

JOHN WAIHEE  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES  
P. O. BOX 119, HONOLULU, HAWAII 96810

ROBERT P. TAKUSHI  
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LLOYD I. UNEBASAMI  
DEPUTY COMPTROLLER

LETTER NO. PM-1380.3

NOV 24 1993

Mr. Brian J. J. Choy  
Director  
Office of Environmental  
Quality Control  
220 South King Street, 4th Floor  
Honolulu, Hawaii 96813

REC'D  
'93 NOV 24 P 1:55  
OFFICE OF ENVIRONMENTAL  
QUALITY CONTROL

Dear Mr. Choy:

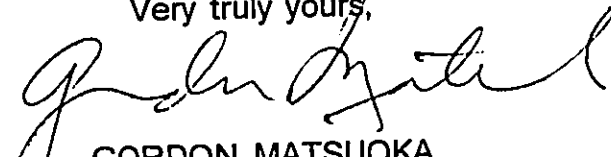
Subject: Negative Declaration for  
University of Hawaii at Hilo  
Infrastructure for Research and Technology Lots  
D.A.G.S. Job No. 11-31-5724  
TMK 2-4-01:7 and 41, Hilo, Hawaii

The Department of Accounting and General Services has reviewed the comments received during the 30-day public comment period which began on July 23, 1993. The agency has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the December 8, 1993, OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

Please contact Ms. Gina Ichiyama at 586-0474 if you have any questions.

Very truly yours,

  
GORDON MATSUOKA  
State Public Works Engineer

GI/si  
Encl.

193

1993-12-08-HI-*FEA*

*University of Hawaii at Hilo Infrastructure  
for Research and Technology Lots*

**FILE COPY**

DEC - 8 1993

**ENVIRONMENTAL ASSESSMENT  
FOR THE  
UNIVERSITY OF HAWAII AT HILO  
INFRASTRUCTURE FOR RESEARCH AND TECHNOLOGY LOTS  
HILO, HAWAII  
TAX MAP KEY: 2-4-01:7 AND 41**

This document is prepared pursuant to Chapter 343, HRS

**Proposing Agency:**

**Department of Accounting and General Services  
State of Hawaii  
1151 Punchbowl Street  
Honolulu, Hawaii 96813**

**Prepared by:**

**Engineering Concepts, Inc.  
250 Ward Avenue, Suite 206  
Honolulu, Hawaii 96814**

**November 1993**

**ENVIRONMENTAL ASSESSMENT**  
**FOR THE**  
**UNIVERSITY OF HAWAII AT HILO**  
**INFRASTRUCTURE FOR RESEARCH AND TECHNOLOGY LOTS**  
**HILO, HAWAII**  
**TAX MAP KEY: 2-4-01:7 AND 41**

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**SECTION I  
PERTINENT DATA**

**APPLICANT:** Department of Accounting and General Services  
State of Hawaii  
1151 Punchbowl Street  
Honolulu, Hawaii 96813  
  
Contact: Gina Ichiyama (586-0474)

**PROJECT TITLE:** University of Hawaii at Hilo  
Infrastructure for Research and Technology Lots

**PROPOSED ACTION:** Construction of water, sewer, drainage, and electrical  
systems to serve existing and proposed research and  
technology lots

**LOCATION:** Hilo, Hawaii  
TMK: 2-4-01:7 and 41

**AGENCIES CONSULTED  
IN THE ASSESSMENT  
PROCESS:**

State of Hawaii  
Department of Health  
Office of Environmental Quality Control  
Historic Sites Section, Department of Land  
and Natural Resources

County of Hawaii  
Department of Public Works  
Department of Water Supply

Federal Government  
Department of the Army, Corps of Engineers

**GOVERNMENT PERMITS  
AND APPROVALS:**

Building Permit  
Grubbing/Grading Permit  
Stream Channel Alteration Permit  
Underground Injection  
Control (UIC) Permit  
National Pollutant Discharge  
Elimination System (NPDES)  
Permit  
Nationwide Permit No. 12  
Coastal Zone Management  
(CZM) Certification  
401 Water Quality Certification

County Department of Public Works  
County Department of Public Works  
State Department of Land and Natural Resources

State Department of Health

State Department of Health  
Department of the Army, Corps of Engineers

Office of State Planning  
State Department of Health

**SECTION II**  
**DESCRIPTION OF PROPOSED ACTION**

**PROPOSED ACTION**

The proposed action consists of the construction of water, sewer, drainage, and electrical systems at the University of Hawaii at Hilo (UH-Hilo). The work will provide the necessary infrastructure for development of three university-based research and technology lots. The project will also provide utility services for a fourth lot currently occupied by the Joint Astronomy Center (JAC).

The project is located within a 116-acre State-owned site directly west of the existing campus (Figure 1). The proposed work will be confined within the existing Komohana Street, Roads 'A' and 'B', and the existing water and electrical easements, with a large portion of the utilities being installed within Roads 'A' and 'B'. In addition, a sewer line serving one of the lots will traverse the northern boundary of the State-owned parcel to the Wailoa Flood Control Channel, where it will cross and connect to an existing sewer manhole on Lanikaula Street. Access to the project site is from the intersection of Komohana Street and existing Road 'A'.

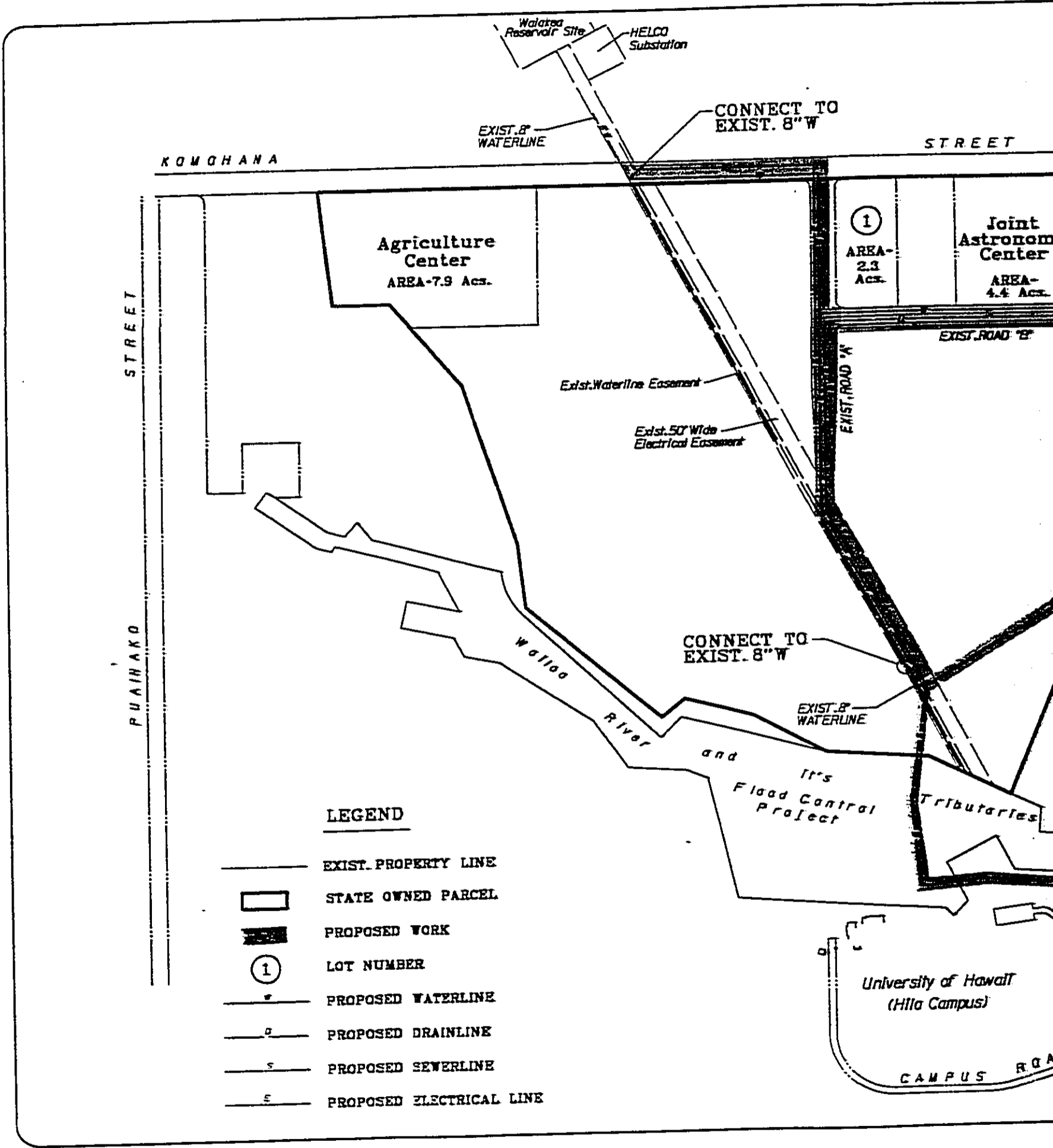
**PROJECT SCHEDULE AND CONSTRUCTION COST**

The installation of utilities will occur over a one-year period. The estimated construction cost for the project is approximately \$3.3 million, which will be funded entirely by the State.

**STATEMENT OF OBJECTIVES**

The main objective of the proposed project is threefold. First, the installation of utilities will allow for the development of the three research and technology lots. Second, the addition of upsized water lines will improve fire flow capabilities to the existing campus, and improve system hydraulics within the service area of the Waiakea Reservoir. Third, the installation of a sewer system will eliminate the use of individual wastewater systems, resulting in higher assurances for public health and reduced impairment to the groundwater.

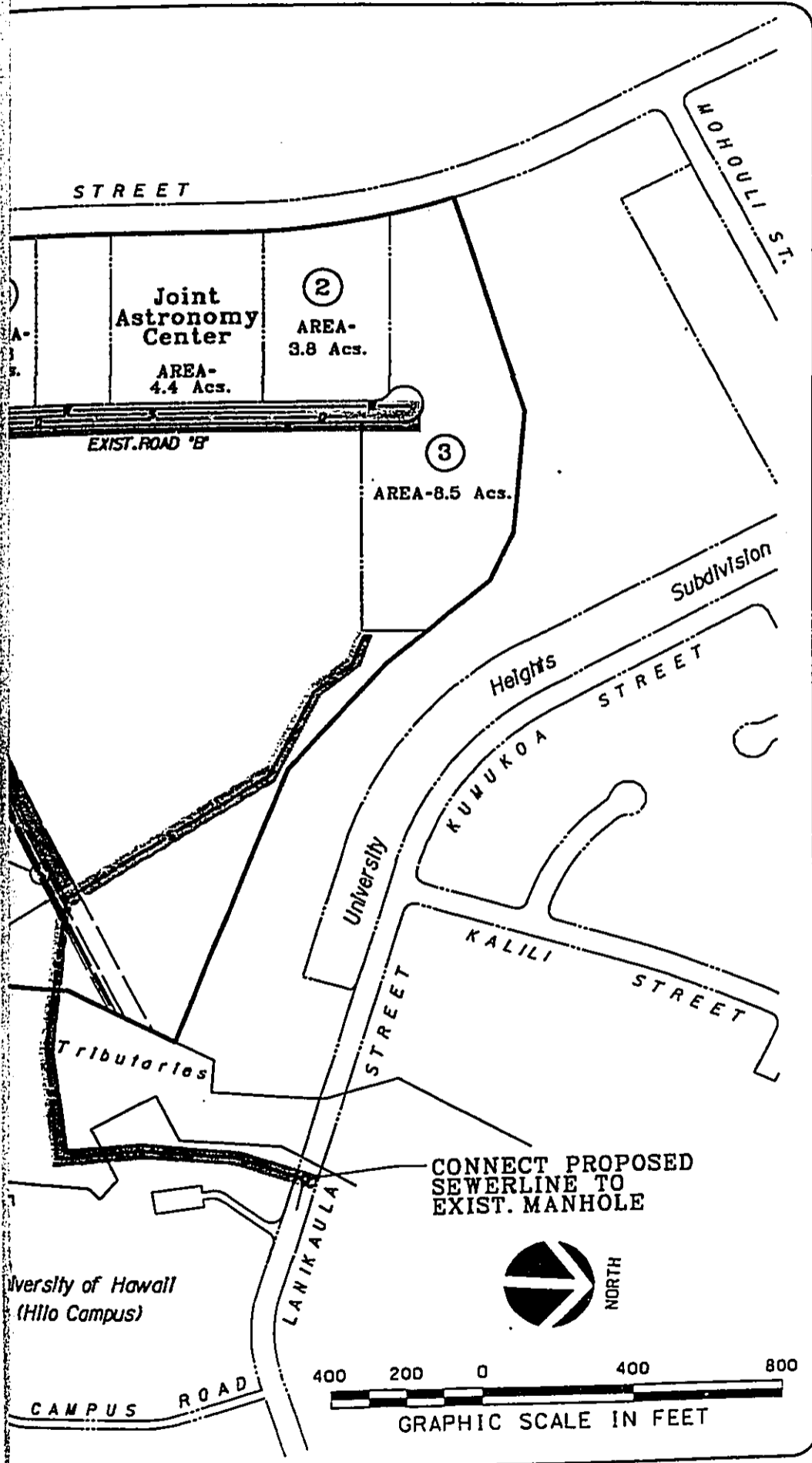




**LEGEND**

- EXIST. PROPERTY LINE
- ▭ STATE OWNED PARCEL
- ▨ PROPOSED WORK
- ① LOT NUMBER
- PROPOSED WATERLINE
- PROPOSED DRAINLINE
- PROPOSED SEWERLINE
- PROPOSED ELECTRICAL LINE

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

**UNIVERSITY OF  
 HAWAII - HILO  
 INFRASTRUCTURE  
 FOR RESEARCH AND  
 TECHNOLOGY LOTS**  
 Hilo, Island of Hawaii, Hawaii

**Proposed  
 Project  
 Layout**

**figure 1**

Secondary objectives as a consequence of the proposed project include the integration of research and technology activities within UH-Hilo, as well as promoting access and communications between the student/faculty community and the technological community. Other secondary objectives include enhancement of the long-term image of the university as a leader in space observatory research and technology, and providing Hilo with both short- and long-term economic growth. Jobs created from construction-related activity will stimulate short-term economic growth. In addition, the creation of research and technological occupations, along with the production of new technology, will provide potential for long-term economic growth.

**SECTION III**  
**SUMMARY DESCRIPTION OF THE AFFECTED ENVIRONMENT**

**PROJECT LOCATION**

The proposed project is located in the city of Hilo on the island of Hawaii (TMK: 2-4-01:7 and 41). Hilo is located on the eastern coast of the island and serves as the center for Hawaii County and State government agencies (Figure 2). With a population of about 46,000, Hilo is the most populous city on the island.

The University of Hawaii at Hilo (UH-Hilo) is one of the nine campuses that comprise the University of Hawaii system. The campus was established in 1970 and is a comprehensive undergraduate institution that offers certificates in various vocational fields and baccalaureate degrees. The existing campus is located approximately 2 miles southwest of Hilo airport and occupies about 115 acres. The campus is bound by Lanikaula, Kapiolani, Kawili, and Puainako Streets, and the Wailoa Flood Control Channel (Figure 2).

**Project Site**

The proposed project is located within a 116-acre State-owned parcel which lies directly west of the existing UH-Hilo campus. The proposed activity will be confined to the northern portion of the State-owned parcel. The project is bound by the University Heights subdivision to the north, an electrical and water easement to the south, Komohana Street to the west, and by the Wailoa Flood Control Project to the east (Figure 1).

There are two existing roads traversing the project. Road 'A' is a 1,150-foot long road that is connected to Komohana Street. Road 'A' traverses the project in an east-west direction towards an existing electrical easement. Road 'B' is a 1,250-foot long cul-de-sac that is connected to Road 'A' and traverses the project in the north-south direction. Both roads feature asphalt concrete pavements and concrete curb and gutters.



Two utility easements currently traverse the State parcel in an east to west direction. One is a 50-foot wide electrical easement in favor of Hawaii Electric and Light Company (HELCo), which has overhead power lines routed through the parcel. The lines provide service from the existing HELCo substation on Komohana Street. The second easement runs adjacent to the electrical easement and is in favor of the County's Department of Water Supply. This easement contains an 8-inch water transmission line which conveys water from the 0.5 million gallon Waiakea Reservoir located off of Komohana Street at a spillway elevation of 354 feet.

Currently, the State parcel is occupied by two tenants: The Joint Astronomy Center (JAC) facility (4.4 acres), and the UH-Hilo Agriculture Center (7.9 acres). The JAC facility consists of a one- and two-story concrete building with a total floor space of approximately 14,000 square feet. An additional 34,000 square feet is used for parking and driveways, with the remaining area being open space. The Agriculture Center is comprised of three programs: 1) The Hawaii Agricultural Experiment Station (HAES), 2) the Cooperative Extension Service, and 3) the College of Agriculture. The HAES currently occupies about 20,000 square feet of floor space which includes offices, conference rooms, storage rooms, laboratories, greenhouses, research plots, and a library. The Cooperative Extension Service occupies about 6,500 square feet of floor space. This includes offices, a display area, a laboratory/kitchen/seminar room, library, conference rooms, and storage rooms. The College of Agriculture occupies about 15,000 square feet of space, which is mainly laboratory space for students and faculty.

Once the utilities are installed, the three lots slated for development are expected to be for astronomy-related technology and/or research. Lot 1 (2.3 acres) will be developed by the California Institute of Technology, lot 2 (3.8 acres) will be developed by Subaru of Japan, and lot 3 (8.5 acres) will be developed in a joint venture between the Hawaii Institute for Astronomy and various government agencies.

#### **LAND OWNERSHIP**

The land is currently owned by the State of Hawaii.

### TOPOGRAPHY

The project site slopes from east to west. Site elevations range from about 140 feet mean sea level (MSL) at the Wailoa Flood Control Channel to about 320 feet MSL at Komohana Street. In general, the slope of the site ranges from 6 to 10 percent, while areas along Komohana Street and near the center of the site have slopes between 10 and 15 percent. Isolated areas throughout the site have slopes greater than 15 percent.

### GEOLOGY/SOILS

The types of soil within the project site are identified in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Island of Hawaii, State of Hawaii (1972). The soil types consists of Keaukaha extremely rocky muck, Pahoehoe Lava flows, and Panaewa very rocky silty clay loam.

Keaukaha extremely rocky muck consists of well-drained, thin organic soils overlying pahoehoe lava bedrock. A representative profile consists of a very dark brown muck about 8 inches thick overlaying the pahoehoe lava. Runoff potential on this type of soil is medium, and the erosion hazard is slight.

Pahoehoe lava flows have a billowy, glassy surface that is relatively smooth. Pahoehoe lava usually has no soil covering and is typically bare of vegetation. Pahoehoe lava is very slowly permeable, but water will move readily and rapidly through cracks.

Panaewa very rocky silty clay loam consists of shallow, moderately well-drained silty clay loams that were formed in volcanic ash. The soil's permeability is rapid, runoff is slow, and the erosion hazard is slight. A representative profile has a surface layer consisting of very dark brown silty clay loam about 12 inches thick. The subsoil is about 4 inches thick and consists of very cobbly dark brown silty clay loam, mottled with yellowish red. These layers are underlain by pahoehoe lava bedrock.

## CLIMATE

Hilo is located on the eastern (windward) side of the island and is usually subjected to northeasterly (onshore) winds during the day. These wind speeds predominately range from 4 to 12 miles per hour. However, diurnal heating and cooling occasionally gives rise to offshore (southwesterly) breezes at night.

Daytime temperatures in degrees Fahrenheit range from the upper 70's to the low 80's, while temperatures at night range from the low 60's to the upper 70's.

Mean annual rainfall averages about 141 inches. Although the wet season usually occurs from October through April, rain falls approximately 280 days out of the year.

## FLORA

A botanical survey of the State parcel was conducted in December 1992 for the purpose of identifying the existence of any rare or endangered flora. A copy of the botanical survey is included in Appendix A.

The survey indicated that the parcel is characterized mainly by two types of vegetal cover: Ohia-Uluhe, and an introduced mixed forest. Along the west and north areas of the parcel, native ohia trees (Metrosideros polymorpha) and dense, matted uluhe ferns (Dicranopteris linearis) dominate the landscape. Vegetation along the eastern portions of the parcel are comprised of introduced species, mainly secondary forest trees such as the gunpowder tree (Trema orientalis), melochia (Melochia umbellata), and Chinese banyan (Ficus microcarpa).

According to the survey, there are no plants that are officially listed as threatened or endangered. In addition, none of the plants surveyed are proposed or candidates for such a designation.



### **STATE AND COUNTY LAND USE DESIGNATION**

According to State Land Use Commission documents, the parcel is designated as an Urban District (Figure 3). On the Hawaii County General Plan Land Use Pattern Allocation Guide (LUPAG) map, the land is classified as University. The Hawaii County Zoning maps show the site designated as Single Family Residential District RS-10, and Agricultural District A-1A (Figure 4).

### **AIR QUALITY**

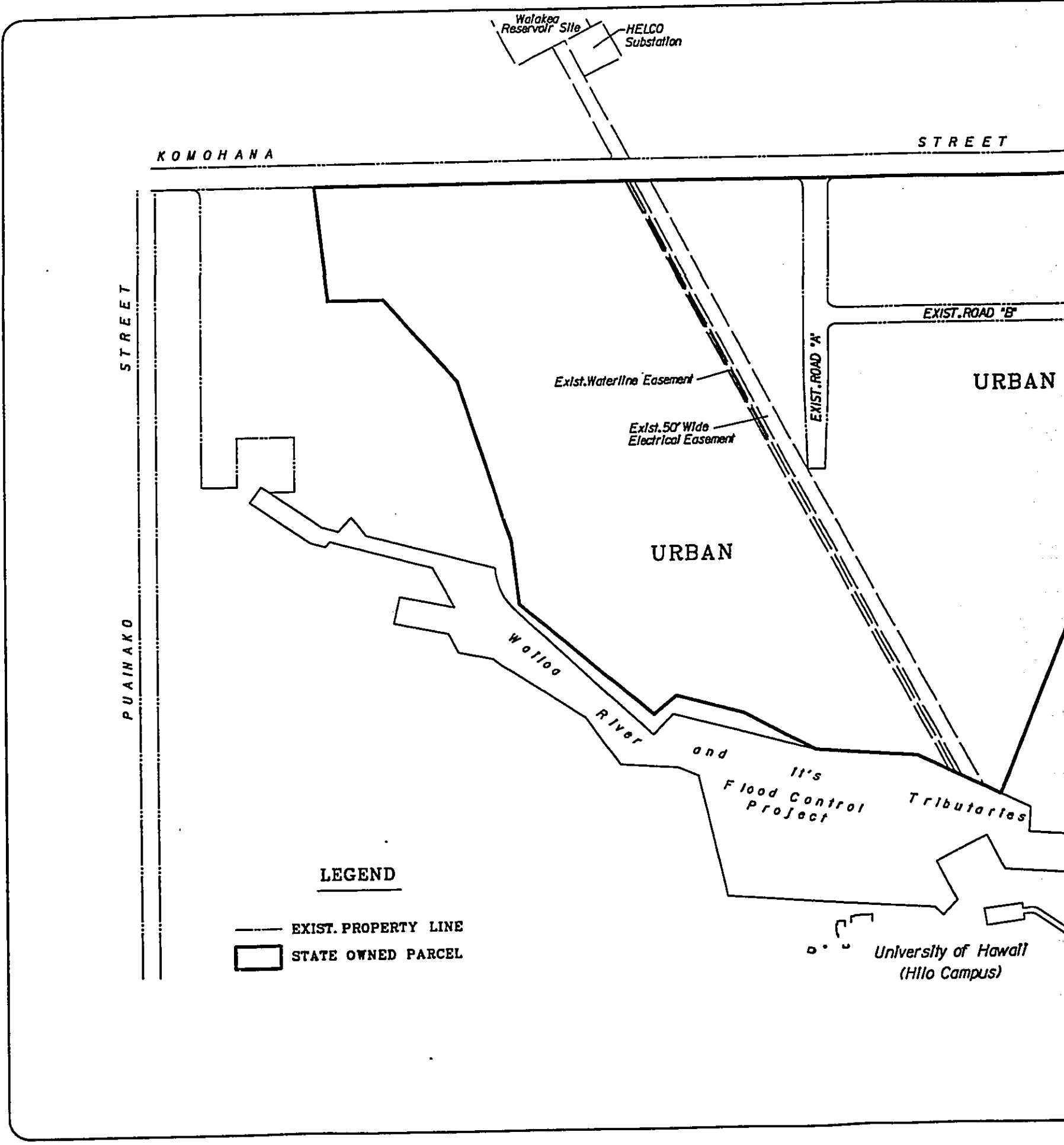
Hilo does not usually have high levels of pollutants due to tradewinds. However, during periods of volcanic activity with little or no wind, the city can experience a decrease in air quality due to volcanic emissions. In addition, air quality along the major corridors through the city occasionally decrease due to traffic activity (automobile emissions), especially during periods of congestion.

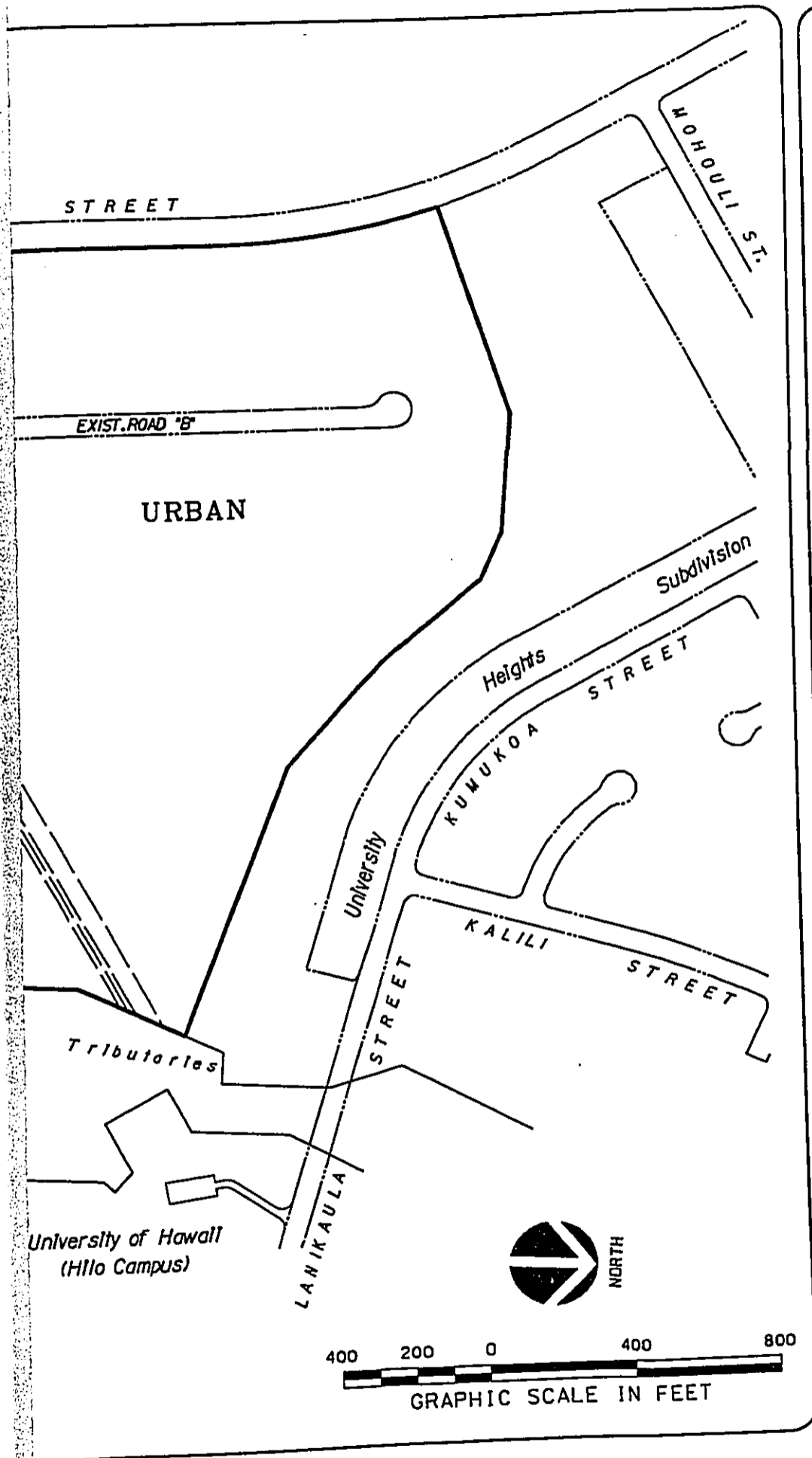
### **ARCHAEOLOGICAL SITES**

A surface and historical background study of the state-owned parcel was conducted in December 1992 and January 1993. A total of four sites were identified in the southern portion of the parcel (Figure 5). Two of the sites and a mound feature within the third site were excavated to search for cultural remains. Based on the type and age of the sites, as well as the data collected and analyzed, no further work was recommended for the area. In addition, archaeological monitoring during construction earthmoving was not recommended due to the adequacy of information gathered. A copy of the archaeological survey is included in Appendix B.

A supplemental archaeological survey encompassing approximately 11 acres within the adjacent flood control channel immediately east of the project site was subsequently undertaken in September 1993 to identify features which may be impacted due to the proposed sewer crossing. Four mound features and the continuation of a rock wall from the state-owned parcel were identified. It was concluded that these features, like those identified in the state-owned parcel, were part of the commercial sugar cane cultivation landscape. The conclusion was based on subsurface testing of the largest, most discernable mound within the

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



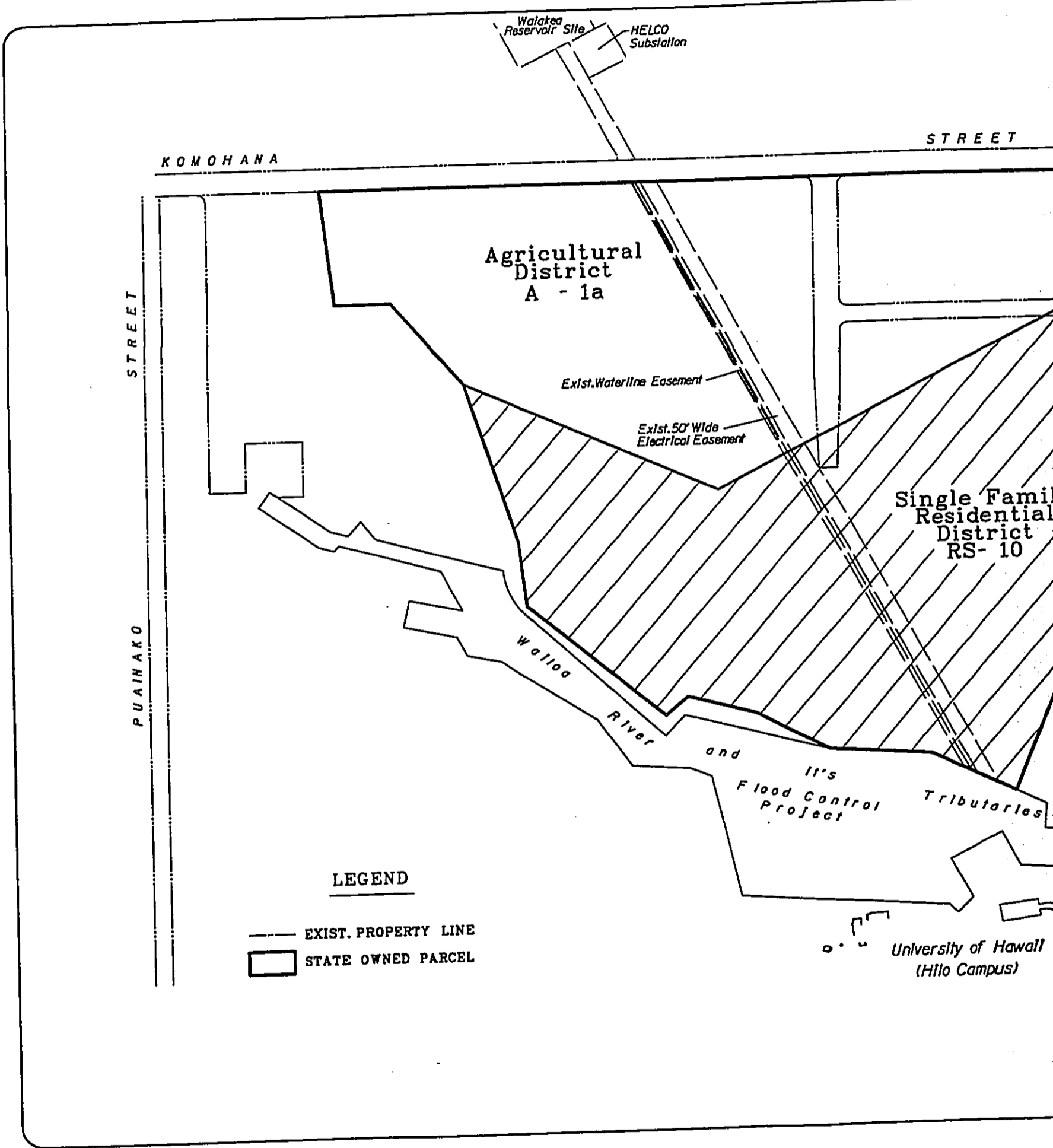


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 Honolulu, Hawaii

**UNIVERSITY OF  
 HAWAII - HILO  
 INFRASTRUCTURE  
 FOR RESEARCH AND  
 TECHNOLOGY LOTS**  
 Hilo, Island of Hawaii, Hawaii

**State Land  
 Use District  
 Boundaries**

**figure 3**



Walakea Reservoir Site  
HELCO Substation

KOMOHANA

STREET

Agricultural District  
A - 1a

STREET

Exist. Waterline Easement

Exist. 50' Wide  
Electrical Easement

Single Family  
Residential  
District  
RS- 10

PUAINAKO

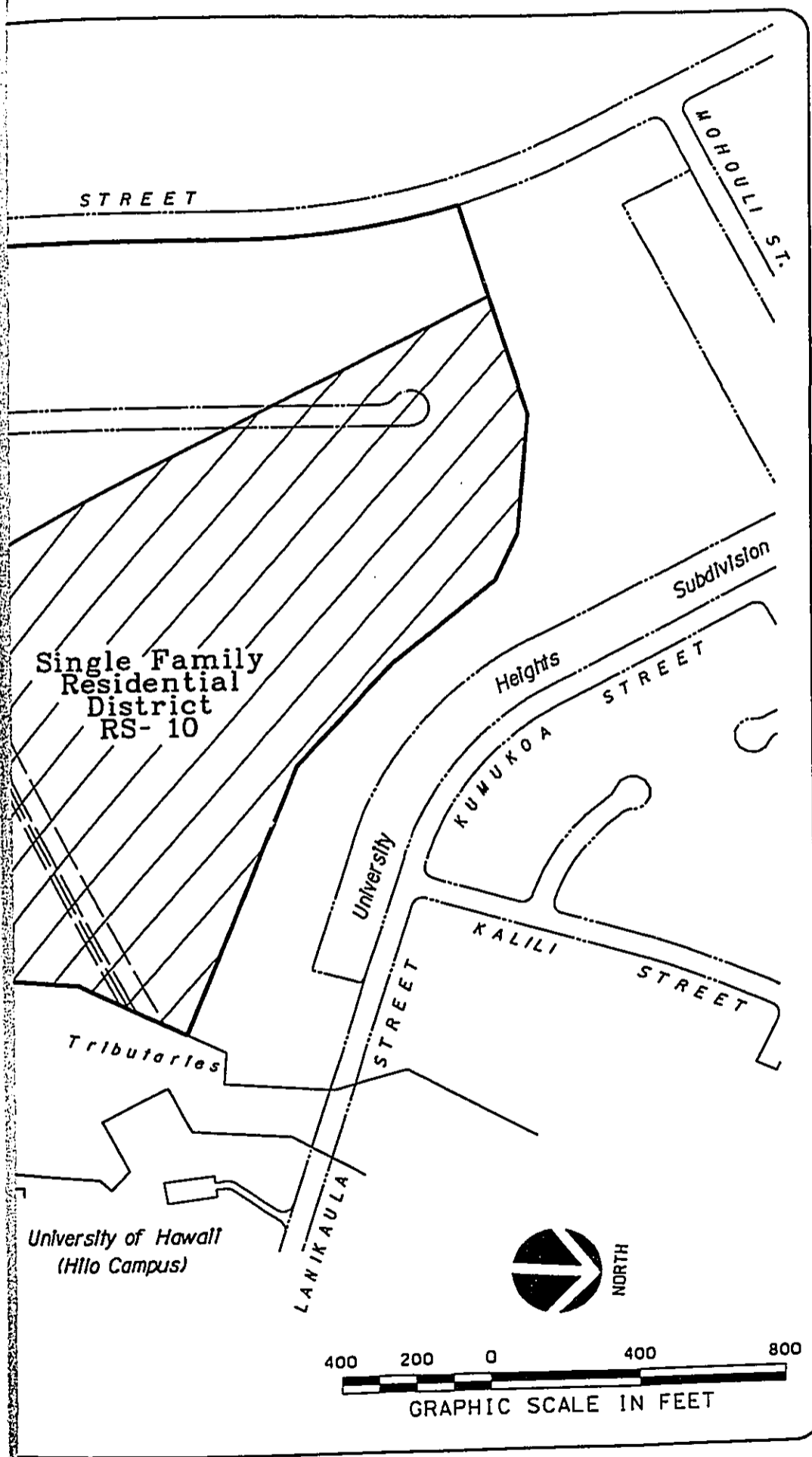
Walaloa River

and its  
Tributaries  
Flood Control  
Project

LEGEND

- EXIST. PROPERTY LINE
- STATE OWNED PARCEL

University of Hawaii  
(Hilo Campus)

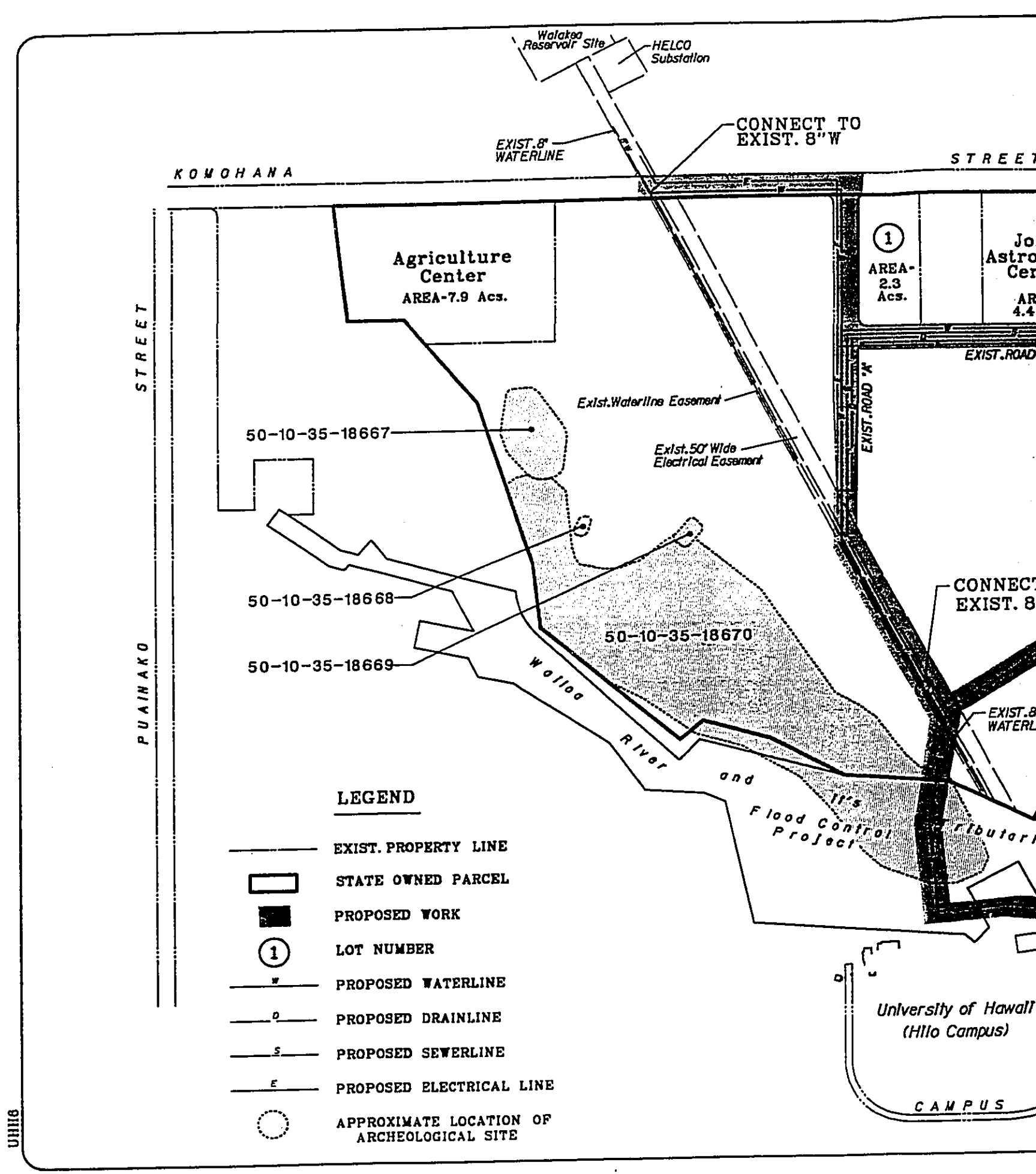


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**UNIVERSITY OF  
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 INFRASTRUCTURE  
 FOR RESEARCH AND  
 TECHNOLOGY LOTS**  
 Hilo, Island of Hawaii, Hawaii

**Hawaii County  
 Zoning**

**figure 4**



KOMOHANA

STREET

STREET

PUAINAKO

UH116

Agriculture Center  
AREA-7.9 Acs.

50-10-35-18667

50-10-35-18668

50-10-35-18669

50-10-35-18670

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AREA-  
2.3  
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Jo  
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Cer  
AR  
4.4

Exst. Waterline Easement  
Exst. 50' Wide  
Electrical Easement

CONNECT  
EXIST. 8"

EXIST. 8"  
WATERLINE

**LEGEND**

- EXIST. PROPERTY LINE
- ▭ STATE OWNED PARCEL
- PROPOSED WORK
- ① LOT NUMBER
- W PROPOSED WATERLINE
- D PROPOSED DRAINLINE
- S PROPOSED SEWERLINE
- E PROPOSED ELECTRICAL LINE
- APPROXIMATE LOCATION OF ARCHEOLOGICAL SITE

and  
Flood Control  
Project

University of Hawaii  
(Hilo Campus)

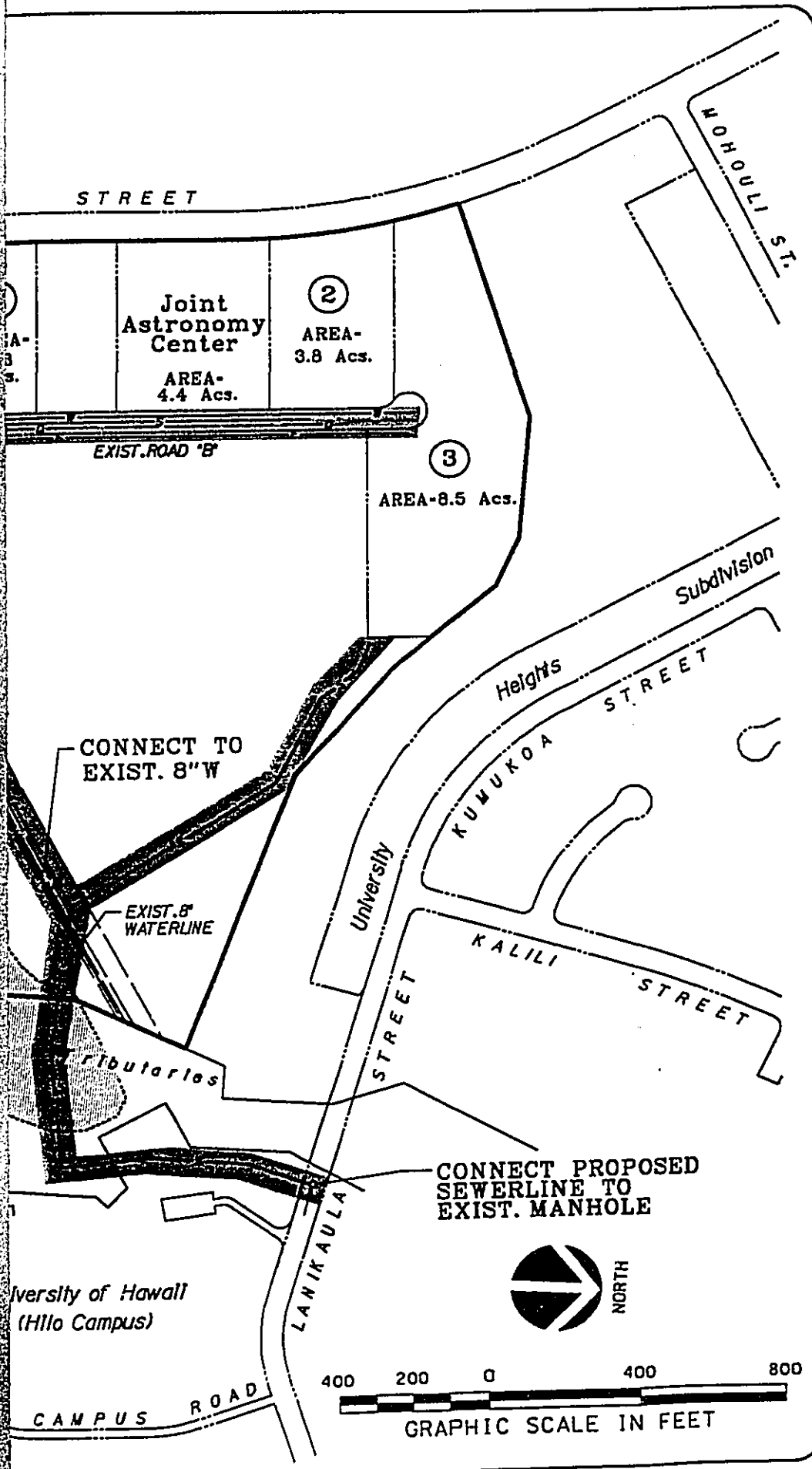
CAMPUS

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Honolulu, Hawaii

**UNIVERSITY OF  
HAWAII - HILO  
INFRASTRUCTURE  
FOR RESEARCH AND  
TECHNOLOGY LOTS**  
Hilo, Island of Hawaii, Hawaii

**Archeological  
Sites**

**figure 5**



flood control channel and another large mound within the state-owned parcel. The four mounds and wall, are component features of the furrowed field given State Site number 50-10-35-18670 (Figure 5), and are included under the same site designation. No further archaeological research is necessary for the features. A copy of the supplemental archaeological survey is included in Appendix C.

Concurrence of the State Historic Preservation Division with the conclusions presented in these two archaeological reports is pending.



## SECTION IV

### IDENTIFICATION AND SUMMARY OF IMPACTS AND PROPOSED MITIGATION MEASURES

This section identifies the impacts attributable to the proposed project. Impacts are categorized into short-term impacts, normally of short duration and confined to the length of construction period, and long-term impacts resulting from operational activities.

#### SHORT-TERM IMPACTS

Short-term impacts will be attributable to construction of the proposed infrastructure. Dust, exhaust emissions, noise, and traffic disruptions will be most pronounced during this period of construction.

Nearby residences and existing campus facilities will be periodically affected by traffic from the construction vehicles. In addition, earthwork activities at the site will result in noise impacts to the neighborhood.

#### LONG-TERM IMPACTS

The proposed project will have several long-term impacts. First, the installation of a larger diameter water pipe to replace a section of the existing 8-inch water transmission line from the Waiakea Reservoir will improve system hydraulics for areas within the reservoir's service zone. In addition, the larger diameter pipe will improve fire flow capabilities for portions of the existing UH-Hilo campus currently served by the reservoir.

A second long-term impact associated with the project will be the elimination of the existing individual wastewater systems to treat sewage generated by the research and technology lots. This will result in higher levels of assurances for public health and virtually eliminate the impact to the groundwater by leachate from the individual wastewater systems. Installation of the new sewer lines will convey wastewater into the County's municipal sewer system, where it will be sent to the Hilo wastewater plant for treatment and disposal.

The proposed project will not impact significant flora. Introduced or alien species are the dominant components of the vegetation in the area.

Onsite survey and historical research indicate the absence of any significant archeological sites. Rock clearance mound features within the flood control channel may be impacted by excavation for the proposed sewer crossing. However, historic agricultural sites or features, like the rock clearance mounds, are not generally deemed appropriate for preservation based on State Historic Preservation Division guidelines.

#### **MITIGATION MEASURES**

Adverse impacts of the proposed project related to construction activities will be governed by all federal, state, and county laws and the contract specifications. The contractor's work activity shall be limited to the hours between 7:00 am and 3:30 pm.

#### **Noise**

The contractor will be required to implement measures to reduce the level of noise generated by his construction activities. The contractor shall abide to the following:

1. No construction activities shall create excessive noise when measured at or beyond the project boundary for the hours before 7:00 am and after 3:30 pm of the same day.
2. No construction activities shall exceed the 95 dBA noise level on Saturdays, Sundays, and on holidays.

#### **Air Pollution**

Air quality degradation can be expected in the immediate vicinity of construction activity and is primarily attributable to fugitive dust and exhaust emissions from construction equipment.

The contractor will be required to comply with the provisions of Chapter 60, "Air Pollution Control," of Title 11, Administrative Rules of the State of Hawaii Department of Health. The contractor will be required to implement measures to minimize air quality degradation.

These measures may include the application of water to retard airborne dust and the inspection of construction vehicles for exhaust emissions. Further dispersion of airborne emissions is expected from the prevailing winds.

#### **Short-Term Traffic Disruptions**

Construction of the proposed infrastructure may result in periodic traffic disruptions to the residences in the vicinity of the project. The contractor shall conform to the safety precautions and requirements of the "Rules and Regulations Governing the Use of Traffic Control Devices at Work Sites on or Adjacent to Public Streets and Highways," adopted by the Highway Safety Coordinator, and the U.S. Federal Highway Administration's "Manual on Uniform Traffic Control Devices for Streets and Highways, Part VI, Traffic Controls for Highway Construction and Maintenance Operations." Other conditions to be imposed on the contractor to minimize traffic disruptions include:

1. Access to and from driveways and public streets shall be provided at all times.
2. During nonworking hours, trenches shall be covered with steel plates and all lanes shall be open to traffic.
3. As required by Hawaii County, special duty police officers shall be hired to direct the flow of traffic.
4. All walkways and intersections shall be maintained in passable condition for pedestrian traffic.

#### **Visual Impacts**

There will be no known adverse visual impacts associated with the proposed project. Most utilities will be installed underground, with only the new street lighting being visible.

**SECTION V**  
**ALTERNATIVE CONSIDERED**

The project goal is to install utilities to allow development of the three research and technology lots, and to upgrade existing utilities. A secondary goal is to integrate research and technology activities with UH-Hilo, and promote access and communications between the student/faculty community and the technological community. Following these guidelines, one alternative was considered in addition to the proposed action.

**NO ACTION**

In the no action scenario, the existing water transmission system would not be upgraded. Therefore, the fire flow requirements for several portions of the existing campus would remain inadequate. In addition, several areas serviced by the Waiakea reservoir would continue to experience water line pressures below Department of Water Supply (DWS) standards. No action would also allow continuation of sewage disposal through the use of septic tanks and leaching fields.

Non-installation of the utilities would also prevent the coordinated development of utilities for the three lots. Individual installation of utilities for each lot would create traffic routing problems along Komohana Street, Road 'A', and Road 'B'.

This alternative is not acceptable because it would allow continuation of inadequate water service and wastewater disposal, and would prevent orderly development of the three proposed research and technology lots.

## SECTION VI

### DETERMINATION, FINDINGS, AND REASONS SUPPORTING DETERMINATION

#### DETERMINATION

As a result of this environmental assessment, it is concluded that the proposed project will not have any significant potential impacts on the environment, and an environmental impact statement (EIS) is not required. Therefore, in accordance with Chapter 343, Hawaii Revised Statutes, this environmental assessment is being submitted as a Negative Declaration.

#### FINDINGS AND REASONS SUPPORTING DETERMINATION

The proposed action was determined to have no significant impacts according to the significant criteria stated in Section 11-200-12 of the Environmental Impact Statement Rules. The criteria and findings are stated below.

1.     **Criteria:** Involves an irrevocable commitment to loss or destruction of any natural or cultural resources.  
       **Finding:** The project site does not contain any endangered wildlife or flora. Disturbance of rock clearance mounds may occur due to sewer construction within the flood control channel. However, subsurface testing of these features has revealed the absence of cultural material (i.e. midden, artifacts) and preservation is not generally deemed appropriate based on State Historic Preservation Division guidelines.
  
2.     **Criteria:** Curtails the range of beneficial uses of the environment.  
       **Finding:** There will be no known beneficial use of the environment that will be curtailed.
  
3.     **Criteria:** Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapters 343 and 344, Hawaii Revised Statutes,

and any revisions thereof and amendments thereto, court decisions, or executive orders.

Finding: There will be no known conflict.

4. Criteria: Substantially affects the economic or social welfare of the community or state.

Finding: No residences or businesses will be permanently displaced.

5. Criteria: Substantially affects economic or sociological activities.

Finding: The construction of infrastructure will create short-term, construction related jobs for the island.

6. Criteria: Involves substantial secondary impacts, such as population changes or effects on public facilities.

Finding: The project will improve water services to the existing campus and surrounding areas serviced by the Waiakea reservoir. No substantial population changes are anticipated by this project.

7. Criteria: Involves a substantial degradation of environmental quality.

Finding: Construction-related short term impacts will occur. No long-term degradation of environmental quality will take place. Connection of existing JAC facility to county sewer system will alleviate potential detrimental effects due to the individual wastewater disposal system currently used.

8. Criteria: Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

Finding: No, this is not the case.

9. Criteria: Substantially affects a rare, threatened, or endangered species of animal or plant or habitat.

Finding: No endangered wildlife or flora are found in the affected area.

10. **Criteria:** Detrimentially affects air or water quality or ambient noise levels.  
**Finding:** The impacts to air and ambient noise levels are associated with construction activities. These impacts are short-term and temporary. The Contractor will be required to conform to all applicable laws and regulations to mitigate construction-associated impacts.
11. **Criteria:** Affects an environmental sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.  
**Finding:** The majority of the project is not located in an environmentally sensitive area. A portion of the sewer line will be installed in a flood control channel. A stream channel alteration permit, Army Corps of Engineers Nationwide Permit No. 12, 401 Water Quality Certification, and Coastal Zone Management Certification will be obtained prior to construction.

**SECTION VII**  
**COMMENTS AND RESPONSES RECEIVED DURING PREPARATION OF**  
**THE FINAL ENVIRONMENTAL ASSESSMENT**

The notice of availability for the Draft Environmental Assessment was officially published in the Office of Environmental Quality Control (OEQC) Bulletin on July 23, 1993. Two comment letters were received during the 30-day public comment period ending on August 23, 1993. Copies of comment and response letters are included in this section.



Copy

Ho'oikaika letter

1

Michael D. Larish  
Chair, Ho'oikaika Research Committee  
34 Mala'ai Poai  
Hilo, HI. 96720  
Telephone: 959-9789  
Aug. 20, 1993

Ms. Gina Ichiyama  
Dept. of Accounting and General Services  
1151 Punchbowl Street  
Honolulu, HI. 96813  
Telephone: 586-0474

Subject: Draft Environmental Assessment for the University of Hawai'i  
at Hilo Infrastructure for Research and Technology Lots

Ho'oikaika, a Hawaiian-awareness club at UH-Hilo, is actively lobbying for the establishment of a hands-on educational resource for Hawaiian Studies and other areas of study on the State (crown) lands at the Puna end of the UH-Hilo campus, which is adjacent to the project area for the UH-Hilo Infrastructure for Research and Technology Lots. Although the boundaries of this educational resource have not yet been officially established, the sewer line will cross the northern boundary of the Waioa Flood Control Canal (the lower end of the Waiakea Stream); this is part of the area we are trying to have preserved. We are concerned that the stone-stacked walls that follow the contours of the canal will be negatively impacted by this project. Will any of these structures be destroyed or disturbed?

There are at least thirty (30) structures in the Technology Park (see Figure 10 of Borthwick, Collins, Folk, and Hammett's Archaeological Survey and Testing of the Proposed University of Hawai'i at Hilo Expansion, April 1993, p. 29), but only four sites are indicated in the Figure 5 of the Draft Environmental Assessment for the Infrastructure. We are concerned that Borthwick et al. recommend "no further archaeological work" for the Technology Park (page 45) because we, of Ho'oikaika, contend that some of the structures on the undeveloped UH-Hilo lands may be pre-plantation Hawaiian structures. In Hunt and McDermott's (July 1993) Archaeological Inventory Survey for the Pu'ainako Street Extension Project, for example, prehistoric Hawaiian artifacts were discovered by excavation (p. 61); three volcanic glass pieces were uncovered just across the canal from your project area. Dr. Hunt's report can be obtained at the following address:

County of Hawai'i  
Dept. of Public Works  
25 Aupuni Street  
Hilo, HI. 96720

Ho'oikaika letter

2

We estimate that there are about 150 stone-stacked structures on the undeveloped lands of UH-Hilo. We are concerned that only nine sites have been partially excavated so far, four by Borthwick et al. and five by Hunt and McDermott. We maintain that this is an inadequate sample due to the large number of structures in the area; we contend that further archaeological study is justified by the discovery of prehistoric artifacts, by the age of the soil (see 1992 UH-Hilo Geology map [7,000 years BP and 1,200 years BP]), the presence of springs, a river, and a pool in this area, and the existence of native Hawaiian plants on, in, or near the stone-stacked structures. All of these factors point to the strong probability that this area was extensively used in prehistoric times.

Although Ho'oikaika is lobbying for the total preservation in situ of the archaeological structures at the Puna end of the UH-Hilo campus, we suggest that as many archaeological structures as possible be left intact as the Technology Park is developed. We maintain that the stone-stacked structures on both sides of the Flood Control Canal are interrelated; they share the same archaeological context. Whether these structures are from the early plantation days, from the pre-plantation days, or both, by preserving as many structures as possible, we can proudly state that we are one of the only universities in the Pacific that has history at our doorstep.

Please find enclosed a letter from Chancellor Kormondy concerning the establishment of various educational resources at UH-Hilo, and a 1992 UH-Hilo Geology Map that indicates the presence of a spring near the boundary of the Technology Park and soil ages. We are especially concerned that this spring remain undisturbed and be incorporated into our proposed educational resource. We also believe that any potentially significant structures north of the Flood Control Canal should also be incorporated into the educational resource. We are lobbying for the preservation of as many structures as possible in the proposed educational resource, and for the inclusion of this resource into the new UH-Hilo Master Plan. In addition, please find enclosed a memo from Lani Stemmermann dated 6 June 1992 with an attached map that outlines two biological preserves. We support Winona P. Chat's recommendation that botanical areas be left intact and be incorporated into the landscape design of the Technology Park wherever possible (Botanical Survey for the University of Hawai'i at Hilo Infrastructure for Research and Technology Lots, p. 7). By preserving native plants together with archaeological structures, we will create a magnificent historic campus.

If possible, could the faculty, students, and community members who are concerned with the preservation of UH-Hilo natural and archaeological resources meet with the various developers of the

Ho'oiikaika letter

3

Technology Park so that we have an opportunity to share information and concerns?

Thank you very much for your concern in these matters.

Sincerely,



Michael D. Larish  
Chair, Ho'oiikaika Research Committee

July 30, 1993

Mr. Michael D. Larish  
Chair, Ho'oiikaika Research Committee  
34 Mala'ai Road  
Hilo, HI 96720

Dear Michael:

The opportunity for Dean Boneparth, Assistant to the Chancellor Furukawa and me to meet with you and other representatives of the Ho'oiikaika Research Committee proved mutually beneficial in clarifying goals and objectives of both the University and the Committee.

As I indicated, the University is intent on setting aside three portions of University Park for long-range educational and research purposes. These include an 1881 Ohia succession, a major significant lava flow and the Hawaiian site, be the latter archaeological or of the plantation-period. These intentions will be called to the attention of the consultants on updating the University's Long Range Development Plan (i.e., the master plan of the campus).

Although a decision is yet to be made, it would be my presumption that appropriate faculty/staff members of UH-Hilo would be asked to assume monitoring responsibility for each of the sites to assure their proper preservation and conservation for the edification of generations of students and visitors to come. The husbandry responsibilities of universities in general translate to a specific function in preservation/conservation activities such as this, and it is propitious indeed that this campus is blessed with three sites on its grounds for proper custodial management.

I also advised the Committee that University Park comprises land leased to the University of Hawai'i Board of Regents by the State's Department of Land and Natural Resources, including an easement for an extension of Puainako Street. How this might affect the choice of an alternate route for the extension is unknown.

cc: Kenneth Ishizaki, Engineering Concepts, Inc.  
Ross Cordy, State Historic Preservation Division;  
Brian Choy, Office of Environmental Quality Control  
Chancellor Perrin, University of Hawai'i at Hilo;  
Dean Ellen Boneparth, College of Arts and Sciences, UH-Hilo



## University of Hawai'i at Hilo

OFFICE OF THE CHANCELLOR

200 W. KAWILI STREET HILO, HAWAII 96720-4091  
TEL: (808) 933-3444 • FAX: (808) 933-3622

An Equal Opportunity/Affirmative Action Institution

Mr. Michael D. Larrish  
Page 2  
July 30, 1993

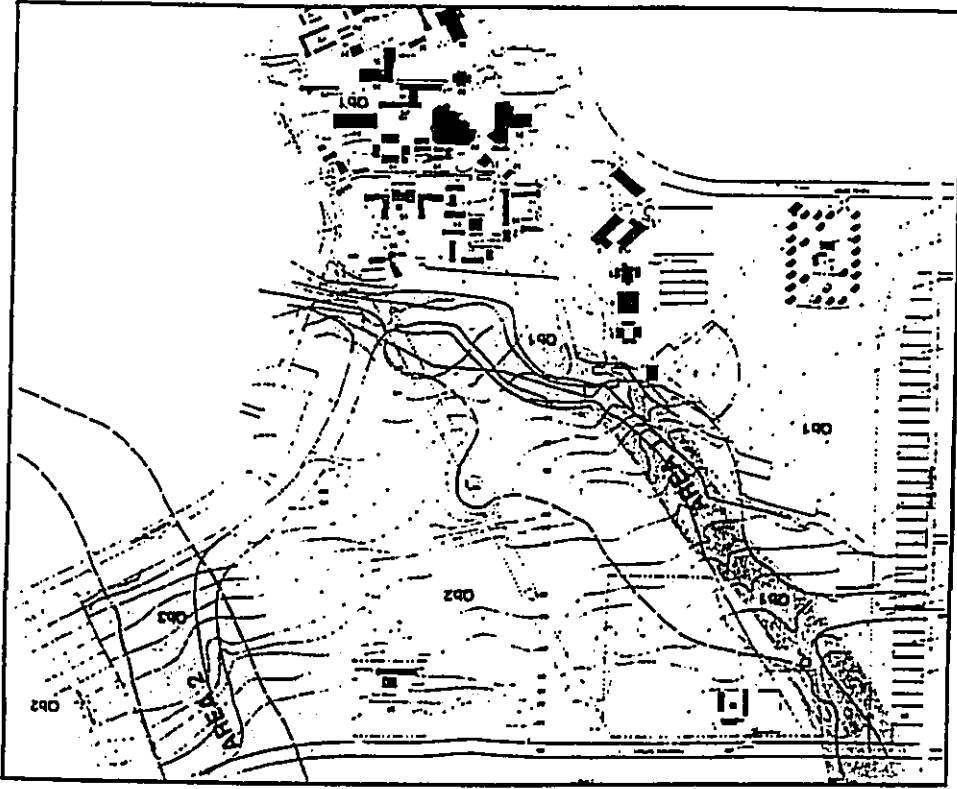
Thank you again for the opportunity to share concerns about a project of mutual interest.

Sincerely yours,

*Edward J. Kormondy*

Edward J. Kormondy  
Senior Vice President and Chancellor

cc: Chancellor-Designate Perrin  
Dean Boneparth  
Audrey Furukawa



GEOLIG MAP  
UNIVERSITY OF HAWAII  
AT HILO

OB3 - LAVA FLOW OF 1881:  
Zone of Mauna Loa; gassy flow top in east  
local boundary; highly vesicular; contains  
well-preserved small (1-2mm) olivine  
phenocrysts; downflow terraces unknown.

OB2 - LAVA FLOW OF INTERMEDIATE AGE:  
Aphyric pahoehoe flow of 1200 years before  
present; groundmass resembles lava flow of  
1881 but lacks olivine phenocrysts.

OB1 - UNIVERSITY FLOW:  
A flow containing abundant olivine  
phenocrysts; age approximately 7,000 years  
before present; olivine phenocrysts frequently  
occur in the matrix of weathered volcanic  
debris; olivine phenocrysts frequently  
occur in the matrix of weathered volcanic  
debris; olivine phenocrysts frequently  
occur in the matrix of weathered volcanic  
debris.

SPRING Q

One from the Geology Department (1972).

JOHN WARD  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES  
P. O. BOX 115, HONOLULU, HAWAII 96819

ROBERT TADUSH  
COMPTROLLER  
LLOYD LUKESAKI  
DEPUTY COMPTROLLER

LETTER NO. PM-1374.3

NOV 22 1993

Mr. Michael D. Larish  
Letter No. PM-1374.3  
Page 2

the proposed project proceeds. A list of government permits and approvals required for construction of the proposed project has been disclosed in the Environmental Assessment.

If you have other concerns or require additional information on the proposed project, please contact Ms. Gina Ichiyama at 586-0474.

Very truly yours,

*Gordon Matsuo*  
GORDON MATSUOKA  
State Public Works Engineer

G/si  
Encl.

cc: UH Hilo  
Engineering Concepts, Inc.

Mr. Michael D. Larish, Chair  
Ho'oukaika Research Committee  
34 Maialai Road  
Hilo, Hawaii 98720

Dear Mr. Larish:

Subject: Draft Environmental Assessment  
University of Hawaii at Hilo  
Infrastructure for Research and Technology Lots  
D.A.G.S. Job No. 11-31-5724

Thank you for reviewing and commenting on the Draft Environmental Assessment for the proposed project. We have enclosed a response letter from Cultural Surveys Hawaii which addresses your comments relating to the site archaeology.

As further clarification to Cultural Surveys Hawaii's letter, the stone-stacked walls referenced in your letter will be impacted by construction of the proposed sewer. The additional archaeological survey and testing undertaken in this area have indicated these features are associated with agricultural activities of the sugar cane plantation and are not generally deemed appropriate for preservation based on State Historic Preservation Division (SHPD) guidelines. We are awaiting official concurrence from the SHPD on this conclusion.

In addition, we have the following responses to your other comments:

1. The proposed project is not anticipated to disturb the spring located along the Waioa Flood Control Canal.
2. There will be several opportunities for your committee to present public testimony as planning and design of

**CULTURAL SURVEYS HAWAII**  
Archaeological Studies

Hallett H. Hamanaka, Ph.D.  
733 N. Kaliao Avenue, Kailua, Hawaii 96734  
Phone: (808) 262-9972 / Fax: 262-4950

November 1, 1993

Engineering Concepts, Inc.  
250 Ward Ave. #206  
Honolulu, HI 96814

Attn: Mr. Kenneth Ishizaki  
Fax 538-3463

Subject: Response to Draft Environmental Assessment (DEA) University of  
Hawaii at Hilo Infrastructure for Research and Technology Lots

Cultural Surveys Hawaii is aware of the controversy surrounding the archaeological sites associated with the proposed Pu'ainako Street Extension Project (Hunt and McDermott, July 1993) and UH Hilo Expansion area (Borthwick et al., 1993). The sites and features recorded for both projects are, based on our research and the work of Hunt and McDermott (1993), related as features of commercial sugar cultivation practices. The rock structures recorded (i.e., sites and features) functioned as rock clearing features, though additional usage such as places to plant supplemental food crops by plantation workers and/or cane lot homesteaders, is not precluded. The controversy centers around the functional and chronological interpretation of the sites as "plantation-era" structures versus "pre-plantation Hawaiian structures" as put forth by Michael D. Larish, Chair Ho'oiikaika Research Committee.

The following is an itemized response to the Ho'oiikaika Research Committee's letter of Aug. 20, 1993 to DAGS:

1. "Concerned that the stone-stacked walls that follow the contours of the canal will be negatively impacted by this project." - It is assumed the walls referred to are the cement and stone masonry walls of the flood control channel itself. These are not historic sites by definition (i.e., more than 50 years in age) therefore not necessarily of archaeological concern. In the DEA, the necessity of a stream alteration permit (W-3) is indicated, which presumably would address flood control channel structures.  
Additional archaeological inventory survey was undertaken in an area adjacent to and including the flood control channel through which infrastructure-related construction is proposed. A supplement report details findings within this particular area. Findings include four additional mounds, one of which was tested, and the *mabat* continuation of the field boundary located during the original survey. Survey and testing indicated sugar cane plantation function and age for the mounds and wall which are included as component features of previously designated State Historic Site #50-10-35-18670.

2. "Only four sites are indicated in the Figure 5 of the draft DEA." - the confusion relates to the use of "features" and "sites." The "thirty (30)

structures" refers to the individual features of Site -18667. In many cases associated features of a complex are combined under a single site number, which is the case here (i.e., sites -18667 and -18670).

3. "concerned that Borthwick et al. recommend no further archaeological work for the Technology park." The concern is: has a representative sample of the sites and/or features been test excavated, thus accurately addressing functional and chronological interpretations of the estimated 150 stone-stacked structures on the undeveloped lands of UH-Hilo (Larish:92).

There are a number of issues to address here:

- a) The original project area was specific to existing and proposed roadways which did not contain any of the four sites located. However, the additional area requested to be surveyed contains component features (previously unrecorded) of State Site # -18670. To address sampling concerns, related to function and chronological interpretations, the largest, most distinct mound was subjected to sub-surface testing. Testing confirmed commercial cane cultivation mound construction practices. Therefore it is our opinion no further archaeological work is necessary.
- b) With the additional testing conducted all four sites within the "study area" (Sites -18667, -18668, -18669, and -18670) have now been subjected to limited sub-surface testing during the inventory survey work. The results of testing supported the functional and chronological interpretations. Construction of the mound-type feature (-18667 Feature B) was typical of an agricultural rock clearance mound. Two mounds with Site -18670 were subsequently tested (See supplemental report). These test excavations also revealed an absence of traditional Hawaiian cultural material in direct association with the mounds. However, in soil strata below one of the mounds, a single volcanic glass fragment and a fragment of burnt *kukui* were recovered. Both items pre-date the mound's construction and use. Based on the compilation of survey data, historic background literature research, and sub-surface testing we recommended "no further archaeological work" specific to the four sites within the "study area." Thus, our recommendation which has yet to be finalized by the State Historic Preservation Division of Department of Land and Natural Resources (SHPD/DLNR), is not intended to cover all the sites and/or features (i.e., 150 stone stacked structures on the undeveloped lands of UH-Hilo) referred to in Mr. Larish's Aug. 20, 1993 letter, but only the four sites and associated features within our study area.

- c) The results of the survey and testing conducted for the proposed Pu'ainako Street Extension (Hunt and McDermott,


July 1993) are supportive of the functional and chronological interpretations that the sites (and/or features) are "plantation-era" structures. Three volcanic glass pieces were recovered

"beneath the structure" (Site -18915 Feature H). Hunt states that these pieces are not related to the structure itself but pre-date it. They further state that the structure itself dates to the historic era (Hunt and McDermott 1993:91). Hunt and McDermott clearly state that the archaeological structural remains of the Pu'ainako Road Extension project date firmly within the historic period (*Ibid.*:95). Therefore, these remains are not prehistoric Hawaiian sites. Finally, results of the two different archaeological surveys (Borthwick et al, 1993; Hunt and McDermott, 1993) which in part are "just across the canal" (Larish, Aug. 20, 1993:1) from each other and contain similar site types, concur on functional and chronological interpretations of the sites and features recorded as related to commercial sugar cane cultivation.

- 4) "We are lobbying for the preservation of as many structures as possible in the proposed educational resource and for inclusion of this resource into the new UH-Hilo Master Plan" (Larish, Aug. 20, 1993:2). - Cultural Surveys Hawaii is not against preservation of the sites referred to by Mr. Larish. However, historic agricultural sites or features, like rock clearance mounds, are not generally deemed appropriate for preservation based on SHPD/DLNR guidelines. This is in contrast to historic-era plantation-related sites, like sugar camps, mills, major infrastructural tunnels, railways, etc.) which have, in certain cases, been preserved.

Prior to the additional survey work no sites located in the original study area were actually to be affected by the infrastructure-related project. However, in the additional survey area there are features associated with 60-10-35-18670, thus a portion of this large site would now be affected by infrastructure-related work. Changes to the University of Hawaii Hilo Master Plan because of archeological site preservation that would possibly include Site -18670 might affect the proposed infrastructure-related work.

Sincerely,



Doug Borthwick  
Hallett H. Hammatt

As the time for landscaping the project approaches please note that I have a number of native plants available which would grow well in the habitat of the project area. I would be glad to help design a landscaping plan incorporating native species around the buildings. Feel free to contact me on this matter.

Thank you,

*David Paul*

David Paul  
U.H. Hilo, Student Naturalist

Aug/22/93

RECEIVED

AUG 25 1993

ENGINEERING CONCEPTS

To: Gina Ichiyama  
Dept. of Accounting and General Services  
1151 Punchbowl St.  
Honolulu, HI. 96813

From: David Paul  
Student Naturalist  
University of Hawaii at Hilo  
Hilo, HI. 96720

RE: Botanical Survey  
University of Hawaii at Hilo  
Proposed Infrastructure for Research and Technology Lots  
South Hilo District, Island of Hawaii

The botanical survey for the proposed infrastructure for research and technology lots on the University of Hawaii at Hilo by Winona P. Char (December, 1992) appears to be in order except for a minor correction that should be made on the species list. The Musa sp. is Musa x paradisiaca, but is a Brazilian variety (Apple-Banana) and therefore not a Polynesian introduction, so it's status should be marked as alien (X).

It should be kept in mind that the project will take place on biologically sensitive areas. (Please refer to Stemmermann, June/6/1992 [see attached].) Winona P. Char's and Lani Stemmermann's recommendations to leave as much native landscape and vegetation as possible around buildings, and to add more native plants to the landscape once the buildings are complete should be seriously considered. Hawaii State law (HRS 173) holds that native plants must be incorporated into the landscape of State development projects.

A natural spring is located along the Waioa Flood Control Canal between the 1,200 year old lava flow ("Ob2") and the 7,000 year old flow ("Ob1"). (Please refer to UHH Geology Dept., 1992 [see attached].) The actions of the project should be conducted in a manner that does not disturb the flow of the spring.

Also note that neneleau (Rhus sandwicensis) is growing in the project area (Char 1992, p.13). Neneleau (Rhus sandwicensis) is recognized in "Allertonia" by Fosberg and Herbst (1975) as a rare species due to the occurrence of habitat loss from human development.

CC: Kenneth Ishizaki, Engineering Concepts, Inc.  
Brian Choy, Office of Environmental Quality Control  
Kenneth Perrin, Chancellor, U.H. Hilo  
Edgar Torigot, Vice Chancellor for Administrative Affairs  
U.H. Hilo  
Ellen Boneparth, Dean, College of Arts and Sciences  
U.H. Hilo  
Kolin Kettleison, Auxiliary Services Officer, U.H. Hilo  
Lo-Li Chih, Facilities Planner, U.H. Hilo

REFERENCES

- Char, M.P.  
December, 1992. "Botanical Survey, University of Hawaii at Hilo, Proposed Infrastructure for Research and Technology Lots, South Hilo District, Island of Hawaii". Char & Associates, Botanical Consultants. Honolulu, HI. 17 p.
- Fosberg, F.R. & Herbst, D.  
1975. "Allertonia, Rare and Endangered Species of Hawaiian Vascular Plants". Pacific Tropical Botanical Garden. Lawai, HI, 72 p.
- Stemmermann, L.  
June 6, 1992. (Gives "Preliminary Biological Recommendations" in letter to Chancellor Kormondy.)  
University of Hawaii at Hilo. Hilo, HI. 2 p.
- UHH Geology Department.  
1992. "University of Hawaii at Hilo, Geologic Map".  
University of Hawaii at Hilo. Hilo, HI.



# HAWAII COMMUNITY COLLEGE

University of Hawaii

General Education

To: Chancellor Kormondy

From: Lani Stemoerama

Date: 6 June 1992

### Re: PRELIMINARY BIOLOGICAL RECOMMENDATIONS

You have asked for the specific identification of areas supporting high-quality native vegetation on the mauka campus tract, so that as parcels are being allocated for development some of the biologically valuable areas may be set aside. Using the best presently available information, we propose to set aside for further survey, two units: one Hamakua side of Kooehana Agriculture, and another Hamakua side of Joint Astronomy.

This recommendation, however, is based on somewhat scanty information. We really need to have a new photograph flown so that we can better map the biologically sensitive areas in respect to recent road construction. The recommendations as outlined on the accompanying map are larger than the permanent preserves need to be, but should serve to protect the most valuable sections of these areas as present contracts for development are being drawn up.

In addition to protection of the mapped areas, there are some general recommendations regarding development which organizations should be appraised of as they are making commitments to develop on campus:

- The campus has (is developing) an environmental development plan to guide campus construction activities.
- As many native trees (hala and 'ohi'a) as possible should be maintained on site and incorporated into natural landscaping.
- New landscaping should consist to a large degree of native Hawaiian and Polynesian-introduced species.
- Hand-clearing and small bulldozers should be used whenever possible to maintain the natural pahoehoe and 'a'a rock surfaces for incorporation into the landscape design.
- Architecturally, buildings should be designed to maximize energy conservation by utilizing natural lighting and cooling available at the site.

HILO, HAWAII 96720-4091 • TEL: (808) 933-3421 • FAX: (808) 933-  
As Equal Opportunity/Affirmative Action Institution

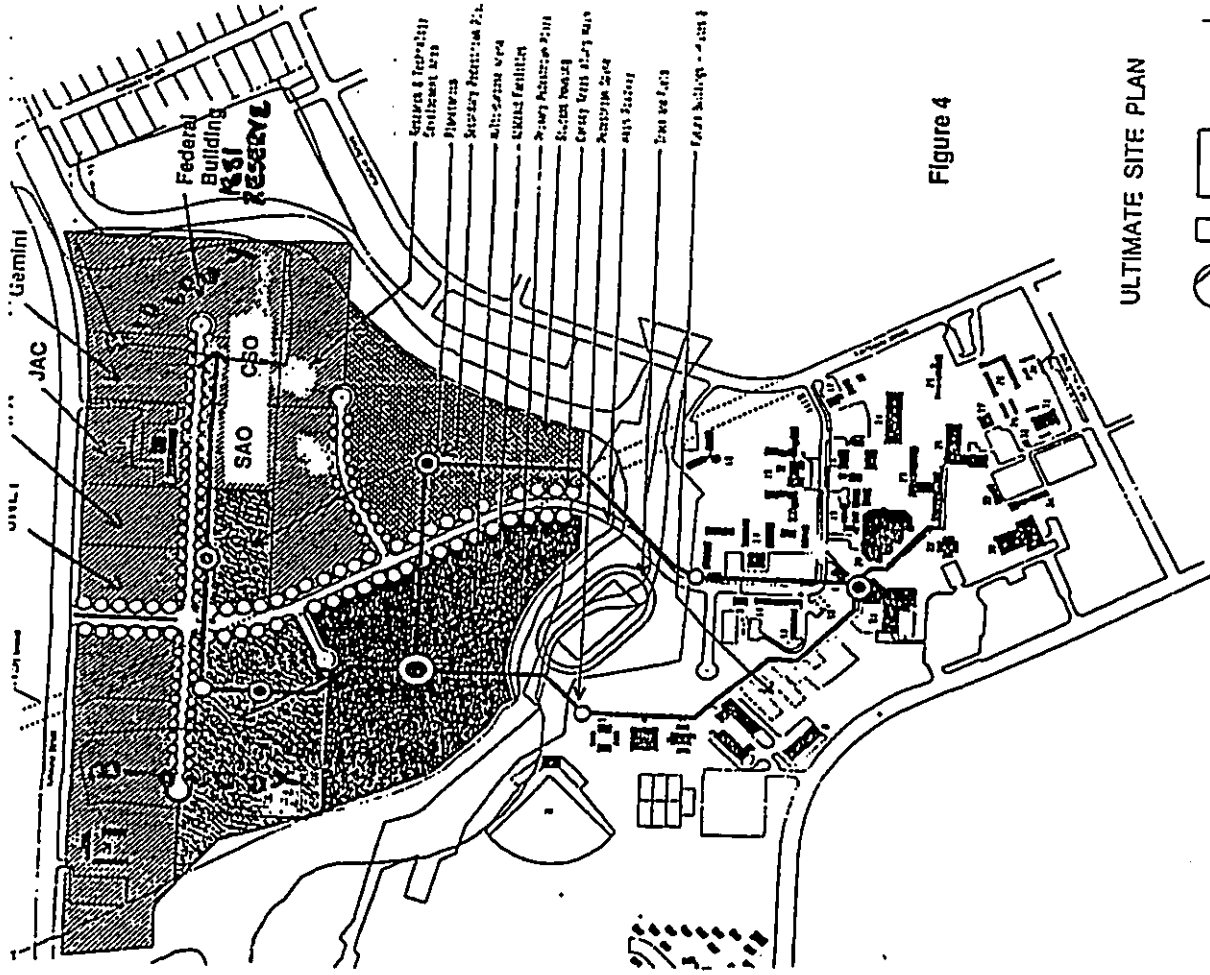
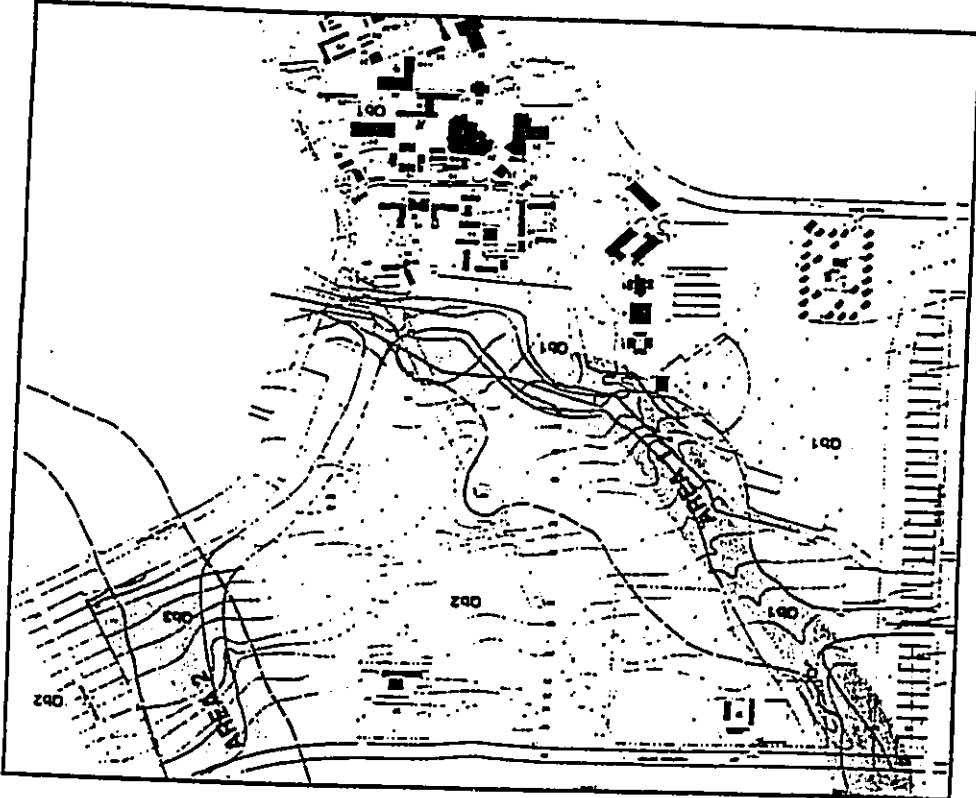


Figure 4

ULTIMATE SITE PLAN



UNIVERSITY OF HAWAII AT HILO  
 DEPARTMENT OF GEOLOGY  
 GEOLOGIC MAP  
 AT HILO



**GEOLOGIC MAP**  
**UNIVERSITY OF HAWAII**  
**AT HILO**

**OB3 - LAVA FLOW OF 1881:**  
 Flowing from the northeast to the southwest, this flow is well preserved. It is a basaltic flow and contains many small (1-2 cm) cinders. Phenocrysts: olivine, clinopyroxene, orthopyroxene, plagioclase, and ilmenite.

**OB2 - LAVA FLOW OF INTERMEDIATE AGE:**  
 A flow of intermediate age, possibly from the late Pleistocene or early Holocene. It is a basaltic flow and contains many small (1-2 cm) cinders. Phenocrysts: olivine, clinopyroxene, orthopyroxene, plagioclase, and ilmenite.

**OB1 - UNIVERSITY FLOW:**  
 A flow containing abundant olivine phenocrysts, age approximately 7,000 years based upon radiocarbon dating. It is a basaltic flow and contains many small (1-2 cm) cinders. Phenocrysts: olivine, clinopyroxene, orthopyroxene, plagioclase, and ilmenite.

**SPRING**  
 CONTACT: dashed where approximate.

**OHIO**  
 CONTACT: dashed where approximate.

**UNIVERSITY OF HAWAII DEPARTMENT OF GEOLOGY (1971)**

JOHN WILKINS  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES  
P. O. BOX 111, HONOLULU, HAWAII 96810

ROBERT P. TANIGUCHI  
COMPTROLLER  
LLOYD L. UKEBASAM  
DEPUTY COMPTROLLER  
LETTER NO. PM-13733

NOV 22 1993

Mr. David Paul  
Student Naturalist  
University of Hawaii at Hilo  
Hilo, Hawaii 96720

Dear Mr. Paul:

Subject: Draft Environmental Assessment  
University of Hawaii at Hilo  
Infrastructure for Research and Technology Lots  
D.A.G.S. Job No. 11-31-5724

Thank you for reviewing and commenting on the Draft Environmental Assessment for the proposed project. We have enclosed a response letter from Char & Associates addressing your comments on the botanical survey. In addition, we wish to add that the proposed project is not anticipated to disturb the spring flow located along the Waikoa Flood Control Canal.

If you have other concerns or require additional information on the proposed project, please contact Ms. Gina Ichiyama at 588-0474.

Very truly yours,

*Gordon Matsuoika*  
GORDON MATSUOIKA  
State Public Works Engineer

GJ/si  
Encl.  
cc: UH Hilo  
Engineering Concepts, Inc.

13 September 1993

Mr. David Paul  
Student Naturalist  
University of Hawaii at Hilo  
Hilo, Hawaii 96720

Dear Mr. Paul:

Subject: Botanical survey, Proposed infrastructure for Research and Technology Lots, University of Hawaii at Hilo

Thank you for reviewing and commenting on the botanical studies for the proposed infrastructure project. Thank you for also identifying the banana to the variety level; the plants were not fruiting at the time of our field survey.

"Act 73", which was passed by the 1991 Hawaii Legislature, should encourage the use of more kinds of native plants for landscaping and the preservation of native plants if already present on a property proposed for development. The neneleau you mentioned in your letter would make a rather good landscape plant as it grows well on the open, sunny banks along roads.

Sincerely,

*Winona P. Char*  
Winona P. Char

**CHAR & ASSOCIATES**

Botanical/Environmental Consultants  
4471 Puu Paia Ave.  
Honolulu, Hawaii 96819  
(808) 734-1223

**APPENDIX A**

**BOTANICAL SURVEY  
UNIVERSITY OF HAWAII - HILO  
PROPOSED INFRASTRUCTURE FOR RESEARCH AND TECHNOLOGY LOTS  
SOUTH HILO DISTRICT, ISLAND OF HAWAII**

**BY**

**CHAR & ASSOCIATES**

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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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 Hawaii'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



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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 gunpowder 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.

LITERATURE CITED

- Char, W.P. 1992. Botanical survey, Pu'u'eo Makai project site, South Hilo District, island of Hawai'i. Prepared for PBR Hawaii. March 1992.
- Lamoureux, C.H. 1984. Checklist of the Hawaiian pteridophytes. Unpublished manuscript, University of Hawai'i, Manoa.
- Macdonald, G.A. and A.T. Abbott. 1970. Volcanoes in the sea, the geology of Hawaii. 5th printing. University of Hawaii Press, Honolulu.
- Sato, H.H., W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro, Jr. 1973. Soil survey of the island of Hawaii, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C.
- State of Hawaii. 1977. Final EIS, U.H. Hilo Long Range Development Plan. June 1977.
- U.S. Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants. 50 CFR 17.11 & 17.12.
- \_\_\_\_\_. 1990. Endangered and threatened wildlife and plants; Review of plant taxa for listing as endangered and threatened species; Notice of review. Federal Register 55 (35): 6184-6229.
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and Bishop Museum Press, Honolulu. Bishop Museum Special Publication No. 83.

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>
<b>FERNS</b>				
BLECHNACEAE (Blechnum Family) Blechnum occidentale L.	blechnum fern	X	+	+
DICKSONIACEAE (Tree Fern Family) Cibotium glaucum (J. Sm.) Hook. & Arnott	hapu'u	E	+	-
GLEICHENIACEAE (Vine Fern Family) Dicranopteris linearis (Burm.) Underw.	uluhe	I	+	+
HEMIONITIDACEAE (Gold Fern Family) Pityrogramma calomelanos (L.) Link	silver fern	X	-	+
LINDSAEACEAE (Lace Fern Family) Sphenomeris chinensis (L.) Maxon	pala'a	I	+	-
LYGODIACEAE (Climbing Fern Family) Lygodium japonicum (Thunb.) Sw.	lygodium	X	+	+
NEPHROLEPIDACEAE (Sword Fern Family) Nephrolepis multiflora (Roxb.) Jarrett ex Morton	hairy sword fern	X	+	+
POLYPODIACEAE (Common Fern Family) Phlebodium aureum (L.) J. Sm.	laua'e-haole	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	+	+

Vegetation type

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Status

Common name

Scientific name

FLOWERING PLANTS

MONOCOTS

AGAVACEAE (Sisal Family)  
Cordylone fruticosa (L.) A. Chev.

ti, ki

P

+

+

ARACEAE (Aroid Family)  
Dieffenbachia picta Schott

dieffenbachia

X

+

-

ARECACEAE (Palm Family)  
Archontophoenix alexandrae (F. v. Muell.)  
H.A. Wendl. & Drude

king palm, Alexandra  
palm

X

+

+

COMMELINACEAE (Dayflower Family)  
Commelina diffusa N.L. Burm.

honohono

X

-

+

CYPERACEAE (Sedge Family)

Cyperus halpan L.

Fimbristylis dichotoma (L.) Vahl.

Kyllinga brevifolia Rottb.

Machaerina mariscoides ssp. meyenii

(Kunth) T. Koyama

Pycneus polystachyos (Rottb.) P. Beauv.

Scleria testacea Nees

green kyllinga, kili'o'opu

'ahaniu, 'uki

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DIOSCOREACEAE (Yam Family)

Dioscorea bulbifera L.

Dioscorea pentaphylla L.

bitteryam, pi'oi

pi'ia

P

P

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MUSACEAE (Banana Family)

Musa X paradisiaca L.

banana, maia

P

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

Vegetation type

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Status

Common name

Scientific name

BOMBACACEAE (Bombax Family)  
Indet. sp.

X - +

BUDDLEIACEAE (Butterfly Bush Family)  
Buddleia asiatica Lour.

Asiatic butterfly bush, huelo-  
'ilio

X + -

CAMPANULACEAE (Bellflower Family)  
Hippobroma longiflora (L.) G. Don

star-of-Bethlehem

X + -

CARYOPHYLLACEAE (Pink Family)  
Drymaria cordata (L.) Willd. ex Roem.

pipili

X - +

CECROPIACEAE (Cecropia Family)  
Cecropia obtusifolia Bertol.

guarumo

X - +

CLUSIACEAE (Mangosteen Family)  
Clusia rosea Jacq.

autograph tree, copey

X + +

CONVOLVULACEAE (Morning-glory Family)  
Ipomoea alba L.  
Ipomoea indica (J. Burm.) Merr.  
Ipomoea triloba L.

moonflower, koali pehui  
koali 'awahia  
little bell, pink bindweed

X I X  
- - -

EUPHORBIACEAE (Spurge Family)  
Macaranga mappia (L.) Mull. Arg.  
Phyllanthus debilis Klein ex Willd.  
Ricinus communis L.

bingabing  
niruri  
castor bean, koli, pa'aila

X X X  
+ - -

FABACEAE (Bean Family)  
Caesalpinia major (Medik.) Dandy & Exell  
Chamaecrista nictitans (L.) Moench  
Crotalaria cf. lanceolata E. Mey.  
Crotalaria pallida Aiton  
Crotalaria retusa L.

kakalaioa, hihikolo  
partridge pea, lauki  
smooth rattlepod, pikakani

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<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
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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 hila hila	X	+	-
LAMIACEAE (Mint Family)				
Hyptis pectinata (L.) Poit.	comb hyptis	X	+	-
Lauraceae (Laurel Family)				
Persea americana Mill.	avocado, alligator pear	X	-	+
LYTHRACEAE (Loosestrife Family)				
Cuphea carthagenensis (Jacq.) Macbr.	tarweed, Colombian cuphea	X	+	-
MALVACEAE (Mallow Family)				
Hibiscus furcellatus Desr.	'akiohala, 'akiahala, hau hele	I	+	-
Sida rhombifolia L.	Cuba jute	X	+	-
MELASTOMACEAE (Melastoma Family)				
Dissotis rotundifolia (Sm.) Triana	dissotis	X	+	-
Melastoma candidum D. Don	melastoma	X	+	+
MORACEAE (Mulberry Family)				
Ficus microcarpa L. f.	Chinese banyan	X	-	+
MYRTACEAE (Myrtle Family)				
Metrosideros polymorpha Gaud.	'ohi'a, 'ohi'a lehua	E	+	-
Psidium cattleianum Sabine	strawberry guava	X	+	+
Psidium guajava L.	guava, kuawa	X	+	+

<u>Scientific name</u>	<u>Common name</u>	<u>Status</u>	<u>Vegetation type</u>	
			<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) Chrysothymus 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, kanakaloa	X I?	+	+
ULMACEAE (Elm Family) Trema orientalis (L.) Blume	gunpowder tree, charcoal tree	X	+	+
URTICACEAE (Nettle Family) Pilea microphylla (L.) Liemb.	artillary plant, rockweed	X	-	+
VERBENACEAE (Verbena Family) Lantana camara L. Stachytarpheta dichotoma (Ruiz & Pav.) Vahl	lantana, lakana owi, oi	X X	+	- +

**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

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and  
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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

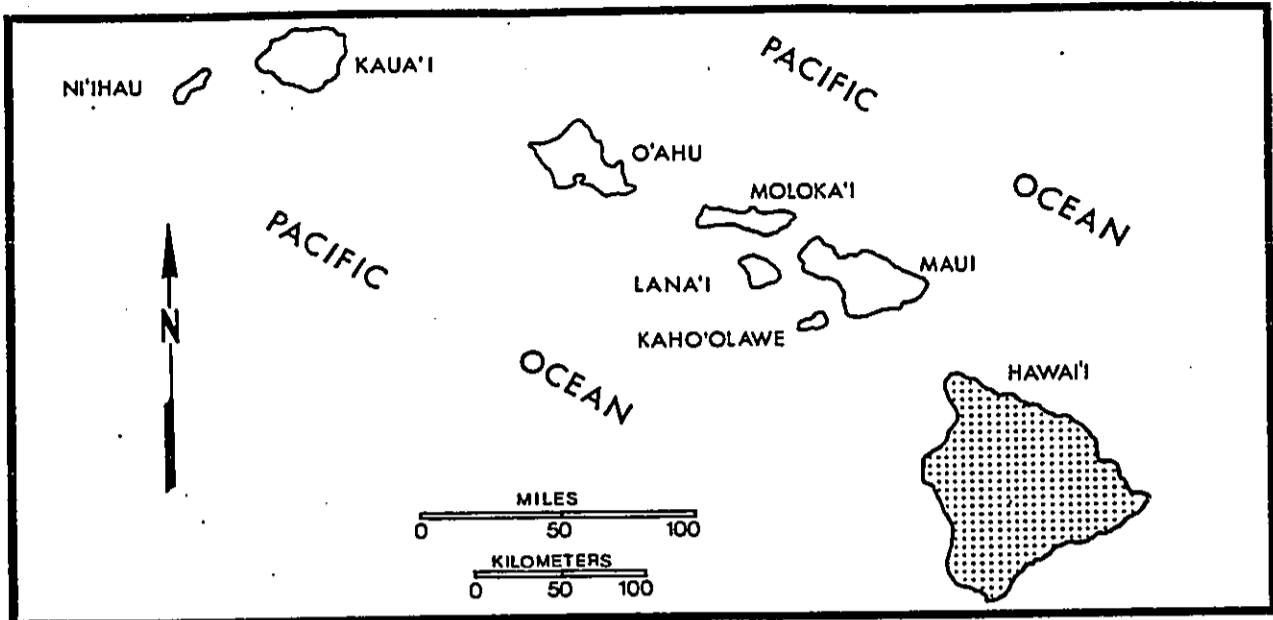


FIGURE 1  
State of Hawai'i

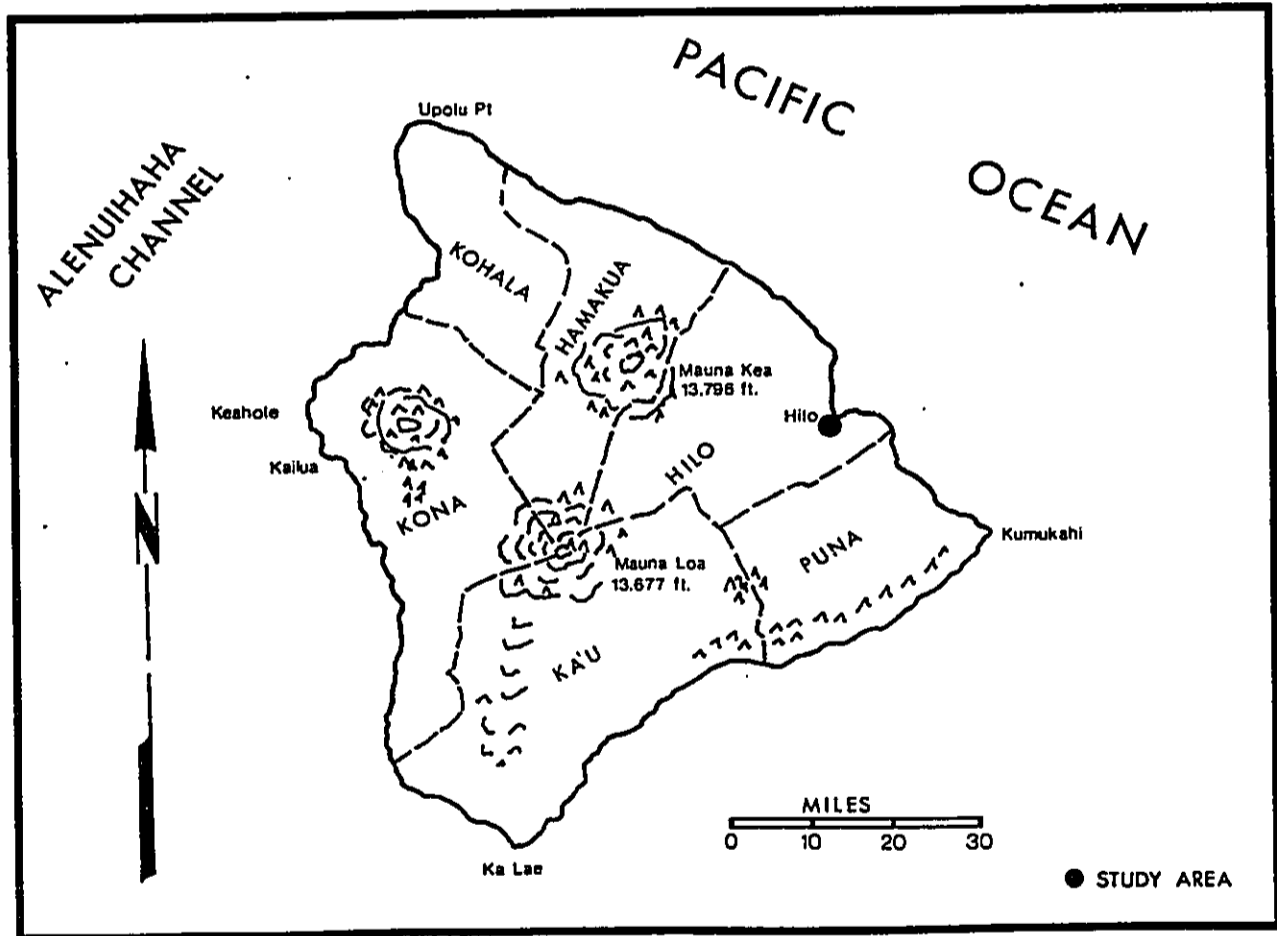


FIGURE 2  
General Location Map, Hawai'i Island



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

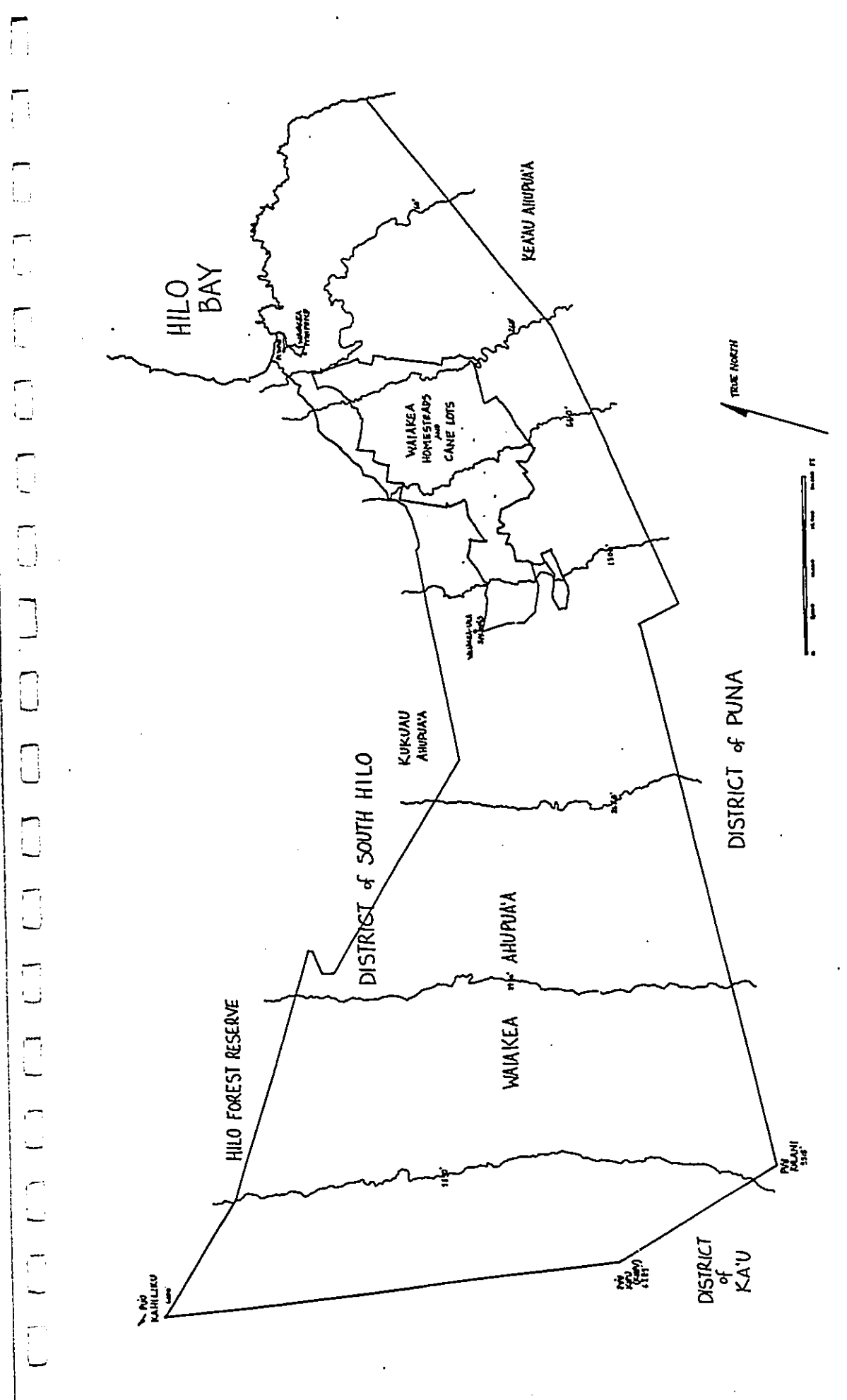


Figure 4 Ahupua'a of Waiakea (after USGS Topographic Map)

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



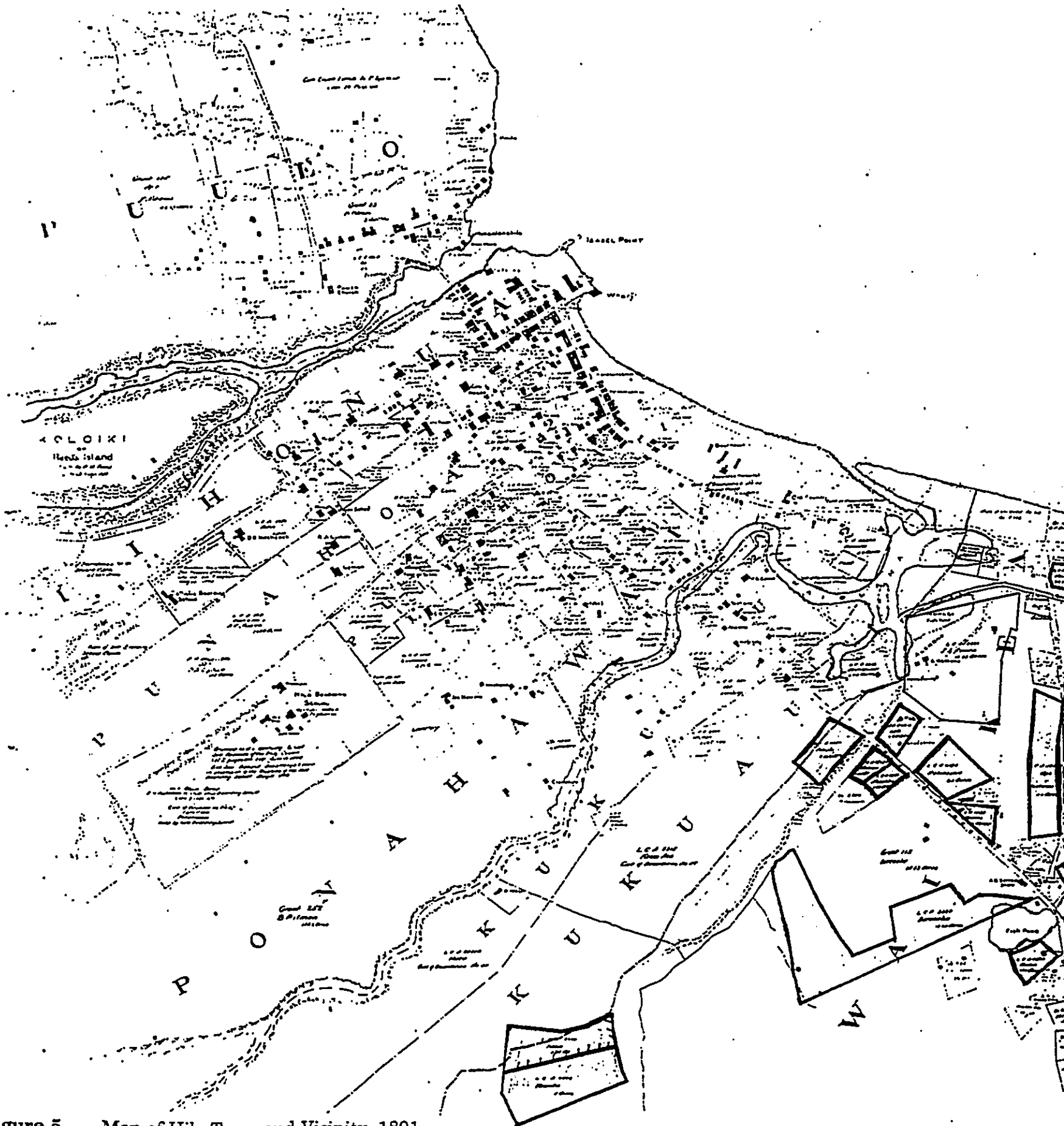
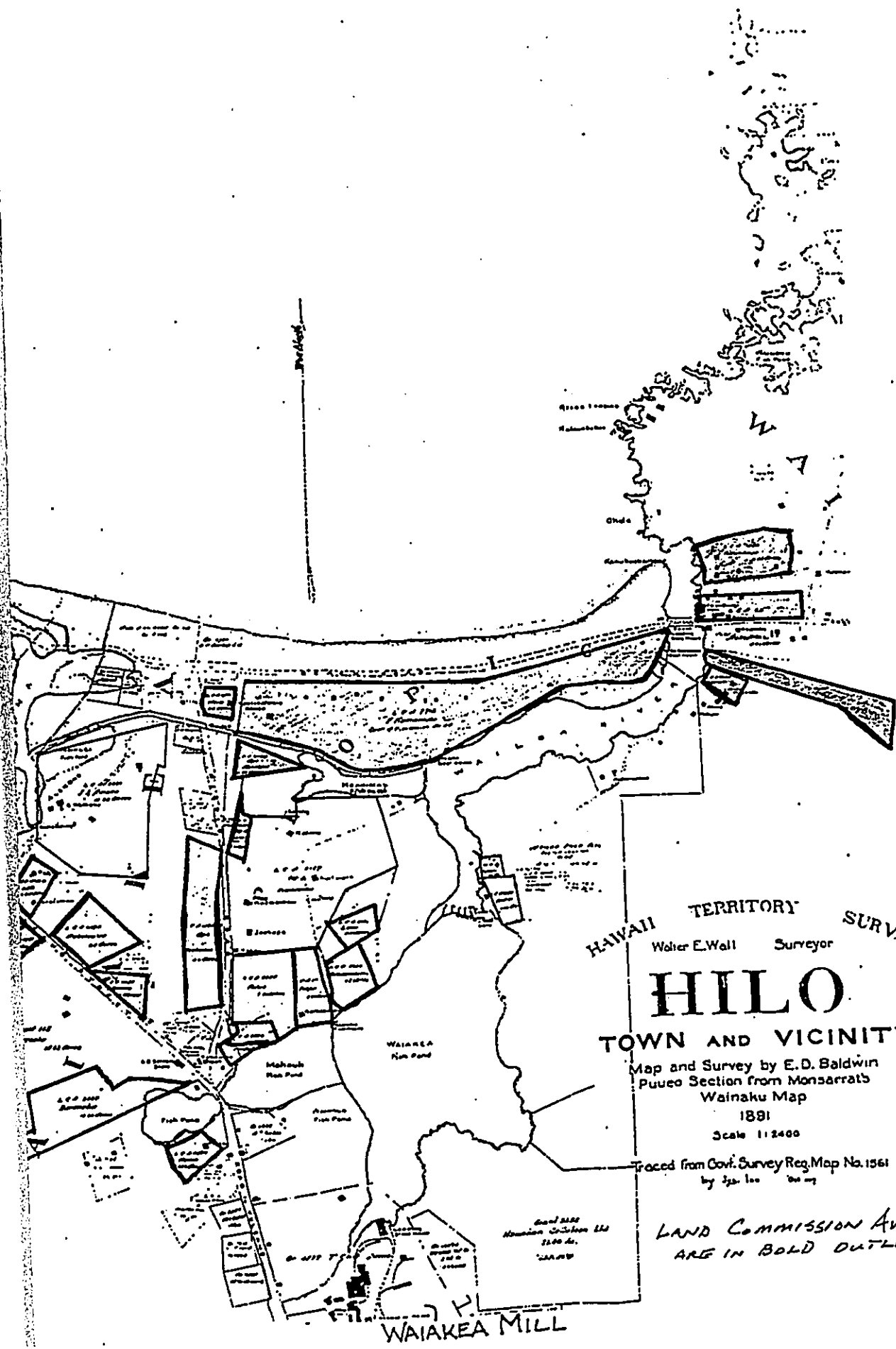


Figure 5 Map of Hilo Town and Vicinity, 1891

DOCUMENT CAPTURED AS RECEIVED



HAWAII TERRITORY SURVEY  
Water E. Wall Surveyor

# HILO

## TOWN AND VICINITY

Map and Survey by E. D. Baldwin  
Puueo Section from Monsarrats  
Wainaku Map  
1891  
Scale 1:2400

Traced from Govt. Survey Reg. Map No. 1361  
by J. L. ...

LAND COMMISSION AWARDS  
ARE IN BOLD OUTLINE

WAIKEA MILL

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.

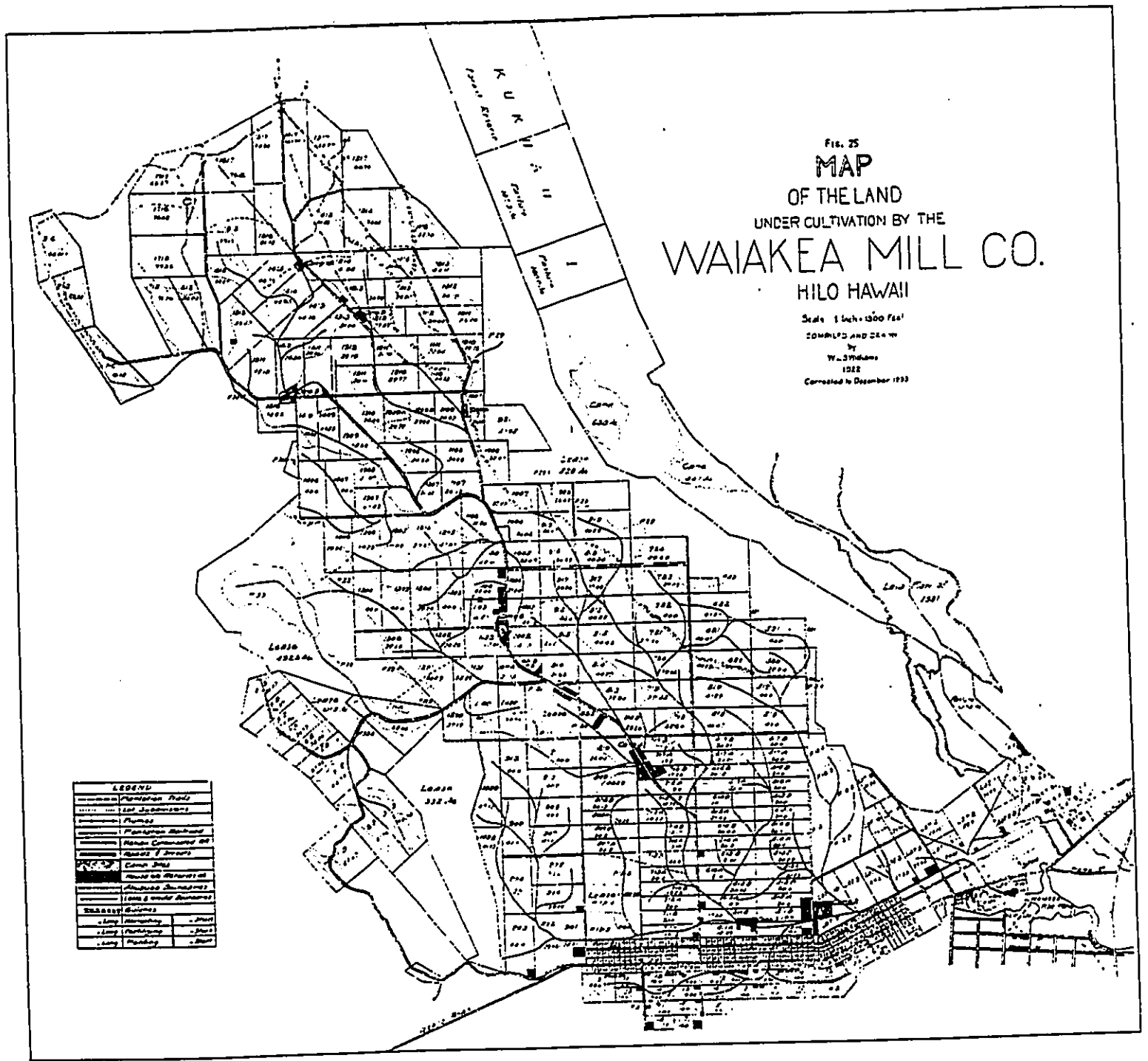
Immigrant labor (Chinese, Japanese, Portuguese) were living in "camps" set up by the plantation for its workers. Waiākea Mill Co. would eventually have some 10 camps situated along major rail lines of the plantation (Figure 6).

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** Waiakea 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.



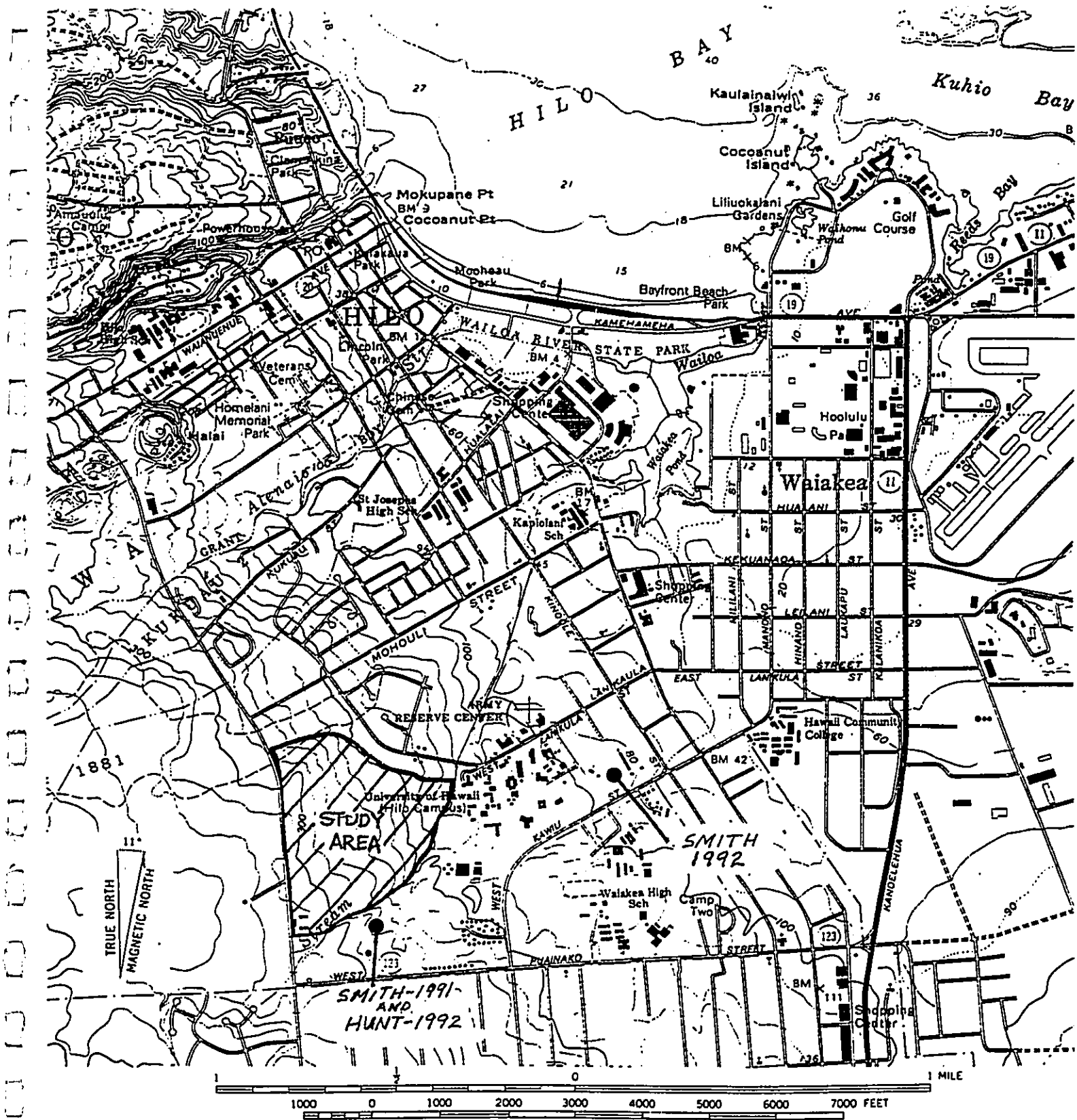
## PREVIOUS ARCHAEOLOGICAL RESEARCH

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 Ponoehawai" (*Op. cit.*:5). A total of 48 sites were observed and recorded. Site types included "walls, mounds, platforms, and faced terraces" (*Op.cit.*:9). The highest concentration of sites is "in one area... Alternative B (Lower section) near the University of Hawaii-Hilo" (*Op.cit.*:11). This cluster of sites, which "appear to be associated with Hawaiian occupation and cultivation along the intermittent drainage during prehistoric and historic times" (*Ibid.*), includes some of the same sites observed by Marc Smith during his field inspections of the proposed Research and Technology Park (Smith 11/8/91). The sites are situated within the former Waiākea Cane Lots and also appear to be on the same soil-mantled lava flow (i.e., >4,000 B.P.) as described by Marc Smith (Smith 11/8/91 and 1/3/92).

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

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

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

## SURVEY RESULTS

### Methodology

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

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

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

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

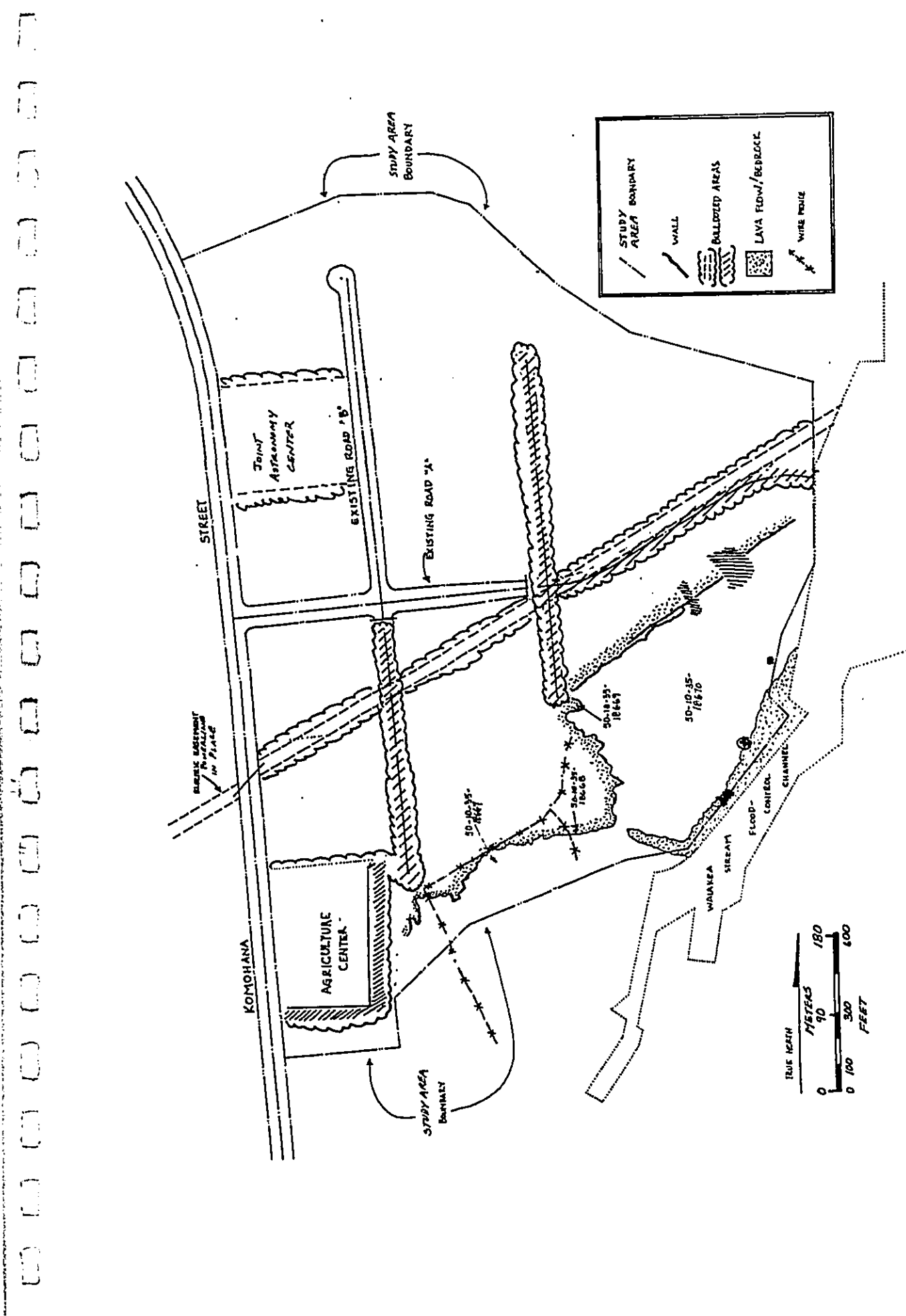


Figure 8 Study Area, Showing Existing Roads, Powerline Easement and Areas of Previous Bulldozing

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

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

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

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

### Fieldwork

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



remains to help in dating the sites.

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

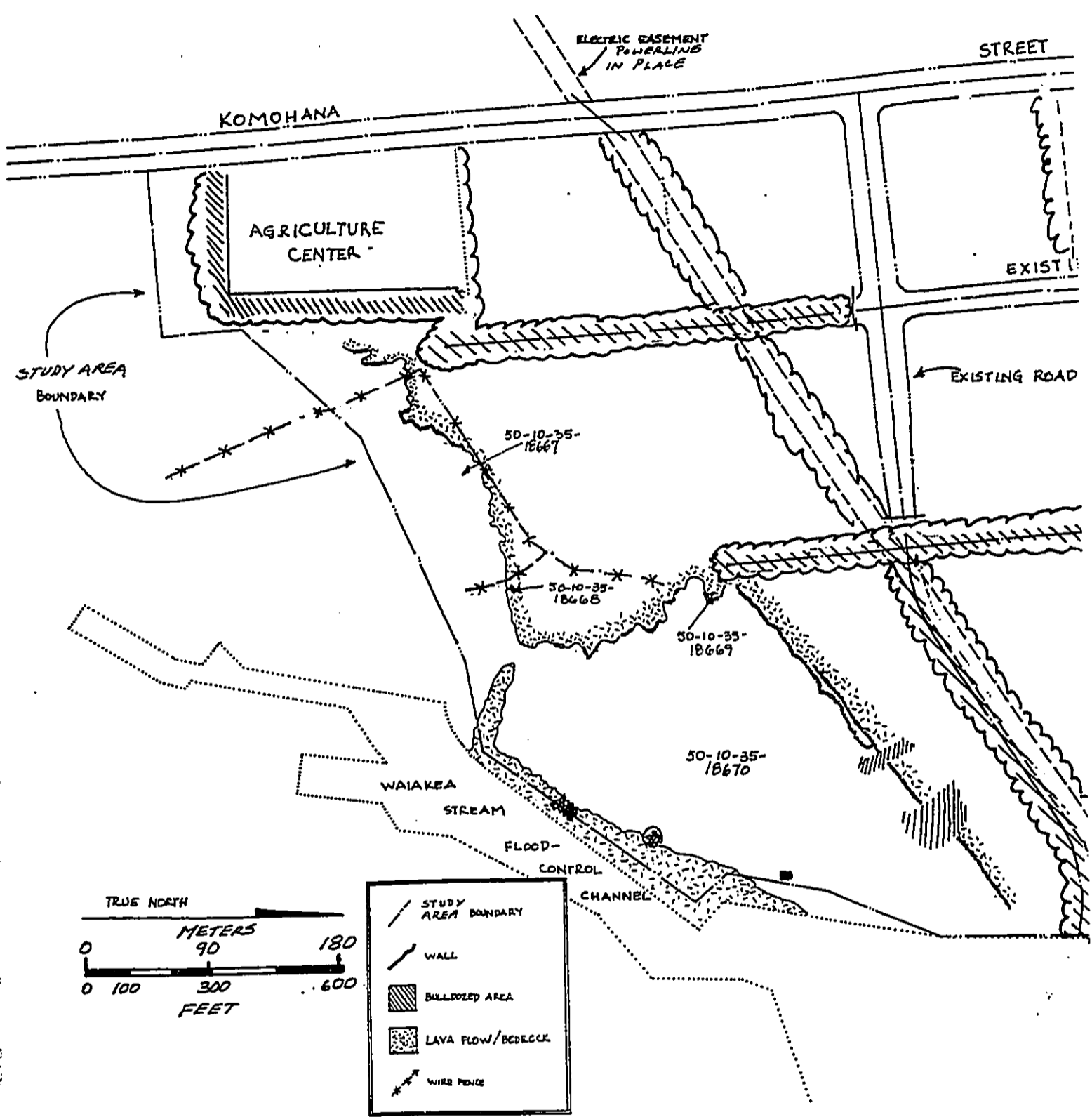


Figure 9 Portion of Study Area Showing Archaeological Sites

## SITE DESCRIPTIONS

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

Table: Site Summary of Survey Area

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

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

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

**CSH Site: 10**

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

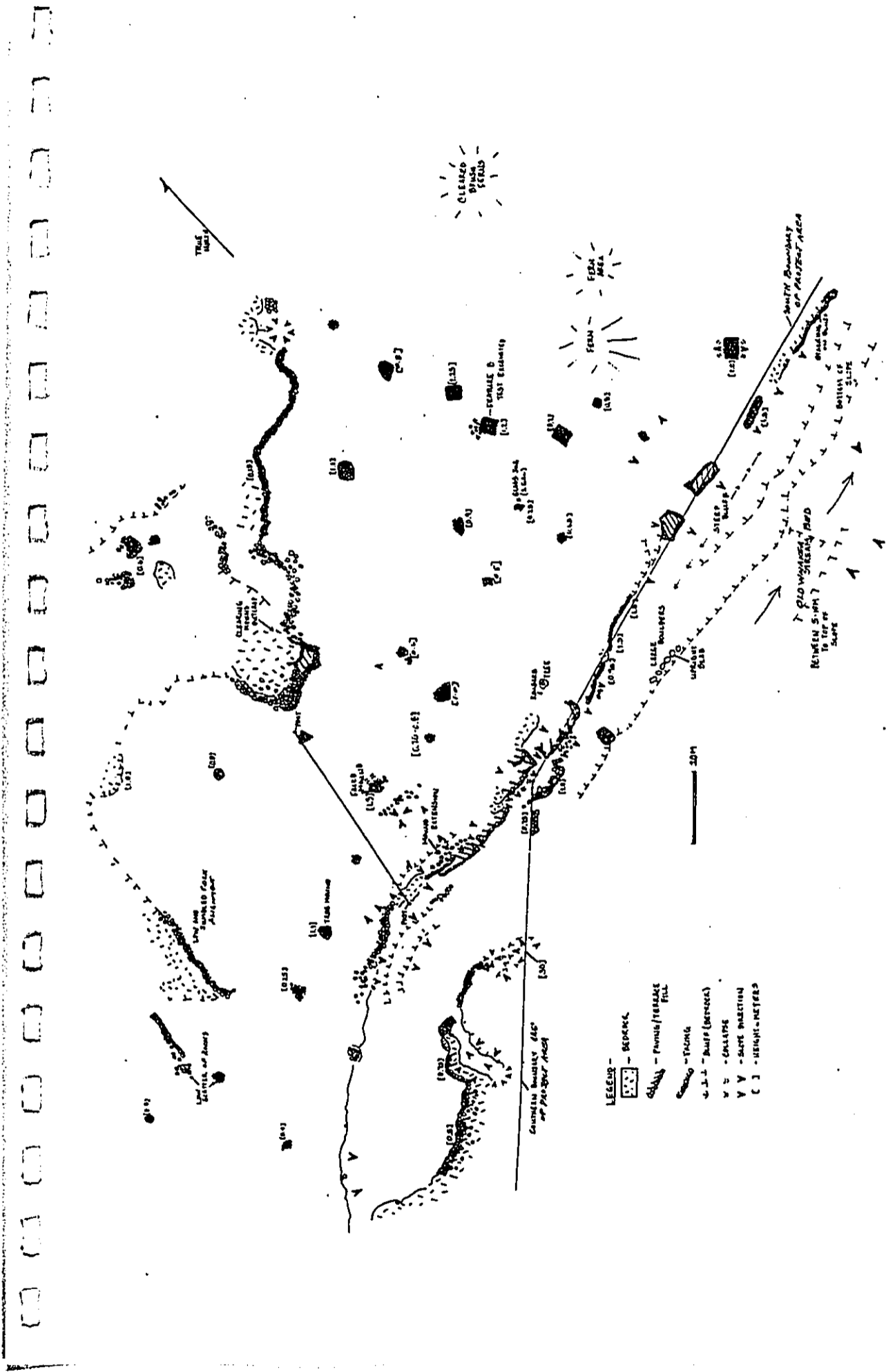


Figure 10 State Site 50-10-35-18667, Plan View

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

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

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

No midden or artifacts were observed.

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

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

No midden or artifacts were observed.

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

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

No midden or artifacts were observed.

Feature C is in poor condition.

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

### **Testing Results**

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

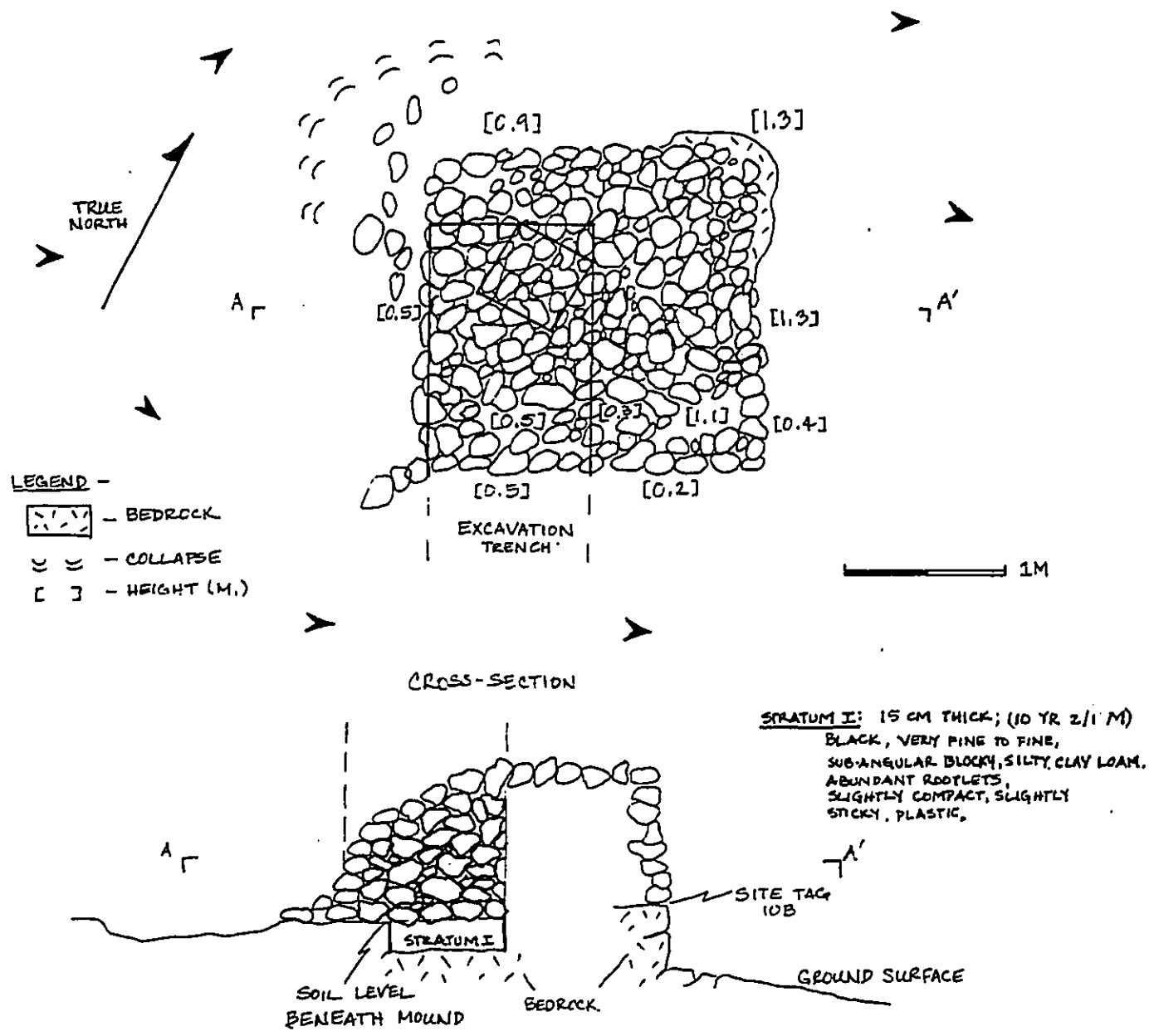


Figure 11 Site 50-10-36-18667 Feature B, Plan View of Mound (Top), and Cross Section Showing Stratigraphic Relationship of Rock Mound to Sediments (Bottom)

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

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

**CSH Site #: 11**

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

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

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



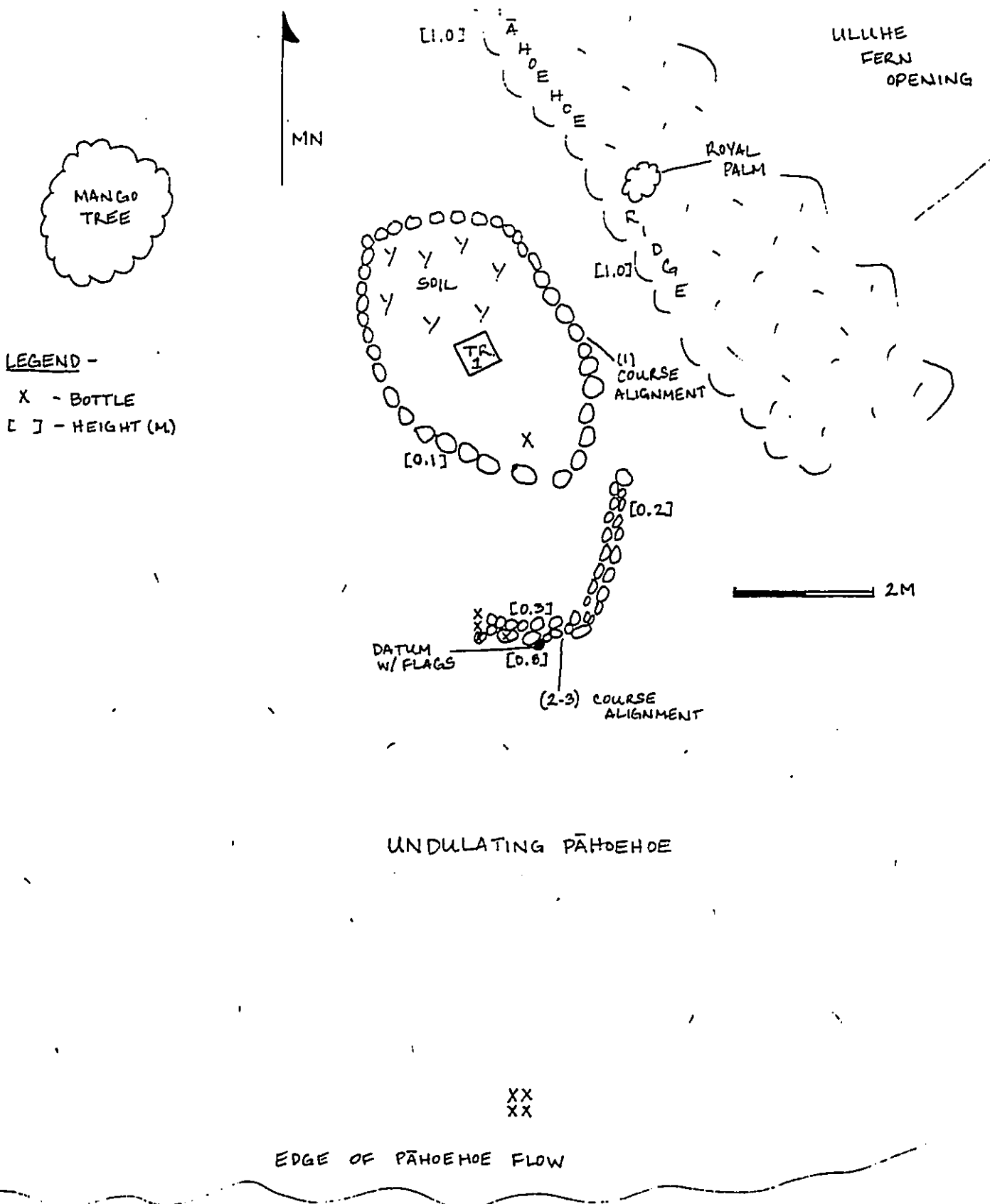


Figure 12 Site 50-10-35-18668, Plan View Showing Excavation Unit

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

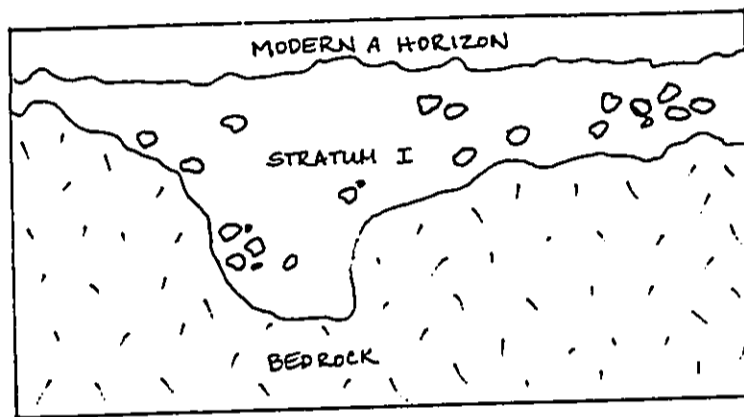
Site 18668 is probably a temporary camp with the oval single course alignment representing the perimeter of a tent pitching site.

#### Testing Results

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

<b>State Site #:</b>	50-10-35-18669	<b>CSH Site #:</b> 40
<b>Site Type:</b>	Site complex	
<b>Function:</b>	Lunch station	
<b>Features (#):</b>	2	
<b>Dimension:</b>	224 m. <sup>2</sup> (2409.9 ft. <sup>2</sup> )	

**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

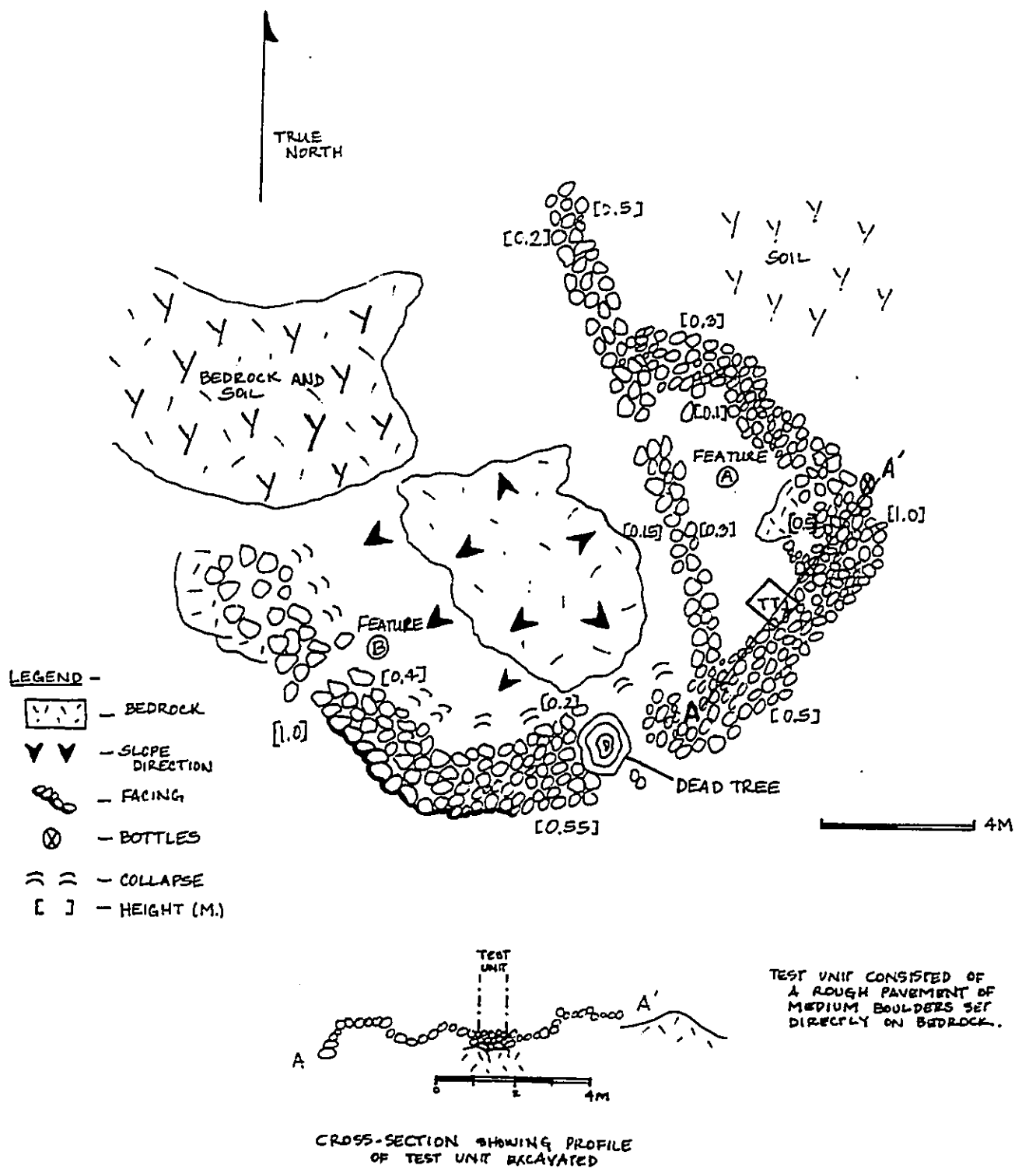


Figure 14 Site 50-10-35-18669, Plan View and Cross Section Showing Excavation Unit

**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.

CSH Site #: 12&13

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>)

**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.

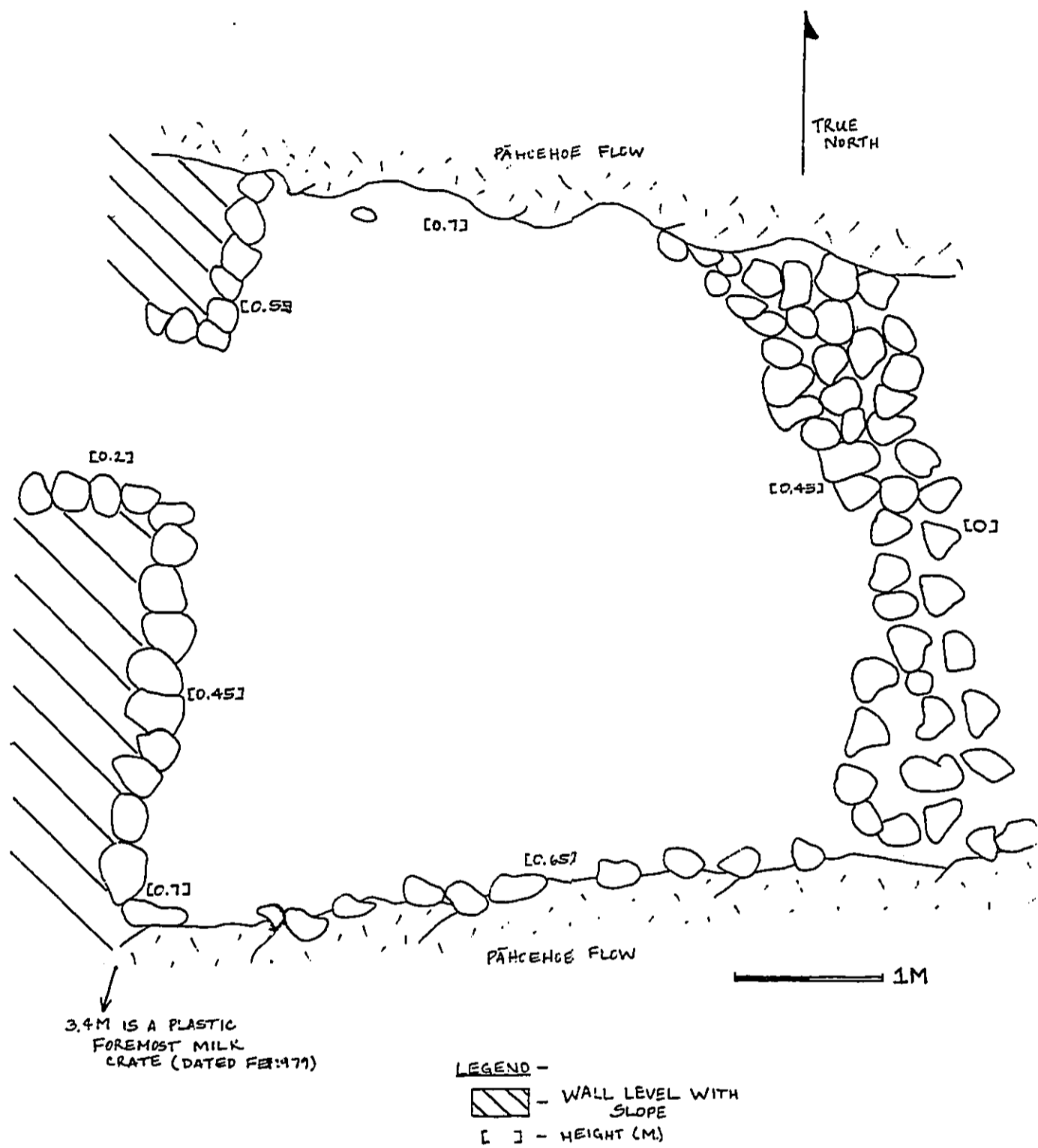


Figure 15 Enclosure Sub-Feature of Site 50-10-35-18670 (CSH12)

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

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

Based on historic research including a review of the Waiākea 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.).



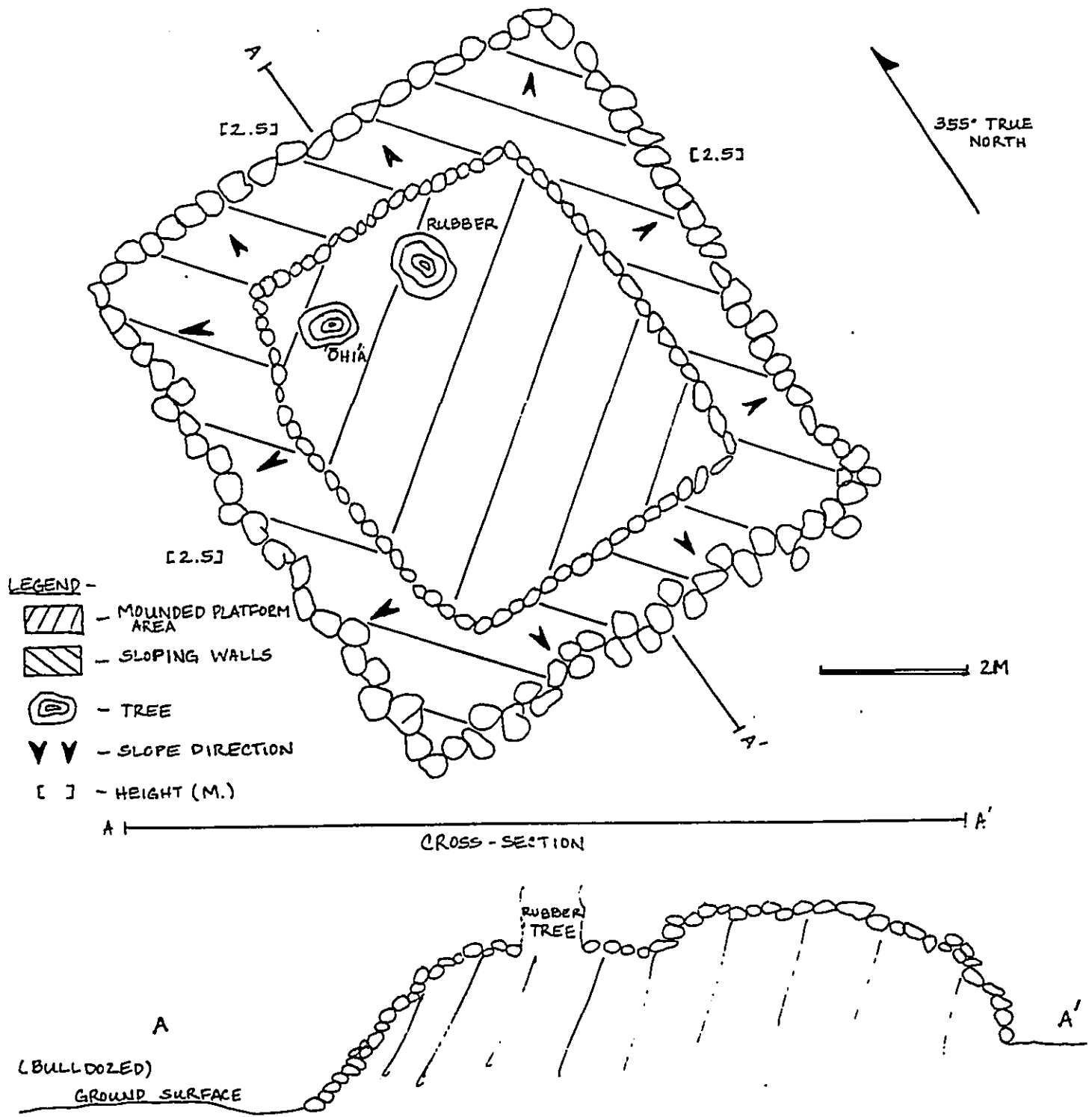


Figure 16 Larger Rock Clearance Mound within Site 560-10-35-18670, Plan View and Cross Section

## SUMMARY AND SIGNIFICANCE

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

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

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

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

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

#### Significance

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

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

#### Recommendations

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

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

## REFERENCES

- Condé, Jesse C. and Gerald M. Best  
1973 *Sugar Trains: Narrow Gauge Rails of Hawaii*, Glenwood Publishers, Felton Calif.
- Kelly, Marion, Barry Nakamura and Dorothy B. Barrère  
1981 *Hilo Bay: A Chronological History, Land and Water Use in the Hilo Bay Area, Island of Hawai'i*, Bishop Museum, Honolulu.
- McEldowney, Holly  
1979 *Archaeological and Historical Literature Search and Research Design: Lava Flow Control Study*, Department of Anthropology, Bishop Museum, Honolulu.
- Hunt, Terry L.  
1992 *Interim Report: Archaeological Inventory Survey Puainako Street Extension Project: Lands of Waiākea, Kukuau 1 and 2, and Pono Hawaii, South Hilo District, Island of Hawai'i*,
- Moniz, Jadelyn J.  
1992 "Summary of Prior Archaeological Work" *Historical and Archaeological Synthesis of Land Use and Settlement Patterns Waiākea Ahupua'a, Hilo Hawaii*, UH Anthropology 645: Historic Preservation, Fall 1992, Honolulu.
- Sato, H. et al.  
1973 *Soil Survey of the Island of Hawaii*, U.S. Department of Agriculture and Univ. of Hawaii Agricultural Experiment Station.
- Smith, Marc  
1992 *Field Inspection for State Land Disposition of the Proposed Department of Water Supply Office Site in Hilo, Waiākea Cane Lots, Waiākea, South Hilo, Hawaii Island (TMK: 3-2-4-56:1)*, January 3, 1992, State Historic Preservation Division, Department of Land and Natural Resources, Honolulu.
- Smith, Marc  
1991 *Site Inspection of the University of Hawaii - Hilo Perimeter Road Alignment, Research and Technology Park Phase I, Waiākea, South Hilo, Hawaii Island (TMK: 3-2-4-01:7)*, November 8, 1991, State Historic Preservation Division, Department of Land and Natural Resources, Honolulu.

**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

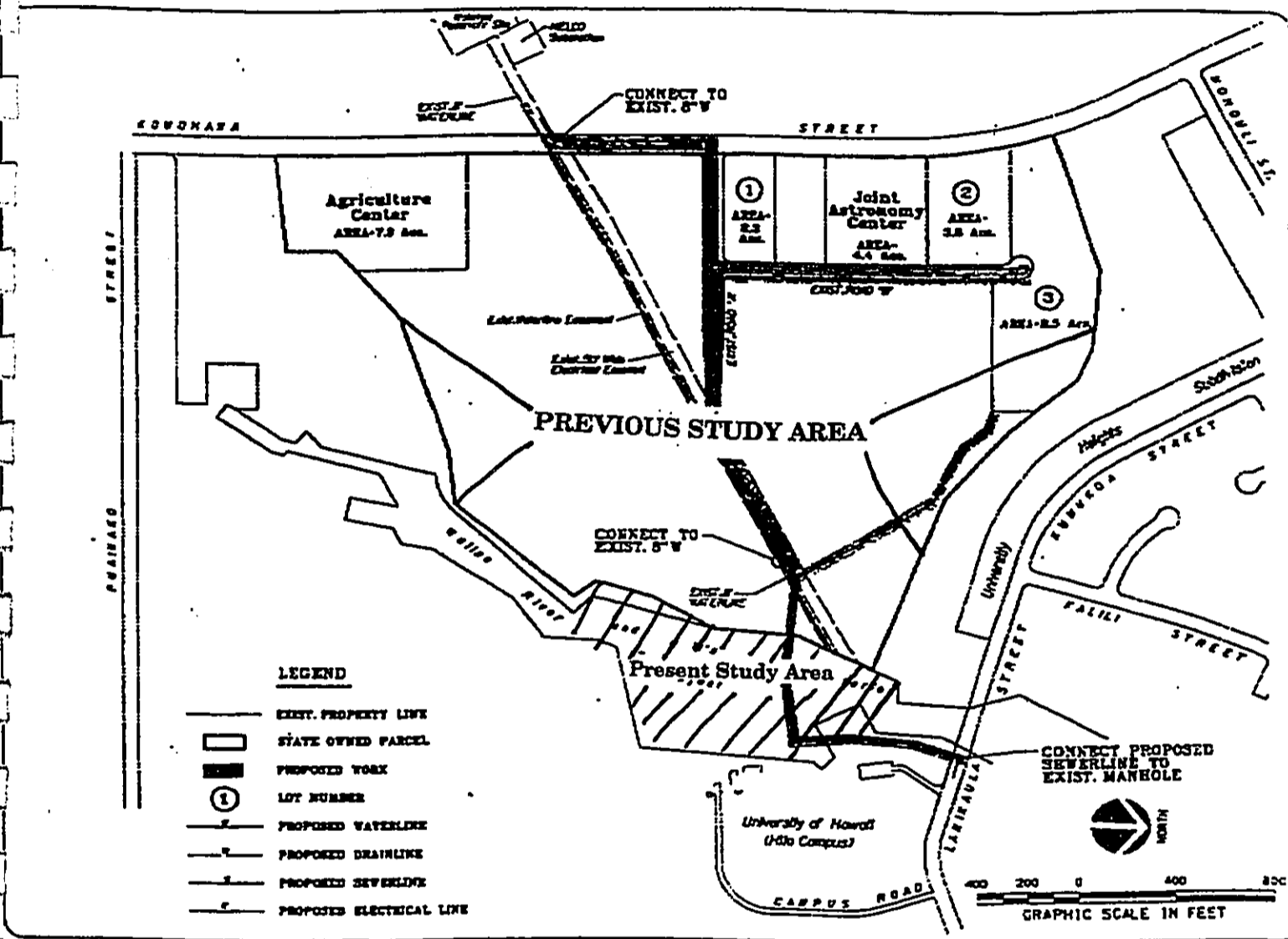


Fig. 1 Locational Map of University of Hawaii Hilo Proposed University Park, Showing Previous and Present Study Areas

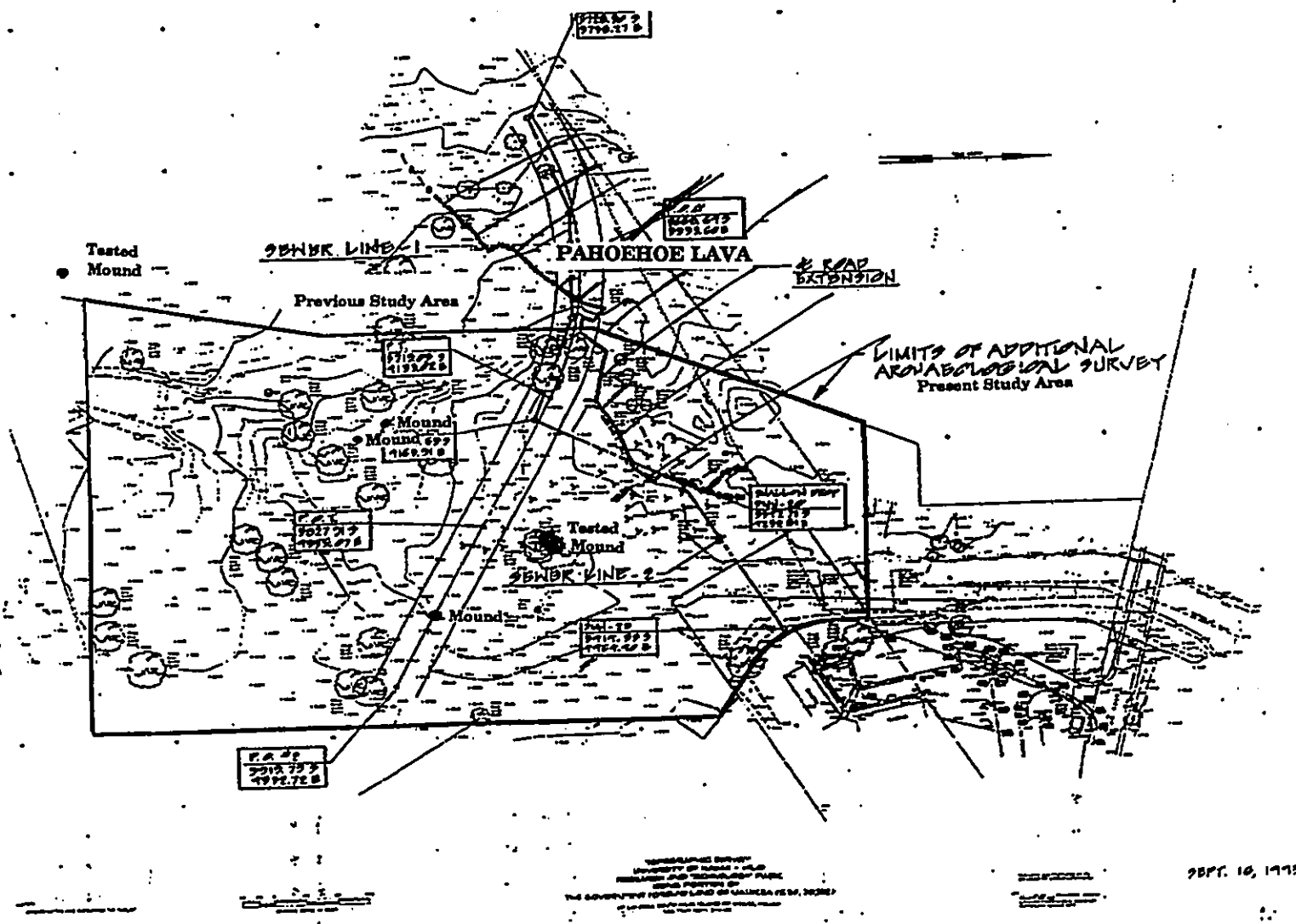


Fig. 2 Project Area Map Showing Archaeological Features

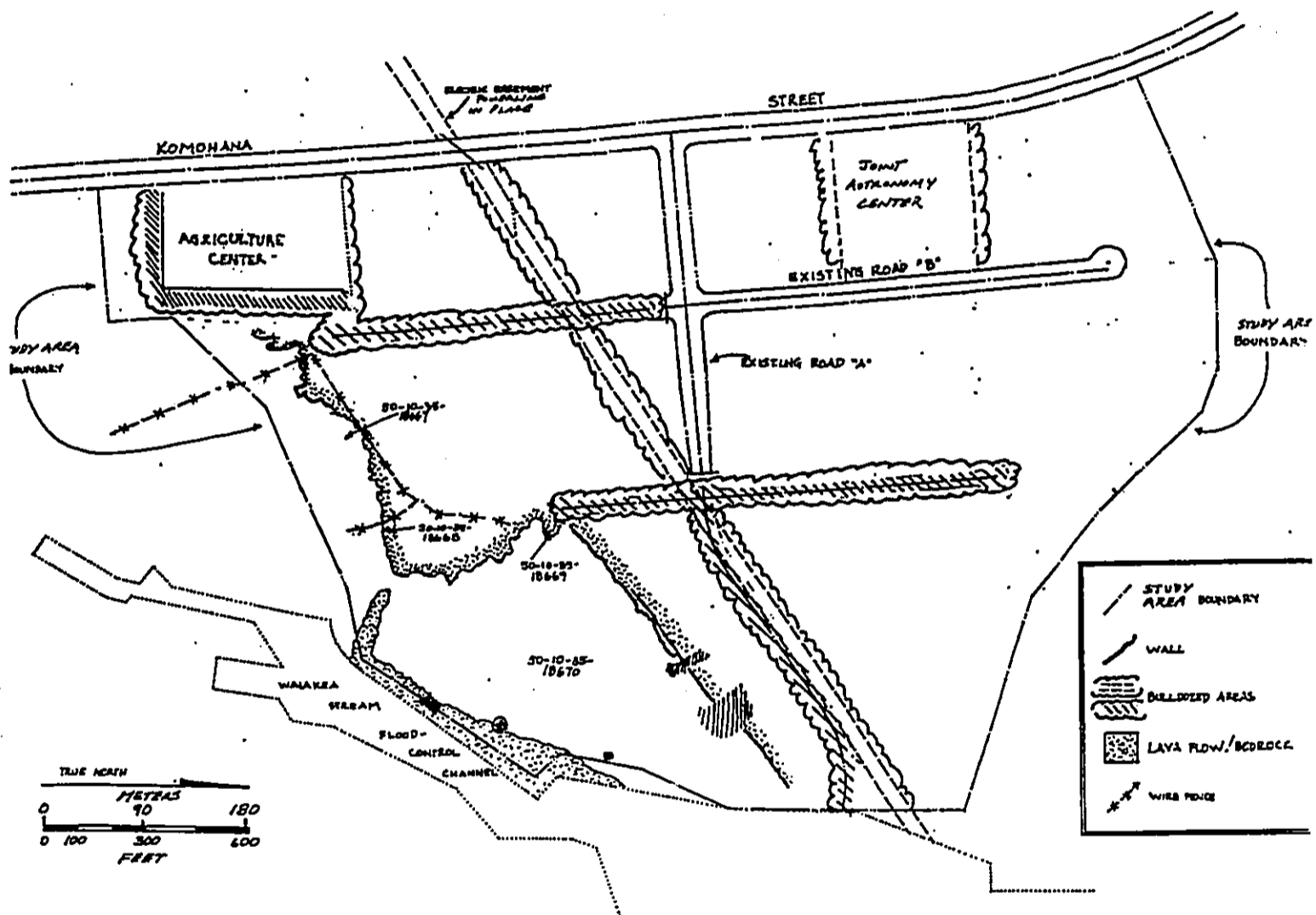


Fig. 3 Previous Study Area Map with Archaeological Sites (Borthwick et al. 1993:Fig. 8)

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

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

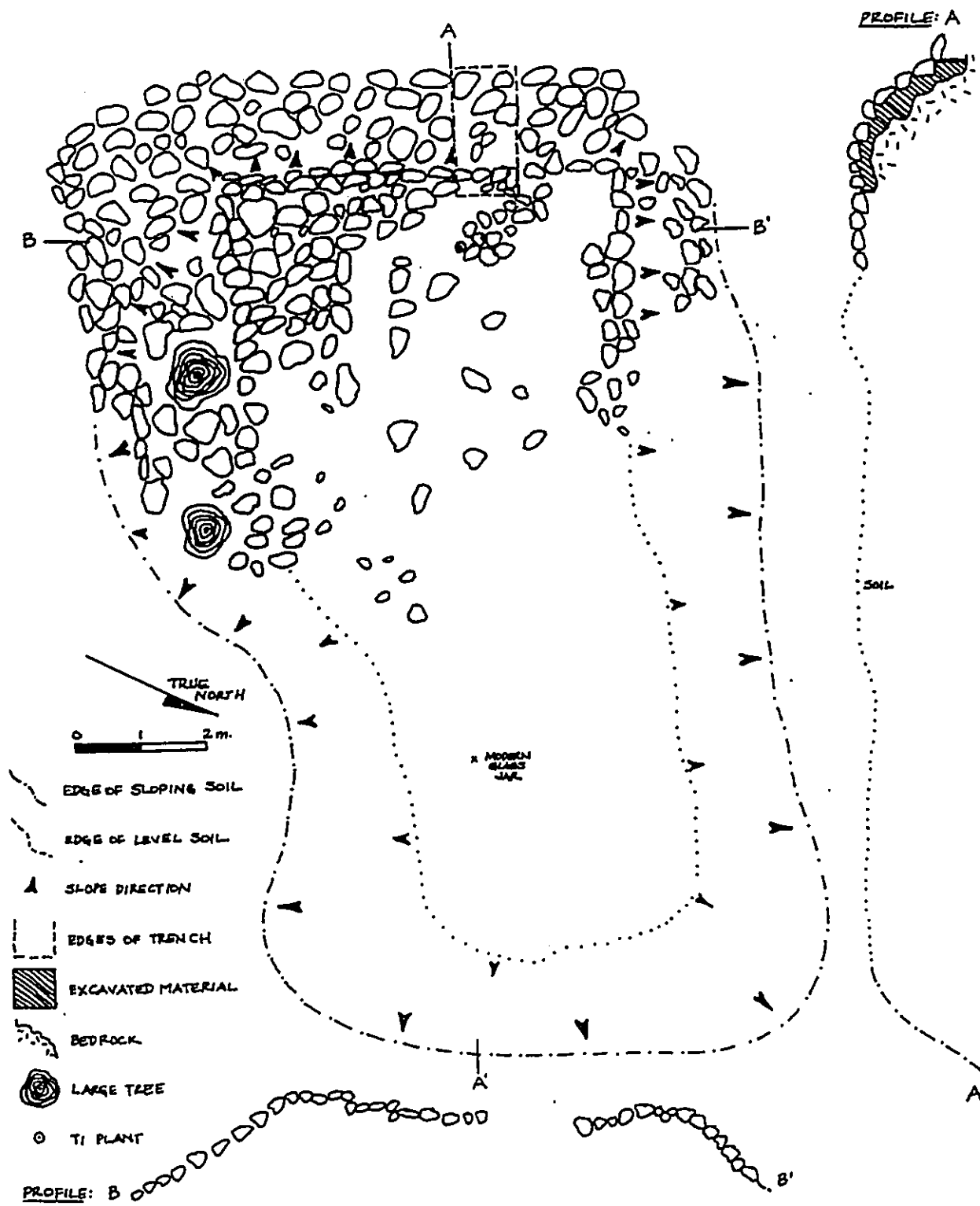


Fig. 4 Plan View and Cross Section of Tested Mound within Present Project Area, Feature of Site -18670



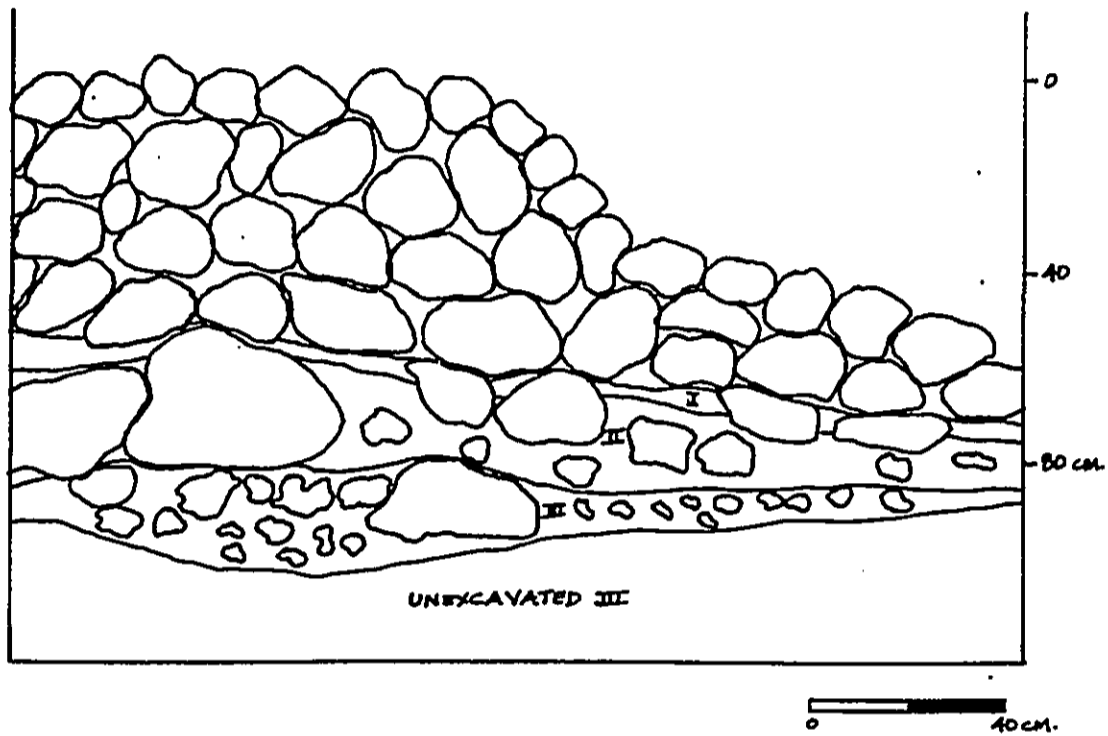
(10YR 3/6) silt loam. Stratum III represents the parent material soil layer or C Horizon which contains a high percentage of soft decomposing rock. No cultural material was within Stratum III.

The survey and testing within the present project area and previous background research for the Research and Technology Park (Borthwick *et al.* 1993:6-23) indicates that the features observed were associated with commercial sugar cane cultivation.

Specifically, the features are situated within the former Waiakea Cane Lots (Portion of Lot #16). During the previous study a State Historic Site number (50-10-35-18670) was allotted for the cane lots' associated features within that specific project area (*ibid.*:39-42) (See Fig. 3). Since the four newly identified mounds were also associated with the same lot or sugar cane field we are including these features under the same State site number, 50-10-35-18670.

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

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



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

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

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

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

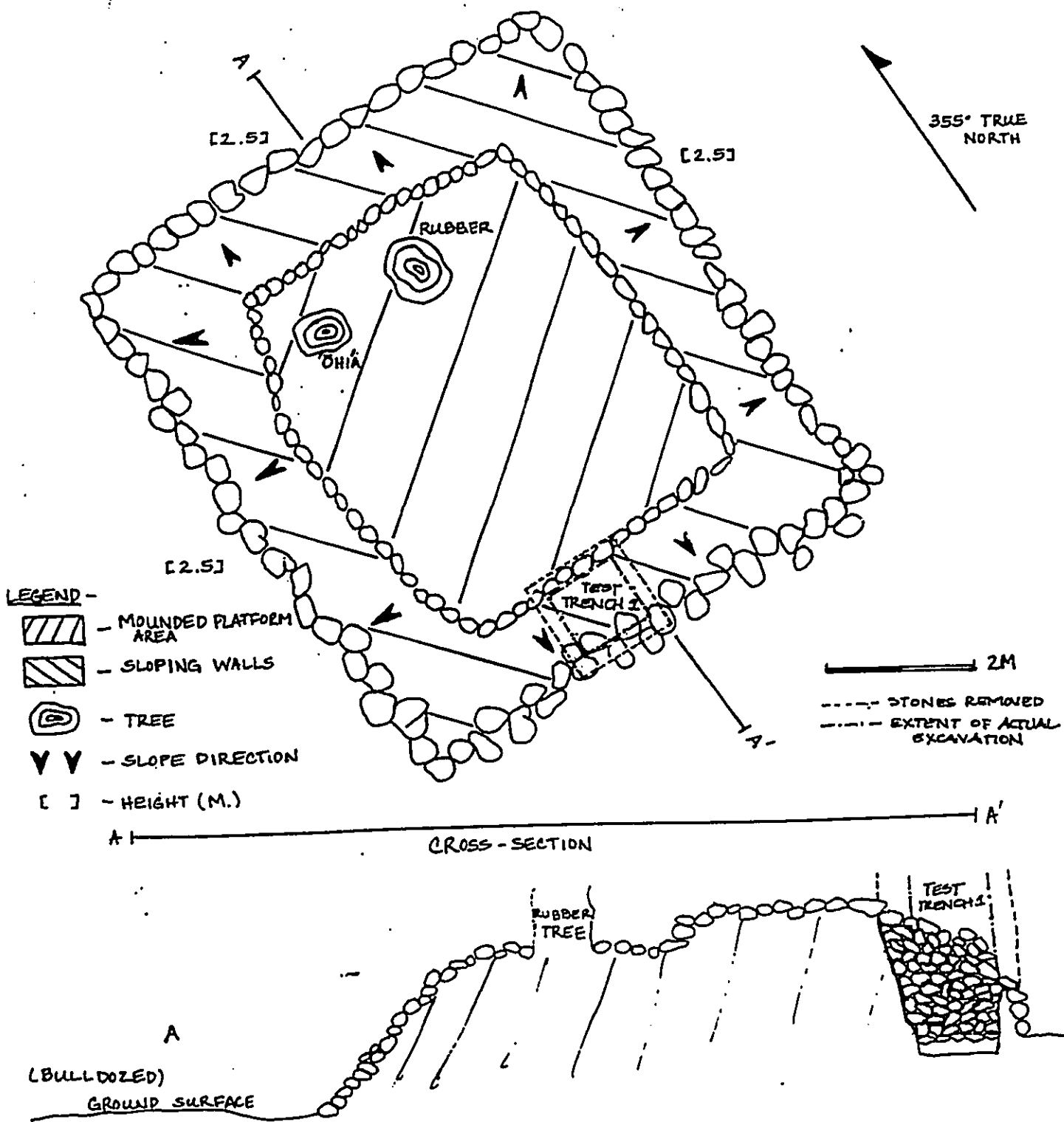
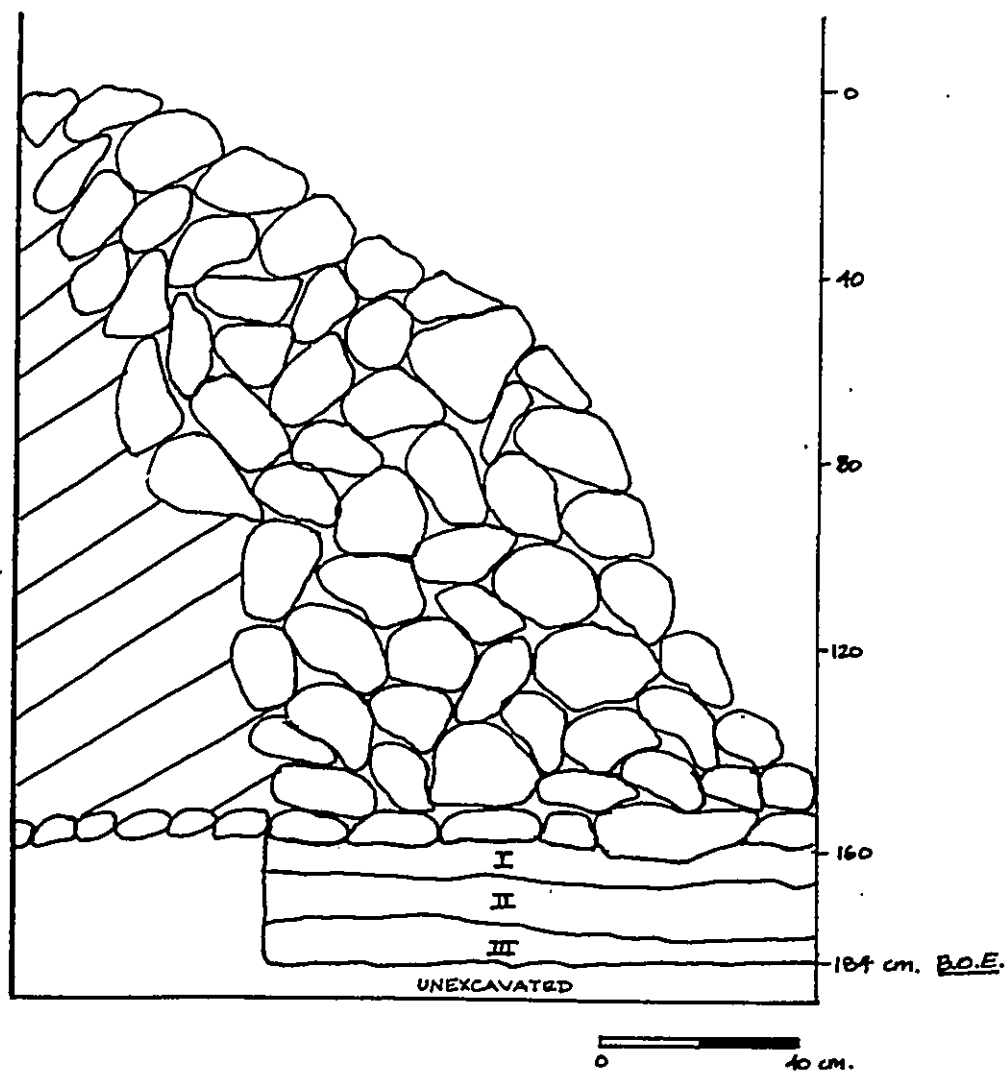


Fig. 6 Plan View and Cross Section of Tested Mound in Previous Study Area Portion of Site -18670 (Based on Figure 16 Borthwick *et al.*:42)

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

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

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



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

STRATUM II: 10 cm. THICK; (10 YR 5/2) VERY DARK GRAYISH BROWN SILTY CLAY LOAM; 10-20% ANGULAR PEBBLES

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

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

## SUMMARY AND RECOMMENDATIONS

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

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

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

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

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

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

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

## REFERENCES

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