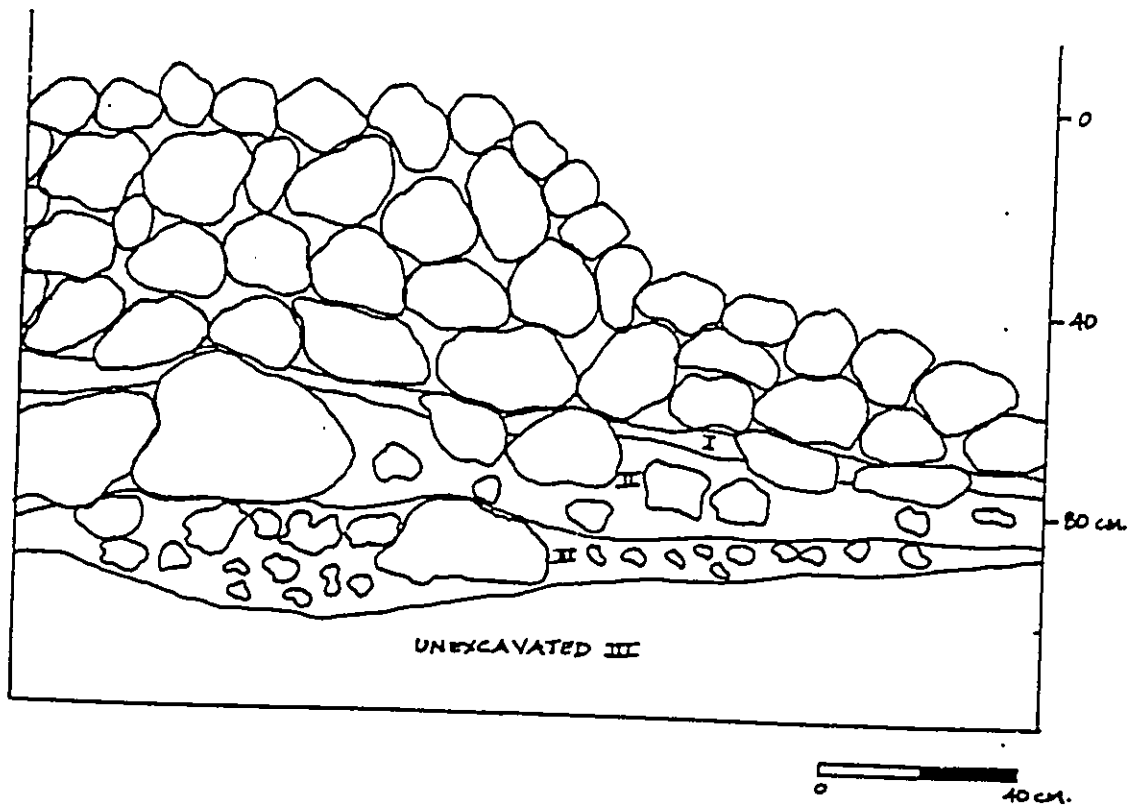


(10YR 3/6) silt loam. Stratum III represents the parent material soil layer or C Horizon which contains a high percentage of soft decomposing rock. No cultural material was within Stratum III.

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

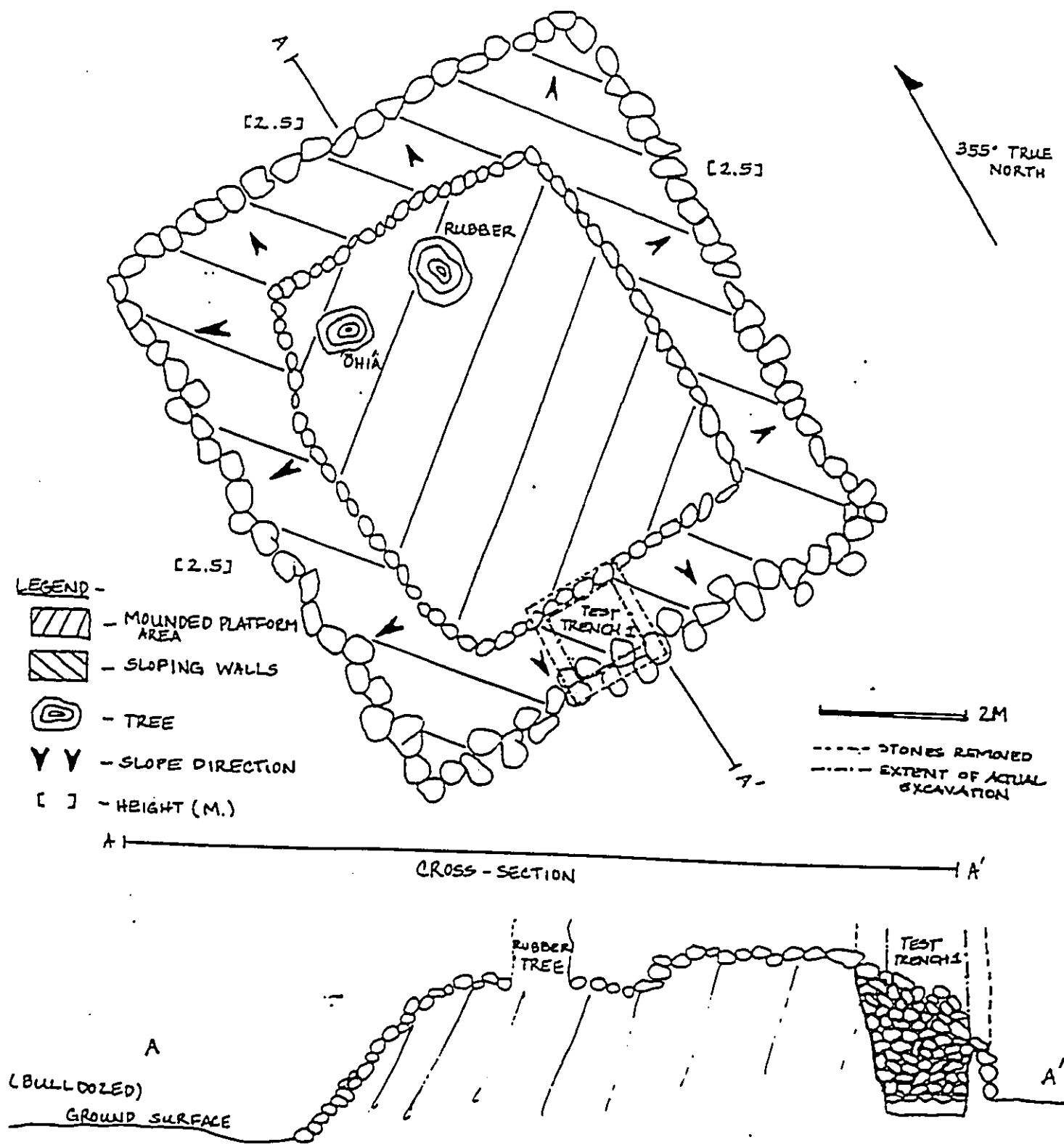
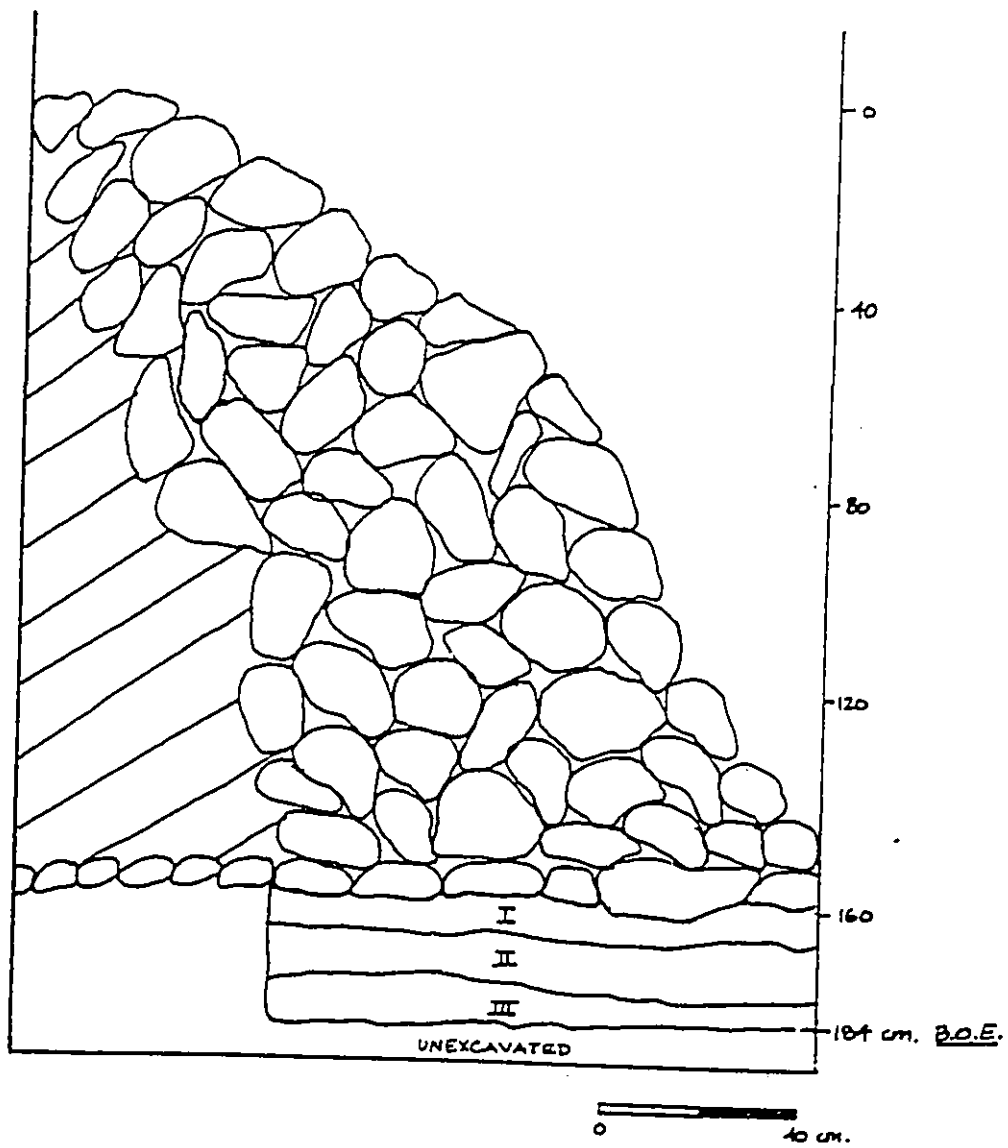


Fig. 6 Plan View and Cross Section of Tested Mound in Previous Study Area Portion of Site -18670 (Based on Figure 16 Borthwick et al.:42)

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 8/2) VERY DARK GRAYISH BROWN SILTY CLAY LOAM; 10-20% ANGULAR PEBBLES

STRATUM III: 10+cm. THICK; (10 YR 8/2) 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 Ponohawai, South Hilo District, Island of Hawai'i.*



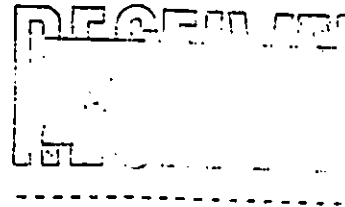
APPENDIX D

LETTERS BETWEEN THE STATE OFFICE OF HAWAIIAN AFFAIRS  
AND SIDNEY FUKU AND ASSOCIATES REGARDING LAND OWNERSHIP

PHONE (808) 594-1888



FAX (808) 594-1865



STATE OF HAWAII  
OFFICE OF HAWAIIAN AFFAIRS  
711 KAPI'OLANI BOULEVARD, SUITE 500  
HONOLULU, HAWAII 96813

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 D

## Sidney Fuke & Associates

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

Consulting Land Use Planners

April 9, 1997

Ms. Martha Ross, Deputy Administrator  
OFFICE OF HAWAIIAN AFFAIRS  
711 Kapi'olani Boulevard, Suite 500  
Honolulu, Hawai'i 96813

Dear Ms. Ross:

**SUBJECT: Environmental Assessment - Proposed Hilo Base Facility  
of the Gemini North 8-Meter Telescope. Hilo, Hawai'i**

Thank you very much for your letter of March 21, 1997, regarding the subject matter.  
I appreciate your clarification.

As a result of your comments, I have made the appropriate changes to the land  
ownership matter. A copy of the pertinent pages are attached for your use and information.

Again, many thanks!

Sincerely,

  
SIDNEY M. FUKÉ  
Planning Consultant

encl.

c Steve Hardash, Gemini Project w/ copy of OHA's letter

and the National Science Foundation for the NEPA process.

### 1.3 Agencies Consulted

As the document will be published for public review and comment in the State Office of Environmental Quality Commission's (OEQC) bulletin, public and additional agency comments have been incorporated in the Final EA. In the preparation of this draft Environmental Assessment, however, the following agencies were consulted:

- \* State
  - Department of Land & Natural Resources
  - Department of Transportation, Highways
  - University of Hawai'i at Hilo
  
- \* County
  - Planning Department
  - Public Works Department
  - Department of Water Supply

## 2. DESCRIPTION OF PROPOSED ACTION

### 2.1 Location and Ownership

The proposed area is located in Waiakea, District of South Hilo, Hawai'i, Tax Map Key: (3) 2-4-01: portion of 7. It consists of a 2+ acre portion of a 202.736 acre parcel. Held in trust by the State of Hawaii, the entire parcel which is ceded land, is leased and use by the University of Hawaii at Hilo.

The subject parcel is located along the east side of Komohana Street, generally between Puainako and Mohouli Streets, and west of the University of Hawai'i complex. The specific location of the proposed improvements is along North Aohoku Place, between the base facilities of California Institute of Technology (CALTECH) and the Joint Astronomy Centre (Figure 1). North Aohoku Place intersects with Nowela Street, which in turn intersects with Komohana Street.

It should be noted that there is a discrepancy relative to the size of the total acreage of parcel 7. According to the files at the Planning Department (Figure 2), a consolidation and resubdivision action

resulted in the creation of two parcels, a 20.0 acre parcel (parcel 41) and the remaining parcel (parcel 7). This occurred on June 16, 1977, file number 3965.

In the consolidation/resubdivision action of the entire parcel, parcel 7 was identified as consisting of an area of 142.450 acres. The current tax map, however, shows a parcel consisting of approximately 202.763 acres, with two lots. One of the lots consists of 152.5 acres, and the other has 36.08 acres (Figure 3).

In an Environmental Assessment prepared in 1993 for the proposed infrastructural improvements of this parcel, the area was described as having 116 acres.

For this EA, however, it will be assumed that the area of the entire parcel is 202.76 acres, consistent with the existing tax maps. Further, this EA will cover only the 2+ acre portion of the entire parcel for the proposed Gemini astronomy base facility.

As noted earlier, the property is ceded land and is held in trust by the State of Hawaii. It is leased to the UH-H for a research and technology park. The Joint Astronomy Centre and the CALTECH base facility are located adjacent to the proposed facility. The National Astronomy Observatory of Japan's (NAOJ) base facility for the Subaru telescope is located adjacent and to the north of the Joint Astronomy Centre, while the University Agriculture Center is located further south on the same parcel.

As noted previously, funding for the telescope is being provided by the governments of the United States, United Kingdom, Canada, Chile, Argentina, and Brazil. The U. S. National Science Foundation, acting as the executive agency for the project, has entered into a cooperative agreement with AURA for the operation of the Gemini Project and is providing 50% of the funding for this project.

## 2.2 Existing Uses

The subject area is currently vacant of any structures. The topography is fairly level, with less than a 10% change in elevation, running in a westerly to easterly direction. Ohia-uluhe and an introduced