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September 9, 1994

JOHN WAIHEE
GOVERNOR

TO: Robert P. Takushi, Comptroller
Department of Accounting and General Services

SUBJECT: Final EIS: North Hawaii Community Hospital

I am pleased to accept the Final Environmental Impact Statement for the North Hawaii Community Hospital, Waimea, Hawaii as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

This environmental impact statement will be a useful tool in the process of deciding if the action described therein should be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect the appropriate legislative bodies and governmental agencies to consider if the societal benefits justify the economic, social and environmental impacts which will likely occur. These impacts are adequately described in the statement which, together with the comments made by reviewers, provides useful analysis of the proposed action.

JOHN WAIHEE

c: Office of Environmental Quality Control

1994 FEIS HAWAII
NORTH HAWAII COMMUNITY HOSPITAL

FILE COPY

**SITE SELECTION REPORT AND
FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR A
NORTH HAWAII COMMUNITY HOSPITAL
WAIMEA, HAWAII**

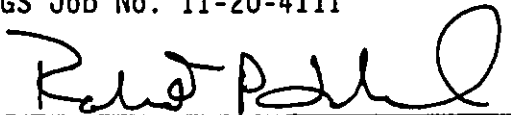
Department of Accounting and General Services
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813
DAGS Job No. 11-20-4111

June 1994

SITE SELECTION REPORT AND
FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR A
NORTH HAWAII COMMUNITY HOSPITAL
WAIMEA, HAWAII

Prepared for: State of Hawaii
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, Hawaii 96813
DAGS Job No. 11-20-4111

Responsible
Official:


Robert P. Takushi, Comptroller

6/22/94
Date

Accepting
Authority:

John D. Waihee, Governor State of Hawaii

Prepared by:

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826
WOA: 3010-01

June 1994

SUMMARY SHEET

NORTH HAWAII COMMUNITY HOSPITAL
Waimea, Hawaii

Proposing Agency: State of Hawaii
Department of Accounting and General Services
1151 Punchbowl Street, Rm. 430
Honolulu, Hawaii 96813
Contact: Brian Isa

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Accepting Authority: Governor John D. Waihee
State of Hawaii

Candidate Sites Tax Map Keys: 6-7-02:13, 6-7-02:11, 6-7-02:17, 6-8-01:1, 6-6-01:2

Location: Waimea, Hawaii

Proposed Action: Construction of a 50-bed non-profit, full service community hospital to provide quality acute and skilled nursing care and other medical services to the residents of Waimea and surrounding communities.

PREFACE

Chapter 343 Hawaii Revised Statutes (HRS) requires that a government agency or private developer proposing to undertake a project consider the potential environmental impacts of the proposed project by preparing an assessment. Among the criteria set forth in Chapter 343 HRS for preparation of an environmental assessment is the use of public funds for the project. The State legislature in the 1991 session appropriated \$12.5 million as a grant-in-aid for construction of the proposed North Hawaii Community Hospital.

This Environmental Impact Statement has been prepared to meet the requirements of Chapter 343 HRS and its implementing rules, Chapter 200 of Title 11, State of Hawaii Department of Health Administrative Rules, Environmental Impact Statement. The document also incorporates the methodology and results of the Site Selection Report which was undertaken to identify candidate sites for the proposed North Hawaii Community Hospital. The Site Selection Report portion of the document identifies relative advantages and disadvantages of seven alternative sites and compares the potential environmental impacts to facilitate discussion and decision making on a final site. If required, the information contained in this document could be used for additional necessary governmental permits and approvals.

Prior to completing this Final EIS, Site No. 1 at the Lucy Henriques Medical Center was recommended by the Department of Health for the future North Hawaii Community Hospital (joint development with Lucy Henriques Medical Center). This selection occurred following preparation of the Kamuela Stream Flood Study which examined the potential flood hazard at the site. The Kamuela Stream Flood Study is included in Appendix B of this document, and supersedes the Flood Hazard Analysis which was conducted for Site No. 1 during preparation of the Draft EIS (see Appendix B-1). The Draft EIS Flood Hazard Analysis recommended the use of a culvert to direct water around a conceptual building footprint and into Waikoloa Stream. The subsequent Kamuela Stream Flood Study assessed the flood hazard to adjacent properties based on a more detailed site plan of the hospital prepared in June 1993 by Media Five Limited, Honolulu, Hawaii, the project architect, for a joint development with Lucy Henriques Medical Center. This detailed site plan is also included in Appendix B along with the more recent flood study.

EXECUTIVE SUMMARY

Project Description

Studies dating to 1969 have shown the need for a hospital in the northern and western portion of Hawaii County. Among the findings of these studies was that an acute care hospital was needed to service this North Hawaii area and that a central location in the Waimea area should be considered. One result of this determination was the construction of the Lucy K. Henriques Medical Center in Waimea by the Lucy K. Henriques Trust.

In 1987, the North Hawaii Community Hospital, Inc., (NHCH) a non-profit and non-stock corporation was formed to generate community support and private funding for construction of a full service hospital in North Hawaii. Subsequently, NHCH has undertaken a number of efforts to raise the necessary funds from public and private sources for construction of the hospital.

Analysis was conducted by the State of Hawaii Department of Accounting and General Services (DAGS) for the Department of Health (DOH) to determine the appropriate scale or scope of a hospital facility in North Hawaii. The results of this analysis, set forth in a Project Development Report, show that with the projected growth in population a hospital facility of approximately 62,000 square feet of space is needed to serve the North Hawaii area. Thus, the proposed North Hawaii Community Hospital will be a 50-bed facility consisting of 25 long-term care beds, 15 acute care beds, and 10 beds which could be used in either category. The proposed facility would provide a total floor area of about 62,000 SF and may be either a one or two-story structure. Services to be provided include inpatient surgery, obstetrics, imaging, physical therapy, clinical laboratory, food service, pharmacy, and an emergency room. In addition, it will include the various support functions required to operate the hospital.

Based on a conceptual site plan, the preliminary cost estimates set forth in the Project Development Report show the proposed hospital will cost about \$25.0 million to construct. The State legislature in the 1991 session appropriated \$12.5 million for construction of the hospital. This amount was given to the NHCH as a grant-in-aid. The remainder of the funds required for construction of the hospital must be matched by NHCH. Once sufficient funds have been raised, NHCH will be responsible for construction of the hospital.

Once the hospital has been constructed, NHCH will be responsible for funding all operation and maintenance of the facility. Operation and maintenance of the proposed hospital will not involve the State of Hawaii Department of Health.

Candidate Sites

The site selection analysis examined seven (7) candidate sites, each of approximately five to seven acres located within proximity to the existing

Lucy Henriques Medical Center in Waimea and close to a State highway or improved major county road. Based on this analysis, the following candidate sites were selected:

- o Site No. 1 Lucy Henriques Medical Center;
- o Site No. 2 Waimea Civic Center*;
- o Site No. 3 2020 Plan;
- o Site No. 4 Fire Station;
- o Site No. 5 Race Track;
- o Site No. 6 Tree Farm; and
- o Site No. 7 Waiaka Bridge.

* Used only in conjunction with Site No. 1.

A preferred site for construction of the proposed hospital has not been selected at this time. However, construction of the proposed hospital at Site No. 1 would result in a number of advantages including consolidation of certain functions and could decrease the size of the required facility.

Environmental Impacts

Environmental impacts would generally involve short-term impacts associated with construction of the hospital and long-term impacts associated with the facilities operation and maintenance.

Short-term Impacts

Construction of the hospital will require removing vegetation from the selected site, and clearing and grading to meet the design requirements for the facility. Other short-term impacts experienced during construction will include increased noise levels near the project site from operation of heavy equipment and a decrease in local ambient air quality. During the construction period, increased traffic is anticipated along existing roadways leading to the project site. The project will provide job opportunities for local workers employed in the construction industry. The increased construction activities will also benefit local material suppliers and retail businesses.

Long-term Impacts

In the long-term, use of a site for a hospital will prevent its use for agricultural or other purposes and will eliminate some open space. Areas not paved or built upon will be landscaped in accordance with a landscape plan, providing for the reestablishment of certain plants, birds, and other wildlife. The use of certain sites may also obstruct certain views of open pasture or of the surrounding mountains from certain angles.

Portions of Sites No. 1, 2, and 3 are located within the flood hazard area from Kamuela Stream. Hawaii County code prohibits encroachment or construction in a flood hazard area, if such encroachment will raise base flood elevations. Because of the advantages of using Site No. 1, including consolidation of functions with the existing medical center, a

flood hazard study was prepared to determine mitigation measures or improvements which may be required for construction in the site's flood hazard area. The results of the study showed that, based on preliminary information, with construction of a culvert to divert the flow of Kamuela Stream, the proposed hospital could be constructed on Site No. 1. The culvert would divert flow from Kamuela Stream to Waikoloa Stream. Thus, there would be no increase in base flood elevations.

Subsequent to preparation of the Draft EIS, meetings were held with NHCH, the DOH, and Hawaii County Department of Public Works to discuss the flood hazard issue and the proposed culvert mitigation plan. As a result of those meetings, the proposed culvert will no longer be considered as a flood hazard mitigation measure. Instead, a second flood study was conducted based on a conceptual site plan of the hospital building footprint prepared by Media Five Limited, the project architect selected by NHCH. Based on the conceptual site plan, the existing flood plain would be channelized within the project site to contain the flow and direct it back to the existing alignment of the stream on the west. The analysis indicates that the hospital facilities should not significantly impact the hydraulic properties of the stream both upstream and downstream of the project site. If implemented, the mitigation measure will be closely coordinated with the Hawaii County Department of Public Works to ensure all County requirements are met for construction within a flood hazard area.

Patients, employees, visitors, and service vehicles will generate traffic to and from the hospital during the course of the day. It is estimated that approximately 580 vehicle trips will be generated by the facility during a 24 hour period, and that it will generate 59 AM peak hour and 68 PM peak hour vehicle trips. The increase in traffic is not expected to contribute significantly to vehicle emissions in the Waimea area. Nor will the noise associated with this additional traffic significantly increase the noise level around the Waimea area.

The projected staff required to operate the new hospital is about 162 full-time equivalent staff positions for the three daily shifts. This additional staff may create a demand for housing in the surrounding area and will contribute to an increase in local consumption expenditures.

Depending on the site chosen, construction of the hospital may have an impact on surrounding land uses if located in an area which has been previously undeveloped. Impact may be greatest from sites No. 5 and 7 which are not in the Urban district. Less affected would be Sites No. 1 through 4 which are planned for development of low-density residential space as part of the Parker Ranch 2020 Plan. In this plan, Site No. 5 is an area designated for Race Track and Stables, and Site No. 6 is designated Industrial. Either of these sites could displace future uses incompatible with the new hospital.

Based on a daily average demand of 200 to 250 gallons of water per bed, the proposed hospital will use 10,000 to 12,500 gallons per day of water. Hawaii County currently limits new water service to 1-inch meters or up to

4,200 gallons per day in the Waimea area. Development of a new water source would be required prior to construction of the proposed hospital at any of the candidate sites. At this time, Hawaii County has not programmed or budgeted to undertake studies to identify a source, conduct exploratory drilling, or construct a production water well.

Given the current County restrictions, a water source will have to be developed prior to construction of the proposed hospital. If the County does not develop the source, the proposed hospital may have to identify and develop a source either with its own funds or in conjunction with the County or other private users.

About 12,500 gallons per day of wastewater will be generated by the proposed hospital. The Waimea area is not serviced by a County wastewater treatment system. Thus, an individual wastewater treatment system and effluent disposal system would be required at any of the candidate sites. Since the Waimea area is located with a critical wastewater disposal area, the wastewater effluent will be disposed using a leaching field. The DOH has concurred on this method of treatment and disposal of wastewater.

Solid waste generated by the facility is expected to amount to about 1.4 commercial-sized bins per day. The solid waste would be picked up and disposed by the commercial operator that serves the Waimea area. Hawaii County has undertaken a study to select a site for a new landfill. A tentatively identified landfill site could be operational sometime in 1993.

The proposed hospital will not have an incinerator to dispose of bio-infectious wastes. Such wastes will be collected in sealed containers, then placed in sealed metal containers prior to transport to the approved disposal facility at Kona Hospital. This method of collection and transportation of bio-infectious waste is currently used at the Lucy Henriques Medical Center.

Electric transmission and distribution lines in the Waimea area can service the proposed hospital without adverse impacts to other users. An emergency generator has been recommended to serve critical care areas of the hospital.

Site Selection Report and
Final Environmental Impact Statement
North Hawaii Community Hospital

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1. INTRODUCTION

1.1 Project Background

Since 1969 a number of studies have been undertaken concerning the need for acute care hospital facilities in the northern and western portion of Hawaii County, called North Hawaii in this document. These studies examined historical and forecasted resident and tourist population trends and potential service areas to establish the need for a hospital, the level of patient care, and types of service that should be available for North Hawaii communities. In addition, the studies examined the site or location for a hospital, if it were to be constructed in North Hawaii.

In 1969, the first of these studies, undertaken for the Lucy K. Henriques Trust, concluded that:

- o Initial construction for a hospital should include acute care and long-term care ;
- o Initial construction for the hospital should be designed to expand incrementally;
- o Incremental growth of the facility should be designed to occur as population increases; and
- o The hospital should be designed to permit maximum support from minimum staff.

This 1969 study recommended a facility with a total area of approximately 81,400 SF, including a hospital area of 58,500 SF, long-term care area of 17,100 SF, and outpatient clinic area of 5,800 SF.

Although the 1969 study did not identify a specific location or site for the acute and long-term care hospital, the service area examined included the districts of North and South Kohala, Hamakua, and North Kona.

Despite the findings of need for an acute and long-term care hospital, the estimated cost to construct such a facility was more than the available funds of the Lucy Henriques Trust. Thus, in 1974, another study was undertaken by the Bishop Trust Company, Trustees of the Lucy K. Henriques Trust, to examine the construction and operation of the first increment of services for the proposed facility. Among the findings of that study were that the Lucy K. Henriques Trust be responsible for:

- o Funding construction of a new facility on the Mamalahoa Highway site in Waimea;
- o Funding any required operational subsidies deriving from new or expanded health programs not available in the Waimea area; and
- o Overseeing the reconstitution of the Northern Hawaii Hospital Corporation (NHHC) so that it will be representative of the community and so that NHHC can act in the community's behalf in matters of health care.

In addition, the 1974 study recommended that the NHHC be responsible for:

- o Developing and managing the proposed facility;
- o Operating the new emergency medical service; and
- o Promoting additional needed health programs in the community and the northern portion of Hawaii County including the development of an acute care hospital serving this region.

Other recommendations of the 1974 study also proposed that:

- o Surplus income derived from NHHC programs or building rental be used to establish a fund for further expansion of health services in the community including acute and extended care; and
- o Construction of the acute care hospital in Waimea shall coincide with the phasing out of the present nonconforming Honokaa Hospital.

The final recommendation of the study was that the option to develop a new outpatient and emergency facility in Waimea should be the first increment of construction. The location on Mamalahoa Highway in Waimea was recommended for this facility since the site had space for future additions of acute care hospital beds.

The result of these studies was construction of the Lucy Henriques Medical Center funded from the Trust of Lucy K. Henriques. Lucy Henriques, who died in the early 1800's, set aside money and land along Mamalahoa Highway with the understanding that the property would be used towards constructing a sanatorium. A Trust was established in 1934 to undertake this task. Subsequently, the Trustees of the estate, Bishop Trust Company, realized the need for acute and long-term hospital facilities in North Hawaii and amended the will's original intention to include a medical facility.

1.2 North Hawaii Community Hospital, Inc.

In 1987, the North Hawaii Community Hospital, Inc. (NHCH), a non-profit and non-stock corporation was formed to generate community support and private funding for construction of a full service hospital in North Hawaii. In August 1989, the Internal Revenue Service approved the NHCH as a non-profit organization. This tax-exempt status, retroactive to November 1987, allows donors to NHCH to deduct their contributions from their taxable income.

The NHCH program statement indicates the NHCH will be committed to the provision of quality acute care and skilled nursing care and other medical services to the residents of Waimea and surrounding communities in North Hawaii. The services to be provided by NHCH will be available to everyone, regardless of color, race, sex, national origin, religion, or the ability to pay. NHCH intends to maintain an awareness of the needs of the community and will adjust their goals and objectives when necessary to meet those community needs.

As of June 1990, NHCH was under the direction of a 13-member board of directors representing the North Hawaii communities and physicians with active practices in the area. In addition, NHCH has an ex-officio board of 9-members including the Director of the State of Hawaii Department of Health. An advisory board has also been formed to provide direction for NHCH. As of June 1990, this advisory board was composed of 53 members; 49 of them representing South Kohala, North Kohala, and Hamakua areas, and four at large members.

1.3 Community Support

The State of Hawaii Department of Health (DOH) has acknowledged the importance of community support in its decision to locate a hospital in North Hawaii. A number of community and business organizations in North Hawaii and throughout the State have participated with NHCH to raise funds for construction of the hospital. This participation has included support for a number of community events such as an art exhibit, music festivals, art and creative writing contests. The events have been well-attended by North Hawaii residents and supporters from other areas of Hawaii County and the State. In addition to funds from organizations and events, over 250 individuals have made contributions to the NHCH.

The importance of community support was clearly seen at the town meeting held in Waimea in October 1987. More than 400 individuals, some of them representing businesses and various community groups, attended this meeting to support a centralized, accessible, high quality hospital for North Hawaii. The 17 active practicing physicians in North Hawaii also signed a letter of support for a hospital.

The October 1987 town meeting was the first step in a petition drive in North Hawaii to demonstrate to the DOH that there was a consensus in the community to have the hospital constructed in Waimea, rather than Honokaa. Ultimately, the petition for a hospital in Waimea was signed by 4,600 persons representing approximately 12,000 family members of North Kohala, South Kohala and Honokaa.

2. DESCRIPTION OF NEED

2.1 The North Hawaii Community

2.1.1 Service Area

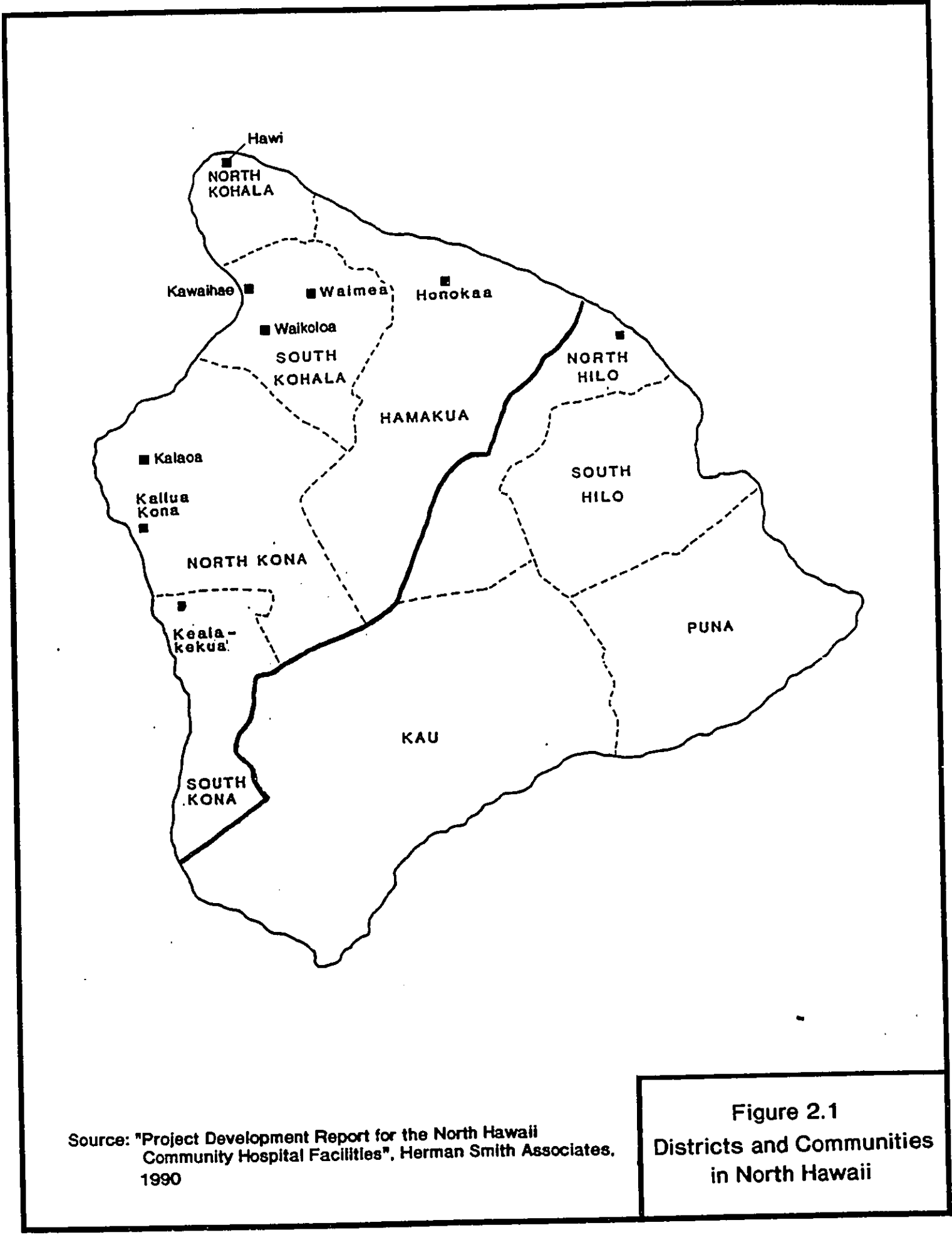
The service area for the proposed North Hawaii Community Hospital is set forth in the "Project Development Report for The North Hawaii Community Hospital Facilities", prepared by Herman Smith Associates, 1990, for the State of Hawaii Department of Accounting and General Services. North Hawaii is generally considered to encompass the Hamakua district on the east, North and South Kohala to the north, and to a lesser extent, North and South Kona to the west. Major communities in North Hawaii include Honokaa in the Hamakua District; Waimea, Kawaihae, and Waikoloa in the South Kohala District; Hawi in the North Kohala District; Kalaoa and Kailua-Kona in the North Kona District; and Kealahou in the South Kona District. Figure 2.1 shows the districts and communities in North Hawaii.

2.1.2 District Profiles

The following profiles provide a brief summary of the characteristics of the districts in the proposed North Hawaii Community Hospital service area.

North Kohala -- Land use in this district is primarily agricultural. Major agricultural products include cattle, nursery products, and macadamia nuts. Major ranches in the district include Kahua and Parker Ranch which produce almost one-half of Big Island cattle sales. Tourism and its related service industries provide other sources of income and employment for the district, although no major visitor facilities are located in North Kohala.

South Kohala -- The visitor industry is the primary activity in this region, centered around the Mauna Kea Beach, Mauna Lani, and Waikoloa



Source: "Project Development Report for the North Hawaii Community Hospital Facilities", Herman Smith Associates, 1990

Figure 2.1
Districts and Communities
in North Hawaii

Beach Resorts. Planned expansion of these resorts could add a total of 5,350 hotel units and 5,680 condominium units to their existing inventory. Cattle-ranching uses most of the land in South Kohala. Parker Ranch is headquartered in Waimea and has a total of 227,000 acres in the districts of Hamakua, North and South Kohala. It is one of the nation's largest ranches. Demand for locally grown fruits, vegetables, and beef by the hotels in the region is high and is expected to continue to grow.

Hamakua -- Land use in the Hamakua district is principally agricultural, primarily sugarcane production and some macadamia nut farming. Recent land sales by the Hamakua Sugar Co. for proposed residential and resort developments indicate that the region may also experience growth in population and in visitor accommodations in the future.

North and South Kona -- The visitor industry provides the major source of economic activity in North Kona and is expected to expand at a rapid rate. There are now more than 4,500 hotel and condominium visitor units in the district. Diversified agriculture in North and South Kona continues to develop steadily in products such as papaya, bananas, avocados, ginger root, orchids, anthuriums, and protea. Coffee production has also experienced a related increase.

2.1.3 Waimea

Waimea, in the South Kohala District, is located in the approximate geographic and logistical center of the service area and presently provides a number of commercial, retail, governmental, and emergency medical services for the North Hawaii communities. The town has two sizable shopping centers, a State judicial building and civic center, a medical center (Lucy Henriques), and a State Airport with commuter air service. In addition to cattle ranching, temperate climates in Waimea allow for extensive farming of crops such as broccoli, burdock, chinese cabbage, cauliflower, celery, daikon, head and romaine lettuce. Commercial flower growing also occurs in the Waimea area.

2.2 Population

The population of Hawaii County has grown rapidly in recent years, from 63,470 persons in 1970 to 92,050 persons in 1980, an annual growth of about 3.8 percent, and to 117,500 persons in 1988, a 3.1 percent annual growth rate. As a comparison, the State of Hawaii population increases were about 2.3 percent per year from 1970 to 1980 and 1.65 percent per year from 1980 to 1988.

Population growth in the West Hawaii region of North Kona and North and South Kohala is largely responsible for the increase in Hawaii County. Patterns of population growth are defined primarily by an areas' economic opportunities. In this respect, the West Hawaii region already has the foundations for providing a diverse economic base. The region has many opportunities to sustain a stable and diversified economy supported by energy resources, high technology research and development, aquaculture, diversified agriculture, commercial and sport fishing, and seafood marketing and ocean research.

The Project Development Report (PDR) prepared by Herman Smith Associates includes data which illustrates the population growth in North Hawaii. According to the PDR, the resident population in 1989 of the proposed hospital service area--the communities of North and South Kona, North and South Kohala, and Hamakua--was 47,770 persons. This population is forecasted to increase to 67,046 persons by 1998, an annual increase of 3.8 percent. Most of this growth (about 60 percent) is expected to occur in the South Kohala region (see Table 2.1). During this same period, the population of the State is forecasted to increase at an annual rate of 1.5 percent.

From 1989 to 1998, the number of tourists in North Hawaii is similarly expected to grow from an average of 7,411 persons daily to 17,493 persons daily, or an increase of 10 percent per year. Again, the majority of this

TABLE 2.1

NORTH AND WEST HAWAII ISLAND POPULATION BY DISTRICT
EXISTING AND PROJECTED*

DISTRICT	1989 Population			1998 Population			Percent Change 1989 to 1998	
	Resident	Tourist	De Facto	Resident	Tourist	De Facto	Resident	De Facto
Hamakua	5,519	6	5,524	6,536	8	6,544	18.4	18.5
N. Kohala	3,986	21	4,007	5,563	342	5,905	39.6	47.4
S. Kohala	8,024	2,585	10,609	12,872	7,592	20,464	60.4	92.9
N. Kona	22,587	4,734	27,321	33,146	9,457	42,604	46.7	55.9
S. Kona	7,654	66	7,721	8,928	93	9,021	16.6	16.8
TOTAL	47,770	7,411	55,182	67,046	17,493	84,539	40.4%	53.3%

* Source: "Project Development Report for the North Hawaii Community Hospital Facilities--
Volume 1" published by Herman Smith Associates, 1990.

growth is expected in the South Kohala region. The same is true for de facto population.

Market share data by district for a proposed hospital in Waimea were also included in the PDR using the service area population projections to 1998. Based on these projections, the NHCH is expected to capture an estimated 50 percent of hospital users in the Hamakua, South Kohala, and North Kohala districts and about 15 percent in the North Kona district. Figure 2.3 shows the estimated market share to be captured by the NHCH.

2.3 Existing Medical Facilities

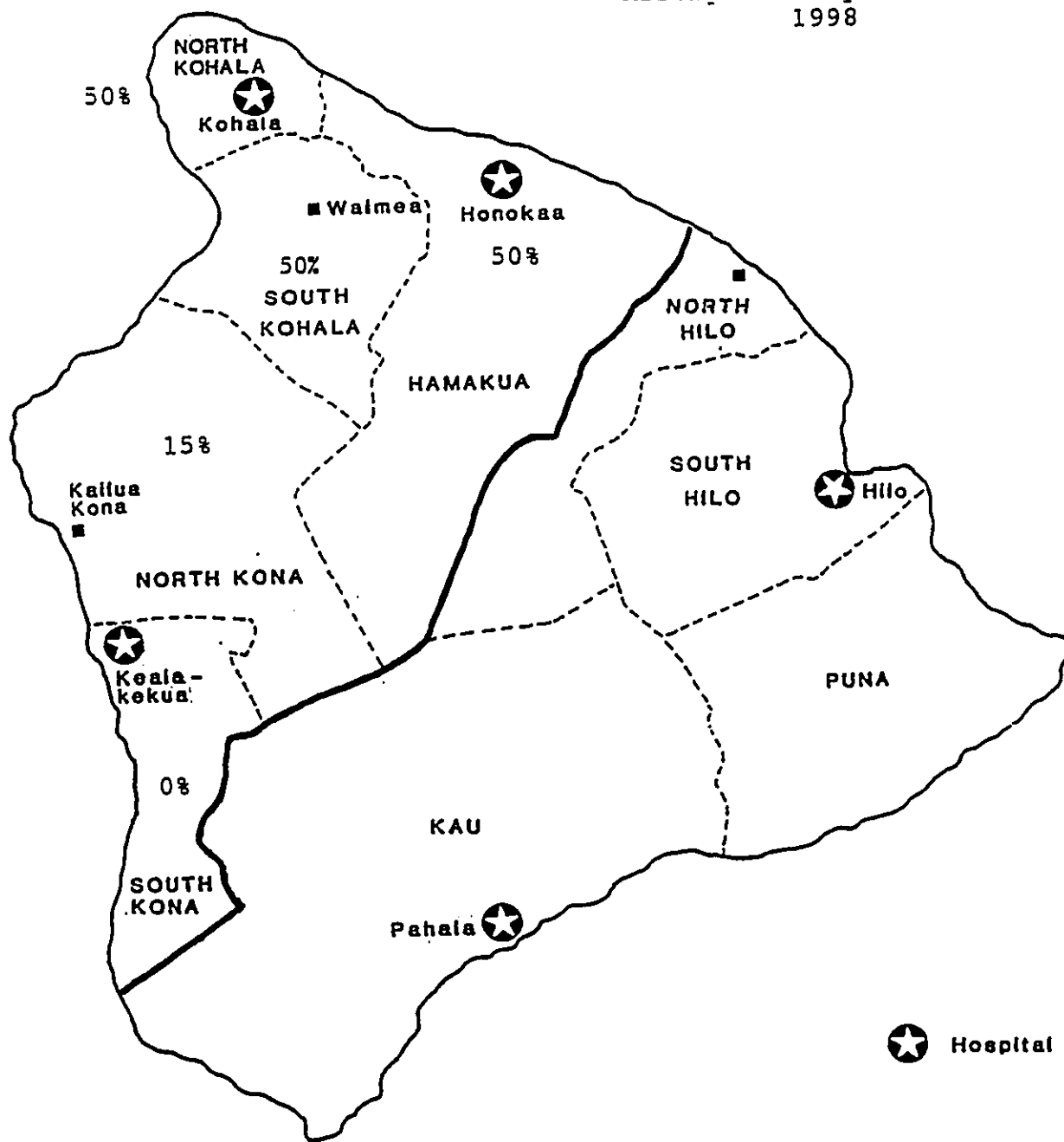
2.3.1 Hawaii County

There are five hospitals in Hawaii County which could be used by residents of North Hawaii, depending upon the type of medical services required. The existing State hospitals are located at Hilo, Kona, Honokaa, Kohala and Kau. All five hospitals have acute care beds and some type of long term care beds. In addition, all five provide obstetrics, emergency room, laboratory, x-ray, ambulance, and outpatient services. However, the three smaller hospitals--Honokaa, Kohala, and Kau--are not large enough to justify the full range of full-time registered personnel required for certification. Thus, to obtain requisite services from registered personnel, patients and their families in Hawaii County must drive to either Hilo Hospital or Kona Hospital. Figure 2.2 shows the location of the existing hospitals in Hawaii County.

2.3.2 Lucy Henriques Medical Center

At this time, six physicians maintain everyday office space in the Lucy Henriques Medical Center. In addition, four specialists are available at the center either on a weekly, twice a week, or once a month basis. Support staff at the medical center currently includes six personnel in the laboratory, six personnel in x-ray, fifteen personnel for all three

Preliminary Market Share Assumptions By District 1998



Source: "Project Development Report for the North Hawaii Community Hospital Facilities", Herman Smith Associates, 1990

Figure 2.2
MARKET SHARE BY
DISTRICT-1998

shifts in the emergency room, and approximately 20-25 other personnel to support the physicians offices.

The Lucy Henriques Medical Center currently has no acute care beds. The emergency room has some holding beds which can accommodate patients up to 12 hours if necessary. If required, air ambulance services to Honolulu are available from the Waimea-Kohala Airport via fixed-wing aircraft. Normally, with use of an aircraft, it would take a patient 4-6 hours to reach other medical facilities in Honolulu. Most patients currently coming to the Lucy Henriques Medical Center and needing additional services go to Hilo or Kona, depending on the bed availability, specialist availability, and the desires of the families.

2.3.3 Honokaa Hospital

Some general surgery can be accommodated at Honokaa Hospital approximately 15 miles east of Waimea. However, facilities and services at Honokaa Hospital are currently limited. It is intended that the NHCH will serve the acute care needs of patients in North Hawaii, while the long-term care and primary care needs will be met by construction of a new health care facility in Honokaa. The proposed facility will be constructed on State land immediately south of Honokaa Hospital, between Plumeria Street and Lehua Street.

Studies have shown that the existing Honokaa Hospital, constructed in 1946, has a number of areas in the building which contain asbestos. In addition, several areas of the wooden structure have been damaged by termites such that repair would be more costly than construction of a new facility. Moreover, Federal guidelines for reimbursement of medical expenses require that hospitals not be of wooden construction.

The proposed long-term care Honokaa Health Care Facility will have a total area of approximately 66,700 SF consisting of a long-term care ward of approximately 58,700 SF and a separate primary care facility of 8,000 SF.

It will accommodate 50 long-term care patients from Honokaa and other surrounding areas. Patients will be admitted to the new Honokaa Health Care Facility by the attending physician or will be transferred from acute facilities. Urgent care services will also be available to examine and treat patients with minor injuries or complaints. Patients with serious injuries or potential serious complaints will be evaluated, stabilized and transferred to an acute care facility. The urgent care facility will provide X-ray and clinical laboratory facilities and a small procedures room.

2.4 Project Need

The State of Hawaii Department of Health (DOH) initially planned reconstruction of an acute care hospital in Honokaa. These initial plans for a hospital in Honokaa called for a facility with 40 long-term care beds and 10 acute care beds. However, under those plans, no provisions were made for certain services such as inpatient surgery or obstetrics. Patients needing those types of services would still be required to drive to Hilo or Kona. Without locally available medical facilities, residents of these communities and visitors will be forced to continue drives to either Kona or Hilo for acute care services such as inpatient surgery and obstetrics. For patients requiring these services, the driving time can be critical.

Analysis of driving times and distances to other acute care hospitals from North Hawaii shows that most of these drives can require up to one hour or more depending upon traffic and weather conditions. The drive to Hilo, about 55 miles, or Kona, about 40 miles, from the North Hawaii communities must be accomplished over winding roads and often during rainy or foggy conditions. A local facility for these patients would eliminate this drive distance and ensure proper and timely care. Table 2.2 shows the travel time and distance between hospitals.

These driving times show the need of acute care medical facilities to serve the growing resident and visitor population of North Hawaii. A

TABLE 2.2					
TRAVEL DISTANCE AND TIME BETWEEN HOSPITALS (Waimea is proposed North Hawaii Community Hospital)					
	Medical Facility Service Area				
TIME DISTANCE	Hilo	Kona	Honokaa	Kohala	Waimea
Hilo		2.5 hours	1 hour	2 hours	1.5 hours
Kona	106 miles			1.5 hours	1 hour
Honokaa	41 miles			1 hour	.5 hour
Kohala	78 miles	62 miles	38 miles		.5 hour
Waimea	55 miles	40 miles	14 miles	21 miles	

Source: "Hawaii County Hospital Network Comprehensive Implementation Plan",
Alexander Grant & Company, 1985.

centrally located facility in Waimea would provide patients with local care well within driving times and distances expected for this area.

As discussed, the previous studies and population forecasts show a clear need for an acute care hospital in North Hawaii. The DOH has recognized there has been a shift in population trends which shows that Waimea would provide the optimal location for an acute care facility. Acute care facilities at the Honokaa Hospital are not sufficient to meet the needs of the existing population of North Hawaii. Moreover, with the forecasted population growth of the North Hawaii communities, the need for acute care medical facilities will continue to grow.

3. DESCRIPTION OF PROPOSED PROJECT

3.1 Project Development Report

Analysis was conducted by the Department of Health (DOH) to determine the appropriate scale or scope of the hospital facility needed in the North Hawaii area. The result of this analysis is set forth in the Project Development Report (PDR) prepared for the DOH by Herman Smith Associates and published in September 1990. The PDR consists of a needs assessment, design considerations (including a comprehensive space listing of all required facilities), and alternate site plans for a one-story and a two-story structure. A draft equipment list and conceptual cost estimate of the facility is also provided. The following sections summarize the major features set forth in the PDR for a hospital in North Hawaii.

3.2 Project Features

The North Hawaii Community Hospital's proposal is for a 50-bed facility with 25 long-term care beds, 15 acute care beds, and 10 beds which could be used in either of the above categories depending on need. The services offered by the NHCH would include inpatient surgery and obstetrics. This hospital would also provide a well-equipped and well-staffed emergency room.

The North Hawaii Community Hospital will be a non-profit, full service community hospital committed to the provision of quality acute and skilled nursing care and other medical services to the residents of Waimea and surrounding communities in the northern section of the Island of Hawaii. To achieve these goals and objectives, North Hawaii Community Hospital will be designed, constructed, and equipped with the latest planning and architectural requirements, as well as state-of-the-art equipment.

Based on the PDR, the new hospital should have a total area of about 61,700 SF comprised primarily of patient care and other service areas as shown below:

Hospital Space Requirements	
<u>Space</u>	<u>Area (Sq. Ft.)</u>
Patient Care Areas	18,800
Other Areas	37,200
Mechanical Areas	<u>5,600</u>
Total Area	61,700 SF

These features comprise the internal space requirements of the hospital. The space requirements for these areas are listed in more detail in Table 3.1. Further description of the rooms and features in the areas listed in Table 3.1 are shown in Appendix A.

The proposed hospital has not yet been designed. However, the internal spaces of the hospital will have to include storage areas for bio-infectious wastes and supplies and wastes associated with nuclear medicine programs. In addition, some interior space may be required to handle recyclable solid wastes.

Interior spaces of the hospital will be air conditioned for patient and employee comfort and for environmental control. Windows will be closed to maintain internal temperatures and to control external sources of noise, dust, fumes, and other pollutants in critical patient areas.

3.3 Conceptual Site Plan

The site plan for the proposed hospital has not yet been designed. However, a conceptual site plan is included in the PDR for the approximately 62,000 SF facility on one level with emergency, service, and visitor accesses, and parking area for approximately 150 vehicles. A conceptual site plan for a two level facility with the same features is

TABLE 3.1
SPACE LISTING *

	Total Gross Square Feet**
PATIENT CARE AREAS	
o Medical/Surgical/ICU-Intensive Care/CCU-Critical Care/LDRP-Labor, Delivery, Recovery, Post Partum	5,612
o Support Areas - Medical/Surgical/ICU/CCU/LDRP	1,870
o Staff Areas - Medical/Surgical/ICU/CCU/	1,062
o Skilled Nursing Unit Patient Areas	3,072
o Support Areas - Skilled Nursing Unit	1,833
Total Net Square Feet	13,499
Net to Gross Factor @ 40%	5,380
SUBTOTAL PATIENT CARE AREAS	18,829
OTHER AREAS:	
Emergency Department	2,965
Surgical Suite	6,282
Clinical Laboratory	2,258
Imaging Services	3,791
Respiratory Therapy/Pulmonary Function	742
Electro-Diagnostic Laboratory	1,709
Physical Therapy	1,627
Patient Support Areas	549
Purchasing/General Stores	2,520
Central Processing Service	1,420
Engineering/Maintenance/Housekeeping/Security	2,842
Food Service	3,072
Public Areas	1,929
Administrative Areas	4,467
Pharmacy	1,069
SUBTOTAL PATIENT CARE AND OTHER AREAS	56,071
Mechanical Areas @ 10%	5,607
TOTAL GROSS SQUARE FEET	61,678
* Data is from "Project Development Report for the North Hawaii Community Hospital Facilities--Volume I" published by Herman Smith Associates, 1990.	
** All square footages include a Net to Gross Factor @ 40%.	

also included in the PDR. These conceptual site plans could be constructed on any selected site with modifications to meet specific site conditions. Figure 3.1 shows Option #1, a one level facility. Figure 3.2 shows Option #2, a two level facility.

The PDR recommends the selected site be minimum of five acres to accommodate the buildings, parking areas, visitor, service and emergency access roads, infrastructure facilities, and possible future expansion. The actual areas set aside for each of these functions, including possible expansion of the facility, will be determined after final site selection and during development of the site plan. These plans will be developed to minimize visual impacts to view planes and other affects to surrounding areas.

The site plan will also have to consider parameters such as site access plans, entrance/exit lanes, turning lanes, acceleration/deceleration lanes, road widening, signalization, holding lanes, and access to adjacent roads. At this time, these factors have not been determined.

3.4 Construction Costs

Preliminary estimates based on the conceptual plan indicate the proposed hospital would cost approximately \$25.0 million to construct. The State legislature in the 1991 session appropriated \$12.5 million for construction of the hospital. This amount was given to the NHCH as a grant-in-aid. The remainder of the funds required for construction of the hospital must be matched, or raised, by NHCH. Once sufficient funds have been raised, NHCH will be responsible for construction of the hospital.

Once the site and building plan have been selected, the facility will have to be designed for the specific site and detail construction plans produced. The building shall conform to all requirements of the codes and statutes pertaining to building construction in Hawaii County.

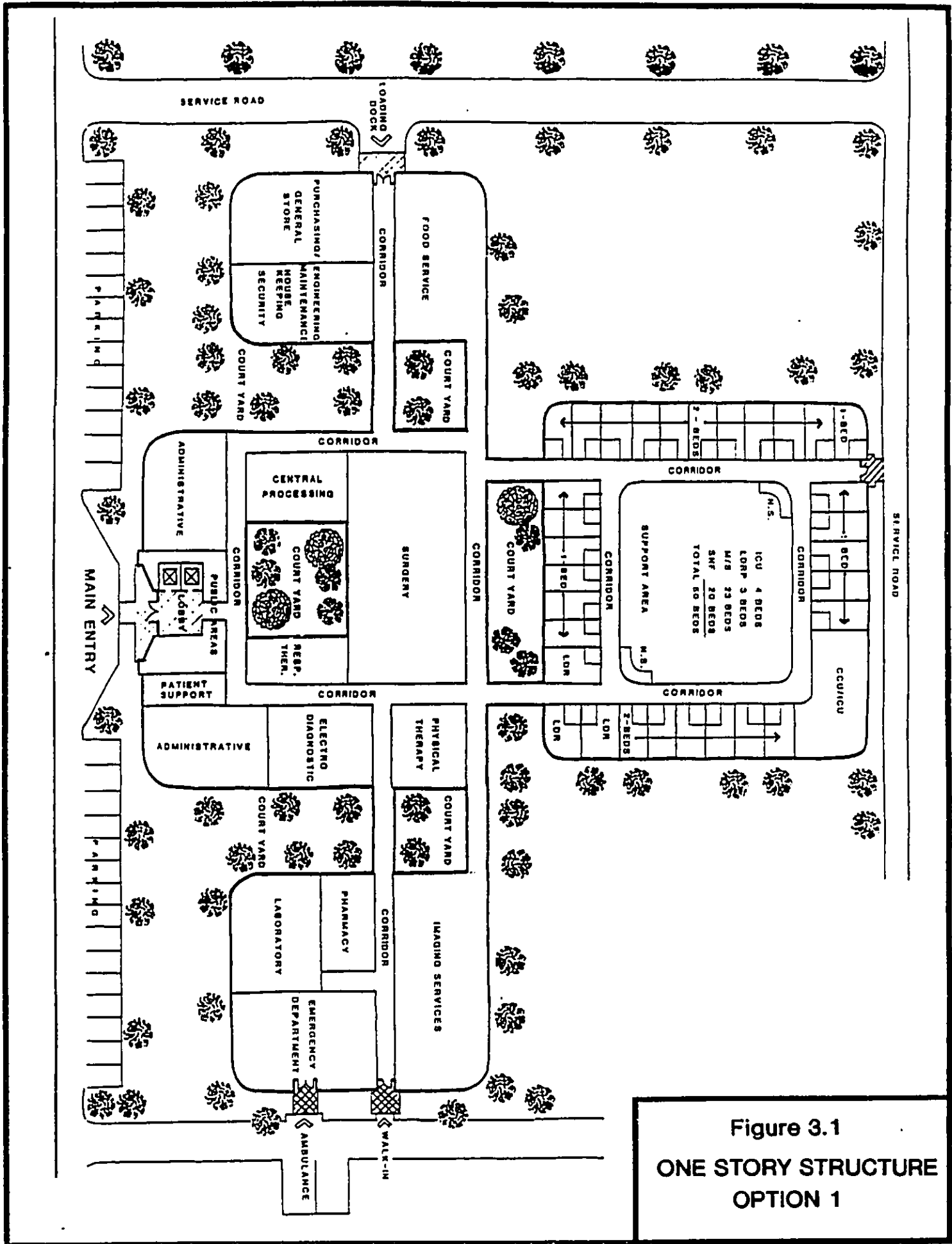


Figure 3.1
**ONE STORY STRUCTURE
 OPTION 1**

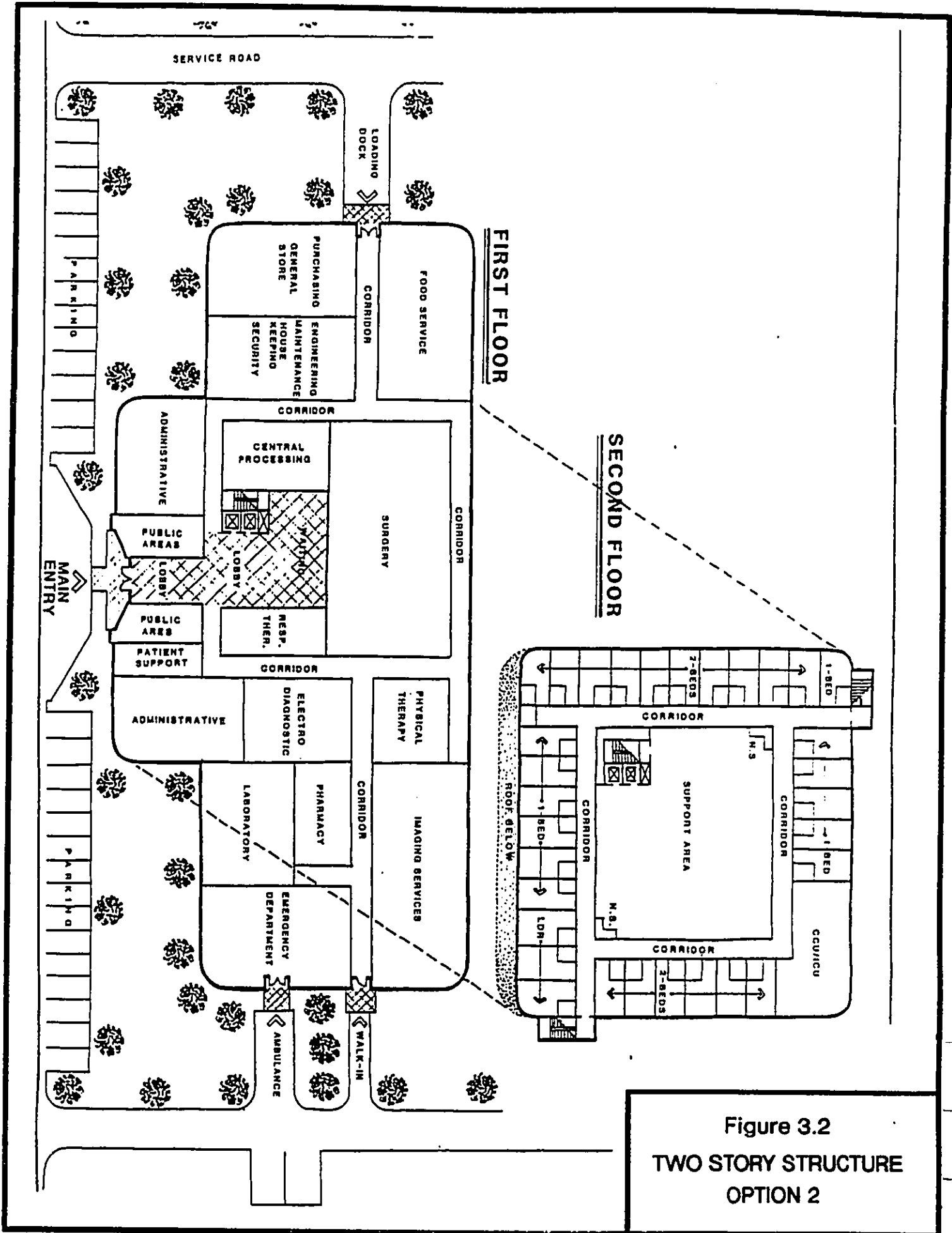


Figure 3.2
TWO STORY STRUCTURE
OPTION 2

As part of the building design, Hawaiian Electric Light Company (HELCO) has recommended installation of a backup emergency generator to support critical patient care areas of the hospital. The location of this generator on the site has not yet been determined.

3.5 Operation and Maintenance

Once the hospital has been constructed, NHCH will be responsible for funding all operation and maintenance of the facility. Operation and maintenance of the hospital will not involve the State of Hawaii Department of Health.

According to the Project Development Report, the proposed hospital will require a staff of 161.5 full time equivalent positions for three shifts (day, evening, and night). The Project Development Report indicates this level of projected staff is based on a number of assumptions including average daily census, percentage of utilization, and hours of operation for certain ancillary and diagnostic services. In addition, five to ten physicians will be on the staff on a full and part-time basis. Normally, the day shift will work from 7:00 AM to 3:00 PM, the evening shift from 3:00 PM to 11:00 PM, and the night shift from 11:00 PM to 7:00 AM. A distribution of this staffing by shift is not available.

4. ENVIRONMENTAL SETTING OF THE WAIMEA AREA

4.1 Geology

The island of Hawaii was formed by five shield volcanoes; Kohala, Mauna Kea, Mauna Loa, Hualalai, and Kilauea (presently active). In geologic terms, the island of Hawaii is the youngest island in the Hawaiian chain. Rocks from the island's earliest volcano are estimated to be about 700,000 years old. In contrast, Kauai is over three million years old and Oahu is at least two million years old.

The Waimea Plain was formed by the Mauna Kea lava ponding against the older Kohala Mountains. Geologic maps of the island of Hawaii indicate that the Waimea Plain is underlain by lavas of the Laupahoehoe series, and that the area is overlain by shallow depths of Pahala ash. Some of the ash near Kamuela is quite fresh and has the same composition as late lavas of Mauna Kea. It is believed that most of the ash on Mauna Kea came from eruptions on that mountain, and that the ash layer becomes thinner toward the north because the trade winds carried most of the ash southwestward from the erupting vents.

4.2 Hydrology

The relatively young, slightly dissected domes comprising the Hawaii island have gentle slopes and little soil. The unweathered and highly permeable lavas allow much of the rainfall to percolate to the water table. Hence, there are few perennial streams on the island. Most all the streams of any consequence are located on the slopes of Kohala Mountain and Mauna Kea.

In the South Kohala District, about 60 percent of water use comes from groundwater and 40 percent from surface water. In Waimea, because of the area's high elevation, the town uses surface water only. The Waimea town is part of the Waimea-Puukapu-Nienie System. The principal sources for

this system are Waikoloa Stream and the Kohakohau Stream diversion. The Waimea area is subject to extremes in climatic conditions, as reflected in stream flows of flood proportions at times, and by periods of extended low flows during drought weather.

4.3 Topography

The town of Waimea is located on a fairly level plain which is bordered on the south by the beginnings of the gently sloping Kohala Mountains. Elevations of the populated sections of Waimea range from 2,280 FT above mean sea level (MSL) on the west to 3,160 FT MSL on the east.

4.4 Soils

Soils in the Waimea area are of the Waimea-Kikoni-Naalehu association which consist of medium-textured to moderately fine textured soils which formed in volcanic ash. Waimea and Kikoni soils occur in the Mauna Kea Soil and Water Conservation District. Waimea soils have a surface layer of very dark brown and dark-dark-brown very fine sandy loam and loam, and a dark-brown silt loam subsoil. Kikoni soils have a surface layer of very dark-brown very fine sandy loam. Their subsoil is dark-brown and dark reddish-brown very fine sandy loam and silt loam. Waimea and Kikoni soils are used for pasture and, in small areas, for truck crops.

Naalehu soils occur in the Kau district.

4.5 Climate

Waimea is characterized by cool, moist weather year-round. Average temperatures range from 62°F during the coolest month to 67°F during the hottest month, and extremes range from 34°F to 90°F. In the center of town rainfall averages 35 inches annually but varies from about 20 inches on the west (dry) side to over 70 inches on the east (wet) side. From the center of town, rainfall decreases to the south, averaging between just

20 and 30 inches near the Waimea-Kohala Airport, and conversely increases to the north, where as much as 200 inches falls at the peak of the Kohala Mountains. Winds are generally steady out of the northeast and blow down the slopes of the Kohala Mountains.

4.6 Wetlands

There are 13 major wetland areas located on Hawaii, none of which are situated anywhere near Waimea. The closest wetland site is in Waipio Valley, located about seven miles to the northeast of the Waimea area.

4.7 Flood Hazard

Zone A and AE flood hazard areas are located along major and minor streams which course through and near Waimea town. These areas are examined in more detail in the impacts section and in Appendix B as they relate to several of the proposed alternative hospital sites.

4.8 Air Quality

No air emission or noise monitoring stations are located in the area. However, the absence of large stationary sources and the relatively low existing vehicular traffic make it likely that existing air quality in the region is good most of the time. The principal source of air quality impact is from automotive emissions, and to a lesser extent from airport activities at the Waimea-Kohala Airport.

4.9 Flora

The natural vegetation over the Waimea soil association consists of bermudagrass, lantana, guava, rattail, kikuyugrass, and whiteclover. Common tree species include eucalyptus and pine. On undeveloped urban lands around Waimea, the predominant species is kikuyugrass, introduced in 1935 to Parker Ranch lands for grazing.

A botanical survey was conducted in 1985 for the Waimea Land Use Boundary District Amendment which examined about 600 acres of land in the following areas: 255 acres between Kuhio Village and the Waimea-Kohala Airport, about 130 acres west of the airport, and approximately 190 acres between Kawaihae Road and Kohala Mountain Road. Eight native plant species were observed in these areas. No Federal or State of Hawaii listed, proposed or candidate endangered or threatened plant species were observed on these undeveloped urban lands.

4.10 Fauna

Also in 1985, an avian and feral mammal field survey was conducted on undeveloped urban lands in Waimea as part of the same boundary amendment petition, giving some indication of the existing wildlife around Waimea. During the survey, 13 species of exotic birds were recorded. The only resident native bird observed during the survey was the Short-eared Owl or Pueo (*Asio flammeus sandwichensis*), an endemic bird of prey not uncommon on the island of Hawaii. The only migratory bird species recorded was the Pacific Golden Plover (*Pluvialis fulva*), an indigenous bird that winters in Hawaii. The most common species observed were the Eurasian Skylark (*Alauda arvensis*), Black Francolin (*Francolinus francolinus*), and Nutmeg Mannikin (*Lonchura punctulata*).

Apart from domestic animals such as dogs and cats, and commercial farm animals such as horses, cattle, and pigs, four other mammal species were evident in the surveyed areas: Mongoose (*Herpestes aurodunctatus*), Black rat (*Ratus rattus*), House mouse (*Mus musculus*), and feral pig (*Sus scrofa*). The endemic Hoary Bat (*Lasiurus cinereus semotus*) was not observed during the survey, probably due to the lack of trees in the inspected areas. No Federal or State of Hawaii listed, proposed or candidate endangered or threatened wildlife species were observed during the survey.

4.11 Existing Land Uses

Most residential and commercial property is located along Mamalahoa Highway and Kawaihae Road, and commercial areas are centered where these two roadways meet. Intensive agricultural areas consist of the Lalamilo Farm lots, located southwest of the town's commercial center, and other open areas for grazing which surround the town to the north and south. Parker Ranch light industrial activity is situated just south of the town center, and the small Waimea-Kohala Airport is located another mile further south.

4.12 Scenic Characteristics

Most open areas in Waimea have exceptional mountain views of Mauna Kea, Mauna Loa, Hualalai, and the Kohalas. Western portions of the town also offer views of the South Kohala coast. These views have been maintained through the low-rise, low-density, and open ranch character of the town.

4.13 Archaeological and Historic Sites Potential

In pre-contact, and early historic times, the town of Waimea was a significant historic district which included extensive agricultural fields and canals and scattered clusters of house sites, field shelters and undoubtedly religious structures and burials.

Undeveloped urban lands around Waimea town were surveyed in 1985 as part of the State Land Use District boundary amendment petition for the Parker Ranch 2020 Plan. In the portion of the petition area south of the Waimea town center, notable archaeological sites included two large agricultural field systems, the remains of an 'auwai (irrigation ditch) system, barrier walls, and residential sites dating to perhaps the 13th or 14th century.

Also as part of the petition area, surveys were conducted in the open area west of the Kamuela Airport near Gary's Automotive Service, but did not

uncover anything of archaeological significance. In the area between Kohala Mountain Road and Kawaihae Road, west of the residential community, five residential sites were located, some with discernible hearth and enclosing rock wall. Numerous stone walls and other sites outside the residential sites were also located.

4.14 Public Services

4.14.1 Recreation

Waimea has two county parks that total 10.5 acres. In addition, the Courthouse and "Church Row" have three acres of open space owned by the County.

4.14.2 Schools

Three schools serve Waimea: Waimea Elementary and Intermediate School (grades K-9), Parker School (a private school with grades 7-12), and Hawaii Preparatory Academy (a private school with grades K-12). Waimea students attending public school grades 9-12 are bussed to the Honokaa High School.

4.14.3 Police and Fire Protection

The Hawaii County Police and Fire Departments in Waimea are located next to each other on Kamamalu Street. A total of 22 police officers are presently stationed at the Waimea Police Station; 17 patrolmen, 3 sergeants, 1 lieutenant, and 1 captain.

The County-operated fire station provides 24-hour service and is staffed by six fire fighters (not including volunteers). Two of these staff make up the stations emergency medical unit which consists of one paramedic and an assistant who are on duty at all times. The emergency ambulance

services at the fire station are contracted by the State of Hawaii Department of Health.

4.14.4 Health Care

Health Care in the Waimea area is provided primarily by the Lucy Henriques Medical Center. Two State hospitals--Kohala Hospital and Honokaa Hospital--operate in Hawi and Honokaa. Both hospitals allow for certain types of major surgery, while the Lucy Henriques Medical Center has only emergency and out-patient facilities.

4.14.5 Transportation

Mamalahoa Highway is the major east-west travel road in the Waimea area. Although this highway is a portion of Hawaii Belt Road, a state highway, Hawaii County has jurisdiction for the roadway from a point about one mile east of Waimea to a point about one mile from the Mamalahoa Highway and Lindsey Road intersection. Access to Mamalahoa Highway in this portion is controlled by the County.

Data on traffic volumes along the Highway in the Waimea area has not been collected by the County. However, a traffic study was conducted for construction of a shopping center/office complex located along Kawaihae Road west of the intersection of Mamalahoa Highway and Lindsey Road. As part of that study, traffic volume data was collected at the intersection of Mamalahoa Highway and Lindsey Road. Based on actual traffic counts at the intersection, traffic flow was at Level of Service (LOS) B in the morning peak hour and LOS C in the afternoon peak hour.

Level of Service for signalized intersections is considered to be a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Six levels of service, levels A through F, define the full range of driving conditions from best to worst, respectively. Level of

service criteria are indicated in terms of the average stopped delay per vehicle for a 15-minute analysis period.

Levels of service have been described by the National Research Council, Transportation Research Board in their Highway Capacity Manual. The description for LOS B is: More vehicles stop than with LOS A, causing higher levels of average delay. Generally occurs with good progression and/or short traffic signal cycle lengths.

The description for LOS C is: Higher delays are present which may result from fair progression and/or longer traffic signal cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant although many still pass through the intersection without stopping.

Thus, as described, although Mamalahoa Highway is the major east-west travel road, levels of service are relatively good when compared to many other areas.

Notwithstanding this information, over the years, the State of Hawaii Department of Transportation (State DOT) has considered a road to by-pass the Waimea area to increase traffic capacity. Some of these studies date to 1969 and progressed to the point that a proposed alignment had been selected for the by-pass road. These alignments generally start east of Waimea, proceed east along an alignment south and parallel to the existing highway, and then connect to Kawaihae Road west of Waimea. The major problem is this alignment crosses through State of Hawaii Department of Hawaiian Home Lands (DHHL) homestead lots. Further, some of the homestead lots along this alignment have been leased under DHHL procedures. Normally, once the lots have been leased, another public agency cannot condemn the land for other uses without providing a comparable lot.

Recently, State DOT has been working with DHHL to identify alternative alignments for this by-pass road. Although discussions for the road

appear to be progressing, no agreement has been reached. At this time, no schedule has been determined for designating a new alignment for the by-pass road.

4.15 Infrastructure

4.15.1 Water

The County of Hawaii Department of Water Supply (DWS) provides water service in Waimea through a source, storage, and distribution system. The DWS 4 million gallon water storage system in the Waimea area is adequate for current needs. Water distribution line sizes range from 12-, 8-, and 6-inches on Mamalahoa Highway and Waimea-Kawaihae Road and are also presently adequate. However, the Waimea area is currently constrained by limited water sources from which to provide service, and the DWS is limiting water allocation in the Waimea area to a 1-inch maximum water meter and 4,200 gallons per day per existing parcel provided the current zoning designation of the parcel allows the proposed land use.

The present capacity of the Waimea-Puukapu-Nienie water system is about 3.6 MGD while consumption is about 2.0 MGD. However, most of the 1.6 MGD available for expansion is committed to serve existing lots and planned and approved projects. This margin is expected to be reached within 5 to 10 years, much of it being used by residential development on lands leased by the Department of Hawaiian Home Lands.

In 1987, the State Legislature passed the State Water Code (HRS Chapter 174C) to protect and manage Hawaii's surface and ground water resources. Part III of the State Water Code calls for the formulation of a Hawaii Water Plan, an integrated program for the protection, conservation, and management of the waters of the State. The "Hawaii County Water Use and Development Plan" is one of seven subplans which collectively comprise the Hawaii Water Plan. It was adopted by Hawaii County ordinance and endorsed by the Mayor on May 10, 1990.

According to this document, there are plans for a Puukapu deep well development to tap high-level water sources for farmers in Waimea during times of need. The proximity of this well to the domestic system in Waimea could result in additional supply to the domestic water system as an alternative. The cost estimate in the Hawaii County Water Use and Development Plan to provide the deep well with pumps and related equipment is slightly over \$1 million.

To date, although the DWS is pursuing an exploratory well drilling project in Waimea, such a project has not been budgeted. Consequently, no water source development studies have been conducted, nor has an exploratory well site been identified.

Alternatively, Parker Ranch may eventually drill their own private well which would then supply water into the municipal system and support development in Waimea as part of the Parker Ranch 2020 Plan (see section 6.2.4).

4.15.2 Wastewater

The Waimea area is not serviced by a County wastewater collection and treatment system. Instead, the town uses individual wastewater disposal systems such as septic tanks and cesspools.

4.15.3 Drainage

The Waimea area has no County drainage infrastructure other than surface channelization which directs runoff into either the two nearby streams (Lanimaumau and Kamuela Streams), into lava tubes, or into the dry, uninhabited regions south of the town. Soils in the area are generally well-drained and surface flow only becomes a problem during heavy rains when runoff from higher elevations in the watershed area drain into the lower elevations near Waimea. When this occurs, there are several areas within the town which are susceptible to flooding.

4.15.4 Electrical/Telephone

Electrical power, telephone and cable television (CATV) lines are routed through Waimea. The main overhead electrical distribution lines for both Waimea and the region are located in the Mamalahoa Highway and Kawaihae Road rights-of-way. These Hawaiian Electrical Light Company (HELCO) distribution lines are served by the HELCO Kamulea and Lalamilo substations which are adequate to service the Waimea area.

5. IDENTIFICATION OF CANDIDATE SITES

5.1 Minimum Site Criteria

Based on discussions with the DOH, several key criteria were identified on which to base the selection of candidate sites. The first criteria was that the candidate site should be in reasonable proximity (two miles maximum) to the existing Lucy Henriques Medical Center. The proximity would decrease driving time between the new hospital and the existing medical center where the hospital physicians would also maintain offices. In addition, if close enough, some support services of the medical center could be used in lieu of constructing them in the new hospital. Moreover, sharing of support facilities would ultimately decrease construction costs.

The second key criteria was that the candidate site be located close to the State highway or improved major county road to provide access to the service area of the NHCH. This location criteria would also permit direct access for emergency vehicles and ease patient, visitor, and service vehicle access to the new facility.

The last key criteria was that the candidate site contain sufficient space to construct a facility of approximately 62,000 SF, provide separate access for emergency and service vehicles, and provide parking area for 150 vehicles for patients and staff personnel. Based on these requirements, the candidate site should contain at least five to seven acres (5 to 7 acres) of developable land.

At this stage, the candidate sites were examined without regard to ownership of the site, availability of the land for acquisition, or long term lease. If a candidate site is selected, the availability of the site for acquisition or lease will have to be determined at that time.

5.2 Candidate Sites

Based on the minimum criteria discussed above, the following seven candidate sites were selected for further consideration:

- o Site No. 1: Lucy Henriques Medical Center;
- o Site No. 2: Civic Center*;
- o Site No. 3: 2020 Plan;
- o Site No. 4: Fire Station;
- o Site No. 5: Race Track;
- o Site No. 6: Tree Farm; and
- o Site No. 7: Waiaka Bridge.

* Used only in conjunction with Site No. 1.

General characteristics about each site are described in the following sections. Figure 5.1 shows the location of the seven sites.

5.2.1 Site No. 1: Lucy Henriques Medical Center

Location: Lucy Henriques (Site No. 1) is located near the center of Waimea Town along Mamalahoa Highway on TMK parcel 6-7-02:13. This parcel is approximately 12.7 acres, of which about 5 acres is presently used for the Lucy Henriques Medical Center. The space available for construction is to the north, west and south of the existing medical center. Figure 5.2 shows the location of Site No. 1.

Soils: According to the USDA Soil Conservation Service Survey for the island of Hawaii, soils at the site are Waimea Very Fine Sandy Loam (WMC), 6 to 12 percent slopes, and Kikoni Very Fine Sandy Loam, KfA, 0 to 3 percent slopes. These soils have high erodibility and are considered good topsoil. On the Agricultural Lands of Importance to the State of Hawaii (ALISH) maps of the area, this site is Unclassified.

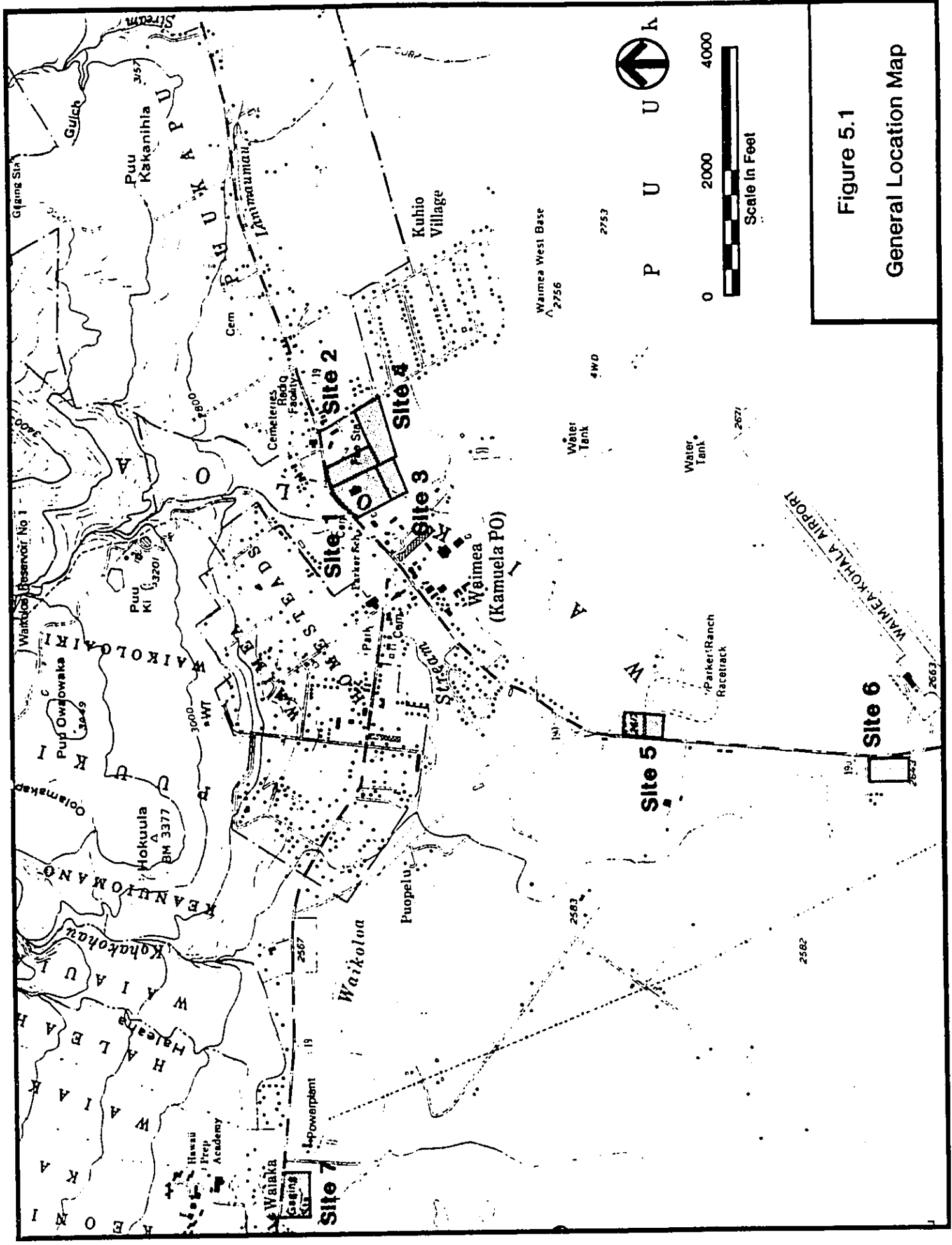


Figure 5.1
General Location Map

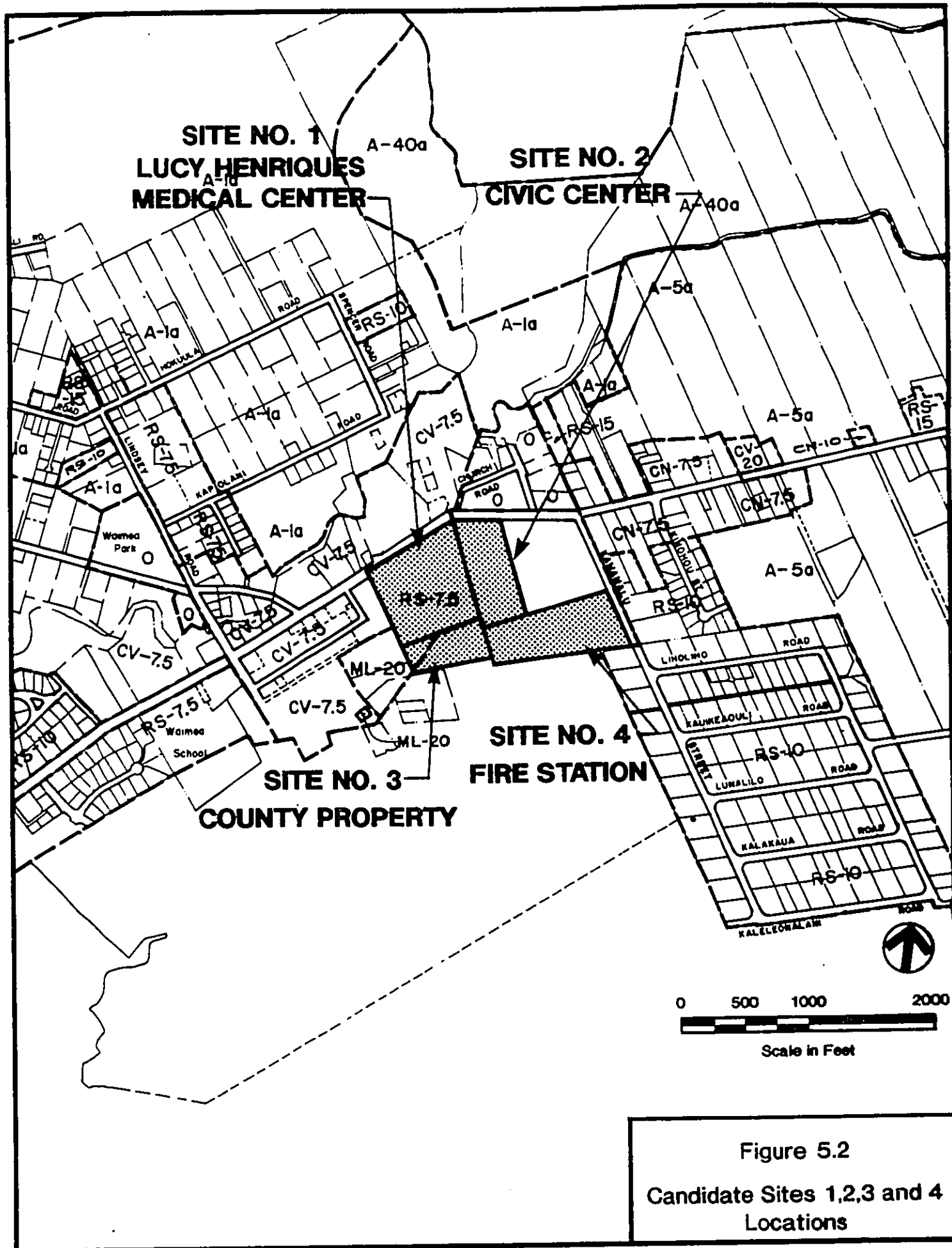


Figure 5.2
Candidate Sites 1,2,3 and 4
Locations

Access: Access to the site would be directly from Mamalahoa Highway. No additional access road would be required to the site.

Surrounding Land Uses: East of the site is the Waimea Civic Center. Directly west of the site is a hardware store and the beginning of the Parker Ranch Shopping Center. South of the site's boundary is a single residence and pasture land. Figure 5.3 shows photographs of the existing Medical Center. Figure 5.4 shows Site No. 1.

Ownership/Lessees: The site is owned by the Lucy Henriques Trust and managed by the Bishop Trust Company.

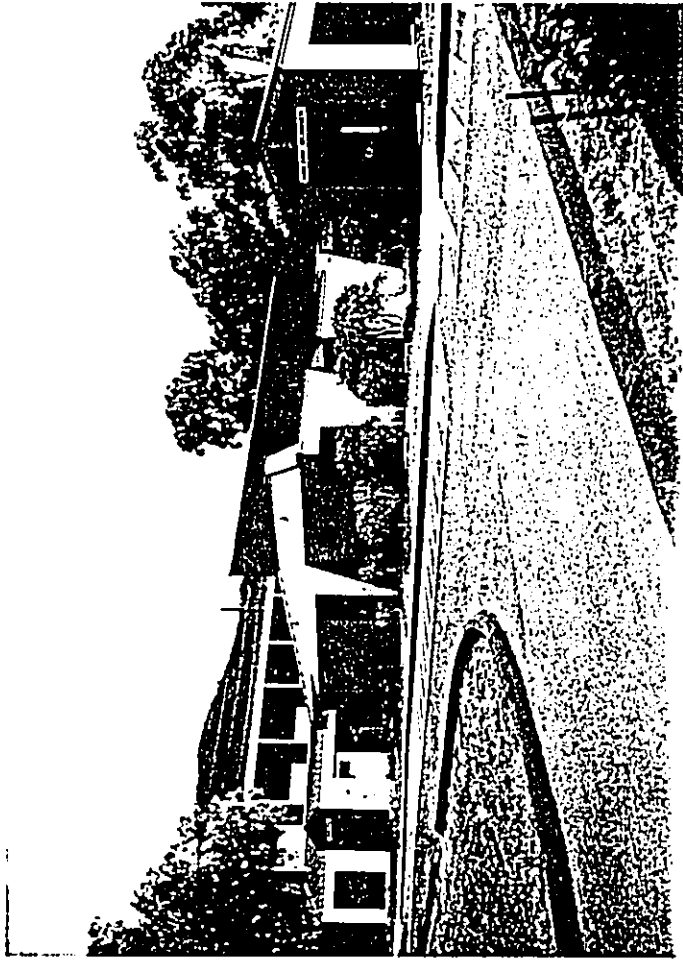
5.2.2 Site No. 2: Civic Center

(Note: Site No. 2 would only be used if the required facilities could not be entirely sited within Site No. 1. Site No. 2 would not be used as a separate site for the hospital.)

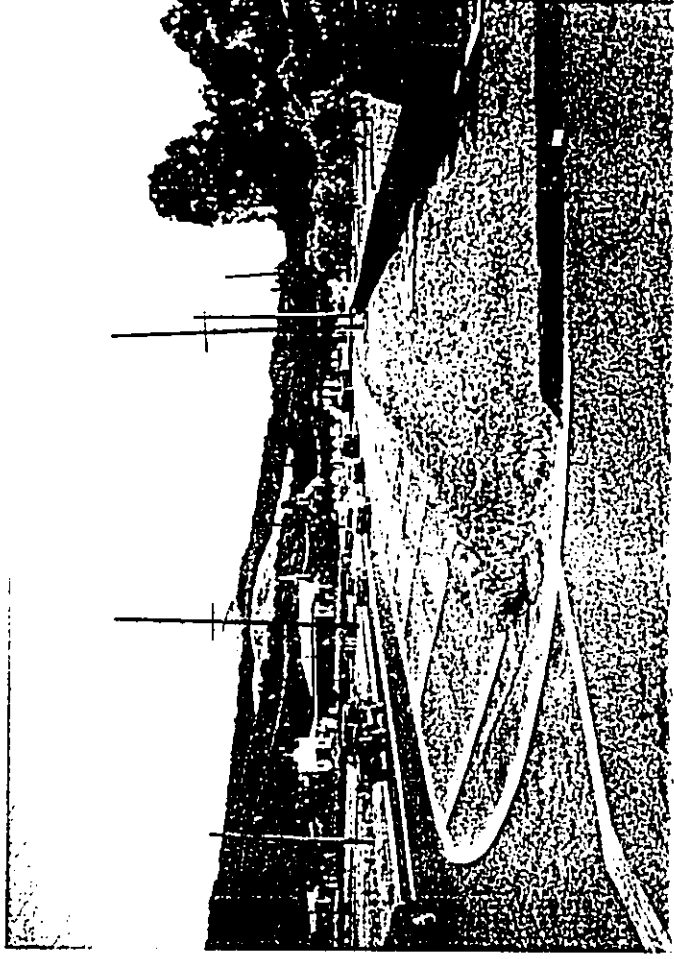
Location: The Civic Center (Site No. 2) is located adjacent to the Lucy Henriques Medical Center on the corner of Mamalahoa Highway and Kamamalu Street, parcel 6-7-02:11. Open area to the west of the site consists of about five acres of pasture which could be used to supplement Site 1. See Figure 5.2.

Soils: Soil at the site is Kikoni Very Fine Sandy Loam (KfA), 0 to 3 percent slopes. This soil has high erodibility and is considered good topsoil. On ALISH maps, 5 percent of the site is Prime, and 95 percent Unclassified lands.

Access: Access to the site would be directly from Mamalahoa Highway or through the Lucy Henriques Medical Center Site No. 1. No additional access road would be required to the site.



<-- Main entrance to the Lucy Henriques Medical Center.

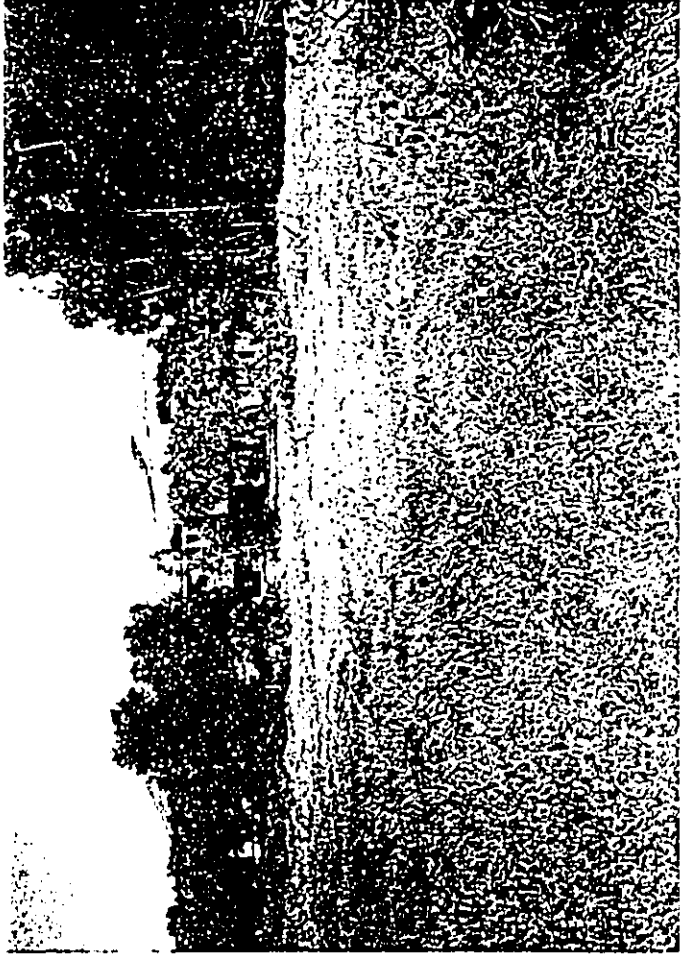


Mamalahoa Highway looking east where it fronts the Medical Center.

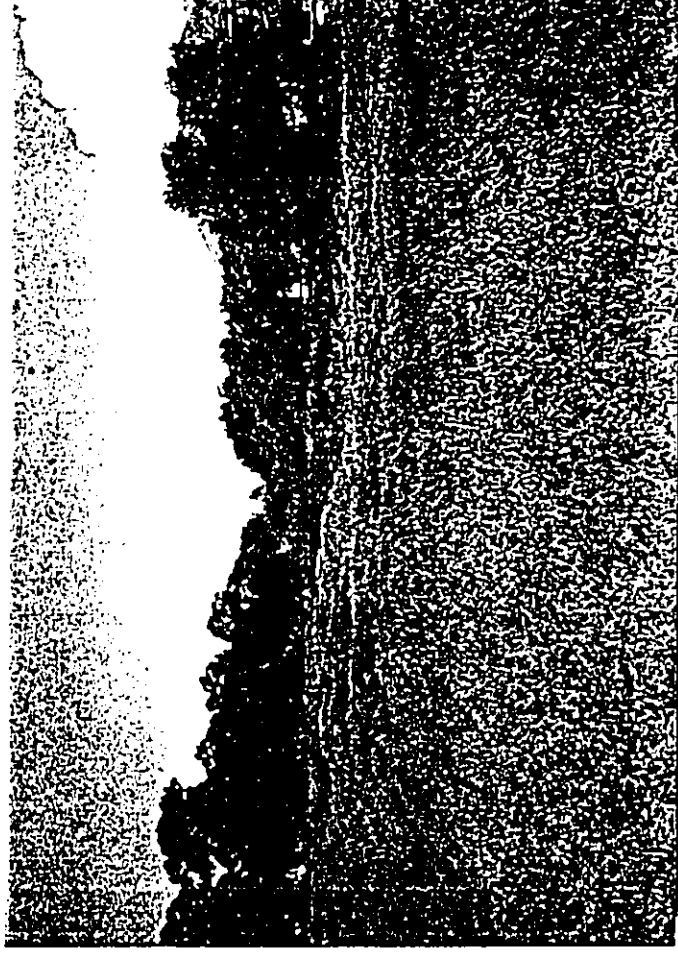


<-- View of Lucy Henriques Medical Center from across Mamalahoa Highway.

Figure 5.3



<-- The Lucy Henriques Medical Center Site 1. This photo was taken from the rear of the parcel near its southern boundary. The Medical Center is in the background.



This photo is taken from the same position, looking more to the west. A portion of the Medical Center is still visible on the right hand side.



<-- Open area as seen from rear of the Medical Center. This is part of the western portion of the site.

Figure 5.4

Surrounding Land Uses: The Lucy Henriques Medical Center is to the west. Public facilities east of the site include a police station, County court building, and community center building. Southeast of the site, across a drainage channel, is the Waimea Fire Station. Figure 5.5 shows photographs of Site No. 2.

Ownership/Lessees: The site is owned by the State of Hawaii.

5.2.3 Site No. 3: 2020 Plan

(Note: Site No. 3 has been identified in the Parker Ranch 2020 Plan as an expansion area for medical services. Thus, it has been included in this inventory of candidate sites. Use of Site No. 3 would be dependent upon construction of the proposed roadway and circulation system set forth in the Parker Ranch 2020 Plan. A discussion of the Parker Ranch 2020 Plan is included in Chapter 6, section 6.2.4.)

Location: This Site No. 3 is located south of the Lucy Henriques Medical Center parcel on part of TMK 6-7-02:17. This area has a single residence and consists mostly of pasture land. Available space is approximately 7 acres. See Figure 5.2.

Soils: Soils at the site are Waimea Very Fine Sandy Loam (WMC), 6 to 12 percent slopes, and Kikoni Very Fine Sandy Loam, KfA, 0 to 3 percent slopes. These soils have high erodibility and are considered good topsoil. On the Agricultural Lands of Importance to the State of Hawaii (ALISH) maps of the area, the site is 50 percent Prime and 50 percent Unclassified land.

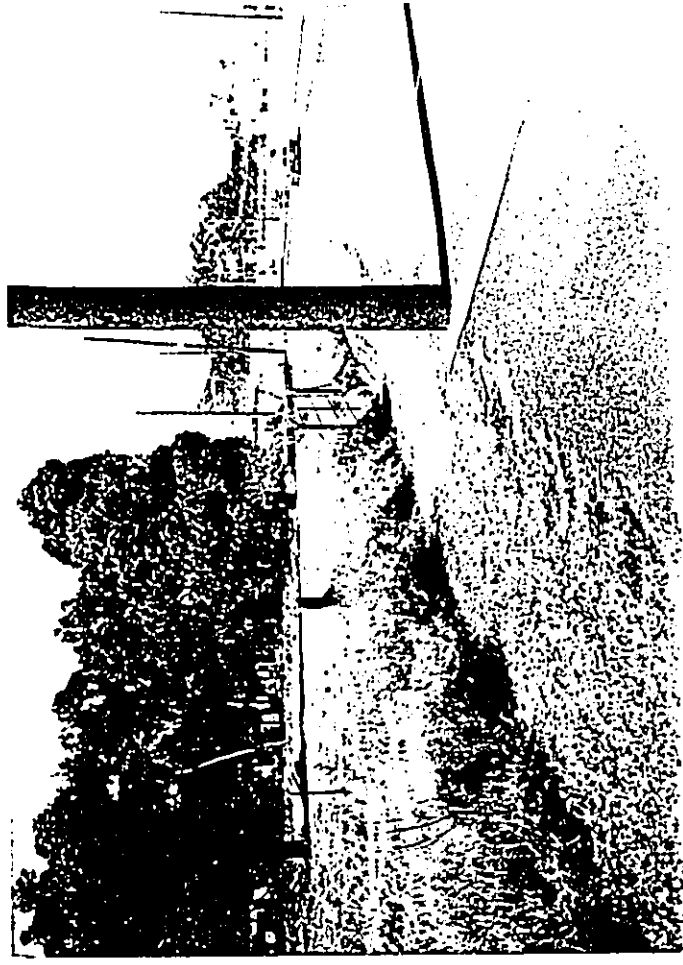
Access: Access to this site would be from a new road proposed in the Parker Ranch 2020 Plan which would also provide access to other developments that are part of the 2020 Plan development. Figure 6.6 in chapter 6 shows the location of the proposed road.



<-- Taken from Mamalahoa Highway, this photo looks over the open, western portion of the Civic Center site (Site 2). The fence at left is visible in the photo below.



This shows the same area of the Civic Center (Site 2) looking more to the west. The Lucy Henriques Medical Center is visible through the trees.



<-- View of Mamalahoa Highway where it fronts Site 2.

Figure 5.5

Surrounding Land Uses: An industrial area is west of the site. The rest of the surrounding area, excluding the Medical Center, is pasture land. Figure 5.6 shows photographs of Site No. 3.

Ownership/Lessees: The property is owned by the Trust of Richard Smart.

5.2.4 Site No. 4: Fire Station

Location: Fire Station (Site No. 4) is located along Kamamalu Street, about one-quarter mile south of its intersection with Mamalahoa Highway, on TMK parcel 6-7-02:17. The site is bordered on the east by Kamamalu Street, the Waimea Fire Station on the north and an electric substation on the south. See Figure 5.2.

Soils: Soil at the site is Kikoni Very Fine Sandy Loam (KfA), 0 to 3 percent slopes. This soil has high erodibility and is considered good topsoil. On ALISH maps, the entire site is designated Prime agricultural land.

Access: Access to the site would be from Kamamalu Street. No additional access road would be required to the site.

Surrounding Land Uses: Besides the Fire Station and electric substation, residences are located directly across Kamamalu Street and also south of the electric substation. The area to the west of the site is pasture land. Figure 5.7 shows photographs of Site No. 4.

Ownership/Lessees: The land is owned by the Trust of Richard Smart.

5.2.5 Site No. 5: Race Track

Location: The Race Track (Site No. 5) is located along Mamalahoa Highway, approximately 1 mile west of Lucy Henriques Medical Center on the way to

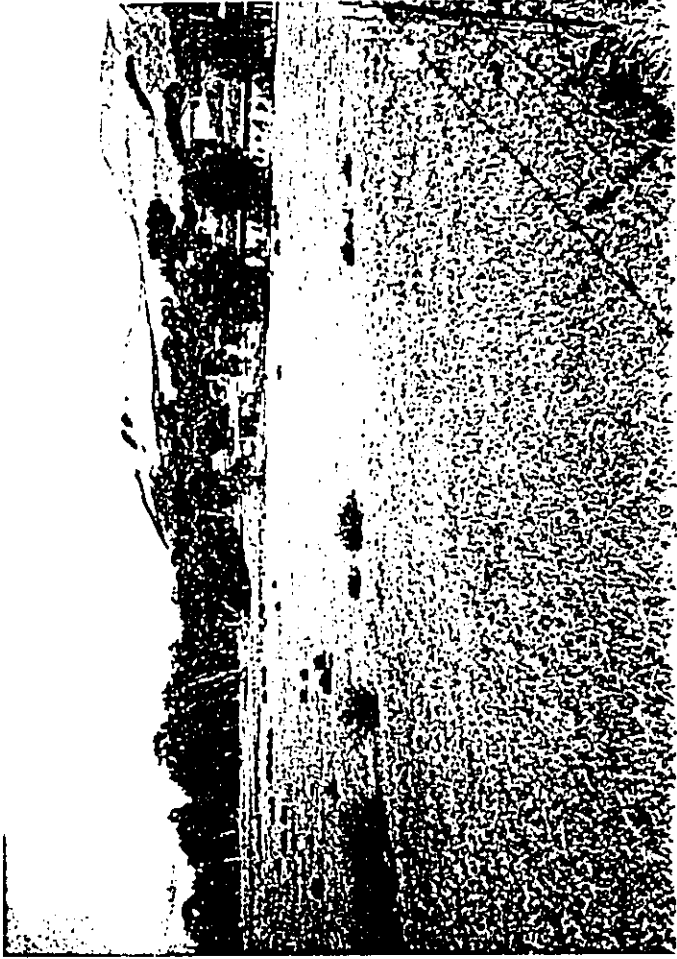


<-- This photo is taken from the southern boundary of the Medical Center parcel overlooking the County property designated as Site 3. A low rock wall indicates the sites' borders. The area is presently occupied by a single residence and some small farm buildings.

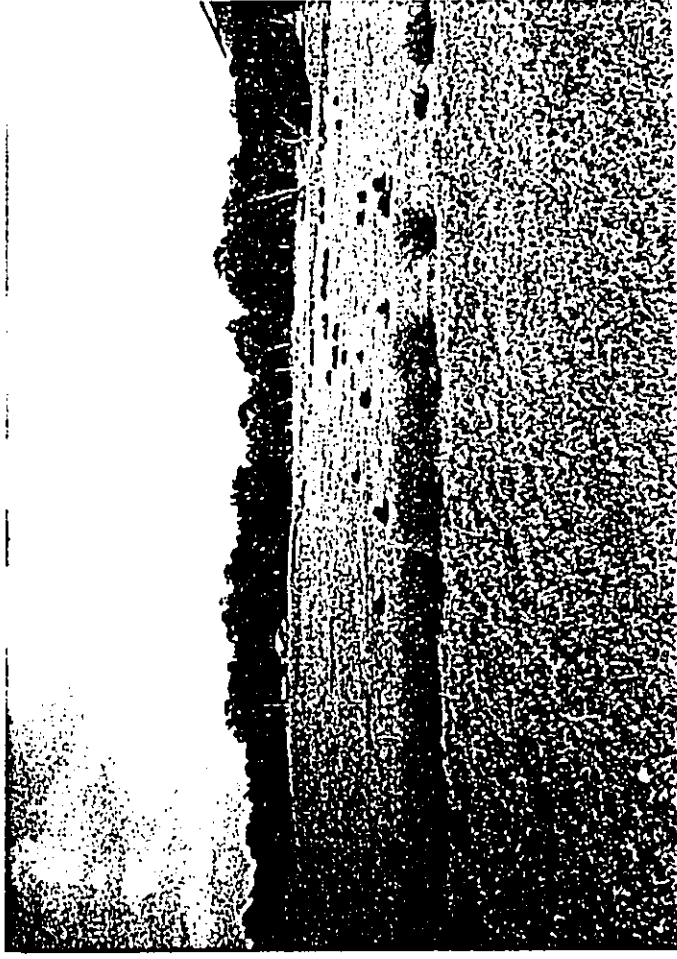


<-- View of the same site looking more to the southwest.

Figure 5.6



<-- This photo of Site 4 is taken along Kamamalu Street near the electric substation looking towards the Civic Center. The Fire Station is the first building to the right.



<-- View of the same site looking more to the west. The building near the trees in the background is the residence on Site 3.

Figure 5.7

Waimea-Kohala Airport. The site has been delineated in open space between the race track and the road on TMK parcel 6-7-02:17. See Figure 5.8.

Soils: Soils at the site are Waimea Very Fine Sandy Loam (WMC), 6 to 12 percent slopes. These soils have high erodibility and are considered good topsoil. On the (ALISH) maps of the area, the site is 95 percent Prime and 5 percent Unclassified land.

Access: Access to the site is directly from Mamalahoa Highway. No additional access road would be required to the site.

Surrounding Land Uses: Nearby residences are located to the northeast and across Mamalahoa Highway to the north. The race track is located east of the site.

Ownership/Lessees: The land is owned by the Trust of Richard Smart.

5.2.6 Site No. 6: Tree Farm

Location: This site is situated about 2 miles from the Medical Center along Mamalahoa Highway on the way to the Waimea-Kohala Airport. It is delineated on the west side of the Highway within TMK 6-8-01:1 where the southern boundary of a tree farm ends. Figure 5.8 shows the location of Site No. 6.

Soils: Soils at the site consist of Puu Pa Extremely Fine Sandy Loam (PVD), 6 to 20 percent slopes which have high erodibility and are considered poor topsoil. On ALISH maps, the entire area is Unclassified.

Access: Access to the site is directly from Mamalahoa Highway. No additional access road would be required to the site.

Surrounding Land Uses: Mamalahoa Highway fronts the site to the east. Gary's Automotive shop is located one-half mile west of Mamalahoa Highway to the rear of the site. The Waimea-Kohala Airport is located across

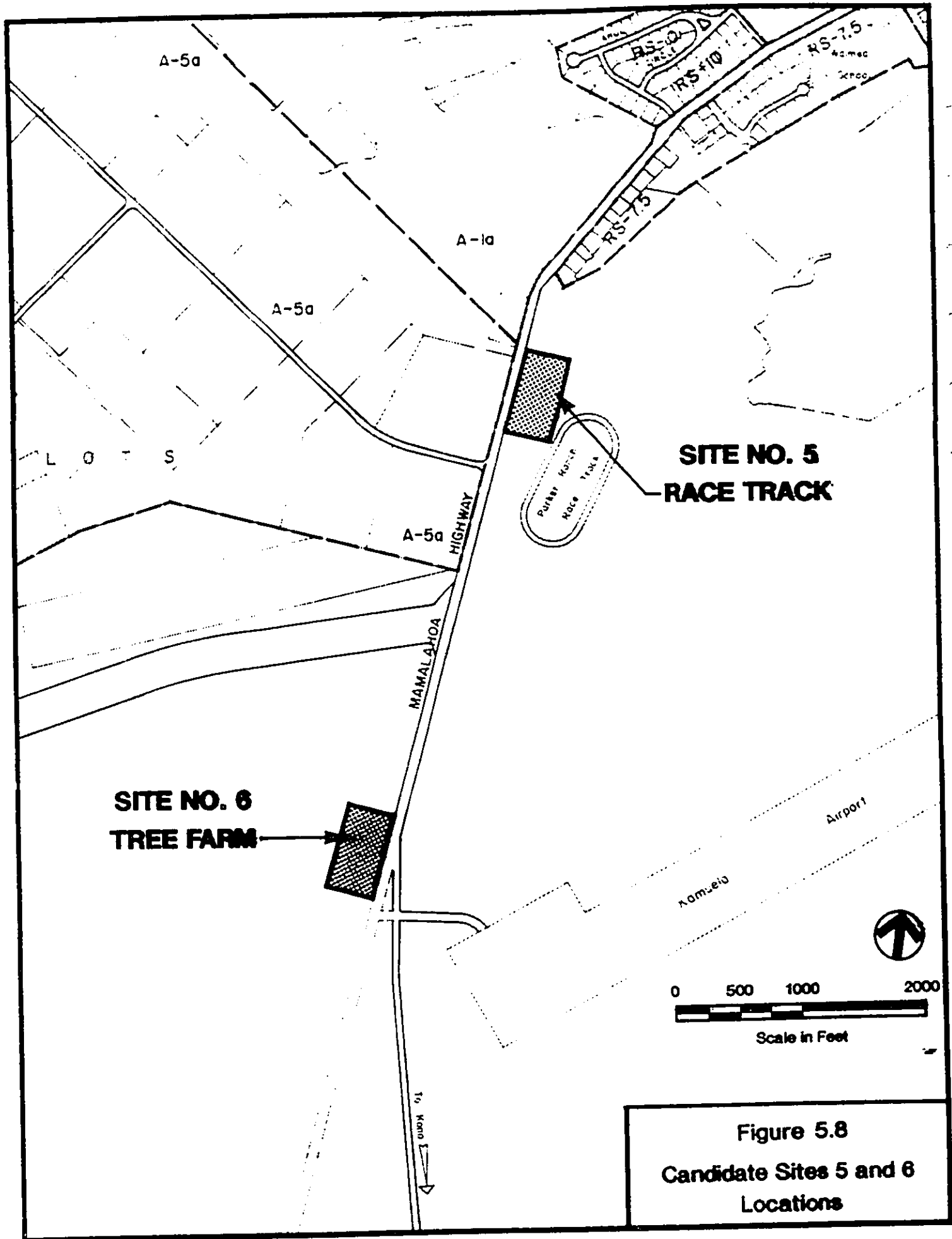


Figure 5.8
Candidate Sites 5 and 6
Locations

the Highway to the southeast. Between the site and the tree farm is a dirt road which, according to the tax map, is an easement for a new highway. Figure 5.9 shows photographs of Site No. 6.

Ownership/Lessees: The land is owned by the Trust of Richard Smart.

5.2.7 Site No. 7: Waiaka Bridge

Location: Waiaka Bridge (Site No. 7) is located approximately 2.3 miles from the Medical Center along Kawaihae Road where the road forks, one branch heading to the coast and the other to Kohala. The site is delineated in a clear field south of Kawaihae Road. Waiaka Stream flows to the northwest of the site. See Figure 5.10.

Soils: Soils at the site are Waimea Very Fine Sandy Loam (WMC), 6 to 12 percent slopes. These soils have high erodibility and are considered good topsoil. On the (ALISH) maps of the area, the entire site consists of Other Important Agricultural Lands.

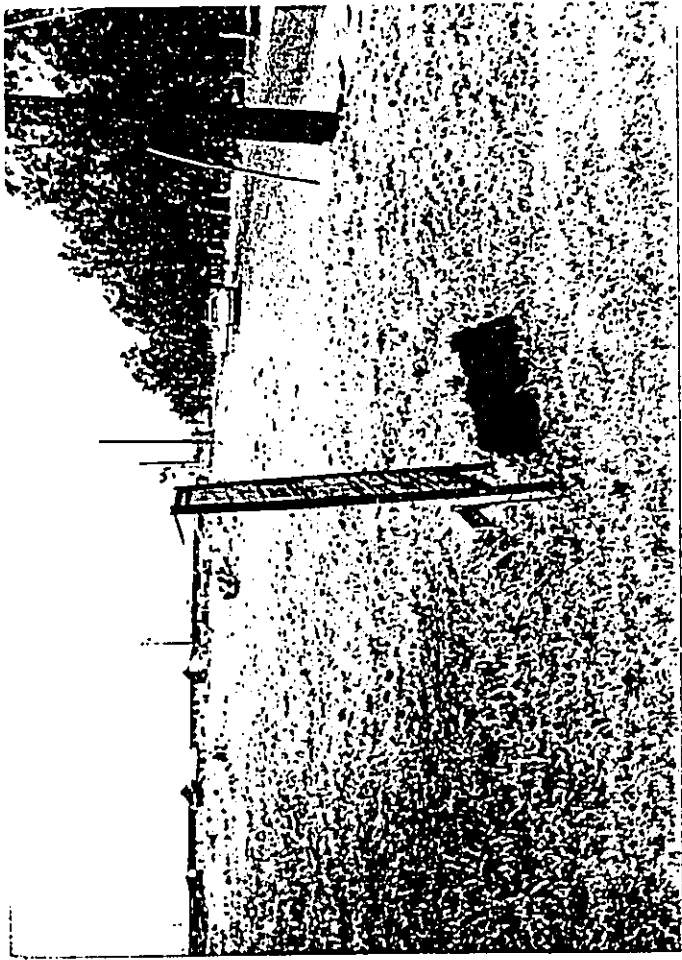
Access: Access to the site would be directly from Mamalahoa Highway. No additional access road would be required to the site.

Surrounding Land Uses: An electric substation and refuse transfer station are located east of the site. Residential developments are located across Waiaka Stream to the northwest. Figure 5.11 shows photographs of Site No. 7.

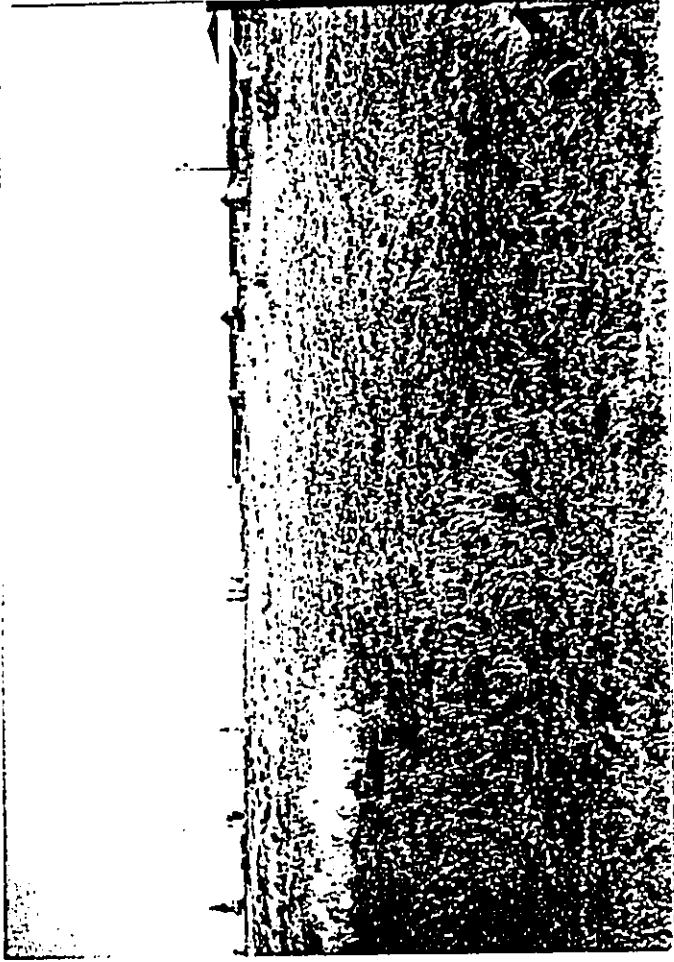
Ownership/Lessees: The land is owned by the State of Hawaii.

5.3 Summary of Candidate Sites

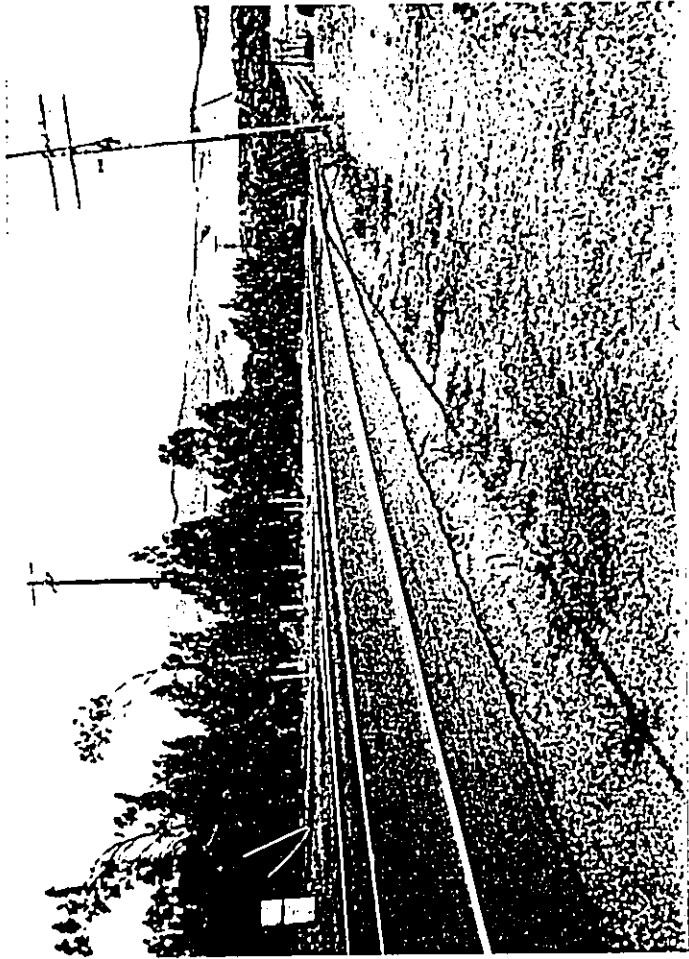
Data on the candidate sites is summarized on Table 5.1.



< -- This is the Tree Farm Site 6 as seen from Mamalahoa Highway. Gary's Automotive Service is in the background and its access road is on the right.



Another view of the site looking more to the southwest.



< -- Mamalahoa Highway looking towards Waimea Town. The tree farm is across the road. The sign for Gary's Automotive Service is visible at left.

Figure 5.9

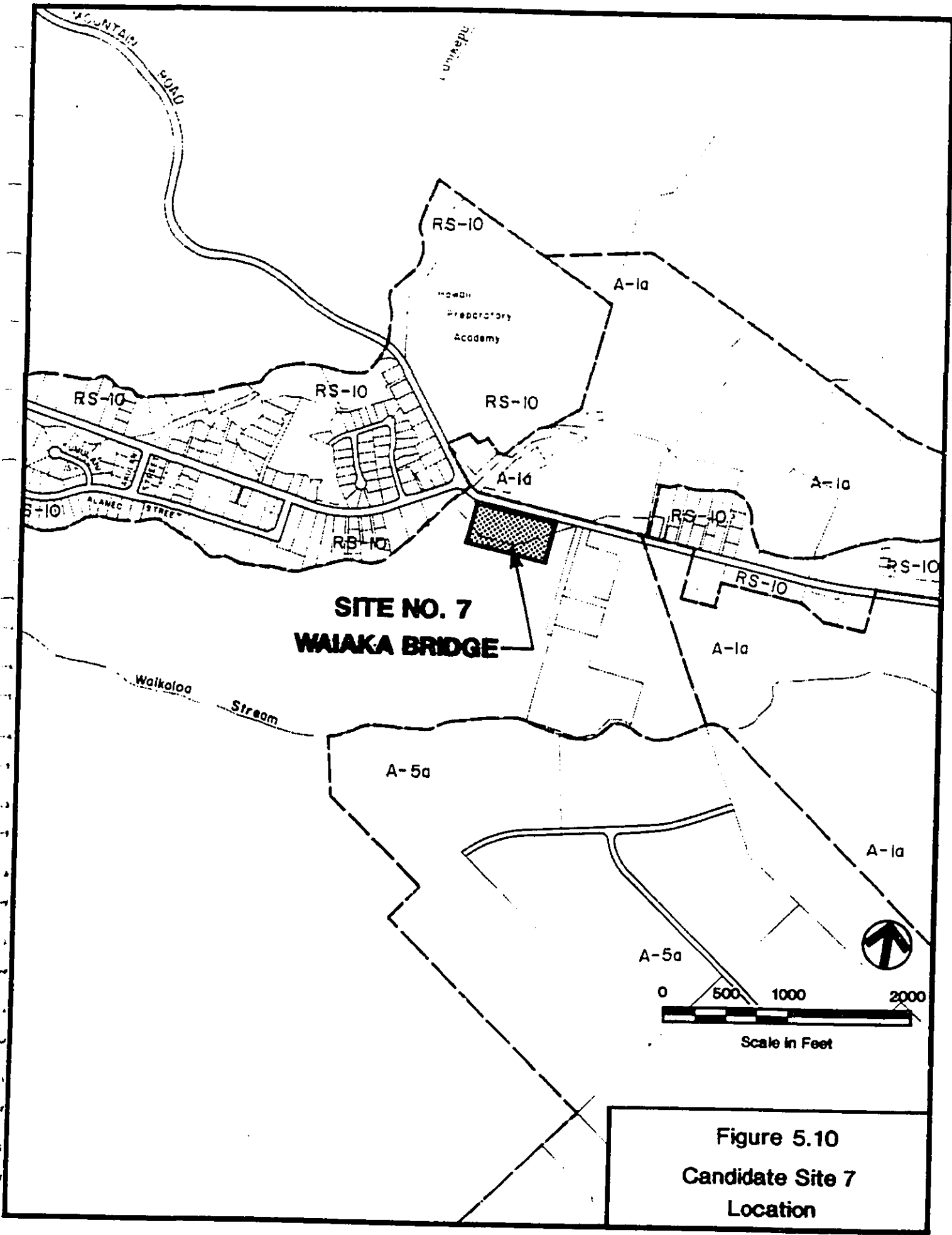
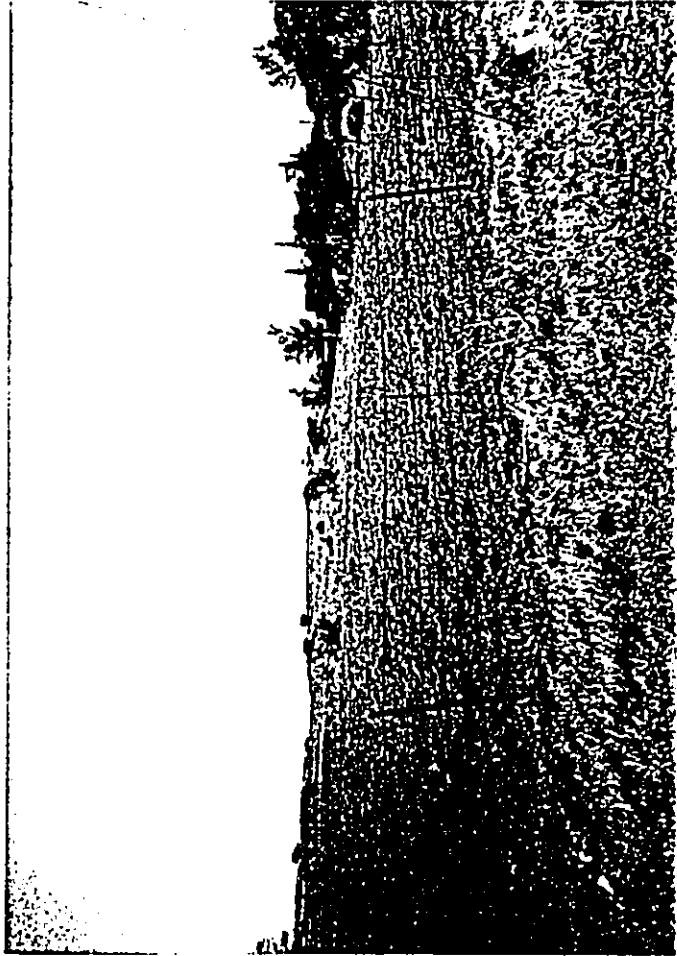
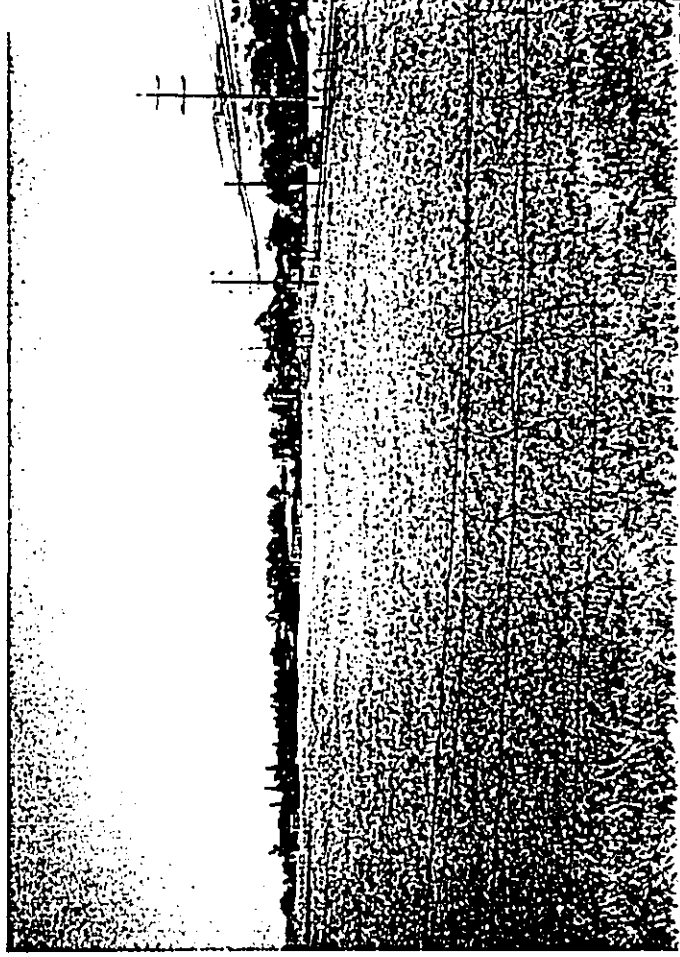


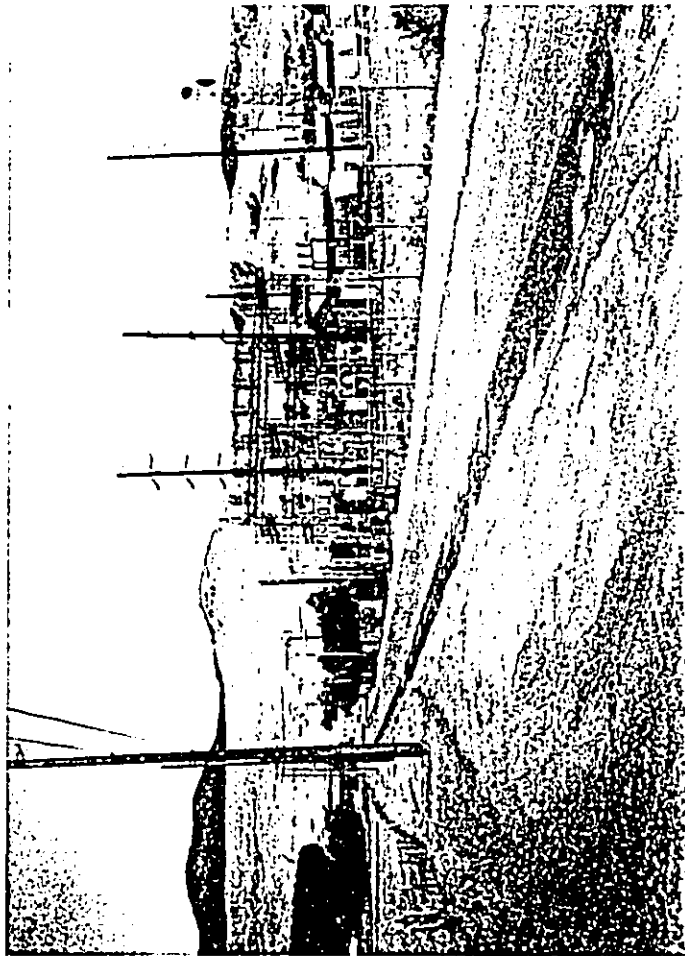
Figure 5.10
Candidate Site 7
Location



<-- The Waiaka Bridge Site 7 looking southwest from Kawaihae Road. The small gully at right is Waiaka Stream.



Another broad view of the site looking west. Kawaihae Road is at right.



<-- Photo of the electric plant along the road to the refuse transfer station. The fence at left marks the eastern boundary of the State land on which Site 7 is located.

Figure 5.11

6. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

The plans and policies relating to the proposed North Hawaii Community Hospital range from broad program guidance offered by the Hawaii State Plan and State Health Functional Plan, to land use controls governing development of the site. The hospital will be developed in consonance with various governmental land use plans, policies and regulatory controls. The following is a review of these plans and policies.

6.1 Related Plans and Policies

6.1.1 Hawaii State Plan

The proposed North Hawaii Community Hospital is consistent with the following State Plan objectives and policies.

- o Fulfillment of basic individual health needs of the general public.
- o Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.

To achieve the health objectives, it shall be the policy of this State to:

- o Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems, including substance abuse.
- o Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.

6.1.2 State Functional Plans

The Statewide Planning System requires the development of State Functional Plans which are approved by the Governor. The State Functional Plans guide the implementation of State and County actions in the areas of agriculture, conservation lands, education, employment, energy, health, higher education, historic preservation, housing, human services, recreation, tourism, transportation, water resources, and other areas designated by the Governor. The State Functional Plans delineate specific strategies of policies and priority actions that should be addressed in the short term and place emphasis on the implementation of programs and actions. They are intended to act in a coordinated fashion with County General Plans and Development Plans.

6.1.3 State Health Functional Plan

The Hawaii State Health Functional Plan revised in 1989 reflects the changing priorities and new administrative direction within the Department of Health. The focus of the State Health Functional Plan and priority issues are as follows:

- o There is a new emphasis on preventive health. In addition to new infectious diseases such as AIDS and Hepatitis B, chronic diseases threaten the health care system with long term bankruptcy. For these diseases treatment is often costly, extended and intensive. Prevention strategies need to be undertaken to avoid massive future health costs.
- o Presently access to health care is available to most of Hawaii's people. However, some groups lack such access; Hawaiians who are specially impacted with poor health status; the 'gap group' of people who do not have accessibility to care because of inability to share in insurance mechanisms; and special populations such as

persons with severe, disabling mental illness who are hard to reach and often do not accept treatment - all require special emphasis.

- o Hawaii's environment is among the most pristine in the nation and must be protected.
- o The Department of Health requires upgrading its administrative and leadership capabilities.

These priorities are expressed in six major objectives discussed as 'issue areas' in the State Health Functional Plan. These major functional health issue areas focus on promoting healthy lifestyles and behavior, prevention and control of communicable diseases, special population's access to health care, community hospitals, environmental health, and improved Department of Health capabilities.

Each of the six issue areas within the State Health Functional Plan express the problem, the objective of the State concerning the problem, State policies addressing possible strategies, and a recommended action. The following issue area is directly related to the proposed North Hawaii Community Hospital.

Issue

Area 4: Healthcare Services (Acute, Long-term, Primary and Emergent) for Rural Communities

Problem: Inadequate healthcare services to meet the needs of residents in rural communities. A large portion of Hawaii is rural in nature, a factor which has not enabled government or the private sector to economically deliver needed healthcare services to the population of these areas.

Object. 4: Development of a community hospital system which is innovative, responsive, and supplies high quality care to the constituencies it serves.

Policy 4B: Use innovative financial and service delivery arrangements to provide for new hospital facilities to meet community needs.

Action 4B2: Develop through a public/private partnership, primary, acute and long-term care facilities to meet health care needs in North Hawaii.

6.2 Land Use Plans and Policies

6.2.1 State Land Use District

The State Land Use Commission has classified all lands in the State into four land use districts: Urban, Agriculture, Conservation and Rural. These designations within the Waimea area are shown in Figure 6.1. Hospital use is permitted under the Urban designation only, otherwise a boundary amendment must be sought. Sites Nos. 1, 2, and 4 are within the Urban district. Portions of Sites Nos. 3 and 6 are located within the Urban district and portions within the Agricultural district. Site Nos. 5 and 7 are in the Agricultural district.

6.2.2 County of Hawaii General Plan

Hawaii County has recently completed its update of the General Plan for Hawaii County and adopted it as Ordinance 89-142, November 1989. Among the Plans objectives is a statement of development guidelines, standards and principles with respect to the most desirable use of land, density of population, system of principal highways, and the general location of public infrastructure and recreation uses within the County. With regard to health care facilities in the County, the following goals appear in the General Plan under (4) Health and Sanitation:

POLICY

- o The County should encourage the development of new or improvement of existing health care facilities to serve the needs of Hamakua, North and South Kohala, and North and South Kona.

STANDARDS

- o Hospitals should be on sites capable of handling moderate expansion of facilities. Quiet surroundings, convenient and adequate access, and compatibility with adjoining uses shall be required.
- o Hospitals shall be served by a public sewerage system or have self-contained sewerage systems. Hospital solid waste disposal methods shall be by incineration.

The proposed North Hawaii Community Hospital fulfills the above policy. The selected hospital site will endeavor to accommodate moderate expansion in a quiet, convenient, and accessible location which is compatible with surrounding land uses. The facility will be serviced by a self-contained sewerage system, and will dispose of its solid and/or medical wastes by incineration in conjunction with other island hospitals.

Another major component of the General Plan is the Land Use Pattern Allocation Guide Map, which depicts the desired distribution of land uses within the County (see Figure 6.2). For the Waimea area, this Map shows the following designations: Low/Medium Density, Urban Expansion Area, Intensive Agriculture, Industrial, and Conservation.

6.2.3 County of Hawaii Zoning

Hawaii County has established zoning designations for lands in the County and adopted these as Chapter 25 of the Hawaii County Code. Chapter 25 sets forth the permitted uses in the various zoning designations within

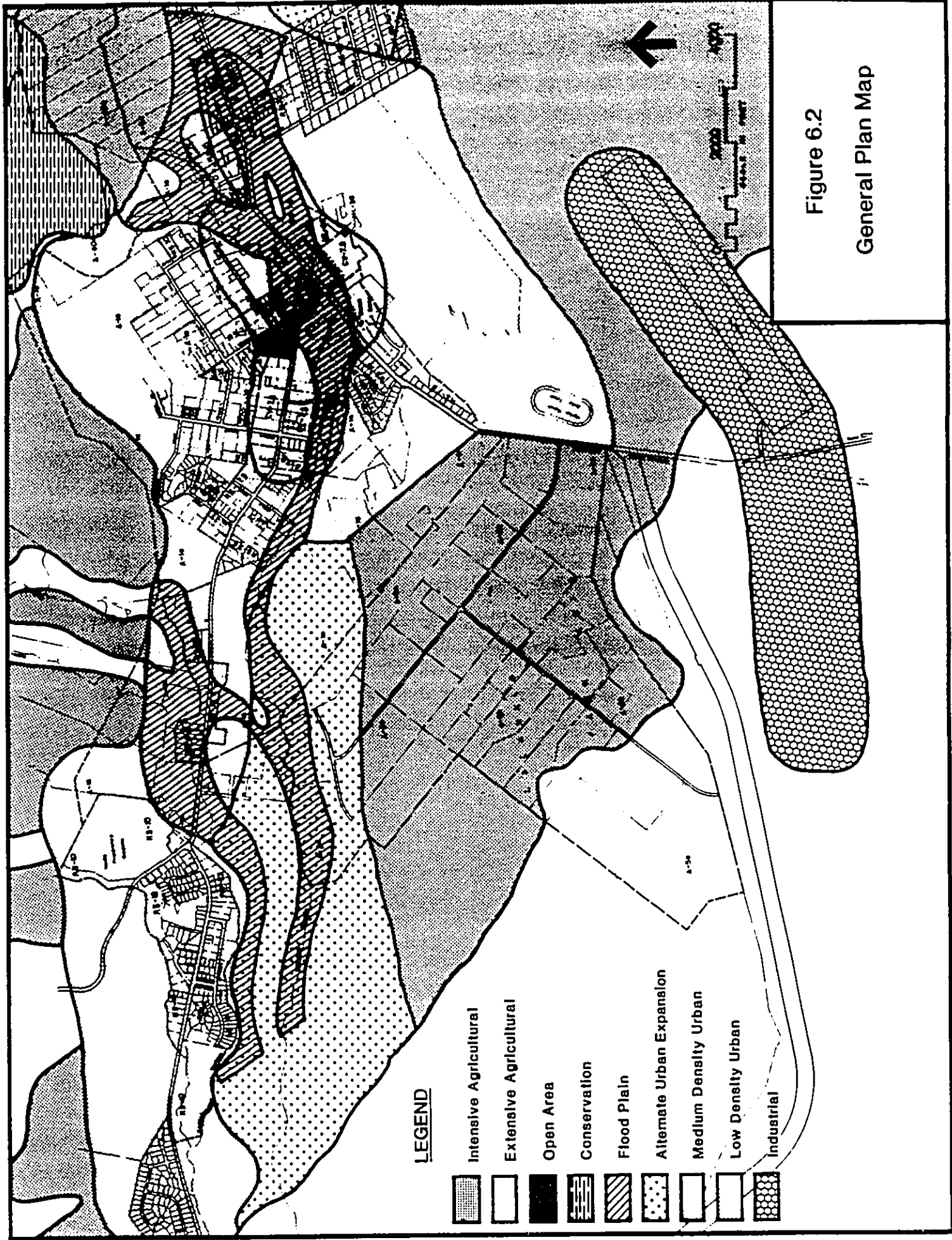


Figure 6.2
General Plan Map

the County. Chapter 25 indicates that there is no designation which immediately permits health care facility use on a site. Instead, a Use Permit must be filed and reviewed by the Planning Commission as a discretionary permit. All users within 300 feet must be informed of the planned use and may testify in favor of or against the use. Use of the site for a health care facility is ultimately approved or rejected by the Planning Commission.

Currently, Site No. 1 is zoned Single-Family Residential (RS 7.5). Site Nos. 2, 4 and 5 are zoned Agricultural (A-40a). Most of Site No. 3 is A-40a, except for its small western corner which is designated Limited Industrial (ML-20). Site Nos. 6 and 7 are zoned Unplanned. Figures 6.3, 6.4, and 6.5 depict the zoning designations for all of the alternative sites.

6.2.4 Parker Ranch 2020 Plan

A Community Plan, "Parker Ranch 2020", was prepared by Parker Ranch in 1987 to address growth issues, preserve the town's ranch character, and support a petition to the State Land Use Commission to amend the State land use district boundary in the area (see Figure 6.6). The plan addressed three primary areas: 495 acres near the town center, 130 acres west of the Waimea-Kohala Airport near Gary's Automotive, and 195 acres below Hawaii Preparatory Academy between the Kohala Mountain Road and Kawaihae Road. The town center plan examined planned development of a number of uses including residential, low-density apartment, park, commercial, ranch commercial, industrial, and agricultural lots. It also set aside a 2 acre area immediately south of the Lucy Henriques Medical Center for hospital expansion.

In addition to the town center plan, the other major land use which could affect the Waimea area is the planned State Highway or by-pass road. As discussed in Chapter 4, section 4.14.5, a segment of the highway alignment passes through lands controlled and leased out by the State of Hawaii

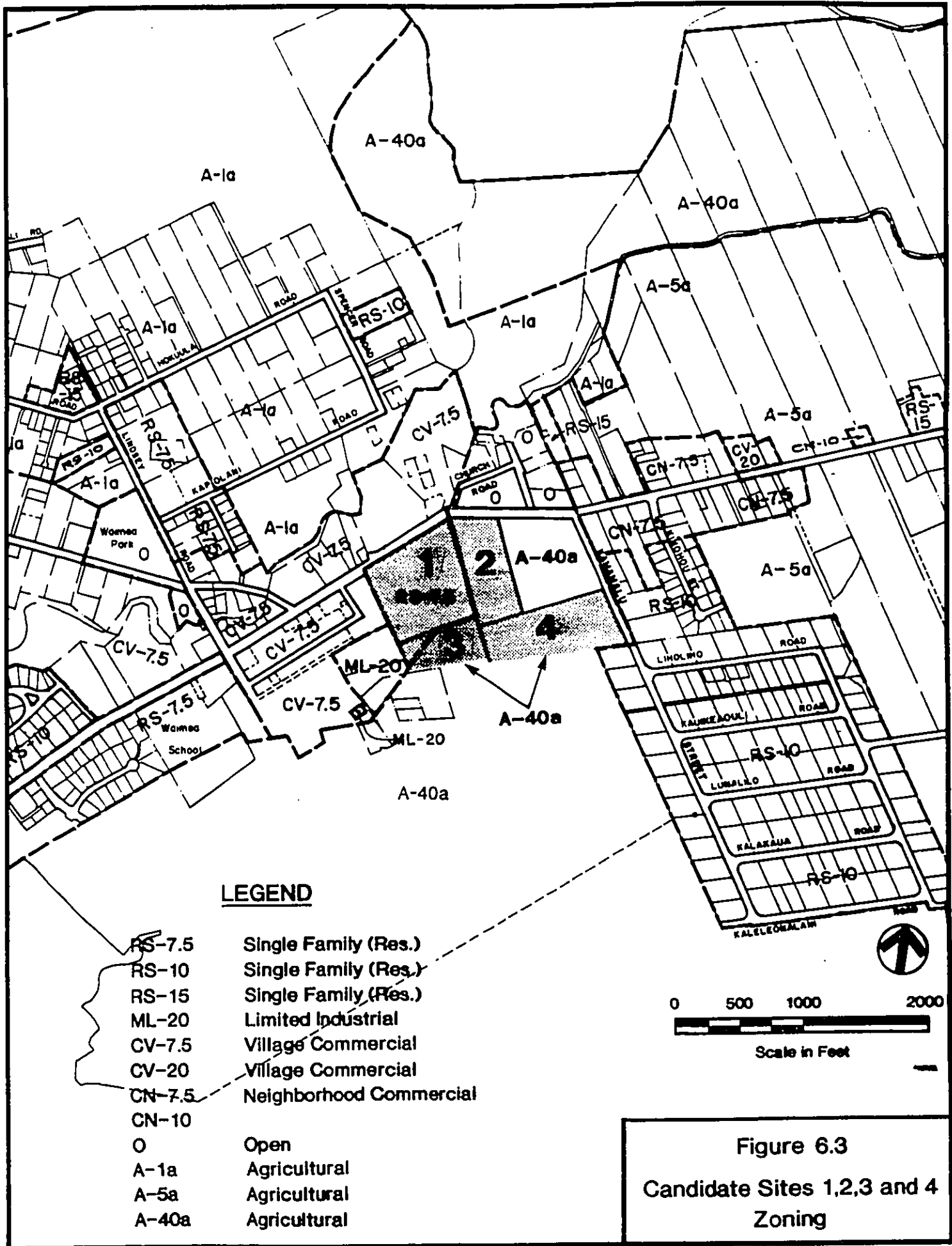
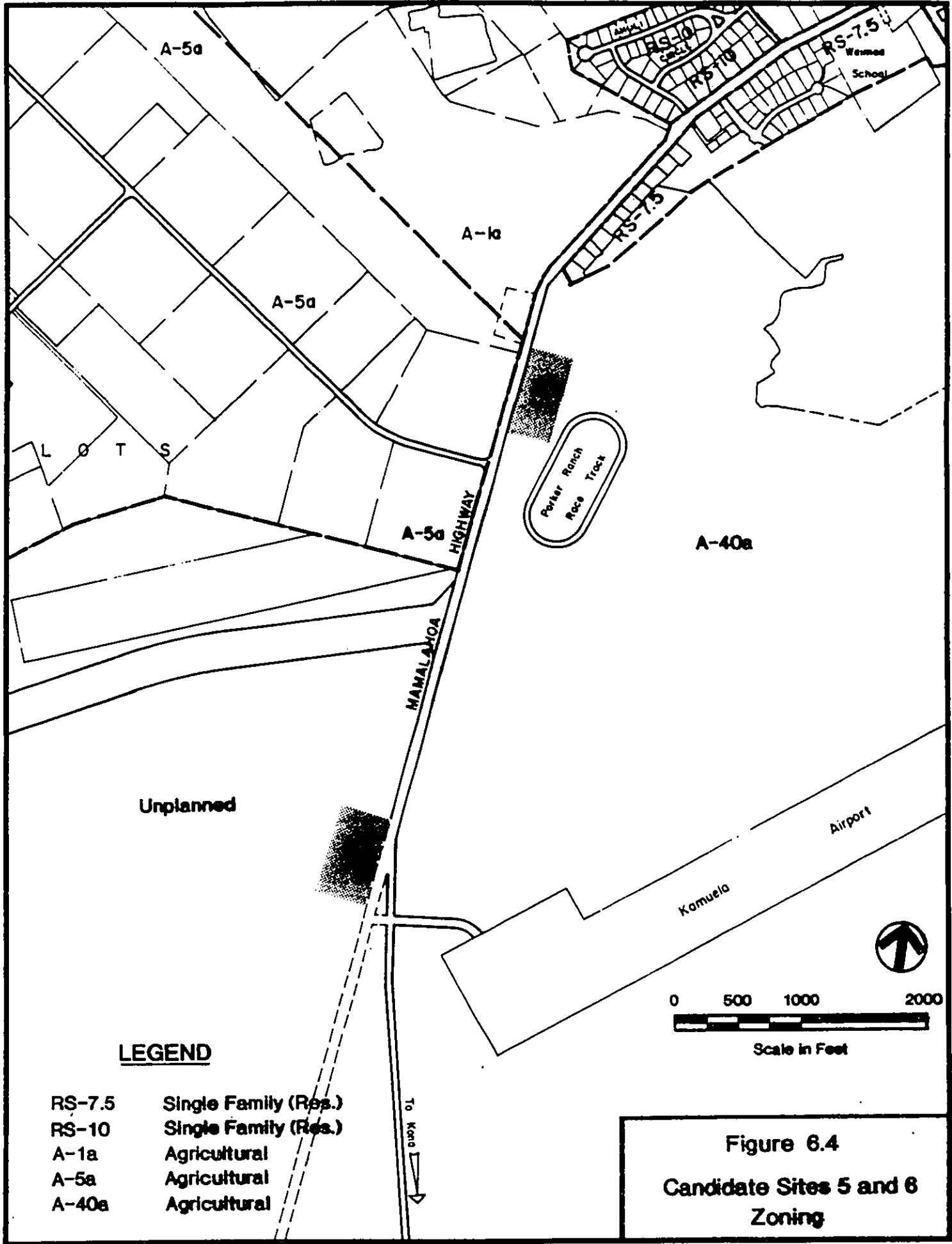


Figure 6.3
Candidate Sites 1,2,3 and 4
Zoning



LEGEND

- RS-7.5 Single Family (Res.)
- RS-10 Single Family (Res.)
- A-1a Agricultural
- A-5a Agricultural
- A-40a Agricultural



Figure 6.4
Candidate Sites 5 and 6
Zoning

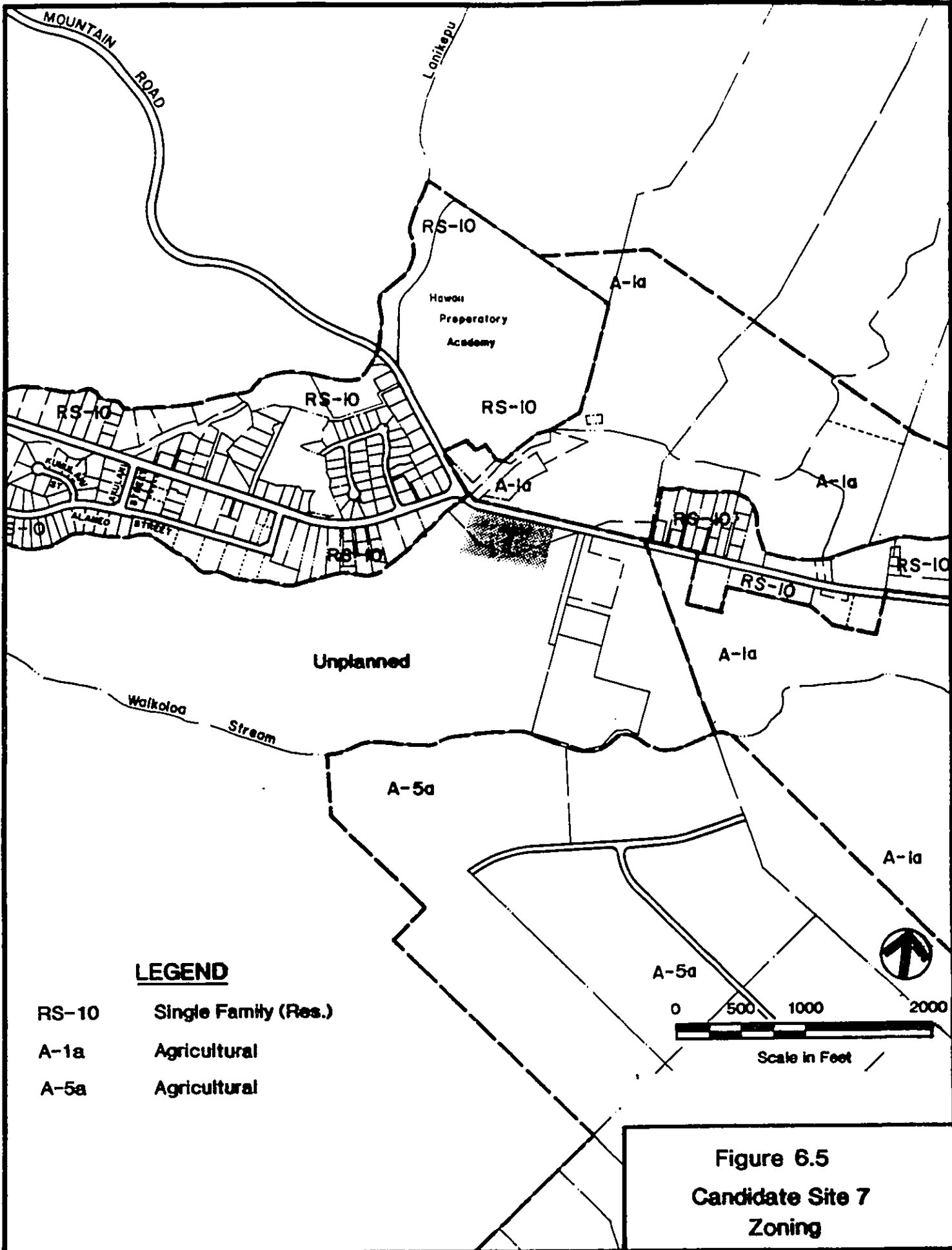


Figure 6.5
Candidate Site 7
Zoning

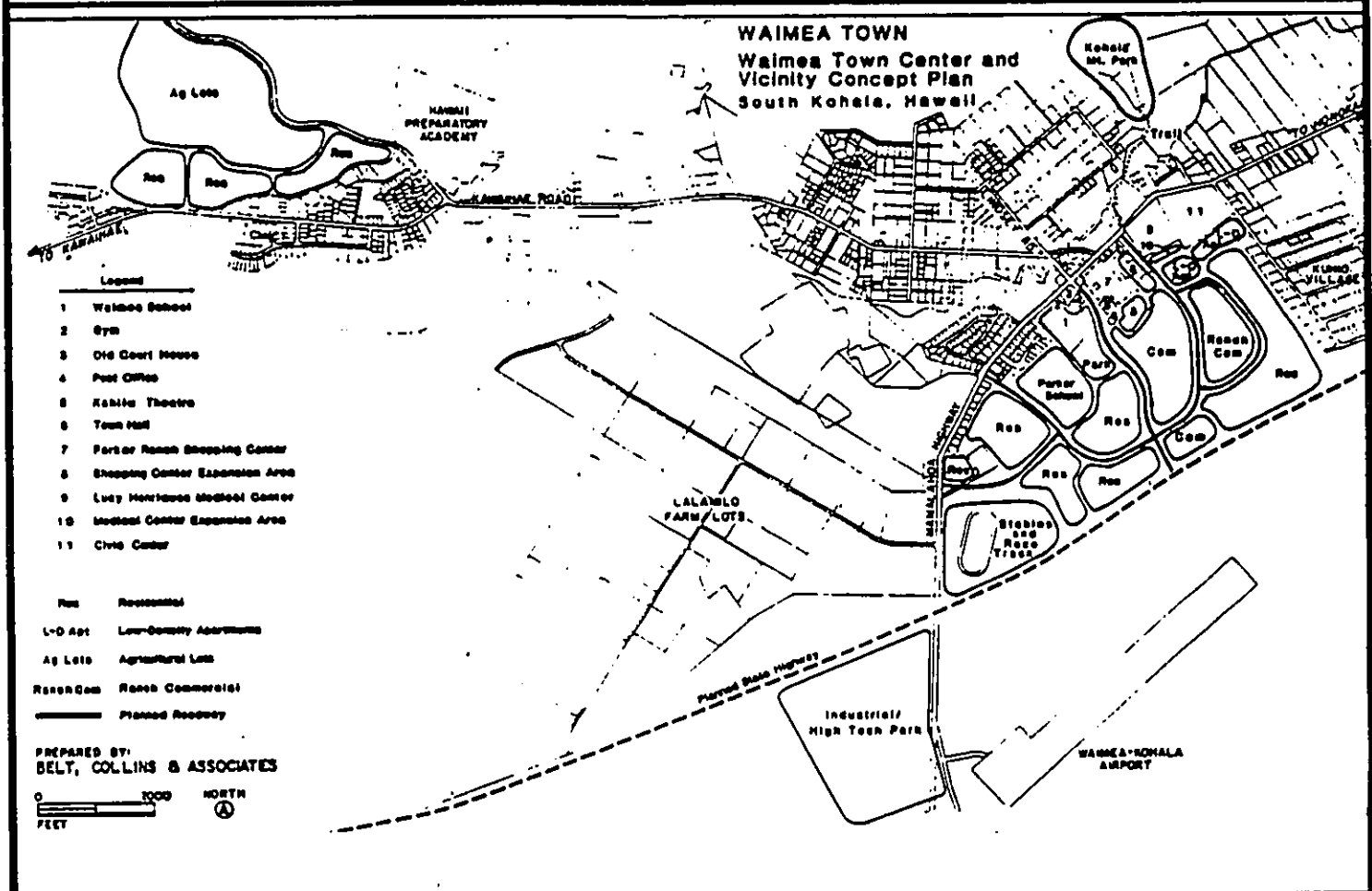
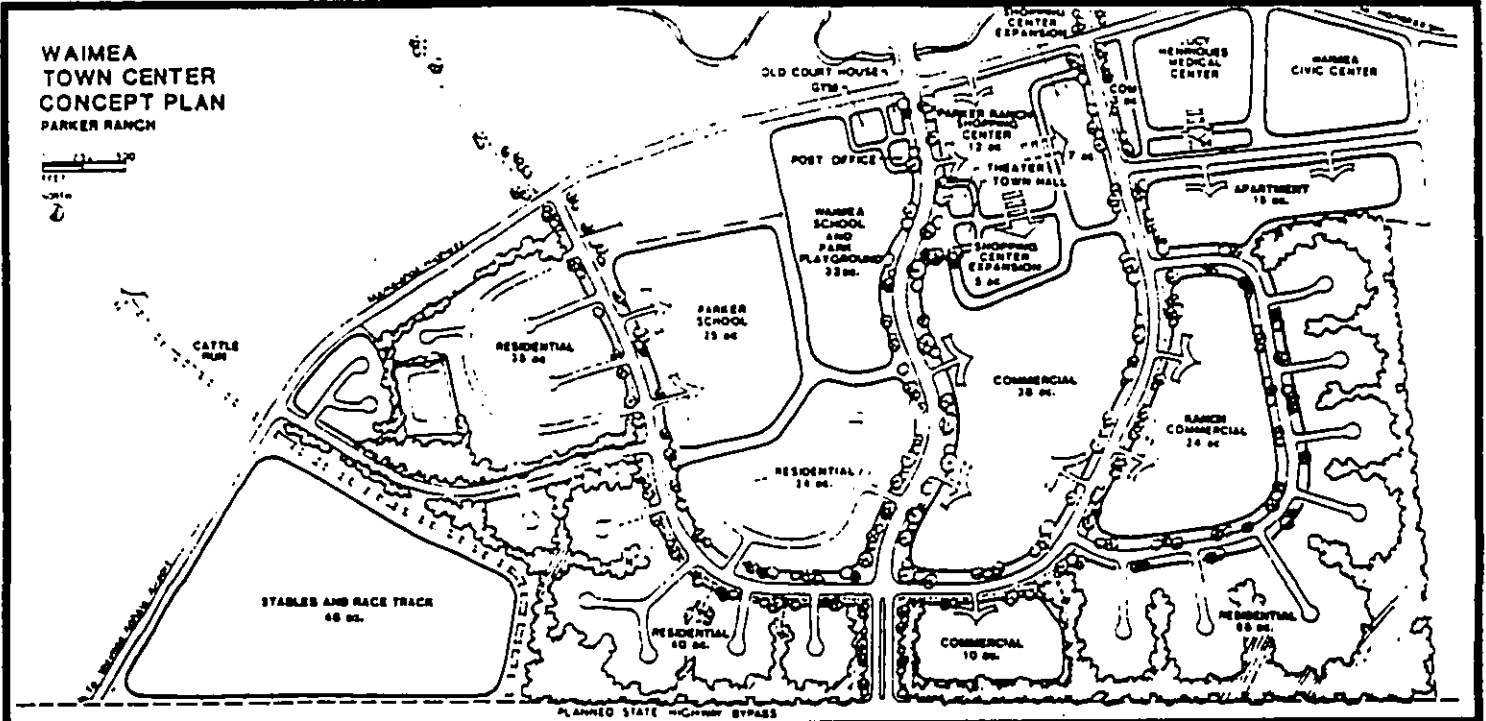


Figure 6.6
 Parker Ranch 2020
 Community Plan

Department of Hawaiian Home Lands. Recently, State DOT has been working with DHHL to identify alternative alignments for this by-pass road. Although discussions for the road appear to be progressing, no agreement has been reached. At this time, no schedule has been determined for designating a new alignment for the by-pass road.

7. EVALUATION OF CANDIDATE SITES

7.1 Detailed Site Evaluation Criteria

The selected candidate sites which met the minimum criteria discussed in Chapter 5 were also examined in relation to a set of detailed site evaluation criteria. These criteria were derived from six main categories: Physical Environment, Utilities, Accessibility, Governmental, Community Effects, and Acquirability. These criteria were selected to aid in identification of a preferred site for the proposed hospital. The rationale for these categories and their respective criteria are discussed below:

Physical Environment--Physical environment criteria considered such site characteristics as adjacent noise or other pollution sources, on-site foundation and soil characteristics, land productivity, agricultural importance of the land, and potential flood hazard. These factors were the environmental considerations which might hinder a site from being feasibly developed as a hospital or would preclude use of the site for other purposes such as agricultural production.

Utilities--Already available utility service to a specific site is essential to a new hospital if major additional costs are to be avoided. Utility considerations included assessment of water service (line sizes, proximity), drainage conditions or facilities at the site, and proximity of electric and telephone lines. Although sewer service in Waimea is limited to individual treatment and disposal, available land area for an independent facility to serve the hospital was considered instead of an assessment of municipal service.

Accessibility--Because the new hospital is planned as an acute-care facility, accessibility primarily examined access for emergency services and, secondarily, for service vehicles, patients and their families.

Accessibility is therefore a function of proximity to major highways and the level of service (traffic) on access roads.

Governmental--State Land Use, Community Plan, and County Zoning designations need to be examined to ensure compatibility with existing and future land use plans. Conformity to existing land use designations also avoids time consuming land use and zoning amendments or special permits.

Community Effects--Community support, existing land use, and aesthetic value criteria are all in some degree connected to land use designations. Construction of a hospital at a particular candidate site should not displace or interfere with existing and surrounding land use, should not interfere with scenic vistas, and should thereby evince community support.

Acquirability--A acquirability of a candidate site is determined by the landowner--whether State, County, or private. The ownership of a candidate site will have a major effect on the acquisition cost for the site.

7.2 Detailed Site Evaluations

The following sections describe the detailed site evaluation criteria and the ratings--either good, fair, or poor--for each candidate site. In addition, this section analyzes each candidate site in relation to the evaluation criteria. Table 7.2 at the end of the evaluations is a summary of the ratings for each site.

7.2.1 Physical Environment

7.2.1.1 Noise, other Pollutants

Good - The site is free from noise, dust, odors, smoke, and other nuisances created by industrial or agricultural activities.

Fair - The noise, dust, odors, smoke, and other nuisances from industrial or agricultural activities are at worst periodic but well within the limits of human tolerance.

Poor - The above mentioned nuisances cause discomfort and hamper hospital procedures.

Evaluation - Noise, other Pollutants

Most of the sites would generally be free from noise, dust, odors, smoke, and other nuisances created by industrial and agricultural activities. Sites adjacent to Mamalahoa Highway would be subject to annoyance and pollutants from vehicle traffic including primarily noise and dust, and, to a limited extent, odors from emissions. However, based on the traffic volumes on the Highway, annoyance and pollutants should not be a major consideration. Based on these findings, Site Nos. 1, 2, 3, 4, and 5 were rated "good".

Only Sites No. 6 Tree Farm and Site No. 7 are subject to any potential pollutants. Site No. 6 is subject to aircraft noise from the neighboring Waimea-Kohala Airport. Site No. 7 is adjacent to an electric substation which operates a diesel generator during peak demand periods in the morning and evening. Although air quality near the substation is not monitored, this may a source of potential pollutants not apparent at the other sites. Thus, both Sites No. 6 and No. 7 were given "fair" ratings at this time.

7.2.1.2 Subsurface Soil Characteristics

Good - All features favorable.

Fair - Moderate bearing capacity, moderate compressibility.

Poor - Low bearing capacity, low compressibility.

Evaluation - Subsurface Soil Characteristics

The U.S. Department of Agriculture Soil Conservation Service (SCS) has prepared maps describing subsurface soil types in terms of suitability for topsoil and road fill, as well as general engineering properties indicating suitability for foundations of low buildings. These SCS soil maps indicate the soils in the Waimea are generally of moderate bearing capacity and compressibility. This is true of all the candidate sites, which were rated "fair" in terms of foundation.

7.2.1.3 Land Productivity

Agricultural Land Rating: (University of Hawaii Land Study Bureau Agricultural Land Classification Productivity Rating)

Good - The site is located on land with a very poor (E) productivity rating.

Fair - The site is located on land with a fair (C) to poor (D) productivity rating.

Poor - The site is located on land with a good (B) to very good (A) productivity rating.

Evaluation - Land Productivity

The Land Study Bureau has prepared a Detailed Land Classification--Island of Hawaii which provides an overall assessment of a given area's agricultural potential by assigning it with a master productivity rating. These ratings are: (A)-Very Good, (B)-Good, (C)-Fair, (D)-Poor, and (E)-Very Poor. Candidate sites on land with a higher productivity rating are given a lower criteria rating because they would represent the loss of more valuable agricultural land if a hospital were to be developed on

them. Likewise, lands with low productivity would have a better criteria rating.

According to this Study, Site Nos. 1, 2, 3 and 4 are located on lands with a productivity rating of "B". These sites are therefore rated "poor". Site Nos. 5 and 7 have a productivity rating of "C" and are rated "fair". Site No. 6 has a productivity rating of "E" and is therefore rated "good".

7.2.1.4 Lands of Agricultural Importance

Good - The site is located on Unclassified agricultural lands.

Fair - The site is located on lands classified as Other Important Agricultural Land.

Poor - The site is located on lands classified as Unique or Prime.

Evaluation - Lands of Agricultural Importance

The U.S. Department of Agriculture Soil Conservation Service and the State of Hawaii Department of Agriculture have classified lands within the state according to their agricultural importance, the Agricultural Lands of Importance to the State of Hawaii (ALISH) system. The most importance of these classifications is Prime, followed by Unique, Other Important Agricultural Land and Unclassified. According to this system, Sites Nos. 1, 2, and 6 are either completely or almost completely located on Unclassified lands. Site No. 3 is on 50 percent Prime and 50 percent Unclassified lands. Sites Nos. 5 and 7 are either completely or almost completely located on Other Important Agricultural Land. Site No. 4 is located entire within Prime land.

Based on this system, Sites No. 1, 2, and 6 would be rated "good", Sites Nos. 5 and 7 "fair" and Sites Nos. 3 and 4 "poor".

7.2.1.5 Flood Hazard

Good - The site is not in a flood plain and drainage facilities keep it free from flood hazard.

Fair - The site is within a flood plain but drainage provisions are adequate to prevent flood hazard.

Poor - The site is within a flood plain and extensive drainage provisions must be made to protect against flooding.

Evaluation - Flood Hazard

According to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps, portions of Lucy Henriques Medical Center Site No. 1, Civic Center Site No. 2, 2020 Plan Site No. 3, and Fire Station Site No. 4 are within Zone AE, or areas within the flood hazard area from a 100-year flood. Extensive drainage provisions must be made to protect against flood hazard at these sites, therefore they are rated "poor". Because of the advantages of using Site No. 1, including consolidation of functions with the existing medical center, a flood hazard study was prepared to determine the measures necessary for construction of a hospital within this site's flood hazard area (see Appendix B).

Also rated "poor" is Site No. 7, a portion of which is in Zone A, or areas inundated by the 100-year flood; base flood elevations and flood hazard factors not determined. Rated "fair" is Site No. 5 which has one corner in Zone X-shaded; an area inundated by the 500-year flood. Site No. 6 is not in a flood plain and is therefore rated "good". Figures 7.1, 7.1A, 7.2, and 7.3 show the FIRM maps for each site.

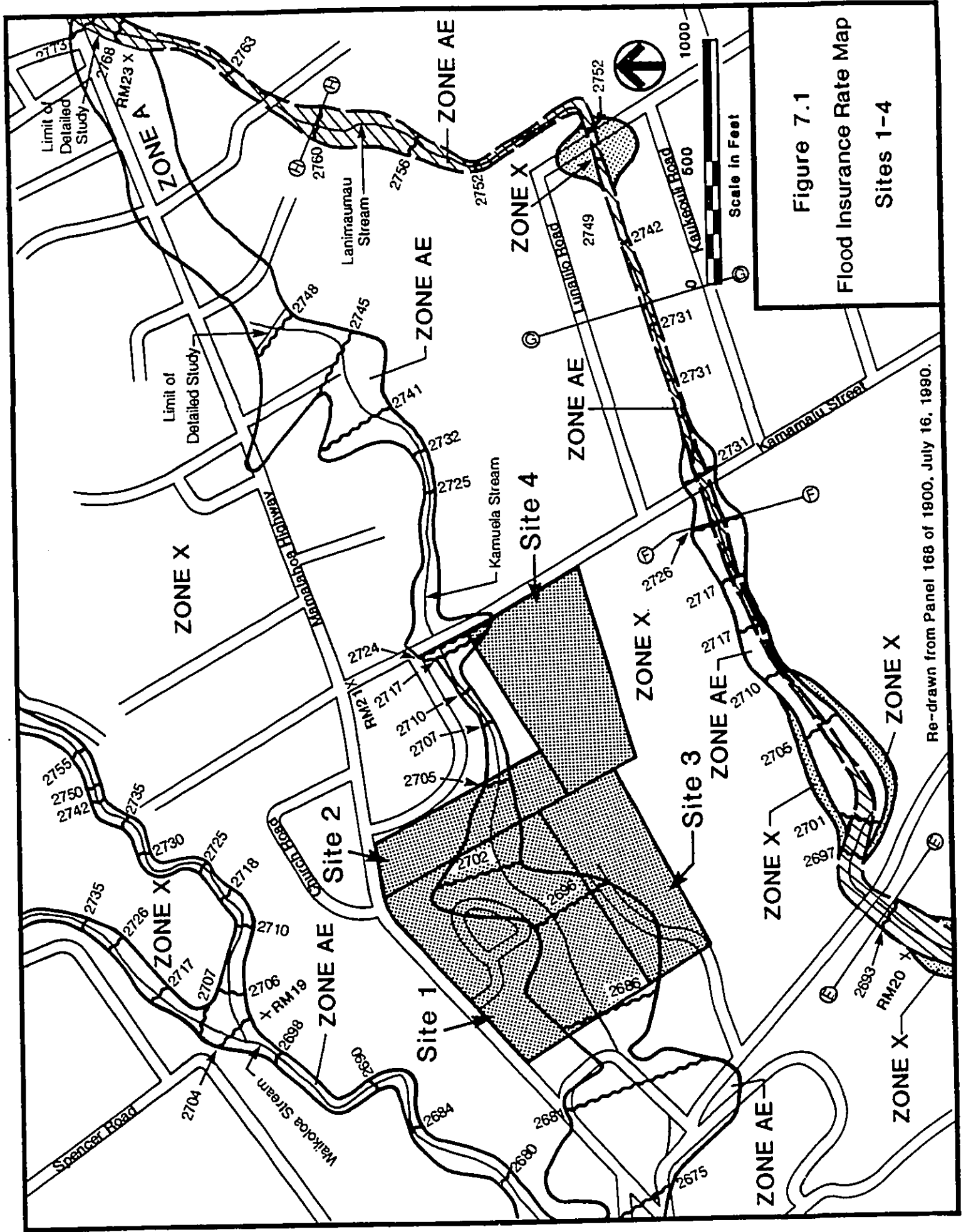


Figure 7.1
Flood Insurance Rate Map
Sites 1-4

Re-drawn from Panel 168 of 1900, July 16, 1980.

LEGEND

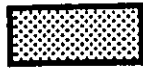


SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.



FLOODWAY AREAS IN ZONE AE



OTHER FLOOD AREAS

- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

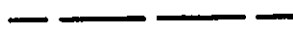


OTHER AREAS

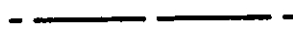
- ZONE X** Areas determined to be outside 500-year flood plain.
- ZONE D** Areas in which flood hazards are undetermined.



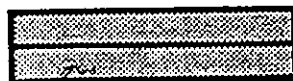
Flood Boundary



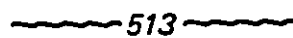
Floodway Boundary



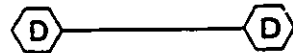
Zone D Boundary



Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.



Base Flood Elevation Line; Elevation in Feet*



Cross Section Line

(EL 987)

Base Flood Elevation in Feet Where Uniform Within Zone*

RM7_x

Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

From Panel 168 of 1900,
July 16, 1990

Figure 7.1a
Flood Insurance Rate Map
Legend

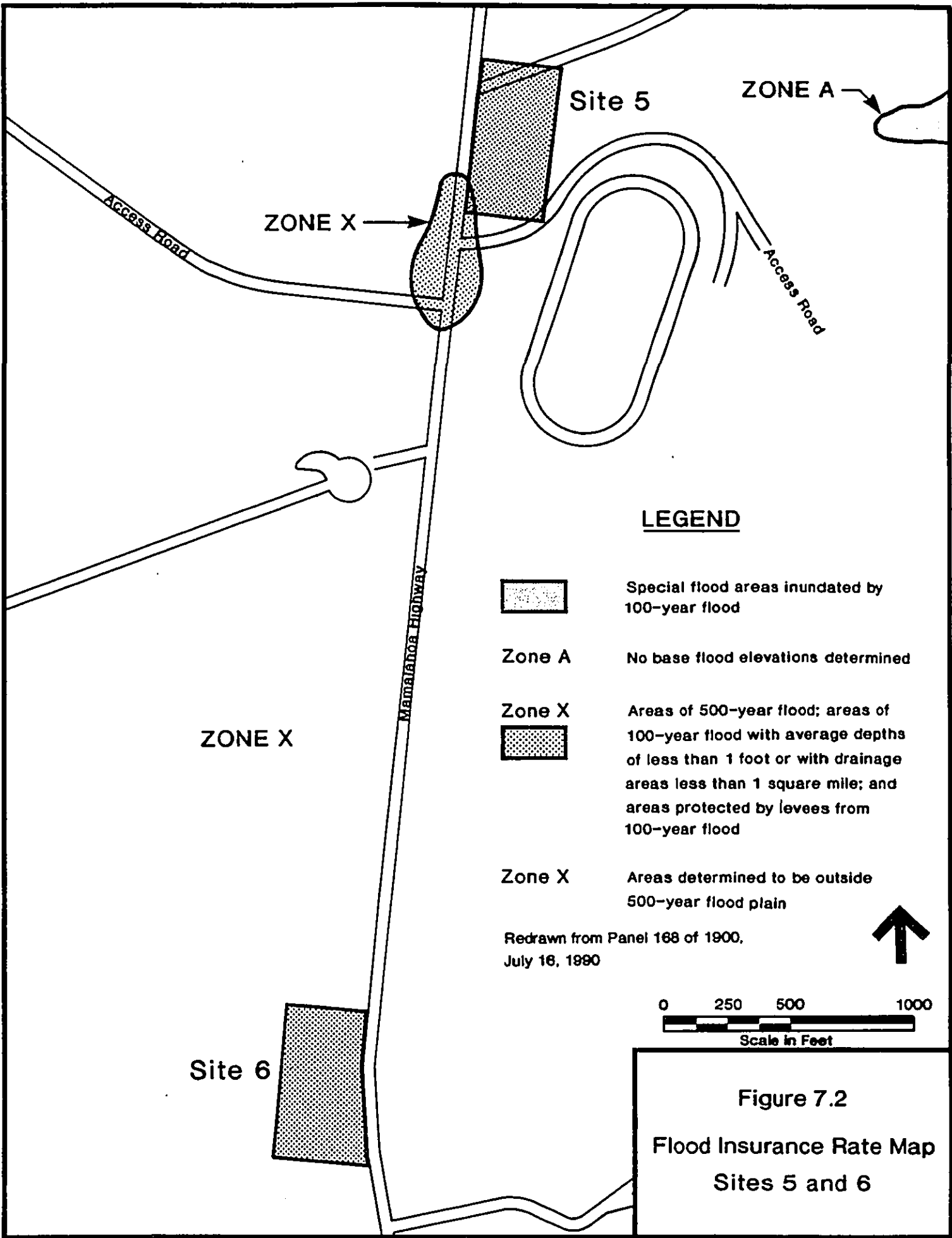
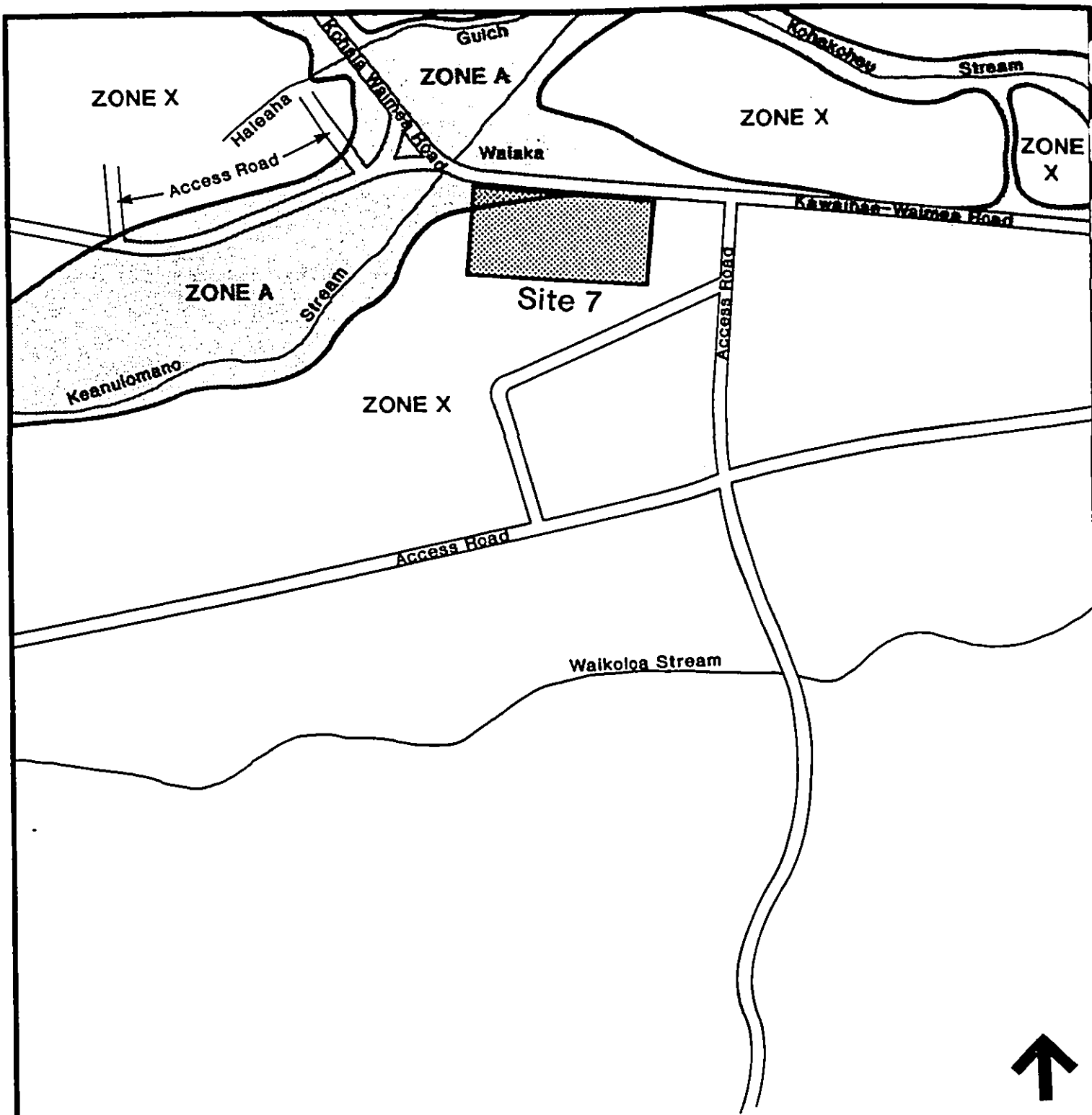



Figure 7.2
Flood Insurance Rate Map
Sites 5 and 6



LEGEND

-  Special flood hazard areas inundated by 100-year flood
- Zone A No base flood elevations determined
- Zone X Areas determined to be outside 500-year flood plain

Redrawn from Panel 168 of 1900, July 16, 1990



Figure 7.3
Flood Insurance Rate Map
Site 7

7.2.2 Utilities

7.2.2.1 Water Service

Good - The site has adequate water pressure and capacity available to meet ultimate hospital needs.

Fair - The existing water service is insufficient but adequate service can be provided by the addition of transmission improvements and/or increasing storage capacity which will meet interim and ultimate needs of the hospital.

Poor - The site will require extensive development of a water system, including source development, to specifically meet hospital needs.

Evaluation - Water Service

Currently, although the water storage and distribution systems in the Waimea area are adequate for current needs, the Waimea area is constrained by limited water sources from which to provide service. The DWS presently limits water allocation in the Waimea area to a maximum 1-inch water meter and 4,200 gallons per day per existing parcel provided the current zoning designation of the parcel allows the proposed land use. Water distribution line sizes range from 12-, 8-, and 6-inches on Mamalahoa Highway and the Waimea-Kawaihae Road. These distribution lines are adequate to supply the candidate sites with adequate potable water and to meet fire flow requirements. Figure 7.4 shows the existing domestic water system for the Waimea area.

Before construction of a new hospital anywhere in the Waimea area, additional water source development will be required. A new source would entail development of a high-level well prior to operation of the new hospital. The Hawaii County Water Plan discusses plans for a Puukapu deep

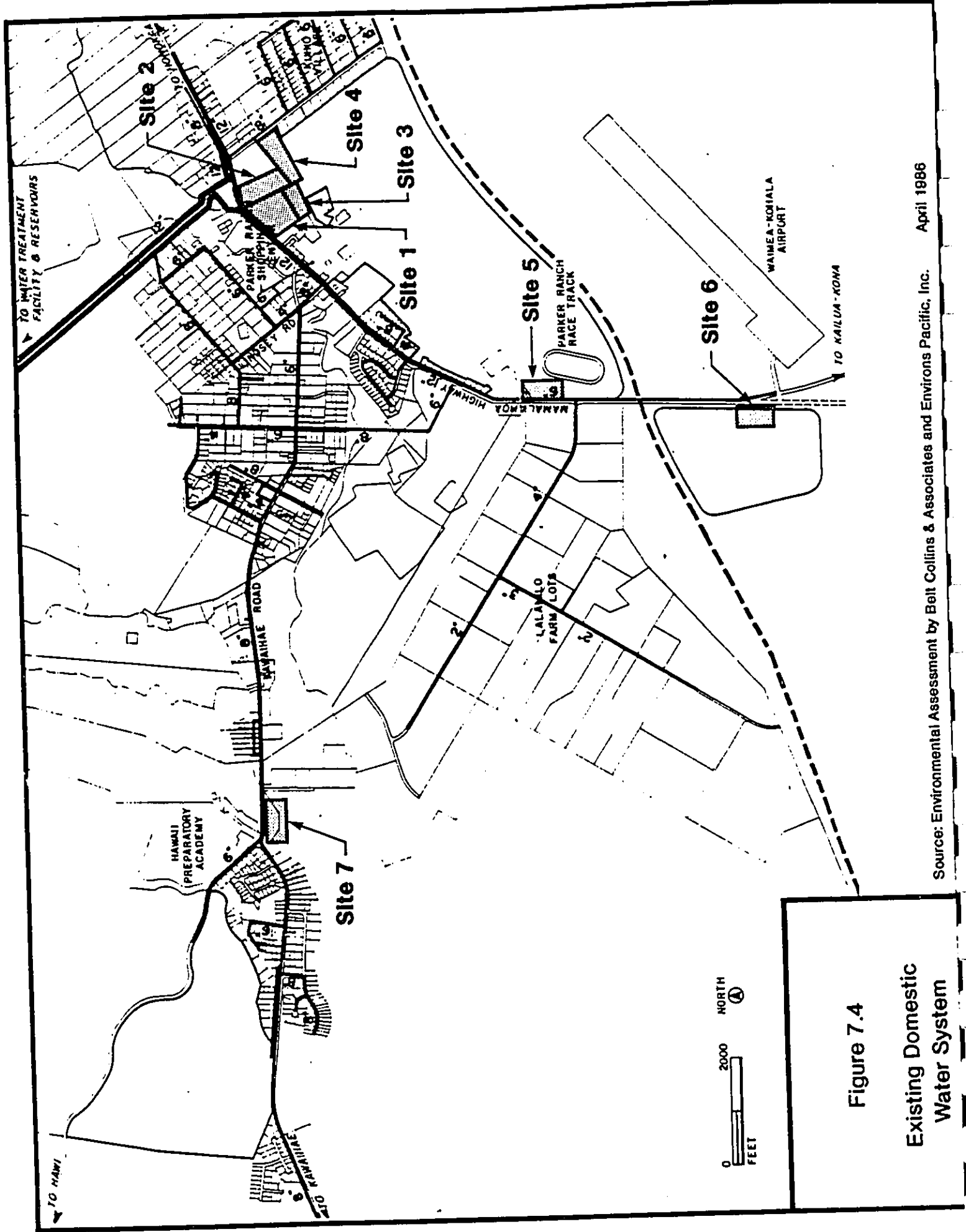


Figure 7.4
Existing Domestic
Water System

Source: Environmental Assessment by Belt Collins & Associates and Environs Pacific, Inc. April 1986

well development to tap high-level water sources for farmers in Waimea during times of need. The proximity of this well to the domestic system in Waimea could result in additional supply to the domestic water system as an alternative. The estimated cost to develop the deep well with pumps and related equipment is slightly over \$1.0 million. However, since development of water sources has not been programmed or budgeted by the County, an adequate supply of water to meet the requirements for a hospital at any site cannot be determined. Thus, all of the sites were rated "poor" in terms of providing water service.

7.2.2.2 Sewer Service

Good - An individual wastewater treatment and disposal system can be developed on the site.

Fair - An individual wastewater treatment and disposal system can not be developed on the site, but a nearby off-site location is available.

Poor - An individual wastewater treatment and disposal system can not be developed either on-site or off-site.

Evaluation - Sewer Service

Construction of the hospital would require an individual on-site wastewater treatment and disposal system. Based on a typical "package" treatment plant, about 0.75 to 1.25 acres (33,000 to 55,000 square feet) of space will be needed for a wastewater treatment facility at any candidate site to provide sewer treatment capacity and to dispose the effluent in a leaching field. All of the sites have available space to construct such a system.

7.2.2.3 Drainage Facilities

Good - The site has adequate drainage facilities available to meet ultimate hospital needs.

Fair - The site may be connected to off-site drainage facilities to serve interim and ultimate needs of the hospital.

Poor - The site requires off-site drainage facility improvements and may require the development of a drainage system to specifically meet hospital needs.

Evaluation - Drainage Facilities

Under base flood conditions, runoff from higher elevations in the watershed area flood farm lands to the east of the town and an area including Site No. 1 Lucy Henriques Medical Center, Site No. 2 Civic Center, and Site No. 3 2020 Plan. Drainage improvements at these sites may require extensive grading to elevate the proposed structure. These sites were rated "poor" for this reason. All other sites were rated "fair" because the need for drainage improvements does not appear to be as extensive.

7.2.2.4 Electric/Telephone

Good - The site has, or is proximate to, adequate existing power and communications lines which are available to service the hospital.

Fair - The site requires some off-site improvements which will provide for adequate power and communications to serve interim and ultimate needs of the school.

Poor - The site has insufficient power or communications available and will require extensive off-site improvement of these services to serve hospital needs.

Evaluation - Electric/Telephone

All of the sites are proximate to existing power and communication lines which could serve the hospital. All of the sites were rated "good".

7.2.3 Accessibility

7.2.3.1 Site Access

Good - The site will be accessible from a main highway.

Fair - The site will be accessible from a County road within 1,000 feet of the main highway.

Poor - The site will be far removed from the main highway.

Evaluation - Site Access

Four of the sites, Site No. 1 Lucy Henriques Medical Center, Site No. 2 Civic Center, Site No. 5 Race Track, and Site No. 6 Tree Farm, are located along Mamalahoa Highway which is under the control of the County of Hawaii in this section. Site No. 7 Waiaka Bridge is located along Kawaihae Road, a major roadway under the control of the State of Hawaii Department of Transportation. Although access to these roadways from the site would require County of Hawaii or State approval, these four sites were rated "good" access.

Site No. 4 Fire Station is accessible from Kamamalu Street, a County road, which connects with Mamalahoa Highway at a T-intersection. This site is rated "fair". Site No. 3 2020 Plan is located directly south of Site No. 1. No access to either Mamalahoa Highway or Kamamalu Street is currently provided to this site. As previously discussed in Chapter 6, Site No. 3 has been identified in the Parker Ranch 2020 Plan which includes provision for a new road to serve proposed developments near Site No. 3. However,

since development of this area and the road would occur sometime in the future, Site No. 3 is rated "poor".

7.2.3.2 Traffic Flow

Good - The site is adjacent to a major roadway with a level of service of A or B (uncongested operations).

Fair - The site is adjacent to a major roadway with a level of service of C or D (light congestion or congestion on critical approaches).

Poor - The site is adjacent to a major roadway with a level of service of E or F (severe congestion, breakdown, or forced flow operations).

Evaluation - Traffic Flow

Specific traffic data at any of the candidate sites is not available. However, a traffic analysis was conducted for an office and commercial project located about 1.0 mile west of the intersection of Mamalahoa Highway and Lindsey Road. The analysis was conducted in June 1990 and examined traffic volumes at the signal intersection of Mamalahoa Highway and Lindsey Road. This analysis shows traffic volume at the intersection to be at Level of Service (LOS) "B" during the morning peak hour and at LOS "C" during the afternoon peak hour.

Except for Sites No. 3, No. 4, and No. 7, the other sites have direct access off of Mamalahoa Highway. Since Sites No. 1, No. 2, No. 5, and No. 6 would use Mamalahoa Highway, they have been rated "good". Sites No. 3 and No. 4 would access off other roads which connect to Mamalahoa Highway and have also been rated "good". No data is available for Kawaihae Road fronting Site No. 7, but its distance from the center of town indicates that traffic flow is minimal. This site is also rated "good".

7.2.4 Governmental

7.2.4.1 State Land Use District

Good - The site is within or adjacent to the Urban District.

Fair - The site is within the Rural District.

Poor - The site is in the Agricultural or Conservation District.

Evaluation - State Land Use District

All of Race Track Site No. 5 and Waiaka Bridge Site No. 7, and parts of 2020 Plan Site No. 3 and Tree Farm Site No. 6 are within the Agricultural district. These sites received "poor" ratings since they would require a land use boundary amendment. All other sites are in the Urban District and were rated "good".

7.2.4.2 County Zoning

Good - A Use Permit should be easy to obtain for the site.

Fair - Not Applicable

Poor - A Use Permit will be difficult to obtain due to natural hazard factors or public opposition.

Evaluation - County Zoning

Site No. 1 is zoned "RS-7.5". Sites No. 2, No. 3, No. 4, and No. 5 are zoned "A-40a". Sites No. 6 and No. 7 are zoned "Unplanned". Any of these sites would require a Use Permit. Natural hazards and public opposition can prevent a Use Permit from being approved. Therefore, because Sites No. 1, 2, and 3 are in a flood plain, they are rated "poor" because this represents a natural hazard. All other sites are rated "good".

7.2.4.3 General Plan

Good - The site is located on low density, medium density, or urban expansion designations.

Fair - The site is located on Intensive Agriculture, Industrial or Open designations.

Poor - The site is located on low density, medium density, or urban expansion designations but is within a flood plain designation.

Evaluation - General Plan

Site Nos. 1, 2, 3, and 4 are located on Medium Density and Flood Plain, giving them a "poor" rating. Rated "fair" is Site No. 6 which is in an Industrial designation. Site Nos. 5 and 7 (Low Density) are rated "good".

7.2.4.4 Community Plan

Good - The site is designated Residential, within which hospital use is consistent.

Fair - The site is designated for commercial, apartment or park use.

Poor - The site is designated for, industrial, agricultural, or open space use.

Evaluation - Community Plan

The Parker Ranch 2020 Plan designations are varied among the different candidate sites. The entire Site No. 1 is designated as Lucy Henriques Medical Center. The 2020 Plan (Site No. 3) is designated as an expansion area to the Medical Center. Both of these sites are rated "good", as is

Site No. 2 Civic Center which would not conflict with the overall community plan.

Rated "fair" is the Fire Station Site No. 4 which is designated "apartment" and would conflict with the Parker Ranch 2020 Plan. The rest of the sites are rated "poor" because they are situated in areas with a more incompatible designation; the Race Track Site No. 5 is in an expanded area for Stables and Race Track, the Tree Farm Site No. 6 is designated for Industrial/High Tech Park use, and the Waiaka Bridge Site No. 7 is undesignated but is assumed to remain as open space.

7.2.5 Community Effects

7.2.5.1 Community Support

Good - The site has full support of the surrounding community.

Fair - The community has reservations about the site.

Poor - The community does not support the site.

Evaluation - Community Support

The community meetings and other functions and activities conducted by NHCH indicate there is strong support in the general community for a new North Hawaii hospital. Site No.1 Lucy Henriques has generally been discussed as the site for the hospital, Site No.3 2020 Plan has been included in the Parker Ranch 2020 Plan as a future expansion of the medical facilities. Both of these sites have been rated "good".

Also rated "good" are Site Nos. 2, 6, and 7 which have been selected by the community as alternates. At this time, the remaining Sites No. 4 Fire Station and No. 5 Race Track have not been reviewed by the public, and for this reason they are currently rated "fair".

7.2.5.2 Existing Land Use

There should be a minimal amount of disruption to the existing pattern of living within the community.

Good - The site is vacant and unused.

Fair - The site is being used for government agencies or institutions.

Poor - The site is being used for agriculture, residences or private businesses.

Evaluation - Existing Land Uses

Except for Site No. 3, all of the sites could accommodate construction of the hospital without relocation of a residential structure or other type of use. All of these sites are rated "good".

Site No. 3 currently contains one residential structure which would have to be displaced. To use the site, the State would be required to locate a comparable site and assist in relocation expenses of the tenant. Thus, Site No. 3 is rated "poor".

7.2.5.3 Aesthetic Value

Good - The site is not an aesthetic asset to the community and will not interfere with scenic vistas when it is developed as a hospital.

Fair - The site has little aesthetic value to the community or may partially obstruct scenic vistas when it is developed as hospital.

Poor - The site is an aesthetic asset to the community or will obstruct scenic vistas when it is developed as a hospital.

Evaluation - Aesthetic Value

Whether a site is an aesthetic asset or not is a fairly subjective determination, but whether or not construction of a hospital will obstruct certain scenic vistas is easier to determine. In the case of Sites No. 1 and No. 3, because they would scarcely be visible from Mamalahoa Highway, they are given "good" ratings.

Site No. 2 Civic Center, Site No. 4 Fire Station, Site No. 5 Race Track, and Site No. 7 Waiaka Bridge would all partially obstruct some scenic vistas from the road front, and they were rated "fair". At Site No. 6 Tree Farm, construction of a hospital would not obstruct any views because the upslope away from the road makes only the site itself visible. Because of this factor, the site was rated "good".

7.2.6 Acquirability

7.2.6.1 Land Ownership/Cost

Good - The land is owned by the State or can be acquired at minimal or no cost.

Fair - The land is owned by the County but may be traded for State lands.

Poor - The land is owned by a private individual and must be purchased at market value.

Evaluation - Land Ownership/Cost

Three of the sites can be acquired at minimal or no cost: Site No. 1 Lucy Henriques Medical Center, Site No. 2 Civic Center, and Site No. 7 Waiaka Bridge. The first site would be provided at no cost by the Lucy Henriques

Trust. Sites No. 2 and No. 7 are on State land which could be leased at nominal cost per annum.

The remaining sites (No. 3, No. 4, No. 5, and No. 6) are on private land owned by the Richard Smart Trust. Presumably, these sites would need to be purchased at market value or leased or used under some type of agreement.

7.2.6.2 Site Acquisition Costs

Site acquisition costs were estimated to determine both actual costs for acquiring privately owned land and opportunity costs for foregone uses of State owned land. In either case, the cost estimate is based on the County's assessed property tax valuation. The intent is not to attempt an accurate market assessment of land values, but to estimate magnitudes of order and relative valuations among the sites. For privately owned lands, the assessed valuation is regarded as the amount the State must expend to acquire a hospital site. For land already owned by the State (Site No. 2 Civic Center and Site No. 6 Waiaka Bridge), the assessed valuation is, hypothetically, what the State could accrue should it put the land to its most economically profitable use, as opposed to using it for a hospital (see Table 7.1).

Based on the Real Estate Atlas, 3rd Tax Division, Site No. 1 Lucy Henriques Medical Center is assessed at \$87,172 per acre for a total cost of \$610,204 for 7 acres. The per acre value is established in part by the value of land beneath the existing medical center. A 7-acre area was determined to be the maximum area needed for a hospital site and was used in all the assessed value calculations.

Sites No. 3, No. 4 and No. 5 are privately owned by the Trust of Richard Smart. These three sites are located on TMK 6-7-02:17 and have an assessed per acre value of \$19,658, or a total of \$137,606 for 7 acres. The difference between the assessed value of these sites and Site No. 1

TABLE 7.1

NORTH HAWAII COMMUNITY HOSPITAL SITE SELECTION STUDY
TAX ASSESSED VALUATIONS *

	TMK of Parcel	Total Acreage of Parcel	Land Value of Parcel	Value/Acre	Cost of 7 acres	Value/Acre of Adjacent Parcel	TOTALS
Medical Center Site 1	6-7-02:13	12.13	\$1,057,400	\$87,172	\$610,204	--	\$610,204
Civic Center Site 2	6-7-02:11	15.00	\$750,000	\$50,000	\$350,000	--	\$350,000
2020 Plan Site 3	6-7-02:17	259.91	\$5,109,200	\$19,658	\$137,606	--	\$137,606
Fire Station Site 4	6-7-02:17	259.91	\$5,109,200	\$19,658	\$137,606	--	\$137,606
Race Track Site 5	6-7-02:17	259.91	\$5,109,200	\$19,658	\$137,606	--	\$137,606
Tree Farm Site 6	6-8-01:1	13,260.97	\$471,800	\$36	\$252	\$10,000	\$70,000
Waiaka Bridge Site 7	6-6-01:2	8,909.95	\$92,700	\$10	\$70	\$17,199	\$120,393

* Valuations are based on the Real Estate Atlas, 3rd Tax Division, and do not represent actual market values.

is due to their agricultural designation. Generally, agricultural land is assessed at a much lower rate than urban land.

Likewise, lands receiving an "Unplanned" zoning designation are assessed at an even lower rate. This is the case with the Site No. 6 Tree Farm, located on TMK 6-8-01:1, which is also privately owned by the Trust of Richard Smart and has a value of \$36 per acre for a total of \$252 for 7 acres. This parcel is a large tract (about 13,260 acres) and according to the SCS maps is unsuited for agricultural use. The automotive shop located adjacent to the candidate site has an assessed value of \$10,000 per acre. This value was therefore used as the basis for an assessed valuation total of \$70,000 for Site No. 6. Site No. 7 Waiaka Bridge is on State land parcel, TMK 6-6-01:2, which is about 8,910 acres in size. It is also zoned "Unplanned". Land owned by the State is assessed at a special lower scale by the County. This fact coupled with the site's poor agricultural qualities gives the site an assessed value of about \$10 per acre. However, adjacent to the candidate site is an 8.9 acre parcel owned by the State which is used as a refuse transfer station by the County. This parcel has an assessed value of about \$17,199 per acre. Using this figure, Site No. 7 Waiaka Bridge has an assessed valuation of \$120,393.

7.3 Summary of Evaluations

The results of the evaluations are summarized on Table 7.2.

7.4 Summary of Cost Analysis

Site preparation and utility cost estimates were prepared for each site for all on-site earthwork, sitework and utilities. These costs are summarized in Table 7.3. More detailed breakdown of these costs is presented in Appendix C. The following assumptions were used to arrive at the site preparation and utility costs:

TABLE 7.2

**NORTH HAWAII COMMUNITY HOSPITAL SITE SELECTION STUDY
SUMMARY EVALUATION RESULTS**

	L.H. Medical Center SITE 1	Civic Center SITE 2	2020 Plan SITE 3	Fire Station SITE 4	Race Track SITE 5	Tree Farm SITE 6	Waiaka Bridge SITE 7	
PHYSICAL ENVIRONMENT								
Noise, other Pollutants	G	G	G	G	G	F	F	
Subsurface	F	F	F	F	F	F	F	
Land Productivity	P	P	P	P	F	G	F	
ALISH Rating	G	G	P	P	F	G	F	
Flood Hazard	P	P	P	P	F	G	P	
UTILITIES								
Water Service	P	P	P	P	P	P	P	
Sewer Service	G	G	G	G	G	G	G	
Drainage Facilities	P	P	P	F	F	F	F	
Electric/Telephone	G	G	G	G	G	G	G	
ACCESSIBILITY								
Site Access	G	G	P	F	G	G	G	
Traffic Flow	G	G	G	G	G	G	G	
GOVERNMENTAL								
State Land Use	G	G	P	G	P	P	P	
County Zoning	P	P	P	G	G	G	G	
General Plan	P	P	P	P	G	F	G	
Community Plan	G	G	G	F	P	P	P	
COMMUNITY EFFECTS								
Community Support	G	G	G	F	F	G	G	
Existing Land Use	G	G	P	G	G	G	G	
Aesthetic Value	G	F	G	F	F	G	F	
ACQUIRABILITY								
Land Ownership/Cost	G	G	P	P	P	P	G	
TOTAL	G = Good	12	11	7	7	8	11	9
	F = Fair	1	2	1	6	7	4	6
	P = Poor	6	6	11	6	4	4	4

TABLE 7.3

NORTH HAWAII COMMUNITY HOSPITAL ALTERNATIVE SITES
COST ESTIMATE SUMMARY

	SITE 1: Lucy H. Medical Ctr.	SITE 2: Civic Center*	SITE 3: 2020 Plan	SITE 4: Fire Station	SITE 5: Race Track	SITE 6: Tree Farm	SITE 7: Waiaka Bridge
GENERAL	\$140,000		\$122,000	\$122,000	\$122,000	\$122,000	\$122,000
EARTHWORK	\$755,000		\$205,250	\$187,750	\$187,750	\$187,750	\$187,750
SITWORK	\$635,700		\$348,050	\$348,050	\$348,050	\$348,050	\$348,050
UTILITIES							
Water	\$131,200		\$54,800	\$54,800	\$54,800	\$54,800	\$54,800
Storm Drain	\$164,550		\$110,450	\$117,450	\$117,450	\$117,450	\$117,450
Sanitary Sewer	\$300,250		\$279,600	\$276,100	\$276,100	\$276,100	\$276,100
Telephone	\$20,000		\$8,000	\$14,000	\$14,000	\$14,000	\$14,000
Electricity	\$30,000		\$12,000	\$21,000	\$21,000	\$21,000	\$21,000
Cable	\$5,000		\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
Gas	\$0		\$0	\$0	\$0	\$0	\$0
Misc. Appurt.	\$7,500		\$7,500	\$7,500	\$7,500	\$7,500	\$7,500
** Water Source Dev	\$1,000,000		\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
TOTALS	\$3,189,200		\$2,083,200	\$2,080,700	\$2,080,700	\$2,080,700	\$2,080,700

* Used only in conjunction with Site 1. No cost estimates prepared for this site.

** This water source development may be accomplished by the County.

- o Existing off-site utilities are adequate to support the proposed development
- o Water pressure and flow are adequate for fire protection and domestic need
- o Land disposal for treated effluent is allowable
- o Costs may be lowered by discharging run-off by sheet flow in some areas
- o Sewage treatment plant size is based on:
50 beds X 250 gallons/bed/day = 12,500 gallons/day.
Of the 250 gallons, 200 gallons is for patient and related uses, 50 gallons is for miscellaneous uses.

Except for the buffer area around the sewage treatment plant and effluent disposal system, site landscaping and irrigation were not considered in the cost estimating. Also absent from the report are facility charges (hook-up) for water, costs for gas lines, and costs for drainlines beyond the property line.

FLOOD ANALYSIS

While the rest of the site preparation and utility assumptions applied to all sites, one assumption applied only to the construction of a facility at the Lucy Henriques Medical Center Site 1. This assumption was that Kamuela Stream would be channelized to permit construction on the site. In addition, a building pad using the approximately 6 feet of imported fill, or about 25,000 cubic yards, would be required to prevent flood hazards at Site No. 1. The proposed channelization would cost approximately \$800,000 for the additional earthwork and sitework. Section 8.2.4 and Appendix B provide further discussion of the flood hazard at Site No. 1.

Although Kamuela Stream is intermittent, under conditions of intense rain it has caused flooding in the agricultural, residential, and commercial areas along its banks. Its flood boundary includes Site 1, except where

the Lucy Henriques Medical Center has been constructed on fill to avoid flooding.

To mitigate the effects of possible flooding, it was determined that the existing flood plain could be channelized within the project site to contain the flow and direct it back to the existing alignment of the stream on the west. It was also determined that a 2:1 embankment of imported fill as well as a grass-lined channel to realign Kamuela Stream would be necessary. Based on the proposed flood control improvements, computer runs were conducted using the HEC-2 Water Surface Profile computer model which calculates water surface profiles for gradually varied flow in natural or man-made channels. A detailed description of the HEC-2 model methodology is provided in Appendix B.

RESULTS

Based on the embankment at Site No. 1, the realignment of Kamuela Stream, and the HEC-2 computer runs, the areal limits of the flood area were then mapped on the base aerial photograph (see Appendix B). Analysis shows the flow would proceed along the 2:1 embankment and over a portion of the proposed hospital parking lot near the southern boundary of the project site. However, most of the flow will be contained within the regraded channel. Channelizing the stream decreases the width of flow to between 80 and 165 feet, all contained within the project site. Because of the narrower flow width, the velocity is about 4 cfs higher through comparable sections of the stream. Once past the NHCH site, the stream resumes its natural path and FEMA's flood limits remain unchanged.

The cost of earthwork improvements for the Lucy Henriques Medical Center Site No. 1 account for the primary cost difference between Site No. 1 and the rest of the sites. The earthwork measures include approximately 4,900 cubic yards of excavation to redirect stream flow past the building site.

8. POTENTIAL IMPACTS AND MITIGATIVE MEASURES

This chapter examines the potential short and long-term impacts of constructing and operating the proposed hospital at any one of the candidate sites. Comparisons are made between the candidate sites when potential impacts are expected to vary by site.

8.1 Potential Short-term Impacts

Short-term impacts are those associated with construction activities such as constructing a temporary access road, removing vegetation, grading the site, excavating or trenching below the surface, and constructing the facility. In general, short-term impacts associated with these construction activities include potential impacts on water quality, flora and fauna, archaeological resources, traffic, air quality, noise, and the local economy.

8.1.1 Hydrology and Water Quality

All of the candidate sites are located more than 8 miles from the ocean at elevations of between 2,400 and 2,800 feet Mean Sea Level (MSL). There are no surface water bodies or perennial streams located on any of the candidate sites. The nearest surface water sources to any of the candidate sites are Waikoloa Stream, 400 feet northwest of the Site No. 1 Lucy Henriques Medical Center, and Waiaka Stream 200 feet west of the Waiaka Bridge Site No. 7. Because of the distance from surface water bodies, eroded soil and airborne dust generated by construction are not anticipated to have an adverse impact on surface water quality.

Prior to any construction activities, the contractor will have to obtain a County grubbing, grading, excavation, and stockpiling permit from the County of Hawaii Department of Public Works. This permit requires submission of plans to control erosion and sediment during grading, grubbing, and excavation activities at the construction site. These

control and mitigation plans must be approved by the Department of Public Works prior to construction. This will further mitigate the potential for adverse effects on the quality of surface water sources in the vicinity of the candidate sites.

Kamuela Stream is an intermittent stream which runs along the southern portion of Sites Nos. 1 and 2, and the northern portion of Site No. 3. The control and mitigation plans will have to be designed to prevent sedimentation or erosion from surface flows from this stream.

8.1.2 Flora and Fauna

Construction of the hospital will require removing vegetation from the selected site, and clearing and grading to meet the design requirements for the facility. Although some of the existing vegetation may be retained, most of the selected site will be cleared prior to construction. After grading and other earthwork activities, the areas not built upon or used for access and parking will be planted with grass, shrubs and trees in accordance with the landscape plan.

There are no Federal or State of Hawaii listed or candidate threatened or endangered species of plants which have been documented in the Waimea area. Except for the 2020 Plan Site No. 3 which has a residence, all of the candidate sites are undeveloped, open lands. Vegetation at all the sites consists primarily of low grass, except for Site No. 1 which is lined along the southern and western borders with trees and some low bushes. Site Nos. 6 and 7 are drier than the others and may contain species of cactus or other succulents.

The bushes and trees which surround Site No. 1 Lucy Henriques Medical Center would provide some habitat for bird species and other wildlife. On the other sites, because of the sparse vegetation, the fauna is expected to consist of species commonly found in other rural areas of the island.

There are no Federal or State of Hawaii listed or candidate threatened or endangered species of fauna on the candidate sites.

The candidate sites may presently provide habitat to non-native wildlife such as feral cat (*Felis catus*), mongoose (*Herpestes auropunctatus*), black rat (*Rattus exulans*), and house mouse (*Mus musculus*), construction of the hospital would remove these habitats. Loss of this habitat and the associated species would not be a significant adverse impact to the fauna on the island of Hawaii.

Site Nos. 3 and 4 are the only candidate sites used as grazing lands for livestock. The use of either site will reduce these grazing lands. The loss of grassland at any of these candidate sites will not have a significant impact on overall population of domestic livestock on the island of Hawaii.

8.1.3 Archaeology/Historical Resources

According to information from the State Historic Preservation Division, a system of 'auwai or irrigation ditches cross portions of Sites 1 through 4. It appears that what is called "Kamuela Stream" on the Flood Insurance Rate Map is one of these ditches. These ditches helped irrigate large portions of the Waimea Plains during the prehistoric and early historic period.

Candidate Sites No. 5 and 6 are also within areas where prehistoric and early historic agriculture took place. However, it appears that these two parcels have been modified in the recent past, and that historic sites are no longer present. In regard to candidate Site No. 7, remnants of prehistoric and early historic agricultural field systems are apparent on aerial photographs.

Archaeological inventory surveys were conducted on July 17-19 and 22-24, 1991, and December 12, 1991, by Paul H. Rosendahl, Ph.D., Inc., Hilo

Hawaii. The following is a brief summary of the survey findings based on the archaeologist's inventory survey (see Appendix D). The work on site No. 2 was limited to literature research.

Site No. 1. Two probable 'auwai (irrigation ditch) were noted on the surface of Site No. 1; one running southwest to northeast across the approximate center of the parcel, and another less distinct ditch to the south which branches from the first. The southern portion of this first ditch, which averages 1.0 meter wide by 30 cm deep, has been disturbed by the construction of the Lucy Henriques Medical Center. Its location corresponds with the location of an 'auwai on a 1915 tax map. The second ditch runs northwest to southeast and averages 50 cm wide by 30 cm deep. This ditch may be recent. Three subsurface trenches totaling 1.5 sq. meter were hand-dug on Site No. 1. No significant cultural material was recovered.

Site No. 2. A visual inspection of Site No. 2 indicated the ditch system also encroaches on this parcel. The ditch corresponds with an 'auwai on the 1915 tax map. The entire parcel has been extensively developed as the Waimea Civic Center and includes buildings, landscaped areas, parking lots and access roads. Most of the site has been previously disturbed.

Site No. 3. A ditch oriented roughly north to south was noted along the eastern edge of Site No. 3. The 1915 tax map indicates an 'auwai in the same general area. Two subsurface trenches totalling 1.0 sq. meter were hand-dug on Site No. 3. No significant cultural material was recovered.

Site No. 4. A ditch oriented southeast to northwest was noted along the southwest corner of Parcel 4. The ditch is also apparent on the 1915 tax map. Three backhoe trenches totalling approximately 60 meters long were excavated at Site No. 4. The trench within the 'auwai revealed at least five depositional strata layers. The last three layers contained some charcoal flecking. A radiocarbon dating sample was obtained from the 4th

layer. The sample revealed an age range of AD 770-1020. The other two trenches outside the 'auwai yielded no cultural remains.

Site No. 5. No archaeologically significant cultural remains were located on the surface of Site No. 5. Likewise, no archaeologically significant cultural remains were recovered from four backhoe trenches approximately 110 meters in total length.

Site No. 6. No surface or subsurface cultural remains were encountered. One backhoe trench approximately 18 meters long revealed very shallow soil development. The area has been extensively disturbed and has very low potential to contain intact cultural remains.

Site No. 7. A series of at least six agricultural fields were identified in Site No. 7. The edges of the fields were demarcated by low soil retaining faces constructed of soil with no obvious inclusion of rock. The ridges were less than 50 cm high and the width of the fields was 20-30 m each. No 'auwai were apparent during the inventory. Seven backhoe trenches placed across the agricultural fields revealed intermittent samples of agricultural soil--darkly stained and sometimes containing flecks of charcoal. The parcel is currently being used as a cattle pasture.

Constructing the proposed hospital at any of the candidate sites would require surface clearing and grading and subsurface excavating to place foundations and footings. These construction activities would remove surface features on the site including any archaeological resources which may still be present. If previously unknown or unexpected subsurface cultural features or deposits are encountered during construction, activities will have to be halted and immediate archaeological consultation sought with the Department of Land and Natural Resources State Historic Sites Office.

8.1.4 Traffic

During construction, trucks, heavy equipment and other vehicles will use existing roads to transport materials and to access construction areas. The increased traffic from construction related vehicles is not anticipated to be significant, but may cause some minor inconveniences in the immediate vicinity of any of the candidate sites for the duration of the construction. As part of the building design plans, a traffic management plan will be included to facilitate traffic flow in the area. If required, the construction contractor may use flagmen to ensure traffic safety. Traffic impacts associated with construction will be greatest at Site Nos. 1, 2, and 3 since they are close to the center of town.

As discussed below, use of Site No. 1 would require construction of a building pad of sufficient height to prevent adverse impacts from the identified flood hazard. Since the site does not contain sufficient material for this purpose, material will have to be trucked from an off-site source. Although the source of this material has not been determined, unless an alternative route can be established, additional truck traffic will be created along Mamalahoa Highway. The traffic management plan will have to accommodate this material hauling traffic. However, some adverse impact to traffic can be expected. Since the other candidate sites would not involve this material hauling, the construction traffic associated with these sites would be less than at Site No. 1.

8.1.5 Air Quality

Ambient air quality will temporarily decrease as a result of fugitive dust generated by grading and construction activities at any of the candidate sites. As prescribed in the State Department of Health Public Health Regulations, Chapter 60 on Air Pollution Control, the contractor will be responsible for minimizing dust generated during construction, particularly during earth moving operations including grading, trenching, and excavating. Use of Site No. 1 has the potential to create more dust

than the other candidate sites as additional material hauling will occur. Mitigation measures to decrease the adverse impacts will include regular dust-watering and covering of dirt hauling trucks.

Also during construction, emissions from engine exhaust (primarily consisting of carbon monoxide and nitrogen oxides) will occur both from on-site construction equipment, and from vehicles used to transport equipment and materials to the construction site. These impacts would be similar for any of the candidate sites, although use of Site No. 1 has the potential to create a higher level of adverse impacts as a result of the additional material hauling required for the building pad. The contractor shall be responsible for minimizing air quality impacts by properly maintaining construction equipment and vehicles.

8.1.6 Noise

Noise levels in the immediate vicinity of any of the candidate sites will increase as a result of operating heavy vehicles and other power equipment during construction. These noise impacts will occur during the daytime hours during the period of construction activities. Generally, receptors are less sensitive to noise generated by activities occurring during the daytime hours.

The level of noise generated will depend on the type of equipment and the number of pieces used on the site. The sound levels generated at 50 feet by this equipment typically range from 75 to 95 dB(A) for tractors, backhoes, scrapers, graders, trucks, and concrete mixers. Although these sound levels can interfere with speech within proximity to the equipment, short-term exposure will not create adverse health effects. Moreover, except for Site No. 1, none of the candidate sites have adjacent residents or other noise sensitive land uses which would be affected by the noise generated by construction activity.

The contractor will be responsible for minimizing noise by properly maintaining mufflers and other noise attenuating equipment.

8.1.7 Economy

Short-term economic benefits will accrue to the Waimea area during the construction period. Although most material used in construction of the hospital will likely be purchased outside the Waimea area, some material, supplies, and equipment will likely be purchased from local businesses. The resultant increase in sales from these purchases will generate income for local businesses. In addition to material purchases, local area businesses will benefit from consumer spending by construction workers for a variety of items including general merchandise, food and gasoline for vehicles.

The total economic benefit during the construction period will depend upon the number of workers who enter the Waimea area. Generally, a large number of workers from outside the area will provide a relatively high local economic benefit. This is because consumption expenditures by workers outside the local area would not otherwise impact local businesses.

8.2 Potential Long-term Impacts

Once the facility has been constructed, long-term impacts are those associated with the operation of the hospital. They include impacts on flora and fauna, availability of agricultural land, scenic and visual resources, flood hazard, traffic, air quality, noise, economy and employment, and utilities.

8.2.1 Flora and Fauna

After construction, most of the selected site will be occupied by the hospital, access roads and parking lots. Those areas not paved or built

upon will be landscaped in accordance with the landscape plan. Eventually, the landscape material may provide habitat for certain species of birds and other wildlife that can use this type of environment for habitat.

There are no Federal or State of Hawaii listed or candidate threatened or endangered species of wildlife currently recorded in the area of any of the candidate sites. As previously discussed, construction of the hospital would remove habitat used by species of non-native wildlife such as feral cat (*Felis catus*), mongoose (*Herpestes auropunctatus*), black rat (*Rattus exulans*), and house mouse (*Mus musculus*). Once the landscaped areas near the hospital have become established, some of these species may reestablish themselves in this habitat. However, since the abundance of the habitat will decrease, the number and types species previously found will be less than before operation of the hospital. The adverse impact to wildlife from construction and operation of the hospital at any of the candidate sites is not expected to be significant.

8.2.2 Loss of Agricultural Land

Once a site has been selected and construction completed, operation of the hospital will continue for the foreseeable future. Thus, the five to seven acre land area will not be available for other purposes, including agricultural production. Loss of this potential agricultural land can be assessed by examining the productivity rating developed by the State of Hawaii Land Study Bureau Detailed Land Classification--Island of Hawaii. This rating provides an overall assessment of a given area's agricultural potential by assigning it with a master productivity rating from A to E, "A" being the highest and "E" the lowest.

According to this study, Site Nos. 1, 2, 3 and 4 are located on lands with a productivity rating of "B"; Site Nos. 5 and 7 have a productivity rating of "C"; and Site No. 6 has a productivity rating of "E". Currently, Site Nos. 3, 4, and 5 are used for grazing and are the only sites zoned "Agriculture". Thus, there would be loss of "B" rated

agricultural land if Site Nos. 3 or 4 were used. However, since the grazing could continue on lands adjacent to the hospital, there would be a minimal loss of agricultural land.

In addition to these productivity ratings, the U.S. Department of Agriculture Soil Conservation Service and the State of Hawaii Department of Agriculture have developed a rating system for agricultural lands of importance. This rating system is called the Agricultural Lands of Importance to the State of Hawaii (ALISH) and classifies lands according to Prime, Unique, or Other Lands of Importance to Agriculture. According to the ALISH classification, Sites Nos. 1, 2, and 6 are completely or almost completely located on Unclassified lands, Site No. 3 on 50 percent Prime and 50 percent unclassified, and Sites No. 5 and 7 on completely or almost completely on Other Lands of Importance to Agricultural. Only Site No. 4 is located on lands classified as Prime agricultural lands.

The Soil Conservation Service and Department of Agriculture have stated their preference that a site other than those classified with Prime agricultural lands (Sites Nos. 3 and 4) be selected for construction of the hospital.

8.2.3 Scenic and Visual Resources

The town of Waimea has a rural, ranch character with low-rise buildings which has been carefully preserved. Construction of a one-story hospital at any of the candidate sites, if done with appropriate site planning, setbacks, building, and landscape materials, should not affect this rural, ranch character. Although a one-story hospital can be accommodated on any of the candidate sites, a two-story hospital could be constructed to minimize the built area of the site. Use of a two-story building would be more difficult to integrate into the rural character of Waimea.

There may be some obstruction of open space and scenic views if certain sites are used. Construction at the Site No. 2 Civic Center, Site No. 4

Fire Station, Site No. 5 Race Track, and Site No. 7 Waiaka Bridge may obscure views of open pasture or of Mauna Kea from certain angles. If located at one of these sites, obstruction of scenic open space can be partially mitigated through design of a low-rise, architecturally compatible, and unobtrusive hospital buildings similar to the current Lucy Henriques Medical Center.

8.2.4 Flood Hazard

The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM) (Panels 164 and 168 of 1900, Hawaii County) indicate that portions of Site No. 1 Lucy Henriques Medical Center, Site No. 2 Civic Center, Site No. 3 2020 Plan, Site No. 4 Fire Station, and Site No. 7 Waiaka Bridge are within the flood hazard area inundated by a 100-year flood. A small portion of Site No. 5 is in the flood hazard area from a 500-year flood. According to the FIRM, no portion of Site No. 6 is within a flood hazard area. See Figures 7.1, 7.2, and 7.3 for the flood hazard areas.

Discussion of Flood Hazard

The Federal Emergency Management Agency (FEMA) publishes Flood Insurance Rate Maps (FIRM) as part of their National Flood Insurance Program. These maps identify areas of flood hazard based on engineering studies which examine rainfall, drainage areas, streams, and topographic information for specific areas. The results of these studies are periodically published in a FIRM for a specific area.

The latest published FIRM for the Waimea area is dated July 16, 1990. According to that FIRM, portions of Waimea town are affected by three streams, Waikoloa, Kamuela, and Lanimaumau. Waikoloa Stream flows north of Waimea, Kamuela Stream flows along a course almost parallel to Mamalahoa Highway, and Lanimaumau Stream flows to the south of Waimea. Figure 7.1 shows the FIRM for Waimea town.

The FIRM shows a flood hazard area inundated by 100-year flood from Kamuela Stream which encompasses areas south of the Mamalahoa Highway and particularly south and east of the intersection of the Highway and Lindsey Road. The flood hazard area shown in the FIRM for the Waimea area is designated as Zone AE, base flood elevation determined. (Base flood is the flood which would occur during a 100-year storm event.) The Zone AE designation indicates FEMA has conducted engineering studies to determine the water surface elevation during base flood conditions. According to the FIRM, the base flood elevations for Site Nos. 1 and 2 range from 2,700 feet to 2,686 feet.

In addition to the FIRM, Hawaii County has adopted Hawaii County Code Chapter 27, Flood Control. One of the purposes of Chapter 27 is to minimize public and private losses due to flood conditions in specific areas. Chapter 27 also includes methods and provisions for:

- o Requiring that facilities be protected to minimize flood damage at the time of initial construction;
- o Controlling, filling, grading, dredging, and other development which may increase flood damage;
- o Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters; and
- o Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

A variance to the provisions of Chapter 27 may be granted by the Chief Engineer of Hawaii County only if the applicant meets a number of standards including demonstrating hardship and showing that a variance will not result in increasing flood levels above the base flood

elevations. Chapter 27 states that FEMA principles and guidelines indicate variances should rarely be granted, and compliance with flood requirements is a necessity.

According to Chapter 27, areas identified as Zone AE are defined as flood fringe areas. Construction and development standards are defined in Chapter 27 for any construction within an identified flood fringe. These standards state that all new construction and substantial improvements in a flood fringe shall be anchored to resist flotation, collapse or lateral movement of the structure.

Chapter 27 states that landfilling which would result in the blockage or impediment of flow in a natural waterway and induce or aggravate flooding in a flood fringe area shall be prohibited. Landfilling may only be permitted where the landfill: (1) is flood-proofed so that below the base flood elevation the structure is watertight with walls substantially impermeable to the passage of water; and (2) has structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

All new construction of non-residential structures in a flood fringe area shall either: (1) elevate the lowest floor, including the basement, to or above the base flood elevation; or (2) together with attendant utility and sanitary facilities, be flood-proofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

As previously discussed, portions of Site No. 1 are within the flood hazard area from Kamuela Stream. However, use of Site No. 1 for construction of the proposed hospital would result in a number of advantages, including the consolidation of certain functions with the nearby existing Lucy Henriques Medical Center. This consolidation would

decrease the size of the proposed facility and, ultimately, result in lower construction cost for the new facility.

Based on these considerations, a flood hazard study was undertaken during preparation of the Draft EIS to determine mitigation measures or improvements which would be required to permit construction of the proposed hospital at Site No. 1. These improvements would be necessary to meet the requirements of Chapter 27 Hawaii County code. Three mitigation measures were examined in the flood hazard study. However, two of the measures would have resulted in an increase in base flood elevations which is prohibited by Hawaii County code. The other mitigation measure would require construction of a culvert to divert the flow of Kamuela Stream into Waikoloa Stream. The inlet for this culvert was to be sited near the border of Site No. 1 and the Lucy Henriques Medical Center. From the inlet, the culvert would be routed to Mamalahoa Highway, along the Highway right-of-way, and then outlet into Waikoloa Stream. Two locations for the outlet were identified, one upstream of the Lindsey Road Bridge and the other downstream. The flood hazard study, dated September 1991, is contained in Appendix B-1.

Subsequent to preparation of the Draft EIS, a number of meetings were held with representatives from NHCH and the DOH to discuss the flood hazard issue and the proposed culvert. Ultimately, a meeting was held with representatives from NHCH, Parker Ranch, and County of Hawaii Department of Public Works to further discuss the flood hazard issue. Based on those discussions, the closed culvert mitigation set forth in the Draft EIS would no longer be considered for Site No. 1.

Instead, a second flood study of Kamuela Stream was conducted based on a conceptual site plan of the hospital building footprint prepared by Media Five Limited in June 1993 (see Appendix B). Based on the conceptual site plan, the proposed hospital site would need to be filled about 6 feet to provide a building pad and regraded to divert the stream flow through the project site. The existing flood plain would be channelized within the

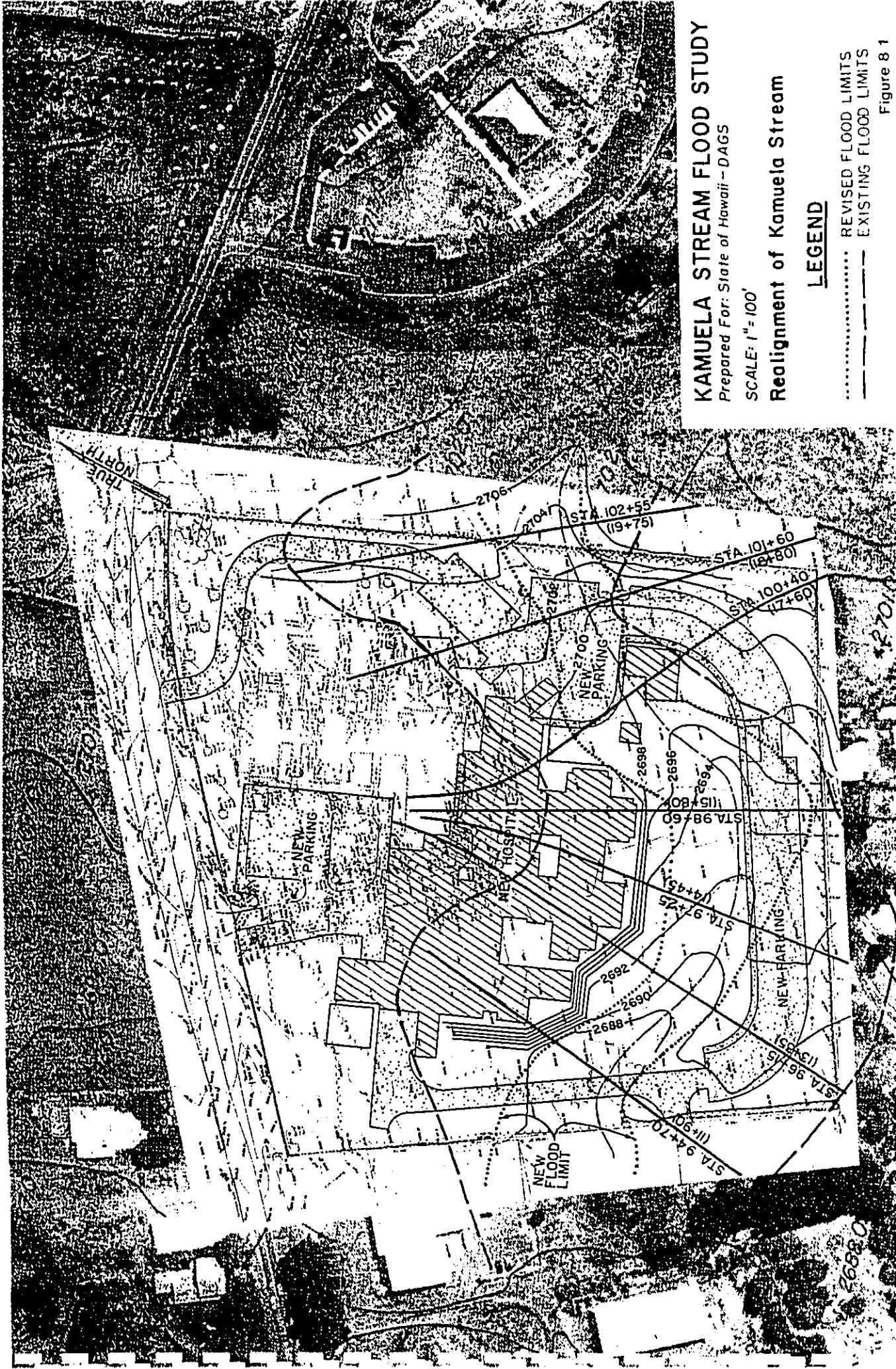
project site to contain the flow and direct it back to the existing alignment of the stream on the west.

For a 100-year storm, about 654 cfs would be flowing in Kamuela Stream as it enters the project site. Analysis shows the flow would proceed along the 2:1 embankment and over a portion of the proposed parking lot near the southern boundary of the project site. However, most of the flow will be contained within the regraded channel. The hospital would be situated to prevent its flooding. Figure 8.1 shows the site layout plan of the new hospital developed by Media Five Limited, the regrading of Kamuela Stream, and the revised flood hazard area.

Flooding widths range from 80 to 165 feet and are contained within the project site. Channelizing the stream decreased the width of flow to less than what is shown on the July 1990 FIRM map. However, because of the narrower flow width, the velocity is about 4 cfs higher through comparable sections of the stream. Once past the NHCH site, the stream resumes its natural path and FEMA's flood limits remain unchanged.

It should be noted that the mitigation measures or improvements will have to conform to County of Hawaii Code Chapter 27, Flood Control and County of Hawaii Storm Drainage Standards. In addition, approval will be required from FEMA prior to construction within the flood hazard area.

The County of Hawaii Department of Public Works has expressed concern over construction of the proposed hospital in any of the sites within the flood hazard area. Their concern was that, in the event of a flood, the proposed hospital may become inaccessible as a result of flood flows. If a site within the flood hazard area is selected, the site plan and final design of the facility will have to consider possible adverse impacts to access from flood flows.



KAMUELA STREAM FLOOD STUDY

Prepared For: State of Hawaii - DAGS

SCALE: 1" = 100'

Realignment of Kamuela Stream

LEGEND

- REVISED FLOOD LIMITS
- EXISTING FLOOD LIMITS

Figure 8.1

8.2.5 Traffic

Patients, employees, visitors, and service vehicles will generate traffic to the hospital during the course of a day. The Institute of Transportation Engineers has developed trip generation rates to determine the number of average vehicle trip ends associated with various types of developments, including hospitals. These trip generation rates are normally expressed in terms of a known measure of the development such as square footage of the building, number of employees at the site, or, in the case of a hospital, the number of beds. Using the trip generation rate and the known factor, the total average number of vehicles entering or exiting a site, or the trip ends, can be estimated. In addition, the Institute of Transportation Engineers provides trip generation rates to estimate the average vehicle trip ends during the AM peak hour and the PM peak hour for the development.

Using these factors, the following shows the average vehicle trip ends for the proposed hospital:

- o Total average vehicle trip ends: 587.50 trips*
(11.750 trips/bed x 50 beds = 587.50 trips)
* Based on a 24-hour period.
- o AM peak hour average vehicle trip ends: 58.85 trips
(1.177 trips/bed x 50 beds = 58.85 trips)
- o PM peak hour average vehicle trips ends: 67.80 trips
(1.356 trips/bed x 50 beds = 67.80 trips)

The Institute of Transportation Engineers also provides factors to estimate the vehicles trips entering and exiting the hospital during the AM peak hour and the PM peak hour. Using these factors, the following shows the average directional distribution of trips during AM peak hour and the PM peak hour for the hospital:

- o AM peak hour average vehicle trip ends:
 - o Entering: 41.19 trips
 - o Exiting: 17.65 trips
- o PM peak hour average vehicle trip ends:
 - o Entering: 27.80 trips
 - o Exiting: 40.00 trips

Depending upon the candidate site, these entering and exiting trips could approach or depart from the hospital in either direction along Mamalahoa Highway for Site Nos. 1, 2, 3, 5, and 6, Kamamalu Street for Site No. 4, and Kawaihae Road for Site No. 7.

Specific traffic count data at any of the candidate sites is not available. However, a traffic analysis was conducted for an office and commercial project located about 1.0 mile west of the intersection of Mamalahoa Highway and Lindsey Road. The analysis was conducted in June 1990 and examined traffic volumes at the signal intersection of Mamalahoa Highway and Lindsey Road. This analysis shows traffic volume at the intersection to be at Level of Service (LOS) "B" during the morning peak hour and at LOS "C" during the afternoon peak hour.

Based on estimated trips during the AM peak hour and PM peak hour, the proposed North Hawaii Hospital will generate additional traffic which could affect the LOS along Mamalahoa Highway. However, the additional traffic generated should not be sufficient to significantly decrease the LOS in the AM peak hour or the PM peak hour along the Highway. Moreover, should the Waimea by-pass road be constructed, Mamalahoa Highway should be able to accommodate the additional traffic without significant decrease in the LOS.

No traffic data is available for roadways further from the Mamalahoa Highway and Lindsey Road intersection. However, because of the distance of Sites No. 5, 6, and 7 from the intersection of Mamalahoa Highway and Lindsey Road, traffic flow fronting these sites could be expected to be less

than at the intersection. Thus, despite the additional traffic generated by the hospital, the LOS along the Highway near these candidate sites should not be significantly affected by operation of the hospital.

The design of the site for facility including access roads and parking lots has not been undertaken at this time. The traffic impacts in the immediate vicinity of the selected site will be analyzed to determine design of the vehicular and pedestrian access to the facility. The need for improvements such as channelized lanes for access, signalization of the access, and safety lighting will be considered in the final design. These design features will be coordinated with the County of Hawaii Department of Public Works to ensure they meet appropriate requirements.

8.2.6 Air Quality

As a result of the low level of development, absence of major stationary sources, and the lack of vehicle traffic congestion, air quality is relatively good in the Waimea area. An on-site incinerator will not be used to dispose of infectious wastes, and the hospital therefore will not have a major stationary source of emissions which could have an adverse impact on local air quality.

As previously discussed, the proposed hospital will create an increase in the number of average daily vehicle trips in the Waimea area. However, this increase is not expected to create a significant adverse effect to the LOS or amount of congestion along the roadways in the Waimea area. Similarly, this increase in traffic generated by the proposed hospital is not expected to contribute significantly to vehicle emissions in the Waimea area. Thus, there should be no significant adverse impact to local air quality from operation of the proposed hospital.

Bio-infectious waste from the North Hawaii Community Hospital will be taken to the incinerator located at the Kona Hospital for disposal. The expected amount of such waste generated by the proposed hospital is not

known. However, based upon operations at Kona Hospital, the amount of bio-infectious waste produced by the proposed hospital that would require disposal in the incinerator can be estimated. Using this basis, the amount of waste from the proposed hospital is estimated at 1,550 pounds per week, or about one-half of the amount currently incinerated at the Kona Hospital. No materials associated with the nuclear medicine programs are presently incinerated at the Kona Hospital incinerator.

The Kona Hospital incinerator is operating under a permit to operate issued by the State of Hawaii Department of Health under Administrative Rules, Title 11, Chapter 60. The special conditions of the permit to operate include that the incinerator be fired only on Liquified Petroleum Gas and the operating temperature of the secondary chamber shall be maintained at 1,800 degrees Fahrenheit. In addition, the charging rate of the incinerator shall not exceed 70 pounds per hour. The incinerator is operated on "no burn days".

At present, there is no requirement for testing emissions from the Kona Hospital incinerator. However, as one of the special conditions to operate incinerator, the Department of Health may at any time require the install a continuous emission monitor or to conduct stack tests or ambient air monitoring. The DOH has not conducted test of the emissions from the incinerator.

The incinerator used at Kona Hospital meets the Federal and state requirements for this type of equipment. The temperatures met in the various stages of the incineration process are established by Federal and state requirements. The process of incineration eliminates hazardous materials from the emissions. Since the incineration process eliminates hazardous materials, the ash generated by the incinerator is picked up by a commercial refuse operator and disposed in the sanitary landfill.

8.2.7 Noise

The low level of development and lack of significant vehicle traffic indicate a relatively low level of noise in the Waimea area. Although commercial air carrier service is provided at the Waimea-Kohala Airport, only propeller driven commuter aircraft are used. This also limits the level of noise in the Waimea area.

Once the hospital has been constructed, there will be noise associated with vehicle traffic entering and exiting the hospital site. As previously discussed, the traffic generated by the hospital is not expected to significantly decrease the LOS. Thus, the noise associated with this additional traffic should not significantly increase the noise level around the Waimea area.

Aside from vehicle traffic, there will be periodic noise associated with the emergency ambulance service. Although the single event noise generated by these vehicles can be intrusive and interfere with speech and other activities, the duration of the noise is relatively short. When noise is associated with an emergency event, this generally mitigates complaints from individuals. Thus, although annoying, most respondents accept or tolerate emergency vehicle noise with minimal adverse response.

Moreover, the Lucy Henriques Medical Center already provides emergency ambulance service and, apart from some increased emergency use, the new emergency facilities will only displace the source of noise at the existing Medical Center. Depending on where it is located, the noise impact from ambulances should be about equal to, or less than, current noise levels.

In addition to vehicle noise, the mechanical equipment used by the hospital such as air conditioners, exhaust fans, and emergency generators will generate noise. The building design and site plans for the proposed hospital will have to account for noise sensitive adjacent land uses to

mitigate adverse noise impacts to these nearby uses. Normally, noise levels from these types of sources can be reduced by using enclosures with insulation or shields and proper installation of equipment. These measures should mitigate adverse impacts from equipment noise on nearby land uses.

The proposed hospital will be air conditioned for patient comfort and for protection of sensitive areas. Although the buildings have not yet been designed, depending on the exact construction method and type of window glass used, normally a closed building will result in a 20 to 25 decibel (dB) reduction in the interior noise levels from exterior ambient conditions. Thus, if the exterior noise levels are in the 60 to 65 dB range, the interior noise would be in the 40 to 45 dB range, or well within acceptable interior noise levels. Thus, there will be no adverse noise impacts to patients from exterior noise sources.

8.2.8 Economy and Employment

The Project Development Report prepared by Herman Smith Associates, 1990, shows that the projected staff required to operate the new hospital is about 162 full-time equivalent staff positions for the three daily shifts. This level of projected staff is based on a number of assumptions including average daily census, percentage of utilization, and hours of operation for certain ancillary and diagnostic services. In addition to these staff positions, five to ten physicians would be at the proposed hospital.

At this time, it is not known what number of these positions will be filled by local Waimea area residents. Some of these positions will likely be filled by workers from other areas of Hawaii County and, potentially, from other areas of the State. In either case, a portion of the income paid to these workers will be spent in the Waimea area for local consumption expenditures and for housing. Local consumption expenditures for items such as food, clothing, fuel, vehicles, and entertainment will occur as long as the hospital continues to operate.

These consumption expenditures will create additional spending by workers employed in local establishments which provide these items. Ultimately, the initial expenditure by the hospital worker will create an economic impact which will result in a higher level employment and income in the Waimea area.

Workers from outside the local area will create a demand for housing in the Waimea area. While some of this demand may be met by housing already available in Waimea, some of the housing demand may have to be met by housing in other areas of Hawaii County, such as in Waikoloa Village and other residential areas in the South Kohala District. If new housing is built to accommodate this demand, additional economic impacts will be created during the construction phase.

8.2.9 Surrounding Land Uses

Impact on surrounding land uses could vary depending on the site chosen. Site Nos. 1 through 4 are located near the town center which is planned for development based on the Parker Ranch 2020 Plan. Because they are presently located in or near an urban environment which is planned for development of low-density residential space, surrounding land uses should not conflict with the hospital use. Contingency for future doctor's offices, laboratories, or other hospital related uses, if necessary, will be made in accordance with County zoning.

Site No. 6 is part of an area designated Industrial on the Parker Ranch 2020 Plan. Development of the site could hinder growth of either hospital related uses or displace industrial uses incompatible with the new hospital. Use of Site No. 6 could result in significant changes to the Parker Ranch 2020 Plan. Any diversion from this plan would have to be regulated by County zoning.

Sites No. 5 and 7 are in the State Agricultural land use district. Site No. 5 is in an area designated Race Track and Stables in the Parker Ranch

2020 Plan. Use of the site could hinder growth of either hospital related uses or use and expansion of the Race Track. No specific land use for Site No. 7 is set forth in the 2020 Plan. The nearest neighboring land uses consist of an electric substation and a refuse transfer station both located to the east, and residential area to the west across Waiaka Stream. Foreseeably, a new hospital at the site could open up the surrounding area to related hospital development.

Proposals for expanded development in the vicinity of either site could require a State Land Use District Boundary Amendment and a County change of zone. The requirement for these approvals should ensure that any development related to the hospital is compatible with surrounding uses.

8.2.10 Utilities

8.2.10.1 Water Service

Water service to the Waimea area is provided by the County of Hawaii Department of Water Supply (DWS) which supplies the sources, storage, and distribution for water to their service area. Water distribution line sizes range from 12-, 8-, and 6-inches along Mamalahoa Highway and Waimea-Kawaihae Road. These distribution lines are adequate to supply any of the candidate sites with adequate potable water and to meet fire flow requirements. All of the candidate sites would use water from the DWS supply to serve the hospital.

Notwithstanding the distribution system, the Waimea area is currently constrained by limited water sources from which to provide service. The limited sources have caused the DWS to restrict water allocation in the Waimea area to a 1-inch meter for residential or small commercial uses, or up to 4,200 gallons per day (GPD) of water demand.

Water consumption data provided by the DWS for Honokaa and Kona hospitals can be used as an approximate estimate of the water needs for the proposed

North Hawaii Community Hospital. According to the DWS data, for the fiscal year 1989-90, the average daily water usage was about 7,000 GPD for Honokaa Hospital (35 beds) and 19,300 GPD for Kona Hospital (75 beds). Using this data, average annual daily water usage at Honokaa Hospital was about 200 gallons per day per bed and about 258 gallons per day per bed at Kona Hospital.

Although the operational requirements of Honokaa and Kona hospitals may differ, the water usage data at these hospitals can be used to provide an approximate estimate of the water requirements at the proposed hospital. Thus, for a 50 bed hospital and a daily average demand of approximately 200 to 250 gallons per day per bed, the water requirement will be 10,000 to 12,500 GPD (200 and 250 GPD times 50 beds) at the proposed North Hawaii Hospital. This consumption is about 2.4 to 2.9 times greater than the 4,200 GPD of water service limitation currently established by the DWS. This analysis shows that before operation of the proposed hospital at any of the candidate sites in the Waimea area, additional water source development will be required. Development of a new source will entail identification of the source, exploratory drilling at the selected site, development of a production well, and, perhaps, construction of a transmission system to connect the source to a storage facility.

According to the Hawaii County Water Use and Development Plan, December 1989, the present capacity of the Waimea-Puukapu-Nienie water system is about 3.6 million gallons per day (MGD) while consumption is about 2.0 MGD. However, most of the 1.6 MGD available for expansion is committed to serve existing lots and planned and approved projects. This margin is expected to be reached within 5 to 10 years, much of it being used by residential development on lands leased by the Department of Hawaiian Home Lands.

The Hawaii County Water Plan discusses plans for a Puukapu deep well development to tap high-level water sources for farmers in Waimea during times of need. The proximity of this well to the domestic system in

Waimea could result in additional supply to the domestic water system as an alternative. The estimated cost to develop the deep well with pumps and related equipment is slightly over \$1.0 million. However, the development of a water source has not been programmed or budgeted by the DWS. Similarly, the exploratory and production wells have not been programmed or budgeted. Thus, if the DWS retains its current policy of restricting water demand to 4,200 GPD, the proposed hospital could not become operational until an additional source of water has been fully developed. Generally, if none of the required DWS water development activities have been planned or funded, a minimum of three years will be necessary before water could be available.

As an alternative to County development, the proposed hospital may identify and develop a private source or well with its own funds or in conjunction with the County or other private users. If this source meets all of the quality and flow requirements established by the DWS for its own sources, it could then be dedicated to the County. Whatever its source, any water provided by the DWS in the Waimea area will have to meet Federal and State drinking water quality standards. Further, regardless of the water source developer, prior to exploration, testing and development, studies will have to be conducted to protect against adverse effects to the identified aquifer.

At this time, the proposed hospital does not plan to provide a kidney treatment program for patients. Normally, the output water quality requirements for most kidney machines typically used in such a program are more stringent than Federal and State drinking water quality standards. However, most kidney machines treat the input water with one of several methods so that the output water meets the more stringent water quality requirements. Thus, if such a program is implemented, there will be no need for the DWS to meet the more demanding water quality standards.

8.2.10.2 Sewer Service

The Waimea area is not serviced by a County wastewater collection and treatment system. Construction of the hospital would require an individual on-site wastewater treatment and effluent disposal system. Currently, the DOH has jurisdiction over these systems in the County of Hawaii.

The proposed DOH Administrative Rules, Chapter 62, Wastewater Systems, provide planning factors to estimate the amount of wastewater typically generated by different types of facilities, including hospitals. According to this document, the estimated amount of wastewater generated by a hospital is about 250+ gallons per bed per day. Using this figure and the proposed 50 beds, about 12,500+ GPD (250 gallons times 50 beds) of wastewater will have to be treated and disposed at any of the candidate sites.

The Project Development Report for the proposed hospital does not include facilities for an in-house laundry. Thus, no non-domestic wastewater should be generated by the hospital. If non-domestic wastewater is to be generated, the plans for treatment and disposal must be submitted to the DOH for review and approval.

Site plans for the hospital including the infrastructure plans have not yet been developed. Given the lack of a County system, the wastewater generated by the hospital will have to be treated in some type of individual treatment or "package" plant. These individual wastewater treatment plants would be subject to DOH Rules. A typical "package" treatment plant, requires about 0.75 to 1.25 acres (33,000 to 55,000 square feet) of space to site the facility and dispose the effluent in a leaching field or injection well. If the treatment plant is subject to potential flood hazard, according to County of Hawaii Code Chapter 27, it will have to be sited and designed such that, under flood conditions, the wastewater will not contaminate flood waters.

Depending upon the type of system selected, a subsurface plant could be self-contained within one or several tanks which treat the wastewater so that the effluent meets the quality requirements for disposal. Aside from pump and motor control centers, the subsurface tanks would not occupy space on the surface, minimizing any odor problem.

Although it may be prudent to avoid a flood hazard area, the proposed DOH Rules do not contain specific requirements for siting a subsurface system within an area subjected to flood hazard from a 100-year storm. However, the DOH will review the design of the proposed system to ensure that potential flood hazards have been addressed.

At this time, the type of individual wastewater treatment system to be used has not been established by North Hawaii Community Hospital Inc. Once the type has been established, soil boring tests will have to be conducted to determine the best site for such a system. In either case, the system will be subject to DOH Rules to ensure adequate treatment and effluent quality standards are met. Adherence to the DOH Rules should mitigate adverse environmental effects from the wastewater treatment system.

In addition to treatment, the effluent from the wastewater system must be disposed. Since the Waimea area is located within a critical wastewater disposal area determined by the DOH, the effluent will be disposed using a leaching field. On-site wastewater treatment and disposal is acceptable provided the wastewater system meets all of the applicable requirements of DOH Administrative Rules, Chapter 11-62, Wastewater Systems.

Soil boring tests will also have to be conducted to site the leaching field to ensure the effluent can be disposed without adverse impacts to near by groundwater or surface water sources. Adherence to the DOH Rules should protect against adverse impacts to the water quality of groundwater and surface water sources in the Waimea area.

For the present, the DOH has concurred with the plan to install a private wastewater treatment facility using a leaching field system to dispose wastewater from the hospital. However, the DOH has stated the hospital should connect to a regional or subregional wastewater system such that the private facility will no longer be required. Construction of a regional or subregional wastewater system will have to be developed by Hawaii County or by a combination between the public and private sectors. To date, no schedule for construction of such a system has been established.

8.2.10.3 Drainage Facilities

The Waimea area has no County drainage infrastructure other than surface channelization to direct runoff from a site to either the two major streams (Lanimaumau and Kamuela Streams), into lava tubes, or into the dry, uninhabited regions south of the town. Individual developments may use injection dry wells to dispose surface runoff from a site.

The drainage system for the proposed hospital has not yet been designed. However, most likely, an on-site dry well system will be used to dispose of storm runoff. Soil boring test will have to be conducted to determine the number, size, and location of any dry wells to be used for the proposed hospital. As previously discussed, construction of dry wells are under the jurisdiction of the DOH to ensure that such wells do not fail and to protect groundwater and surface sources.

8.2.10.4 Solid Waste

Once in operation, the proposed hospital will generate solid and other wastes associated with a hospital. There are no factors available to determine solid waste generation at a hospital. However, information from Honokaa Hospital was used to estimate the solid waste generation at the proposed North Hawaii Community Hospital. Honokaa Hospital, a 35-bed facility, currently generates approximately one (1) commercial size bin of

solid waste per day. Using this rate of generation, the proposed North Hawaii Community Hospital would generate approximately 1.4 commercial size bins of solid waste per day.

The solid waste will be picked up and disposed by the commercial operator that serves the Waimea area. This solid waste would add to the total amount which must be disposed in the County operated landfill near Kailua-Kona. Since this landfill is nearing its capacity, the County has undertaken a study to select a site for a new landfill. Although the study is not complete, a tentative site has been identified near the boundary of the North Kona and South Kohala districts. If used, the County plans to have the landfill site operational sometime during 1993.

The County presently allows commercial use of the Kaahuhu (North Kohala) Transfer Station. Once the new West Hawaii landfill is opened, commercial use of this transfer station will probably be banned. Thus, commercial haulers will have to haul directly to the new landfill. The County is considering imposing a commercial tipping fee at the new landfill. If such a fee is imposed, commercial haulers will be assessed this fee. Most likely, this fee will be passed on to the customers of these commercial disposal firms.

In accordance with Act 324, SLH 1991, "The Hawaii Integrated Solid Waste Management Act", it is expected that the proposed hospital will develop a solid waste management plan to reduce the amount of solid waste generated. During the design phase, the need to provide space for the collection and storage of recyclable material shall be considered.

North Hawaii Community Hospital has not yet hired a person who would be responsible to develop an operational plan to reduce solid waste. Such a person would also be responsible for educating hospital employees about solid waste reduction plans and procedures. Once implemented, these measures will mitigate adverse impacts to landfills by minimizing the amount of solid waste generated by the hospital.

8.2.10.5 Electric/Telephone Service

The new North Hawaii Community Hospital will purchase electrical service from Hawaii Electric Light Company (HELCO), the public utility that provides electrical power to the Waimea area. The distribution lines in the Waimea area are served from the HELCO Kamuela and Lalamilo substations which are adequate to serve the proposed hospital without adverse impacts to other users in the area. If an automatic transfer scheme is required for reliability, an additional feeder must be constructed from either the Kamuela, Lalamilo or Puukapu Substations.

Preliminary plans indicate that the proposed hospital will be served by a new pad mounted transformer furnished, installed and maintained by HELCO. In addition, HELCO has recommended the critical care branches of the hospital will be provided emergency power by an emergency generator.

To provide sufficient generating capacity for its service areas, HELCO has plans to add 20 megawatts (MW) of generating capacity to their Keaau plant during 1992, to add another 20 MW of generating capacity to their West Hawaii plant in 1994, and to add 25 MW of capacity from geothermal sources sometime next year. This additional generating capacity should permit HELCO to service the proposed hospital without interruption to other users.

Telephone service for the new hospital will be provided by Hawaiian Telephone Company. All of the candidate sites are near existing power and communication lines which could serve the hospital.

8.2.11 Bio-Infectious Waste

In addition to solid waste, the proposed hospital will generate infectious or bio-hazardous waste. This waste will be collected in sealed containers then placed in sealed metal containers prior to transport to an approved disposal facility. This procedure for collection and transport is used at

other hospital in Hawaii County. Since the proposed hospital would not have an incinerator, the metal containers will be transported to Kona Hospital for proper disposal. This transport is expected to occur about once per week. Section 8.2.6 discussed the air quality issues related to disposal of this material.

8.2.12 Hazardous Waste

The proposed hospital may also generate other hazardous wastes once in operation. Such waste materials would include those used for cleaning purposes, for servicing machinery and equipment, and for maintaining the facility. Disposal of these wastes are governed by Federal and State rules and regulations. The hospital will comply with these applicable regulations to protect against adverse impacts to the environment.

Currently, there is no hazardous waste disposal facility in Hawaii County. Thus, depending on the amount and type of waste, such material will have to be transported to either Oahu or a mainland site for proper disposal. North Hawaii Community Hospital will have to contract for this transport with companies engaged in this type of business.

8.2.13 Nuclear Medicine

North Hawaii Community Hospital will have a nuclear medicine program which will use radioactive isotopes for various diagnostic, imaging and treatment purposes. The exact isotopes to be used at the proposed hospital are not known at this time, but will vary according to the types of diagnostic or imaging tests and treatments to be performed.

One of the normally used isotopes in nuclear medicine programs is Technetium-99. The combination of Mo-99/Tc-99 constitutes a parent-daughter relationship. Mo-99 decays with a half-life of 67 hours and Tc-99 decays with a half-life of 6 hours.

The U.S. Nuclear Regulatory Commission (NRC) has jurisdiction over the use of radioactive isotopes by a hospital for medical purposes, and it establishes the requirements for storing and monitoring radioactive isotopes prior to and after use. North Hawaii Community Hospital will require a license from the NRC to use radioactive isotopes. No State or County agency monitors radioactive isotopes.

The requirements for storing and monitoring radioactive isotopes at the proposed hospital will depend upon the exact type of isotopes used. The NRC procedure for monitoring these materials is set forth in 10 CFR Part 35. The proposed hospital has not yet developed a plan in the event of an accident involving radioactive isotopes. However, as part of the NRC license, the hospital will be required to prepare a radiation safety plan which will include addressing a potential accident with radioactive isotopes.

The transportation of radioactive isotopes is governed by CFR Part 49 which sets forth the requirements related to the transport of such materials. As part of the license, the proposed hospital must agree to comply with the NRC requirements for the transport of radioactive isotopes.

After use, the isotopes will be retained according to retention criteria determined by radioactive decay charts. The isotopes will be retained well beyond the times shown in the decay charts prior to disposal. Once the retention time has been met, the material will be disposed in a landfill along with the solid waste generated by the hospital. This same disposal method is currently practiced at LHMC and Hilo Hospital.

9. ALTERNATIVES TO THE PROPOSED ACTION

The site selection portions of this document have evaluated alternative sites for a new hospital in North Hawaii. This section examines alternatives to the proposed action to build a new North Hawaii Community Hospital. They include the No Action alternative, expansion of existing facilities at the Lucy Henriques Medical Center, and expanded use of other medical facilities in Hawaii County.

9.1 No Action

Under the No Action alternative, a new hospital in North Hawaii would not be built. There would be no short-term adverse environmental impacts associated with construction of the proposed hospital, nor would there be any long-term impacts related to operation of the proposed hospital. However, this alternative would not serve the identified need for medical service in North Hawaii for several reasons. First, the No Action alternative would not be consistent with the Hawaii State Plan health objectives for providing adequate and accessible health services and facilities for the general public. This is especially true as the population in the North Hawaii area continues to increase at a rate faster than the State average.

Secondly, the proposed hospital is expected to complement the proposed Honokaa Health Care Facility which will provide long-term care services in the region, along with some urgent care services. The new North Hawaii Community Hospital will supply acute care services, including inpatient surgery and obstetrics. Much of these service are currently available in Kona and Hilo, 40 and 55 miles away, respectively. Current space and facilities at Lucy Henriques Medical Center are inadequate for the provision of these types of services.

Without the construction and operation of the proposed hospital the population of the North Hawaii area would lack proper and adequate medical

care and services. Therefore, the No Action alternative is not considered a reasonable and feasible alternative to construction of the proposed hospital.

9.2 Expanding the Lucy Henriques Medical Center

Expansion of Lucy Henriques Medical Center, while perhaps technically feasible, would not adequately address the level of need for health services which will be provided by construction of a new facility in the North Hawaii area. The existing medical center currently has no acute care beds, and its emergency room uses holding beds which can accommodate patients up to 12 hours if necessary. Due to limited space, specialists are brought in on a weekly, bi-weekly, or once a month basis.

Modifications or expansion of the facilities at the Lucy Henriques Medical Center could provide some of the space needed to house all of the services and functions proposed for the new hospital. However, modifications and expansion projects, unless incorporated in the original design of a facility, do not always meet the functional layout requirements of a properly designed building. Moreover, construction activities could disrupt medical services while the facility is being modified and expanded. Based on these reasons, expanding the existing medical center is not considered a reasonable or feasible alternative to construction of the proposed new hospital.

9.3 Expanded Use of Other Facilities

More intensive use of the existing medical facilities in Hawaii County is another alternative to construction of the proposed hospital. The adverse short-term and long-term impacts associated with construction and operation of a new facility would not occur with this alternative. However, as previously discussed, most of the available medical facilities which could provide the level and types of service being proposed for the new hospital are a minimum of 40 miles away. The time required to reach

any of these other facilities could result in adverse effects to the health and well being of the patient. The necessary travel would also create its own adverse environmental impacts related to energy usage and highway traffic.

In addition, quite often the existing facilities are operating at or near their capacity to provide adequate services and cannot accommodate a new patient load. Given these reasons, expanded use of other existing medical facilities is not considered a reasonable and feasible alternative to construction and operation of the proposed hospital.

10. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

10.1 Short-Term Uses

Implementation of the proposed project will result in local short-term uses of man's environment during the construction phase of the project. Short-term construction activities associated with the new North Hawaii Community Hospital will create minor disruptions and nuisances in the vicinity of the project site. Conversely, construction of the proposed hospital will create short-term local economic benefits as a result of expenditures for equipment, material, and supplies. Construction of the proposed hospital will also create short-term economic benefits related to the expansion of direct and indirect employment opportunities.

10.2 Long-Term Productivity

Depending on the site selected for the hospital, construction of the proposed facility could result in the long-term loss of about five acres of agricultural land currently used for cattle grazing. Offsetting this loss of agricultural land is the long-term gain in productivity associated with better health care services for the residents of North Hawaii. Construction and operation of the new North Hawaii Community Hospital will assure the continued maintenance and enhancement of health and social welfare by providing essential medical services at a facility that will be properly designed and constructed to serve the growing population of the region.

The long-term productivity that would accrue from the construction and operation of the proposed hospital would outweigh the short-term adverse environmental impacts associated with constructing the facility. A proper and adequate facility to provide medical care to the residents of North Hawaii is essential for long-term productivity of Hawaii County.

11. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementation of the proposed action would involve the commitment of resources such as fuel, labor, funding and materials for the construction of the new hospital. Labor, materials, and utilities would also be required for operation and maintenance of the proposed hospital. Once these resources had been used for construction and operation of the proposed hospital, they would be irreversibly and irretrievably committed to the proposed hospital as no other project could be undertaken with them. It would not be feasible to use these resources for any other purpose.

Construction of the proposed project will involve the commitment of land for a hospital which will preclude other uses of the selected site while the hospital remains in operation. However, this commitment of land is not irreversible as the disturbance to the selected site would not preclude its future use for other purposes. Once the hospital has ceased operation, the selected site could be reclaimed and other uses undertaken on the land. Construction and operation of the hospital would not be an irretrievable commitment of the land.

12. UNRESOLVED ISSUES

Roadway improvements to mitigate a possible local increase in traffic during peak periods are unresolved at this time. Once a site is selected, further study will be needed to determine what measures such as road widening, signalization, and holding lanes may be necessary to ensure easy access and smooth traffic flow.

Off-site water infrastructure is adequate at this time for all candidate sites, but water supply is insufficient in the Waimea area. Proposals to provide water service will be coordinated with the Hawaii County Department of Water Supply.

Further flood hazard analysis at Sites 1, 2, 3 and 4 is being performed to determine the extent of the downstream effect created by developing any one of the sites.

13. PROBABLE ADVERSE ENVIRONMENTAL IMPACTS WHICH CANNOT BE AVOIDED

The probable environmental impacts which cannot be avoided are those typically associated with construction of the proposed hospital at one of seven mostly undeveloped candidate sites. Construction of the proposed hospital will require clearing of most of the vegetation from the selected site. Removal of the vegetation will, most likely, result in the loss of any species currently using the habitat. However, none of the fauna found at any of the candidate sites is a Federal or State of Hawaii listed or candidate threatened or endangered species. Similarly, none of the vegetation which composes the habitat is a Federal or State of Hawaii listed or candidate threatened or endangered species.

In addition to displacement of five acres of land and habitat, construction of the hospital will result in the unavoidable elimination of some open space and scenic views from several of the candidate sites. Although the facility site plan and building option have not been determined, use of a one-story structure and appropriate site planning can mitigate some of the unavoidable adverse impact to open space and scenic views.

Construction of the proposed hospital will result in unavoidable adverse impacts generally associated with construction of any project. There will be unavoidable adverse short-term impacts from construction activities such as increased levels of dust, noise, and construction traffic. However, the permits and approvals required for construction of the hospital will mitigate some of these unavoidable adverse impacts.

Once constructed, operation of the hospital will result in an unavoidable increase in traffic as workers, patients, visitors, and other service vehicles enter and exit the facility. Although this impact will be unavoidable, the proposed hospital is not expected to create a significant increase in traffic on the local streets. The increase in vehicle trips

in the Waimea area will create an unavoidable associated increase in vehicle emissions.

Notwithstanding the unavoidable effects, there is good reason for proceeding with the proposed action. The new North Hawaii Community Hospital will ensure the continued maintenance and enhancement of public health and welfare by providing an essential medical services and a facility that will serve the population growth of the region.

14. LIST OF NECESSARY APPROVALS

Development of a hospital at either of the alternative sites will require the following governmental land use permits and approvals:

	Site Numbers						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
State Land Use District Boundary Amendment			X		X	X	X
Use Permit	X	X	X	X	X	X	X

There is no designation which immediately permits hospital use on a site. Instead, a Use Permit must be filed and reviewed by the Planning Commission as a discretionary permit. All users within 300 feet must be informed of the planned use and may testify in favor of or against the use. Use of the selected site for a hospital is ultimately approved or rejected by the Planning Commission.

15. CONSULTATION - EIS PREPARATION

15.1. Agencies, Organizations, and Individuals Consulted During EIS Preparation Notice Phase

The following is a list of agencies, organizations, and individuals who were consulted as part of the EIS Preparation Notice Phase. Those consulted parties who responded to consultation letters are noted with an asterisk. A double asterisk indicates those who provided substantive comments. Letters received and responses to those with substantive comments are shown on the following pages.

FEDERAL AGENCIES

- ** U.S. Army Corps of Engineers
- ** U.S. Soil Conservation Service
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency Region IX

STATE AGENCIES

- ** Department of Agriculture
- Department of Accounting and General Services
- * DBEDT Housing Finance and Development Corporation
- Department of Business, Economic Development and Tourism
- * Department of Health
- ** Department of Land & Natural Resources
- DLNR State Historic Preservation Office
- ** Department of Transportation
- Office of Environmental Quality Control
- Office of Hawaiian Affairs
- ** Office of State Planning
- University of Hawaii Environmental Center
- University of Hawaii Water Resources Research Center

COUNTY AGENCIES

- ** Department of Parks and Recreation
- ** Department of Public Works
- ** Department of Water Supply
- ** Planning Department
- County of Hawaii Research & Development

LIBRARIES

Thelma Parker Memorial Library
University of Hawaii Hilo Campus Library
Hilo Public Library

OTHER ORGANIZATIONS

** Lucy Henriques Trust
Sierra Club
Parker Ranch, Richard Smart Trust
North Hawaii Community Association



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96849-3440

RECEIVED!

JUN 6 8 56 AM '91
DIR. OF PUBLIC WORKS
0265

June 4, 1991

REPLY TO
ATTENTION OF:

Planning Division

OFFICE OF PUBLIC WORKS
HAWAII PERMITS
IP State E.M. Eng. Approval
P.M. Sect. Sign.
Staff Sect. Br. MA
Planning Br. Pp
Proj. Mgmt. Br. S&M
Legal Br. Comment
Insp. Br. Inspect &
Qual. Cont. Eng. Insp.
Licensing Sect. Br. Regd.

Mr. Russel S. Nagata
State Comptroller
Department of Accounting and
General Services
State of Hawaii
P.O. BOX 119
Honolulu, Hawaii 96810

Dear Mr. Nagata:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice for the proposed North Hawaii Community Hospital, Waimea, Hawaii. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

- a. A DA permit will not be required for this project.
- b. According to the Federal Emergency Management Agency's Flood Insurance Rate Map, Panels 155166-0168-D and 155166-0164-D, dated July 16, 1990, the alternative sites are located in the following zones:
 - Site 1. Zone AE (areas inundated by the 100-year flood, with a base flood elevation of 2686 to 2704 feet above mean sea level); and Zone X - unshaded (areas determined to be outside the 500-year flood plain).
 - Site 2. Zone AE (with a base flood elevation of 2704-2705 feet above mean sea level); and Zone X - unshaded.
 - Site 3. Zone AE (with a base flood elevation of 2686 to 2697 feet above mean sea level); and Zone X - unshaded.

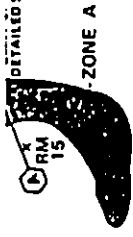
- Site 4. Zone AE (with a base flood elevation of 2715 to 2724 feet above mean sea level); and Zone X - unshaded.
 - Site 5. Zone X - shaded (areas inundated by the 500-year flood); and Zone X - unshaded.
 - Site 6. Zone X - unshaded.
 - Site 7. Zone A (areas inundated by the 100-year flood; base flood elevations and flood hazard factors not determined); and Zone X - unshaded.
- c. Page 5-5 of the EISPN states that Site 4 is not within a flood plain, in disagreement with the 1990 FIRM.
- d. Page 5-6 of the EISPN states that the FIRM shows a floodway for Kamuela Stream. The 1990 FIRM does not show any such floodway.
- e. The 1990 FIRM shows a floodway for Lanimalama Stream, but Figure 5-1 of the EISPN does not.
- f. Appendix B of the EISPN is not necessary as its purpose as stated on page B-2 is to estimate the limits of flooding for Kamuela Stream during the 100-year flood; the Federal Emergency Management Agency's FIRM and Flood Insurance Study have already done that.

Sincerely,

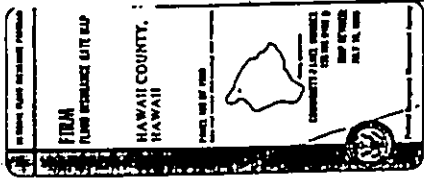
C. App
Kisuk Cheung
Director of Engineering

Enclosure

DETAILED STUDY

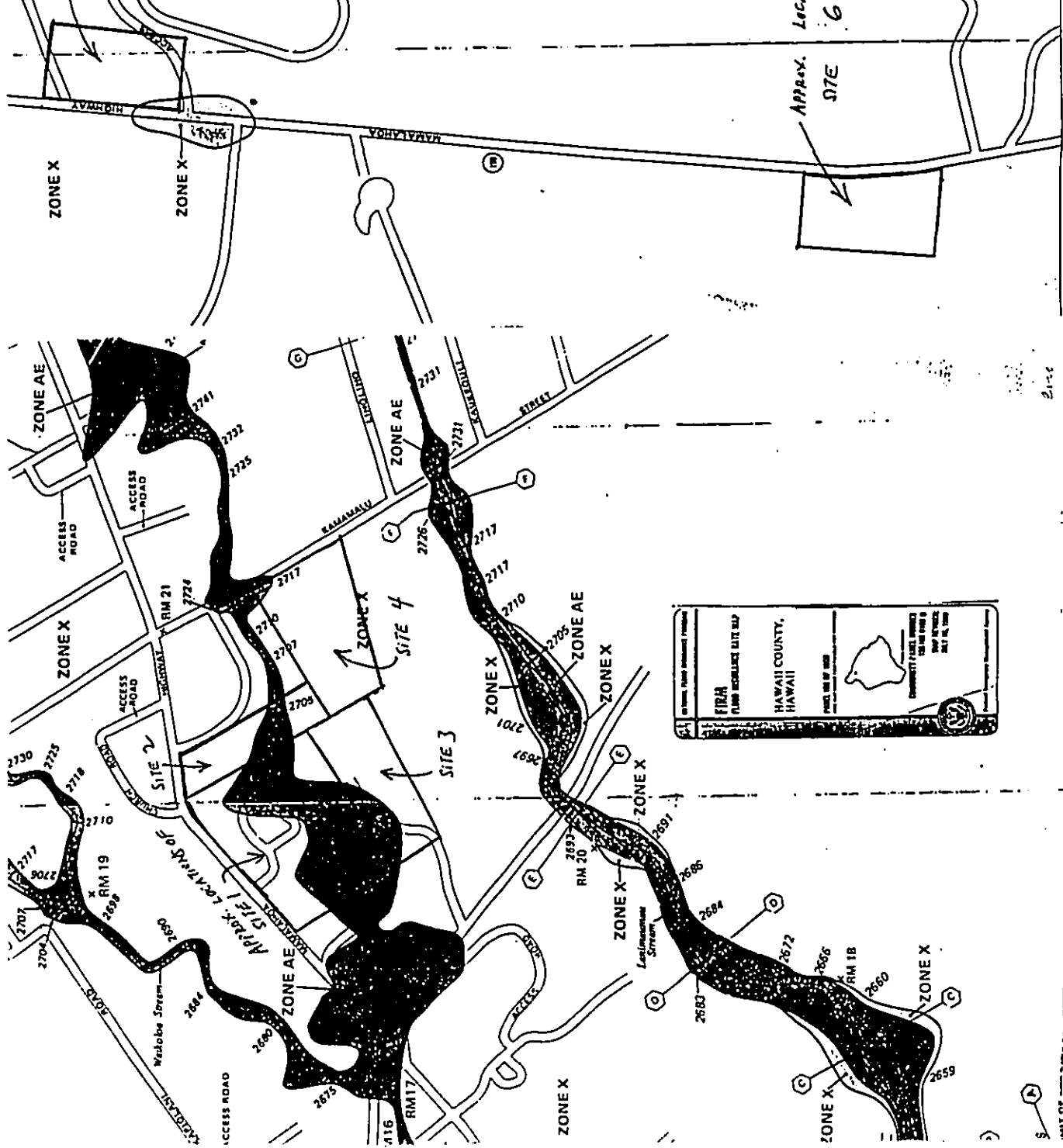


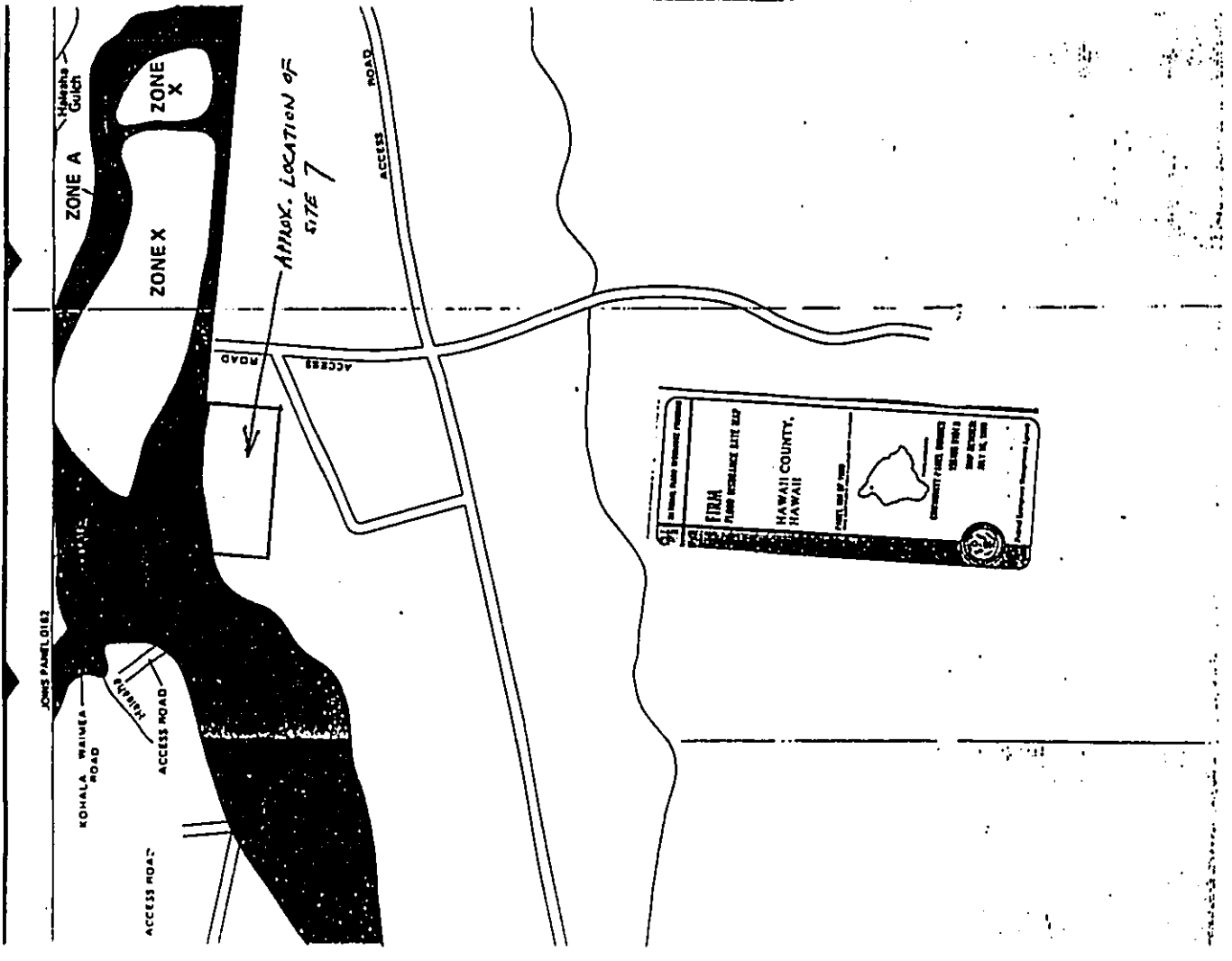
KAMUEL AIRPORT



APPROX. LOCATION OF SITE 5

APPROX. LOCATION OF SITE 6





LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATE
BY 100-YEAR FLOOD

ZONE A
No base flood elevations determined.
Base Flood elevations determined.

ZONE AE
Flood depths of 1 to 3 feet (smaller areas of ponds); base flood elevations determined.

ZONE AH
Flood depths of 1 to 3 feet (mostly about flow on sloping terrain); average depths determined. For areas of elevated fan flooding, velocities also determined.

ZONE AO
To be protected from 100-year flood by Federal flood protection system (levees, dikes, etc.); no base flood elevations determined.

ZONE AV
Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE
Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X
Areas of 500-year flood; areas of 100-year flood with average depth of less than 1 foot or with drainage area less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X
Areas determined to be outside 500-year flood plain.

ZONE D
Areas in which flood hazards are undetermined.

— Flood Boundary
— Floodway Boundary
— Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

Base Flood Elevation Line: Elevation in Feet
Cross Section Line
Base Flood Elevation in Feet Where Uniform Within Zone
Elevation Reference Mark
RIM7X

— 517 —
(ELL 987)
RIM7X

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program. It does not necessarily constitute an offer of insurance. Coverage is subject to flooding features outside Special Flood Hazard Areas.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AO, AV, VE, and V.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths at some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.



STATE OF HAWAII
 DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
 P. O. BOX 111, HONOLULU, HAWAII 96818

ROBERT L. HAGA
 COMPTROLLER
 ROBERT S. FUGATE
 STATE COMPTROLLER

LETTER NO. (P)1733.1

JUL 12 1991

Mr. Kisuk Cheung
 Director of Engineering
 Department of the Army
 U. S. Army Engineer District,
 Honolulu
 Building 230
 Fort Shafter, Hawaii 96858-5440

Dear Mr. Cheung:

Subject: North Hawaii Community Hospital
 Environmental Impact Statement
 Preparation Notice (EISP)

In response to your June 4, 1991 comments on the subject project, we provide the following:

- a. We acknowledge that a Department of the Army permit is not required for this project.
- b. Thank you for the additional information regarding the location of flood zones within the alternative sites. The draft EIS will be revised accordingly.
- c. Page 5-5 of the EISP will be revised to indicate that portions of Sites 4 and 7 are within flood hazard areas as indicated by the 1990 FIRH.
- d. Page 5-6 of the EISP will be revised to indicate that Kamuela Stream does not include a floodway.
- e. Figure 5.1 will be revised to include the floodway for Lanimaumu Stream.
- f. Appendix B will be revised to a feasibility study of constructing a hospital facility within a flood zone.

Mr. Kisuk Cheung
 Page 2

Letr. No. (P)1733.1

We appreciate your input for this project. If you have any further questions regarding the EISP, please contact Mr. John I. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,


 ROBERT S. FUGATE
 State Comptroller

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P.O. BOX 50004
HONOLULU, HAWAII
96850

JUN 20 8 35 AM '91
STATE WORKS

June 18, 1991

Mr. Russel S. Nagata
State Comptroller
Department of Accounting and
General Services
P.O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Nagata:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Review - North Hawaii Community Hospital, Waimea, HI

We have reviewed the North Hawaii Community Hospital EISPN and would like to offer the following comments:

1. Section 5.1.1, Hydrology and Water Quality

The erosion and sediment control plan will be very instrumental in reducing any potential adverse environmental impacts of this project. A well written plan will do much to control the potential sediment production and potential dust control problems of the project.

2. Section 5.1.5, Air Quality

We believe that strict dust control measures should be maintained during the critical grading and excavating activities of this project.

3. Section 5.2.4, Flood Hazard

We are very interested in reviewing the flood control provisions that are being prepared for the Draft EIS. We would like to stress the importance of including proper operation and maintenance into the design of these flood mitigation measures.

Thank you for allowing us to review this document. We would appreciate the opportunity to review the draft EIS.

Sincerely,

Warren M. Lee

WARREN M. LEE
State Conservationist

cc: Mr. Gordon Sam, Project Coordinator, Public Works Division, Department of Accounting and General Services, State of Hawaii, P.O. Box 119, Honolulu, Hawaii 96810



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS

P. O. BOX 119, HONOLULU, HAWAII 96810

JUN 25 1991

LETTER NO. (P)1791.1

RUSSEL S. NAGATA
COMPTROLLER
DEPARTMENT OF ACCOUNTING AND
GENERAL SERVICES

Mr. Warren M. Lee
State Conservationist
United State Department of Agriculture
Soil Conservation Service
P. O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Lee:

Subject: North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

In response to your June 18, 1991 comments on the subject project, we provide the following comments:

1. An erosion and sediment control plan will be submitted to appropriate agencies for review and approval during the design phase of the project.
2. Dust control measures in accordance with State of Hawaii regulations will be implemented during construction of the project.
3. The flood hazard analysis will address generic improvements necessary for the construction of a hospital within flood zones. Accordingly, operation and maintenance features will be considered during the design phase of the project.

If you have any further questions regarding the EISPN, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,

John L. Sakaguchi

TEJUANE TOMINAGA
State Public Works Engineer

SH:jk
cc: Mr. John L. Sakaguchi

DIVISION OF PUBLIC WORKS	
APPROVAL FOR TOUR	
State P.W. Eng.	Approval
PH. Sect.	Sign
State Serv. B.	Info.
Planning B.	File
Fac. Maint. B.	See me
Finance B.	Comments
Info. B.	Impt. %
Cost Est. B.	Rel.

JOHN WAIMAN
GOVERNOR



June 17 2 17 PM '91
State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2312

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE
ILMA A. PIJAMANA
DEPUTY TO THE CHAIRPERSON
FAX: 548-6100

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

OFFICE OF PUBLIC WORKS
INDUSTRIAL DIVISION
Mr. Russel S. Nagata
2701 So. W. Ave.
Suite 300
Honolulu, HI 96815
Mr. Yukio Kitagawa
1428 So. King Street
Honolulu, HI 96814
Mr. John Waiman
1428 So. King Street
Honolulu, HI 96814

June 14, 1991

To: Russel S. Nagata, State Comptroller
Department of Accounting
and General Services

From: Yukio Kitagawa, Chairperson
Board of Agriculture

Subject: North Hawaii Community Hospital
Environmental Impact Statement Preparation Notice (EISPN)
THK: 6-7-02:11, 13, 17 Waimaa, Hawaii
6-6-01:2
6-8-01:1

The Department of Agriculture has reviewed the subject document and has the following comments.

The Department of Accounting and General Services proposes to construct a 50-bed, full-service community hospital for the community of Waimaa and the surrounding area. Seven sites have been selected as alternate locations for the 5- to 7-acre facility, all within or very near Waimaa town.

References to the Land Study Bureau's Detailed Land Classification system are correct. According to the Agricultural Lands of Importance to the State of Hawaii (ALISH) Maps of the area, and the USDA Soil Conservation Service Survey for the Island of Hawaii, each site varies considerably.

Site	ALISH Value	Percent Area	USDA-SCS Survey*
1	Unclassified	100	WMC, KfA
2	Prime Unclassified	< 5 > 95	KfA
3	Prime Unclassified	50 50	WMC, KfA



Mr. Russel S. Nagata
June 14, 1991
Page 2

Site	ALISH Value	Percent Area	USDA-SCS Survey*
4	Prime	100	KfA
5	Other Important Ag. Lands Unclassified	> 95 < 5	WMC
6	Unclassified	100	PVD
7	Other Important Ag. Lands	100	WMC

* USDA Soil Conservation Service designations for soils within the various sites are represented by:

1. WMC - Waimaa Very Fine Sandy Loam (6 to 12 percent slopes), Capability Subclass IIfc. These soils have high erodibility and are considered good topsoil.
2. KfA - Kikoni Very Fine Sandy Loam (0 to 3 percent slopes), Capability Subclass Ifc. These soils have high erodibility and are considered good topsoil.
3. PVD - Puu Pa Extremely Fine Sandy Loam (6 to 20 percent slopes), Capability Subclass IVa. These soils have high erodibility and are considered poor topsoil.

We suggest that the chosen site be within or immediately adjacent to the State Urban District. However, we would prefer that a site with substantial prime agricultural land (such as site 3 or 4) not be utilized.

We look forward to receiving a copy of the Draft EIS for our review. Thank you for the opportunity to comment.

EM

3216-01

JOHN WAHNE
COMPTROLLER



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 114, HONOLULU, HAWAII 96839

LETTER NO. (P)1726.1

RUSSEL S. NAGATA
COMPTROLLER
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

JUL 10 1991

Honorable Yukio Kitagawa
Chairperson
Board of Agriculture
Department of Agriculture
State of Hawaii
Honolulu, Hawaii

Dear Mr. Kitagawa:

Subject: North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

Thank you for your June 14, 1991 comments concerning the North Hawaii Community Hospital EISPN. We appreciate the information provided on the Agricultural Lands of Importance to the State of Hawaii (ALISH) and the USDA soil conservation survey.

Your preference for a site within or immediately adjacent to the State Urban District and not comprised of substantial prime agricultural land is noted and will be considered in the selection of a final site.

If you have any further questions regarding the EISPN, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,

Russel S. Nagata
RUSSEL S. NAGATA
State Comptroller

JOHN WAHNE
COMPTROLLER



STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
SEVEN WILSONWAY PLAZA, SUITE 200
145 ALA MOANA BOULEVARD
HONOLULU, HAWAII 96813
FAX (808) 543-5461

IN REPLY REFER TO:
91:PING/2417jc

BY: [Signature]
DATE: 5/21/91

May 21, 1991

TO: Russell S. Nagata, Comptroller
Department of Accounting and General Services

FROM: Joseph K. Conant
Executive Director

SUBJECT: EIS Consultation Phase
North Hawaii Community Hospital

Thank you for the opportunity to review the subject EIS Preparation Notice. We have no comments to offer.

JT:eks

c: Wilson Okamoto & Associates, Inc.

JUL 12 1991
JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3279
HONOLULU, HAWAII 96811

In reply, please refer to
file:

July 5, 1991

TO: The Honorable Russel S. Nagata, Comptroller,
Department of Accounting and General Services

FROM: Director of Health

SUBJECT: Environmental Impact Statement Preparation Notice
(EISP/N) for the North Hawaii Community Hospital,
Waimea, Hawaii

This is in reply to your June 28, 1991 memo regarding the Department of Health's official stand on the North Hawaii Community Hospital. It is the Department's stand that the construction, maintenance and operation of the facility will be done by North Hawaii Community Hospital, Inc.

The only official involvement of the DOH was for the planning and design of the hospital. This past Legislature set aside \$12.5 million to be matched by the North Hawaii Community Hospital, Inc. for the construction. This amount was given as a grant-in-aid to them. The maintenance, operation and funding will come out of their own operational budget and will not involve the DOH at all.

Should you have any questions, please contact Mr. Ron Kurasaki at 548-7401.

c: Mr. Jerry Walker
Mr. Ron Kurasaki

John C. Lewin
JOHN C. LEWIN, M.D.

- TO: State: Mr. Eng. Approval
- P.M. Secy. S/A
- Staff Serv. Br. P/A
- Planning Br. P/A
- Proj. Mgmt. Br. S/A
- Facility Br. Coord. & Insp.
- Health Br. Insp. & Eval.
- Health Comm. Eng. Insp. & Eval.
- Health Serv. Br. Insp. & Eval.

101-101-101

JUN 10 11 27 AM '61



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
21 SOUTH KING STREET, 5TH FLOOR
HONOLULU, HAWAII 96813

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
MEMORANDUM
TO: []
FROM: []
SUBJECT: []

REF: HP-3LE

- 6 -

MEMORANDUM

TO: Russel S. Nagata, State Comptroller
Department of Accounting and General Services

FROM: William W. Paty, Chairperson
Board of Land and Natural Resources

SUBJECT: Historic Preservation Compliance Review (Chapter 6E) -- EIS Preparation
Notice, North Hawaii Community Hospital, Maimea, Hawaii (OAGS)
Lalamilo, Puukapu and Maikaloa, South Kohala, Hawaii
TAK: 6-7-02; 13 and 17; 6-7-03; 11; 6-8-01; 1; 6-8-01; 1 and 2

Thank you for submitting for our review the EIS Preparation Notice for the North Hawaii Community Hospital, Hawaii. Because this is a state undertaking, compliance with the State Historic Preservation Law (Chapter 6E, H.R.S.) is required, as well as compliance with the EIS process. Typically, we request EIS documents reflect the status of compliance with the historic preservation law.

We feel that the section dealing with archaeology and historical resources (pages 5-2) needs to be amended in the EIS to adequately cover historic preservation compliance concerns. According to our records, none of the seven proposed hospital locations have been surveyed for significant historic sites. All of the potential project areas lie within the former bounds of the Maimea Agricultural System -- a significant historic district in prehistoric and early historic times which included extensive agricultural fields and canals and scattered clusters of house sites, field shelters and undoubtedly religious structures and burials. Unless the project locations have been heavily disturbed in the recent past, there is a relatively high probability that surface or subsurface historic sites are present.

We believe that the Draft EIS should address the possible historic sites for each alternative location and state that once a hospital site is chosen, an archaeological inventory survey will be conducted on that property and be reviewed by the State's Historic Preservation Division for adequacy. It should also be stated that if significant historic sites are found in the inventory survey, then an acceptable mitigation plan (quite probably archaeological data recovery, but also perhaps some preservation) will be worked out and be approved by the State's Historic Preservation Division. Without such a commitment in the Draft EIS, we would have to conclude that the construction of the proposed hospital could have an "adverse effect" on significant historic sites.

Mr. Russel S. Nagata
Page 2

To help you prepare statements on the possible historic site situation at each alternative location, we are enclosing the following information:

1. Alternative Sites No. 1 through 4.
For Sites No. 1 through 4, we are particularly concerned about a system of auwai or artificial ditches which once crossed portions of each of the four parcels. In fact, our records suggest that what is called "Kamele Stream" in the Environmental Statement is one of these ditches. We know from a variety of historic sources and some archaeological work that these ditches helped irrigate large portions of the Maimea Plains during the prehistoric and early historic period. An archaeological inventory survey of these parcels should determine if evidence of these ditches and fields still exist. This survey work may entail trenching through those segments of the canals and adjacent fields. Mitigation work might also be needed.
2. Alternative Site No. 5 and 6
These two alternative locations are also within areas where prehistoric and early historic agriculture took place. Based on aerial photographs it appears that these two parcels have been modified in the recent past, making it possible that historic sites no longer are present. The extent of land alteration needs to be evaluated, to indeed see if historic sites are still present.
3. Alternative Site No. 7
At alternative Site No. 7, remnants of prehistoric and early historic agricultural field systems are apparent on aerial photographs. Unless this area has been severely graded or grubbed since these aerials were taken, we believe that an archaeological inventory survey will be needed if this location is selected, and quite probably mitigation work will be needed also.

If you have any question about this review, please call Holly McElldowney at 587-0608.

cc: Gordon Sam, Public Works Division

JOHN WALKER
DIRECTOR



RUSSEL S. NABATA
COMPTROLLER
OFFICE OF ACCOUNTING
AND GENERAL SERVICES

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 118, HONOLULU, HAWAII 96818

LETTER M(1)1798-1

JUL 30 1991

Honorable William Paty
Chairperson
Department of Land and
Natural Resources
State of Hawaii
Honolulu, Hawaii

Dear Mr. Paty:

Subject: North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

Thank you for your July 9, 1991 comments concerning the North Hawaii Community Hospital EISPN. Our responses to your comments are as follows:

1. Section 5.1.3. Archaeology/Historical Resources on Page 5-2 will be amended to reflect information obtained from archaeological inventory surveys of each site which are currently being conducted.
2. Archaeological inventory surveys of all the candidate sites will be conducted and the reports will be included in the EIS. In the event significant archaeological sites are found during the inventory surveys, a mitigation plan will be submitted to the State's Historic Preservation Division for review and comments.
3. Thank you for the information regarding the historic site situation of each candidate site. The EIS will be amended to include the information.

If you have any further questions regarding the EISPN, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,


RUSSEL S. NABATA
State Comptroller

JOHN WAIKANE
GOVERNOR

EDWARD Y. HIRATA
DIRECTOR
DEPUTY DIRECTOR
AL PANG
JOYCE T. O'BRIEN
JEANNE K. SCHULTZ
JAYAN M. TSUDA



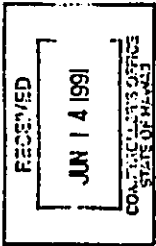
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
809 PEARSON STREET
HONOLULU, HAWAII 96813-2907

JUN 13 1991

RECEIVED

JUN 14 3 05 PM '91
DIV. OF PUBLIC WORKS
DAGS

IN REPLY REFER TO:
HWY-PS
2.7280



MEMORANDUM

TO: The Honorable Russell S. Nagata, Comptroller
Department of Accounting and General Services

FROM: Edward Y. Hirata, Director
Department of Transportation *Ed Hirata*

SUBJECT: NORTH HAWAII COMMUNITY HOSPITAL, EIS CONSULTATION PHASE

Thank you for your letter of May 16, 1991 requesting our review of the subject project.
Please submit a Traffic Assessment Report for the access to the selected hospital site.



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 116, HONOLULU, HAWAII 96819

RUSSELL S. NAGATA
COMPTROLLER
ROBERT F. TILSON
DEPUTY COMPTROLLER

LETTER NO. (P)11112-1

JUL 5 1991

Honorable Edward Hirata
Director
Department of Transportation
State of Hawaii
Honolulu, Hawaii

Dear Mr. Hirata:

Subject: North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

Thank you for your June 13, 1991 comments regarding the subject EISPN. Upon selection of a site for the hospital, we will assess its impact upon your highway system and evaluate the need for a Traffic Assessment Report.

If you have any questions regarding the EIS, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,
Russell S. Nagata
RUSSELL S. NAGATA
State Comptroller

DIVISION OF PUBLIC WORKS
Initial for file

State PW. EIS	Approval
P.W. Sect.	SPR
State Comm. Dir.	Info
Planning Dir.	PS
Proj. Mgmt. Dir.	See PW
Exec. Dir.	Consult
Asst. Dir.	Plan. & Eval.
Asst. Dir.	Spec. & Insp.
Asst. Dir.	Adm. Serv.



OFFICE OF STATE PLANNING

Office of the Governor
STATE CAPITAL, HONOLULU, HAWAII 96825 TELEPHONE (808) 548-1000

RECEIVED

JUN 20 9 14 AM '91

STATE OF HAWAII
OFFICE OF STATE PLANNING

JUN 12 1991

June 7, 1991

MEMORANDUM

TO: The Honorable Russel S. Nagata, State Comptroller
Department of Accounting and General Services

Subject: Environmental Impact Statement Preparation Notice (EISPN)
for the North Hawaii Community Hospital
Maimea, Hawaii

It is our understanding that the State of Hawaii Department of Accounting and General Services is proposing to build the North Hawaii Community Hospital, which will be located in Maimea, Hawaii on approximately 5 to 7 acres of land. The proposed hospital will be a full service, non-profit hospital with 50 beds. Acute care, skilled nursing care, and other medical services such as obstetrics will be provided by the approximately 62,000 square foot hospital. The EISPN listed seven potential sites for the hospital, ranging from four sites within the town center and three sites outside of the town center.

After reviewing the EISPN, we have concerns that should be thoroughly discussed in the Draft Environmental Impact Statement (DEIS). First, although the EISPN discusses the non-profit, non-stock North Hawaii Community Hospital, Inc. and its fundraising activities, we are still unclear as to the State's role in this project. More specifically, who will be responsible for the construction, maintenance and operation of the proposed hospital?

Secondly, alternative site descriptions should include a statement of the rationale for considering each site. In addition, because three of the sites are located outside of the town center, we feel that the DEIS should discuss the project's impact on the surrounding areas. Because the hospital will most likely generate 160 full-time jobs, we are concerned that the surrounding unplanned areas will be used for private doctors' office buildings, nurses' housing, laboratories, etc. Such usage could lead to spot-zoning or urban sprawl and would not be in keeping with the Maimea Town Center and Vicinity Concept Plan, a component of the Parker Ranch 2020 Community Plan.

IN
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Mr. Nagata
Page 2
June 7, 1991

Third, the DEIS should also include measures for mitigating the following long-term impacts: traffic congestion during the peak morning and afternoon hours should the hospital be placed in the town center and obstruction of open space if Sites No. 2, 4, 5, or 7 are chosen. In addition, the DEIS should also address and discuss how adequate water service for the hospital will be provided; where the placement of the necessary on-site wastewater treatment and disposal system will be; how the Kameela Stream Flood hazard on Sites No. 1, 2, and 3 will be dealt with; and the type of drainage infrastructure to address storm runoff on Sites No. 1, 2, and 3.

Thank you for the opportunity to comment. Should you have any questions please feel free to call me or the Land Use Division at 548-2066.

Sincerely,
Harold S. Masumoto
Harold S. Masumoto
Director



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 115, HONOLULU, HAWAII 96810

LETTER NO. (P)1771-1

RUSSEL S. NAGATA
COMPTROLLER
ACCOUNT & FINANCE
STATE OF HAWAII

Mr. Harold S. Masumoto
Page 2
Ltr. No. 1771.1

JUL 22 1991

Mr. Harold S. Masumoto
Director
Office of State Planning
State of Hawaii
Honolulu, Hawaii

Dear Mr. Masumoto:

Subject North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

Thank you for your June 7, 1991 letter concerning the North Hawaii Community Hospital EISPN. In response to your concerns, we provide the following comments:

1. Attached for your information is the July 5, 1991 Department of Health response stating that the construction, maintenance and operation of the facility will be done by North Hawaii Community Hospital, Inc.
2. A discussion of the rationale for selection of each candidate site is included in the recently completed site selection study which will be made a part of the EIS.
3. Please be assured that the impact of the proposed hospital on surrounding land uses will be fully discussed in the EIS. We share your concerns on spot-zoning and urban sprawl and will include such considerations in the selection of a final site.
4. The EIS will address the following concerns:
 - a. The impact of the project on traffic along Hamalehca Highway in the vicinity of the candidate sites.
 - b. The possible obstruction of open space due to selection of any one of the candidate sites.

- c. The measures required to provide an adequate water supply for the project.
- d. The measures required to provide adequate sewage disposal systems.
- e. Flood hazards and their impact on the project.
- f. The measures required to provide adequate drainage infrastructure.

If you have any further questions regarding the EISPN, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,

RUSSEL S. NAGATA
State Comptroller

Attachment



Department of Public Works
15 Aqueduct Street, Room 202 • HDB, Hawaii 96720 • (808) 961-3331 • FAX (808) 969-7138
CIV. EN. 3155

RECEIVED
JUL 31 11 1991

Lorraine R. Inouye
Mayor
Bruce C. McClure
Chief Engineer
Laurence E. Capellas
Deputy Chief Engineer

July 1, 1991

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII
1151 PUNCHBOWL STREET
HONOLULU HI 96813

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
North Hawaii Community Hospital
Applicant: State of Hawaii
Location: Waimea, Hawaii
TRK: 6-7-2: 13, 6-7-2: 11, 6-7-2: 17, 6-8-1: 1 & 6-6-1: 2

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Letter to Department of Accounting & General Services
July 1, 1991
Page 2

- 6. As implied in the Flood Hazard Analysis, sites 1, 2 and 3 would require channelization of Kamuela Stream to provide the required area of 5-7 acres site and would require access improvements due to flooding of Kamamalu Street.
- 7. Determine flooding and fringe of Kamuela Stream.
- 8. Soils in the area are poorly drained since there is evidently a layer of rock that inhibits percolation. How will the drainage be handled?

[Signature]
ROBERT K. YANABU, Division Chief
Engineering Division
TP:byf

We have reviewed the subject application and our comments are as follows:

- 1. Building shall conform to all requirements of code and statutes pertaining to building construction.
- 2. All development generated runoff shall be disposed of on site and shall not be directed toward any adjacent properties.
- 3. Applicant shall be informed that if drywells are included, Chapter 23, Underground Injection Control (UIC) Administrative Rules, Department of Health, prohibit any person from operating, constructing or modifying an injection well (drywell) unless authorized by a permit issued by the Director of Health, State of Hawaii.
- 4. Study each site's impact on traffic. A Traffic Impact Analysis Report (TIAR) will be required upon selection of the site. This TIAR should address improvements required to Hamalaha Highway and the Lindsey Road Intersection.
- 5. A solid waste management plan will be required. It should address the following:
 - a. Total solid waste volume anticipated.
 - b. Toxic and radioactive wastes.
 - c. Waste reduction plans.
 - d. Any planned recycling efforts.



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 115 HONOLULU, HAWAII 96824

RUSSEL S. NAGATA
COMPTROLLER
ROBERT P. FARLON
DEPUTY COMPTROLLER

LETTER NO. (P)1788-1

JUL 29 1991

Mr. Robert K. Yanabu
Division Chief
Engineering Division
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Yanabu:

Subject: North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

Thank you for your July 1, 1991 comments concerning the North Hawaii Community Hospital EISPN. Our responses to your comments are as follows:

1. The building shall conform to all requirements of code and statutes pertaining to building construction.
2. Drainage improvements for the proposed facility will be designed and constructed to prevent adverse impacts on the adjacent properties. To assure proper coordination, construction plans will be submitted for your review and approval.
3. We acknowledge that permits issued by the State Department of Health will be required for the construction, operation and modification of drywells.
4. Upon selection of a site, a Traffic Impact Analysis Report (TIAR) will be prepared during the design stage.
5. A solid waste management plan will be submitted for County approval during the design phase of the project.

Mr. Robert K. Yanabu
Page 2

Letr. No. (P)1788.1

6. A flood hazard analysis will be included in the EIS to address improvements necessary for the construction of a hospital facility within a flood zone. Accordingly, the need for channelization and access improvements will be explored.
7. Attached for your information is a section of the Flood Insurance Rate Maps developed by the Federal Emergency Management Agency which determines the flooding and fringes of Kamuela Stream through Sites 1, 2, 3 and 4.
8. Alternative methods to handle the drainage of each site will be explored in the EIS for the purposes of discussion and generic cost estimates. However, the ultimate drainage plan will be developed during design and submitted to your office for review and approval.

If you have any questions regarding the EISPN, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,

TEDANE TOMINAGA
State Public Works Engineer

SM:jk
Attachment

cc: Mr. John L. Sakaguchi w/o attachment



RECEIVED
 DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
 25 AUPUNI STREET • HILO, HAWAII 96720
 TELEPHONE (808) 939-1421 • FAX (808) 935-8981
 DIV. OF PUBLIC WORKS

June 4, 1991

Mr. Russel S. Magata, State Comptroller
 Department of Accounting and General Services
 P.O. Box 119
 Honolulu, HI 96810

**NORTH HAWAII COMMUNITY HOSPITAL
 EIS CONSULTATION PHASE**

Thank you for the opportunity to review the EIS Preparation Notice for the subject project.

Confirming what was stated in Section 5.2.9.1, water services in the Waimea area are being limited to a maximum 1-inch water meter and 4,200 gallons per day per existing parcel provided the current zoning designation of the parcel allows the proposed land use. This limitation will remain in effect until additional source facilities are constructed.

The Department of Water Supply is pursuing an exploratory well drilling project in Waimea. However, there is no definite time schedule as to when additional water can be made available.

If an artificial kidney program is planned for North Hawaii Community Hospital, then water quality for the South Kohala Water System must be considered. The maximum allowable chemical contaminant concentrations in the water used for the preparation of dialysate as recommended by the AAMI must be reviewed. As an example, chlorine, a disinfectant used in water treatment, is quite hazardous in the hemodialysis setting. Also, changes in pH will affect the efficiency of the purification equipment.

H. William Sewake
 Manager

DL

... Water brings progress...



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

LETTER NO. (P)1793.1

JUL 25 1991

Mr. H. William Sewake
 Manager
 Department of Water Supply
 County of Hawaii
 25 Aupuni Street
 Hilo, Hawaii 96720

Dear Mr. Sewake:

**Subject: North Hawaii Community Hospital
 Environmental Impact Statement
 Preparation Notice (EISP/N)**

Thank you for your June 4, 1991 comments concerning the North Hawaii Community Hospital EISP/N. Our responses to your comments are as follows:


1. We acknowledge that water services in the Waimea area will be restricted to certain limits by the Department of Water Supply until additional source facilities are constructed.
2. Thank you for the information on the exploratory well drilling project in Waimea which may be the Puukapu deep well development discussed in the EISP/N. Accordingly, we will explore the relationship further and expand the discussion in the Draft EIS as necessary.
3. We understand the water quality of Hawaii County in the Waimea area meets Federal drinking water standards. Accordingly, we investigated the matter of water quality appropriate for an artificial kidney program and were assured by representatives of the Department of Health and St. Francis Hospital that the equipment would be designed for the appropriate treatment of water.

Mr. H. William Sewake
Page 2

Ltr. No. (P)1793.1

If you have any questions regarding the EISPK, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,


TEDARES TOHINAGA
State Public Works Engineer

SM:jk
cc: Mr. John L. Sakaguchi



Planning Department

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720 • (808) 934-8228

Lorraine E. Dooye
Mayer
Norman K. Hayashi
Director
Ted Nagralo
Deputy Director

RECEIVED
Jun 25 12 53 PM '91

June 21, 1991

Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, HI 96813

Gentlemen:

Environmental Impact Statement Preparation Notice (EISPN)
North Hawaii Community Hospital

We have reviewed the EISPN of the alternative sites for the proposed North Hawaii Community Hospital in Waiimea and have the following comments:

1. The EIS needs to include a section which discusses the triggering mechanism for compliance with Chapter 343, HRS, and the purpose of the document. Will the EIS be used as an informational document for land use approvals?
2. Figures 4.3, 4.10, 4.13 and Table 4.1 indicate state and county land use designations. The text portion should discuss state and county land use goals and policies in relationship to the proposed hospital.
3. Discussion on plans, if any, for expansion of existing uses or for proposed developments by the respective property owner on Sites 2 - 7 should also be included in the EIS.
4. A traffic analysis report would have a bearing on the choice of sites also; and therefore, it should be conducted and included in the EIS.
5. The EIS should include a list of permits and approvals required for the proposed hospital.

State P.W. Dept.	Approved
PLT Sect.	SEA
State Soc. Pl.	SEA
Planning Div.	SEA
Env. Impact Br.	SEA
Health Div.	SEA
Reg. Aff.	SEA
State Land Use	SEA
State Dept. of Transp.	SEA

Office of Environmental
Quality Control
June 21, 1991
Page 2

Thank you for the opportunity to provide comments on the EISPN document. Should you have any questions, please feel free to contact Alice Kawaha of this office.

Sincerely,

NORMAN K. HAYASHI
Planning Director

AK:smo
2178D
cc: Gordon Sam, DAGS

Mr. Norman K. Hayashi
Page 2
Ltr. No. (P)1831.1

If you have any further questions regarding the EISPN, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,


RUSSELL S. NAGATA
State Comptroller



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 115, HONOLULU, HAWAII 96810
LITTEK NO. (P)1831.1

AUG 08 1991

Mr. Norman K. Hayashi
Planning Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Hayashi:

Subject: North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

In response to your June 21, 1991 comments on the subject project, we provide the following:

- a. The Draft EIS will include a Preface to describe the triggering mechanism for compliance with Chapter 343, HRS, and the purpose of the document. The EIS will be used as an informational document for land use approval.
- b. The Draft EIS will discuss State and County land use goals and policies in relationship to the proposed hospital.
- c. The Draft EIS will discuss plans if any, for expansion of existing uses or for proposed developments by the respective property owner on Sites 2 through 7.
- d. A discussion of the traffic generated by the hospital and the potential impacts of this traffic to nearby roads will be included in the Draft EIS. Upon selection of a site, we will evaluate the need for a Traffic Assessment Report.
- e. The Draft EIS will include a chapter discussing the permits and approvals necessary for development of the hospital at any of the candidate sites.



Monday, June 17, 1991

Department of Accounting and General Services
Attn: Gordon Sam
Kalanimoku Building, Room 430
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Sam,

The West Hawaii Sierra Club requests participation in the EIS process for your proposed North Hawaii Community Hospital.

The Executive Committee of the West Hawaii Sierra Club has passed a resolution asking that developers subscribe to the "Valdez Principles". Enclosed is a copy of the Valdez Principles for reference. Should you have any questions concerning the Valdez Principles, please contact us.

Finally, we expect to have additional comments as the EIS process unfolds; please put us on your mailing list.

Thank you for your attention in this matter,

Jay Hanson
Program Chair, West Hawaii Sierra Club,
78-6622 Alii Drive
Kailua-Kona, HI 96740
Phone 322-7268 or 329-6645 Fax 322-7869

The West Hawaii Sierra Club, 75-5995 Kuakini Hwy. #421, Kailua-Kona, HI. 96740

Hawaii's Sierra Club - now over 4,000 strong!

The Valdez Principles

By accepting these Principles, we publicly affirm our belief that corporations and their shareholders have a direct responsibility for the environment. We believe that corporations must conduct their business as responsible stewards of the environment and seek profits only in a manner that leaves the Earth healthy and safe. We believe that corporations must not compromise the ability of future generations to sustain their needs.

We recognize this to be a long-term commitment to update our practices continually in light of advances in technology and new understandings in health and environmental science. We intend to make consistent, measurable progress in implementing these Principles and to apply them wherever we operate throughout the world.

1. Protection of the Biosphere

We will minimize and strive to eliminate the release of any pollution that may cause environmental damage to the air, water, or earth or its inhabitants. We will safeguard habitats in rivers, lakes, wetlands, coastal zones and oceans and will minimize contributing to the greenhouse effect, depletion of ozone layer, acid rain, or smog.

2. Sustainable use of Natural Resources

We will make sustainable use of renewable natural resources, such as water, soils and forests. We will conserve nonrenewable natural resources through efficient use and careful planning. We will protect wildlife habitat, open spaces and wilderness, while preserving biodiversity.

3. Reduction and Disposal of Waste

We will minimize the creation of waste, especially hazardous waste, and wherever possible recycle materials. We will dispose of all wastes through safe and responsible methods.

4. Wise Use of Energy

We will make every effort to use environmentally safe and sustainable energy sources to meet our needs. We will invest in improved energy efficiency and conservation in our operations. We will maximize the energy efficiency of products we produce and sell.

5. Risk Reduction

We will minimize the environment, health and safety risks to our employees and the communities in which we operate by employing safe technologies and operating procedures and by being constantly prepared for emergencies.

JOHN WALKER
CONTROLLER



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 111, HONOLULU, HAWAII 96818

RUSSELL S. NAGATA
COMPTROLLER
ROBERT P. TAYLOR
SENIOR COMPTROLLER

LETTER NO. (P) 1174.1

JUL 11 1991

Mr. Jay Hanson
Program Chair
West Hawaii Sierra Club
78-6622 Alii Drive
Kailua-Kona, Hawaii 96740

Dear Mr. Hanson:

Subject: North Hawaii Community Hospital
Environmental Impact Statement
Preparation Notice (EISPN)

Thank you for your June 17, 1991 comments concerning the North Hawaii Community Hospital EISPN. As requested, we will include the West Hawaii Sierra Club on the mailing list for the Draft EIS.

If you have any further questions regarding the EISPN, please contact Mr. John L. Sakaguchi of Wilson Okamoto and Associates, Inc., our EIS consultant, at 531-5261.

Very truly yours,

RUSSELL S. NAGATA
State Comptroller

6. Marketing of Safe Products and Services

We will sell products or services that minimize adverse environmental impacts and that are safe as consumers commonly use them. We will inform consumers of the environmental impacts of our products or services.

7. Damage Compensation

We will take responsibility for any harm we cause to the environment by making every effort to fully restore the environment and to compensate those persons who are adversely affected.

8. Disclosure

We will disclose to our employees and to the public incidents relating to our operations that cause environmental harm or pose health or safety hazards. We will disclose potential environmental, health or safety hazards posed by our operations, and we will not take any action against employees who report any condition that creates a danger to the environment or poses health and safety hazards.

9. Environmental Directors and Managers

We will commit management resources to implement the Valdez Principles, to monitor and report upon our implementation efforts, and to sustain a process to ensure that the Board of Directors and Chief Executive Officer are kept informed of and are fully responsible for all environmental matters. We will establish a Committee of the Board of Directors with responsibility for environmental affairs. At least one member of the Board of Directors will be a person qualified to represent environmental interests to come before the company.

10. Assessment and Annual Audit

We will conduct and make public an annual self-evaluation of our progress in implementing these Principles and in complying with applicable laws and regulations throughout our worldwide operations. We will work toward the timely creation of independent environmental audit procedures which we will complete annually and make available to the public.

The Valdez Principles were forged by the Coalition for Environmentally Responsible Economies (CERES), a consortium of the Social Investment Forum and 14 national environmental groups. The Social Investment Forum is a national trade association of money managers, brokers, bankers, analysts, and other socially concerned investors that control about 150 billion investment dollars.

The ten Valdez Principles are structured to reward responsible corporate actions with investment dollars, and to withdraw dollars from irresponsible corporations. For example, a state asset manager might eventually sell off stocks in companies that did not pledge to support the principles.

Investors, consumers, and employees can influence corporate behavior by supporting corporations that subscribe to the Valdez Principles. More and more corporate leaders are learning that environmental responsibility is good for business. Vigorous public participation will shorten their learning curves.

16. CONSULTATION - DRAFT EIS

16.1. Agencies, Organizations, and Individuals Consulted During the Draft EIS Phase

The following is a list of agencies, organizations, and individuals who were consulted as part of the Draft EIS Phase. Those consulted parties who responded to the Draft EIS with comment letters are noted with an asterisk. A double asterisk indicates those who provided substantive comments. Letters received and responses to those with substantive comments are shown on the following pages.

FEDERAL AGENCIES

- * U.S. Army Corps of Engineers
U.S. Army Support Command, Directorate of Facilities Engineering
- ** U.S. Department of Agriculture, Soil Conservation Service
U.S. Environmental Protection Agency Region IX
U.S. Department of Interior, Fish and Wildlife Service
U.S. Department of Interior, Geological Survey
- * U.S. Navy, Naval Base Pearl Harbor
U.S. Department of Transportation, Coast Guard

STATE AGENCIES

- ** Department of Agriculture
Department of Accounting and General Services
Department of Business, Economic Development and Tourism
DBEDT Housing Finance and Development Corporation
DBEDT Library
DBEDT State Energy Office
- ** DBEDT State Land Use Commission
- * Department of Defense
- ** Department of Health
Department of Land & Natural Resources
DLNR State Historic Preservation Office
- * Department of Transportation
- ** Office of Environmental Quality Control
Office of Hawaiian Affairs
- ** Office of State Planning
State Archives
- ** University of Hawaii Environmental Center
University of Hawaii Water Resources Research Center
Honokaa Hospital

COUNTY AGENCIES

- Department of Parks and Recreation
- ** Department of Planning
- ** Department of Public Works
- Department of Research & Development
- * Department of Water Supply

LIBRARIES

Legislative Reference Bureau
State of Hawaii Main Library
Kaimuki Regional Library
Kaneohe Regional Library
Pearl City Regional Library
Hilo Regional Library
Wailuku Regional Library
Kauai Regional Library
Honokaa Public Library
Thelma Parker Memorial (Waimea) Library
Bond Memorial (Kohala) Library
University of Hawaii Hamilton Library
University of Hawaii Hilo Campus Library
DAGS Planning Library

OTHER ORGANIZATIONS

- American Lung Association
- * Hawaiian Electric Company
- Lucy Henriques Trust
- ** West Hawaii Sierra Club
- Parker Ranch, Richard Smart Trust
- North Hawaii Community Association

MEDIA

Hawaii Herald Tribune
Honolulu Advertiser
Honolulu Star Bulletin
Sun Press



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

BEV TO
ATTENTION OF

November 15, 1991

Planning Division

Mr. Brian J. J. Choy, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Mr. Choy:

We have reviewed the Site Selection Report and Draft Environmental Impact Statement (DEIS) for a North Hawaii Community Hospital, Waimea, Hawaii. Our previous comments in response to the Preparation Notice (letter dated June 4, 1991) have been incorporated into the DEIS. We have no additional comments.

Sincerely,

James A. Johnson
James A. Johnson
Director of Engineering

Copies Furnished:

State of Hawaii - Department of Accounting
and General Services
Attention: Mr. Gordon Sam
1151 Punchbowl Street, Kalaninokou Building, Room 430
Honolulu, Hawaii 96813

Wilson Okamoto and Associates
Attention: Mr. John Sakaguchi
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

JS



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

BEV TO
ATTENTION OF

Operations Division

Mr. John L. Sakaguchi, Planner
Wilson Okamoto & Associates, Inc.
1159 South King Street
Honolulu, Hawaii 96814

Dear Mr. Sakaguchi:

This is in response to your letter of December 17, 1991 regarding the North Hawaii Community Hospital, Waimea, Hawaii.

Thank you for taking the time to personally deliver a copy of the Draft Environmental Impact Statement (DEIS) to our office and meeting with Mr. Benton Ching of my staff. The DEIS indicates that a drainage culvert will be installed to divert the flow of Kamuela Stream, possibly into Waikoloa Stream. The placement of fill material into streams or other waters of the U.S. would require a Department of the Army permit.

We appreciate your bringing this matter to our attention since it conflicts with previous Department of the Army letters dated February 4 and November 15, 1991.

File No. R092-049 has been assigned to this project. Should you have any questions, please refer to the file number and contact Mr. Benton Ching of my staff at 438-9258.

Sincerely,

Michael K. Lee
Michael K. Lee
Acting Chief, Operations Division

JS



RECEIVED
DEC 23 1991

WILSON OKAMOTO & ASSOCIATES

sub copy to State of Hawaii

SS file

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HAWAII

RECEIVED
DEC 11 1991

December 3, 1991

The Honorable John D. Washee
Governor, State of Hawaii
c/o The Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

WILSON OKAMOTO & ASSOCIATES P.C.F.

91 DE 15 1316

OFFICE OF
QUALITY

Dear Governor Washee:

Subject: Draft Environmental Impact Statement (DEIS) and Site Selection for the North Hawaii Community Hospital, South Kohala, Hawaii

We have reviewed the DEIS for the North Hawaii Community Hospital and would like to offer the following comments.

1) We would like to stress the importance of the erosion and sediment control plan required by the County of Hawaii's Department of Public Works in reducing the potential erosion and sediment impacts of the proposed project. The reduction of soil erosion by water and air will be important in reducing the environmental and public safety effects of the project.

2) We would like to support the protection of Hawaii's "Prime" agricultural lands. Therefore, we would favor location of the proposed project on a site that does not contain a substantial amount of prime agricultural land.

3) Changes in flood water drainage patterns should be kept to a minimum. In order to minimize the adverse impacts to the surrounding areas, only minor alterations should be made to the flood water channels unless the whole system is addressed.

Thank you for the opportunity to comment on this document. We would appreciate the opportunity to review the final EIS.

Sincerely,

Warren H. Lee

WARREN H. LEE
State Conservationist



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS

P. O. BOX 115, HONOLULU, HAWAII 96810

DEC 20 1991

JOHN WASHEE
GOVERNOR

MUSSEL'S WAGATA
COMPTROLLER
COUNTY OF HAWAII
REPORT OF COMPTROLLER

LETTER NO. P12363.1

Mr. Warren Lee
State Conservationist
U. S. Department of Agriculture
Soil Conservation Service
P. O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Lee

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your December 3, 1991 comments concerning the subject project. Our responses to your comments are as follows:

1. We agree with your assessment of the importance of the County's erosion and sediment control plan. Accordingly, during the design phase, we will comply with the County requirements.
2. Your preference for sites that do not contain a substantial amount of prime agricultural land is noted and will be considered in the selection of a final site.
3. We agree that minimal changes in flood water drainage patterns are desirable. However, since the determination of such modifications requires a design effort and time was of an essence, the goal of this planning study was to develop potential alternatives which could be refined during the design phase. For example, although Alternative A of the Flood Hazard Study indicated increases in base flood elevations, modifications of the landfill and channel could reduce or eliminate the increases.

Mr. Warren M. Lee
Page 2

Ltr. No. (P)2363.1



DEPARTMENT OF THE NAVY
COMMANDER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860-5000

JS

UNRECORDED

11011
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21 OCT 1971

(Handwritten initials)

State of Hawaii
Office of Environmental Quality Control
220 South King Street
Honolulu, Hawaii 96813

Gentlemen:

NORTH HAWAII COMMUNITY HOSPITAL SITE SELECTION AND EIS

We have reviewed the subject DEIS and have no comments to offer. Since we have no further use for the DEIS, it being returned to your office.

Thank you for the opportunity to review the draft.

Sincerely,

(Handwritten signature)

W. K. HUI
Assistant Civil Engineer
Commander

Copy to:
DAGS
(Mr. Gordon Sam)
Wilson Okamoto and Associates
(Mr. John Sakaguchi)

We appreciate your input for this project.

Very truly yours,

(Handwritten signature)

TEJUANE TOHINAGA
State Public Works Engineer

EB:jk

JOHN WAIHEE
GOVERNOR



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

53
YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE
ILUMA A. PIHAMAIA
DEPUTY TO THE CHAIRPERSON
FAX: 548-6100

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

JOHN WAIHEE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 118, HONOLULU, HAWAII 96810

RUSSEL S. WADSWORTH
COMPTROLLER
ROBERT S. TAYLOR
STATE COMPTROLLER

LETTER NO. RJ2347-1

November 22, 1991

NOV 29 1991

WILSON OKAMOTO AND ASSOCIATES

TO: Governor, State of Hawaii
c/o Office of Environmental Quality Control

From: Yukio Kitagawa, Chairperson
Board of Agriculture

Subject: North Hawaii Community Hospital Site Selection and
Draft Environmental Impact Statement
Location: Waimea, Hawaii
TMK: 6-7-02:13, 6-7-02:11, 6-7-02:17, 6-8-01:1,
6-6-01:2

The Department of Agriculture has reviewed the Site Selection and Draft Environmental Impact Statement for the North Hawaii Community Hospital. Our comments are provided below.

The Department of Accounting and General Services' proposal to construct a 50-bed, full-service, community hospital for Waimea and the surrounding area is clearly important to the region. Our concern, as we suggested in our comments on the Environmental Impact Statement Preparation Notice (June 14, 1991) is that in choosing among the seven potential sites an effort be made to locate the facility in or adjacent to the State Urban District. We would also prefer that the site which is ultimately selected not contain substantial amounts of land rated as prime for agriculture under the Agricultural Lands of Importance to the State of Hawaii (ALISH) system, as is the case with Sites Three and Four.

Thank you for the opportunity to comment.

c: DAGS
Wilson Okamoto and Associates



DEC 19 1991

Honorable Yukio Kitagawa
Chairperson
Department of Agriculture
State of Hawaii
Honolulu, Hawaii

Dear Mr. Kitagawa:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your November 22, 1991 comments concerning the subject project. Our responses to your comments are that the EIS will be revised as follows:

1. The criterion for a State Land Use rating of "good" will be expanded to include the additional condition of being adjacent to the State Urban District.
2. Criteria that rates sites located within the ALISH system will be added to Section 7.1 Detailed Site Evaluation Criteria. Sites located in "prime" lands will be rated as "poor".

If there are any questions on this matter, please have your staff contact Mr. Earl Bethke of the Public Works Division at 586-0484.

Very truly yours,

RUSSEL S. WADSWORTH
State Comptroller

JOHN WILKINS
DIRECTOR



STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
315 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3022

ESTHER UEDA
EXECUTIVE OFFICER

JOHN WILKINS
DIRECTOR



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

MUSIEL S. HIGASHI
COMPTROLLER
ACCOUNTS & FINANCE
SERVICES DIVISION
LETTER NO. PJ2360.1

October 21, 1991

RECEIVED
NOV 22 1991

WISSEH UNANGIJO & ASSOCIATES

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

Dear Mr. Choy:

SUBJECT: Site Selection Report and Draft Environmental
Impact Statement for a North Hawaii Community
Hospital, Maimea, Hawaii

We have reviewed the subject Site Selection Report and Draft EIS for the proposed Community Hospital and confirm that alternative sites 1, 2, and 4 are within the State Land Use Urban District and sites 5 and 7 are within the State Land Use Agricultural District. As shown on Figure 6.1 of the report, sites 3 and 6 appear to be within both the Urban and Agricultural Districts. However, the discussion on the State Land Use Districts on pages 6-4 and 7-19 of the report points out that all sites except 5 and 7 are within the Urban District.

We suggest that the Final EIS clarify this matter so that both the map and text refer to the same land use district designation(s) of alternative sites 3 and 6.

We have no other comments at this time. If you have any questions, please call me or Bert Saruwatari of our office at 587-3022.

Sincerely,

ESTHER UEDA
Executive Officer

EU:dyk

cc: DBED&T
Gordan Sam
John Sakaguchi

DEC 18 1991

Ms. Esther Ueda
Executive Officer
Land Use Commission
Department of Business,
Economic Development and Tourism
335 Merchant Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Ueda:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your October 21, 1991 comments which highlighted the discrepancy between the map and text descriptions of State Land Use Districts concerning the subject project. Accordingly, the EIS will be revised to indicate that Sites 3 and 6 are within the Urban and Agricultural Districts.

We appreciate your input for this project.

Very truly yours,

TEUANE TOMINAGA
State Public Works Engineer

EB:jk



STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 OFFICE OF THE ADJUTANT GENERAL
 3445 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96813

1 JS

EDWARD V. HONOLULU
 ADJUTANT GENERAL
 STEVEN M. HALEWAI
 COLONEL
 DEPUTY ADJUTANT GENERAL

October 16, 1991

Engineering Office

RECEIVED
 OCT 17 1991

Governor, State of Hawaii
 c/o Office of Environmental Quality Control
 220 South King Street, 4th Floor
 Honolulu, Hawaii 96813

WILSON OKAMOTO & ASSOCIATES

Gentlemen:

Subject: North Hawaii Community Hospital

Thank you for providing us the opportunity to review the above mentioned site selection study and draft environmental impact statement.

We have no comments to offer at this time regarding the project.

Sincerely,

Jerry M. Matsuda
 Jerry M. Matsuda
 Lieutenant Colonel
 Hawaii Air National Guard
 Contracting and Engineering Officer

Enc. (1)

c: Department of Accounting and
 General Services
 Wilson Okamoto and Associates

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



JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

The Honorable John Waihee
December 11, 1991
Page 2
91-381

RECEIVED
DEC 18 1991

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96811

IN REPLY, PLEASE REFER MR.

December 11, 1991

91-381/epo

WILSON OKAMOTO & ASSOCIATES

To: The Honorable John Waihee
Governor, State of Hawaii
c/o Director, Office of Environmental Quality Control

From: John C. Lewin, M.D. *John C. Lewin*
Director of Health

Subject: Site Selection Report and Draft
Environmental Impact Statement (EIS) for a North Hawaii
Community Hospital, Waimea, Hawaii

We have reviewed the subject document and have the following
comments to offer:

Wastewater

The subject project is located within the critical wastewater
disposal area that has a five (5) acre lot exception. It is not
serviced by a County sewer system.

For the present time, we concur with the plan to install a
private wastewater treatment facility utilizing a leaching field
system to handle the wastewater from the hospital. We recommend
that the final EIS include a commitment from the developers to
create or connect to a regional or subregional wastewater system.
Furthermore, the final EIS should include a realistic time
schedule for the development and construction of this wastewater
system as well as the elimination of the on-site wastewater
treatment facility.

Domestic wastewater disposal by means of the on-site wastewater
system method is acceptable, provided that the wastewater system
meets all of the applicable requirements of the Department of
Health Administrative Rules, Chapter 11-62, "Wastewater Systems."
However, we are also concerned with any non-domestic wastewater
generated. Conventional treatment works may not be appropriate
for such wastes. Detailed plans for both domestic and non-
domestic wastewater treatment systems must be submitted to and
approved by the Department.

If you should have any questions, please contact Ms. Lori
Kajiwara of the Wastewater Branch at 586-4290.

SOLID WASTE

As the State Legislature has established aggressive goals for
waste reduction as part of the Integrated Solid Waste Management
Act (Act 324-91), all state facilities should develop programs to
assist in meeting those goals. Specifically, three programs
should be developed during the design process aimed at reducing
the volume of waste by 25 percent by the year 1995 and 50 percent
by the year 2000. These programs are: spacial, operational, and
educational. Programs to address these 3 waste reduction
programs should be included in the final EIS.

If you should have any questions regarding this matter, please
contact Mr. John Harder of the Solid Waste Office at 586-4227.

Noise

The facility should be designed to minimize potential noise
impacts on adjacent residences from stationary equipment, such as
air conditioning units and exhaust fans.

State rules pertaining to vehicle and construction noise apply
only to Oahu; however, mitigative measures toward minimizing
these noise disturbances should be implemented in Waimea.

If you should have any questions regarding this matter, please
contact Mr. Jerry Haruno of the Noise Branch at 548-3075.

- c: Wastewater Branch
Hawaii District Health Office
Noise and Radiation Branch
Solid Waste Office
Department of Accounting and General Services
Wilson Okamoto & Associates

FORM 4-1987
5-10-82



RUSSEL S. MAGATA
COMPTROLLER
ROBERT P. LEWIS
SECRETARY
MERRY CHRISTOPHER
ASST. COMPTROLLER

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

LETTER NO. (P)1072.2

JAN 29 1992

Honorable John Lewin
Director
Department of Health
State of Hawaii
Honolulu, Hawaii

Dear Dr. Lewin:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your December 11, 1991 comments concerning the subject project.

Wastewater:

The detailed wastewater treatment plan for the proposed hospital has not yet been developed. However, given the location of the hospital, the plan is to install a private wastewater treatment facility using a leaching field system. Construction of regional or subregional wastewater system will have to be developed by Hawaii County or by a combination between the public and private sectors. To date, no schedule for construction of such a system has been established.

The Project Development Report for the proposed hospital does not include facilities for an in-house laundry. As requested, detailed plans for treatment and disposal of non-domestic wastewater will be submitted to the Department of Health for appropriate approvals.

Solid Waste:

Detailed design plans for the proposed hospital have not yet been developed. However, Section 8.2.10.4 of the final EIS will state the need to provide space for the collection and storage of recyclable material. The proposed hospital has not hired a

Honorable John Lewin
Page 2

ltr. No. (P)1072.2

person who would be responsible to develop an operational plan to reduce the generation of solid waste. The final EIS in Section 8.2.10.4 will discuss Act 324-91 and its stated goal of reducing the amount of solid waste generated by facilities throughout the State. The need of the proposed hospital to educate employees in the various areas of the hospital about the solid waste reduction goals will also be stated in Section 8.2.10.4.

Noise:

As previously stated, detailed design plans for the proposed hospital have not yet been developed. The final EIS will include a discussion about mitigation measures to reduce the impacts of noise from the hospital on adjacent land uses.

We appreciate your input for this project.

Very truly yours,

RUSSEL S. MAGATA
State Comptroller

EM

and after appropriate review JS

BRIAN J.J. CHOY
Director



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

720 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813

RECEIVED
OCT 28 1991

WILSON OKAMOTO & ASSOCIATES
October 28, 1991

JOHN BLANCK

EDWARD Y. HIRATA
DIRECTOR
AL PANG
JOYCE T. OAHNE
JEANNE K. SCHULTZ
CALVIN M. TSUDA
IN REPLY REFER TO

HNY-PS
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NOV 01 1991

WILSON OKAMOTO & ASSOCIATES



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION

801 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

OCT 30 1991
October 25, 1991

QUALITY

MEMORANDUM

TO: Governor, State of Hawaii
c/o Office of Environmental Quality Control

FROM: Edward Y. Hirata, Director
Department of Transportation

SUBJECT: NORTH HAWAII COMMUNITY HOSPITAL
SITE SELECTION REPORT AND DEIS

Mr. Gordon Sam
Department of Accounting and General Services
1151 Punchbowl Street, Room 430
Honolulu, HI 96813

Dear Mr. Sam:

Re: Site Selection Report and Draft Environmental Impact Statement for a North Hawaii Community Hospital, Waimea, Hawaii.

We have reviewed the above DEIS and would like to offer the following comments:

- o Please include the phasing and timing of the proposed action; and
- o you may also want to verify page 7-10, paragraph 7.2.1.3 (related to sites rated on land productivity). Sites 1, 2, 3, 4 are rated "B" = good (not "poor"). Site 6 is rated "E" = very_poor (not "good").

If you have any questions or wish to discuss our comments, please contact Eva Tasaki at 586-4185.

Sincerely,

Brian J.J. Choy
Director

Thank you for your transmittal requesting our comments on the subject project.

We do not anticipate that the proposed hospital will have an adverse impact on our State Highway System. Construction plans for work within the highway rights-of-way, however, must be submitted for our review and approval.

c: Wilson Okamoto and Associates, Inc.



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS

P. O. BOX 111, HONOLULU, HAWAII 96810

ROBERT S. HAGAATA
COMPTROLLER
ROBERT E. FALGOUT
GENERAL COUNSEL

LETTER NO. (P) 2387.1

JAN 2 1992

Mr. Brian J. J. Choy
Director
Office of Environmental
Quality Control
Central Pacific Plaza
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your October 28, 1991 comments concerning the subject project. Our responses to your comments are as follows:

1. The exact timing and phasing for the proposed hospital have not been determined at this time.
2. Pages 7 to 10, Section 7.2.1.3 discusses the criteria ratings of the candidate sites which are diametrically opposite to the master productivity ratings of agricultural potential. As discussed, a candidate site on land with a high productivity rating is given a low criteria rating because selection of that site would result in the loss of productive land. The EIS will be revised to clarify this observation.

If there are any questions on this matter, please contact Mr. Earl Bethke of the Planning Branch at 586-0484.

Very truly yours,

J. Tohinaga
TEUANE TOHINAGA
State Public Works Engineer

EB:jk



OFFICE OF STATE PLANNING

Office of the Governor

MAILING ADDRESS: P.O. BOX 2442 HONOLULU, HAWAII 96824
STREET ADDRESS: 500 SOUTH HOTEL STREET, 5TH FLOOR
HONOLULU, HAWAII 96813-1600

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
LETTER NO. (P) 2316-1



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 111, HONOLULU, HAWAII 96819

JOHN WAIKIKE
GOVERNOR

November 7, 1991

MIYU KAWAHINI

TO: The Honorable John Waiikike, Governor
State of Hawaii
c/o Office of Environmental Quality Control

SUBJECT: Draft Environmental Statement (DEIS)
for the North Hawaii Community Hospital
Waimea, Hawaii
DMK's: 6-7-92: 13, 6-7-92: 11, 6-7-92: 17,
6-8-91: 1, 6-8-91: 2

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NOV 13 1991

WILSON UKAMOTO & ASSOCIATES

We have reviewed the Draft Environmental Impact Statement (DEIS) proposing the construction of the North Hawaii Community Hospital (NHCH). The proposed hospital will occupy 5 to 7 acres of land at one of the seven sites listed. Preliminary estimates indicate that the proposed hospital would cost \$25 million to construct. It is our understanding that the State appropriated \$12.5 million for the construction and the remaining balance is to be raised by NHCH. Once construction is completed, NHCH will be solely responsible for the maintenance and operation of the proposed hospital.

As we discussed in our previous comments dated June 7, 1991, the hospital will attract urban activities and services. Therefore, the selected site should allow for reasonable expansion with minimal infrastructural and visual impacts on the surrounding area.

Thank you for the opportunity to comment. Should you have any comments, please feel free to call me or the Land Use Division at 548-2066.

Harold S. Masumoto
Harold S. Masumoto
Director

cc: Mr. Gordon Sam, IAGS
Mr. Douglas Tom, CZM
Mr. John Sakaguchi, Wilson Ukamoto & Assoc.

Mr. Harold Masumoto
Director
Office of State Planning
State of Hawaii
Honolulu, Hawaii

Dear Mr. Masumoto:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your November 7, 1991 comments concerning the subject project. Please note that future expansion of the proposed facility was a consideration in the determination of the minimum site size of five acres. The actual area set aside for expansion will be determined after final site selection and during development of the site layout plan, which will consider minimal infrastructural and visual impacts on the surrounding area.

If there are any questions on this matter, please contact Mr. Earl Bethke of the Public Works Division at 586-0484.

Very truly yours,

Earl Bethke
Earl Bethke
State Comptroller

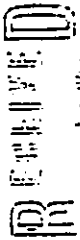


University of Hawaii at Manoa

Environmental Center
A Unit of Water Resources Research Center
1900 East-West Avenue, Honolulu, Hawaii 96822
Telephone: (808) 957-7161

Honorable Governor John Waihee
State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813
Dear Governor Waihee:

November 22, 1991
RE:0593



WATER SUPPLY PROGRAMS

Draft Environmental Impact Statement (EIS)
North Hawaii Community Hospital
South Kohala, Hawaii

The proposed North Hawaii Community Hospital will be a 50-bed facility with 30 beds allotted to acute care and the remaining 20 to skilled nursing. The hospital will provide medical services to residents of Kohala and the surrounding communities in North Hawaii. Each of the seven candidate sites occupies five to seven acres in near proximity to the existing Lucy Henriques Medical Center. The development of the proposed hospital will be funded by the State, various private foundations, and hospital revenues.

Our comments on the North Hawaii Community Hospital project were prepared with the assistance of Harlan Hashimoto and Arthur Kodama of the School of Public Health; and Alex Iuttaro of the Environmental Center.

Evaluation of Candidate Sites

We note the six evaluation criteria and the established ratings of good, fair, or poor, appear thoughtfully formulated in the "Evaluation of Candidate Sites" (Chapter 7). The "totals" given in Table 7.2 (page 7-25) are accurate if one assumes that all six criteria are weighted equally. However, we suggest that there may be differences in the relative importance of the parameters. While the preparer of the study may choose not to utilize a weighted analysis, the alternative of weighted categories should be noted somewhere in the text to better inform the committee responsible for making the final selection. We believe a weighted scale will more accurately and realistically reflect the true financial costs and long-term impacts of the proposed hospital.

Governor John Waihee
November 22, 1991
Page 2

Water Supply

Our reviewers note there may be no source of water presently available for this project. The Draft EIS states the Puukapu source's proposed expansion depends on the availability of 1.6 MGD that according to this document, "is committed to serve existing lots and planned and approved projects" (Section 8.2.10.1, page 8-21). Is the proposed hospital one of the "planned and approved projects" mentioned in the Draft EIS? If not, how are its developers prepared to mitigate the possible adverse effects that may result from the withdrawal of significant quantities of water from a source which is already expected to be at maximum capacity without the proposed project? The developer should determine which water source options will be chosen prior to the issuance of the Final EIS. The Final EIS should discuss the potential impacts and mitigative proposals of the chosen water source in greater detail than in the Draft EIS.

Sewer Service

According to the Draft EIS, a sewage treatment system has not been chosen at the time this document was published.

The statement, "Adherence to the DOI Rules will mitigate adverse environmental effects from the wastewater treatment system" (Section 8.2.10.2, page 8-23), is an assertion placing ultimate accountability for environmental problems on regulatory policies articulated by the DOI. In the event of any wastewater related problems, adherence to DOI rules should help to mitigate any adverse environmental impacts. However, the developer's attempted adherence to the DOI's rules does not, in itself, eliminate the possibility of adverse impacts. The absolute language of this statement may be misleading and, therefore, we recommend that it be changed or omitted from the Final EIS.

Additionally, the Draft EIS states that the DOI Rules requires that "The draft EIS shall contain a statement of the probable impact of the proposed action on the environment" (Chapter 200 of Title 11 Administrative Rules, Section 11-200-17(1)). How can the developer of this project know what the probable impacts of the wastewater treatment system will be if a system has not been chosen?

Summary

In general, we find the document informative, well organized, and adequately addressed many of the potential environmental impacts of the proposed project. However, if water supply and sewage treatment issues remain unresolved in the Final EIS, the document may be considered inadequate because of its failure to address possible significant impacts caused by the proposed hospital's water use and disposal.

Governor John Wallace
November 22, 1991
Page 3

Thank you for the opportunity to review this Draft EIS document and we hope you will find our comments helpful.

Sincerely,

John T. Harrison
John T. Harrison, Ph.D.
Environmental Coordinator

cc: DMCS
Wilson Okamoto and Associates
Roger Fujioka
Harlan Washimoto
Arthur Kodama
Alex Buttaro



DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 113, HONOLULU, HAWAII 96810

JAN 29 1992

Dr. John T. Harrison
Environmental Coordinator
Environmental Center
University of Hawaii at Manoa
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Dear Dr. Harrison:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your November 22, 1991 comments concerning the subject project. Our responses to your comments are as follows:

Evaluation of Candidate Sites:

The use of weights for the evaluation criteria was considered in the site selection process. However, use of weights would involve qualitative judgements which may appear to be manipulation of the results.

Water Supply:

At this time, the policy of the County is to restrict water allocation for new users in Waimea to residential or small commercial users, or up to 4,200 gallons per day. As stated in the draft EIS, the County of Hawaii has not yet begun the process of identifying and developing a water source for the Waimea area. However, the Hawaii County Water Plan identifies a potential high level water source which could be developed to provide water for the Waimea area. Given the County's restriction on new users, this source, or some other source, will have to be developed prior to construction of the proposed hospital to ensure sufficient water for operation of the facility. If the County does not develop this source, the proposed hospital may have to identify

RUSSEL S. HADATA
COMPTROLLER
ROBERT P. TAMURA
TREASURER
LETTER NO. P11074.2

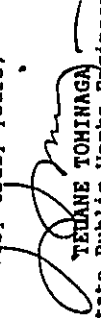
and develop a source either with its own funds or in conjunction with County or other private users. Regardless of the water source developer, prior to implementing exploration, testing and development, studies will have to be conducted to protect against adverse effects to the identified aquifer.

Sewer Service:

Please note, the specific site development plans for the proposed hospital, including the infrastructure plans, have not yet been prepared. Regulation of individual wastewater treatment systems is under the jurisdiction of the Department of Health (DOH). As such, prior to construction of any system, the plans must be approved by the DOH. The approval process is intended to ensure the proposed system complies with applicable rules and procedures which have been designed to mitigate adverse environmental impacts. Thus, even if the proposed treatment system has not been identified, the adherence to the DOH rules should protect against adverse impacts. Section 8.2.10.2 will be revised to reflect the statement that adherence to DOH rules should help to mitigate adverse environmental impacts.

We appreciate your input for this project.

Very truly yours,


TEDANE TOMIHAGA
State Public Works Engineer

EB:jk



Planning Department

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

Lorraine R. Inouye
Mayor

Norman K. Hayashi
Director

Tad Nagasaki
Deputy Director

Mr. Brian Choy, Director
November 22, 1991
Page 2

November 22, 1991

Mr. Brian Choy, Director
Office of Environmental Quality
Control
220 South King Street
Central Pacific Plaza, 4th Floor
Honolulu, HI 96813

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
November 29 1991
WILLIAM NAGATA

Dear Mr. Choy:

Site Selection and Draft Environmental
Impact Statement
North Hawaii Community Hospital

We have reviewed the site selection and draft EIS document for the proposed North Hawaii Community Hospital and have the following comments:

1. According to the EIS, sites 2 and 7 have not been surveyed by an archaeologist. Archaeological surveys for all sites need to be conducted and the final reports should be appended as part of the draft EIS, not the final EIS. It should be noted that the July 30, 1991 response letter from Russell Nagata (DAGS) to William Paty (DLNR) states:
"Archaeological inventory surveys of all the candidate sites will be conducted and the reports will be included in the EIS."
2. On Page 12-1 roadway improvements have been listed as an unresolved issue. Further studies to determine whether measures as road widening, signalization, holding lanes, etc. should be completed for each site and part of this EIS.
3. On Page 8-26, HELCO is alleged to have sufficient generation, transmission and distribution capacity to adequately provide this facility with electrical service. There are no numbers and there is no statement from HELCO to support this point.

4. It is unclear if the proposed facility will be designed for air conditioning; however, air conditioning will increase electrical demand. Secondly, average temperatures are in the mid 60's so air conditioning doesn't seem necessary. With this case, it means windows will be open; and as such, analysis of traffic noise and its impacts to patients and hospital operations should be discussed.
5. The need to handle toxic and hazardous waste is discussed; however, the actual process by which such waste is handled is not specifically discussed in the EIS. As there are no toxic and hazardous waste disposal facilities on the island, how will the toxic and hazardous wastes be disposed?
6. The UIC requirements need to be discussed especially with how sewage will be disposed of. Injection wells may not be allowed and therefore, other sewage disposal alternatives need to be discussed in greater detail.
7. What is the preferred alternative?

Should you have any questions, please feel free to contact Alice Kawaha of this office.

Sincerely,

NORMAN K. HAYASHI
Planning Director

AK:smo
3798D
cc: Gordon Sam, DAGS
John Sakaguchi



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS

P. O. BOX 111, HONOLULU, HAWAII 96819

RUSSEL S. MAGUIA
COMPTROLLER
ROBERT P. YAMAGUCHI
SENIOR COMPTROLLER

LETTER NO. (P)1075.2

Mr. Norman K. Hayashi
Page 2
Ltr. No. (P)1075.2

JUN 20 1992

Mr. Norman K. Hayashi
Planning Director
Planning Department
County of Hawaii
25 Aupuni Street, Room 109
Hilo, Hawaii 96720

Dear Mr. Hayashi:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your November 22, 1991 comments concerning the subject project. Our responses to your comments are as follows:

1. Right-of-entry to Candidate Sites 2 and 7 had not been received from the Board of Land and Natural Resources at the time the draft EIS was published. The final EIS will contain the complete archaeological reports.
2. The site development plan for the proposed hospital has not yet been prepared. As such, detail information have not been developed for parameters such as site access plans, entrance/exit lanes, turning lanes, acceleration/deceleration lanes, road widening, signalization, holding lanes, and other design plans for access to adjacent roads. Once the site has been selected, the site plans with these parameters will have to be developed and approved by the appropriate State and County agencies. It would be premature to develop such plans at this time.
3. HELCO has commented to the draft EIS that distribution lines along Mamalahoa Highway and Kawaihae Road and the Kamulea and Lailamilo substations are adequate to serve the proposed hospital. HELCO has also stated that it is their plan to add 20 megawatts (MW) of generating capacity to their Keeku

plant during 1992, to add another 20 MW of general capacity to their West Hawaii plant in 1994, and to add 25 MW of capacity from geothermal sources sometime next year.

4. The proposed hospital is to be designed for air conditioning. This is consistent with the other State hospitals on Hawaii. The final EIS will note the use of air conditioning in the proposed hospital. Normally, depending on the exact construction method and type of window glass used, a closed facility with air conditioning will result in a 20 to 25 decibel (dB) reduction in the interior noise levels from exterior ambient conditions. Thus, if the exterior noise levels are in the 60 to 65 dB range, the interior levels would be in the 40 to 45 dB range. This noise level is well within the accepted range for interior noise.

5. The proposed hospital has not yet developed procedures to handle hazardous and toxic wastes on the facility. However, as stated in the draft EIS, the collection and storage of these wastes prior to disposal is subject to Federal and State rules and regulations. The proposed hospital will have to follow these procedures for collection, storage, and disposal of hazardous waste. Since there are no hazardous waste disposal facilities on Hawaii County, depending on the amount and type of waste, such material will have to be transported either to Oahu or a mainland site for proper disposal. The proposed hospital will have to contract for this transport and disposal to companies engaged in this type of business.

6. The proposed hospital is located within the critical wastewater disposal area. The wastewater treatment and disposal system for the proposed hospital has not yet been developed. However, the State of Hawaii Department of Health (DOH) has stated their concurrence with a plan that would use a private wastewater treatment facility and leaching field system. The DOH has also stated that wastewater disposal by means of an on-site wastewater system is acceptable, provided the wastewater system meets all of the applicable requirements of DOH Administrative Rules, Chapter 11-62, "Wastewater Systems."

Mr. Norman K. Hayashi
Page 3

Itr. No. (P)1075.2

7. No preferred candidate site has been selected at this time. The selected site will be determined after the final EIS has been filed.

We appreciate your input for this project.

Very truly yours,



TEUANE TOMINAGA
State Public Works Engineer

EB:jk



Department of Public Works

County of Hawaii - 25 Aupuni Street, Room 202 - Hilo, Hawaii 96720 - (808) 961-8321 - Fax (808) 969-7138

Lorraine B. Inouye
Mayor
Bruce C. McClure
Chief Engineer
Laurence E. Capellas
Deputy Chief Engineer

December 23, 1991

RECEIVED
DEC 24 1991

WILSON OKAMOTO & ASSOCIATES

MR RUSSELL S. MAGATA, COMPTROLLER
DEPARTMENT OF ACCOUNTING & GENERAL SERVICES
STATE OF HAWAII
1151 PUNCHBOWL STREET
HONOLULU HI 96813

SUBJECT: SITE SELECTION REPORT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR A NORTH HAWAII COMMUNITY HOSPITAL
Applicant: State of Hawaii
Location: Waimea, South Kohala, Hawaii
TP#: 6-7-02: 13, 6-7-02: 11, 6-7-02: 17, 6-8-01: 1, 6-6-01: 2

We have recently received the subject report and are in the process of completing our comprehensive review. We will be forwarding our detailed comments as soon as possible. In the meantime, we have reviewed the Flood Hazard related impacts and proposed mitigative measures and have the following comments to offer:

1. The proposed improvement shall conform to applicable sections of Hawaii County Code, Chapter 27 - Flood Control and County of Hawaii Storm Drainage Standards.
2. Natural gullies or streams such as Kamuela Stream shall not be replaced with a closed system except at roadway crossings according to our Storm Drainage Standards.
3. The proposed improvements will alter existing Flood Hazard Areas and shall therefore be required to obtain a (LOHR) approval from FEMA prior to approval for any construction activity within the Flood Hazard Area.
4. Although construction of this proposed facility is permitted, if in compliance with applicable Building, Flood Control and other applicable codes and statutes, we are very concerned that a critical support facility is being proposed within and adjacent to a Flood Hazard Area. We strongly recommend that this facility be located

Letter to Russell S. Magata, Comptroller
December 23, 1991
Page 2

well outside any identified or known hazard areas. It is our opinion that it is critical for this facility to be fully operational especially during periods of disaster and not be distracted by its own proximity to a flood hazard area. The proposed mitigation measures will only function properly if all design assumptions are met (i.e. drainage facility maintained properly, no debris problems, design storm not exceeded, etc.). We recommend that this hospital facility meet a higher design standard and degree of protection than is required for residential or commercial facilities.

If you have any questions, please call Glenn Okada at 961-8327.

ROBERT J. YANABU, Division Chief
Engineering Division

GO:byf

cc: Wilson, Okamoto & Associates, Inc.
Attention: John Sakaguchi



Department of Public Works

County of Hawaii - 25 Aupuni Street, Room 202 - Hilo, Hawaii 96720 - FAX (808) 969-7138

RECEIVED:

Lorraine R. Inouye
Mayor

Bruce C. McClure
Chief Engineer

Laurence E. Capellas
Deputy Chief Engineer

January 21, 1992

State P.W. Eng.	Approval
P.W. Survey	Sign
Spec. Serv. Br.	Info
Planning Br.	File
Proc. Mgmt. Br.	See me
Design Br.	Comments
Inspection Br.	Report

MR. RUSSELL S. NAGATA, COMPTROLLER
DEPARTMENT OF ACCOUNTING & GENERAL SERVICES
STATE OF HAWAII
1151 PUNCHBOWL STREET
HONOLULU HI 96813

SUBJECT: SITE SELECTION REPORT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR A NORTH HAWAII COMMUNITY HOSPITAL

Applicant: State of Hawaii
Location: Waimea, South Kohala, Hawaii
TRK: 6-7-02: 11, 13 & 17; 6-8-01: 1; 6-6-01: 2

We have reviewed the subject report and have the following comments to offer:

1. We disagree with the results of the traffic impact analysis. In particular, with LOS B and C at the Lindsey Road/Mamalahoa Highway intersection during the AM and PM peak hour, respectively. We believe LOS is closer to E and F or capacity during the peak hours.
2. Traffic improvements shall be provided at the proposed hospital entrance at Mamalahoa Highway, including channelized intersection, street lights and traffic signals when warranted.
3. We suggest that your solid waste management plan be discussed with John Harder of your Solid and Hazardous Waste Branch. He is a good resource and should be able to assist in developing a workable plan.
4. The North Kohala area is serviced by the Kaauahu (North Kohala) Transfer Station. We presently allow commercial use of this facility, however, when the new West Hawaii Landfill is opened, commercial use will probably be banned.
5. Be advised that the County of Hawaii may have a commercial tipping fee in the near future. Commercial haulers as well as businesses who choose to self-haul will be assessed a user fee at landfills and selected transfer stations; and we are not planning to exempt government agencies.

Letter to Mr. Russell S. Nagata, Comptroller
January 21, 1992
Page 2

6. Due to the extremely limited capacity of the old Kailua landfill, construction wastes will be prohibited at this landfill and all transfer stations island-wide until the new West Hawaii Landfill is completed and in operation. Construction wastes may be brought to the Hilo Landfill, however, the contractor will be responsible to provide all necessary labor, equipment materials and supplies to properly landfill his waste.

In addition, please refer to our previous letter dated December 23, 1991, for additional comments of Flood Hazard related impacts. If you have any questions, please call Glenn Okada at 961-8327.

[Signature]
ROBERT K. YANABU, Division Chief
Engineering Division

GO:byf



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS

P. O. BOX 118, HONOLULU, HAWAII 96810

APR 3 1992

FORSET & HIGGINS
CONSULTANTS
PO BOX 11402
HONOLULU, HAWAII
LETTER NO. (P)1274.2

Mr. Robert K. Yanabu
Page 2

Ltr. No. (P)1274.2

Mr. Robert K. Yanabu
Division Chief
Engineering Division
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Yanabu:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your December 23, 1991 and January 21, 1992 comments concerning the subject project. Our responses to your comments are as follows:

1. Flood Hazard

- a. The EIS will state that improvements within the flood hazard area will conform to Hawaii County Code, Chapter 27 - Flood Control and County of Hawaii Storm Drainage Standards.
- b. Subsequent to publication of the Draft EIS, a number of meetings were held with our consultants and representatives of the Department of Health and North Hawaii Community Hospital to discuss the flood hazard issue, Hawaii County standards and the proposed closed drainage system. Most recently, a meeting was held in Hilo on March 13, 1992 with participants from your Department of Public Works, North Hawaii Community Hospital, Parker Ranch and our consultants to further discuss the flood hazard issue. Based on the discussions at that meeting, the closed culvert mitigation set forth in the Draft EIS will no longer be considered by the hospital at the Lucy Henriques site. If the Lucy Henriques site is selected, the design of the facility will be closely coordinated with your office.

2. Traffic

- c. The EIS will state that an approval will be required from the Federal Emergency Management Agency (FEHA) prior to construction within the flood hazard area.
 - d. Your concern regarding the location of the proposed hospital within and adjacent to a flood hazard area is appreciated and will be discussed in the EIS. As discussed above, if the final site selected is within a flood hazard area, the design of the facility will be coordinated with your office.
- a. The traffic information and level of service (LOS) discussed in the Draft EIS are based on actual traffic counts taken at the intersection of Mamalahoa Highway and Lindsey Road, the traffic light timing, and lane width analysis. The traffic counts were made in early summer 1990 and used for a shopping center project completed in June 1990.
 - b. Upon selection of a final site, the design of the facility will be initiated and coordinated with your office. Traffic impacts in the immediate vicinity of the selected site will be studied in greater detail as a basis for designing vehicular and pedestrian access to the hospital. The need for improvements such as channelized intersections, signalization and lighting will be considered at that time.

3. Solid Waste

- a. A solid waste management plan will be coordinated with the Solid Waste Office of the State of Hawaii Department of Health.
- b. We appreciate the information regarding the possible ban of commercial use of the Kaunahu Transfer Station.
- c. The EIS will state that a commercial tipping fee may be imposed on commercial haulers using County landfills.

Mr. Robert K. Yanabu
Page 3

Ltr. No. (P)1274.2

- d. The information provided on the prohibitions and conditional uses of the Kailua, Hilo and new West Hawaii landfills will be included in the EIS.

We appreciate your input to this project.

Very truly yours,



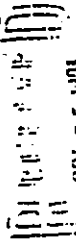
TEVANE TOMINAGA
State Public Works Engineer

EB:jk



October 22, 1991

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
25 AUPUNI STREET • HILO HAWAII 96720
TELEPHONE (808) 939-1421 • FAX (808) 939-6996



OCT 25 1991

OCT 24 1991

DEPARTMENT OF WATER SUPPLY
QUALITY CONTROL

Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, HI 96813

SITE SELECTION REPORT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR A NORTH HAWAII
COMMUNITY HOSPITAL
WAIHEA, HAWAII

Thank you for the opportunity to review the above subject. The Department has no
comments at this time.

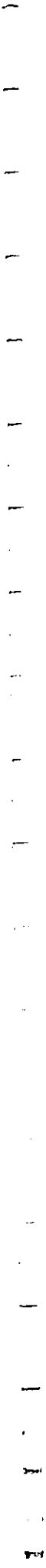
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Manager

DL

and copy to appropriate parties

File

... Water brings progress...



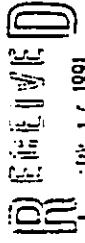
Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840 000

JS



William A. Bonnet
Manager
Division of Public Works

November 13, 1991



Governor, State of Hawaii,
c/o Office of Environmental
Quality Control
220 South King Street
Honolulu, HI 96813

WILSON OKAMOTO & ASSOCIATES

Dear Governor:

Subject: Draft Environmental Impact Statement (DEIS) for the
North Hawaii Community Hospital
Site Selection and EIS
THK: 6-7-02:13, 6-7-02:11, 6-7-02:17
6-8-01:1, 6-6-01:2

We have reviewed the subject DEIS, and have the following comments
on the proposed project in the subject area:

1. Hawaii Electric Light Company (HELCO) has main overhead distribution lines along Mamalahoa Highway and Kawaihae Road adjacent to the subject parcels. These distribution lines are served from our Kamuela and Lalamilo Substations which are adequate to serve the subject parcels.
2. If an automatic transfer scheme is required for reliability, an additional feeder must be constructed from Kamuela, Lalamilo or Puukapu Substation.
3. HELCO recommends installation of a back-up generator to support the hospital's critical loads.

HELCO shall reserve further comments pertaining to the protection of existing powerlines bordering and servicing the area until construction plans are finalized.

Sincerely,
William A. Bonnet

cc: Mr. Gordon Sam, Dept. of Accounting and General Services
Mr. John Sakaguchi, Wilson Okamoto and Associates

HELCO Company



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96819

DEC 16 1991

Mr. William A. Bonnet
Manager
Environmental Department
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Bonnet:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your November 13, 1991 comments concerning the subject project. We appreciate the additional information on distribution lines within the area which will be included in the EIS. Please be assured that we will coordinate the design of the electrical system for the proposed hospital with HECO, including the need for an automatic transfer scheme and a back-up generator.

If there are any questions on this matter, please contact Mr. Earl Bathke of the Planning Branch at 586-0484.

Very truly yours,
Teuane Tomihana
TEUANE TOMIHANA
State Public Works/Engineer

EB:jk

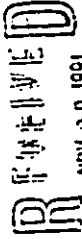
MARCEL E. HAGATA
COMMUNICATIONS
RECEIVED
LETTER NO. P12345.1

JS



Forests

Seas



November 13, 1991

Wilson Okamoto and Associates
Mr. John Sakaguchi
1150 South King Street, Suite 800
Honolulu, HI 96814

WILSON OKAMOTO & ASSOCIATES
NOV 20 1991

Dear Mr. Sakaguchi,

After reviewing the "SITE SELECTION REPORT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR A NORTH HAWAII COMMUNITY HOSPITAL", dated October, 1991, we find that your draft EIS fails to adequately address the impacts of hazardous waste, the impacts of additional waste on the Kona Hospital incinerator, the impacts of nuclear medicine and the impacts of additional power requirements on HELCO'S energy grid.

Please supply more information on the following items:

CONCERNING HAZARDOUS WASTE

1. Please describe in more detail exactly which hazardous wastes might be generated at the new hospital and in what quantities.
2. Please reveal exactly how hazardous waste will be disposed of.
3. How are hazardous wastes from the Kona Hospital presently being disposed of.

West Hawaii Sierra Club - PAGE 1 of 4

Hawaii's Sierra Club - now over 4,000 strong!

CONCERNING IMPACTS ON THE KONA HOSPITAL INCINERATOR

1. What is the capacity of the Kona Incinerator?
2. How much material is presently burned in the Kona Incinerator?
3. How much material that requires burning is expected to be produced by the new hospital?
4. Please describe the training required to operate the Kona Incinerator. Have the operators Kona Incinerator been certified by the American Society of Mechanical Engineers?
5. Does the Kona Incinerator operate on "no burn" days?
6. Are any materials associated with nuclear medicine presently burned in the Kona Incinerator?
7. Which state agency monitors emissions from the Kona Incinerator?
8. How frequently are emissions from the Kona Incinerator tested?
9. When was the last time that emissions from the Kona Incinerator were tested?
10. Which hazardous materials (dioxin, cadmium, benzene, polycyclic aromatic hydrocarbons, lead, mercury, nitrogen oxides, sulfur dioxide, hydrochloric acid, etc.) are found in the Kona Incinerator's airborne emissions. Please include the test results from the last emission test.
11. Considering the additional burden from the new hospital, please calculate the expected total emissions of hazardous airborne emissions from the Kona Incinerator.
12. Have residents in the area of the Kona Hospital been warned about the emissions from the Incinerator?
13. Has property in the vicinity of the Kona Incinerator been surveyed for heavy metal and dioxin contamination?
14. Have residents in the vicinity of the Kona Incinerator been surveyed for health problems?
15. What hazardous materials are found in ash from the Kona Incinerator (heavy metals, dioxin, etc.)?
16. How is the incinerator ash from the Kona Hospital presently being disposed of?

West Hawaii Sierra Club - PAGE 2 of 4

OUR INCINERATOR OPINION: According to the Maniowai Residential Community Draft EIS, Nov. 1991, the North Hawaii Community Hospital (NHCH) is scheduled to begin operations in 1994. Moreover, there are plans for a West Hawaii Regional Health Center (WHRHC) near the Keahole area of North Kona. Thus, disposal requirements for medical waste will increase considerably.

In an attempt to protect its citizens from dioxin and cadmium, the California Air Resources Board recently completed a study on that state's medical incinerators. According to the report, "Medical waste incinerators have the potential for posing the greatest individual risk of dioxins sources currently identified". The report concluded that autoclaving was a better alternative than incineration.

We presently have terrible air quality problems here in Kona. It is really ludicrous for a health care provider to contaminate our air with dioxin and heavy metals from an incinerator.

The Sierra Club feels that the Department of Health should shut down the incinerator at the Kona Hospital, and either establish on-site autoclaving or a large regional autoclave facility which would be able to handle all of the anticipated medical waste disposal needs of West Hawaii.

CONCERNING NUCLEAR MEDICINE

1. We understand the the following may be used in nuclear medicine: Carbon-14, Cesium-137, Chromium-51, Cobalt-60 and -64, Gallium-67, Hydrogen-3, Iron-59, Iodine-125 and -131, Technetium-99 and Thallium-201. Please identify all radioactive isotopes, including radioactive daughter products, that may occur in nuclear medicine programs at Big Island hospitals.
2. How are radioactive isotopes transported to the hospitals?
3. In the event of an accident concerning radioactive isotopes, please describe the details of the emergency response plans.
4. Please describe exactly how radioactive isotopes are stored and monitored at the hospitals, both prior to and after use.
5. What is the exact criteria for determining when radioactive isotopes may be dumped in a landfill.
6. Which state or county agency monitors radioactive isotopes?
7. Please describe the agency's procedures for monitoring radioactive isotopes.

CONCERNING HELCO'S POWER GRID

Given HELCO'S abysmal management ability, we are concerned about NHCH's cumulative impacts on our power grid. HELCO'S notorious power failures have cost our community many thousands of dollars due to lost business, lost productivity and damaged electric equipment.

Present insufficient capacity is evidenced by rolling blackouts, a HELCO policy of reducing maintenance time in order to maintain production, and by operating combustion turbines, which are designed for peak-shaving, for many hours each day.

Our future energy supply is presently in grave doubt because of HELCO'S unwillingness to embrace Demand Side Management (DSM) programs, an unknown delivery date for 25 MW of geothermal power from Ormat and HELCO'S apparent problems in obtaining property at Kawathae for a new power plant.

Therefore, please include a detailed HELCO forecast of Big Island electric power requirements for the next ten years. Please show anticipated growth in resorts, residential units, etc. Furthermore, please include a detailed HELCO forecast of electric power production capabilities for the next ten years.

Thank You,



Jay Hanson, Program Chair,
West Hawaii Sierra Club,
78-6622 AIII Drive
Kailua-Kona, HI 96740



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS

P. O. BOX 111, HONOLULU, HAWAII 96810

RUSSEL S. HAGAFA
COMPTROLLER
ROBERT B. FACLOA
STATE COMPTROLLER

LETTER NO. (P)1073.2

JUN 3 1992

Mr. Jay Hanson
Program Chair
West Hawaii Sierra Club
78-6622 Aii Drive
Kailua-Kona, Hawaii 96740

Dear Mr. Hanson:

Subject: North Hawaii Community Hospital
EIS Public Review Phase

Thank you for your November 13, 1991 comments concerning the subject project. Our responses to your comments are as follows:

Hazardous Waste

1. The various types of hazardous waste which might be generated by the proposed hospital include materials used for cleaning purposes, products used to service machinery and equipment, and materials used for maintenance of the facility. The quantities of these materials which might be considered hazardous waste is not known at this time. However, since the storage and disposal of these materials such as these are subject to Federal and State rules and regulations, the proposed hospital must comply with the applicable regulations.
2. Since there are no hazardous waste disposal facilities in Hawaii County, depending on the amount and type of waste, such material will have to be transported either to Oahu or a mainland site for proper disposal. The proposed hospital will have to contract for this transport and disposal to companies engaged in this type of business.

Mr. Jay Hanson
Page 2

Ltr. No. (P)1073.2

Kona Hospital Incinerator

1. The Kona Hospital incinerator has a capacity of 70 pounds per hour.
2. Approximately 3,100 pounds per week of material is burned at the incinerator, including material from other medical facilities in the Kona area.
3. Based on the experience of the Kona Hospital, the amount of material expected to be generated by the North Hawaii hospital for incineration will be about 1,550 pounds per week.
4. Training to operate the Kona Hospital incinerator was conducted by the contractor that installed the equipment. The training and operational manuals used for this purpose are retained at the hospital for use as required.
5. The Kona Hospital incinerator operates on "no burn days."
6. No materials associated with nuclear medicine are presently burned in the Kona Hospital incinerator.
7. Monitoring by a State agency is not conducted at the Kona Hospital incinerator.
8. At present, there is no requirement for testing emissions from the incinerator. However, one of the special conditions to operate the Kona Hospital incinerator is that the Department of Health (DOH) may at any time require the hospital to install and operate a continuous emission monitor or to conduct ambient air monitoring.
9. Since the amount of material disposed is relatively small, DOH has not tested the emissions from the incinerator.
10. The incinerator used at the Kona Hospital meets the Federal and State requirements for this type of equipment. The temperatures met in the

various stages of the incineration process are established by Federal and State requirements. The process of incineration eliminated hazardous materials from the emissions. No emission tests have been conducted at the Kona Hospital incinerator.

11. As previously described, the incineration process eliminates hazardous materials from the emissions.
12. There has been no warning to residents in the vicinity about the emissions from the incinerator.
13. The property in the vicinity of the incinerator has not been surveyed for heavy metal and dioxin contamination. There is no requirement to conduct such a survey.
14. Residents in the vicinity have not been surveyed for health problems related to operation of the incinerator.
15. As previously stated, the incinerator used at the Kona Hospital meets the Federal and State requirements for this type of equipment. The temperatures met in the various stages of the incineration process are established by Federal and State requirements. The process of incineration eliminates hazardous materials. Thus, the ash can be disposed in the landfill.
16. Ash from the incinerator is picked up by the commercial refuse operator for the area, Kona Coast Refuse, and disposed of in the landfill. At this time, the DOH has no plans to establish an on-site autoclaving or a large regional autoclave facility to handle medical wastes in the West Hawaii area.

Nuclear Medicine

1. The exact isotopes to be used at the proposed hospital are not known at this time. The isotopes used will vary with the types of diagnostic or imaging tests to be performed.

However, one of the normally used isotopes is Technetium-99. The combination of Mo-99/Tc-99 constitutes a parent-daughter relationship. Mo-99 decays with a half-life of 67 hours and Tc-99 decays with half-life of 6 hours.

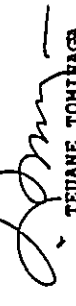
2. Use of radioactive materials by a hospital for medical purposes is under the jurisdiction of the U. S. Nuclear Regulatory Commission (NRC). The transportation of radioactive isotopes is governed by CFR Part 49 which sets forth the requirements related to the transport of such materials. The proposed hospital will require a license from the NRC. The hospital must comply with the NRC requirements for the transport of materials.
3. The proposed hospital has not yet developed a plan in the event of an accident involving radioactive isotopes.
4. The requirements for storage and monitoring radioactive isotopes prior to and after use is established by the NRC. These requirements will depend upon the exact type of isotopes used at the hospital.
5. The criteria for retention of radioactive isotopes prior to disposal is set by decay charts. Most isotopes are retained well beyond the times shown in these decay rates prior to disposal.
6. No State or County agency monitors radioactive isotopes. The NRC has jurisdiction over these materials.
7. The NRC procedure for monitoring radioactive isotopes is set forth in 10 CFR Part 35.

HELCO Power Grid

HELCO has stated that it is their plan to add 20 megawatts (MW) of generating capacity to their Keeau plant during 1992, add another 20 MW of generating capacity to their West Hawaii plant in 1994, and to add 25 MW of capacity from geothermal sources sometime next year.

We appreciate your input to this project.

Very truly yours,



TEANE TOMIYAGA
State Public Works Engineer

EB:jk

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Based on the PDR, the new hospital should have a total area of about 61,700 SF comprised primarily of patient care and other service areas as listed below:

Patient Care Areas

Medical/Surgical Unit

No. of spaces

9	Patient rooms -- 2 bed
5	Patient rooms -- 1 bed
4	Patient rooms -- Intensive Care, Critical Care
2	Patient toilet, lavatory wardrobe alcove
3	Labor/Delivery/Recovery/Post Partum

Support Areas -- All 1 space

Nurses Station, Medication Room, Clean Utility, Soiled Utility, Equipment Storage, Examination/Treatment, Pantry, Wheelchair Shower, Tub Room, Janitor's Closet.

Support Areas ICU/CCU -- All 1 space

Nurses Station, Clean Utility, Soiled Utility, Storage, Medication Room.

Support Areas LDRP -- All 1 space

Well Baby Nursery, Nurses Work Room, Examination/Treatment, Father's Gowning, Male Changing Room, On-Call Sleep and Toilet, Female Changing Room.

Staff Areas -- All 2 spaces

Head Nurse's Office, Conference/Classroom, Female Lockers, Male Lockers, Lounge, Staff Toilet.

Skilled Nursing Unit Patient Areas

No. of Spaces

9 Patient Room -- 2 beds
2 Patient Room -- 1 bed

Skilled Nursing Unit Support Areas -- All 1 unit

Nurse's Station, Medication Room, Clean Utility, Soiled Utility, Examination/Treatment, Pantry, Patient Dining/Recreation, Occupational Therapy, Wheelchair Storage, Janitor's Closet, Wheelchair Shower, Tub Room, Patient Laundry, Barber/Beauty Shop.

Emergency Room

Waiting Area, Public Toilets (2), Public Telephone Alcove, Reception/Registration, Nurses Station, Medication Room, Wheelchair Storage, Clean Utility, Soiled Utility, Trauma/Cardiac Room, Suture Room, Private Examination Rooms (2), Patient Toilet, Janitor's Closet, Storage, Ambulance Entrance, Office, Male Lockers, Female Lockers, Staff Toilet, On-Call Sleep and Toilet, Lounge.

Surgical Suite

Operating Rooms (2), Substerile/Scrub, Cysto Room, Control/Scheduling, Pre-Op Holding and Work Area, Clean Holding, Soiled Holding, Equipment Storage, Janitor's Closet, Medication/Blood Storage, Frozen Section Laboratory, Recovery Space, Outpatient Recovery, Anesthesia Work Room/Storage, Outpatient Preparation (2), Patient Toilet, Office, Male Lockers, Female Lockers, Staff Toilet (2), Staff Lounge, Doctor's Lounge, Doctor's Dictation, Waiting Area, Outpatient Registration, Public Toilet, Consultation Room, Dark Room, Public Telephone Alcove.

Clinical Laboratory

Waiting Area, Reception/Secretary, Phlebotomy, Patient Toilet, Pathologist Office, Secretary/Transcription, Specimen Preparation, Open Laboratory, Bacteriology, Computer Room, Storage, Staff Lockers, Glass Washing Area.

Imaging Service

Waiting Area, Reception/Registration, Dressing Room, General Radiographic Rooms (4), Fluoroscopy Room, Mammographic Room, Ultrasound Room, Toilet, CT Scanner, Nuclear Medicine, Hot Laboratory, Dark Room, Light Room/Barium Prep, Storage, Janitor's Closet, Inpatient Holding, Viewing Room, Office, Lockers Room, Staff Toilet, Film Files/Transcription.

Respiratory Therapy/Pulmonary Function

Pulmonary Function Lab, Blood Gas Laboratory, Work Room Clean Supplies, Equipment and Tank Storage, Technician Work Area.

Electro-Diagnostic Laboratory

Waiting Room, Reception/Registration, Electrocardiography, Echocardiography, Holter Scanning, Electroencephalography, Electromyogram, Clean Holding, Soiled Holding, Staff Work Room, Reading Room/Files, Janitor's Closet, Patient Toilet, Staff Toilet.

Physical Therapy

Waiting Area, Reception/Tech Work Room, Treatment Area, Whirlpool (2), Exercise Room, Patient Toilet, Clean Holding, Soiled Holding, Equipment Storage, Staff Lockers, Staff Toilet.

Patient Support Areas

Chaplain's Office, Meditation Room, Social Service Office.

Purchasing/General Stores

Purchasing Office, Receiving Area, General Storage.

Central Processing Service

Decontamination Area, Washer Sterilizer/Prep & Pack, Terminal Sterilization, Sterile Storage, Lockers (2), Staff Toilet (2), Office.

Food Service

Food Preparation/Production, Salad and Desert Preparation, Tray Assembly Area, Walk-In Refrigerator, Walk-In Freezer, Dry Storage, Warewashing, Ware Storage, Trash and Empty Containers, Cart Wash Area, Dietician Office, Janitor's Closet, Serving Line, Soiled Tray Cart Park Area, Dining Room, Public Toilet.

Engineering/Maintenance/Housekeeping/Security

Engineering Office, Material and Parts Storage, Repair Shop, Housekeeping Office, Supplies/Equipment Storage, Clean Linen Holding, Soiled Linen Holding, Male Lockers, Female Lockers, Staff Toilet, Cold Room (Morgue), Security Office.

Public Areas

Main Lobby/Waiting Area, Reception/Information, Wheelchair Storage, Public Toilet, Public Telephone Alcove, Gift Shop, Storage/Work Room, Volunteer Office/Lockers, PBX - Communications.

Administrative Areas

Administrator's Office, Assistant Administrator's Office, Secretary/Files, Administration Waiting Area, Conference Room, Director of Nursing's Office, Staff Toilet, Admitting Office (2), Work Room/Storage, Business Office and Data Processing, Cashier, Manager's Office, Storage, Personnel/Payroll, Conference Room, Medical Records, Doctor's Work Room, Doctor's Lounge/Library, Medical Library, Toilet, Quality Assurance, Utilization Review, Infection Control Office, Janitor's Closet.

Pharmacy

Receiving/Breakdown, General Storage, Manufacturing/Packaging, Controlled Drug Vault, IV Preparation, Office/Reference Library, Lockers/Toilet.

In addition, the Hospital should be provided with the following entrances and parking space:

- o Main Entrance:

The main entrance will be used by patients to be admitted to or discharged from the Hospital. Therefore, a drop-off/pick-up area should be provided near the main entrance. Outpatients seeking diagnostic and therapeutic services will also be using the main entrance and drop-off/pick-up area. Parking facilities for patients should be conveniently located for easy access to the main entrance.

o **Emergency Entrance:**

The emergency department should be provided with two separate entrances. One entrance for ambulances, with adequate turnaround space and parking for two ambulances adjacent to the entrance to the emergency department. The ambulance entrance should also provide four or five parking stalls for police, press, or family members that accompany or follow the ambulance to the Hospital.

The other entrance will be for walk-in emergency patients, and parking facilities should also be provided for these patients as close as possible to their entrance to avoid leaving the patient unattended while the driver parks the vehicle.

o **Service Entrance:**

The service entrance should be reached by a roadway that does not interfere with other types of traffic; i.e., patients, visitors, staff, etc. The service entrance should lead to a loading dock which should be large enough to allow the separation of supplies and food delivery, clean, and soiled linen, trash and contaminated waste. If there are site restrictions for size of such a loading dock, then two entrances should be provided -- one for supplies and the other for food delivery.

The area leading to the loading dock should be large enough to allow for a turnaround area for large trucks (minimum 40 feet in front of the loading dock).

o Employee Entrance:

If a dedicated entrance for employees is to be provided, it should be easily accessible from the employees' parking area. Physicians could use the employee entrance if dedicated doctors' parking is provided close to this entrance, then medical staff facilities and medical records should relate to this entrance.

o Parking:

Based on the size of the North Hawaii Community Hospital, approximately 150 stalls will be needed, depending on site conditions; the parking could be separated by users or developed as one parking lot with some restrictions within, such as doctors' parking, evening shift, etc. However, parking for the emergency department should be separated with a separate access road.

APPENDIX B
KAMUELA STREAM FLOOD STUDY

**KAMUELA STREAM FLOOD STUDY
FOR
NORTH HAWAII COMMUNITY HOSPITAL
KAMUELA, ISLAND OF HAWAII**

Prepared for: State of Hawaii
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, HI 96813
DAGS Job No. 11-20-4111

Prepared by: Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, HI 96826
WOA: 3178-01

December 1993

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1.0 BACKGROUND AND PURPOSE

1.1 Background

Kamuela Stream is an intermittent stream which runs near most of the farm and residential areas south of Mamalaloa Highway, and eventually through the central section of the town of Waimea on the Island of Hawaii. It drains an area of approximately 0.69 square miles north and east of Waimea. Flows from Kamuela Stream eventually discharge into Waikoloa Stream in the vicinity of the intersection of Mamalaloa Highway and Lindsey Road. The total length of the stream is about 3,880 feet. See Figure 1 at the end of this section.

North Hawaii Community Hospital is proposing construction of a new hospital on the 12.5-acre parcel presently occupied by the existing Lucy Henriques Medical Center in Waimea. Currently, Kamuela Stream flows behind (south of) the existing Lucy Henriques Medical Center facilities. The proposed hospital will be constructed on fill in the area south of the existing Medical Center within the flood plain identified for Kamuela Stream. According to the site layout plan prepared by Media Five Limited, the project architect, a building pad with 2:1 sloped embankment will be established for the facility. The access road and parking areas will be located at-grade outside of the building pad. The flood plain area of Kamulea Stream will be regraded to create a more defined, deeper channel to divert flows away from the hospital building.

1.2 Purpose

The purpose of this analysis is to assess the flood hazard to adjacent properties from construction of the hospital facilities and parking areas. The analysis will also identify the areal extent of the new flood limits from the realignment of Kamuela Stream.

2.0 METHODOLOGY

2.1 Background

The analysis is based on the U.S. Federal Emergency Management Agency's (FEMA) flood study prepared in 1989. Results of the 1989 flood study were used to prepare Flood Insurance Rate Maps (FIRMs) for the Waimea area. The most recent FIRM was published by FEMA in July 16 1990 (Panel 168). Data from the 1989 study incorporated into this analysis includes cross-sections, flowrates, and station locations. Data for sections affected by the proposed hospital was modified to reflect information from the topographic survey of the project site completed in December 1992 and the preliminary grading plan for the new facility.

The 1989 FEMA flood study analyzed Kamuela and Waikoloa Streams independently to produce the July 16, 1993 FIRM. Photographs show Kamuela Stream as a tributary to Waikoloa Stream. Thus, it was necessary to analyze both streams in this study since constructing the hospital and regrading Kamuela Street may have downstream effects on both streams.

2.2 Computer Model

The U.S. Army Corps of Engineers' Hydrologic Engineering Center (HEC-2) water surface profile computer model was used as the method to determine the flood limits and to calculate the water surface elevation. The HEC-2 program computes water surface elevations, flow velocities and flood widths for given flows and stream parameters. Data needed to perform these computations include:

- 1) Stream alignment and stationing;
- 2) Assumed flow regime;
- 3) Starting elevation;
- 4) Discharge flow;
- 5) Loss coefficients;

- 6) Cross-section geometry; and
- 7) Reach lengths.

2.2.1 Stream Alignment and Stationing

The sections utilized in the HEC-2 model for this analysis follow the Waikoloa Stream stationing established in the 1989 analysis. The procedure established stations proceeding upstream from the confluence of Waikoloa and Kamuela Streams and then along Kamuela Stream. Only a portion of the 1989 study was used due to the extensive length of that study. However, a sufficient portion of the 1989 study was used to verify that the hydraulic properties of the stream were not altered significantly outside the project site. According to the 1989 study, the equation station at Waikoloa Stream Station 84+35 corresponds to Kamuela Stream Station 0+00. The stations used in this analysis are from 64 + 00 to 122 + 10, a total distance of 5,810 feet.

2.2.2 Flow Regime

Flow regime refers to the stream flow conditions. The HEC-2 model was used to model two flow regimes, subcritical (tranquil) and supercritical (turbulent). The boundary between these two regimes is termed critical. The velocity of the stream at this "boundary" is termed the critical velocity. Critical velocity is calculated using a formula involving gravity and critical depth, the depth of flow at this "boundary" which produces minimum energy and maximum flow rate.

Supercritical flow is characterized by higher velocities and a shallower depth of flow while subcritical flow is characterized by lower velocities and a higher depth of flow. The 1989 study assumed subcritical flow throughout the stream length. This assumption is usually conservative with respect to flow depth. However, it may not account for flooding caused by high velocity and curves within the stream.

Two computer runs were performed in this analysis to account for the different flow regimes. One analysis proceeded upstream to analyze subcritical conditions and the other one proceeded downstream to analyze supercritical conditions. Each section was evaluated and the applicable flow regime was selected as the basis to analyze the areal extent and the velocity of the flows . Flow regimes for each station are summarized in Table 1.

2.2.3 Starting Elevation

The program uses an elevation input to establish the starting water surface elevation for both the subcritical and supercritical computer runs. The subcritical run in this analysis used a starting elevation of 2,650.77 at Station 64+00 of Waikalua Stream. This is the elevation determined from the FEMA 1989 Kamuela flood study The supercritical run used the elevation of 2,740.37 at Station 122+10.

2.2.4 Discharge

Discharge refers to a volume of water passing through a point in the stream over a measured period of time. A variable flow rate was used in this analysis to account for flow entering the stream along its length. The flow rate used for analysis ranged from 380 cfs at the most upstream section of Kamuela Stream to 2,648 cfs at the furthest downstream section in Waikoloa Stream. The large range is primarily due to the contribution of Waikoloa Stream at Station 84+35, the point of confluence of both streams. At this station, Kamuela Stream contributes 919 cfs and Waikoloa Stream contributes 1,268 cfs for a total of 2,187 cfs.

2.2.5 Loss Coefficients

Energy loss coefficients refer to factors that affect head (energy) losses. Two different types of energy loss coefficients were used in this analysis: Manning's 'n'

values which relate to friction losses within the stream; and contraction/expansion coefficients which relate to transition (shock) losses between sections.

The 'n' values are directly related to channel roughness, and typically range from 0.013 for a troweled concrete channel, to 0.030 for a clean and straight natural channel, to 0.100 for a very weedy natural channel with deep pools. Three 'n' values were used for each cross-section in this analysis - one for the stream, and one for each of the two overbank areas outside the stream's banks. The values used for this analysis ranged from 0.013 to 0.045.

Contraction/expansion of flow due to changes in the channel cross-section is also a common cause of energy loss. When the change between river cross-sections is small, contraction and expansion coefficients may typically be 0.1 and 0.3 respectively. However, if the change in contraction and expansion is abrupt, such as at bridges, box culverts, or crossing structures, these values may be as high as 0.6 and 1.0, respectively. The values used for this analysis ranged from 0.1 to 0.3 for contraction and 0.3 to 0.5 for expansion.

2.2.6 Cross-Section Geometry

Cross-sections were taken across the stream with offset and elevation data. These cross-sections extended across the entire flood plain, and were generally perpendicular to the anticipated flow direction. This condition often required curved or dog-legged alignments.

Two sources of information were used to establish the cross-sectional data for the model. The first source was an aerial topographic survey compiled by Air Survey Hawaii in 1984 which showed 5-foot contours and spot elevations and was the base map used in the FIRM. The other source was the December 1992 site topographic survey for the project site as the basis for cross-sectional data. The site topographic

survey used 2-foot contours and spot elevations, but was confined to the project site only. Off-site cross-section data points used to compute flood limits are therefore subject to some interpretation.

2.2.7 Reach Lengths

Reach length refers to the distances between cross-sections. These lengths reflect the angles and distances between cross-sections. The reach lengths used in this analysis ranged from 15 ft at an abrupt change between sections to 485 ft for gradual changes.

3.0 RESULTS

3.1 Existing Flood Limits

The existing alignment of Kamuela Stream runs directly through the site proposed for the hospital. The current flood limits shown in the FIRM indicate roughly 50 percent of the project site is in the flood area of a 100-year storm. The existing medical center is located just outside of the flood limits. See Exhibit 1.

3.2 Revised Flood Limits

The proposed hospital site would be filled about 6 ft to provide a building pad and regraded to divert the stream flow through the project site. The existing flood plain would be channelized within the project site to contain the flow and direct it back to the existing alignment of the stream on the west.

For a 100-year storm, about 654 cfs would be flowing in Kamuela Stream as it enters the project site. Analysis shows the flow would proceed along the 2:1 embankment and over a portion of the proposed parking lot near the southern boundary of the

project site. However, most of the flow will be contained within the regraded channel. The hospital would be situated to prevent its flooding. Exhibit 1 shows the site layout plan of the new hospital developed by Media Five Limited, the realignment of Kamuela Stream and the revised flood hazard area.

Two buildings, a Resource Center and an auxiliary building, may be built at a future date. They will be located within the floodway, but will have finish floor elevations above the base flood elevation. The Resource Center building will act as one of the stream banks, constricting the flow of the stream. This constriction in flow width is shown at Station 101+60. Velocities of the flow in the channel within the project site were estimated to be between 4.6 and 7.1 ft/sec. See Table 1.

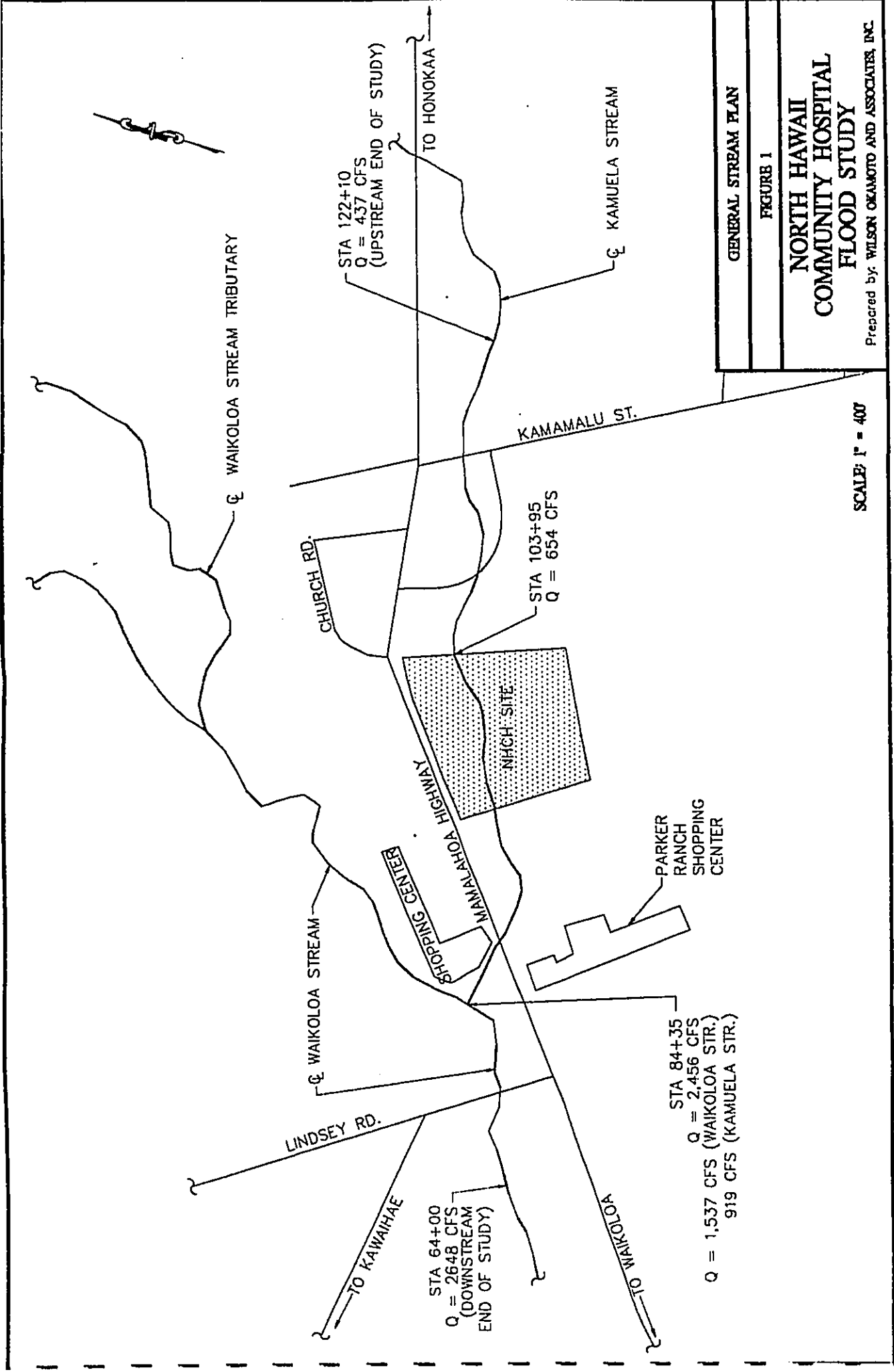
According to boring logs taken from bore holes made on the project site by FGE, Inc., the soil within the stream channel is stiff silt, which, with suitable ground cover or vegetation, should be able to prevent any erosion.

Flooding widths range from 80 to 165 ft. and are contained within the project site. See Exhibit 1. Channelizing the stream decreases the width of flow to less than what is shown on the July 1990 FIRM map. However, because of the narrower flow width, the velocity is about 4 cfs higher through comparable sections of the stream. Once past the NHCH site, the stream resumes its natural path and FEMA's flood limits remain unchanged. (See Exhibit 2).

4.0 CONCLUSION

Containing the floodwaters of Kamuela Stream next to the existing Lucy Henriques Medical Center site will be an important consideration for the proposed North Hawaii Community Hospital. Based on the analysis of the layout incorporating a 2:1 sloped embankment, the hospital facilities should not significantly impact the hydraulic properties of the stream both upstream and downstream of the project

site. It appears that flooding hazard will be mitigated on the project site with the proposed grading and channelization. These results are consistent with the flood limit defined in the 1989 Kamuela flood study and the July 1990 FIRM map.



GENERAL STREAM PLAN

FIGURE 1

**NORTH HAWAII
COMMUNITY HOSPITAL
FLOOD STUDY**

Prepared by: WILSON OKAMOTO AND ASSOCIATES, INC.

SCALE: 1" = 400'

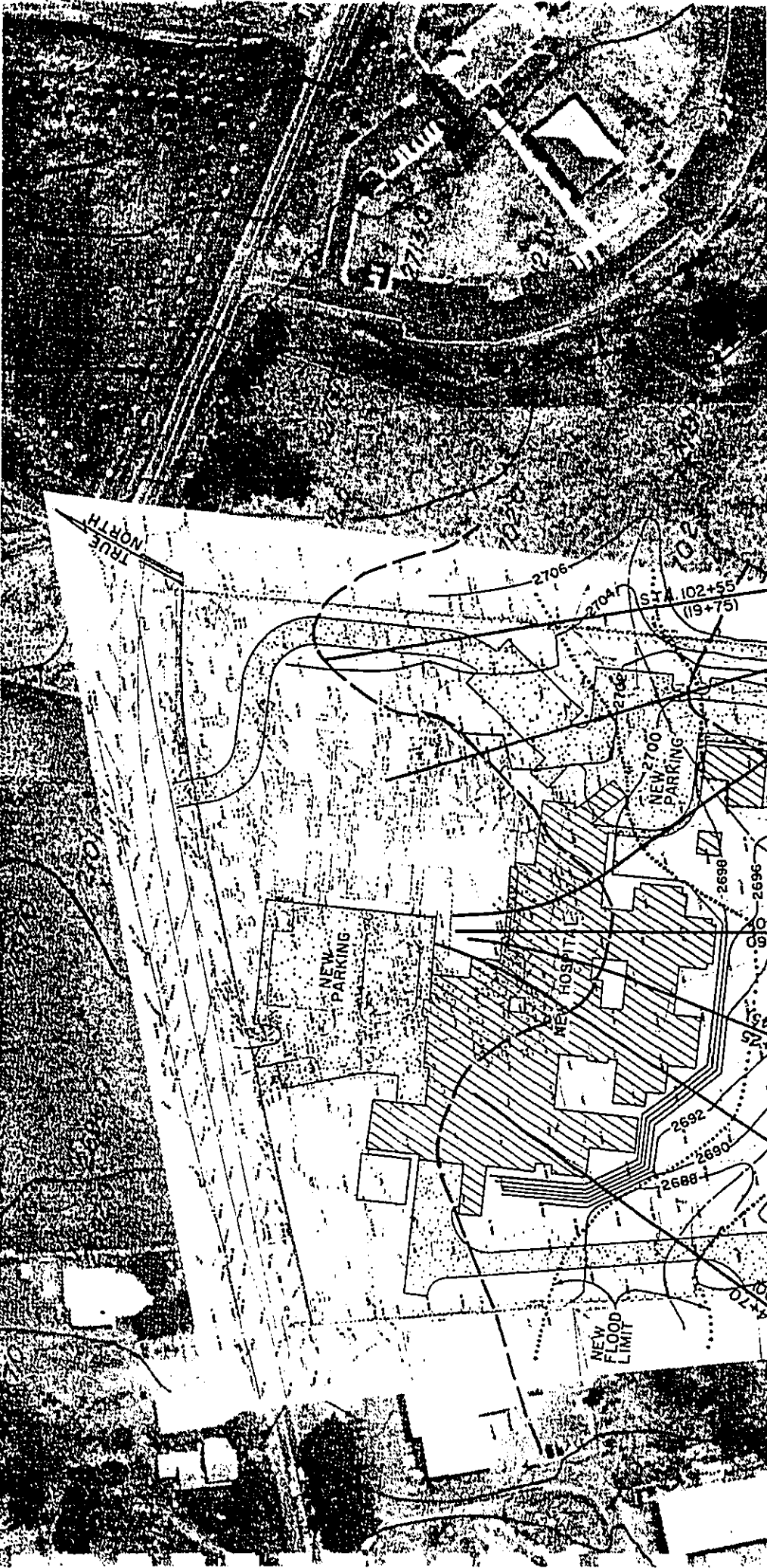
TABLE I - COMPARISON OF PRESENT STUDY & 1989 STUDY

STATION	Q (CFS)	SUBCRITICAL RUN REGIME (SLOPE3)	SUPERCRITICAL RUN REGIME (SLOPE4)	GOVERNING REGIME	WIDTH (FT)		DEPTH (FT)		VELOCITY (FT/SEC)		COMMENTS	
					SUB	SUPER	SUB	SUPER	SUB	SUPER		
64+00	3,195	SUBCRITICAL	CRITICAL	SUBCRITICAL	135.56	84.35	7.47	6.23	7.59	10.86	7.62	WAIKOLOA STREAM
65+30	3,181	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	129.74	100.66	8.02	7.98	8.54	9.98	8.51	
66+90	3,163	CRITICAL	CRITICAL	CRITICAL	835.07	855.41	6.51	6.58	6.44	6.00	6.43	
69+20	3,138	SUBCRITICAL	CRITICAL	SUBCRITICAL	1175.79	503.88	9.35	8.91	3.37	5.85	3.37	
70+75	3,121	SUBCRITICAL	CRITICAL	SUBCRITICAL	282.44	169.99	9.01	8.26	6.25	8.74	6.21	
71+60	3,112	SUBCRITICAL	CRITICAL	SUBCRITICAL	317.51	256.10	8.89	7.82	4.27	7.38	4.29	
72+50	3,102	SUBCRITICAL	CRITICAL	SUBCRITICAL	805.24	403.70	8.55	8.10	3.20	5.90	3.21	
73+75	3,089	CRITICAL	CRITICAL	CRITICAL	179.27	180.89	9.42	9.45	8.38	8.27	8.37	
76+35	3,061	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	772.60	96.64	8.30	7.93	3.41	14.21	3.41	
78+90	3,033	CRITICAL	CRITICAL	CRITICAL	72.45	72.44	5.90	5.90	11.12	11.12	11.11	
80+35	3,017	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	66.38	52.06	7.76	3.83	7.45	17.44	7.45	
80+50	3,016	SUBCRITICAL	CRITICAL	SUBCRITICAL	35.80	35.77	6.89	6.04	12.25	13.99	12.26	
81+10	3,016	SUBCRITICAL	CRITICAL	SUBCRITICAL	35.86	47.46	8.89	5.53	9.49	12.75	9.49	
81+25	3,008	SUBCRITICAL	CRITICAL	SUBCRITICAL	51.78	47.45	8.06	5.53	8.31	12.74	8.31	
83+45	2,984	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	55.48	53.92	6.22	5.26	12.09	15.35	12.09	
85+05	2,461	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	215.61	169.53	6.54	6.14	9.25	10.76	9.25	
86+55	2,459	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	101.43	89.36	6.07	5.46	9.20	11.73	9.20	
88+10	2,456	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	187.02	141.38	6.80	6.10	9.08	12.19	9.08	
89+10	830	CRITICAL	CRITICAL	CRITICAL	482.53	483.16	0.59	0.59	4.39	4.35	2.01	KAMUELA STR. 6+30
91+60	795	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	133.31	111.65	2.41	1.93	4.88	6.78	6.61	KAMUELA STR. 8+80
13+10*	735	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	~WAIKOLOA STR. 97+45
15+40*	702	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	~WAIKOLOA STR. 99+75
17+70*	670	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	~WAIKOLOA STR. 102+05
19+00*	651	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	~WAIKOLOA STR. 103+35
21+40*	618	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	~WAIKOLOA STR. 105+75
94+70	753	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	103.45	102.31	1.62	1.50	6.22	6.93	N/A	KAMUELA STR. 11+90
96+15	733	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	84.84	80.95	2.25	1.89	6.78	8.95	N/A	KAMUELA STR. 13+35
97+25	718	CRITICAL	CRITICAL	CRITICAL	120.87	138.86	2.25	2.32	5.77	7.07	N/A	KAMUELA STR. 14+45
98+60	700	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	165.39	78.53	2.04	1.46	5.12	10.18	N/A	KAMUELA STR. 15+80
100+40	675	CRITICAL	CRITICAL	CRITICAL	111.79	111.71	2.55	2.55	7.05	7.06	N/A	KAMUELA STR. 17+60
101+60	659	SUBCRITICAL	SUPERCRITICAL	SUPERCRITICAL	145.37	94.83	2.17	1.42	3.72	7.56	N/A	KAMUELA STR. 18+80
102+55	650	CRITICAL	CRITICAL	CRITICAL	108.10	108.34	1.62	1.63	5.84	5.76	N/A	KAMUELA STR. 19+75
107+30	588	SUBCRITICAL	CRITICAL	SUBCRITICAL	80.52	69.22	3.68	3.31	6.04	7.47	7.39	KAMUELA STR. 23+50
109+20	561	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	32.19	27.45	3.44	2.49	7.62	12.37	7.09	KAMUELA STR. 25+40
111+00	536	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	41.38	34.11	3.45	2.84	7.51	11.05	7.55	KAMUELA STR. 27+20
111+95	523	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	24.81	22.16	2.65	1.19	8.82	20.89	8.81	KAMUELA STR. 28+15
112+05	521	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	334.14	301.33	9.73	9.60	6.43	7.67	7.50	KAMUELA STR. 28+25
112+53	513	CRITICAL	CRITICAL	CRITICAL	266.14	266.14	9.47	9.47	6.69	6.69	6.69	KAMUELA STR. 28+73
112+63	467	SUBCRITICAL	CRITICAL	SUBCRITICAL	232.33	38.52	9.79	2.31	0.76	7.58	0.76	KAMUELA STR. 28+83
115+90	467	SUBCRITICAL	CRITICAL	SUBCRITICAL	48.42	31.49	5.74	2.92	2.71	7.87	2.70	KAMUELA STR. 32+10
118+00	437	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	19.63	16.15	4.91	4.04	9.07	13.41	9.07	KAMUELA STR. 34+20
119+50	416	CRITICAL	CRITICAL	CRITICAL	33.82	33.92	3.65	3.66	7.43	7.39	7.43	KAMUELA STR. 35+70
121+30	391	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	128.43	87.90	1.31	0.90	4.65	9.92	4.65	KAMUELA STR. 37+50
122+10	380	CRITICAL	CRITICAL	CRITICAL	335.80	335.65	0.37	0.37	3.38	3.39	3.38	KAMUELA STR. 38+30

* RESULTS FROM FEMA'S 1989 KAMUELA FLOOD STUDY. SHOWN FOR INFORMATION ONLY.

1989 STUDY WAS BASED ON SUBCRITICAL RUN ONLY.

WAIKOLOA STREAM STATIONING USED FOR KAMUELA STREAM TO RETAIN CONTINUITY.



KAMUELA STREAM FLOOD STUDY
 Prepared For: State of Hawaii - DAGS
 SCALE: 1" = 100'
Realignment of Kamuela Stream

LEGEND

- REVISED FLOOD LIMITS
 - EXISTING FLOOD LIMITS
- EXHIBIT I



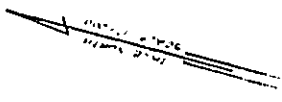
KAMUELA STREAM FLOOD STUDY
 Prepared For: State of Hawaii - DAGS



Department of Agriculture

LEGEND

- 10' WIDE EASEMENT
- 5' EASEMENT



REFERENCES

1. U.S. Army Corps of Engineers. HEC-2 Water Surface Profiles, User's Manual. September 1982.
2. Vennard, John K. and Robert L. Street. Elementary Fluid Mechanics. 1982.
3. Wilson Okamoto & Associates, Inc. Kamuela Flood Insurance Study, Kamuela Stream HEC-2 Computer Runs. 1989.
4. Wilson Okamoto & Associates, Inc. Kamuela Flood Insurance Study, Waikaloa Stream HEC-2 Computer Runs. 1989.

APPENDIX B - 1

FLOOD HAZARD ANALYSIS
(superseded by Kamuela
Stream Flood Study,
Appendix B)

**FLOOD HAZARD ANALYSIS
NORTH HAWAII COMMUNITY HOSPITAL
WAIMEA, HAWAII**

Note: The information shown in this analysis has been superseded by Appendix B, the Kamulea Stream Study. The alternatives shown in this appendix are no longer being considered for implementation. This appendix is included to document the analysis and should be considered for reference only.

Prepared for: State of Hawaii
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, Hawaii 96813
DAGS Job No. 11-20-4111

Prepared by; Wilson Okamoto & Associates, Inc.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

SEPTEMBER 1991

FLOOD HAZARD ANALYSIS
NORTH HAWAII COMMUNITY HOSPITAL

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References

Attachments

1. PURPOSE

As discussed in the Draft EIS, construction of the proposed North Hawaii Community Hospital near the existing Lucy Henriques Medical Center would result in a number of advantages, including consolidation of certain functions between the two facilities. This consolidation would decrease the size of the proposed hospital and ultimately, result in lower cost of construction for the new facility. However, review of the flood hazard map for the area shows Site No. 1 is located within a flood hazard area. Thus, prior to selection of a site for the proposed hospital, a flood hazard analysis was necessary to determine if construction could be undertaken.

The purpose of this flood hazard analysis is to examine the flood hazard from Kamuela Stream to determine mitigation measures or improvements which would be required to permit construction of the proposed North Hawaii Community Hospital at the Lucy Henriques Medical Center Site No. 1. The study estimates the limits of flooding in the areas south and west of Site No.1 during a 100-year flood. An event such as the 100-year flood is also called base flood conditions.

This analysis is also to meet the requirements County of Hawaii Code Chapter 27 Flood Control Ordinance which governs construction in the floodway. According to Chapter 27, any encroachment or construction in the floodway will be prohibited unless certified by a registered engineer that the encroachment will not cause any increase in base flood elevations.

2. BACKGROUND

2.1 Kamuela Stream

The origin of Kamuela Stream is not a clearly defined location. The latest U.S. Department of Interior Geological Survey (USGS) quadrangle map

for the Waimea area does not identify Kamuela Stream. However, a previous study prepared for the Department of Army Corps of Engineers shows Kamuela Stream is an offshoot of Lanimaumau Stream with an origin point south of Mamalahoa Highway and north of Kuhio Village, about 4,200 FT northeast of Site No.1.

Although the exact origin is not known, available maps show the stream runs near most of the farm and residential areas approximately 500 FT south of the Highway, and eventually through the central section of the town, including near proposed Site No.1 and the existing Lucy Henriques Medical Center. Eventually, flows from Kamuela Stream and other areas in Waimea enter into Waikoloa Stream in the vicinity of the intersection of Mamalahoa Highway and Lindsey Road.

Although intermittent, under conditions of intensive rain, Kamuela Stream has topped its banks and caused flood waters to flow into the agricultural, residential, and commercial areas near the stream. When this has occurred, the flooded areas have suffered damage to crops and property.

There are several factors which contribute to this flood hazard condition including the relatively flat topographic character of this area of Waimea, the large watershed area upstream of the central area of Waimea, and the relatively undefined stream channel.

In addition, in the areas where Kamuela Stream crosses a roadway, culverts have been constructed to permit uninterrupted vehicle traffic flow. Since the stream is intermittent, the channel flows are not sufficient to keep it clear of debris and other material. Thus, when sufficient rains occur, debris, vegetation, and other material in the channel often cause the culverts along the stream to clog and nearby areas to flood.

These flood conditions have occurred on occasion over the years, most recently in the winter of 1979/1980 when waters from the Stream flooded

portions of Waimea and reached Mamalahoa Highway in certain areas. The retention basin constructed by the U.S. Department of Agriculture Soil Conservation Service located about two miles east of Site No. 1 has reduced some, although not all, of the flooding problem in the Waimea area.

2.2 Definitions

The following definitions are used by the County of Hawaii Code Chapter 27 Flood Control Ordinance and the Department of the Army Corps of Engineers Pacific Ocean Division "Flood Plain Management". Since they will be used throughout this analysis, these definitions are provided for clarity.

Floodway - The channel of a river or other water course and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than 1-FT. As previously discussed, encroachment into the floodway is prohibited unless certified by registered engineer that the encroachment will not cause any increase in base flood elevations.

Flood Fringe - The area of flood plain located outside the floodway. Generally, the flood fringe may serve as a temporary storage area for flood waters from base floods. Encroachment of the flood fringe by landfill is prohibited if it would result in the blockage or impediment of flow in a natural waterway and induce or aggravate flooding in a flood fringe area. Encroachment or landfill is permitted only if the fill is flood-proofed and resists hydrostatic and hydrodynamic loads and the effects of buoyancy.

Flood Plain - The floodway and flood fringe combined.

3. ANALYSIS METHODOLOGY

3.1 Introduction

A computer simulation model developed by the Department of the Army Corps of Engineers Water Resources Support Center, Davis, California has been used by the Federal Emergency Management Agency (FEMA) to determine flood hazard areas near streams and rivers. The output from this model is used by FEMA as the basis for determining the information published in the Flood Insurance Rate Map (FIRM). The latest FIRM for the Waimea area was published July 16, 1990.

The Water Resources Support Center model used in this flood hazard analysis of Kamulea Stream is the Hydrologic Engineering Center or HEC-2 Water Surface Profile computer model. The HEC-2 model calculates water surface profiles for gradually varied flow in natural or man-made channels. Both subcritical (tranquil) and supercritical (rapid) flow profiles can be calculated by the HEC-2 model.

The profile or output from the model can be plotted on a map to show the areal extend of the flood hazard area during base flood conditions. In addition, the input conditions to the model can be changed to reflect different conditions such as encroachment or construction within the flood hazard area. This data can also be plotted to show the affect of the construction or improvements on the areal extend of the flood hazard area.

3.2 100-Year Flood

The HEC-2 model uses a flood event to determine flood hazard conditions. A flood event of a magnitude expected to be equalled or exceeded once, on the average, during a 100-year period, is commonly called a 100-year flood and has a 1 percent chance of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods, rare floods of this magnitude could occur at much shorter

intervals or even in the same year. The 100-year flood is normally chosen for analysis because of its significance for flood plain management and flood insurance premium rates. As previously stated, a 100-year flood is called the base flood.

3.3 Model Input Data

The HEC-2 model uses a series of input information on the stream, stream flow, topographic conditions, and the stream channel to determine the areal extent of flow from the stream. The basic data used in the model for the HEC-2 program include the following:

1. Flow channel and overbank cross-sections;
2. Channel and overbank roughness;
3. Channel slope;
4. Relationship of cross-sections to each other;
5. Stream flow; and
6. Stream transition losses.

The variables used in the model to calculate the profiles are available in a separate document.

Channel roughness, a critical factor used in the computer program, is measured by a variable called Mannings "n" value. Typical "n" values vary from 0.013 for trowel finished concrete to 0.080 for unmaintained channels with dense weeds and uncut brush. The "n" value factors used in this analysis ranged from 0.035 to 0.040.

3.3.1 Flood Basins

In addition to the input data, the HEC-2 model uses information about flood basins to determine flood hazard conditions. The flood basins were determined from analysis of the topographic contours shown in the USGS quadrangle map. This analysis showed flows into Kamuela Stream come from

two basins with a combined area of 0.69 square miles and encompassing the area east of Waimea.

The first basin (Basin 1) is located north of Kuhio Village toward Hill Haioa. Basin 1 covers an area of approximately 0.15 square miles. The second basin (Basin 2) is located west of Basin 1 and generally encompasses the area north of the western portion of Kuhio Village. Basin 2 covers an area of about 0.54 square miles. The flow from Basin 2 was assumed as being constantly distributed along Kamuela Stream for this study.

Flow was determined with reference to the previous Wilson Okamoto study and the 100-year flood calculated using on a 2-year 24-hour rainfall duration (see attached figure at back of appendix). The 100-year storm flow was based on the formula:

$$Q_{100} = 34.3(DA)^{0.77} (P_{24-2})^{2.26}$$

where Q_{100} = Flow for 100-year storm expressed in cubic feet per second

DA = Drainage basin area expressed in square miles

P_{24-2} = 24 hour duration 2-year rainfall expressed in inches

Through interpolation of the weighted rainfall by area, P_{24-2} was determined to be 4.862 inches.

The results show the following:

For Basin 1: (Beginning of Kamuela Stream)

$$Q = 34.3 (0.15)^{0.77} (4.862)^{2.26}$$

= 284 CFS

Under base flood conditions, this calculation shows Basin 1 contributes a flow of approximately 284 cubic feet per second (CFS) at the origin of Kamuela Stream.

For Basins 1 and 2 (End of Kamuela Stream)

$$Q = 34.3 (0.69)^{0.77} (4.862)^{2.26}$$

$$= 919 \text{ CFS}$$

This calculation shows, under base flood conditions, Basin 2 contributes a flow of 635 CFS to Kamuela Stream and the total flow of Basin 1 and Basin 2 is 919 CFS.

Kamuela Stream in the area analyzed is approximately 4,770 linear feet (LF) long. Therefore, since Basin 2 contributes 635 CFS along the stream, the flow per linear foot was .1331 CFS/LF, as shown below:

$$635 \text{ CFS}/4,770 \text{ LF} = .1331 \text{ CFS/LF of stream}$$

By using this information, it was found that flow along the Stream varied from 539 CFS downstream of Kamamalu Street, to 695 CFS at the existing Medical Center, to 919 CFS prior to its confluence with Waikoloa Stream. Cross sections were taken at 200-FT minimum intervals so the areal extent of the flow could be plotted on a map.

4. RESULTS

The HEC-2 computer program produces cross sectional information which provides the areal limits of flood waters from base flood conditions. The areal limits of the flood area were then be mapped on the base aerial photograph. It should be noted, the cross-section and topographic data for the areas analyzed were obtained from the Corps of Engineers orthophoto contour map of Kamuela, Hawaii, which was photographed in April 1984. Contour intervals on this map are at 5 FT elevation differences and use the aerial photographs as the base. No on-the-ground topographic information has been used in this analysis. Ground topographic survey of the area would be necessary to more accurately assess the flood limits due to the flat topography of the land. Thus, conclusions in this report should consider the limitation of the topographic information.

Hydrological information was referenced to a previously performed study by Wilson Okamoto & Associates, Inc. dated February 16, 1989.

Figure 1 at the back of this study shows a comparison of the July 1990 FIRM and the results of this analysis for Site No. 1 under base flood conditions. The differences in the flood limits between the July 1990 FIRM and this analysis can be explained by a number of factors, including the following:

- 1) More and closer spaced cross sections were taken along Kamuela Stream for this analysis;
- 2) This analysis used two cross-section cuts in areas which were not examined in the FIRM study. These cross-sections are located 200 FT upstream of the existing Lucy Henriques Medical Center and 400 FT downstream of the medical center;
- 3) The stream centerlines chosen for each study showed a slightly different alignment since Kamuela Stream becomes poorly defined from about 700 FT downstream of Kamamalu Street; and
- 4) As previously indicated, the 5-FT contour aerial topographic map is inexact when interpreting elevations.

Notwithstanding the differences, the general areal extent of the flood limits are similar for the July 1990 FIRM and this analysis.

In addition the limits of the flooding or flood hazard area shown in Figure 1, the HEC-2 model was used to determine the floodway and flood fringe. This distinction was necessary as Hawaii County Code Chapter 27 regulates encroachment into these areas differently. Figure 2 shows the extent of the floodway and the flood fringe as determined by the HEC-2 model. It should be noted that the floodway and flood fringe shown in

Figure 2 are a result of the centerline alignment used for the stream. As previously noted, the centerline of the Stream becomes poorly defined about 700 FT downstream of Kamamalu Street. Thus, other centerline alignments could have other results.

The results of the HEC-2 model show a portion of the proposed hospital site will extend within both the floodway and flood fringe limits. See Figure 2. Given this result, it will be necessary to provide measures to protect the proposed hospital site from flooding during a base flood condition. Analysis of the results of the HEC-2 model showed approximately 5 FT of fill will be required to raise the site above the level of flood waters from a base flood.

In the flood fringe, encroachment by landfill is prohibited if it will block or impede the flow in a natural waterway and induce or aggravate flooding in a flood fringe area. Encroachment into the floodway is prohibited unless certified by registered engineer that the encroachment will not cause any increase in base flood elevations.

5. PROPOSED IMPROVEMENTS

The results of the HEC-2 model showed use of Site No.1 for construction of the proposed hospital could have effects on areas downstream or to the north and south of the site. Since Chapter 27 requires that encroachment not increase the base flood elevations, potential mitigation measures or improvements were analyzed to allow construction on Site No.1. Based on a review of the HEC-2 results, topographic conditions in the vicinity of the site, and surrounding land uses Site No. 1, several alternatives were considered.

5.1 Alternative A

Alternative A would construct a channel approximately 800 FT long parallel to the southern border of Site No.1 and the adjacent Lucy Henriques Medical Center. This channel would be constructed by regrading the area to direct the runoff to the southern edge of the site. See Figure 3. Alternative A would meet the requirements of Chapter 27 for construction in the floodway and flood fringe and allow construction of the proposed hospital on Site No. 1. Based on the information shown on the topographic map, approximately 6,500 cubic yards (CY) of excavation would be required to construct the channel. The cost to construct the channel is estimated to be about \$30.00 per CY or about \$200,000. (Note: This cost estimate is based on the available topographic information.. Further detail analysis of the design could result in a higher cost estimate for this improvement.)

Determination of the level of impact downstream from the regrading cannot be accurately assessed without a more precise topographic survey map. However, since the regrading would concentrate and redirect flows, some effects on the base flood elevations downstream or to the north and south of Site No. 1 would, most likely, occur from Alternative A. Thus, although Site No. 1 could be made acceptable for construction, as a result of the potential downstream impacts, Alternative A could not be implemented without other mitigation measures.

5.2 Alternative B

Alternative B would construct a culvert to divert the flow of Kamuela Stream before the flows could affect the base flood elevations of downstream areas. The inlet for the culvert would be sited between Site No. 1 and the existing Lucy Henriques Medical Center. From the inlet, the culvert would be routed to Mamalahoa Highway, along the Highway right-of-way, and then outlet into Waikaloa Stream. Two locations for the outlet

have been identified, one upstream of the Lindsey Road culvert and one downstream. See Figure 4.

The culvert would be sized to divert the flow of Kamuela Stream (695 CFS) near Site No. 1 so that base flood elevations in the areas downstream would not be affected. Based on preliminary calculations, a culvert with a minimum size of 84 inches in diameter would be required to divert this flow. It is assumed the culvert would be buried along its entire length at a depth necessary to meet the Hawaii County code for this type of structure. In addition, it is also assumed the slope (difference in elevation between the inlet and outlet) is sufficient to carry the total calculated flow and to discharge into Waikoloa Stream.

As previously discussed, the outlet for the proposed culvert could be located either upstream of the Waikoloa Stream/Lindsey Road bridge or downstream of this bridge. The exact location of the outlet will depend upon the availability of the right-of-way for the culvert. If the outlet is located upstream of Lindsey Road, the proposed culvert would have to be approximately 1,900 LF long. If the outlet is located downstream of Lindsey Road, the proposed culvert would be approximately 2,500 LF. Routing the outlet downstream of Lindsey Road would avoid potential flooding at the existing Lindsey Road bridge. It should be noted, construction of this culvert would not increase the total flows into Waikoloa Stream as it already handles the discharge of Kamuela Stream.

Based on these lengths and dimensions, a preliminary range of costs to construct the culvert can be estimated, as shown below:

Cost per LF: \$550.00 to \$600.00 for a pipe or concrete type culvert

1,900 LF x \$550.00/LF = \$1,045,000

1,900 LF x \$600.00/LF = \$1,140,000

2,500 LF x \$550.00/LF = \$1,375,000

2,500 LF x \$600.00/LF = \$1,500,000

Note: These costs are based on limited topographic information. Detail topographic information may indicate the culvert size may be reduced with a resultant lower cost. Alternatively, another design or type of culvert may be required with a resultant higher cost. In addition, these cost estimates do not include the costs for right-of-way acquisition or extensive rerouting of existing utility lines.

5.3 Alternative C

It should be noted Alternative B would remove all of the flow currently generated by Kamuela Stream at the inlet and divert it to Waikoloa Stream. Since some of the areas downstream of Site No.1 are currently subject to flows, only a portion of the flow may need to be diverted to a culvert. Using the HEC-2 model, approximately 260 CFS was diverted into a culvert of about 60 inches diameter. The inlet, routing, and outlet for this smaller culvert would be similar to the larger 84-inch culvert.

The results of this analysis show this smaller diameter culvert would not divert sufficient flows to ensure no increase in base flood elevations in downstream areas. See Figure 5. A comparison of the Alternative A and Alternative C shows the only minor differences between the two alternatives. See Figure 6. Thus, diversion of only a portion of the flows would not meet the requirements of Hawaii County Code Chapter 27.

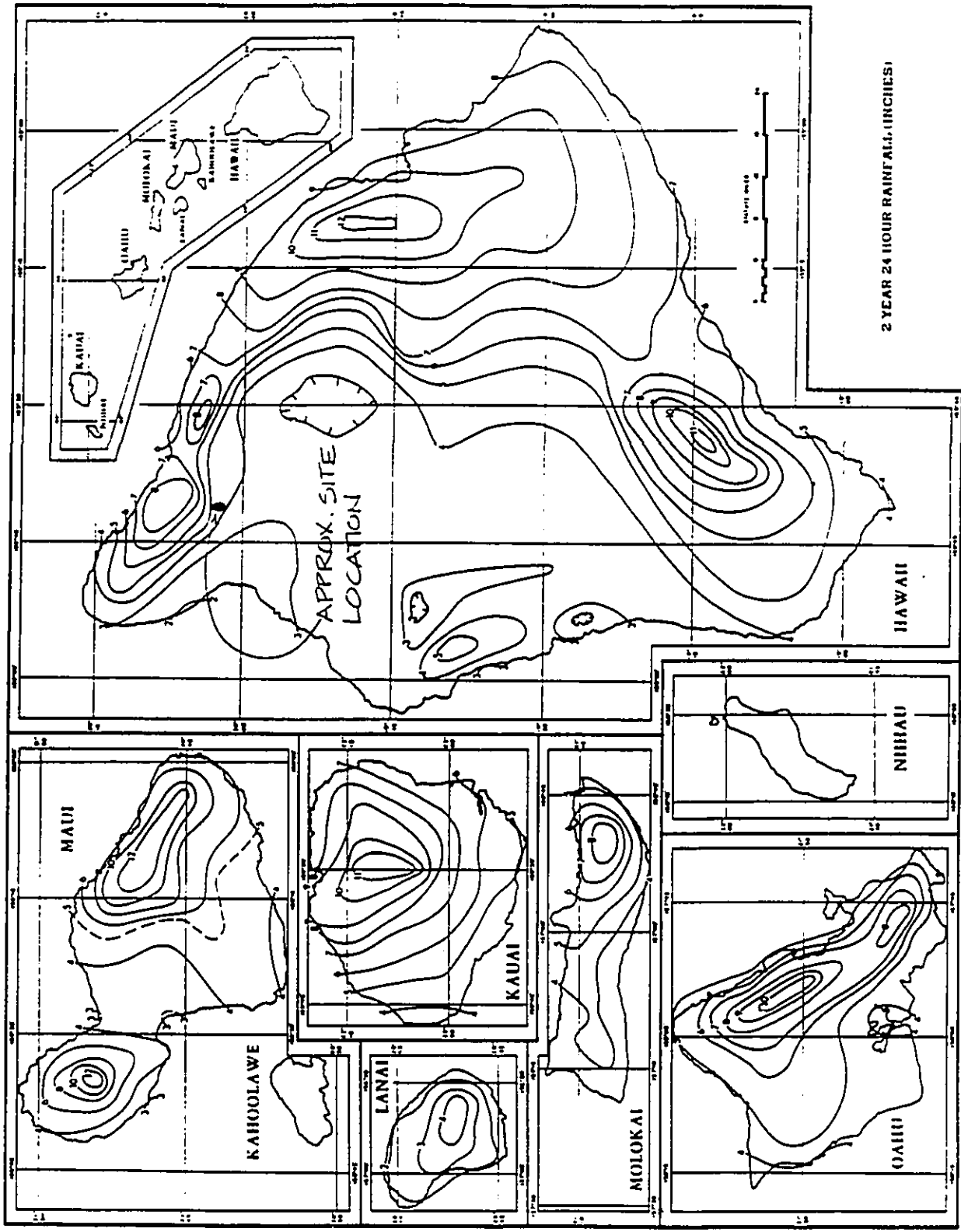
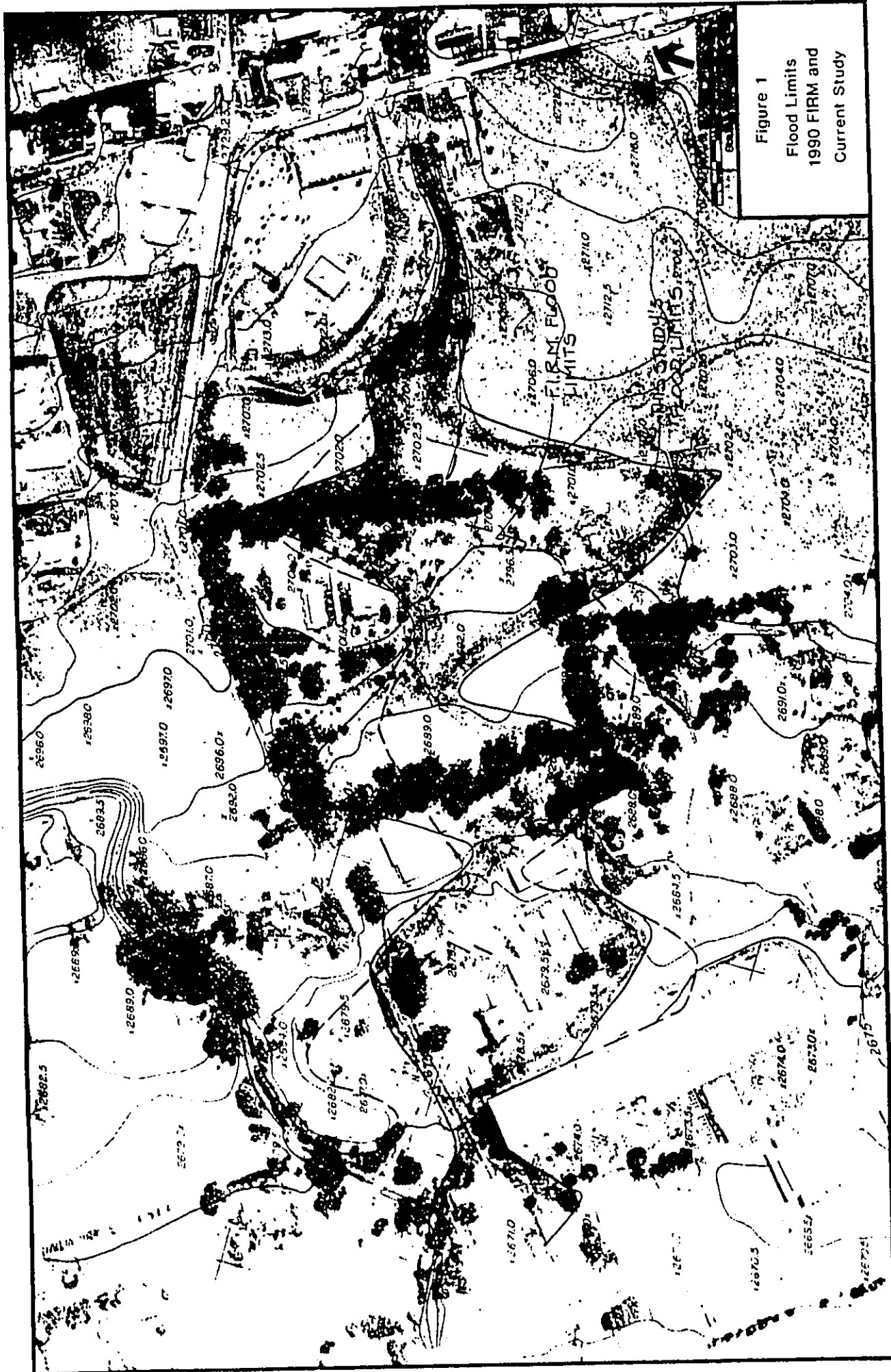
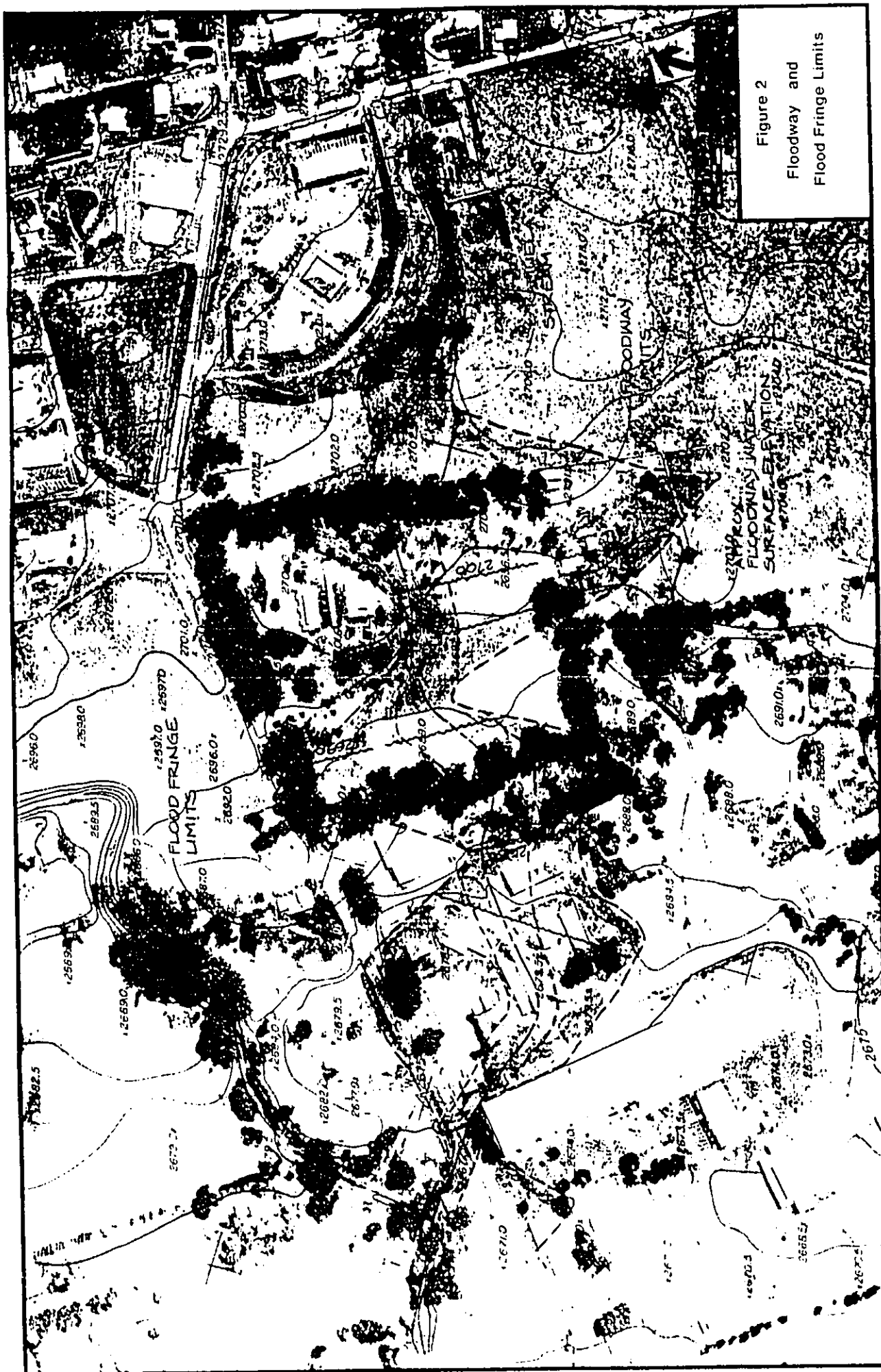


Figure 51.—2-yr. 24-hr. rainfall (in.)

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

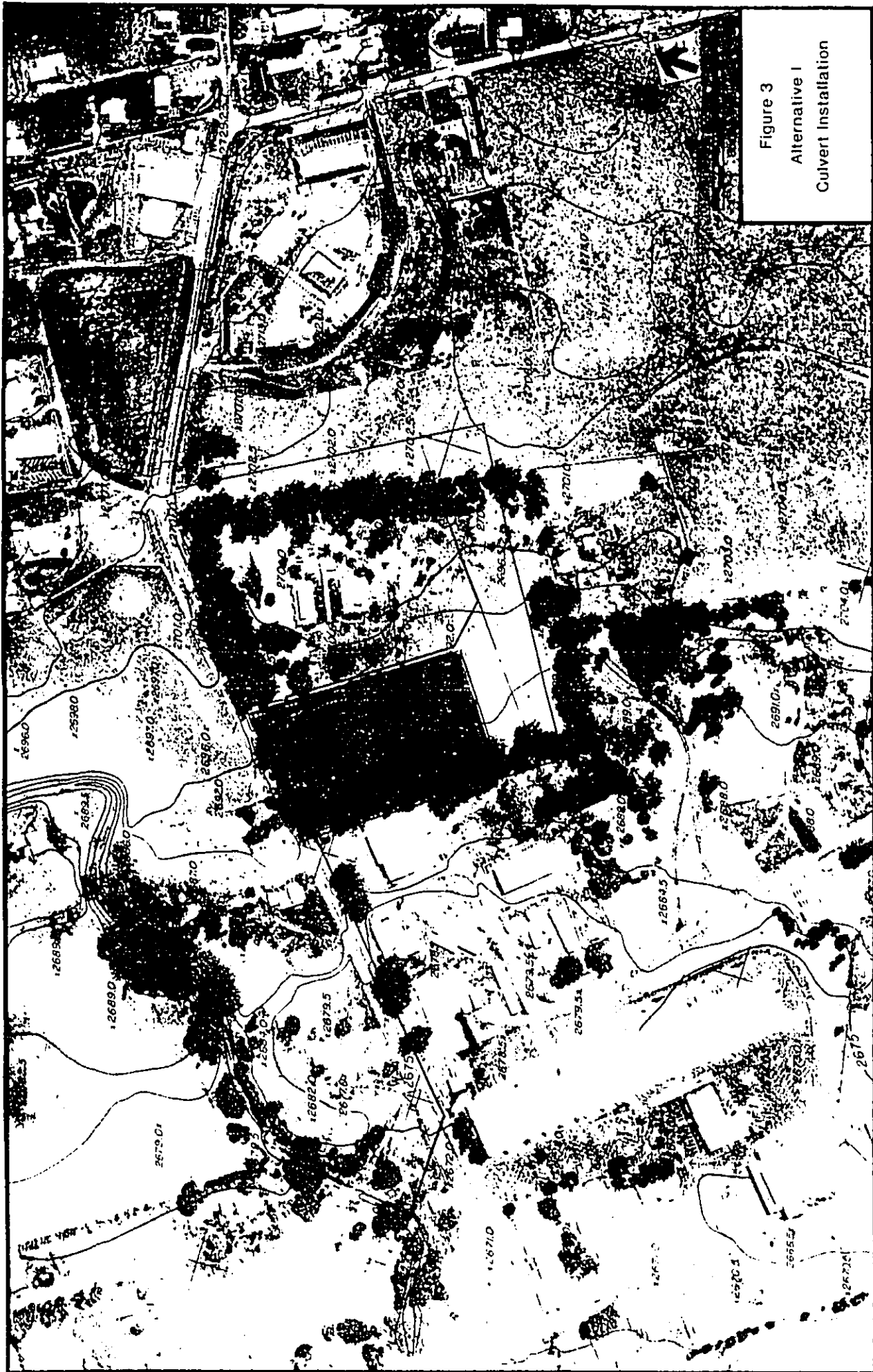


Figure 3
Alternative I
Culvert Installation

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS



Figure 5
Alternative C
Channel & Culvert
Installation

RECEIVED AS FOLLOWS

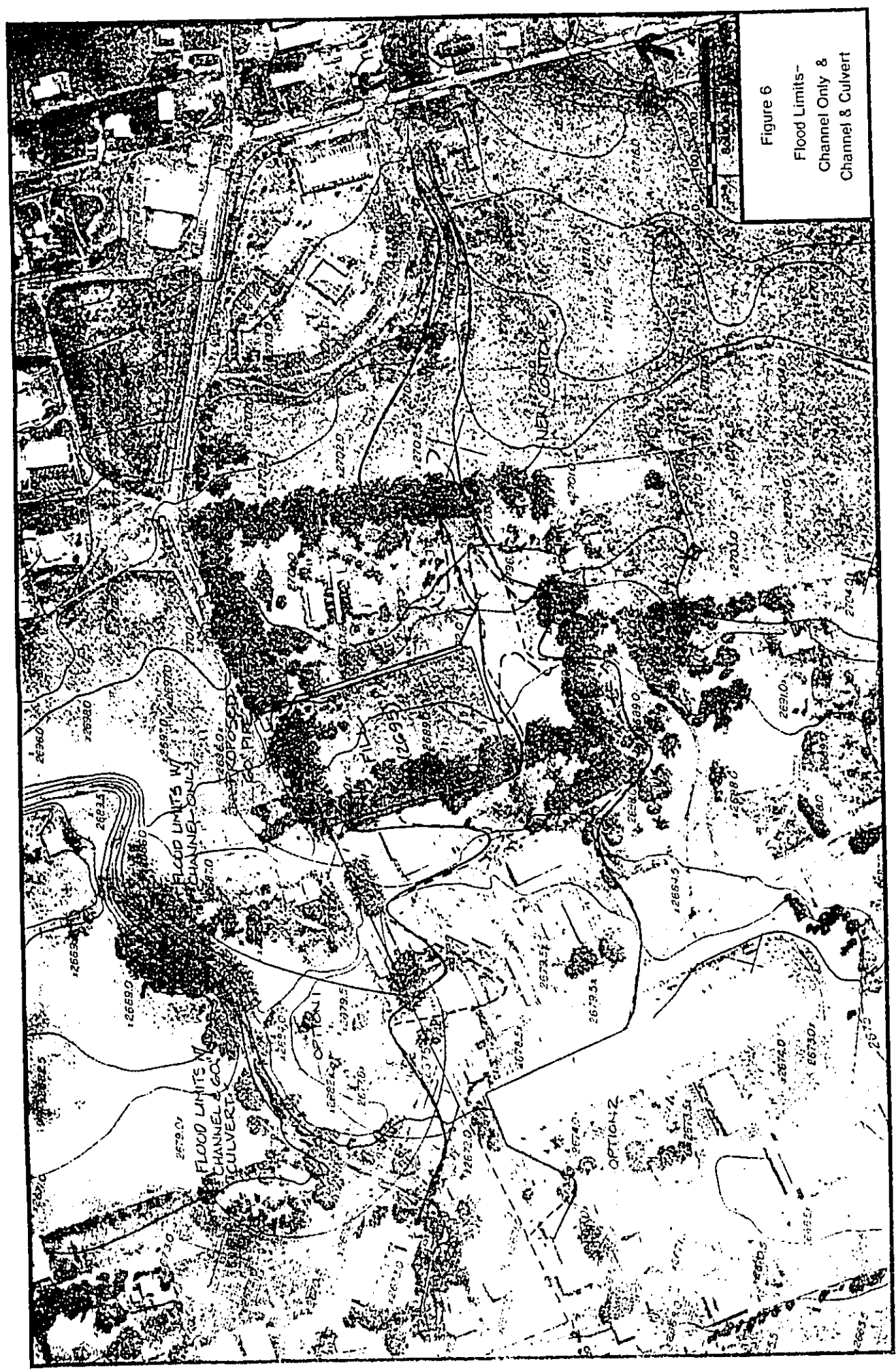


Figure 6
Flood Limits-
Channel Only &
Channel & Culvert

References

1. County of Hawaii Chapter 27 Flood Control Ordinance.
2. U.S. Army Corps of Engineers, the Hydrologic Engineering Center, HEC-2 Water Surface Profiles, User's Manual, September 1982.
3. U.S. Army Corps of Engineers - Pacific Ocean Division. "Flood Plain Management".
4. U.S. Department of Commerce Weather Bureau, Technical Paper No 43 "Rainfall-Frequency Atlas of the Hawaiian Islands for Areas to 200 Square Miles, Durations to 24 Hours, and Return Periods from 1 to 100 years", 1962.
5. Wilson Okamoto & Associates, Inc., "Kamuela Flood Study Revision", February 1989.

APPENDIX C

DETAILED SITE PREPARATION
AND UTILITY COST ESTIMATES

PRELIMINARY

PRINTED: 06/07/94
REVISED: 11/03/93

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NORTH HAWAII COMMUNITY HOSPITAL
CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
NEW FACILITIES ADJACENT TO EXISTING LUCY HENRIQUES MEDICAL CENTER
BASED ON DRAFT DESIGN BY MEDIA 5

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
GENERAL				
=====				
MOBILIZE/DEMOLIBLIZE	1	L.S.	\$100,000	\$100,000
CLEAR & GRUB	10	AC.	\$2,000	\$20,000
EROSION CONTROL	1	L.S.	\$20,000	\$20,000
GENERAL SUBTOTAL				\$140,000
EARTHWORK				
=====				
EXCAVATION	4,900	C.Y.	\$25	\$122,500
EMBANKMENT	25,300	C.Y.	\$25	\$632,500
EARTHWORK SUBTOTAL				\$755,000
SITWORK				
=====				
A.C PAVEMENT	131,500	S.F.	\$4	\$526,000
CONCRETE WHEELSTOPS	124	EA.	\$250	\$31,000
CONCRETE SIDEWALKS	6,400	S.F.	\$8	\$51,200
WOODEN HEADER	4,500	L.F.	\$5	\$22,500
PAV'T MARKINGS/TRAFFIC SIGNAGE	1	L.S.	\$5,000	\$5,000
SITWORK SUBTOTAL				\$635,700
UTILITIES				
=====				
WATER				

CONNECTION/METERING	1	L.S.	\$5,000	\$5,000
TRENCHING/BACKFILLING (4' X 3')	1,000	C.Y.	\$20	\$20,000
PAV'T RESTORATION	1	L.S.	\$1,500	\$1,500
FIRE PROTECTION LINE - 6"	1,970	L.F.	\$40	\$78,800
DOMESTIC SUPPLY LINE - 4"	240	L.F.	\$35	\$8,400
FIRE HYDRANTS	5	EA.	\$2,500	\$12,500
MISC. FITTINGS & APPURTENANCES	1	L.S.	\$4,000	\$4,000
CHLORINATE & DISINFECT	1	L.S.	\$1,000	\$1,000
WATER SUBTOTAL				\$131,200

PRELIMINARY
=====

PRINTED: 06/07/94
REVISED: 11/03/93

NORTH HAWAII COMMUNITY HOSPITAL
CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
NEW FACILITIES ADJACENT TO EXISTING LUCY HENRIQUES MEDICAL CENTER
BASED ON DRAFT DESIGN BY MEDIA 5

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
STORM DRAIN				
DRAINAGE INLETS	11	EA.	\$3,000	\$33,000
TRENCHING/BACKFILLING (6' X 4')	1,000	C.Y.	\$20	\$20,000
STORM DRAIN LINES - 18"	1,090	L.F.	\$45	\$49,050
STORM DRAIN LINES - 24"	50	L.F.	\$50	\$2,500
DRYWELLS	10	EA.	\$5,000	\$50,000
OUTLET HEADWALL	2	EA.	\$5,000	\$10,000
STORM DRAIN SUBTOTAL				\$164,550
SANITARY SEWER				
TRENCHING/BACKFILLING (4' X 3')	75	C.Y.	\$20	\$1,500
SEWERLINES - 6"	150	L.F.	\$25	\$3,750
SEWER MANHOLES	1	EA.	\$4,000	\$4,000
SEWER TREATMENT PLANT (15,000 GPD)	1	L.S.	\$150,000	\$150,000
EFFLUENT DISPOSAL SYSTEM	1	L.S.	\$70,000	\$70,000
MISC. APPURT. (10% OF STP & DISP. SYS.)	1	L.S.	\$22,000	\$22,000
FENCING (6' HIGH)	1,200	L.F.	\$20	\$24,000
LANDSCAPING/PLANTING BUFFER (10,000 S.F.)	1	L.S.	\$25,000	\$25,000
SANITARY SEWER SUBTOTAL				\$300,250
GRAND TOTAL				\$2,126,700

PRELIMINARY
=====

PRINTED: 06/07/94
REVISED: 11/03/93

NORTH HAWAII COMMUNITY HOSPITAL
CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
NEW FACILITIES ADJACENT TO EXISTING LUCY HENRIQUES MEDICAL CENTER
BASED ON DRAFT DESIGN BY MEDIA 5

BASIS OF ESTIMATE & ASSUMPTIONS
=====

EXCLUSIONS:

SITE LANDSCAPING & IRRIGATION COSTS (EXCEPT AT STP).
OFF-SITE INFRASTRUCTURE, EARTHWORK & IMPROVEMENTS COSTS.
COUNTY ASSESSMENTS.
OFF-SITE FLOOD HAZARD MITIGATION COSTS.

ASSUMPTIONS:

MOBILIZE/DEMobilize COST BASED ON 5% OF TOTAL COSTS.
TOTAL LOT SIZE IS APPROXIMATELY 10 ACRES.
CLEAR & GRUB AREA IS APPROXIMATELY 10 ACRES.
ROADWAY WIDTH IS 24'.
PARKING BASED ON 248 STALLS, WITH 6' WHEEL STOPS (1 PER 2 STALLS).
SIDEWALK WIDTH IS 6'.
EXISTING OFF-SITE UTILITIES ADEQUATE TO SUPPORT PROPOSED DEVELOPMENT.
1' TOPSOIL FOR GRASSING.

FLOOD-PROOF REQUIREMENTS:

NEW FACILITIES TO BE BUILT ON FILL - TOP ELEV. 2700+ (SAME AS EXISTING).

WATER:

DOES NOT INCLUDE FACILITY CHARGES (IF APPLICABLE).

STORM DRAIN:

ASSUME SITE SOILS CAPABLE OF DRAINING DRYWELLS.
ASSUME STORM DRAINS CAN OUTLET INTO KAMUELA STREAM.

SANITARY SEWER:

STP SIZE BASED ON 50 BEDS X 250 GALS./BED = 12,500 GALS.
50 BEDS X 50 GALS./BED = 2,500 GALS. (MISC.)

TOTAL = 15,000 GALS.

ASSUME ON-SITE SUBSURFACE DISPOSAL OF TREATED EFFLUENT ALLOWABLE.

GAS:

NOT INCLUDED.

ELECTRICITY:

NOT INCLUDED.

TELEPHONE:

NOT INCLUDED.

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 3
 SITE DESCRIPTION: 2020 PLAN

08/09/91
 11:30 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
GENERAL				
MOBILIZE/DEMobilize (10% OF TOTAL)	1	L.S.	\$100,000.00	\$100,000
CLEAR & GRUB (\$2000/ACRE)	1	L.S.	\$12,000.00	\$12,000
EROSION CONTROL	1	L.S.	\$10,000.00	\$10,000
GENERAL SUBTOTAL				\$122,000
EARTHWORK				
EXCAVATION	0	C.Y.		\$0
EMBANKMENT (2') (IMPORT)	7,700	C.Y.	\$25.00	\$192,500
TOPSOIL/GRASSING (1')	850	C.Y.	\$15.00	\$12,750
SURFACE DRAINAGE/SWALES/DITCHES	0	L.F.		\$0
EARTHWORK SUBTOTAL				\$205,250
SITWORK				
ROADWAYS (24' WIDE)	68,000	S.F.	\$3.00	\$204,000
PARKING	43,000	S.F.	\$2.75	\$118,250
CONCRETE CURBS/WHEELSTOPS	1,600	L.F.	\$8.00	\$12,800
CONCRETE SIDEWALKS	2,000	S.F.	\$4.00	\$8,000
PAV'T MARKINGS/TRAFFIC SIGNAGE	1	L.S.	\$5,000.00	\$5,000
SITWORK SUBTOTAL				\$348,050
UTILITIES				
WATER				
CONNECTION/METERING	1	L.S.	\$5,000.00	\$5,000
TRENCHING/BACKFILLING (3' X 24")	200	C.Y.	\$20.00	\$4,000
PAV'T RESTORATION	1	L.S.	\$1,500.00	\$1,500
WATERLINE - 8"	0	L.F.		\$0
FIRE PROTECTION LINE - 6"	700	L.F.	\$40.00	\$28,000
DOMESTIC SUPPLY LINE - 4"	200	L.F.	\$35.00	\$7,000
FIRE HYDRANTS	2	EA.	\$2,500.00	\$5,000
MISC. FITTINGS & APPURTENANCES	1	L.S.	\$4,000.00	\$4,000
CHLORINATE & DISINFECT	1	L.S.	\$300.00	\$300
WATER SUBTOTAL				\$54,800

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 3
 SITE DESCRIPTION: 2020 PLAN

08/09/91
 11:30 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
STORM DRAIN				
DRAINAGE INLETS	10	EA.	\$3,000.00	\$30,000
TRENCHING/BACKFILLING (3' X 24")	300	C.Y.	\$20.00	\$6,000
STORM DRAIN LINES - 18"	250	L.F.	\$45.00	\$11,250
STORM DRAIN LINES - 12"	800	L.F.	\$40.00	\$32,000
DRYWELLS	2	EA.	\$15,000.00	\$30,000
DRAIN TROUGHS (FOR SIDEWALKS)	0	L.F.		\$0
OUTLET HEADWALL	2	EA.	\$600.00	\$1,200
STORM DRAIN SUBTOTAL				\$110,450
SANITARY SEWER				
TRENCHING/BACKFILLING (3' X 24")	150	C.Y.	\$20.00	\$3,000
SEWERLINES - 6"	500	L.F.	\$25.00	\$12,500
CLEAN-OUT-TO-GRADES	3	EA.	\$300.00	\$900
SEWER MANHOLES	3	EA.	\$4,000.00	\$12,000
SEWER TREATMENT PLANT (12,500 GPD)	1	L.S.	\$125,000.00	\$125,000
MISC. APPURT. (10% OF STP & DISP. SYS.)	1	L.S.	\$20,000.00	\$20,000
EFFLUENT DISPOSAL SYS. (7 SEEPAGE PITS)	1	L.S.	\$70,000.00	\$70,000
FENCING (6' HIGH)	400	L.F.	\$28.00	\$11,200
LANDSCAPING/PLANTING BUFFER (10,000 S.F.)	1	L.S.	\$25,000.00	\$25,000
SANITARY SEWER SUBTOTAL				\$279,600
TELEPHONE/ELECTRICITY/CABLE/GAS				
HTCO DUCTLINES	200	L.F.	\$40.00	\$8,000
HELCO DUCTLINES	200	L.F.	\$60.00	\$12,000
CABLE DUCTLINES	200	L.F.	\$20.00	\$4,000
GAS LINES	0	L.F.		\$0
MISC. APPURT. (INCL. ELECT. TRANSF.)	1	L.S.	\$7,500.00	\$7,500
TEL./ELECT./CABLE/GAS SUBTOTAL				\$311,100
GRAND TOTAL				\$1,083,200

NORTH HAWAII COMMUNITY HOSPITAL
CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
SITE NO.: 3
SITE DESCRIPTION: 2020 PLAN

08/09/91
11:30 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
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EXCLUSIONS:

SITE LANDSCAPING & IRRIGATION (EXC. AT STP).

ASSUMPTIONS:

EXISTING UTILITIES ADEQUATE TO SUPPORT PROPOSED DEVELOPMENT.
WATER PRESSURE & FLOW ADEQUATE FOR FIRE PROTECTION & DOMESTIC NEED.
LAND DISPOSAL FOR TREATED EFFLUENT ALLOWABLE.
CLEAR & GRUB QUANTITY IS 6 ACRES.

FLOOD-PROOF REQUIREMENTS:

NO SPECIFIC REQUIREMENTS INCLUDED.

WATER:

DOES NOT INCLUDE FACILITY CHARGES.

STORM DRAIN:

DRAINLINES UP TO PROPERTY LINE ONLY.
COST MAY BE LOWERED BY DISCHARGING RUN-OFF BY SHEET FLOW IN SOME AREAS.

SANITARY SEWER:

STP SIZE BASED ON 50 BEDS X 200 GALS./BED = 10,000 GALS.
50 BEDS X 50 GALS./BED = 2,500 GALS. (MISC.)

TOTAL = 12,500 GALS.

GAS:

NOT INCLUDED.

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 4
 SITE DESCRIPTION: FIRE STATION

02/25/91
 09:12 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
GENERAL				
MOBILIZE/DEMobilize (10% OF TOTAL)	1	L.S.	\$100,000.00	\$100,000
CLEAR & GRUB (\$2000/ACRE)	1	L.S.	\$12,000.00	\$12,000
EROSION CONTROL	1	L.S.	\$10,000.00	\$10,000
GENERAL SUBTOTAL				\$122,000
EARTHWORK				
EXCAVATION	0	C.Y.		\$0
EMBANKMENT (2') (IMPORT)	7,000	C.Y.	\$25.00	\$175,000
TOPSOIL/GRASSING (1')	850	C.Y.	\$15.00	\$12,750
SURFACE DRAINAGE/SWALES/DITCHES	0	L.F.		\$0
EARTHWORK SUBTOTAL				\$187,750
SITework				
ROADWAYS (24' WIDE)	68,000	S.F.	\$3.00	\$204,000
PARKING	43,000	S.F.	\$2.75	\$118,250
CONCRETE CURBS/WHEELSTOPS	1,600	L.F.	\$8.00	\$12,800
CONCRETE SIDEWALKS	2,000	S.F.	\$4.00	\$8,000
PAV'T MARKINGS/TRAFFIC SIGNAGE	1	L.S.	\$5,000.00	\$5,000
SITework SUBTOTAL				\$348,050
UTILITIES				
WATER				
CONNECTION/METERING	1	L.S.	\$5,000.00	\$5,000
TRENCHING/BACKFILLING (3' X 24")	200	C.Y.	\$20.00	\$4,000
PAV'T RESTORATION	1	L.S.	\$1,500.00	\$1,500
WATERLINE - 8"	0	L.F.		\$0
FIRE PROTECTION LINE - 6"	700	L.F.	\$40.00	\$28,000
DOMESTIC SUPPLY LINE - 4"	200	L.F.	\$35.00	\$7,000
FIRE HYDRANTS	2	EA.	\$2,500.00	\$5,000
MISC. FITTINGS & APPURTENANCES	1	L.S.	\$4,000.00	\$4,000
CHLORINATE & DISINFECT	1	L.S.	\$300.00	\$300
WATER SUBTOTAL				\$54,800

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 4
 SITE DESCRIPTION: FIRE STATION

02/25/91
 09:12 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
STORM DRAIN				
DRAINAGE INLETS	10	EA.	\$3,000.00	\$30,000
TRENCHING/BACKFILLING (3' X 24")	300	C.Y.	\$20.00	\$6,000
STORM DRAIN LINES - 18"	450	L.F.	\$45.00	\$20,250
STORM DRAIN LINES - 12"	750	L.F.	\$40.00	\$30,000
DRYWELLS	2	EA.	\$15,000.00	\$30,000
DRAIN TROUGHS (FOR SIDEWALKS)	0	L.F.		\$0
OUTLET HEADWALL	2	EA.	\$600.00	\$1,200
STORM DRAIN SUBTOTAL				\$117,450
SANITARY SEWER				
TRENCHING/BACKFILLING (3' X 24")	100	C.Y.	\$20.00	\$2,000
SEWERLINES - 6"	400	L.F.	\$25.00	\$10,000
CLEAN-OUT-TO-GRADES	3	EA.	\$300.00	\$900
SEWER MANHOLES	3	EA.	\$4,000.00	\$12,000
SEWER TREATMENT PLANT (12,500 GPD)	1	L.S.	\$125,000.00	\$125,000
MISC. APPURT. (10% OF STP & DISP. SYS.)	1	L.S.	\$20,000.00	\$20,000
EFFLUENT DISPOSAL SYS. (7 SEEPAGE PITS)	1	L.S.	\$70,000.00	\$70,000
FENCING (6' HIGH)	400	L.F.	\$28.00	\$11,200
LANDSCAPING/PLANTING BUFFER (10,000 S.F.)	1	L.S.	\$25,000.00	\$25,000
SANITARY SEWER SUBTOTAL				\$276,100
TELEPHONE/ELECTRICITY/CABLE/GAS				
HTCO DUCTLINES	350	L.F.	\$40.00	\$14,000
HELCO DUCTLINES	350	L.F.	\$60.00	\$21,000
CABLE DUCTLINES	200	L.F.	\$20.00	\$4,000
GAS LINES	0	L.F.		\$0
MISC. APPURT. (INCL. ELECT. TRANSF.)	1	L.S.	\$7,500.00	\$7,500
TEL./ELECT./CABLE/GAS SUBTOTAL				\$322,600
GRAND TOTAL				\$1,080,700

NORTH HAWAII COMMUNITY HOSPITAL
CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
SITE NO.: 4
SITE DESCRIPTION: FIRE STATION

02/25/91
09:12 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
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EXCLUSIONS:

SITE LANDSCAPING & IRRIGATION (EXC. AT STP).

ASSUMPTIONS:

EXISTING UTILITIES ADEQUATE TO SUPPORT PROPOSED DEVELOPMENT.
WATER PRESSURE & FLOW ADEQUATE FOR FIRE PROTECTION & DOMESTIC NEED.
LAND DISPOSAL FOR TREATED EFFLUENT ALLOWABLE.
CLEAR & GRUB QUANTITY IS 6 ACRES.

FLOOD-PROOF REQUIREMENTS:

NO SPECIFIC REQUIREMENTS INCLUDED.

WATER:

DOES NOT INCLUDE FACILITY CHARGES.

STORM DRAIN:

DRAINLINES UP TO PROPERTY LINE ONLY.
COST MAY BE LOWERED BY DISCHARGING RUN-OFF BY SHEET FLOW IN SOME AREAS.

SANITARY SEWER:

STP SIZE BASED ON 50 BEDS X 200 GALS./BED = 10,000 GALS.
50 BEDS X 50 GALS./BED = 2,500 GALS. (MISC.)

TOTAL = 12,500 GALS.

GAS:

NOT INCLUDED.

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 5
 SITE DESCRIPTION: RACE TRACK

02/25/91
 09:14 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
GENERAL				
MOBILIZE/DEMobilIZE (10% OF TOTAL)	1	L.S.	\$100,000.00	\$100,000
CLEAR & GRUB (\$2000/ACRE)	1	L.S.	\$12,000.00	\$12,000
EROSION CONTROL	1	L.S.	\$10,000.00	\$10,000
GENERAL SUBTOTAL				\$122,000
EARTHWORK				
EXCAVATION	0	C.Y.		\$0
EMBANKMENT (2') (IMPORT)	7,000	C.Y.	\$25.00	\$175,000
TOPSOIL/GRASSING (1')	850	C.Y.	\$15.00	\$12,750
SURFACE DRAINAGE/SWALES/DITCHES	0	L.F.		\$0
EARTHWORK SUBTOTAL				\$187,750
SITework				
ROADWAYS (24' WIDE)	68,000	S.F.	\$3.00	\$204,000
PARKING	43,000	S.F.	\$2.75	\$118,250
CONCRETE CURBS/WHEELSTOPS	1,600	L.F.	\$8.00	\$12,800
CONCRETE SIDEWALKS	2,000	S.F.	\$4.00	\$8,000
PAV'T MARKINGS/TRAFFIC SIGNAGE	1	L.S.	\$5,000.00	\$5,000
SITework SUBTOTAL				\$348,050
UTILITIES				
WATER				
CONNECTION/METERING	1	L.S.	\$5,000.00	\$5,000
TRENCHING/BACKFILLING (3' X 24")	200	C.Y.	\$20.00	\$4,000
PAV'T RESTORATION	1	L.S.	\$1,500.00	\$1,500
WATERLINE - 8"	0	L.F.		\$0
FIRE PROTECTION LINE - 6"	700	L.F.	\$40.00	\$28,000
DOMESTIC SUPPLY LINE - 4"	200	L.F.	\$35.00	\$7,000
FIRE HYDRANTS	2	EA.	\$2,500.00	\$5,000
MISC. FITTINGS & APPURTENANCES	1	L.S.	\$4,000.00	\$4,000
CHLORINATE & DISINFECT	1	L.S.	\$300.00	\$300
WATER SUBTOTAL				\$54,800

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 5
 SITE DESCRIPTION: RACE TRACK

02/25/91
 09:14 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
STORM DRAIN				
DRAINAGE INLETS	10	EA.	\$3,000.00	\$30,000
TRENCHING/BACKFILLING (3' X 24")	300	C.Y.	\$20.00	\$6,000
STORM DRAIN LINES - 18"	450	L.F.	\$45.00	\$20,250
STORM DRAIN LINES - 12"	750	L.F.	\$40.00	\$30,000
DRYWELLS	2	EA.	\$15,000.00	\$30,000
DRAIN TROUGHS (FOR SIDEWALKS)	0	L.F.		\$0
OUTLET HEADWALL	2	EA.	\$600.00	\$1,200
STORM DRAIN SUBTOTAL				\$117,450
SANITARY SEWER				
TRENCHING/BACKFILLING (3' X 24")	100	C.Y.	\$20.00	\$2,000
SEWERLINES - 6"	400	L.F.	\$25.00	\$10,000
CLEAN-OUT-TO-GRADES	3	EA.	\$300.00	\$900
SEWER MANHOLES	3	EA.	\$4,000.00	\$12,000
SEWER TREATMENT PLANT (12,500 GPD)	1	L.S.	\$125,000.00	\$125,000
MISC. APPURT. (10% OF STP & DISP. SYS.)	1	L.S.	\$20,000.00	\$20,000
EFFLUENT DISPOSAL SYS. (7 SEEPAGE PITS)	1	L.S.	\$70,000.00	\$70,000
FENCING (6' HIGH)	400	L.F.	\$28.00	\$11,200
LANDSCAPING/PLANTING BUFFER (10,000 S.F.)	1	L.S.	\$25,000.00	\$25,000
SANITARY SEWER SUBTOTAL				\$276,100
TELEPHONE/ELECTRICITY/CABLE/GAS				
HTCO DUCTLINES	350	L.F.	\$40.00	\$14,000
HELCO DUCTLINES	350	L.F.	\$60.00	\$21,000
CABLE DUCTLINES	200	L.F.	\$20.00	\$4,000
GAS LINES	0	L.F.		\$0
MISC. APPURT. (INCL. ELECT. TRANSF.)	1	L.S.	\$7,500.00	\$7,500
TEL./ELECT./CABLE/GAS SUBTOTAL				\$322,600
GRAND TOTAL				\$1,080,700

NORTH HAWAII COMMUNITY HOSPITAL
CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
SITE NO.: 5
SITE DESCRIPTION: RACE TRACK

02/25/91
09:14 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
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EXCLUSIONS:
SITE LANDSCAPING & IRRIGATION (EXC. AT STP).

ASSUMPTIONS:
EXISTING UTILITIES ADEQUATE TO SUPPORT PROPOSED DEVELOPMENT.
WATER PRESSURE & FLOW ADEQUATE FOR FIRE PROTECTION & DOMESTIC NEED.
LAND DISPOSAL FOR TREATED EFFLUENT ALLOWABLE.
CLEAR & GRUB QUANTITY IS 6 ACRES.

FLOOD-PROOF REQUIREMENTS:
NO SPECIFIC REQUIREMENTS INCLUDED.

WATER:
DOES NOT INCLUDE FACILITY CHARGES.

STORM DRAIN:
DRAINLINES UP TO PROPERTY LINE ONLY.
COST MAY BE LOWERED BY DISCHARGING RUN-OFF BY SHEET FLOW IN SOME AREAS.

SANITARY SEWER:
STP SIZE BASED ON 50 BEDS X 200 GALS./BED = 10,000 GALS.
50 BEDS X 50 GALS./BED = 2,500 GALS. (MISC.)

TOTAL = 12,500 GALS.

GAS:
NOT INCLUDED.

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 6
 SITE DESCRIPTION: TREE FARM

02/25/91
 09:15 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
GENERAL				
MOBILIZE/DEMOBILIZE (10% OF TOTAL)	1	L.S.	\$100,000.00	\$100,000
CLEAR & GRUB (\$2000/ACRE)	1	L.S.	\$12,000.00	\$12,000
EROSION CONTROL	1	L.S.	\$10,000.00	\$10,000
GENERAL SUBTOTAL				\$122,000
EARTHWORK				
EXCAVATION	0	C.Y.		\$0
EMBANKMENT (2') (IMPORT)	7,000	C.Y.	\$25.00	\$175,000
TOPSOIL/GRASSING (1')	850	C.Y.	\$15.00	\$12,750
SURFACE DRAINAGE/SWALES/DITCHES	0	L.F.		\$0
EARTHWORK SUBTOTAL				\$187,750
SITework				
ROADWAYS (24' WIDE)	68,000	S.F.	\$3.00	\$204,000
PARKING	43,000	S.F.	\$2.75	\$118,250
CONCRETE CURBS/WHEELSTOPS	1,600	L.F.	\$8.00	\$12,800
CONCRETE SIDEWALKS	2,000	S.F.	\$4.00	\$8,000
PAV'T MARKINGS/TRAFFIC SIGNAGE	1	L.S.	\$5,000.00	\$5,000
SITework SUBTOTAL				\$348,050
UTILITIES				
WATER				
CONNECTION/METERING	1	L.S.	\$5,000.00	\$5,000
TRENCHING/BACKFILLING (3' X 24")	200	C.Y.	\$20.00	\$4,000
PAV'T RESTORATION	1	L.S.	\$1,500.00	\$1,500
WATERLINE - 8"	0	L.F.		\$0
FIRE PROTECTION LINE - 6"	700	L.F.	\$40.00	\$28,000
DOMESTIC SUPPLY LINE - 4"	200	L.F.	\$35.00	\$7,000
FIRE HYDRANTS	2	EA.	\$2,500.00	\$5,000
MISC. FITTINGS & APPURTENANCES	1	L.S.	\$4,000.00	\$4,000
CHLORINATE & DISINFECT	1	L.S.	\$300.00	\$300
WATER SUBTOTAL				\$54,800

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 6
 SITE DESCRIPTION: TREE FARM

02/25/91
 09:15 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
STORM DRAIN				
DRAINAGE INLETS	10	EA.	\$3,000.00	\$30,000
TRENCHING/BACKFILLING (3' X 24")	300	C.Y.	\$20.00	\$6,000
STORM DRAIN LINES - 18"	450	L.F.	\$45.00	\$20,250
STORM DRAIN LINES - 12"	750	L.F.	\$40.00	\$30,000
DRYWELLS	2	EA.	\$15,000.00	\$30,000
DRAIN TROUGHS (FOR SIDEWALKS)	0	L.F.		\$0
OUTLET HEADWALL	2	EA.	\$600.00	\$1,200
STORM DRAIN SUBTOTAL				\$117,450
SANITARY SEWER				
TRENCHING/BACKFILLING (3' X 24")	100	C.Y.	\$20.00	\$2,000
SEWERLINES - 6"	400	L.F.	\$25.00	\$10,000
CLEAN-OUT-TO-GRADES	3	EA.	\$300.00	\$900
SEWER MANHOLES	3	EA.	\$4,000.00	\$12,000
SEWER TREATMENT PLANT (12,500 GPD)	1	L.S.	\$125,000.00	\$125,000
MISC. APPURT. (10% OF STP & DISP. SYS.)	1	L.S.	\$20,000.00	\$20,000
EFFLUENT DISPOSAL SYS. (7 SEEPAGE PITS)	1	L.S.	\$70,000.00	\$70,000
FENCING (6' HIGH)	400	L.F.	\$28.00	\$11,200
LANDSCAPING/PLANTING BUFFER (10,000 S.F.)	1	L.S.	\$25,000.00	\$25,000
SANITARY SEWER SUBTOTAL				\$276,100
TELEPHONE/ELECTRICITY/CABLE/GAS				
HTCO DUCTLINES	350	L.F.	\$40.00	\$14,000
HELCO DUCTLINES	350	L.F.	\$60.00	\$21,000
CABLE DUCTLINES	200	L.F.	\$20.00	\$4,000
GAS LINES	0	L.F.		\$0
MISC. APPURT. (INCL. ELECT. TRANSF.)	1	L.S.	\$7,500.00	\$7,500
TEL./ELECT./CABLE/GAS SUBTOTAL				\$322,600
GRAND TOTAL				\$1,080,700

NORTH HAWAII COMMUNITY HOSPITAL
CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
SITE NO.: 6
SITE DESCRIPTION: TREE FARM

02/25/91
09:15 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
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EXCLUSIONS:

SITE LANDSCAPING & IRRIGATION (EXC. AT STP).

ASSUMPTIONS:

EXISTING UTILITIES ADEQUATE TO SUPPORT PROPOSED DEVELOPMENT.
WATER PRESSURE & FLOW ADEQUATE FOR FIRE PROTECTION & DOMESTIC NEED.
LAND DISPOSAL FOR TREATED EFFLUENT ALLOWABLE.
CLEAR & GRUB QUANTITY IS 6 ACRES.

FLOOD-PROOF REQUIREMENTS:

NO SPECIFIC REQUIREMENTS INCLUDED.

WATER:

DOES NOT INCLUDE FACILITY CHARGES.

STORM DRAIN:

DRAINLINES UP TO PROPERTY LINE ONLY.
COST MAY BE LOWERED BY DISCHARGING RUN-OFF BY SHEET FLOW IN SOME AREAS.

SANITARY SEWER:

STP SIZE BASED ON 50 BEDS X 200 GALS./BED = 10,000 GALS.
50 BEDS X 50 GALS./BED = 2,500 GALS. (MISC.)

TOTAL = 12,500 GALS.

GAS:

NOT INCLUDED.

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 7
 SITE DESCRIPTION: WAIAKA BRIDGE

02/25/91
 09:15 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
GENERAL				
MOBILIZE/DEMobilIZE (10% OF TOTAL)	1	L.S.	\$100,000.00	\$100,000
CLEAR & GRUB (\$2000/ACRE)	1	L.S.	\$12,000.00	\$12,000
EROSION CONTROL	1	L.S.	\$10,000.00	\$10,000
GENERAL SUBTOTAL				\$122,000
EARTHWORK				
EXCAVATION	0	C.Y.		\$0
EMBANKMENT (2') (IMPORT)	7,000	C.Y.	\$25.00	\$175,000
TOPSOIL/GRASSING (1')	850	C.Y.	\$15.00	\$12,750
SURFACE DRAINAGE/SWALES/DITCHES	0	L.F.		\$0
EARTHWORK SUBTOTAL				\$187,750
SITework				
ROADWAYS (24' WIDE)	68,000	S.F.	\$3.00	\$204,000
PARKING	43,000	S.F.	\$2.75	\$118,250
CONCRETE CURBS/WHEELSTOPS	1,600	L.F.	\$8.00	\$12,800
CONCRETE SIDEWALKS	2,000	S.F.	\$4.00	\$8,000
PAV'T MARKINGS/TRAFFIC SIGNAGE	1	L.S.	\$5,000.00	\$5,000
SITework SUBTOTAL				\$348,050
UTILITIES				
WATER				
CONNECTION/METERING	1	L.S.	\$5,000.00	\$5,000
TRENCHING/BACKFILLING (3' X 24")	200	C.Y.	\$20.00	\$4,000
PAV'T RESTORATION	1	L.S.	\$1,500.00	\$1,500
WATERLINE - 8"	0	L.F.		\$0
FIRE PROTECTION LINE - 6"	700	L.F.	\$40.00	\$28,000
DOMESTIC SUPPLY LINE - 4"	200	L.F.	\$35.00	\$7,000
FIRE HYDRANTS	2	EA.	\$2,500.00	\$5,000
MISC. FITTINGS & APPURTENANCES	1	L.S.	\$4,000.00	\$4,000
CHLORINATE & DISINFECT	1	L.S.	\$300.00	\$300
WATER SUBTOTAL				\$54,800

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 7
 SITE DESCRIPTION: WAIAKA BRIDGE

02/25/91
 09:15 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
STORM DRAIN				
DRAINAGE INLETS	10	EA.	\$3,000.00	\$30,000
TRENCHING/BACKFILLING (3' X 24")	300	C.Y.	\$20.00	\$6,000
STORM DRAIN LINES - 18"	450	L.F.	\$45.00	\$20,250
STORM DRAIN LINES - 12"	750	L.F.	\$40.00	\$30,000
DRYWELLS	2	EA.	\$15,000.00	\$30,000
DRAIN TROUGHS (FOR SIDEWALKS)	0	L.F.		\$0
OUTLET HEADWALL	2	EA.	\$600.00	\$1,200
STORM DRAIN SUBTOTAL				\$117,450
SANITARY SEWER				
TRENCHING/BACKFILLING (3' X 24")	100	C.Y.	\$20.00	\$2,000
SEWERLINES - 6"	400	L.F.	\$25.00	\$10,000
CLEAN-OUT-TO-GRADES	3	EA.	\$300.00	\$900
SEWER MANHOLES	3	EA.	\$4,000.00	\$12,000
SEWER TREATMENT PLANT (12,500 GPD)	1	L.S.	\$125,000.00	\$125,000
MISC. APPURT. (10% OF STP & DISP. SYS.)	1	L.S.	\$20,000.00	\$20,000
EFFLUENT DISPOSAL SYS. (7 SEEPAGE PITS)	1	L.S.	\$70,000.00	\$70,000
FENCING (6' HIGH)	400	L.F.	\$28.00	\$11,200
LANDSCAPING/PLANTING BUFFER (10,000 S.F.)	1	L.S.	\$25,000.00	\$25,000
SANITARY SEWER SUBTOTAL				\$276,100
TELEPHONE/ELECTRICITY/CABLE/GAS				
HTCO DUCTLINES	350	L.F.	\$40.00	\$14,000
HELCO DUCTLINES	350	L.F.	\$60.00	\$21,000
CABLE DUCTLINES	200	L.F.	\$20.00	\$4,000
GAS LINES	0	L.F.		\$0
MISC. APPURT. (INCL. ELECT. TRANSF.)	1	L.S.	\$7,500.00	\$7,500
TEL./ELECT./CABLE/GAS SUBTOTAL				\$322,600
GRAND TOTAL				\$1,080,700

NORTH HAWAII COMMUNITY HOSPITAL
 CIVIL ENGINEER'S PRELIMINARY COST ESTIMATE
 SITE NO.: 7
 SITE DESCRIPTION: WAIAKA BRIDGE

02/25/91
 09:15 AM

DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT COST	EXTENSION
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EXCLUSIONS:
 SITE LANDSCAPING & IRRIGATION (EXC. AT STP).

ASSUMPTIONS:
 EXISTING UTILITIES ADEQUATE TO SUPPORT PROPOSED DEVELOPMENT.
 WATER PRESSURE & FLOW ADEQUATE FOR FIRE PROTECTION & DOMESTIC NEED.
 LAND DISPOSAL FOR TREATED EFFLUENT ALLOWABLE.
 CLEAR & GRUB QUANTITY IS 6 ACRES.

FLOOD-PROOF REQUIREMENTS:
 NO SPECIFIC REQUIREMENTS INCLUDED.

WATER:
 DOES NOT INCLUDE FACILITY CHARGES.

STORM DRAIN:
 DRAINLINES UP TO PROPERTY LINE ONLY.
 COST MAY BE LOWERED BY DISCHARGING RUN-OFF BY SHEET FLOW IN SOME AREAS.

SANITARY SEWER:
 STP SIZE BASED ON 50 BEDS X 200 GALS./BED = 10,000 GALS.
 50 BEDS X 50 GALS./BED = 2,500 GALS. (MISC.)

 TOTAL = 12,500 GALS.

GAS:
 NOT INCLUDED.

APPENDIX D

**ARCHAEOLOGICAL INVENTORY
SURVEY REPORT**

**Archaeological Inventory Survey
Potential Sites for
North Hawaii Community Hospital**

**Lands of Waikoloa, Pu'ukapu, and Lalamilo
South Kohala District, Island of Hawaii**

PHRI

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

Archaeological • Historical • Cultural Resource Management Studies & Services

305 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-6998
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**Archaeological Inventory Survey
Potential Sites for
North Hawaii Community Hospital**

**Lands of Waikoloa, Pu'ukapu, and Lalamilo
South Kohala District, Island of Hawaii
(TMK:6-7-02:13,17;6-7-03:11; 6-8-01:1,2)**

by

Linda W. Thompson, B.A.
Supervisory Field Archaeologist

and

Paul H. Rosendahl, Ph.D.
Principal Archaeologist

Prepared for

Wilson Okamoto & Associates
P.O. Box 3530
Honolulu, Hawaii 96811

May 1992

PHRI

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SUMMARY

At the request of Wilson, Okamoto & Associates, Paul H. Rosendahl Ph.D., Inc. (PHRI) conducted an archaeological inventory survey of potential sites for the North Hawaii Community Hospital, in Waimea, in the Lands of Waikoloa, Pu'ukapu, and Lalamilo, South Kohala District, Island of Hawaii (TMK:6-7-02:13,17; 6-7-03:11; 6-8-01:1,2). The project area consists of seven different parcels (Parcels 1-7)*. Permission to enter Parcel 2 was never obtained so an inventory survey was not conducted in the parcel; work on the parcel was limited to background research. The overall objective of the inventory survey was to provide a level of information sufficient for the preparation of an Environmental Impact Statement (EIS).

During the survey, an 'auwai complex (Site 16095)* was identified within Parcels 1, 3, and 4. The complex consists of a series of ditches ('auwai) linked to a larger irrigation system—the Waimea Agricultural System (Clark and Kirch 1983:242). No features or sites were noted in association with the 'auwai complex. An agricultural field complex was identified within Parcel 7 (Site 18054). The complex consists of at least six fields, identified by a series of low, soil retaining faces oriented perpendicular to the prevailing winds. Associated 'auwai, planting mounds, or habitation features were not identified.

Site 16095 is assessed as important for information content, and further data collection is recommended within Parcels 1, 3, and 4 to further define the integrity and extent of the 'auwai. Site 18054 is also assessed as important for information content, and further data collection is recommended within Parcel 7 to further define the nature of the field complex. As no cultural remains were encountered in Parcels 5 or 6, no further work is recommended for the parcels. An inventory survey of Parcel 7 is recommended prior to development in the area.

* In the EIS Preparation Notice the parcels are referred to as "Alternative Sites."

* State Inventory of Historic Places Site Designation System: 5-digit no. prefixed by 50-10-06 (50=State of Hawaii; 10=Island of Hawaii; 06=USGS quadrangle map [Kamuela, Hawaii]).

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INTRODUCTION

BACKGROUND

At the request of Wilson, Okamoto & Associates, Paul H. Rosendahl Ph.D., Inc. (PHRI) conducted a 100% surface and limited subsurface archaeological inventory survey of potential sites for the North Hawaii Community Hospital, in Waimea, in the Lands of Waikoloa, Pu'ukapu, and Lalamilo, South Kohala District, Island of Hawaii (TMK:6-7-02:13,17; 6-7-03:11; 6-8-01:1,2). The project area consists of seven different parcels (Parcels 1-7), each a potential hospital site. Permission to enter Parcel 2 was never obtained so an inventory survey was not conducted in the parcel; work on the parcel was limited to background research. Parcels 1, 3, 4, 5, 6, and 7, comprising about 35 acres, were subjected to a full inventory-level survey. The overall objective of the inventory survey was to provide a level of information sufficient for the preparation of an Environmental Impact Statement (EIS).

The survey field work was conducted July 17-19 and 22-24, and December 12, 1991, by a crew of two to four under the supervision of Supervisory Field Archaeologist Linda W. Thompson, B.A., and under the overall direction of Principal Archaeologist Dr. Paul H. Rosendahl. Crew members included Katherine Brown, Maureen DaRos, Alice Smith, Rusty Smith, and Karen Wigglesworth. It took approximately 18 labor-days to complete the field work.

SCOPE OF WORK

The basic purpose of the inventory survey was to identify—to discover and locate on available maps—all sites and features of potential archaeological significance within the project area. An inventory survey comprises an initial level of archaeological investigation. It is extensive rather than intensive in scope, and is conducted basically to determine the presence or absence of archaeological remains. This level of survey indicates both the general nature and variety of archaeological remains present, and the general distribution and density of such remains. It permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for any subsequent mitigation work as might be necessary or appropriate. Such work could include further data collection involving detailed recording of sites and features, and limited excavations; and possibly subsequent data recovery research excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

The basic objectives of the inventory survey were four-fold: (a) to identify (find and locate) all sites and site complexes present with the project area; (b) to evaluate the potential general significance of all identified archaeological remains; (c) to determine the possible impacts of proposed development upon the identified remains; and (d) to define the general scope of any subsequent further data collection and/or other mitigation work that might be necessary or appropriate.

Based on a review of available background literature, familiarity with both the general project area and the current requirements of State and County review authorities, and based on discussions with representatives of Wilson, Okamoto & Associates, the following specific tasks were determined to constitute an adequate scope of work for the survey:

1. Conduct limited archaeological and historical documentary background research involving review and evaluation of readily available archaeological and historical literature, historic documents and records, and cartographic sources relevant to the immediate project area;
2. Conduct a 100% coverage, variable-intensity (30-90 ft intervals) surface survey of each selected parcel to identify, record, and evaluate any previously identified sites and all newly identified sites;
3. Conduct limited subsurface testing of selected sites and features within the parcels to determine the presence or absence of potentially significant buried cultural features or deposits, and to obtain suitable samples for age determination analysis;
4. Synthesize background and field data and prepare appropriate reports.

The inventory survey was carried out in accordance with the standards and guidelines recommended by the Department of Land and Natural Resources - State Historic Preservation Division (DLNR-SHPD). The significance of all archaeological remains identified within the selected parcels was to be assessed in terms of the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60) and the criteria for evaluation of traditional cultural values prepared by the Advisory Council on Historic Preservation. These criteria are used by the DLNR-SHPD for the evaluation of cultural resources. The significance of all remains was also

to be assessed in terms of PHRI Cultural Resource Management (CRM) value modes, which are defined in the Conclusion section of this report.

PROJECT AREA DESCRIPTION

The seven parcels constituting the North Hawaii Community Hospital Site comprise about 40 acres (Figure 1). The specific boundaries of each parcel have been described in the EIS preparation notice (Wilson, Okamoto and Associates 1991), as follows:

Parcel 1 - Parcel 1 is located near the center of Waimea Town along Mamalahoa Highway on TMK parcel 6-7-02:13. This parcel is approximately 12.7 acres, of which approximately 5 acres is presently used for the Lucy Henriques Medical Center. The space available for construction is to the north, west, and south of the existing medical center. East of Parcel 1 is the Waimea Civic Center. Directly west of the parcel is a hardware store and the beginning of the Parker Ranch Shopping Center. South of the parcel's boundary is a single residence and pasture land. Parcel 1 is owned by the Lucy Henriques Trust and is managed by the Bishop Trust Company.

Parcel 2 - Parcel 2 is located adjacent to the Lucy Henriques Medical Center on the corner of Mamalahoa Highway and Kamamalu Street, TMK parcel 6-7-02:11. Open area to the west of Parcel 2 consists of about five acres of vacant land which could be used to supplement Parcel 1. Parcel 2 would only be used if the required facilities could not be entirely sited within Parcel 1. Parcel 2 would not be used as a separate site for the hospital. The Lucy Henriques Medical Center is to the west of Parcel 2. Public facilities east of Parcel 2 include a police station, County Court building, and community center building. Southeast of Parcel 2, across a drainage channel, is the Waimea Fire Station. Parcel 2 is owned by the State of Hawaii.

Parcel 3 - Parcel 3 is located south of the Lucy Henriques Medical Center parcel on part of TMK: 6-7-02:17. This area has a single residence and consists mostly of pasture land. Available space is approximately seven acres. An industrial area is west of Parcel 3. The rest of the surrounding area, excluding the Medical Center, is pasture land. Parcel 3 is owned by the County of Hawaii. Parcel 3 has been identified in the Parker Ranch 2020 Plan as an

expansion area for medical services. Thus, it has been included in this inventory of alternative sites. Use of Parcel 3 would be dependent upon construction of the proposed roadway and circulation system set forth in the Parker Ranch 2020 Plan.

Parcel 4 - Parcel 4 is located along Kamamalu Street about one-quarter mile south of its intersection with Mamalahoa Highway, on TMK parcel 6-7-02:17. The parcel is bordered on the east by Kamamalu Street, the Waimea Fire Station on the north, and an electric substation on the south. Available space is approximately 5-7 acres. Besides the fire station and the electric substation, residences are located directly across Kamamalu Street and also south of the electric substation. The area to the west of the site is pasture land and the single residence mentioned above in Parcel 3. The parcel is owned by the Trust of Richard Smart.

Parcel 5 - Parcel 5 is located along the Mamalahoa Highway, approximately one mile west of Lucy Henriques Medical Center on the way to Kamuela Airport. The proposed hospital site has been delineated in the open space between the racetrack and the road on TMK parcel 6-7-02:17. Residences are located to the northeast and across Mamalahoa Highway to the north. The racetrack is located east of the parcel. The land is owned by the Trust of Richard Smart.

Parcel 6 - Parcel 6 is situated about two miles from the Medical Center along Mamalahoa Highway on the way to Kamuela Airport. It is delineated on the west side of the Highway within TMK 6-8-01:1 where the southern boundary of the tree farm ends. Approximately 5-7 acres are available for use. The Mamalahoa Highway fronts the site to the east. Gary's Automotive shop is located one-half mile east of Mamalahoa Highway to the rear of the parcel. The Kamuela Airport is located across the Highway to the southeast. Between the parcel and the tree farm is a dirt road which is an easement for a new highway (according to the tax map). The land is owned by the Trust of Richard Smart.

Parcel 7 - Parcel 7 is located approximately 2.3 miles from the Lucy Henriques Medical Center along the Kawaihae Road, where the road forks, one branch heading to the coast and the other to Kohala. The parcel is delineated in a clear field south of the Kawaihae Road. Waiaka Stream flows to the north-

west of the site. An electric power substation and refuse transfer station are located east of the parcel. Residential developments are located across Waiaka Stream to the northwest. The land is owned by the State of Hawaii.

The project area is on the leeward side of Hawaii Island within the Waimea Plateau, at c. 870 m above sea level. The region is cool and moist. The mean annual temperatures range between 60-70 degrees Fahrenheit, with mean maximums generally between 70-80 degrees and monthly minimums sometimes plunging below 50 degrees (Clark and Kirch 1983). The mean annual rainfall averages 1,500 mm (59.1 in)(ibid. 1983).

Most of the time trade winds prevail in the project area. These winds are distorted by Kohala Mountains and Mauna Kea. The winds blow for 80 to 95% of the time from May through September, and for 50 to 80% of the time from October through April (Blumenstock and Price 1967:3). It is during winter months that the major storms occur and the heaviest rains fall. The winds tend to be stronger in the winter with velocities in excess of 12 mph about 50% of the time (Blumenstock 1961:5). The storms may blow in from any direction but are typically from the south, southwest, or southeast. *Mumuku*, fierce gusts of wind from the northeast, also blow in the project area.

The topography of the region is gently rolling to comparatively flat, with an occasional outcrop ridge or knoll. Physiographically, this area is known as the Waimea Saddle. The saddle is the result of Mauna Kea lavas ponding against the older dome of Kohala (U.H. Geog. 1973:31). Overlying these lavas are soils derived from volcanic ash. Very generally, these can be characterized as predominantly very fine sandy loams to silt loams, with loam and silty clay loam also present. They generally have good topsoil and are well-drained with moderately rapid permeability (Soil Conservation Service 1973). The soils are powdery and light and are highly susceptible to wind and water erosion.

The vegetation in the project area is somewhat varied and includes Vegetation Zones VI and VII (McEldowney 1983). In general terms, the vegetation can be characterized as open grassland dominated by *Pennisetum clandestinum* (*kikuyu* grass) and *Sporobolus africanus*. These are mixed with other exotic grasses, broad-leafed herbs, occasional exotic shrubs, and rarely, native and exotic ferns. Trees in the project area are limited to a few planted stands and windbreaks, primarily of *Eucalyptus* spp., but with some Taxodiaceae (cedarts and cypress), *Casuarina equisetifolia* (ironwood), and exotic *Acacia* sp. (McEldowney 1983).

There are no perennial streams within the study areas, although three intermittent drainages (Lanimaunau, Waikoloa, and Waiaka Streams) flow off of the Kohala Mountain slope a short distance to the north. These streams were vital to the prehistoric agricultural system of the area.

Most of the project area is used for cattle pasture. Parcel 1 is vacant land, except for those portions that house the Medical Center and parking lot. Parcel 2 is well-grazed pasture land. Parcel 3 is a combination of pasture and overgrown brush and contains a single residence and garage. Parcel 4 is well-grazed pasture land. Parcel 5 is also well-grazed pasture land which has been disturbed. In the past, the area was occupied by the military. This is evidenced by asphalt pads and bulldozed areas.

PREVIOUS ARCHAEOLOGICAL WORK

All of the project area parcels, are within the Waimea Lalamilo Agricultural System, a significant district in prehistoric and early historic times. The system includes extensive agricultural fields, irrigation canals, scattered clusters of house sites, field shelters, and religious structures and burials. Though extensive, the field system was not as elaborate as the pondfields found in the windward valleys, but was much more similar to the Kona and Kohala field systems described extensively in Kirch (1985). Briefly, the agricultural fields are apparent as low retaining faces constructed of stone and/or soil. The ridges usually ran perpendicular to the prevailing wind making their orientation roughly SE to NW. Irrigation ditches (*auwai*) were associated as well as planting mounds and boundary walls. Temporary or short term habitation features were present, evident as small enclosures and or shelters. Figure 2 shows a distribution of agricultural and habitation features within the Waimea Lalamilo area. The approximate location of the parcels inventoried for this project are indicated. Within the Waimea Lalamilo field system, four complexes are apparent, each adapting to the particular microenvironment. A brief summary of these complexes is presented in the discussion of Clark's work in 1980, to follow, and in much greater detail in the report itself (Clark 1981) and in the Mudlane-Waimea-Kawaihae road corridor report (Clark and Kirch 1983). Because of the presence of the system within the project area, it was thought—prior to the present field work—that unless the various parcels had been heavily disturbed in the recent past there would be a relatively high probability that surface or subsurface historic sites would be found.

The DLNR-SHPD provided the following information regarding the possibility of encountering historic sites within each parcel:

RECEIVED AS FOLLOWS

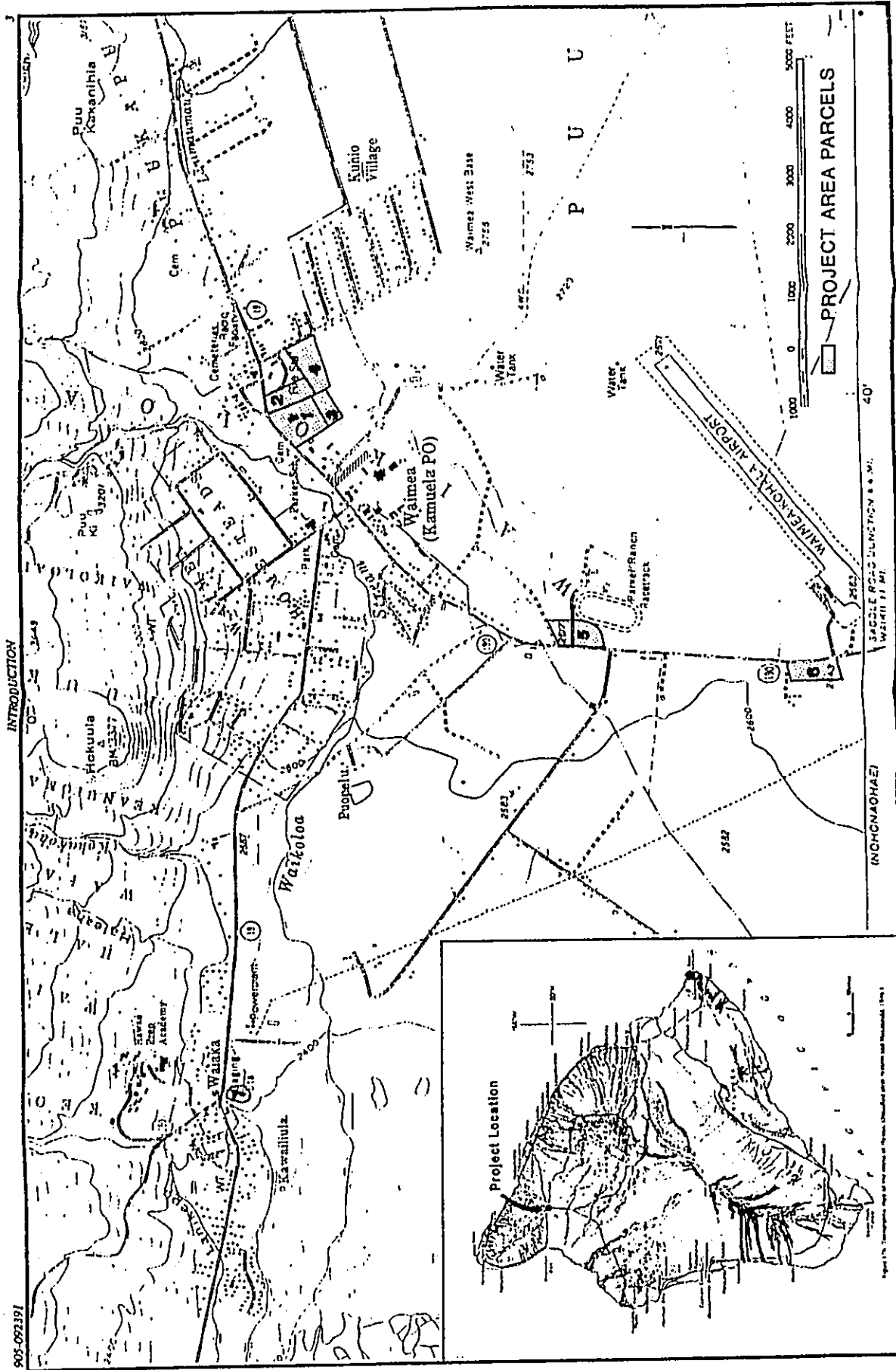


Figure 1. Project Area Location Map

Parcels 1-4 - For Parcels 1 - 4, DLNR-SHPD was particularly concerned about a system of *'auwai* or artificial ditches which once crossed the four parcels. Their records suggest that what has been labeled "Kamuela Stream" in the Environmental Impact Statement has been determined to be an *'auwai*. They concluded from a variety of historic sources and some archaeological work that these ditches helped irrigate large portions of the Waimea Plains during the prehistoric and early historic period. They indicated that an inventory survey of Parcels 1-4 should determine if evidence of the ditches and fields still exist. It was thought that trenching would identify segments of the canals and adjacent fields, and that mitigation work might also be needed;

Parcels 5-6 - The DLNR-SHPD indicated that Parcels 5 and 6 were also within areas where prehistoric and early historic agriculture took place; however, based on aerial photographs it appeared that the parcels had been modified recently, making it possible that historic sites were no longer present. The extent of land alteration needed to be evaluated in order to determine if historic sites might still be present.

Parcel 7 - Aerial photographs showed that within Parcel 7 were remnants of prehistoric and early historic agricultural field systems. The DLNR-SHPD believed that unless the parcels had been severely graded or grubbed since the photos were taken, an archaeological inventory survey would be necessary if the area was selected as the hospital site. It was also thought that mitigation work would also be needed.

A number of archaeological investigations have been conducted within and in the general vicinity of the project area—studies by Barrera and Kelly (1974), Clark (1981), Clark and Kirch (1983), Bonk (1985), Hammatt and Shideler (1989), and Clark et al. (1990).

In 1973, Barrera and Kelly (1974), for B.P. Bishop Museum, conducted an archaeological inventory survey of a proposed new sector of the Hawaii Belt Road, from Mudlane through Waimea to Kawaihae. A corridor of roughly 10,272 acres was inventoried, and 4,561 archaeological features were recorded. The majority of the features were located near Kawaihae on the coast, or in the Lalamilo area near Waimea. As a result of the survey, the proposed highway alignment was rerouted to bypass the Lalamilo area, and the core of this area was designated a historic district (Barrera and Kelly 1974).

In the early 1980s Clark (1981) conducted an archaeological survey of the proposed Lalamilo Agricultural Park in South Kohala. The work was done for the Division of Water and Land Development (DOWALD), DLNR. The survey area consisted of 295 acres and was located in the uplands of Lalamilo, immediately west of the existing Lalamilo farm lots. During the survey 321 sites, including both agricultural and residential features, were identified. The Clark project area is located west and south of the current Parcels 1-4, west of Parcels 5 and 6, and south of Parcel 7.

The Lalamilo Agricultural Park project area is situated in the midst of an extensive archaeological complex, the Waimea Archaeological District (Clark 1981). The district contains many residential structures scattered throughout what was once an extensive agricultural system. Clark defines the agricultural system as forming a large arc to the north, west, and south of the present day town of Waimea, beginning on the south flank of the Kohala Mountains, extending down the slope to the Waimea Plain south of town, then turning east, fading out just south of Waimea and west of Kuhio Village.

The agricultural system was divided into four field complexes, each with its own characteristics. Field Complex 1 is on the Kohala slopes, just north of Parcel 7, on the north side of the existing Kawaihae-Waimea Road. Field Complex 2 is south of the Kawaihae-Waimea Road and is bordered by Waikoloa Stream to the south. Parcel 7 is within Field Complex 2. In Field Complex 2 are agricultural fields demarcated by terrace retaining faces, or low ridges of soil and/or stone. The fields average 25 m in width with the long axis oriented northwest by southeast, perpendicular to the prevailing winds. Numerous *'auwai* are associated with the fields. In addition, numerous residential and other non-agricultural features are scattered throughout the area. Similar features are presumed to exist within Parcel 7.

Field Complex 3 encompasses most of the Lalamilo Agricultural Park project area (Clark 1981). It is south of Field Complex 2, with Waikoloa Stream the northern boundary. The eastern boundary of the complex is roughly defined by Mamalahoa Highway. The original landscape in the eastern portion of Field Complex 3 has been largely destroyed by creation of the existing Lalamilo Farm Lots. The current Parcel 6 lies within Field Complex 3.

Field Complex 4 is east of Mamalahoa Highway, south of Waimea Village, and southwest of Kuhio Village. It is the smallest of the field complexes and the least complex in development. It consists of a set of agricultural fields delineated by low soil ridges. The ridges are oriented perpendicular to the prevailing winds and average c. 30 m

apart. As with the other complexes, a set of 'auwai was found associated with the fields, although in Complex 4 the 'auwai may not be integral components of the agricultural system. Residential structures and numerous stone walls were documented. Field Complex 4 was intensively surveyed and mapped by Clark (1981). Site 8805 was identified within Field Complex 4 and is located near Parcel 5 of the current project. The site is an extensive field complex and the relationship of the site to Parcel 5 is discussed in the results section of this report.

Investigators from the Bishop Museum conducted further archaeological investigations within the Mudlane-Waimea-Kawaihae road corridor under a contract with the State of Hawaii (Clark and Kirch 1983). The objectives of this project were (a) to survey those portions of the road not covered in the 1973 survey, (b) to prepare recommendations for the mitigation of adverse effects to the sites in the project area, and (c) where warranted, conduct a data recovery program for a sample of the sites. This project resulted in the generation of valuable data pertinent to a variety of topics but focusing primarily on the upland agricultural system. Clark (1981) and Clark and Kirch (1983) provided the majority of the background information for this report. Numerous sites were identified, both agricultural and habitation, and the project provided a broad data base for comparing site distribution data from the coast of Kawaihae to upland Lalamilo.

In 1985 Bonk conducted an inventory survey in portions of Waikoloa, Pu'ukapu, and Ouli, in the District of South Kohala (Bonk 1985). The survey was conducted for Mauna Lani Resorts. Four areas encompassing approximately 300 acres of land were inventoried. Area I was southeast of the community center, southwest of Kuhio Village, south of Waimea Elementary and Intermediate School, southeast of a reservoir, and east of a racetrack and Area II. The proposed right-of-way for the bypass addition of the Hawaii Belt road marks the southern boundary of both Areas I and II. Area III was west of Mamalahoa Highway and Kamuela airport, and south of the proposed bypass road. Parcel 6 of the current project is within Area III of Bonk's inventory. Area IV is an elongated, irregularly shaped parcel between Kawaihae-Waimea Road on the south and Kohala-Waimea Road on the north. The parcel is less than 0.5 mile west of the Waiaka intersection. This area is just north of the current Parcel 7; thus, information gained from Area IV would be relevant to Parcel 7.

Bonk investigated nine sites in Areas I and II. Four of the sites were recommended for additional work. No sites or features were identified in Area III and no further work was recommended. The current Parcel 6 is within Area III.

Numerous sites and potential sites were identified in Area IV and additional work was recommended for the majority of the area.

In 1988, Hammatt, Borthwick, and Shideler (1988) conducted archaeological investigations on a 12-acre parcel in upper Lalamilo, just west of Waimea town, for a proposed expansion of the Lalamilo House Lots Subdivision. Seven archaeological sites were recorded, and limited subsurface testing was conducted. Both habitation and agricultural sites were documented.

In 1989, Hammatt and Shideler (1989) conducted further investigations at two of the identified sites within the proposed project area, and further analyses were performed on some of the earlier collected materials. Their data analysis suggests that informal agricultural activity (represented by agricultural mounds) was occurring by the mid-13th century, field boundary walls were constructed by the mid-15th century, and permanent habitation was occurring from the early 16th century to the late 18th Century.

In 1990, the Applied Research Group, Public Archaeology Section, of the Bishop Museum conducted archaeological testing and data recovery for the proposed expansion of Waimea Elementary and Intermediate Schools in the town of Waimea (Clark et al. 1990). Site 8808, which was previously identified during the inventory survey of the Mudlane-Waimea-Kawaihae road corridor (Clark and Kirch 1983), was located within the project area. Three of the 'auwai associated with Site 8808 were relocated. In addition, two surface features, another 'auwai, a subsurface activity area, and a historic house foundation were located. Backhoe testing was conducted at the site, and buried agricultural soils were also identified. Further subsurface archaeological investigations were recommended for the identified buried activity area.

In summary, there have been numerous projects conducted in the general vicinity of the project area, and data gained from these investigations were a valuable tool in identifying features in the survey parcels. No previously recorded sites have been reported within the parcels, but there have been cultural features identified adjacent to and near the parcels—features which logically once extended into the parcels. These features are discussed in the Findings section.

FIELD METHODS AND PROCEDURES

On July 17, 1991, Supervisory Field Archaeologist Linda W. Thompson, B.A., assisted by Field Archaeologists Kathy Brown, Alice Smith, and Karen Wigglesworth

conducted a 100% pedestrian reconnaissance of five of the seven parcels (1, 3, 4, 5, and 6). Permission for access to Parcel 7 was not granted until December 1991. Parcel 7 was inventoried on December 12, 1991 by Linda Thompson and Rusty Smith. Permission for access to Parcel 2 was never granted.

Parcels 1, 3, 4, 5, 6, and 7 were surveyed utilizing a series of roughly parallel transects. The spacing between individuals walking the transects never exceeded 20 m and typically was less. Inventory was not conducted in portions of the parcels which currently contain modern buildings and parking lots. It was not necessary to mark transects with flagging tape for reference because the parcels were small and surface visibility was very good due to the lack of high, dense vegetation.

When possible archaeological sites were encountered, all crew members were notified and sweeps were halted.

The sites were marked with flagging tape, and their locations were plotted on a large-scale aerial map of the survey area or on the appropriate USGS topographic map.

After the surface inventory, limited testing was conducted to sample the area for subsurface cultural remains. This aspect of the field work was conducted on July 18, 19, 22, 23, and 24, and December 13, 1991 by a crew of two to four. Subsurface testing was conducted at Parcels 1, 3, 4, 5, 6 in the form of backhoe trenching and hand-dug units (Figures 3 and 7 show the locations of subsurface testing in Parcels 1-4). The backhoe trenches (BT-#) were excavated to bedrock where possible. A wall of at least one trench per parcel was drawn. Soil descriptions were provided for each stratigraphic profile. Soil samples were collected from two of the backhoe trenches (See Appendix B). One radiocarbon sample was obtained. The hand-dug test units were 100 by 50 cm in horizontal extent. Stratigraphic descriptions for test units were completed, but profiles of the units were not drawn.

FINDINGS

SURFACE SURVEY

A prehistoric *'auwai* system (Site 16095) and a prehistoric field system (Site 18054) were identified during the surface inventory. The *'auwai* system is apparent in Parcels 1, 3 and 4. Portions are visible in Parcel 2 as well, although it has not yet been inventoried. The field complex was identified within Parcel 7. Both sites are part of the larger Waimea Lalamilo field system. Parcels 1, 3, and 4 are within Field Complex 4 as defined by Clark (1981) and Parcel 7 is within Field Complex 2.

Parcel 1

Two probable *'auwai* considered part of Site 16095 were noted on the surface of Parcel 1 (Figure 3). One distinct one runs southwest to northeast across the approximate center of the parcel. This one is apparent on an aerial photo of the parcel. The northernmost portion of the ditch has been disturbed by construction of the Lucy Henriques medical facilities; it appears the portion has been incorporated into the landscaping for the facilities. The southern portion is a shallow ditch an average of 1.0 meter wide by 30 cm deep. The ditch extends outside the west side of the parcel and becomes less distinct as it leaves the parcel. The location of this ditch corresponds with the location of an *'auwai* on a 1915 tax map (see Historical Documentary Research). A second ditch is apparent south of the first. This ditch is much less distinct. It branches from the first ditch, approximately at the west central edge of Parcel 1, and runs northwest to southeast following the contour. This ditch averages 50 cm wide and 30 cm deep. It is also apparent on the aerial photograph, but is not on the tax map. The ditch may be recent.

Parcel 2

Permission to enter Parcel 2 was not granted, but an examination from outside the parcel revealed that a ditch was present within it. The ditch corresponds with an *'auwai* on the 1915 tax map (see Figure 3). The ditch is also apparent on an aerial photograph of the parcel.

Parcel 3

A ditch oriented roughly north to south was noted along the eastern edge of Parcel 3. The 1915 tax map indicates an *'auwai* in the same general area (Figure 2), and the aerial photograph also documents a ditch in the same approximate location. The ditch is also present on an 1848

tracing of LCA 4026 (see Figure 3, Appendix A). These *'auwai* are also considered part of Site 16095. LCA 4026 was apparent as an existing house structure complete with chickens and pigs. No other structures or remains of structures were apparent within the project area.

Parcel 4

A ditch oriented southeast to northwest was noted along the southwest corner of Parcel 4. The ditch is apparent on the 1915 tax map (see Figure 3), and also on the aerial photograph of the parcel. Backhoe Trench 1 was excavated across a portion of the ditch, and the stratigraphic profile of the ditch indicated multiple phases of activity. A radiocarbon dating sample was obtained from a dark, charcoal-bearing lens within the ditch. This subsurface portion of the ditch was designated Feature A.

Parcel 5

No archaeologically significant cultural remains were identified on the surface of Parcel 5. Present on the parcel were two asphalt pads, each measuring c. 5 by 10 m. Parker Ranch personnel indicated the pads were from military activity in the area. Other evidence of disturbance—bladed surfaces and bulldozed areas—indicates use of the area by either the military or Parker Ranch personnel.

Parcel 5 lies right on the boundary of Site 8805, an agricultural site within Field Complex 4 identified during the Mudlane-Waimea-Kawaihae road corridor inventory (Clark and Kirch 1983). There was no evidence of Site 8805 within Parcel 5. Figure 4 shows Parcel 5 in relation to Site 8805. Subsurface testing was conducted within the parcel to test for subsurface cultural deposits. The results were negative and are discussed in the subsurface survey results.

Parcel 6

No cultural modifications were identified in this parcel during the survey.

Parcel 7

A series of agricultural fields were identified during the inventory survey of Parcel 7. At least six fields were apparent. The edges of the fields were demarcated by low soil retaining faces constructed of soil with no obvious inclusion of rock. The ridges were less than 50 cm high and the width of the

fields was 20-30 m each. The lengths varied from 60-80 m and several of the ridges appear to have been truncated on the northwest in the past by the existing Waimea-Kawaihae road. The ridges all paralleled one another and were oriented perpendicular to the prevailing wind (NW to SE). No 'auwai were apparent during the inventory. The parcel is currently being used as a cattle pasture and modern field traffic has cut paths across some of the fields, creating the illusion of ditches in some cases. There was nothing apparent that was as distinct as the ditches noted in Parcels 1, 3, and 4.

SUBSURFACE SURVEY

Fifteen backhoe trenches and five hand-dug test excavation units were placed in the six inventoried parcels. The purpose of the excavations was to determine the presence or absence of subsurface cultural remains and to recover datable material. Potentially significant cultural remains were found in one of the backhoe trenches and one radiocarbon sample was obtained. Agricultural soils were identified in several of the backhoe trenches excavated in Parcel 7. The rest of the testing efforts yielded negative results.

A summary of the testing efforts by parcel is provided below.

Parcel 1

Three hand-dug units, totaling 1.5 sq m, were excavated within Parcel 1. Two 'auwai comprising elements of Site 16095 were evident on the surface. The subsurface hand-dug testing was conducted away from the 'auwai in order to determine the nature of the surrounding deposits. No significant cultural material was recovered from the test units. Test Unit 1 yielded recent historic trash in the top 20 cm—window glass, a soda bottle, soda bottle fragments, fragments of wire, and two nails. The deposits below were culturally sterile. Test Units 2 and 3 yielded no cultural deposits.

Permission to excavate backhoe trenches within Parcel 1 was never granted.

Parcel 2

Permission to enter the parcel was not granted.

Parcel 3

A portion of the 'auwai system identified within the project area (Site 16095) was clearly evident on the surface in Parcel 3. Subsurface testing of the 'auwai was not conducted during this project. No backhoe trenches were exca-

vated within Parcel 3 either due to the presence of an occupied home in most of the parcel.

Two hand-dug units totaling 1 sq m were excavated within Parcel 3 in order to test for remains associated with the house site mentioned in the LCA text (see Appendix A, page 30). As mentioned earlier, a modern house exists in the area of the LCA currently. Test Unit 1 contained no cultural deposits. Test Unit 2 produced recent trash in the top 30 cm. An aluminum beverage can (Coke) was found within the top 10 cm, and beneath that were fragments of clear glass, the base of a brown (beer?) bottle, a piece of 1/4-inch rubber hose, and a piece of glass that appeared to be from a glass plate. No other cultural remains were observed. The deposits below were culturally sterile.

Parcel 4

Three backhoe trenches totaling approximately 60 m long were excavated at Parcel 4. One of the trenches (BT-1) cut across the 'auwai evident on the surface. Subsurface evidence of the 'auwai was apparent in the east and west faces of the trench. The 'auwai was associated with a series of depositional episodes. This subsurface portion was designated Feature A. The strata most clearly associated with prehistoric use of the 'auwai are III, IV, and V. All of these strata contained some charcoal flecking. Strata I and II evidenced disturbance by modern agriculture. Strata VI and VII appeared natural and unmodified.

Initial construction of the 'auwai seems to have occurred when Stratum V was being deposited, with later, more intensive modification evidenced by the sharp definition of Strata IV.

A radiocarbon dating sample was obtained from Stratum IV which was filled with flecks of charcoal and darkly stained soil. The sample yielded an age range of AD 770-1020 (AD 1130 +/- 60 BP [at one sigma; calibrated using Stuiver and Pearson 1986]; C-13/C-12 ratio = -25.5). BTs 2 and 3 yielded no cultural remains.

Parcel 5

Four backhoe trenches, approximately 110 m in total length, were excavated at Parcel 5. No significant cultural remains or cultural strata were revealed in any of the trenches. None of the backhoe trenches excavated within Parcel 5 revealed the agricultural soils evident in nearby Site 8805. There was no evidence of modification other than the more recent historic disturbance. The strata indicated that the area had been disturbed by extensive ground moving activities, probably associated with past military occupation of the area. Trench 3 revealed a layer of recent trash,

including large pieces of metal and glass, within the upper 10 cm of sediment.

Parcel 6

One backhoe trench approximately 18 m long was placed in this parcel. The trench revealed very shallow soil development and no cultural remains. Numerous exposures of bedrock were apparent across the site, indicating very shallow deposition. The backhoe trench was placed in an area estimated to have the most deposition. Bedrock was encountered almost directly below the surface. The ground surface in the vicinity of the trench was extensively disturbed. Present on the surface were blocks of asphalt and other recent trash—paper, wire, cans, glass, etc. No hand-dug units were placed in the parcel.

Parcel 7

Seven backhoe trenches were excavated within Parcel 7. The trenches were placed across the parcel in order to cross section the agricultural fields noted during the surface inventory. The trenches were placed such that a representative sample of the soils present within the parcel were revealed. A buried agricultural soil termed Stratum II was identified intermittently in all seven trenches. The stratum was apparent as a darkly stained soil, sometimes containing flecks of charcoal. The boundaries were wavy and the distribution was sporadic, across the site. Appendix B provides descriptions of the soils encountered, accompanied by illustrations of the stratigraphic sequences revealed in the field.

RECEIVED AS FOLLOWS

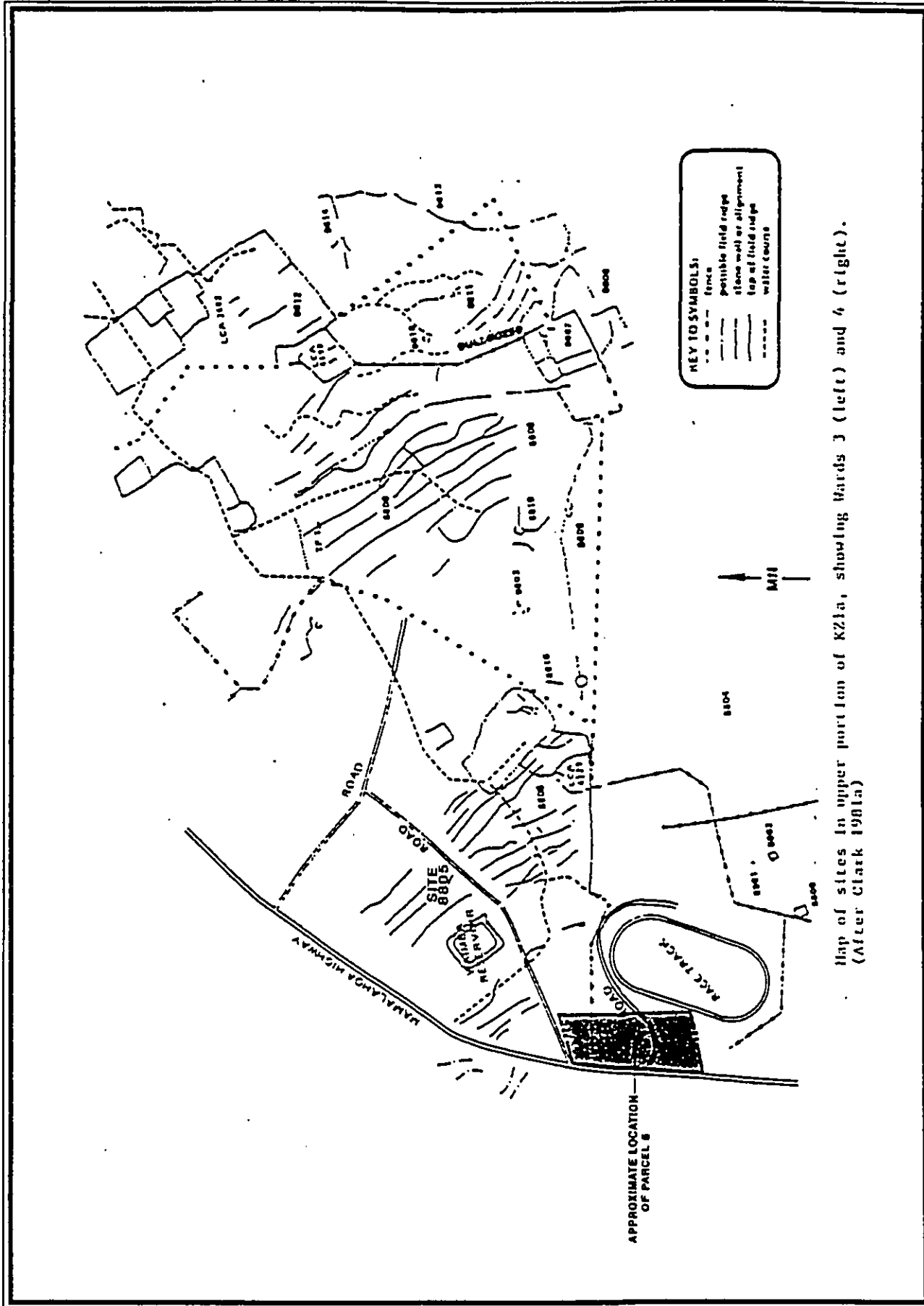


Figure 4. Locations of Site 8805 and Parcel 5

RECEIVED AS FOLLOWS

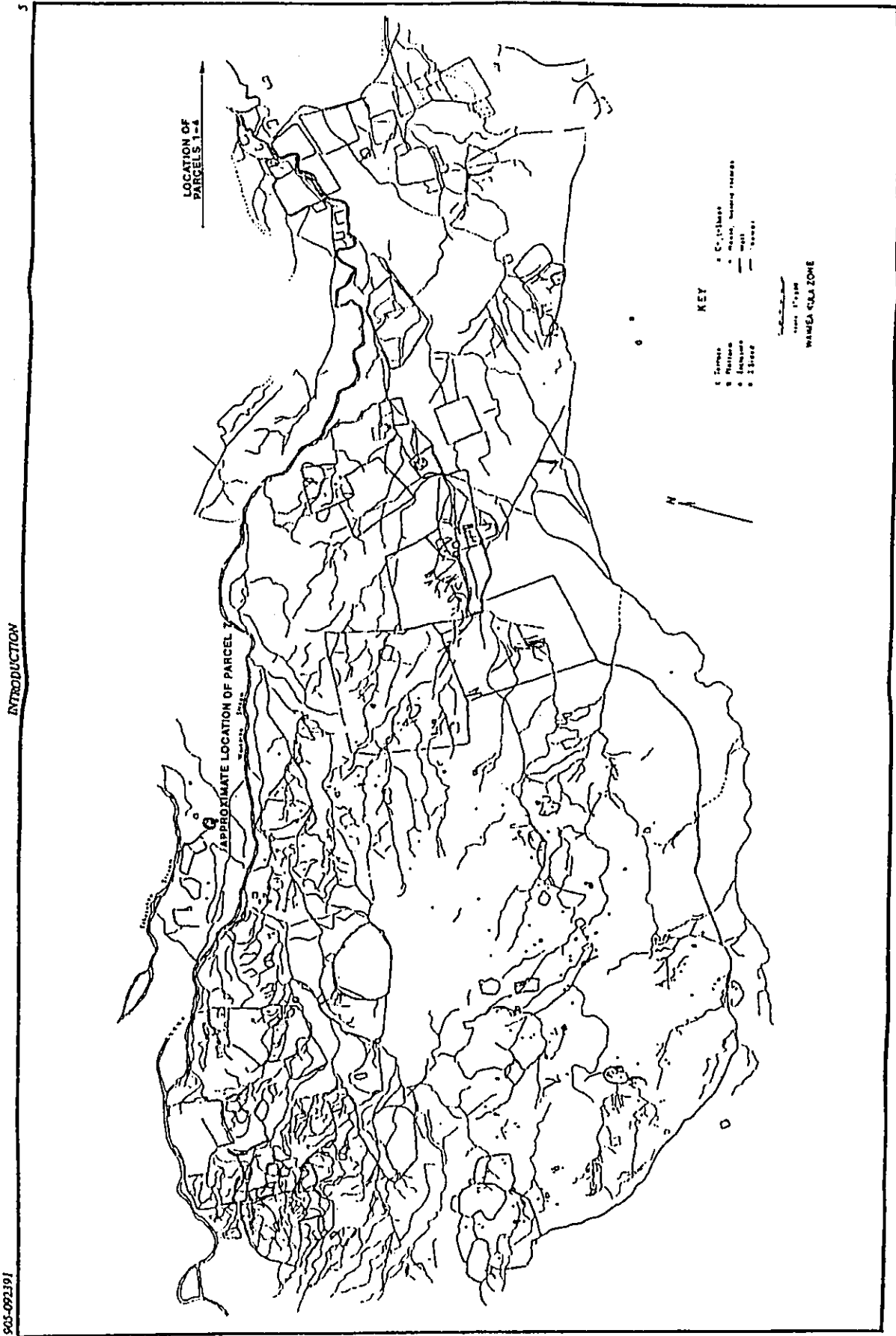


Figure 2. Copy of Waimāea Kūia Zone map (From Clark 1987; fig. 10.1)

CONCLUSION

DISCUSSION

The project area is within the Waimea-Lalamilo Field System, an area conducive to intensive agriculture due to well-developed soil and adequate rainfall. The system, a relatively recent discovery (Clark and Kirch 1983), was cultivated prehistorically much like the Kohala Field System at Lapakahi (Rosendahl 1972) and the Kona Field System (Kirch 1985:223-230).

The Waimea-Lalamilo Field Complex was not solely dependent on rainfall for its success. Irrigation supplemented inadequate or unpredictable rainfall. The irrigation system consisted of a network of ditches radiating from permanent streams that drain the Kohala slope; the individual ditches were not architecturally elaborate (Kirch 1985). The ditches were not extensive enough to keep all the fields constantly watered and a system of rotation has been speculated.

As described earlier, the Waimea-Lalamilo system is composed of four complexes (Clark 1981). Most of the current project area is within Field Complex 4. Parcel 7 is within Field Complex 2. Two sites were identified during this project. Site 16095 is apparent in Parcels 1, 2, 3, and 4, and Site 18054 is apparent in Parcel 7. Site 16095 is an irrigation ditch ('auwai) system. The 'auwai is apparent in Parcels 1, 2, 3, and 4 as linear depressions mantled with vegetation. Backhoe Trench 1 was excavated across a portion of the 'auwai in Parcel 4. One of the strata (Stratum IV) contained large flecks of charcoal. A radiocarbon sample from this stratum yielded an age range of 1130 \pm 60 BP. The radiocarbon results indicate the project area may have been occupied as early as AD 770, with a range up to AD 1020. The range falls within the Developmental Period, as defined by Kirch (1985:302). During this period distinctive patterns of Hawaiian material culture and economic adaptation were firmly established and permanent settlements were developed. Research on LCAs has indicated the project area was occupied as early as 1848.

The age range is much earlier than anticipated. While extensive agricultural use of the area has been documented, there is little previous indication that it occurred at such an early date. The agricultural hubs during the Developmental period were typically confined to the well-watered windward valleys. The early date suggests more intensive development on the leeward, more marginal areas prior to intensive population along the coast. Reeve (1983) suggested that the development of the irrigation system in the Lalamilo area was

the result of a need for increased food production during Kamehameha's reign in the Kawaihae area (1790-1795) and the associated population growth. Perhaps the population grew, instead, due to the already existing food supply.

The radiocarbon age range derived from the 'auwai is also substantially older than dated samples from previous research in the general Waimea area. Dates obtained from agricultural sites located during the Mudlane-Kawaihae road corridor investigations (Clark 1983) are consistently earlier. Site 9178.1 (Lalamilo Swale) produced a date of 200 \pm 40 years BP (HRC-384). Site 9178.2 (Lalamilo Stream-Side) produced an age determination of post AD 1800. Sites 8828 and 8827 also both produced dates within the late prehistoric/early historic range.

The site (18054) identified within Parcel 7 is an agricultural field complex. It is typical of other field systems identified in the region on earlier projects (Clark 1981, Clark and Kirch 1983). The size of the fields and the construction techniques are consistent with other field complexes identified within the Waimea-Lalamilo agricultural system, specifically, Field Complex 2 as defined by Clark (1981). No samples suitable for age determination were collected during the current project. However, based on similarity to other sites in the region, an age range of AD 1600 to AD 1800 is speculated, a time frame when the usage of the area for agricultural purposes is documented. The further work in the parcel should most definitely include the location of suitable samples for dating to confirm or dispute this estimate so as to better define the settlement and land usage patterns of the region over time.

Future research in the vicinity of the project area should be concerned with obtaining information on the culture history and lifeways of the prehistoric Hawaiian population which occupied the Lands of Waikoloa, Pu'ukapu, and Lalamilo and the general South Kohala District. The early date range (AD 770-1020) obtained from the 'auwai (Site 16095) during the current project may be very important to further defining the extent of agricultural development in the Waimea area.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

Significance categories used in the site evaluation process are based on the National Register criteria for evaluation,

as outlined in the Code of Federal Regulations (36 CFR Part 60). The DLNR-SHPD and the HCPD use these criteria for evaluating cultural resources. Sites determined to be potentially significant for information content fall under Criterion D, which defines significant resources as ones which "...have yielded, or may be likely to yield, information important in prehistory or history." Sites potentially significant as representative examples of site types are evaluated under Criterion C, which defines significant characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction."

Sites with potential cultural significance are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (Draft Report, August 1985). The guidelines define cultural values as "...the contribution made by an historic property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historical depth. The guidelines further specify that "[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value."

To further facilitate client management decisions regarding the subsequent treatment of resources, the general significance of the archaeological resources identified during the inventory survey was also evaluated in terms of potential scientific, research, interpretive, and/or cultural values (PHRI Cultural Resource Management [CRM] Value Modes). These three value modes are derived from the above state and

federal criteria. Research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and interregional levels of organization. Interpretive value refers to the potential for archaeological resources for public education and recreation. Cultural value, within the framework for significance evaluation used here, refers to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and values.

Based on the above federal and state evaluation criteria, Site 16095 and Site 18054 are assessed as important for information content. Based on the CRM value modes, the sites are assessed as moderately significant for research and cultural values and of low significance in terms of interpretive value. Further data collection (detailed recording/mapping and more extensive test excavations) is recommended in all parcels where the ditch system is evident (Parcels 1, 2, 3, 4) and in Parcel 7 where Site 18054 is evident. The focus of investigations at Site 18054 should be on obtaining datable samples. No further work is recommended in Parcels 5 and 6 due to the lack of cultural resources and the low potential for buried, intact cultural deposits. Parcel 2 still needs to undergo inventory-level survey.

The evaluations in this report have been based on a 100% surface survey and limited subsurface testing. There is always the possibility, however remote, that potentially significant, unidentified surface or subsurface cultural remains will be encountered in the course of future archaeological investigations or subsequent development activities. In such situations, archaeological consultation should be sought immediately.

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APPENDIX A

HISTORICAL DOCUMENTARY RESEARCH

by Lehua Kalima, B.A.

The Waimea area of North Kohala is often mentioned in early historical accounts because famous battles were fought in the area and the area was the site of an early missionary station. The area also served as a midway point between Hilo and Kona, and was frequently visited. Waimea is also frequently mentioned in more contemporary accounts, for a number of reasons. One is that Waimea is the home of Parker Ranch, the largest privately owned ranch in the United States. Another is that several world class resorts are in the neighboring Land of Waikoloa.

Waimea is often loosely used to refer to either of four places: (1) the town of Waimea (sometimes called Kamuela [Samuel], after Samuel Parker); (2) a large land division stretching from the coast to the uplands and encompassing several subdivisions; (3) the upland area only of that division, including the entire plain between Kohala and Mauna Kea mountains; and (4) the upland region of intensive residential and agricultural occupation (Clark and Kirch 1983:46). In this report the latter best explains the area that concerns us, so the name will be used in this context.

The literal meaning of Waimea is "reddish water (as from erosion of red soil)" (Pukui and Elbert 1971). In *'Olelo No 'eau* (Puku'i 1983), a book of Hawaiian sayings, Waimea is noted as an area of cool climate and chilling rains:

Hele po'ala i ka anu o Waimea
Going in a circle in the cold of Waimea.

Said of a person who goes in circles and gets nowhere. Waimea, Hawai'i, is a cold place and when foggy, it is easy for one unfamiliar with the place to lose his way (757).

Ka ua Kipu'upu'u o Waimea
The Kipu'upu'u rain of Waimea

An expression often used in songs of Waimea, Hawai'i. When Kamehameha organized an army of spear fighters and runners from Waimea, they called themselves Kipu'upu'u after the cold rain of their homeland (1571).

Ke Kipu'upu'u ho'anui 'ili o Waimea

The Kipu'upu'u rain of Waimea that chills the skin of the people (1748).

PRE-CONTACT HISTORY

Samuel Kamakau, a scholar and teacher in the 1800s, notes that Kawaihae in South Kohala was where Maui chiefs beached their canoes on their way to do battle with Kohala chiefs. Once, the Maui chief, Kamalalawalu, sent spies to Hawaii, and they landed at Kawaihae. The spies ran around the island of Hawaii, along the coast, trying to determine the size of the population. They misjudged it and gave this misinformation to Kamalalawalu. Kamalalawalu invaded the island based on this misinformation. He went to Kawaihae but no one was there because the people had gone up to Waimea. Only the people of lower Kawaihae and Puako remained.

Kamalalawalu's counselors told him that Waimea was not a good battle site for strangers because the plain was long and there was no water. Should they be defeated, they would all be slaughtered (Kamakau 1961:58). Kamalalawalu didn't heed this advice; he instead listened to two old men of Kawaihae who purposefully misled him, saying that Pu'oa'oaka was a good battle field and would be a great help to the chief. They told him that all his canoes should be taken apart because the warriors may want to run back to the canoes and return in secret to Maui (ibid.). Kamalalawalu's men landed at Puako and destroyed their canoes, thinking to get new ones after they had won the battle. They then went up to the grass-covered plains of Waimea:

They looked seaward on the left and beheld the men of Kona advancing toward them. The lava bed of Kaniku and all the land up to Hu'ehu'e was covered with the men of Kona. Those of Ka'u and Puna were coming down from Mauna Kea, and those of Waimea and Kohala were on the level plain of Waimea. The men covered the whole of the grassy plain of Waimea like locusts. Kamalalawalu with his warriors dared to fight. The battle of Pu'oa'oaka was outside of the grassy plain of Waimea, but the men of Hawaii were afraid of being taken captive by Kama, so they led [Kamalalawalu's forces] to the waterless plain lest Maui's warriors find water and hard, waterworn pebbles. The men of Hawaii feared that the Maui warriors would find water to drink and become stronger for the slinging of stones that would fall like raindrops from the sky. The stones would fall about with a force like lightning, breaking the bones into pieces and causing sudden death as if by bullets (ibid:59).

The Maui men picked up the stones of Pu'oa'oaka, but they were light and killed few Hawaii men. The Maui men couldn't find any water to relieve their thirst. They retreated to Kawaihae, but because they had destroyed their canoes, few escaped alive. Kamalalawalu was killed on the grassy plain above Puako (ibid:60).

Another version of this battle, related by Abraham Fornander, tells about how Kamalalawalu's invading army arrayed itself on top of the hill of Hoku'ula where, Kamalalawalu had been falsely told, there were large stones to roll down on the enemy. From this perch they could see the armies of Waimea advancing:

While Kamalalawalu was on the hill of Hoku'ula, in Waimea, he beheld the dust rising above the stones of Kaniku, the stones being gradually reddened by the dirt. On account of the many men the darkness of the stones was covered by the dust. And when Kamalalawalu saw the men of Kaniku advancing, he inquired of Kauhikama: "Where have you traveled on Hawaii that you failed to observe the people?" Kauhikama answered: "From Kawaihae to Kaawaloa, in Kona were the places I visited, but I encountered no person." Kamalalawalu said to Kauhikama: "Did you not see houses standing?" "There were houses indeed, but there were no occupants. There were pigs running about, and there were chickens crowing." Whereupon, Kumaikeau and Kumakaia remarked: "You could not find the occupants at home, for they had gone upland to till the ground because it was morning, and they had gone out fishing. If it were in the afternoon you went there, you would have met the men at home." Kamalalawalu, on hearing this, said to Kauhikama: "We shall perish; we cannot be saved. I thought your report was true, but it is not so. By whom have you been taught that the house is a thing that stands without dwellers. Why! The house is erected, the men live therein. Woe betides us that we perish by your report (Fornander 1919(5):448).

Alapa'inuiakaua (Alapa'i) was a famous chief. He was living on Maui when Keawe, the famous ruler of Hawaii, died. He went to make war against Hawaii's remaining chiefs, took them captive, and became ruler of Kohala and Kona. Kekaulike, ruler of Maui, heard about Alapa'i's success and wanted to take over. He began the fight against Alapa'i in Kona, but before long Alapa'i forced Kekaulike to flee. As he retreated, Kekaulike slaughtered the people of Kohala, seized their possessions, and fled by canoe to Maui (Kamakau 1961:77).

Toward the end of his reign, Alapa'i lived first in Waimea and then moved to Kikiako'i in Kawaihae. He was ill when he lived at Waimea and his illness became serious at Kikiako'i. At the *heiau* of Mailekini, in Kawaihae, he appointed his son, Keawe'opala, to be his successor (ibid.).

It has been speculated that during the times of Alapa'inui and Kalani'opu'u, Waimea was cultivated and the cultivation was expanded to supply the chiefs' needs while they sojourned there (Clark and Kirch 1983:26).

During Kamehameha's campaign to extend his rule to all the major islands he stayed at Waimea and at Kawaihae for extended times. One time was in 1791 and 1792 when the building of the *heiau* at Pu'ukohola required the help of many workers; another time was in 1794 and 1795, when he was preparing his Peleleu fleet which was to carry his wars across the sea to Maui and O'ahu (ibid:27).

The local chiefs of Waimea do not figure prominently in Waimea tales. One chief, however, became known during the reign of Kalani'opu'u for his prowess in leaping cliffs, a difficult skill which could save many a warrior's life in battle. The name of this chief was Hina'i, whom Kamakau described as a close relative of Kalani'opu'u (1961:111-112). Nuhi, Hina'i's son, supported Kiwala'o at Kamehameha's first battle at Moku'ohai. When Kamehameha conquered Hawai'i and took Waimea as a conquered land, the Waimea chiefs were reconciled to him by the marriage of his sister, Ka'ohelani, to Nuhi (Clark and Kirch 1983:27-28).

EARLY HISTORICAL ACCOUNTS

There are many historical accounts concerning the Waimea area, as it was a stopping point between the west and east sides of the island. Also, there was a good harbor at Kawaihae; many people came through Waimea on their way to meet the trading ships at Kawaihae. Handy and Handy (1972) describe Waimea as an area where dry taro was planted along the slopes toward Honoka'a, and along the plains south and west of Kamuela (Handy and Handy 1972:532).

Clark and Kirch (1983), who studied the Waimea-Kawaihae area extensively, describe the area:

A stark contrast emerges between the two zones of Waimea and Kawaihae. Terms such as "desolate," "destitute," "barren," "scorching," "excessively hot," and "oppressive heat" are commonly used in descriptions of Kawaihae and the area extending for several kilometers inland. Descriptions of Waimea,

on the other hand, abound with terms such as "rolling," "verdant," "driving rains," "chilling winds," and "abundantly cultivated" (Clark and Kirch 1983:39).

Few of the early foreign visitors to Kawaihae went inland. Archibald Menzies of Vancouver's expedition did travel a short distance inland of Kawaihae in 1793 and wrote of his trip:

I traveled a few miles back...through the most barren, scorching country I have ever walked over, composed of scorious dregs and black porous rocks, interspersed with dreary caverns and deep ravines....The herbs and grasses which the soil produced in the rainy seasons were now mostly in the shriveled state, thinly scattered and by no means sufficient to cover the surface from the sun's powerful heat, so that I met with very few plants in flower in this excursion. A little higher up, however, than I had time to penetrate, I saw in the verge of the woods several fine plantations, and my guides took great pains to inform me that the inland country was very fertile and numerously inhabited. Indeed, I could readily believe the truth of these assertions, from the number of people I met loaded with the produce of their plantations and bringing it down to the water side to market, for the consumption was now great, not only by the ship, but by the concourse of people which curiosity brought into the vicinity of the bay (Menzies 1920:55-56).

Ellis, writing in 1823, further describes Waimea:

On Monday morning Messrs. Bishop and Goodrich commenced their journey to Waimea. Having procured a man to carry their baggage, they left Kapulena (in the Hamakua district), and, taking an inland direction, passed over a pleasant country, gently undulated with hill and dale. The soil was fertile, the vegetation flourishing, and there was considerable cultivation, though but few inhabitants. About noon they reached the valley of Waimea, lying at the foot of Mauna-Kea, on the north-west side. Here a number of villages appeared on each side of the path, surrounded with plantations, in which plantains, sugar-cane, and taro were seen growing unusually large (Ellis 1969:354).

A few days later Mr. Thurston, a missionary and preacher, traveled inland to Waimea from Kawaihae. He walked to Kalaloe, the residence of Kumuokapiki (Stump of Cabbage),

the chief at that time. Leaving there he walked on to Waiakea, Waikoloa, Pukalani, and Pu'ukapu noting that this was the last village in the district of Waimea (ibid:399).

A few years after the Ellis' visit, Waimea was visited by the Rev. Hiram Bingham who wrote of Waimea's beauty:

Leaving the other travellers, and crossing over to Kawaihae with my family, we ascended at evening to the new inland station. When we had escaped from the oppressive heat on the shore, and reached the height of about 2000 feet, we were met by a slight rain and a chilly wind, which made our muscles shiver, though covered with a cloak, as we came within some twenty-five miles of the snows of the mountain. The rain and clouds passed away as we approached the place of the sojourn of Mr. Ruggles and Dr. Judd. The full-orbed moon looked serenely down from her zenith upon the hoary head of Mauna Kea, and the ample and diversified scenery around (Bingham 1969:374).

Riding out one day to call on Gov. Adams, who had done liberally for the station by the erection of the buildings, I was delighted, on my way to his temporary residence, with the grandeur and beauty of the scenery around me. The clear rippling streams that wind their way along the verdant plain, through alternate plats of shrubbery, grass, kalo, sugar-cane, bananas, flowering bushes, and wild vines, occasionally crossed my path. Beyond the scattered cottages, the wild cattle were grazing unrestrained on their own unenclosed territories bordering on the mountain. The green hills and mountains of Kohala, crowned with trees and shrubbery, and their sides partly cultivated and partly covered with grass of spontaneous growth, rose on the north side of the plain (ibid.).

The various project area sites are part of an agricultural zone named the Waimea Field System (Figure A-1). In the traditional system, taro was the main crop with sweet potatoes, sugarcane, and bananas also being produced abundantly (Clark and Kirch 1983:47). Table A-1 lists the cultivation that took place in the Waimea area in the early-mid 1800s. Due to fertile soil and abundant rainfall this area was highly productive. In addition, three main streams flowed off the Kohala slope and onto the plain, all of which were described by early visitors to the region. With the streams as the focus, the people's homes and plots were scattered along the lower slopes of the Kohala Mountains and stretched out onto the plain. The settlement was not in the form of a nucleated

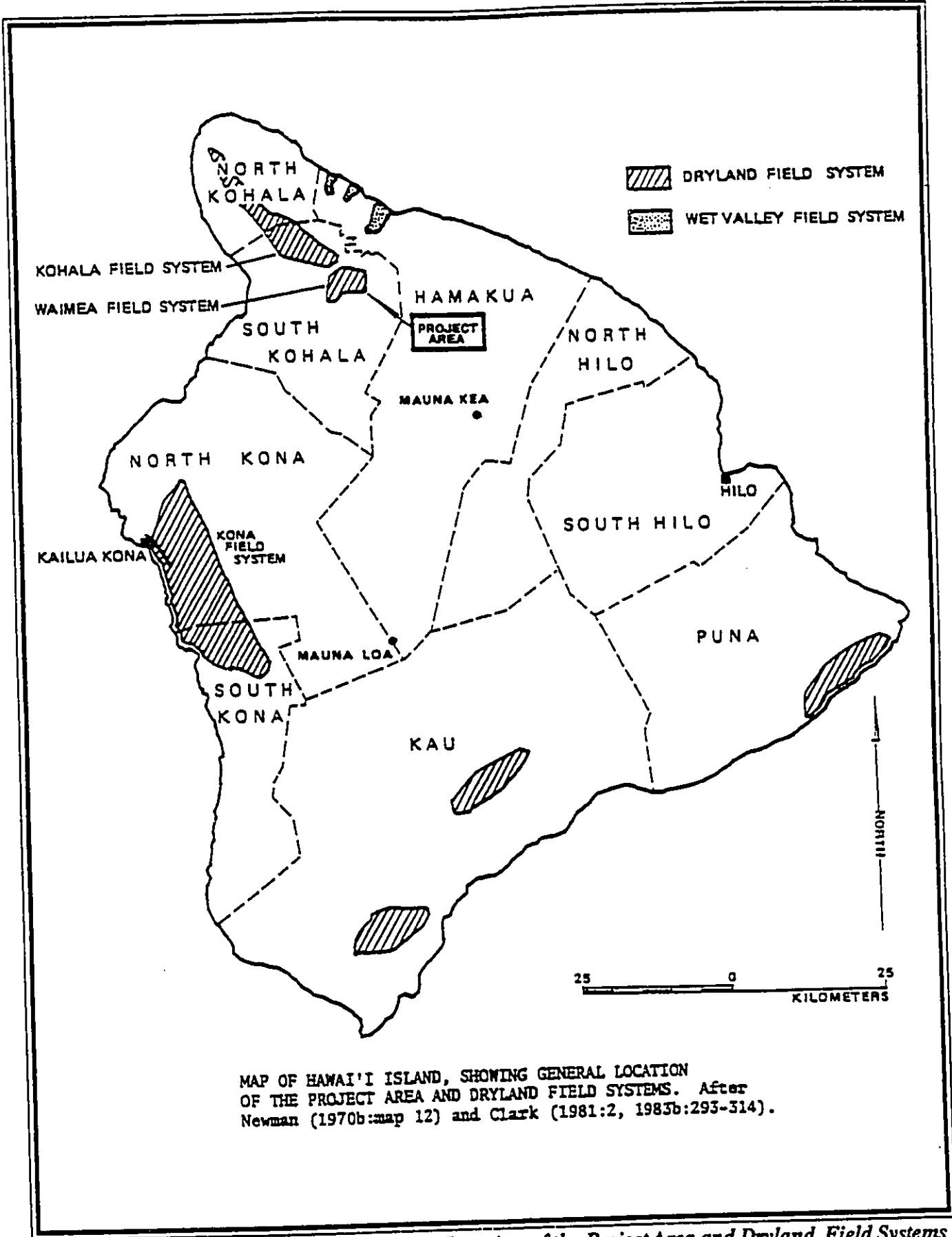


Figure A-1. Map of Hawaii Island, Showing Location of the Project Area and Dryland Field Systems (Adapted from Schilt 1984:2)

Table A-1.

AGRICULTURAL PRODUCTS REPORTED FOR WADMEA AND WADMEA VICINITY, 1823 to 1858.		
Date	Product	Source
1823	Taro, plantains, sugarcane	Ellis 1963:354, 399
1825	Pig, taro (poi)	Bishop 1825:609, 646
1829	Taro, sugarcane, banana	Bingham 1969:374
1830	Upland taro, potatoes, cattle (wild) Beef (wild); taro, potatoes, melons, other vegetables, mulberry trees, coffee trees, pomegranates, figs, etc. (all planted by Judd).	Andrews et al. 1830:4, 7 Judd 1903:28, 35
1830 to 1860	Cattle, mentioned by nearly all references	
1831	Beef (wild)	Judd 1903:28
1832	Sweet potato, Irish potatoes, taro, onions, fowl, ducks, turkeys, eggs, hogs, beef and beef by-products	Baldwin 1832:2013, 2015
	Beans, corn, watermelon, <i>puciale</i> and another famine plant <i>wuks</i> , prickly pear, sheep (thriving flock)	Doyle 1945:49, 63
1833	Sweet potatoes (drink)	Doyle 1945:72
1836	Ducks and other waterfowl (present but not in food context), wild plantains, bananas, wild turnip, sweet potatoes, raspberries, strawberries, <i>maka</i> , other roots and herbs (wild plants utilized), upland taro (culti- vated), <i>mamak</i> , cattle, wild boars, feathers, koa planks	Perambulator 1836
1837	Sugarcane and potatoes	Doyle 1945:101
1840	Beef, taro (poi) Port, beef, taro (poi), arrowroot	Olsted 1969:233 Jarvis 1844:221
1842	Sheep (merino)	Allan 1847
1842 to 1847	Sheep, goat	
1848	Taro, sugarcane Taro, apples, peaches, vegetables, corn, sheep, goats Plover, ducks, brant (as game)	Kenway 1848
1851	Irish potatoes, onions, cattle, sheep, goats	Lyons 1851
1853	Cattle, sheep	Bates 1854:366
1858	Irish potatoes, taro	Lyons 1858

(Taken from Clark and Kirch 1983, Table 3.2)

village, but was fairly well spread out. The area was divided into a number of named locales (e.g., Keaalii, Lihue, Kalaloe, Waiaka, Waikoloa, Alaohia, Pukalani, Pu'ukapu, and others), some of which had a greater population than others (ibid.).

In the years following the first visits of foreigners to the Waimea region, subsistence agriculture sharply declined although there were a couple of periods of increased activity. "The primary reasons for the decline in agricultural activity were (1) depopulation and the abandonment of fields; (2) the pursuit of other commercial interests, such as sandalwood, sugarcane, pulu (wool that grows on tree-ferns used to stuff mattresses and pillows) trade, and the cattle industry (the latter of these was the most devastating, not only in drawing the people away from the fields, but also in bringing about the destruction of the fields); and (3) pest infestations" (ibid:48).

Commercial Interests in Waimea

In the early 1800's thousands of "piculs" (an oriental unit of weight averaging 130-140 pounds) were cut from the forests around Waimea and shipped out of Kawaihae (ibid). During his visit to the area in 1823, Ellis reported seeing two to three thousand men carrying loads of sandalwood down to Kawaihae (Ellis 1969:397). By the early 1840s, however, the sandalwood forests had been stripped (Clark and Kirch 1983:48).

Kuykendall (1968:183) cites an 1837 merchants report that notes that Governor Kuakini planted "an immense cotton field at Waimea." Little else is known of this project, which must have failed rather quickly.

In the 1850's, *pulu* became a major economic interest in areas near tree-fern forests. This industry was failing by the 1860s (Clark and Kirch 1983:48). As with the earlier sandalwood trade, the tree-fern forests in many parts of the island were exploited to the point of destruction.

Cattle Industry

The most stable and long-term economic pursuit in the Waimea area has been the cattle industry. When Captain George Vancouver of the British Royal Navy introduced a few head of cattle to the Waimea region in 1793, they were placed under a *kapu* for ten years so that they could multiply and eventually supply a new source of protein for the Hawaiian population. Vancouver described Waimea as a place very rich and productive, containing a large tract of luxuriant, natural pasture, where all the cattle and sheep he had imported could roam freely, produce and multiply (ibid.).

By 1794 Vancouver had left seven cows, three bulls, five ewes, and five rams on Hawaii (ibid.). This feral cattle population grew out of control, however, and by 1858 one observer guessed that there were about 10,000 head on Mauna Kea (ibid.). While this was probably an over-estimate, the herds clearly played a role in (a) the abandonment of agricultural fields which were subject to destruction by marauding cattle, (b) the construction of stone walls to contain, restrict, or exclude cattle, and (c) deforestation of some areas, primarily because the cattle trampled and ate many of the young sprouts (ibid.).

Wherever they were kept to "increase and multiply" they did so, so rapidly that by 1815 John Whitman reported:

The cattle have become so numerous on the Island of Owhyhee that they are found in large droves and apprehensions were entertained that it would be necessary to destroy part of them on the expiration of the term which Van Couver set, when he left the first pair on the Island (Whitman 1979:61).

Kamehameha I hired a few people to shoot cattle. One of his bullock hunters was John P. Parker, an American who had shipped with traders in the Northwest Coast-China fur trade and finally settled in Hawaii about 1815 (Barrera and Kelly 1974:44). Parker later founded Parker Ranch. Barrera and Kelly (1974) report on the early days of the ranch:

After 1819, Parker lived at Waiapuka in North Kohala and moved to the Waimea area about 1835, where he lived first at Puuloa and then at Mana, Hamakua. He married a Hawaiian woman and raised a family there.... At Mana he developed his ranch based on large herds of cattle and a large acreage over which to graze them. His home became a convenient stopping place for visitors travelling between Hilo and Waimea, and his ranch later became the world-famous Parker Ranch, the largest in Hawaii and perhaps the largest in the world for acreage (Barrera and Kelly 1974:44).

In the 1830s a true cattle industry based on meat, hides, and tallow developed (Clark and Kirch 1983:48). By the late 1830s and 1840s this industry slowed dramatically; less than ten years later, however, it was up again. This industry was largely monopolized by the government or chiefs; most of the common people were excluded from it (Barrera and Kelly 1974:45). In 1846 two-thirds of the Waimea area had been converted to pasture for government cattle, sheep and horses (ibid.). As a result, many native residents moved away.

During the early days of the cattle industry merchants established businesses at Waimea. One of the best known was William J. French, an American who owned cattle and a warehouse in Kawaihae, and who employed a saddlemaker, shoemaker, and a carpenter. There was also a large tallow business in Waimea; in 1841 Governor Kuakini had to place a *tabu* on killing cattle solely for their hides and tallow (ibid:45).

James Fay, an Englishman, had a small business in Waimea. While most ranchers concentrated on cattle, Fay had 700 sheep on his 173 acres. Fay also ran a tannery. One of the most popular barks for tanning leather in Hawaii was from the *kukui* tree. This may be one of the reasons that the forests were depleted in the Waimea area. Although not as good as the *kukui*, the bark of the *koa* and *ohia* trees was also used (ibid.).

In 1847 the government was selling salted beef to the traders and whalers that stopped in Hawaii. By 1849 beef was being exported. William Beckley, who was in charge of the Government's land and cattle, became very powerful in Waimea. His name appears on many of the land claims as the *konohiki* who had given the claimants permission to use the land in the first place; his name also appears on many letters and documents of the Interior Department of the Hawaiian Kingdom Government (ibid.). His name also appears as the man who gave a lot to John Thomas in LCA 4026, which is within Site 3 of the project area, as will be shown later in this report.

While the government was taking over the cattle industry, the common people were having a difficult time ranching. Very few Hawaiians had the cash to buy land, and they were required to pay a certain rate per head for the cattle, hogs, sheep or goats that they had grazing on the king's land. On account of this, many of them moved (ibid.).

While cattle drove many people from Waimea, it also attracted others, particularly foreigners. Many Spanish-Americans from Mexico were brought in to the islands to handle the wild cattle. These *paniolas* (*Espanoles*) colorfully enhanced Waimea with their bright ponchos, pantaloons, and spurred boots (ibid.). Waimea even took on a bit of the look of old Mexico when prickly pear cactus and sisal plants were introduced.

Pest Infestation

Another factor in the decline of subsistence agriculture was natural pests. As early as 1832 crop production was severely damaged due to a worm that plagued the fields for more than six months. In 1837 there was famine in the area because of destruction by worms. In 1841 caterpillars were

destroying the crops, and in 1847 it was beetle grubs (Clark and Kirch 1983:49). Precisely what the pests were and what crops they were preying on is unclear. The same pest may have been given different common names, or there may have been different species involved. Clark and Kirch note that "one or more of the many species of cut-worms are likely candidates, but the sweet potato horn-worm and the sweet potato weevil are also possibilities" (ibid.). In any case its not clear as to whether these pests were endemic or introduced (ibid.).

What were called "field mice" also destroyed crops. Since true field mice aren't found in Hawaii, some other rodent was causing the problem (ibid.). Again, however, it's difficult to determine which species of mouse was being referred to. It seems likely the mice were only a small problem, as only one person cited them (ibid.).

Given the problems facing subsistence farmers, it's not surprising that so many abandoned their fields. Those who remained often faced hardship. In the early years, long stone walls were constructed to keep cattle out of the agricultural areas (ibid:50). With so many people moving and the lack of maintenance on these walls the cattle herds pressed even harder on the farmer. In later years the house lots and small garden plots were enclosed by stone walls to protect the individual lots (ibid.). Many people left their formerly cultivated lots and moved to a distant corner in the woods to avoid the cattle, but the cattle would follow them and destroy whatever plots they had newly planted (ibid.).

Agriculture did undergo a couple of brief periods of revitalization, especially in the late 1840s and early 1850s (ibid.). This was due mainly to the production of potatoes, both sweet and Irish. From the beginning of Euro-American contact in the islands, sweet potatoes were highly valued for replenishing ships stores. By the early 1830s, Irish potatoes were also being grown in Hawaii. The increase in whaling ships after 1840 brought great demands for both sweet and Irish potatoes (Kuykendall 1968:313). In 1849 a short-lived increase in potato production began as a response to the peak of the California Gold Rush. Thousands of barrels of potatoes were shipped to the gold fields over the next two years, but by 1852 the most intense phase of the boom was over (ibid:321). Trade with the whalers, however, continued for a few more years. In 1858 it was reported that "several thousand acres" were cultivated primarily for Irish potatoes, but taro and beans also received a lot of attention. The whaling era ended not long after that (Clark and Kirch 1983:49).

While the number of farmers and the quantity of food production dropped in Waimea, the number of non-farmers

rose dramatically. As a result, there was too little food to support the population. Trade made up the balance. While some goods were brought in from Honolulu and elsewhere through the stores, Waipi'o Valley became the primary supplier of foodstuffs. Taro was the main item bought from that area during that time, and beef and clothing were sent to Waipi'o in exchange for vegetables (ibid.).

In the 1830s Waimea was also chosen as a site for a mission house:

John Ii, Bingham, Bishop, and Ruggles missionized among the Waimea residents with the assistance, not only of Gov. Kuakini, but also of Kapiolani, famous for her defiance of Pele, and Kaahumanu. Bingham reported that when Kaahumanu came to Kawaihae in September 1830, he preached there to 3000 people "...assembled in the open air." The following day the entire party "...repaired to Waimea, and sojourning there several weeks, made the missionaries a thorough-going family visitation." Such support from the chiefs made it possible for the missionaries to set up and maintain a permanent mission station in this distant area (Barrera and Kelly 1974:52).

As the population of Waimea dropped and the agricultural and residential lands shrunk, the settlement pattern changed. What was once a largely dispersed settlement area became highly concentrated in the upper elevations, especially in the old locations of Lihue, Waikoloa, and Pu'ukapu (Clark and Kirch 1983:49). The mission station, the store established by William French, and the cattle processing area all drew the population into a new, fairly nucleated settlement. Despite all the changes and hard times the community continued and even prospered.

THE GREAT MAHELE

In 1848, during the reign of Kamehameha III, the traditional Hawaiian land ownership system was replaced with a more Western-style system. This radical restructuring was called The Great Mahele (division). The Great Mahele defined the land interests of the King and the high-ranking chiefs, and the *konohiki*, who were originally those in charge of tracts of land on behalf of the king or a chief (Chinen 1958:vii and Chinen 1961:13). More than 240 of the highest-ranking chiefs and *konohiki* in the kingdom joined Kamehameha III in this division. The first *mahele* was signed on Jan. 27, 1848 by Kamehameha III and Princess Victoria Kamamalu, and by her guardians Mataio Kekuanaoa and

Ione Ii. The last *mahele* was signed by the King and E. Enoke on March 7, 1848 (Chinen 1958:16).

The Mahele did not convey title to any land. The chiefs and *konohiki* were required to present their claims to The Land Commission to receive awards for lands quit-claimed to them by Kamehameha III. They were also required to pay commutations to the government in order to receive royal patents on their awards. Until an award was issued, title remained with the government. The lands awarded to the chiefs and *konohiki* became known as Konohiki Lands. Because there were few surveyors in Hawaii at the time of the Mahele, the lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This expedited the work of the Land Commission and speeded the transfers (Chinen 1961:13).

During this process all land was placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, and Konohiki Lands. These were all "subject to the rights of native tenants," (Laws of Hawaii 1848:22). Native tenants were the common Hawaiian people who lived on the land and worked it for their subsistence. Questions concerning the nature of these rights began to arise as the King, the government, and *konohiki* began selling parcels of land. On December 21, 1849 the Privy Council attempted to clarify the situation by adopting four resolutions intended to protect the rights of native tenants referred to in the 1848 law (Chinen 1958:29). These resolutions authorized the Land Commission to award fee simple title to all native tenants who occupied and improved any portion of Crown, Government, or Konohiki lands. These awards were to be free of commutation except for house lots located in the districts of Honolulu, Lahaina, and Hilo (ibid.).

Before receiving their awards from the Land Commission, the native tenants were required to prove that they cultivated the land for a living. They were not permitted to acquire wastelands or lands which they cultivated "with the seeming intention of enlarging their lots." Once a claim was confirmed, a survey was required before the Land Commission was authorized to issue any award. These lands became known as "Kuleana Lands" (ibid:30). Until its dissolution on March 31, 1855, the Land Commission issued thousands of awards to the native tenants for their *kuleana*; even so, less than 30,000 acres of land were awarded to the native tenants as Kuleana Lands.

Only Site 3 of the current project contains an LCA. This LCA takes up a major portion of the site (Figure A-2). The following is testimony and a lot description for LCA 4026. The testimony is accompanied by a tracing of the lot (Figure A-3):

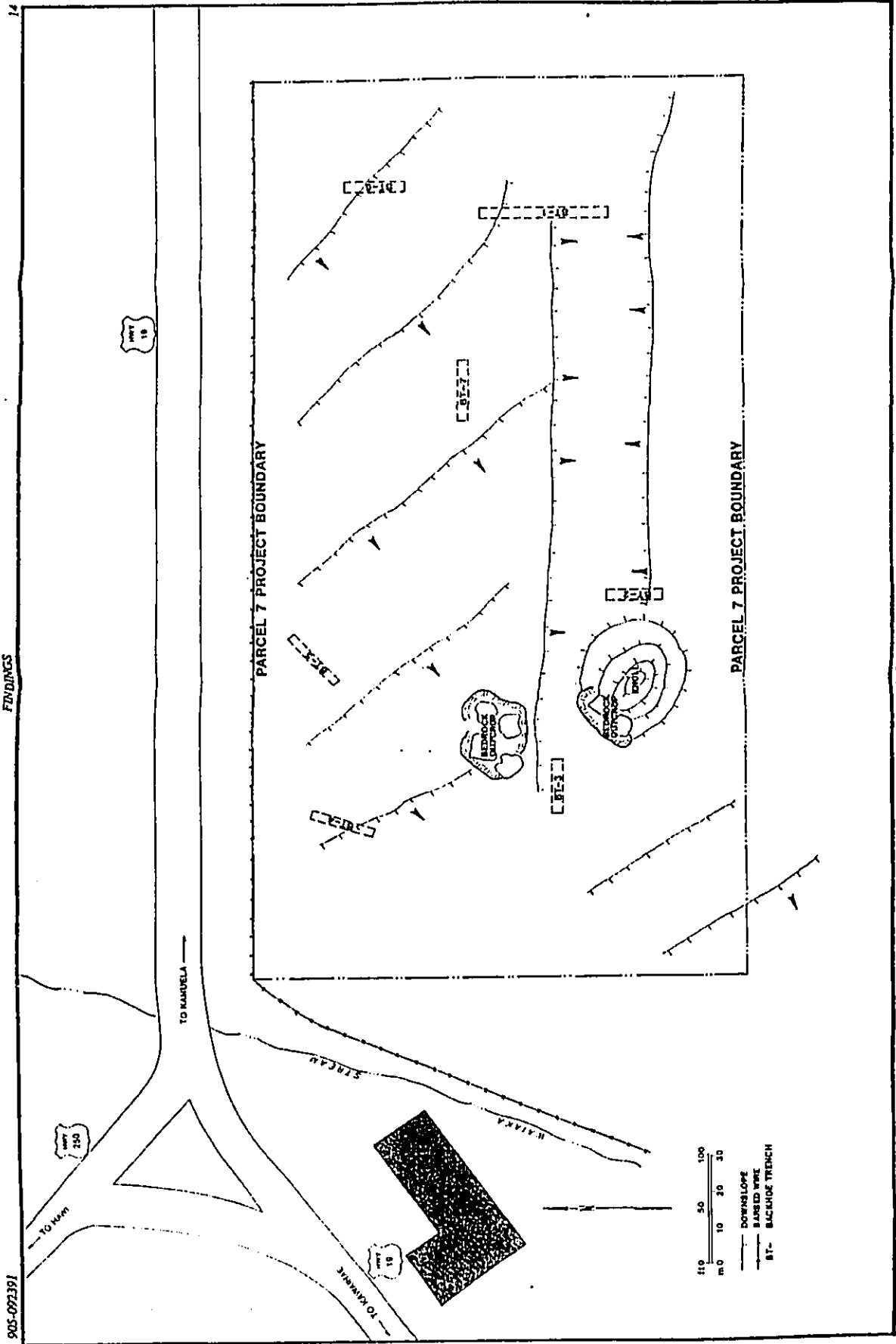


Figure 5. Project Area and Subsurface Testing Location Map (Parcel 7)

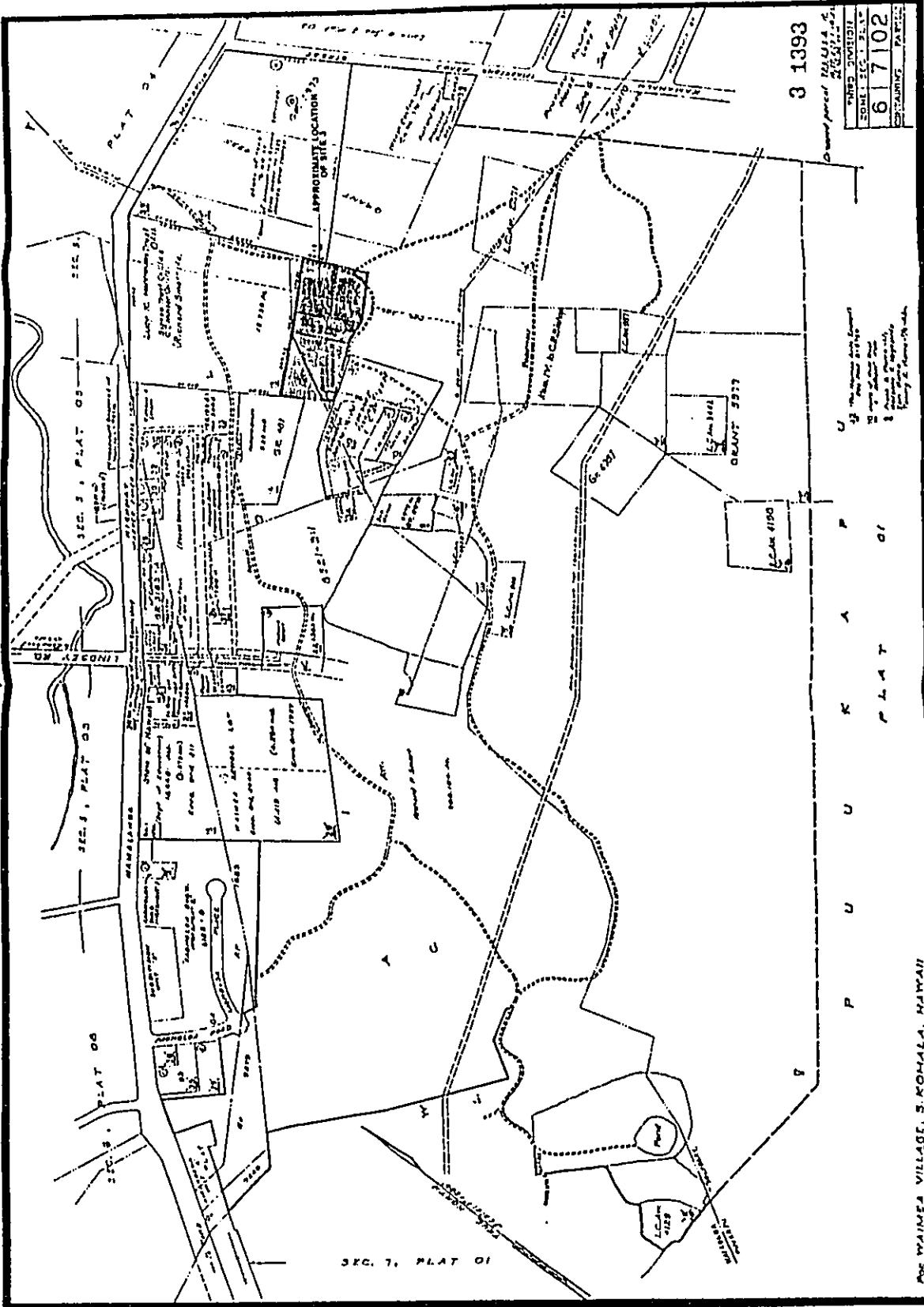


Figure A-2. Portion of 1955 Tax Map 3-6-7-02

POC WAIMEA VILLAGE, S. KOHALA, HAWAII

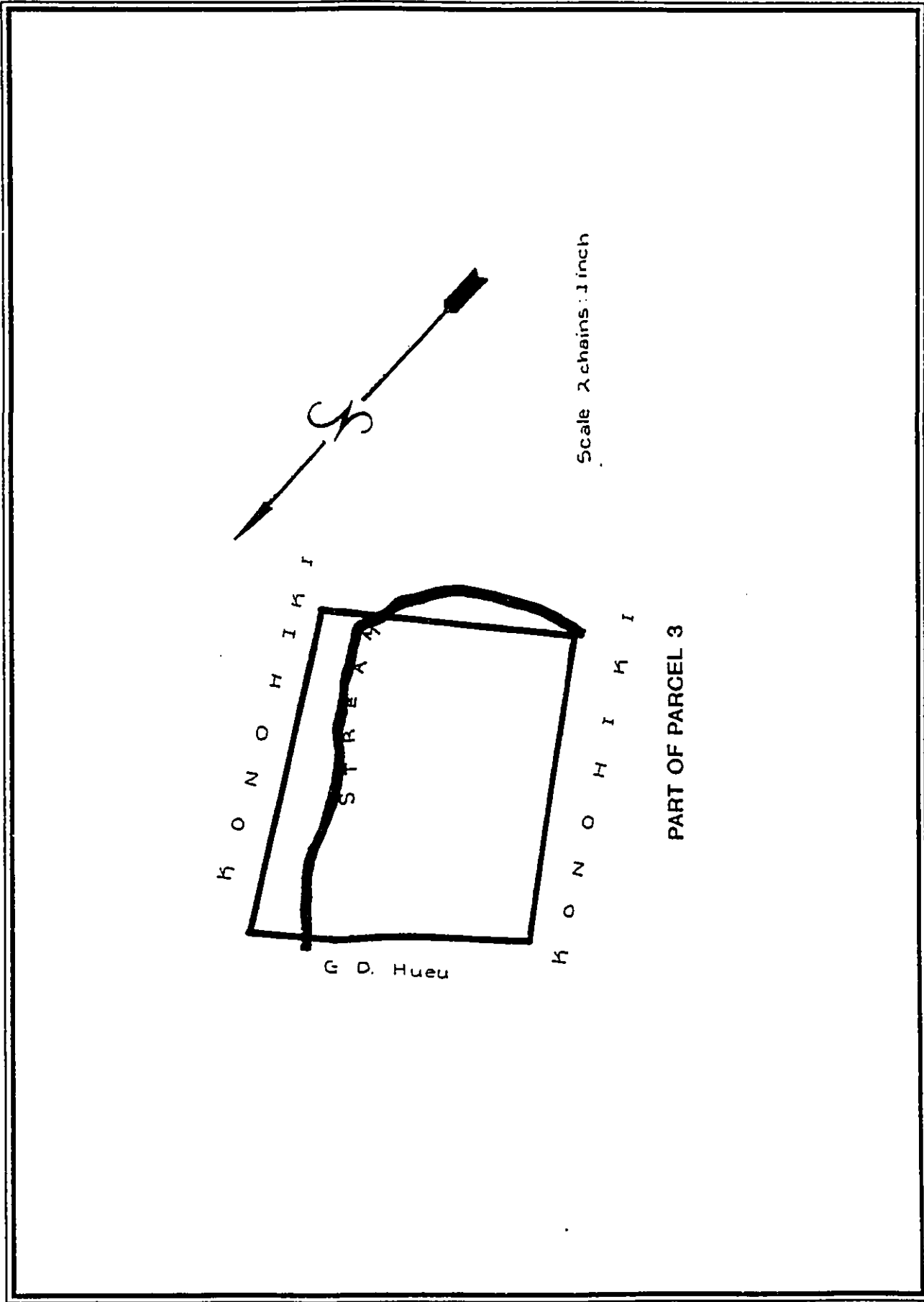


Figure A-3. Tracing of L.C.A. 4026

L.C.A. 4026 located in Site 3
Native Testimony Vol. 4:41

Sept. 16, 1848
No. 4026 - John Thomas

William Bakle sworn and stated: "I have seen John Thomas' house-lot in the ili land at Paulama in Waimea, Hawaii. He is a non-citizen of Hawaii, but he asked me for an interest for his wife and children. I had consented and it was as large as he had filed as a claim. A half of the lot has been enclosed and there are 2 houses in there. I am on the mauka, waho and makai directions while Hueu is on the Kohala side. This is his old place and I had given it to him in 1846 forever, for them, his wife and children. Kamemaikou is the wife, Ailune Thomas, the son. I cannot object to him.

Lot description
L.C.A. 4026 to John Thomas
Paulama, Waimea, Kohala, Hawaii

Houselot in Paulama, Waimea, Kohala, Hawaii commencing at North angle adjoining east corner of G.D. Hueu and running S 52° W 3.90 chains along yard of G.D. Hueu, Thence S 33 1/2° E 4.57 chains along Konohiki to watercourse, Thence N 52° E. 3.69 chains and N 29 3/4° W 4.60 chains along

Konohiki to point of beginning area - 1 acre & 7/10 of an acre

Sur. C.J. Lyons
2/5/1851

In testimony for other LCA in the area it was found that the *Konohiki* at that time was William Beckley (his name was often misspelled, as in the testimony above).

Figure A-4 is a map taken from Clark's report (1987) which shows the various 'auwai as well as archaeological features in the general vicinity. Parcel 7 of the project area has have been approximated on this map. Figure A-5 is taken from the same report and shows the approximate location of Parcel 5.

Throughout its history, Waimea has been an extremely important and successful agricultural area. This small area once produced enough food to supply armies as well as its own inhabitants. It went through many transitions—from an agricultural center to a cattle raising center to producing various other crops. Many of its earlier agricultural sites have been altered—trampled by cattle or covered under pasture grass. Based on the present historical research, it appears likely there are significant archaeological sites within the project area parcels. As Parcel 3 does contain an LCA, this parcel should be studied carefully; it may contain historical remains.

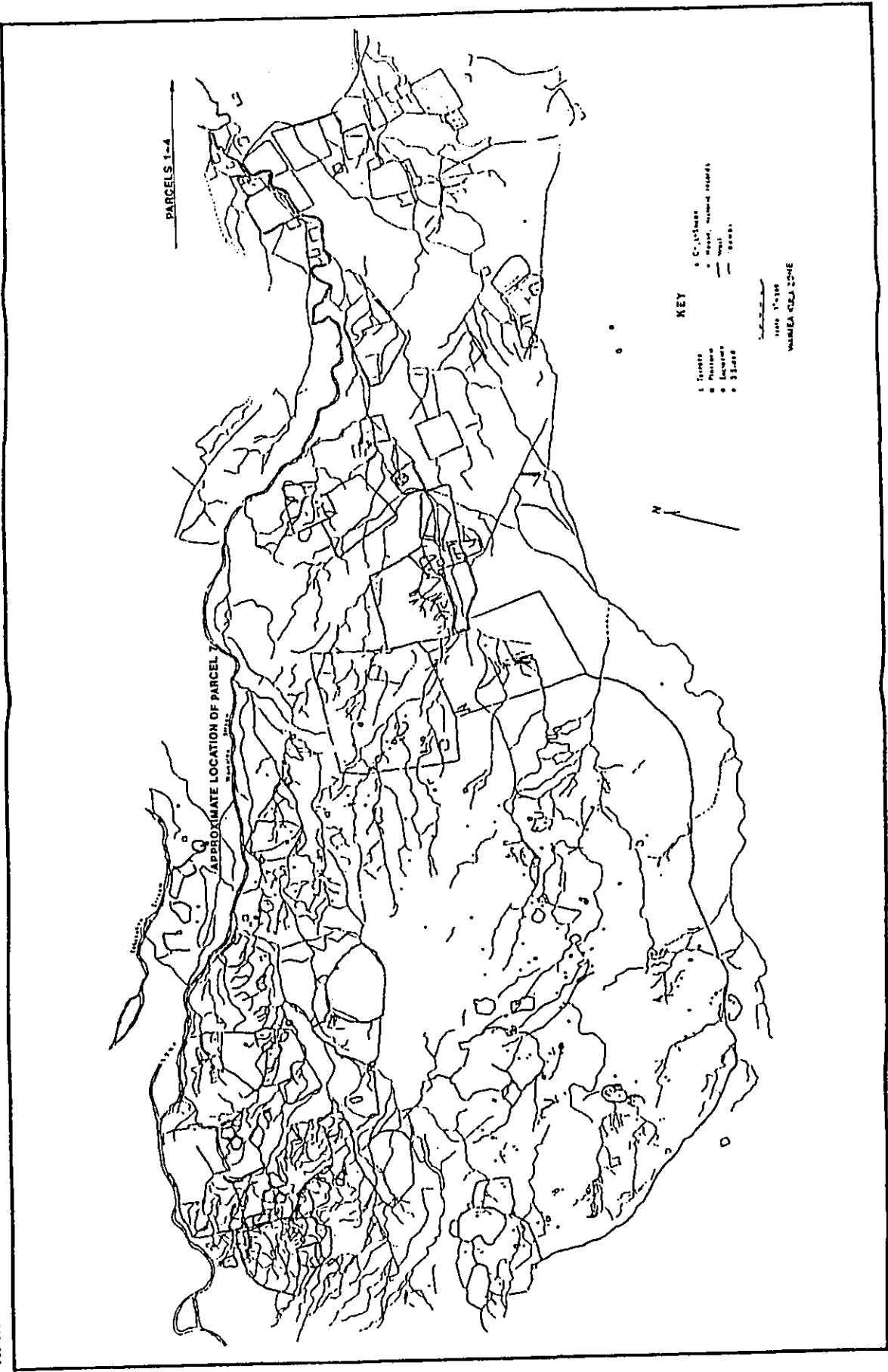


Figure A-4. Copy of Waimea Kula Zone map (From Clark 1987; fig.10.1)

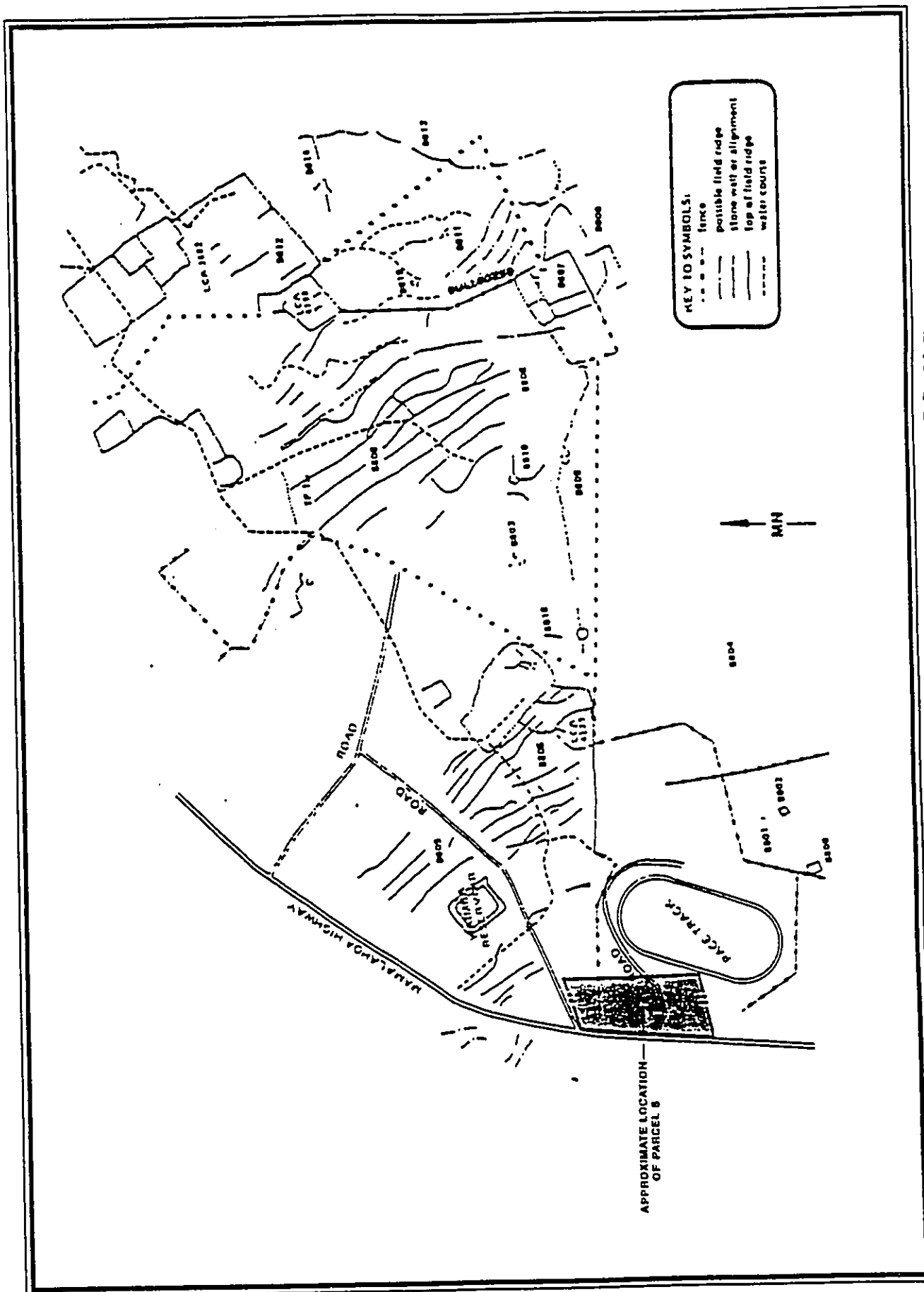


Figure A-5. Map of a Portion of Waimea (From Clark 1987;fig.10.5)

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APPENDIX B

PARCEL 1, TU-1

Layer	Description
I	0-25 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	25-45 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;

TU-2

Layer	Description
I	0-40 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	40-65 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;

TU-3

Layer	Description
I	0-40 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;

II	40-65 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;
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PARCEL 3, TU-1

Layer	Description
I	0-32 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	32-60 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;

TU-2

Layer	Description
I	0-45 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	45-66 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;

PARCEL 4, FEATURE A, BT-1 (Figure B-1)

Layer	Description
I	0-28 cmbs; generally 20 cm thick; dark brown (10YR 3/3 moist); clay loam; dark yellowish brown (10YR 3/6 dry); strong, fine angular blocky structure; hard, very friable, non-sticky, non-plastic; many fine vesicular roots; many fine interstitial pores; abrupt, smooth boundary;
II	20-45 cmbs; generally 22 cm thick; very dark brown (10YR 2/2 moist); sandy clay; dark yellowish brown (10YR 4/4 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; common fine vesicular roots; common fine interstitial pores; gradual, wavy boundary;

PARCEL 4, FEATURE A, BT-1

Layer	Description
III	12-60 cmbs; generally 20 cm thick; dark yellowish brown (10YR 3/4 moist); sandy clay loam; dark yellowish brown (10YR 4/4 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; few fine vesicular roots; few fine interstitial pores; clear, smooth boundary;
IV	50-84 cmbs; generally 20 cm thick; very dark brown (10YR 2/2 moist); silty clay; dark yellowish brown (10YR 3/4 dry); moderate fine blocky structure; loose, very friable, slightly sticky, non-plastic; rare fine vesicular roots; rare fine interstitial pores; clear, smooth boundary;
V	60-100 cmbs; generally 25 cm thick; dark yellowish brown (10YR 3/4 moist); silty clay loam; dark yellowish brown (10YR 4/4 dry); moderate medium crumb structure; loose, very friable, slightly sticky, non-plastic; rare very fine tubular roots; rare very fine interstitial pores; gradual, wavy boundary;
VI	12-100 cmbs; generally 30 cm thick; dark yellowish brown (10YR 3/4 moist); silty clay loam; dark yellowish brown (10YR 4/6 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; rare very fine tubular roots; rare very fine interstitial pores; gradual, irregular boundary;

VII 90-120+ cmbs; generally 20 cm thick; dark yellowish brown (10YR 3/4 moist); silty clay loam; dark yellowish brown (10YR 4/4 dry); weak, fine angular blocky structure; soft, very friable, slightly sticky, non-plastic; rare very fine tubular roots; rare very fine interstitial pores; layer continues below base of unit.

PARCEL 4, BT-1, GENERAL, EAST FACE

Layer	Description
I	0-24 cmbs; generally 20 cm thick; very dark brown (10YR 2/2 moist); clay loam; dark yellowish brown (10YR 3/6 dry); strong, fine angular blocky structure; soft, very friable, slightly sticky, plastic; many fine vesicular roots; many fine interstitial pores; abrupt, smooth boundary;
VIII	24-90 cmbs; generally 60 cm thick; dark yellowish brown (10YR 3/4 moist); sandy clay; dark yellowish brown (10YR 4/6 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; common fine vesicular roots; common fine interstitial pores; gradual, wavy boundary;
IX	92-120 cmbs; generally 30 cm thick; very dark brown (10YR 2/2 moist); sandy clay loam; dark yellowish brown (10YR 4/4 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; few fine vesicular roots; few fine interstitial pores; clear, wavy boundary;
X	120-160+ cmbs; very dark brown (10YR 2/2 moist); silty clay; dark yellowish brown (10YR 3/4 dry); moderate fine blocky structure; loose, very friable, non-sticky, non-plastic; rare fine vesicular roots; rare fine interstitial pores; layer continues below base of unit.

PARCEL 4, BT-2, SOUTHEAST FACE

Layer	Description
I	0-28 cmbs; generally 20 cm thick; very dark brown (10YR 2/2 moist); clay loam; dark yellowish brown (10YR 3/6 dry); strong, fine angular blocky structure; soft, very friable, slightly sticky, plastic; many fine vesicular roots; many fine interstitial pores; abrupt, smooth boundary;

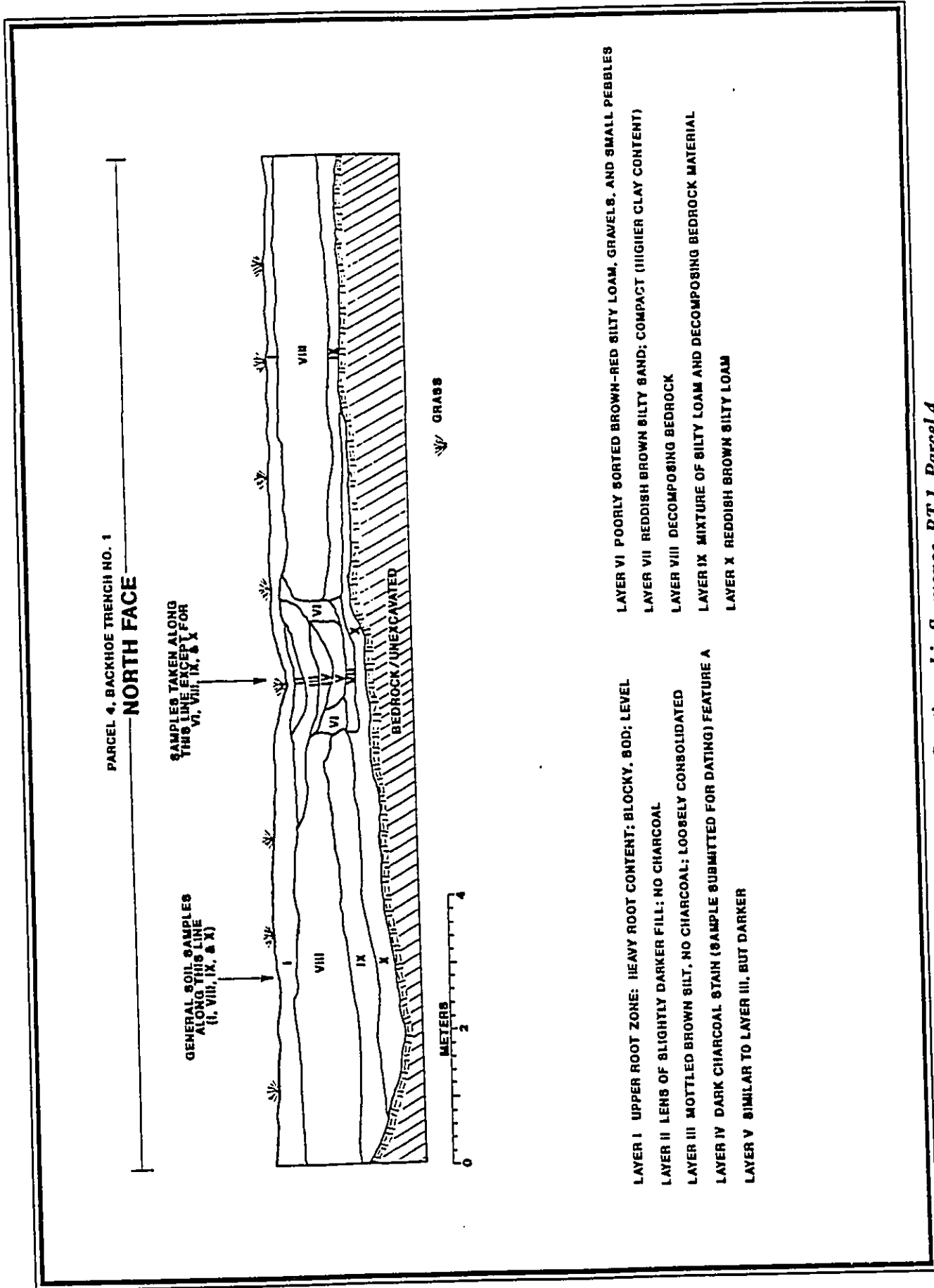


Figure B-1. Stratigraphic Sequence, BT-1, Parcel 4

- II 28-85 cmbs; generally 60 cm thick; dark yellowish brown (10YR 3/4 moist); sandy clay; dark yellowish brown (10YR 4/6 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; common fine vesicular roots; common fine interstitial pores; gradual, wavy boundary;
- III 85-118 cmbs; generally 30 cm thick; very dark brown (10YR 2/2 moist); sandy clay loam; dark yellowish brown (10YR 4/4 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; few fine vesicular roots; few fine interstitial pores; clear, wavy boundary;
- IV 118-155+ cmbs; very dark brown (10YR 2/2 moist); silty clay; dark yellowish brown (10YR 3/4 dry); moderate fine blocky structure; loose, very friable, non-sticky, non-plastic; rare fine vesicular roots; rare fine interstitial pores; layer continues below base of unit.

PARCEL 4, BT-3, EAST FACE

Layer	Description
I	0-34 cmbs; generally 30 cm thick; very dark brown (10YR 2/2 moist); clay loam; dark yellowish brown (10YR 3/6 dry); strong, fine angular blocky structure; soft, very friable, slightly sticky, plastic; many fine vesicular roots; many fine interstitial pores; abrupt, smooth boundary;
II	34-90 cmbs; generally 65 cm thick; dark yellowish brown (10YR 3/4 moist); sandy clay; dark yellowish brown (10YR 4/6 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; common fine vesicular roots; common fine interstitial pores; gradual, wavy boundary;
III	90-115 cmbs; generally 20 cm thick; very dark brown (10YR 2/2 moist); sandy clay loam; dark yellowish brown (10YR 4/4 dry); moderate fine crumb structure; loose, very friable, slightly sticky, non-plastic; few fine vesicular roots; few fine interstitial pores; clear, wavy boundary;
IV	115-150+ cmbs; very dark brown (10YR 2/2 moist); silty clay; dark yellowish brown (10YR 3/4 dry); moderate fine blocky structure; loose, very friable, non-sticky, non-plastic; rare fine vesicular roots; rare fine interstitial pores; layer continues below base of unit.

PARCEL 5, BT-1, SOUTH FACE (Figure B-2)

Layer	Description
I	0-10 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	4-42 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;
III	14-50 cmbs; very dark grayish brown (10YR 3/2 moist); clay; dark brown (10YR 4/3 dry); weak, fine granular structure; soft, friable, slightly sticky, slightly plastic; rare, medium interstitial and tubular roots; many coarse interstitial pores; gradual, wavy boundary;
IV	50-100 cmbs; black (10YR 2/1 moist); sandy loam; very dark brown (10YR 2/2 dry); moderate fine blocky structure; soft, loose, slightly sticky, non-plastic; no roots; few fine to medium interstitial pores; layer continues below base of unit.

PARCEL 5, BT-2, EAST FACE (Figure B-3)

Layer	Description
I	0-15 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	8-45 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;

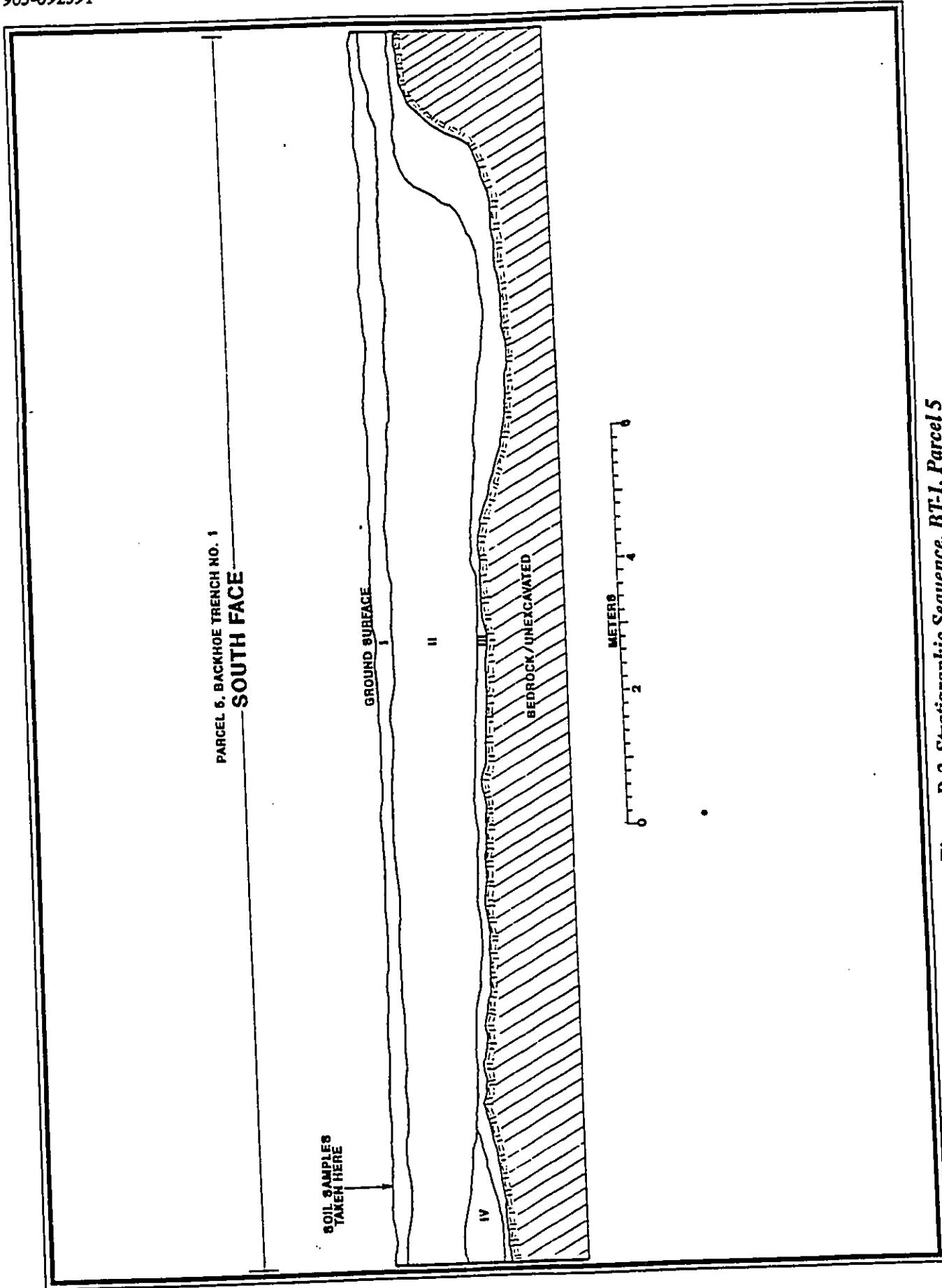


Figure B-2. Stratigraphic Sequence, BT-1, Parcel 5

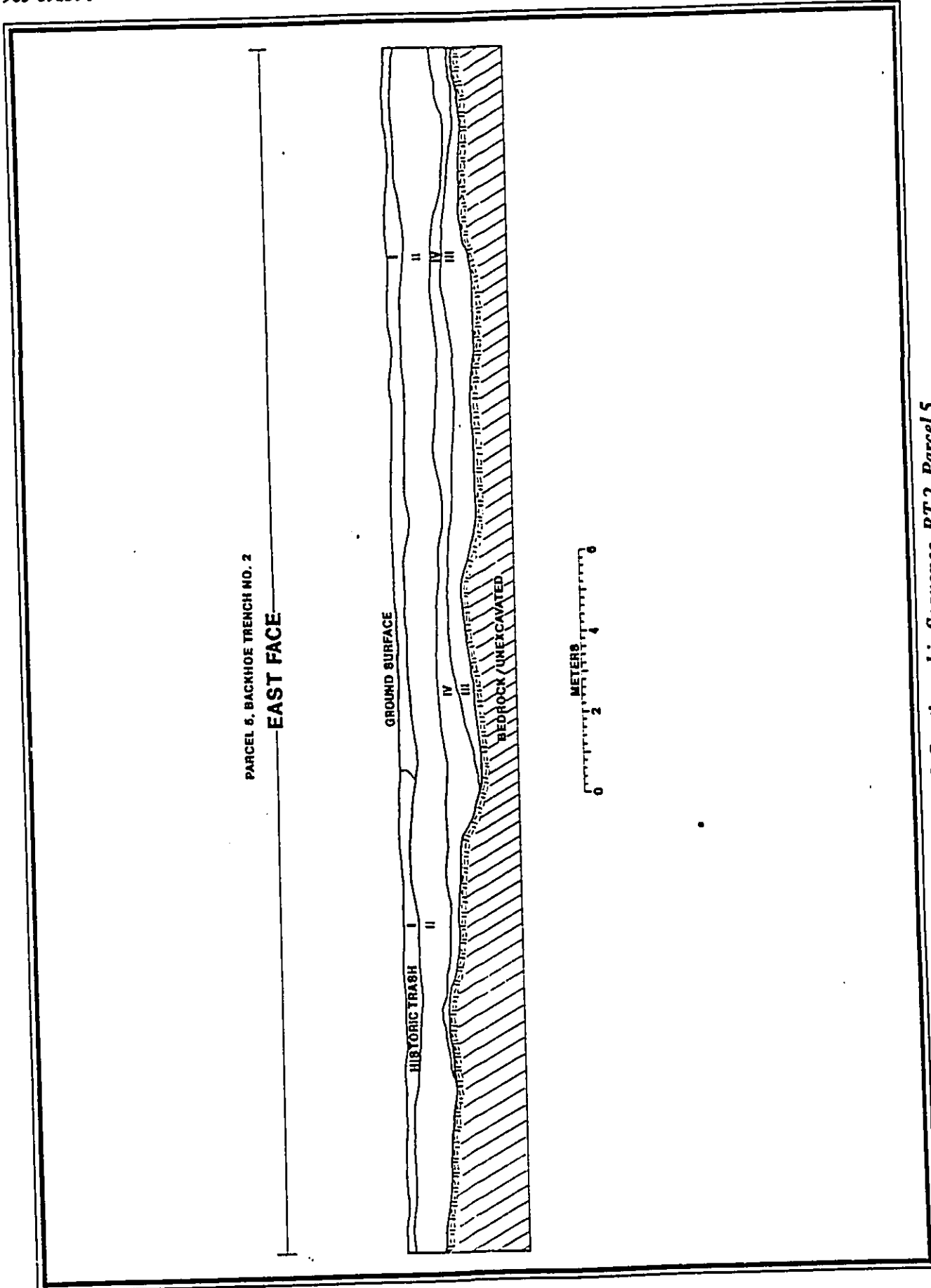


Figure B-3. Stratigraphic Sequence, BT-2, Parcel 5

- III 38-60 cmbs; very dark grayish brown (10YR 3/2 moist); clay; dark brown (10YR 4/3 dry); weak, fine granular structure; soft, friable, slightly sticky, slightly plastic; rare, medium interstitial and tubular roots; many coarse interstitial pores; gradual, wavy boundary;
- IV 90-100 cmbs; black (10YR 2/1 moist); sandy loam; very dark brown (10YR 2/2 dry); moderate fine blocky structure; soft, loose, slightly sticky, non-plastic; no roots; few fine to medium interstitial pores; layer continues below base of unit.

PARCEL 5, BT-3, NORTH FACE (Figure B-4)

Layer	Description
I	0-10 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	4-42 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;
III	14-50 cmbs; very dark grayish brown (10YR 3/2 moist); clay; dark brown (10YR 4/3 dry); weak, fine granular structure; soft, friable, slightly sticky, slightly plastic; rare, medium interstitial and tubular roots; many coarse interstitial pores; gradual, wavy boundary;
IV	15-20 cmbs; dark brown (10YR 3/3 moist); sandy clay loam; dark yellowish brown (10YR 3/4 dry); strong, medium granular structure; slightly hard, very friable, slightly sticky, plastic; no roots; common fine interstitial pores; gradual, wavy boundary;
V	18-25 cmbs; dark yellowish brown (10YR 4/6 moist); sandy loam; yellowish brown (10YR 5/8 dry); weak, very fine single grain structure; loose, very friable, slightly sticky, non-plastic; no roots; common fine to medium interstitial pores; gradual, wavy boundary;
VI	90-100 cmbs; black (10YR 2/1 moist); sandy loam; very dark brown (10YR 2/2 dry); moderate fine blocky structure; soft, loose, slightly sticky, non-

plastic; no roots; few fine to medium interstitial pores; layer continues below base of unit.

PARCEL 5, BT-4, SOUTH FACE

Layer	Description
I	0-20 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	20-48 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;
III	48-60 cmbs; very dark grayish brown (10YR 3/2 moist); clay; dark brown (10YR 4/3 dry); weak, fine granular structure; soft, friable, slightly sticky, slightly plastic; rare, medium interstitial and tubular roots; many coarse interstitial pores; gradual, wavy boundary;
IV	90-100 cmbs; black (10YR 2/1 moist); sandy loam; very dark brown (10YR 2/2 dry); moderate fine blocky structure; soft, loose, slightly sticky, non-plastic; no roots; few fine to medium interstitial pores; layer continues below base of unit.

PARCEL 6, BT-1, NORTH FACE (Figure B-5)

Layer	Description
I	0-25 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; dark grayish brown (10YR 4/2 dry); moderate medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; strong very fine tubular roots; common very fine interstitial pores; gradual, smooth boundary;
II	25-90 cmbs; very dark grayish brown (10YR 3/2 moist); silty clay; dark yellowish brown (10YR 4/6 dry); moderate fine platy structure; soft, very friable, slightly sticky, slightly plastic; many very fine tubular roots; common very fine interstitial pores; gradual, wavy boundary;

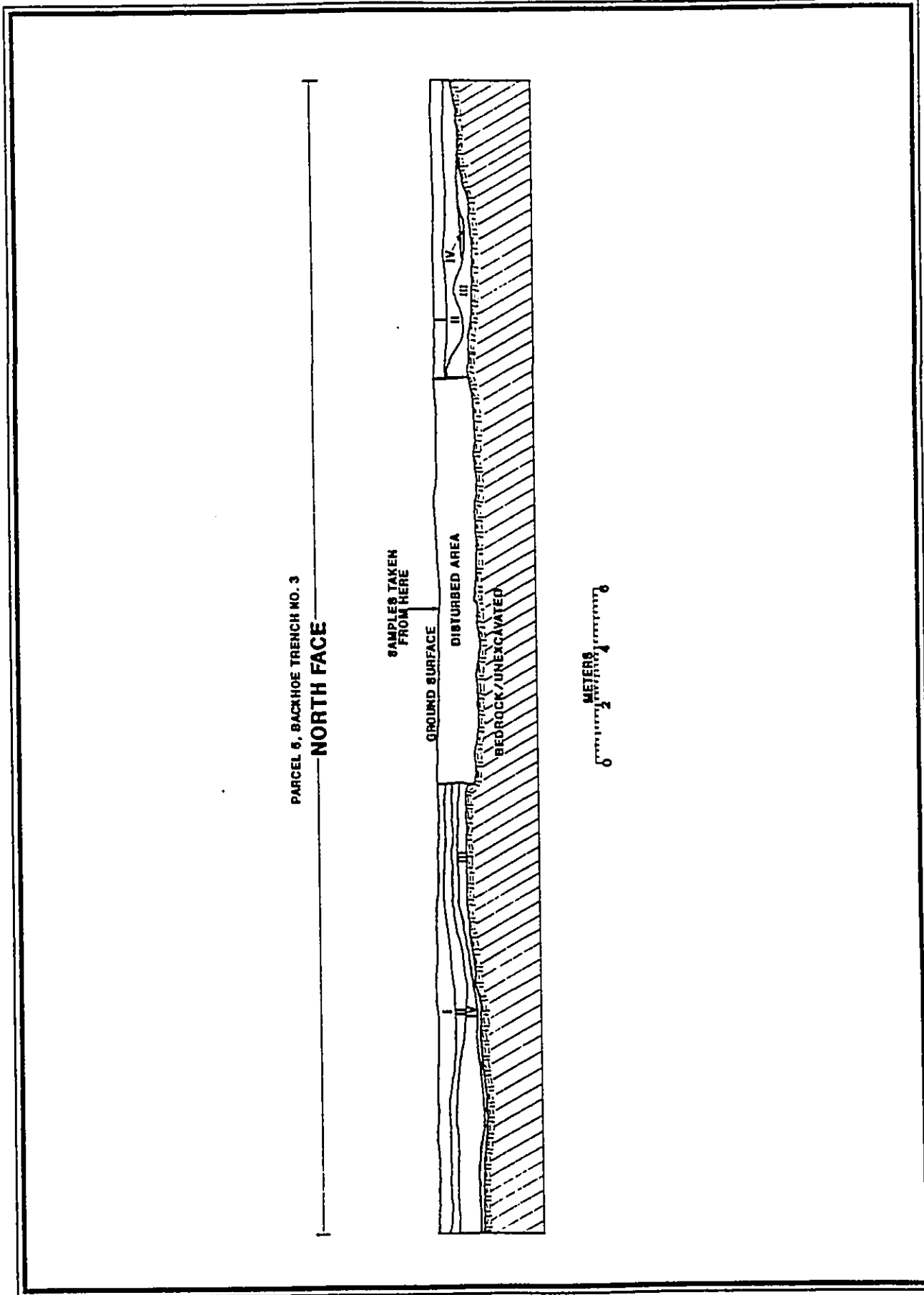


Figure B-4. Stratigraphic Sequence, BT-3, Parcel 5.

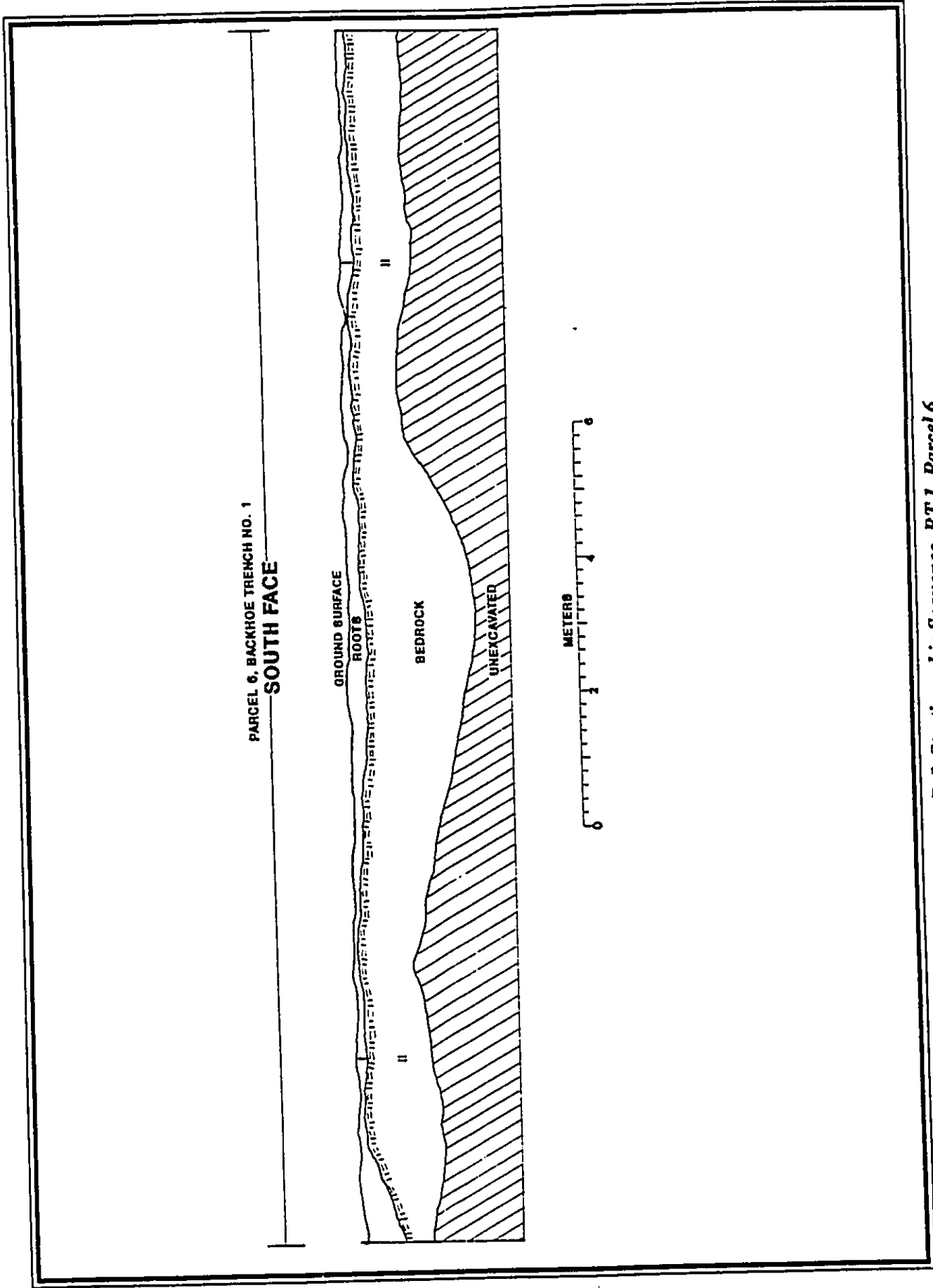


Figure B-5. Stratigraphic Sequence, BT-1, Parcel 6.

- III 90-140 cmbs; very dark grayish brown (10YR 3/2 moist); clay; dark brown (10YR 4/3 dry); weak, fine granular structure; soft, friable, slightly sticky, slightly plastic; rare, medium interstitial and tubular roots; many coarse interstitial pores; gradual, wavy boundary; layer continues below base of unit.

dry); weak, coarse crumb structure; soft, very friable, sticky, plastic;

PARCEL 7, BT-1 (Figure B-6)

Layer	Description
I	0-10 cmbs; dark reddish brown (5YR 3/2 moist); silty clay loam; reddish brown (5YR 4/2 dry); moderate, medium crumb structure; slightly hard, friable, slightly sticky, slightly plastic;
II	30-40 cmbs; dark reddish brown (5YR 3/3 moist); silt loam; dark reddish brown (5YR 3/4 dry); structureless; loose, loose, slightly sticky, slightly plastic;
III	80-90 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; yellowish red (5YR 4/6 dry) moderate, coarse, crumb structure; soft, very friable, sticky, plastic;
IV	135-145 cmbs; dark reddish brown (2.5 YR 2.5/4 moist); silty clay loam; yellowish red (5YR 5/8 dry); weak, fine crumb structure; soft, very friable, sticky, plastic;

PARCEL 7, BT-2 (Figure B-7)

Layer	Description
I	0-30 cmbs; dark reddish brown (5YR 3/3 moist); clay loam; reddish brown (5 YR 4/4 dry); moderate, fine crumb structure; hard, friable, slightly sticky, slightly plastic;
II	10-45 cmbs; dark reddish brown (5YR 3/4 moist); silty clay loam; yellowish red (5YR 4/6 dry); structureless; soft, loose, slightly sticky, slightly plastic;
III	35-115 cmbs; dark brown (7.5YR 3/3 moist); silty clay loam; strong brown (7.5YR 4/6 dry); weak; very coarse crumb structure; soft, very friable, sticky, plastic;
IV	100-115 cmbs; dark reddish brown (2.5YR 2.5/4 moist); silty clay loam; strong brown (7.5YR 5/8

PARCEL 7, BT-3 (Figure B-8)

Layer	Description
I	0-10 cmbs; dark reddish brown (5YR 2.5/2 moist); silty clay loam; dark reddish brown (5YR 3/4 dry); moderate fine crumb structure; hard, friable, slightly sticky, slightly plastic;
II	30-40 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; reddish brown (5YR 4/4 dry); weak, fine to coarse crumb structure; soft, very friable, slightly sticky, slightly plastic;
III	90-100 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; yellowish red (5YR 5/6 dry); weak, fine to coarse crumb structure; soft very friable, slightly sticky, plastic;
IV	150-160 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; yellowish red (5YR 4/6 dry); weak, fine to coarse crumb structure; soft, very friable, slightly sticky, plastic;

PARCEL 7, BT-4 (Figure B-9)

Layer	Description
I	10-20 cmbs; dark brown (7.5YR 3/3 moist); silty clay loam; dark brown (7.5YR 3/4 dry); moderate, fine crumb structure; hard, friable, slightly sticky plastic;
II	25-35 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; dark reddish brown (5YR 3/4 dry); weak, fine to coarse crumb structure; soft, very friable, slightly sticky, slightly plastic;
III	65-75 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; strong brown (7.5YR 4/6 dry); weak, fine to coarse, crumb structure; soft, very friable, slightly sticky, slightly plastic;
IV	90-100 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; strong brown (7.5YR 5/8 dry); weak, fine to coarse crumb structure; soft, very friable, slightly sticky, plastic;

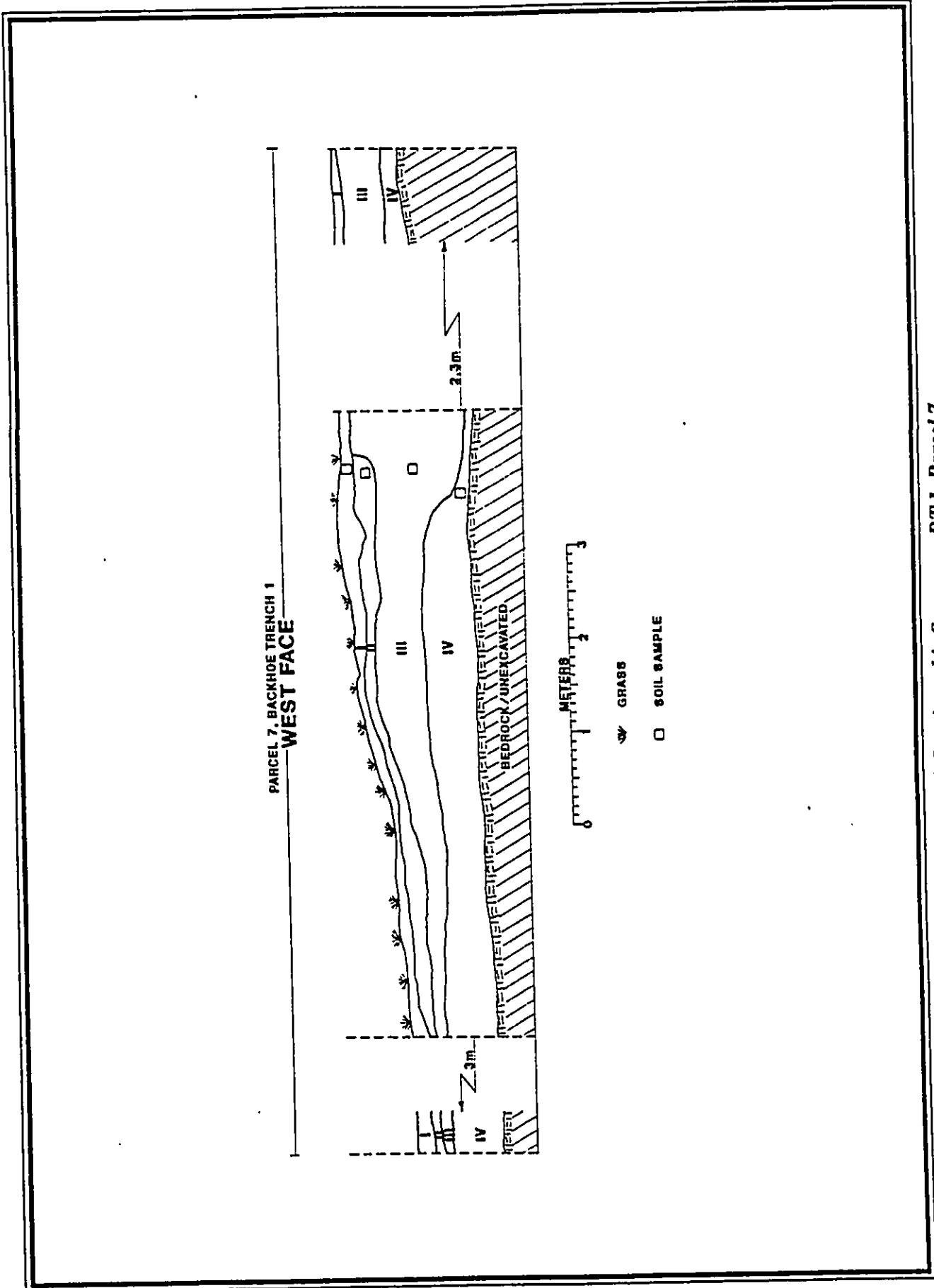


Figure B-6. Stratigraphic Sequence, BT-1, Parcel 7.

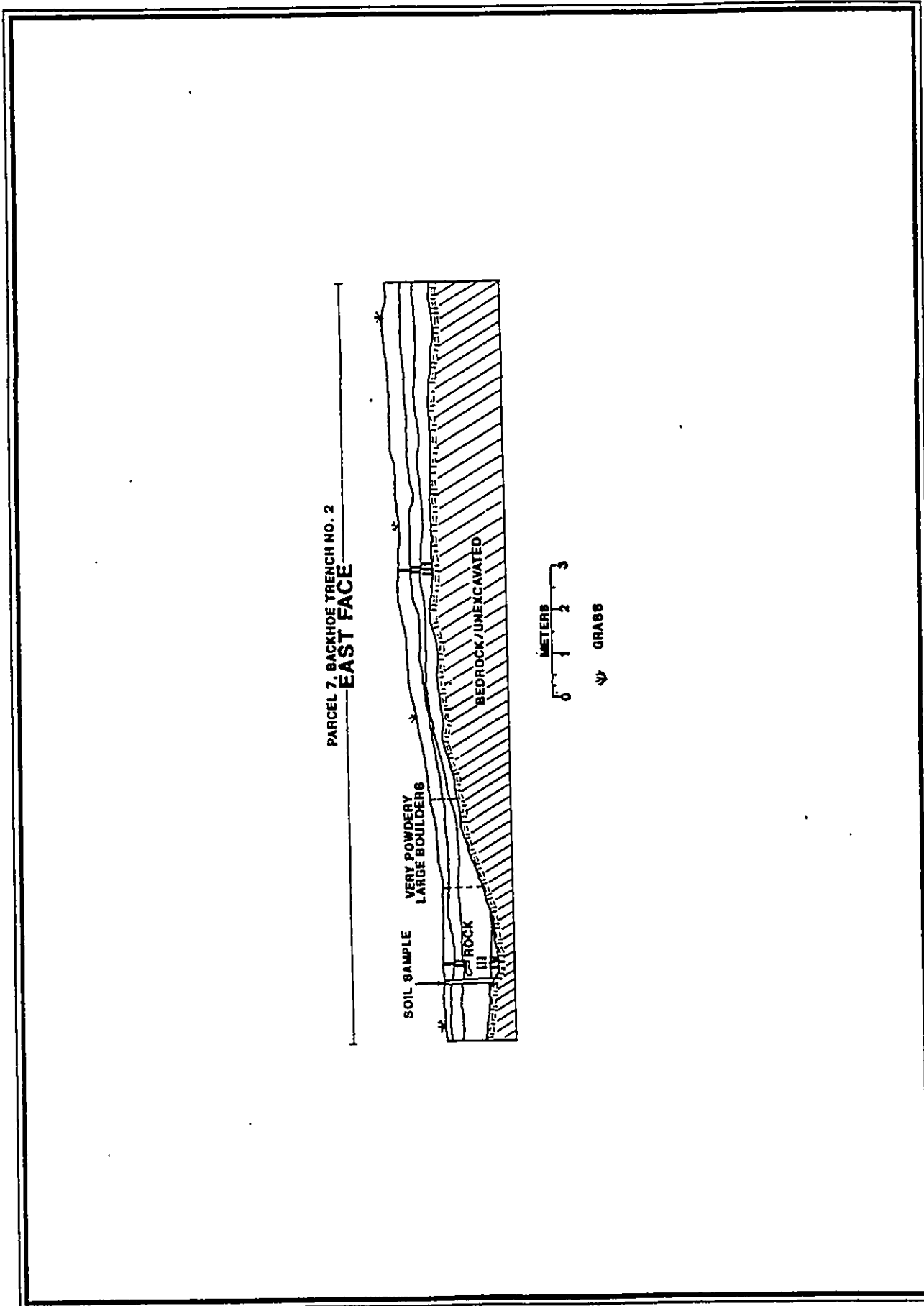


Figure B-7. Stratigraphic Sequence, BT-2, Parcel 7

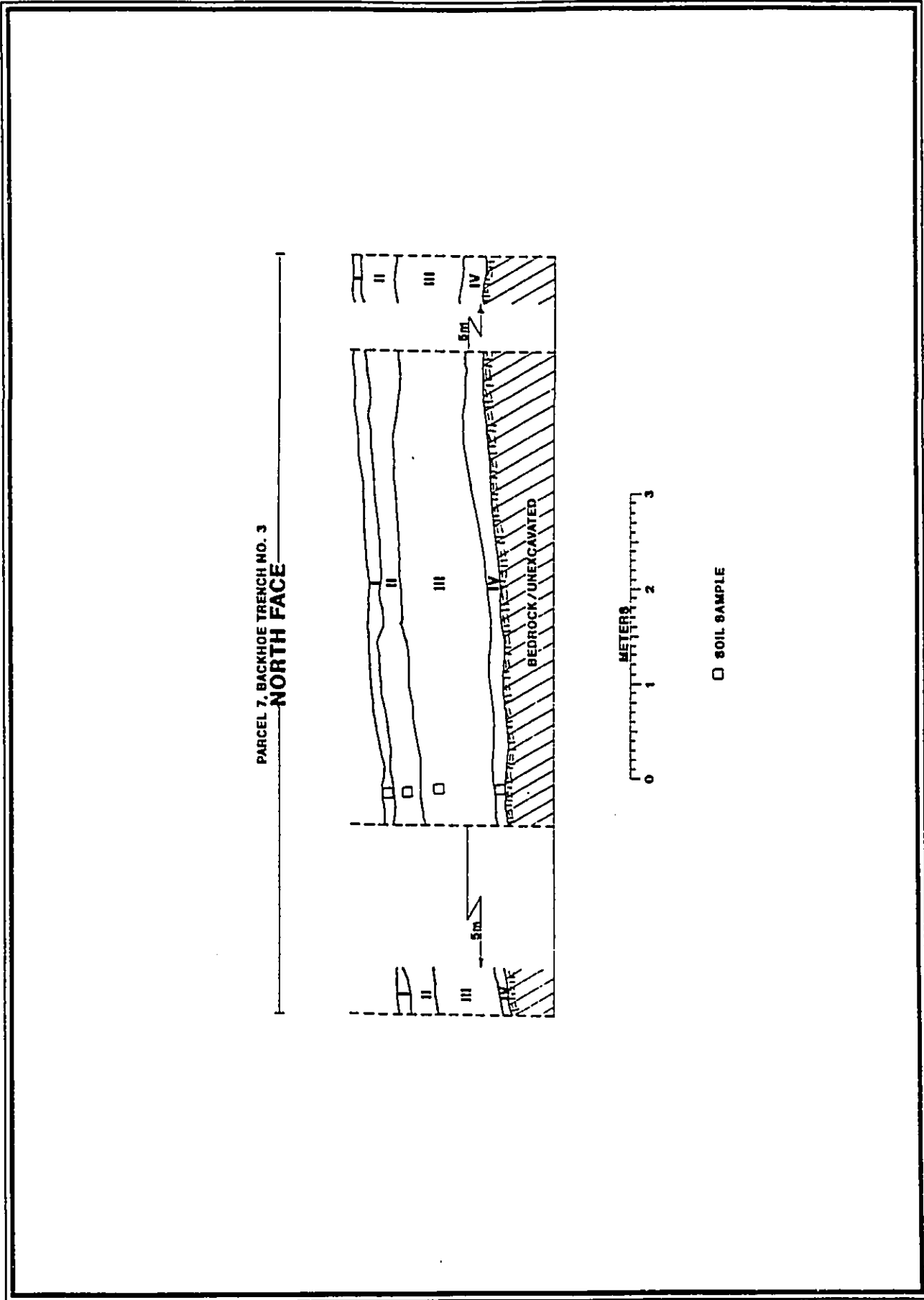


Figure B-8. Stratigraphic Sequence, BT-3, Parcel 7



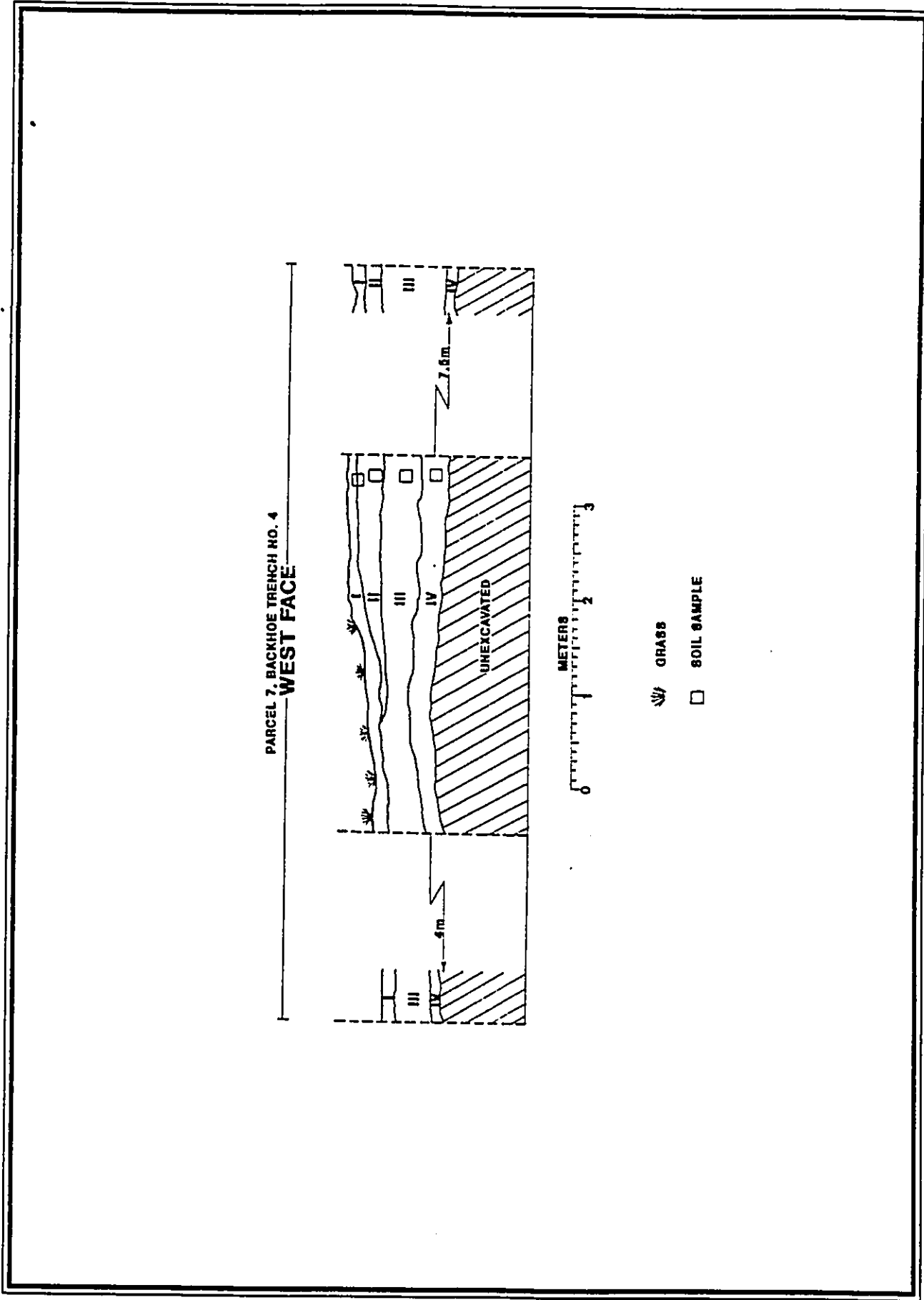


Figure B-9. Stratigraphic Sequence, BT-4, Parcel 7

PARCEL 7, BT-5 (Figure B-10)

Layer	Description
I	0-35 cmbs; dark brown (7.5YR 3/3 moist); clay loam; dark brown (7.5YR 3/4 dry); moderate fine crumb structure; hard, friable, slightly sticky, slightly plastic;
II	30-45 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; dark reddish brown (5YR 3/4 dry); weak, fine to coarse crumb structure; soft, very friable, slightly sticky, plastic;
III	30-150 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; strong (7.5YR dry); weak, fine to medium crumb structure; soft, very friable, slightly sticky, plastic;
IV	80-105 cmbs; dark reddish brown (2.5YR 2.5/4 moist); clay loam; strong brown (7.5YR 5/8 dry); weak, fine to medium crumb structure; soft, very friable, sticky, plastic;

PARCEL 7, BT-6 (Figure B-11)

Layer	Description
I	0-35 cmbs; dark brown (7.5YR 3/3 moist); clay loam; dark brown (7.5YR 3/4 dry); moderate fine crumb structure; hard, friable, slightly sticky, slightly plastic;
II	20-45 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; dark reddish brown (5YR 3/4 dry); weak, fine to coarse crumb structure; soft, very friable, slightly sticky, plastic;

III	25-65 cmbs; dark reddish brown (5YR 3/3 moist); silty clay loam; strong (7.5YR dry); weak, fine to medium crumb structure; soft, very friable, slightly sticky, plastic;
IV	60-90 cmbs; dark reddish brown (2.5YR 2.5/4 moist); clay loam; strong brown (7.5YR 5/8 dry); weak, fine to medium crumb structure; soft, very friable, sticky, plastic;
V	100-120 cmbs; dark brown (7.5YR 3/2 moist); clay loam; dark brown (7.5YR 3/3 dry); moderate, fine to medium crumb structure; hard, friable, sticky, plastic;

PARCEL 7, BT-7 (Figure B-12)

Layer	Description
I	0-30 cmbs; dark reddish brown (5YR 3/3 moist); clay loam; dark brown (7.5 YR 3/4 dry); moderate, medium crumb structure; hard, friable, slightly sticky, slightly plastic;
II	10-60 cmbs; dark reddish brown (2.5YR 2.5/4 moist); silty clay loam; strong brown (7.5YR 4/6 dry); weak, medium crumb structure; soft, very friable, slightly sticky, plastic;
III	30-125 cmbs; dark reddish brown (2.5YR 2.5/4 moist); clay loam; strong brown (7.5YR 4/6 dry); moderate, fine to medium crumb structure; hard, very friable, slightly sticky, plastic;

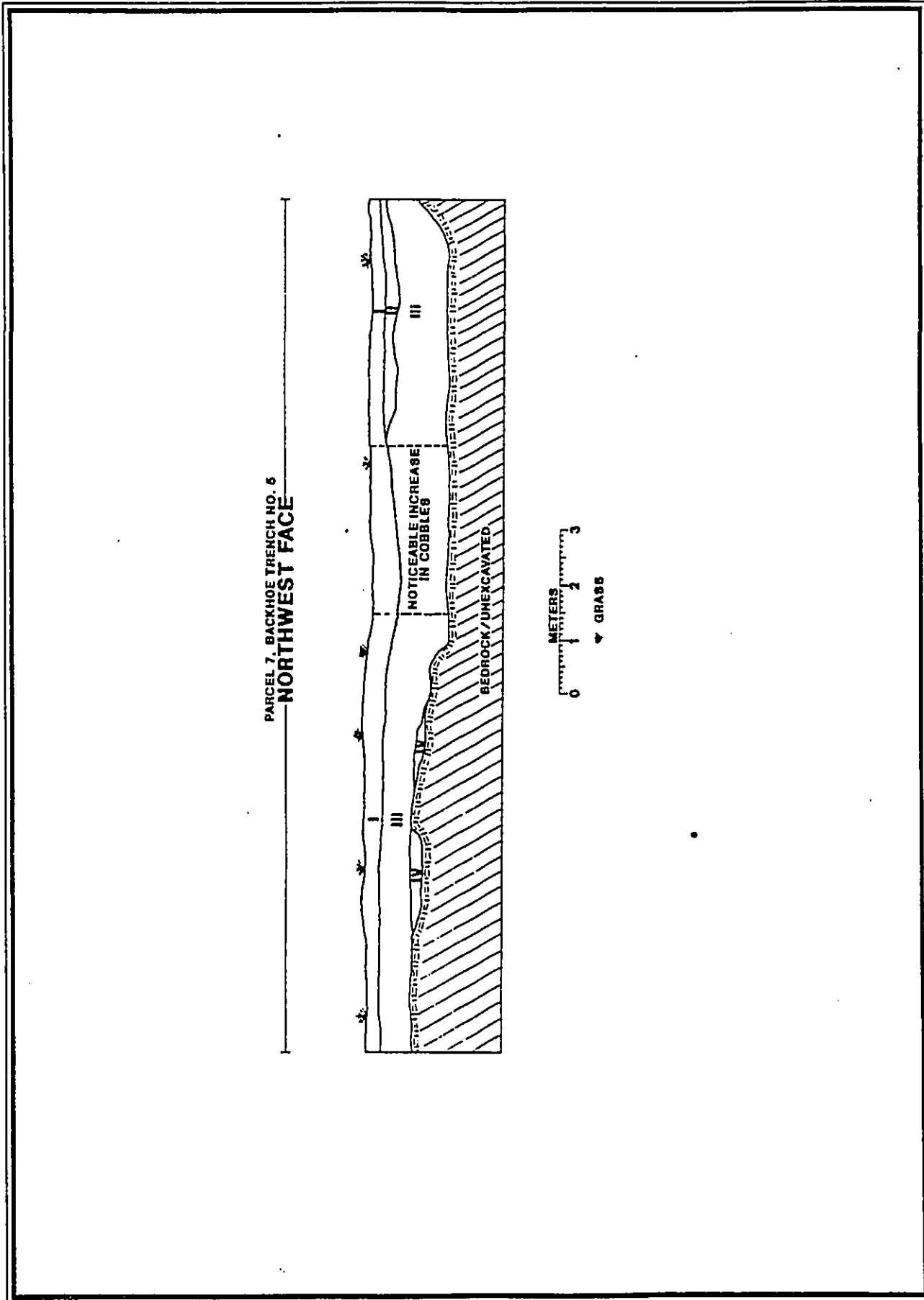


Figure B-10. Stratigraphic Sequence, BT-5, Parcel 7

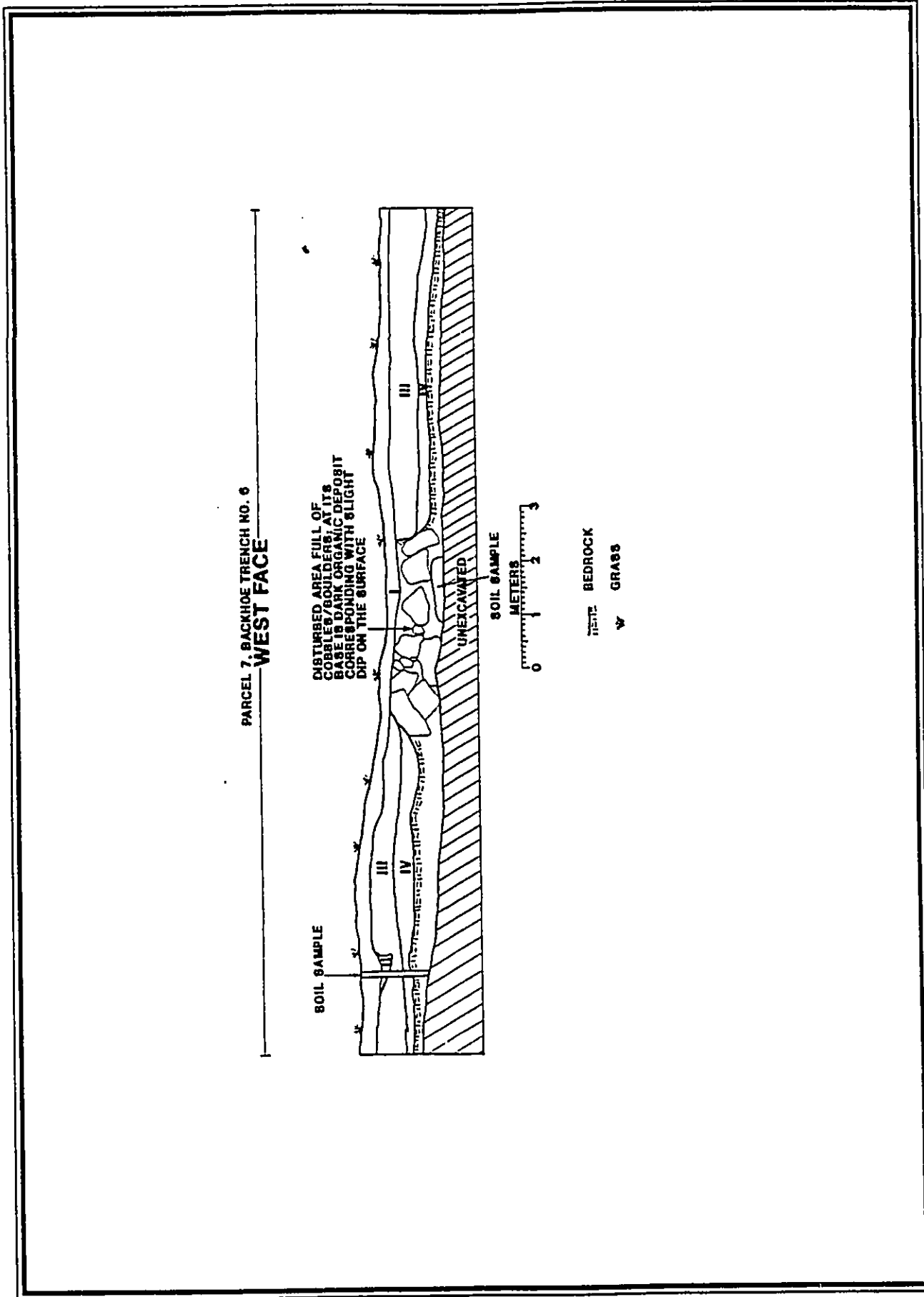


Figure B-II. Stratigraphic Sequence, BT-6, Parcel 7

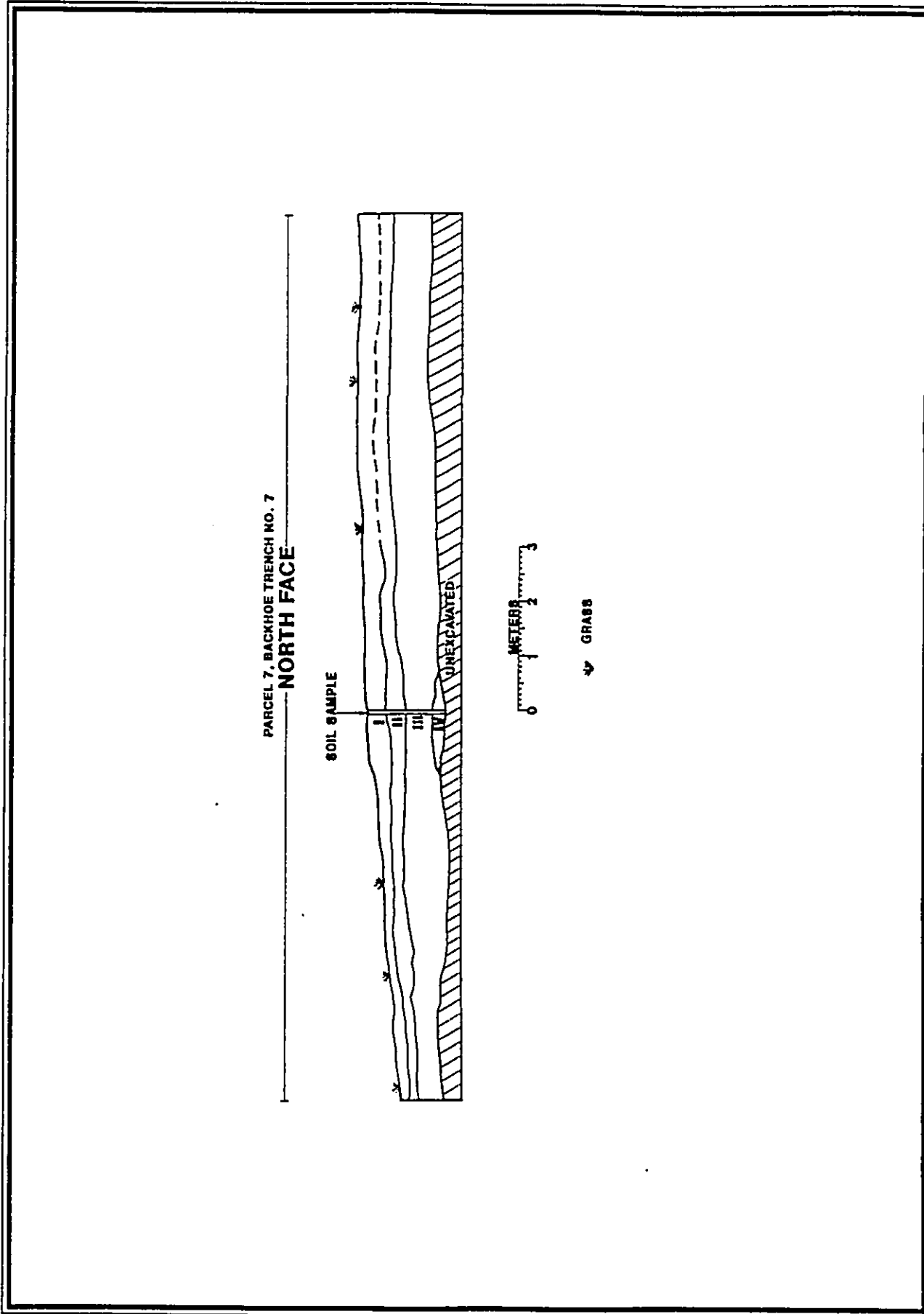


Figure B-12. Stratigraphic Sequence, BT-7, Parcel 7

APPENDIX C

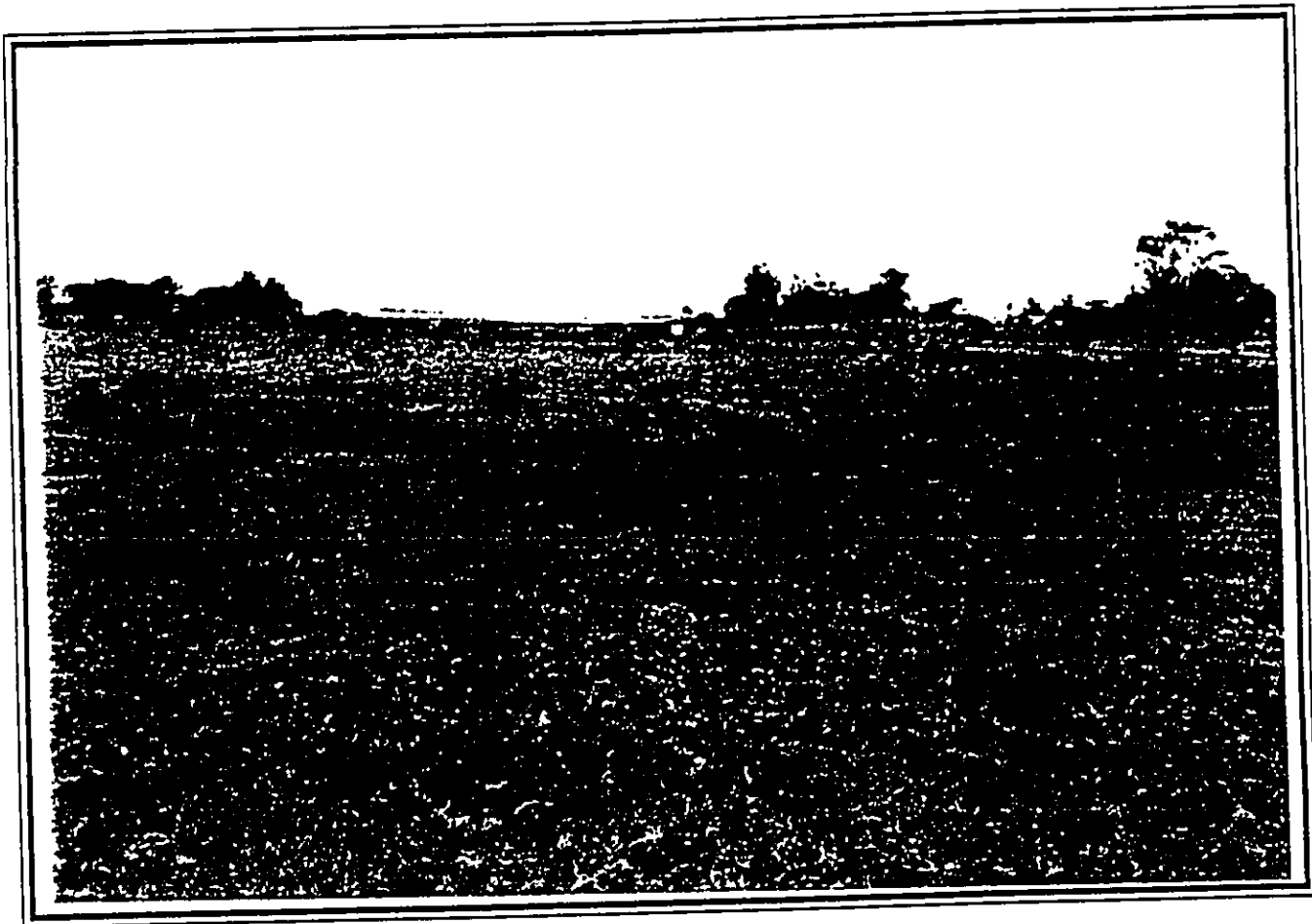


Figure C-1. PARCEL 4, SHOWING 'AUWAI. View to South (Neg.1784-21)

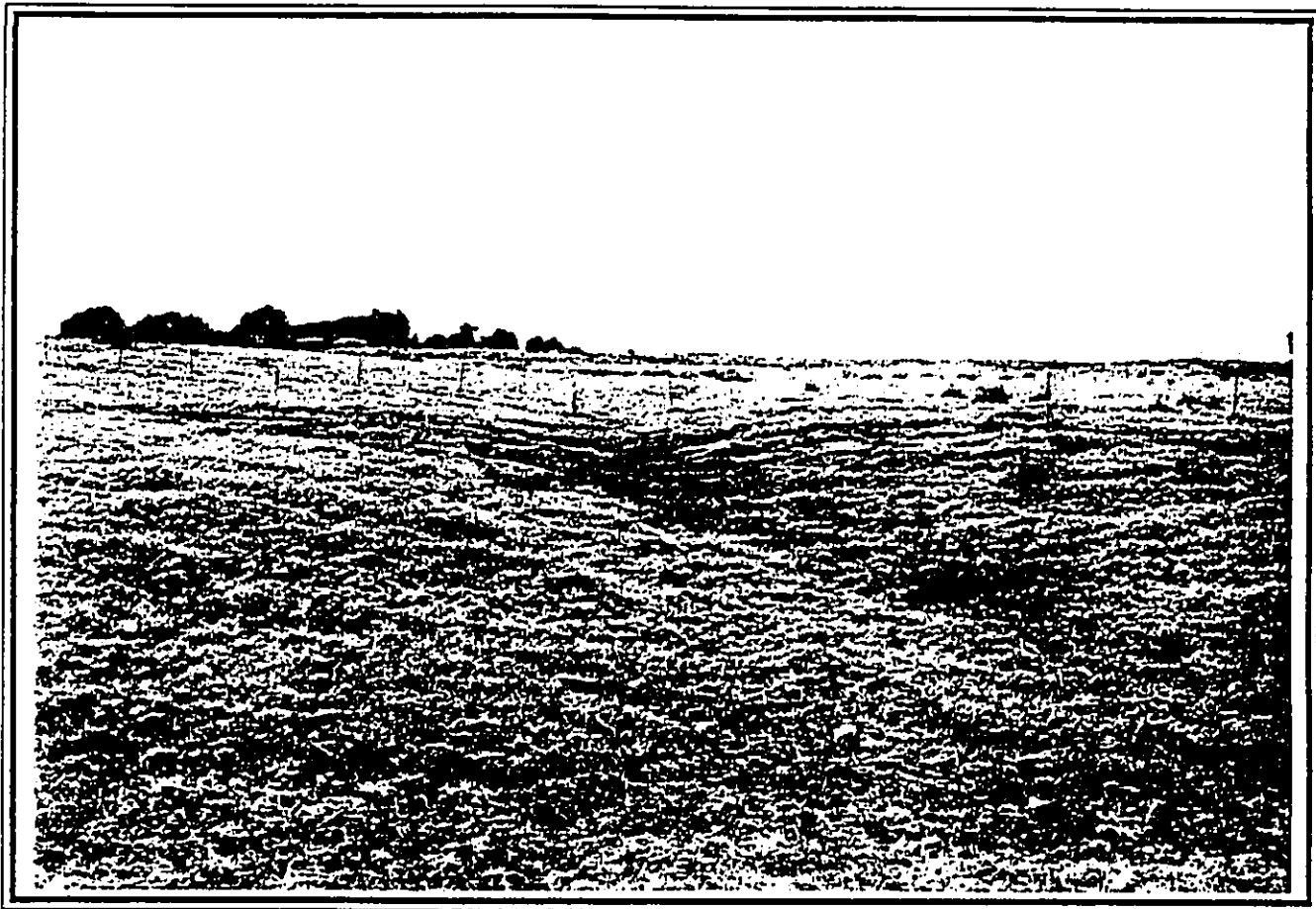


Figure C-2. PARCEL 4, VIEW SOUTHEAST OF 'AUWAI. (Neg. 1784-23)

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APPENDIX C

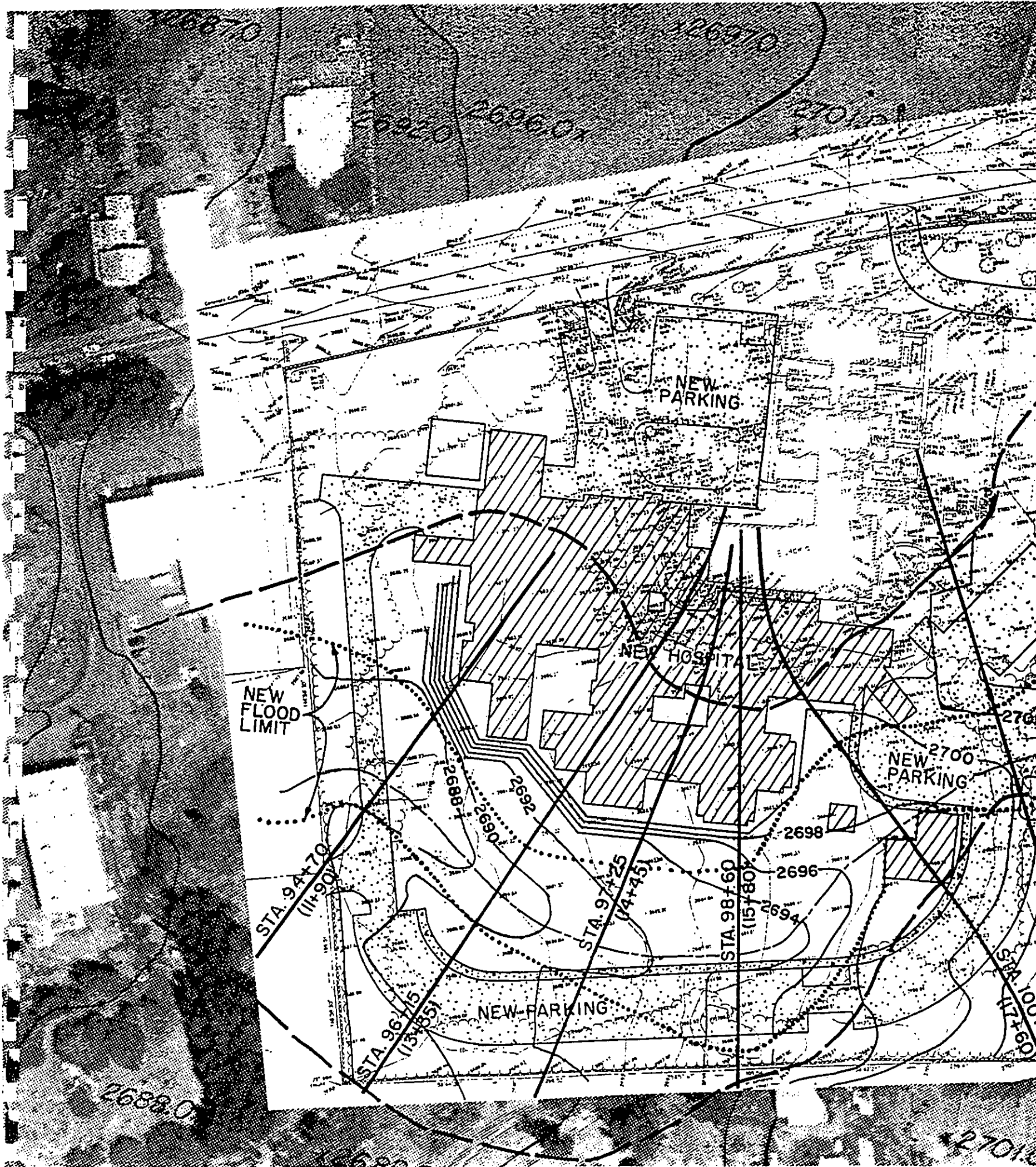
54



Figure C-3. PARCEL 4, FEATURE A IN BACKHOE TRENCH 1. View to S. (Neg.1784-7)

Reduced in
File to be
replaced later

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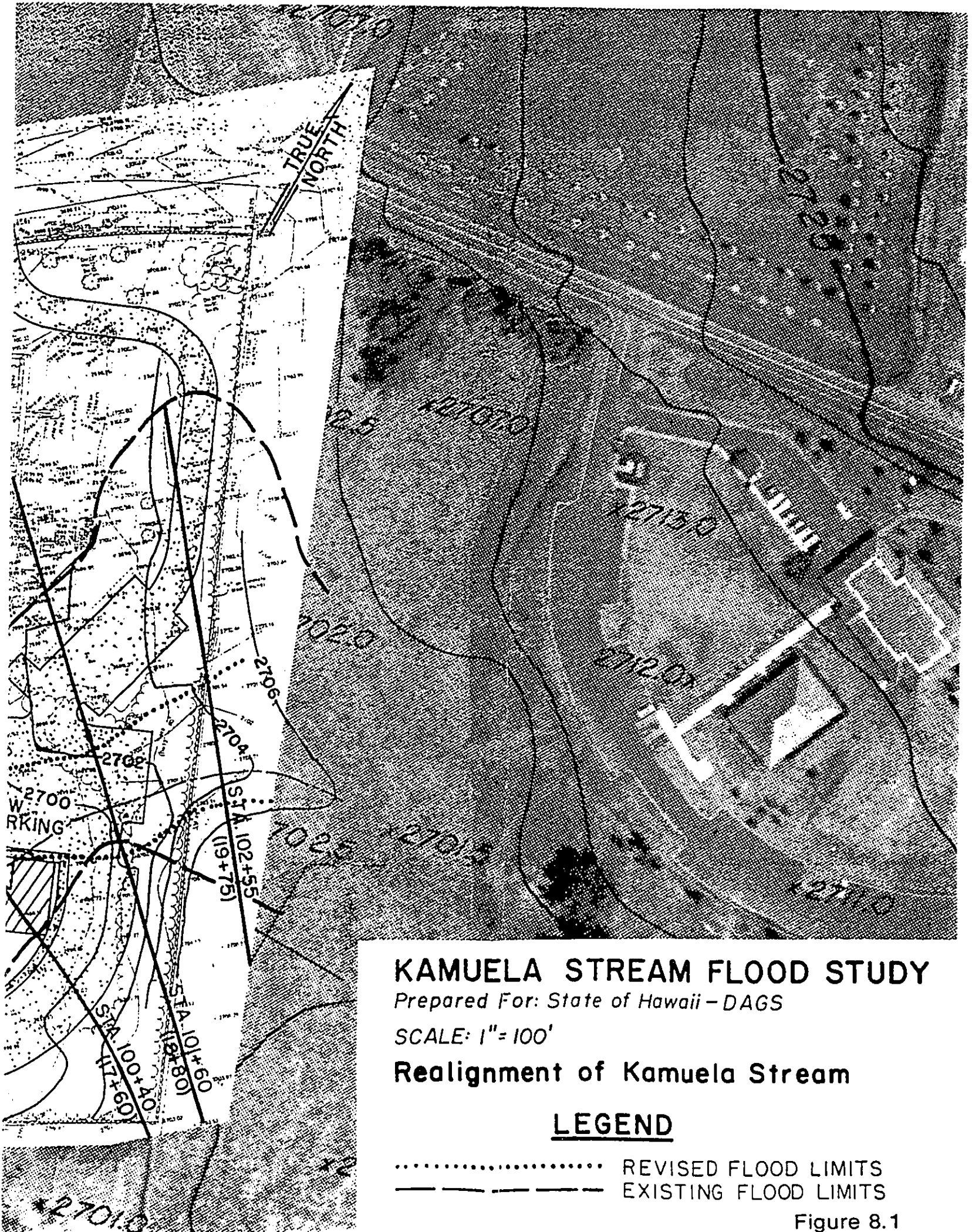
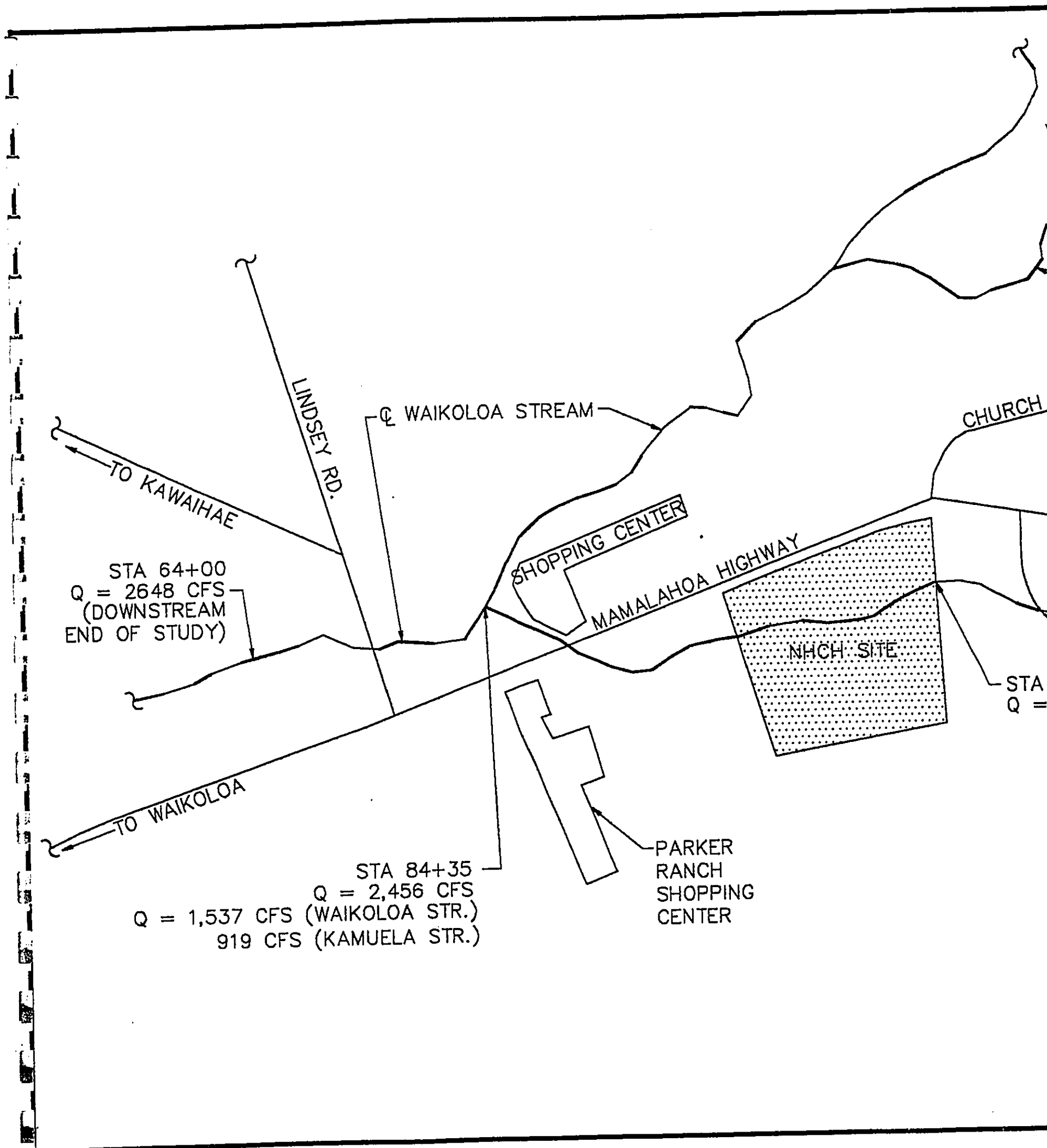


Figure 8.1



LINDSEY RD.

☉ WAIKOLOA STREAM

CHURCH

TO KAWAIHAE

STA 64+00
Q = 2648 CFS
(DOWNSTREAM
END OF STUDY)

SHOPPING CENTER

MAMALAHOA HIGHWAY

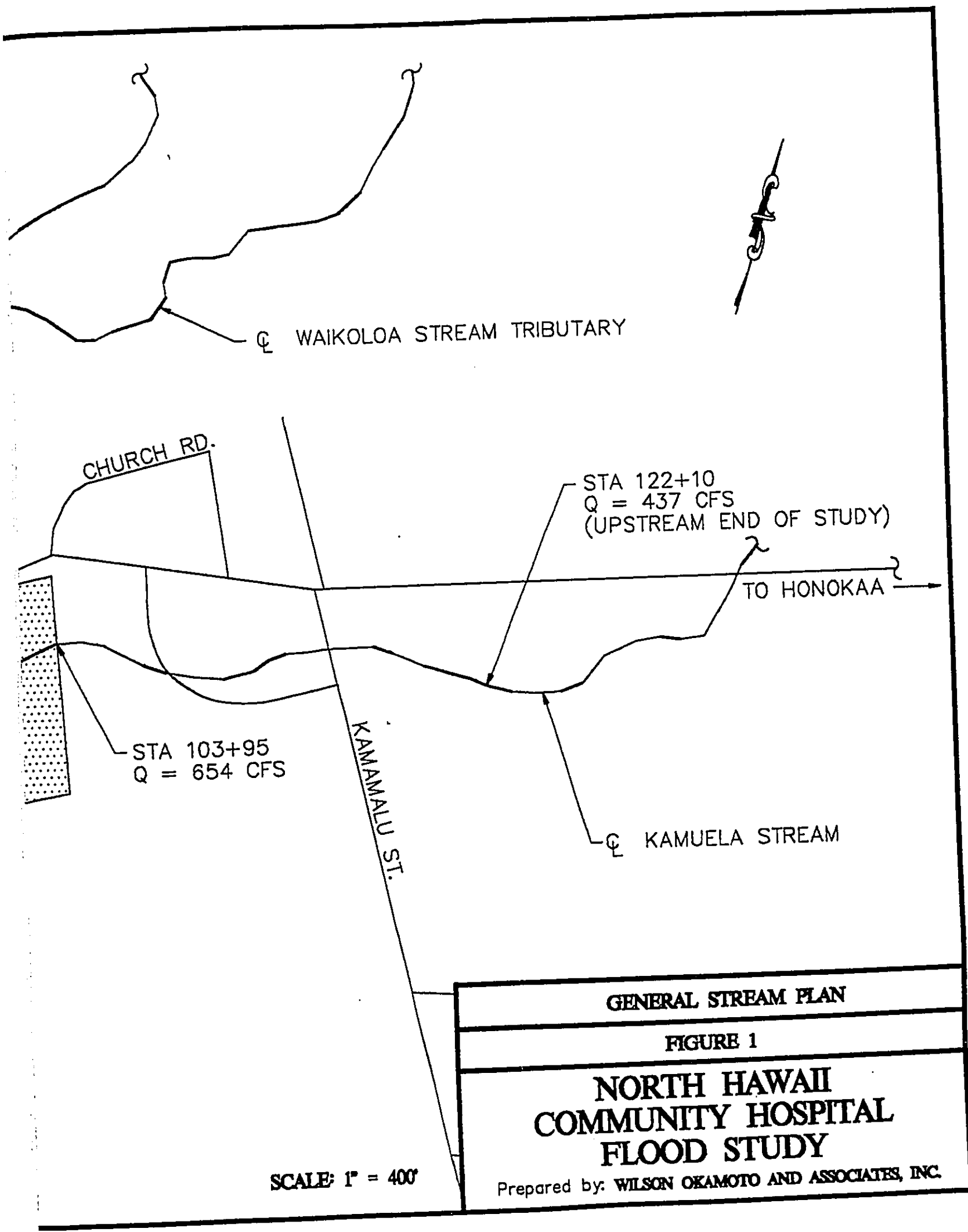
NHCH SITE

STA
Q =

TO WAIKOLOA

STA 84+35
Q = 2,456 CFS
Q = 1,537 CFS (WAIKOLOA STR.)
919 CFS (KAMUELA STR.)

PARKER RANCH SHOPPING CENTER



GENERAL STREAM PLAN
FIGURE 1
NORTH HAWAII
COMMUNITY HOSPITAL
FLOOD STUDY
 Prepared by: **WILSON OKAMOTO AND ASSOCIATES, INC.**

3178-01 NORTH HAWAII COMMUNITY HOSPITAL

TABLE 1 - COMPARISON OF PRESENT STUDY & 1989 STUDY

STATION	Q (CFS)	SUBCRITICAL RUN REGIME (SLOPE3)	SUPERCRITICAL RUN REGIME (SLOPE4)	GOVERNING REGIME	W I D T H (FT)			SUB
					SUB	SUPER	1989	
64+00	3,195	SUBCRITICAL	CRITICAL	SUBCRITICAL	135.56	84.35	135.00	7.47
65+30	3,181	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	129.74	100.66	129.82	8.02
66+90	3,163	CRITICAL	CRITICAL	CRITICAL	835.07	855.41	835.68	6.51
69+20	3,138	SUBCRITICAL	CRITICAL	SUBCRITICAL	1175.79	503.88	1175.53	9.35
70+75	3,121	SUBCRITICAL	CRITICAL	SUBCRITICAL	282.44	169.99	282.14	9.01
71+60	3,112	SUBCRITICAL	CRITICAL	SUBCRITICAL	317.51	256.10	316.89	8.89
72+50	3,102	SUBCRITICAL	CRITICAL	SUBCRITICAL	805.24	403.70	805.17	8.55
73+75	3,089	CRITICAL	CRITICAL	CRITICAL	179.27	180.89	179.36	9.42
76+35	3,061	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	772.60	96.64	772.57	8.30
78+90	3,033	CRITICAL	CRITICAL	CRITICAL	72.45	72.44	72.47	5.90
80+35	3,017	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	66.38	52.06	66.38	7.76
80+50	3,016	SUBCRITICAL	CRITICAL	SUBCRITICAL	35.80	35.77	35.80	6.89
81+10	3,016	SUBCRITICAL	CRITICAL	SUBCRITICAL	35.86	47.46	35.86	8.89
81+25	3,008	SUBCRITICAL	CRITICAL	SUBCRITICAL	51.78	47.45	51.78	8.06
83+45	2,984	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	55.48	53.92	55.48	6.22
85+05	2,461	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	215.61	169.53	215.61	6.54
86+55	2,459	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	101.43	89.36	101.43	6.07
88+10	2,456	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	187.02	141.38	187.02	6.80
89+10	830	CRITICAL	CRITICAL	CRITICAL	482.53	483.16	555.81	0.59
91+60	795	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	133.31	111.65	113.17	2.41
13+10*	735	N/A	N/A	N/A	N/A	N/A	490.76	N/A
15+40*	702	N/A	N/A	N/A	N/A	N/A	307.49	N/A
17+70*	670	N/A	N/A	N/A	N/A	N/A	392.01	N/A
19+00*	651	N/A	N/A	N/A	N/A	N/A	279.78	N/A
21+40*	618	N/A	N/A	N/A	N/A	N/A	157.44	N/A
94+70	753	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	103.45	102.31	N/A	1.62
96+15	733	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	84.84	80.95	N/A	2.25
97+25	718	CRITICAL	CRITICAL	CRITICAL	120.87	138.86	N/A	2.25
98+60	700	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	165.39	78.53	N/A	2.04
100+40	675	CRITICAL	CRITICAL	CRITICAL	111.79	111.71	N/A	2.55
101+60	659	SUBCRITICAL	SUPERCRITICAL	SUPERCRITICAL	145.37	94.83	N/A	2.17
102+55	650	CRITICAL	CRITICAL	CRITICAL	108.10	108.34	N/A	1.62
107+30	588	SUBCRITICAL	CRITICAL	SUBCRITICAL	80.52	69.22	68.73	3.68
109+20	561	SUBCRITICAL	SUPERCRITICAL	SUBCRITICAL	32.19	27.45	33.04	3.44
111+00	536	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	41.38	34.11	41.28	3.45
111+95	523	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	24.81	22.16	24.82	2.65
112+05	521	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	334.14	301.33	317.77	9.73
112+53	521	CRITICAL	CRITICAL	CRITICAL	266.14	266.14	266.14	9.47
112+63	513	SUBCRITICAL	CRITICAL	SUBCRITICAL	232.33	38.52	232.33	9.79
115+90	467	SUBCRITICAL	CRITICAL	SUBCRITICAL	48.42	31.49	48.51	5.74
118+00	437	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	19.63	16.15	19.63	4.91
119+50	416	CRITICAL	CRITICAL	CRITICAL	33.82	33.92	33.82	3.65
121+30	391	CRITICAL	SUPERCRITICAL	SUPERCRITICAL	128.43	87.90	128.43	1.31
122+10	380	CRITICAL	CRITICAL	CRITICAL	335.80	335.65	335.80	0.37

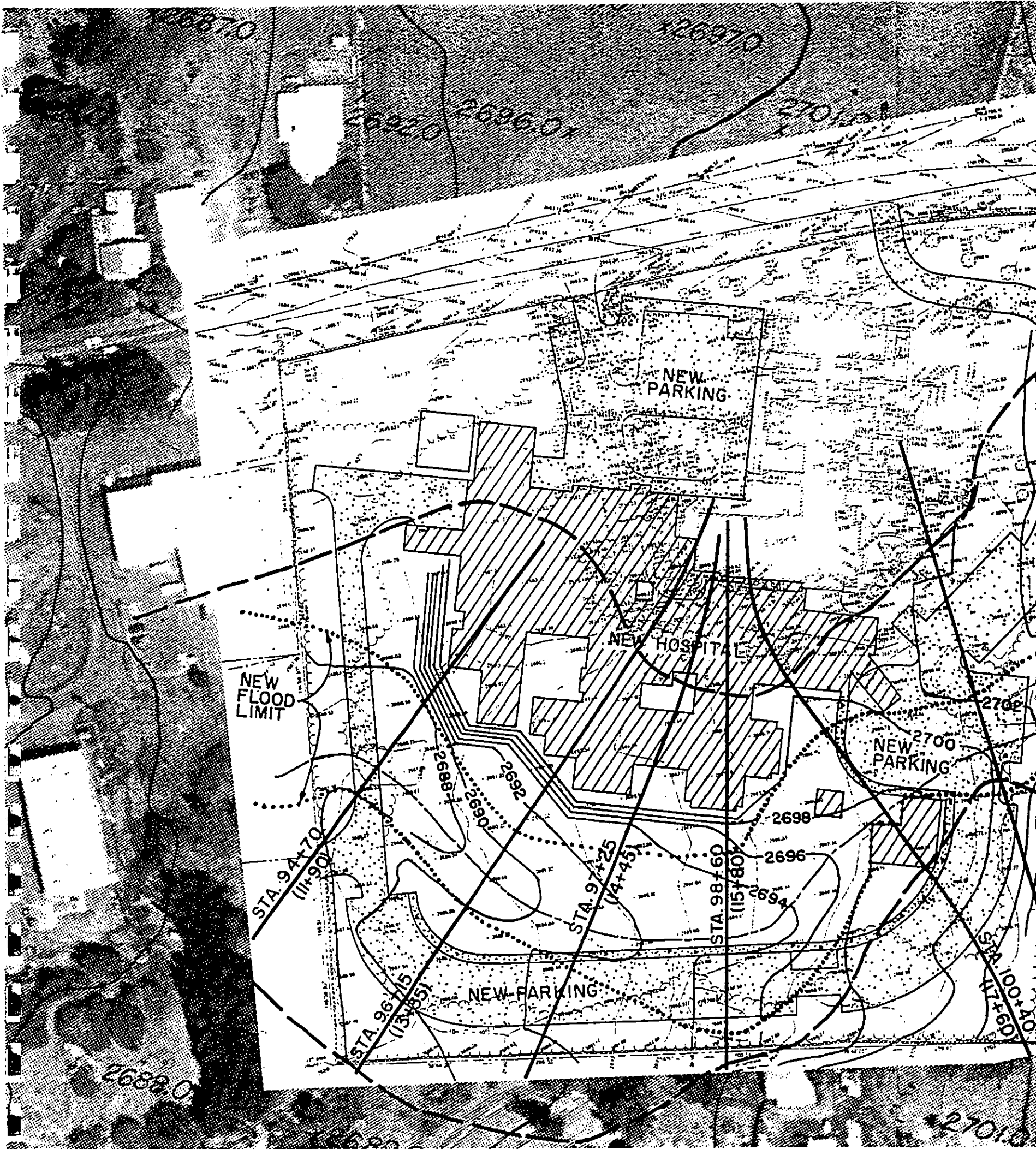
* RESULTS FROM FEMA'S 1989 KAMUELA FLOOD STUDY. SHOWN FOR INFORMATION ONLY.
1989 STUDY WAS BASED ON SUBCRITICAL RUN ONLY.

WAIKOLOA STREAM STATIONING USED FOR KAMUELA STREAM TO RETAIN CONTINUITY.

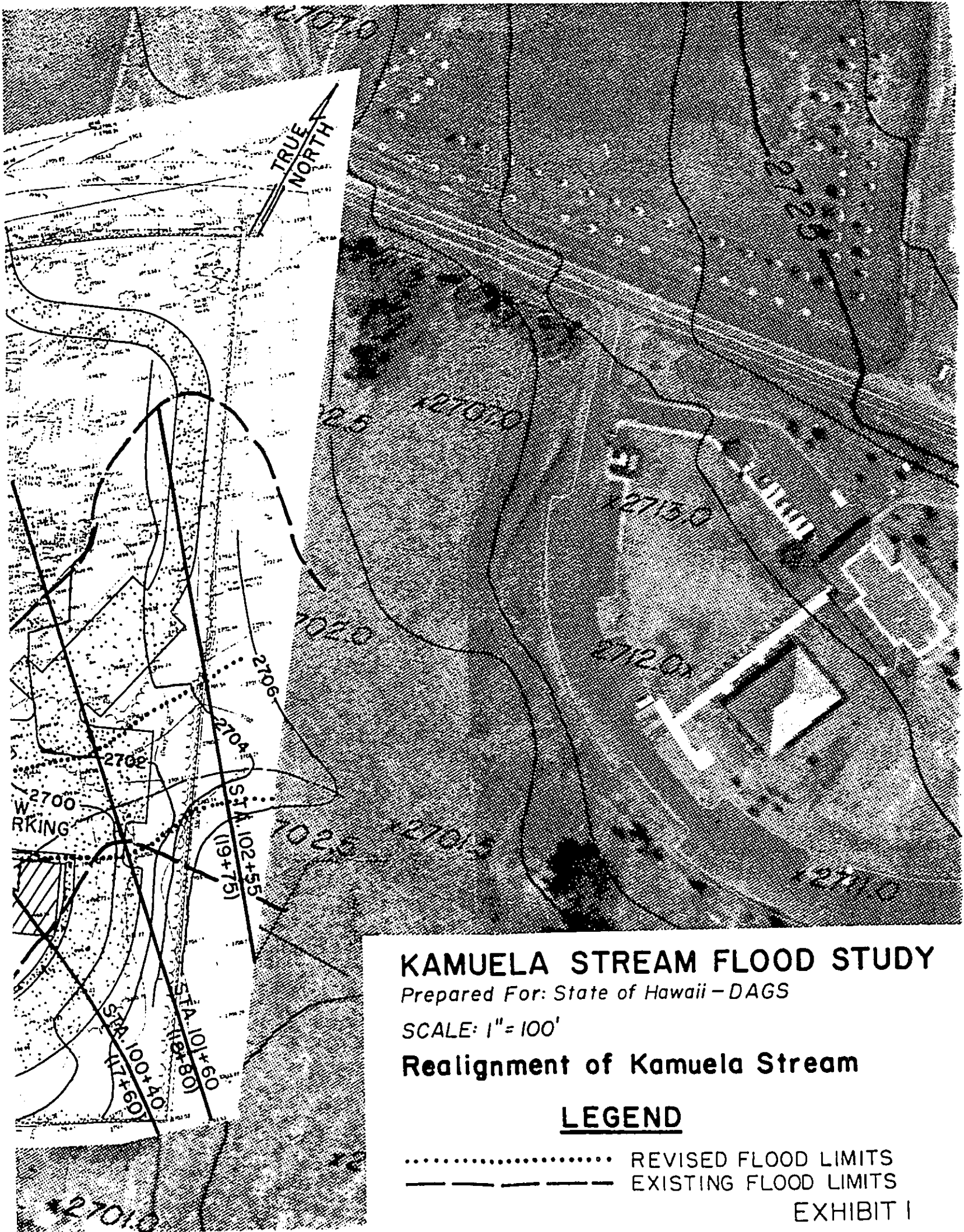
OCTOBER 29, 1993-

1989	DEPTH (FT)		1989	VELOCITY (FT/SEC)			COMMENTS	
	SUB	SUPER		SUB	SUPER	1989		
135.00	7.47	6.23	7.47	7.59	10.86	7.62	WAIKOLOA STREAM	
129.82	8.02	7.98	8.02	8.54	9.98	8.51		
835.68	6.51	6.58	6.51	6.44	6.00	6.43		
1175.53	9.35	8.91	9.35	3.37	5.65	3.37		
282.14	9.01	8.26	9.01	6.25	8.74	6.21		
316.89	8.89	7.82	8.88	4.27	7.38	4.29		
805.17	8.55	8.10	8.55	3.20	5.90	3.21		
179.36	9.42	9.45	9.42	8.38	8.27	8.37		
772.57	8.30	7.93	8.30	3.41	14.21	3.41		
72.47	5.90	5.90	5.90	11.12	11.12	11.11		
66.38	7.76	3.83	7.76	7.45	17.44	7.45		
35.80	6.89	6.04	6.89	12.25	13.99	12.26		
35.86	8.89	5.53	8.89	9.49	12.75	9.49		
51.78	8.06	5.53	8.06	8.31	12.74	8.31		
55.48	6.22	5.26	6.22	12.09	15.35	12.09		
215.61	6.54	6.14	6.54	9.25	10.76	9.25		
101.43	6.07	5.46	6.07	9.20	11.73	9.20		
187.02	6.80	6.10	6.80	9.08	12.19	9.08		
555.81	0.59	0.59	1.10	4.39	4.35	2.01		KAMUELA STR. 6+30
113.17	2.41	1.93	1.96	4.88	6.78	6.61		KAMUELA STR. 8+80
490.76	N/A	N/A	0.48	N/A	N/A	3.90		~WAIKOLOA STR. 97+45
307.49	N/A	N/A	0.93	N/A	N/A	4.59		~WAIKOLOA STR. 99+75
392.01	N/A	N/A	0.49	N/A	N/A	3.95		~WAIKOLOA STR. 102+05
279.78	N/A	N/A	0.99	N/A	N/A	3.50		~WAIKOLOA STR. 103+35
157.44	N/A	N/A	2.20	N/A	N/A	3.57		~WAIKOLOA STR. 105+75
N/A	1.62	1.50	N/A	6.22	6.93	N/A		KAMUELA STR. 11+90
N/A	2.25	1.89	N/A	6.78	8.95	N/A		KAMUELA STR. 13+35
N/A	2.25	2.32	N/A	5.77	7.07	N/A		KAMUELA STR. 14+45
N/A	2.04	1.46	N/A	5.12	10.18	N/A		KAMUELA STR. 15+80
N/A	2.55	2.55	N/A	7.05	7.06	N/A		KAMUELA STR. 17+60
N/A	2.17	1.42	N/A	3.72	7.56	N/A		KAMUELA STR. 18+80
N/A	1.62	1.63	N/A	5.84	5.76	N/A		KAMUELA STR. 19+75
68.73	3.68	3.31	3.29	6.04	7.47	7.39		KAMUELA STR. 23+50
33.04	3.44	2.49	3.62	7.62	12.37	7.09		KAMUELA STR. 25+40
41.28	3.45	2.84	3.44	7.51	11.05	7.55		KAMUELA STR. 27+20
24.82	2.65	1.19	2.65	8.82	20.89	8.81		KAMUELA STR. 28+15
317.77	9.73	9.60	9.67	6.43	7.67	7.50		KAMUELA STR. 28+25
266.14	9.47	9.47	9.47	6.69	6.69	6.69		KAMUELA STR. 28+73
232.33	9.79	2.31	9.79	0.76	7.58	0.76		KAMUELA STR. 28+83
48.51	5.74	2.92	5.75	2.71	7.87	2.70		KAMUELA STR. 32+10
19.63	4.91	4.04	4.91	9.07	13.41	9.07		KAMUELA STR. 34+20
33.82	3.65	3.66	3.65	7.43	7.39	7.43		KAMUELA STR. 35+70
128.43	1.31	0.90	0.37	4.65	9.92	4.65		KAMUELA STR. 37+50
335.80	0.37	0.37	0.37	3.38	3.39	3.38		KAMUELA STR. 38+30

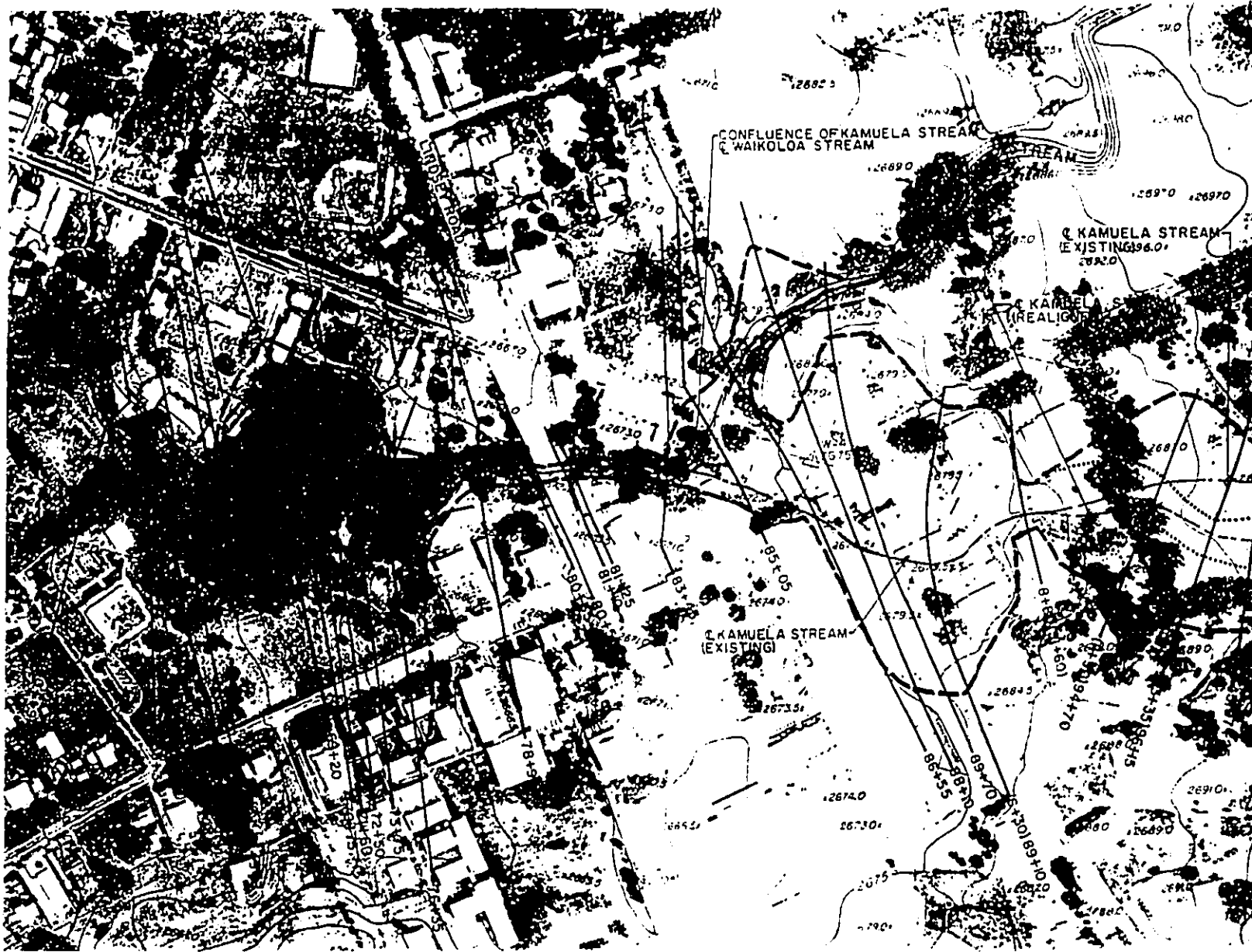
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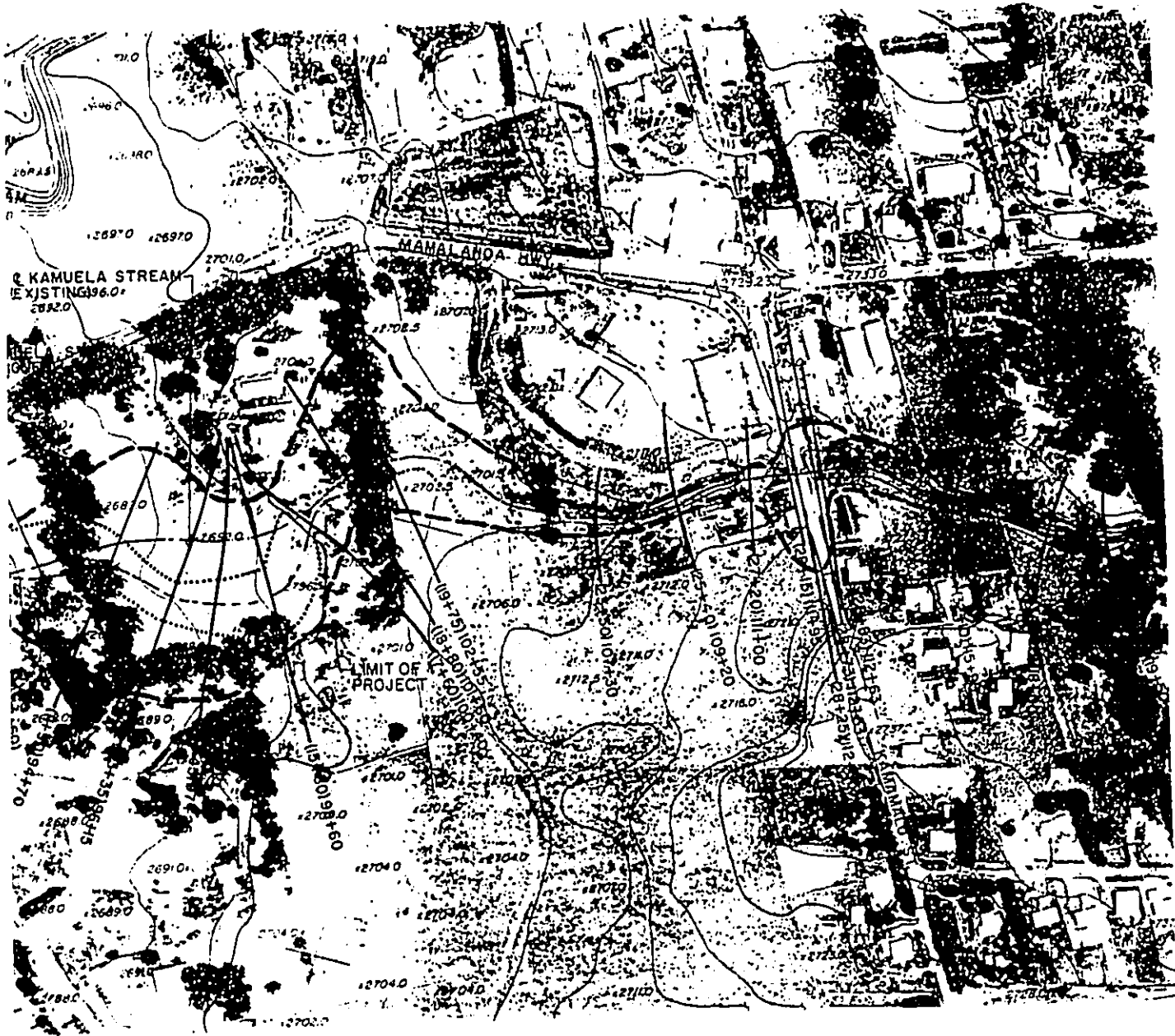
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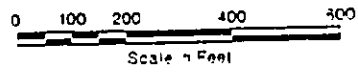


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KAMUELA STREAM FLOOD STUDY

Prepared For: State of Hawaii - DAGS



Realignment of Kamuela Stream

LEGEND

- REVISED FLOOD LIMITS
- EXISTING FLOOD LIMITS

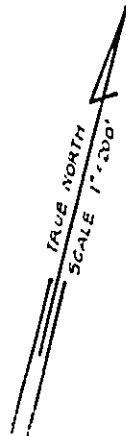
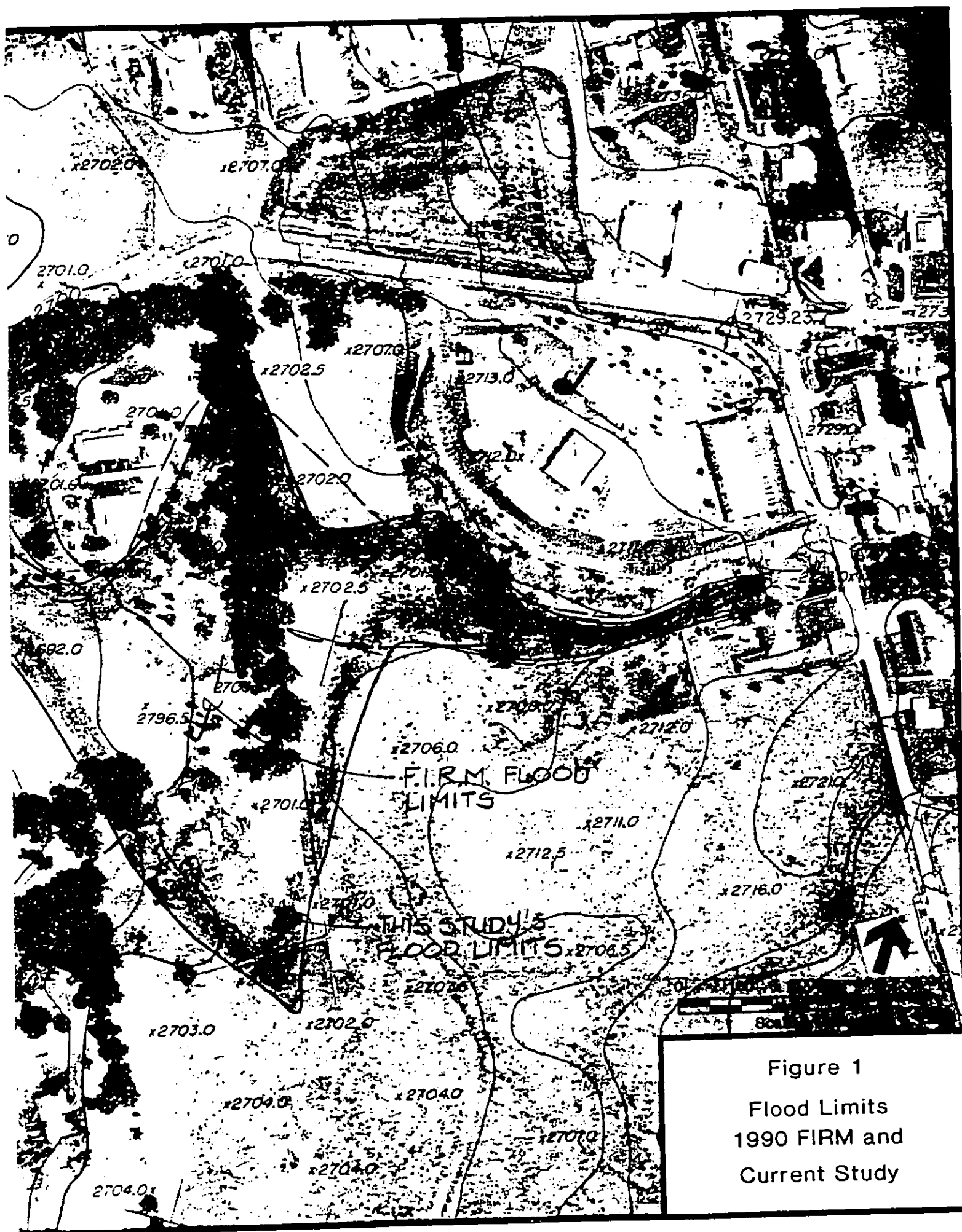


Exhibit 2

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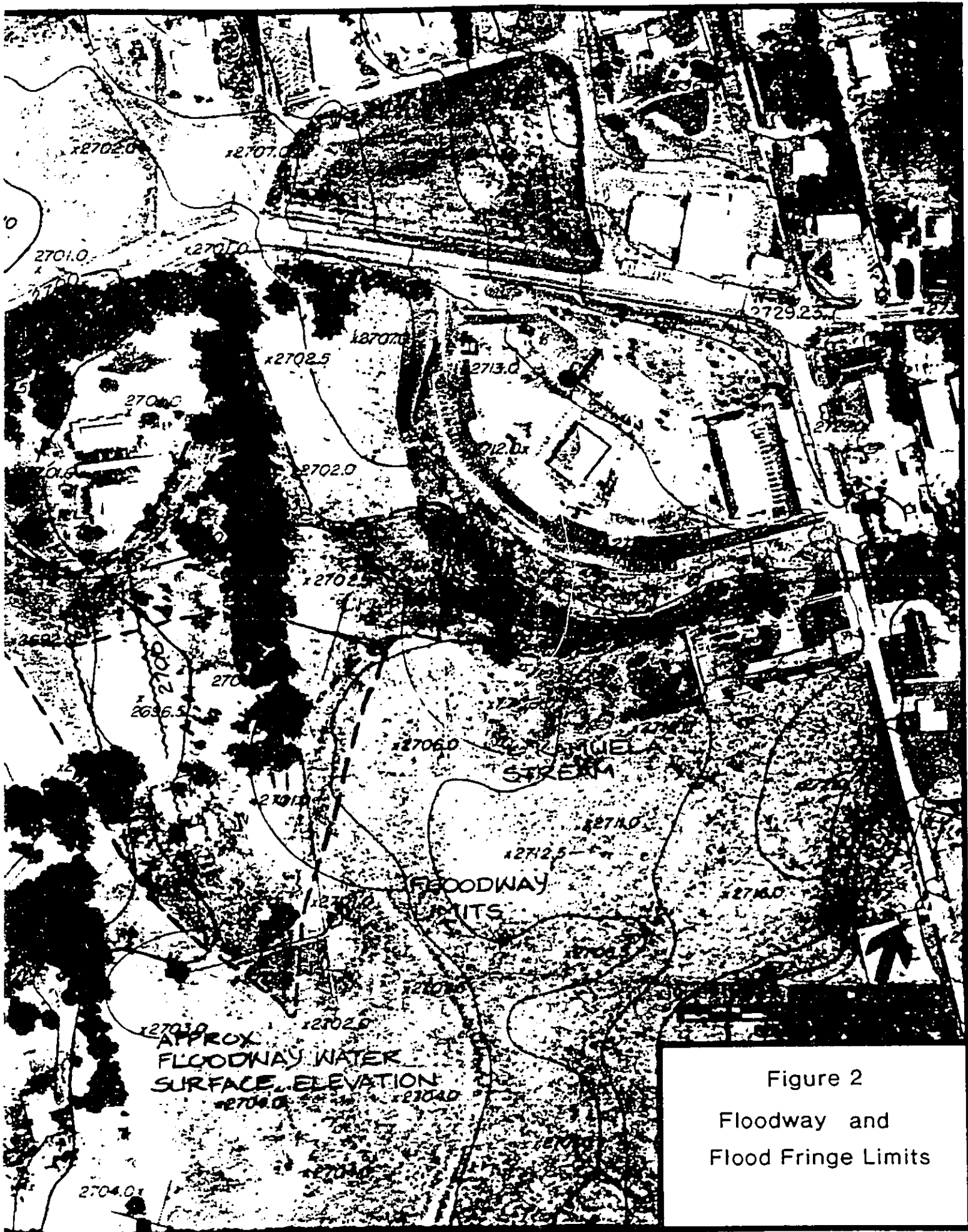


Figure 2
Floodway and
Flood Fringe Limits

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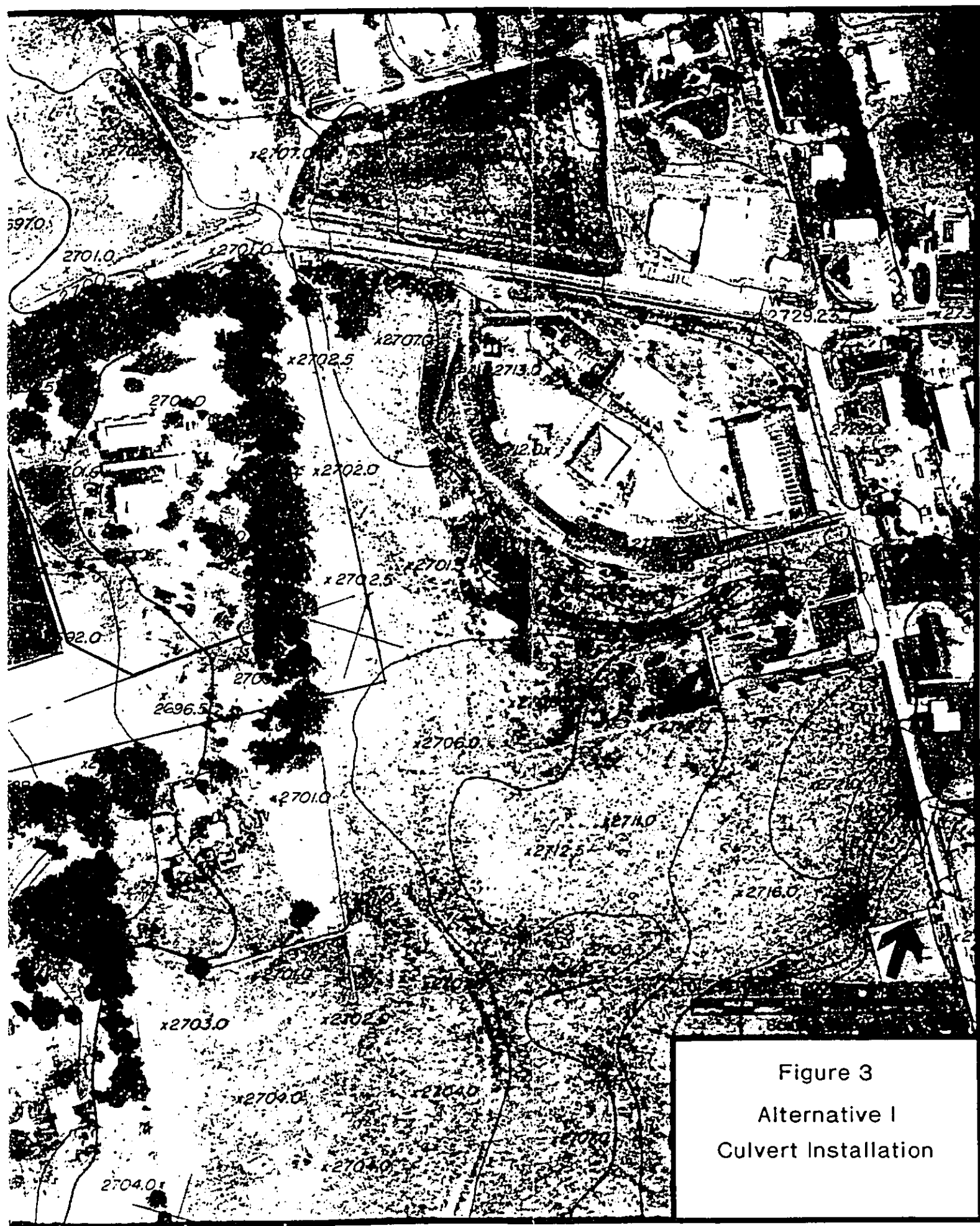


Figure 3
Alternative I
Culvert Installation

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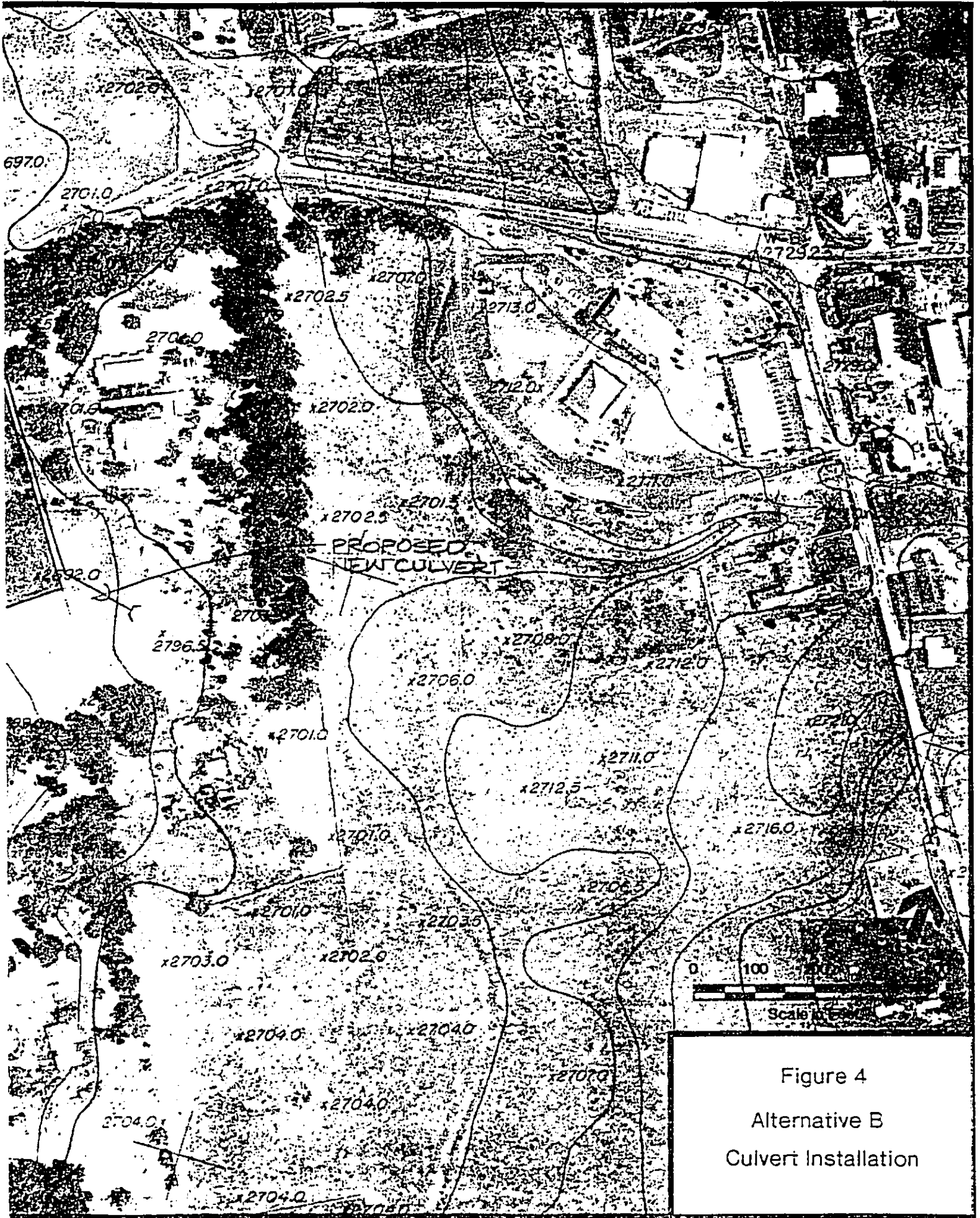


Figure 4
Alternative B
Culvert Installation

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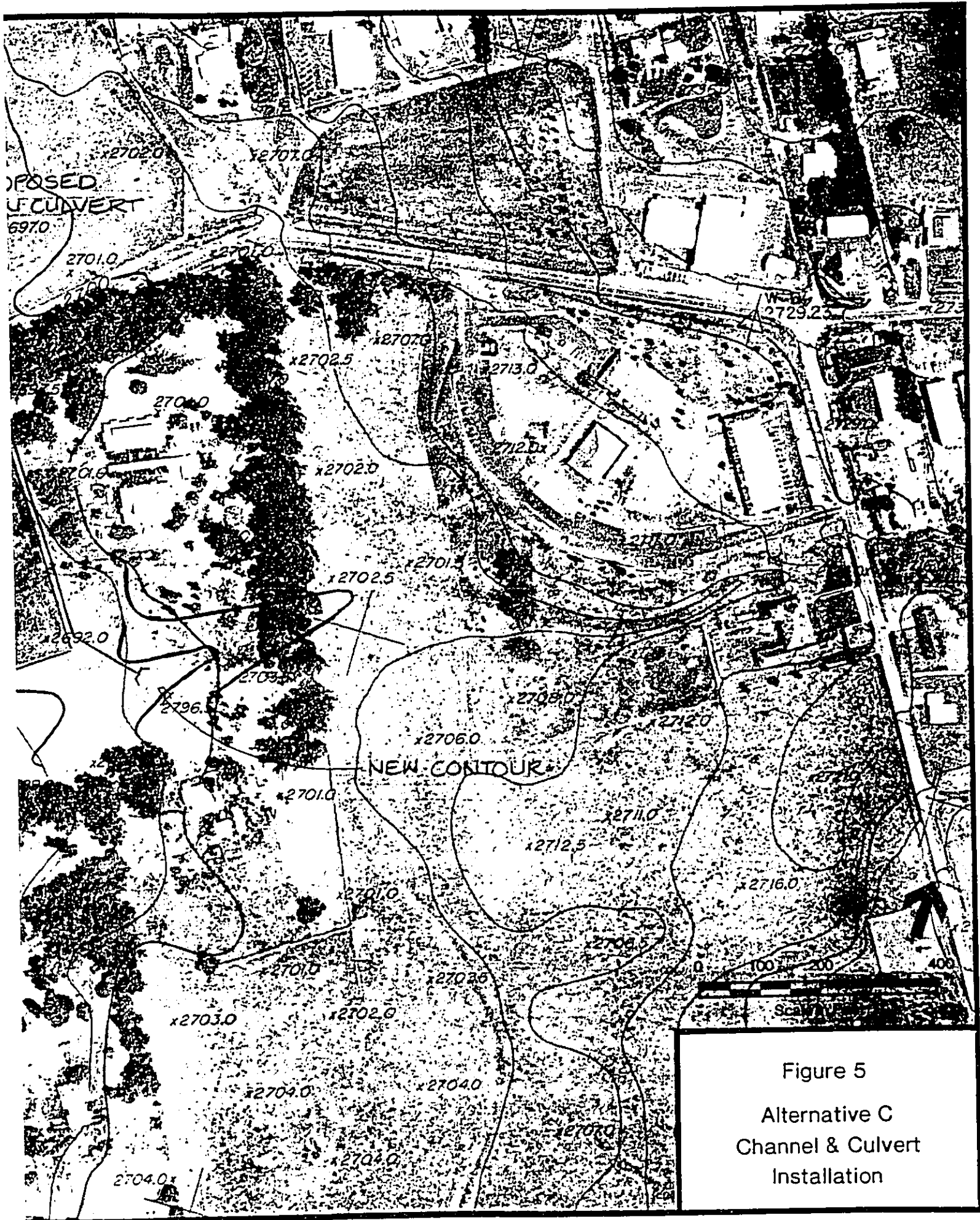
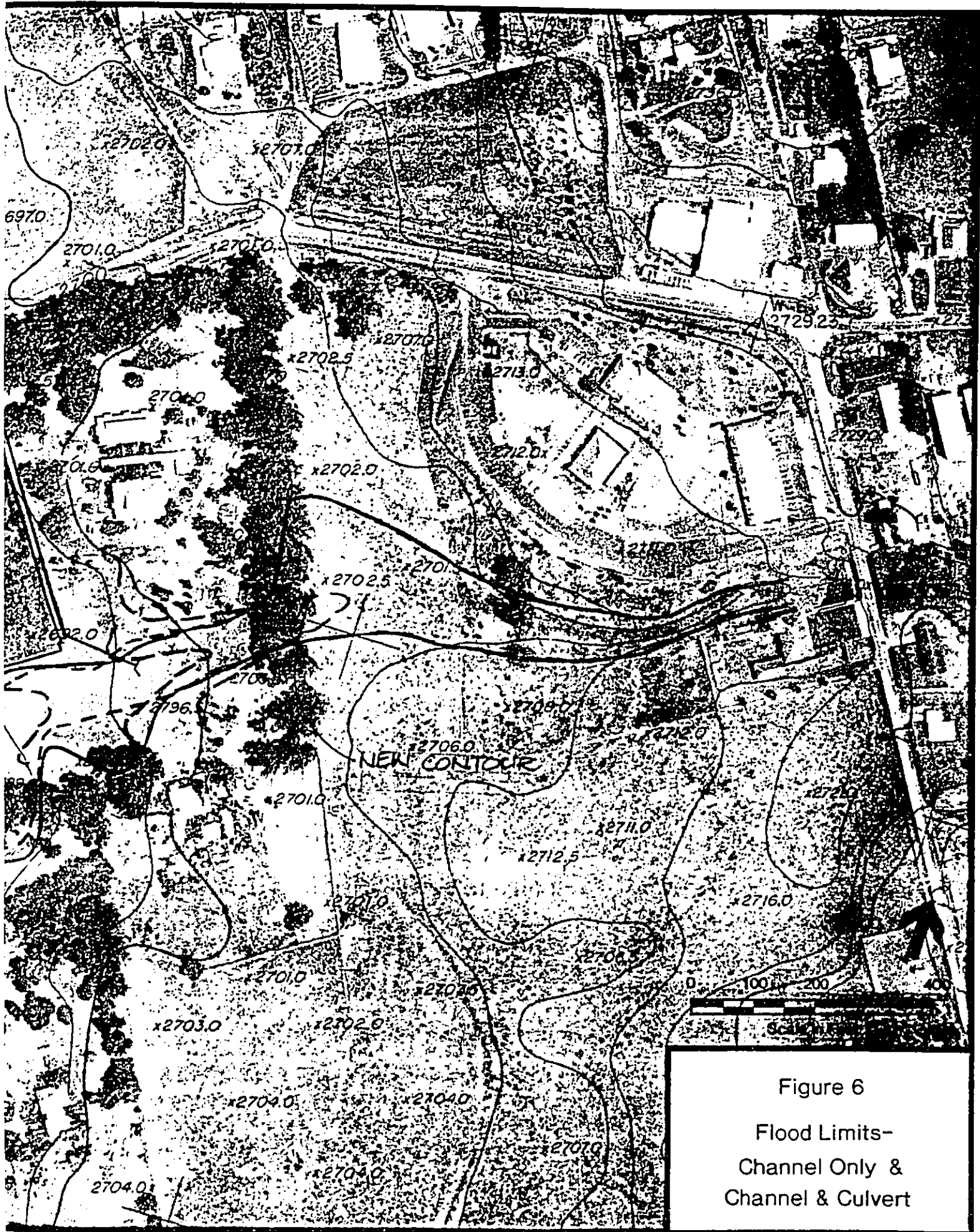


Figure 5
Alternative C
Channel & Culvert
Installation

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INTRODUCTION

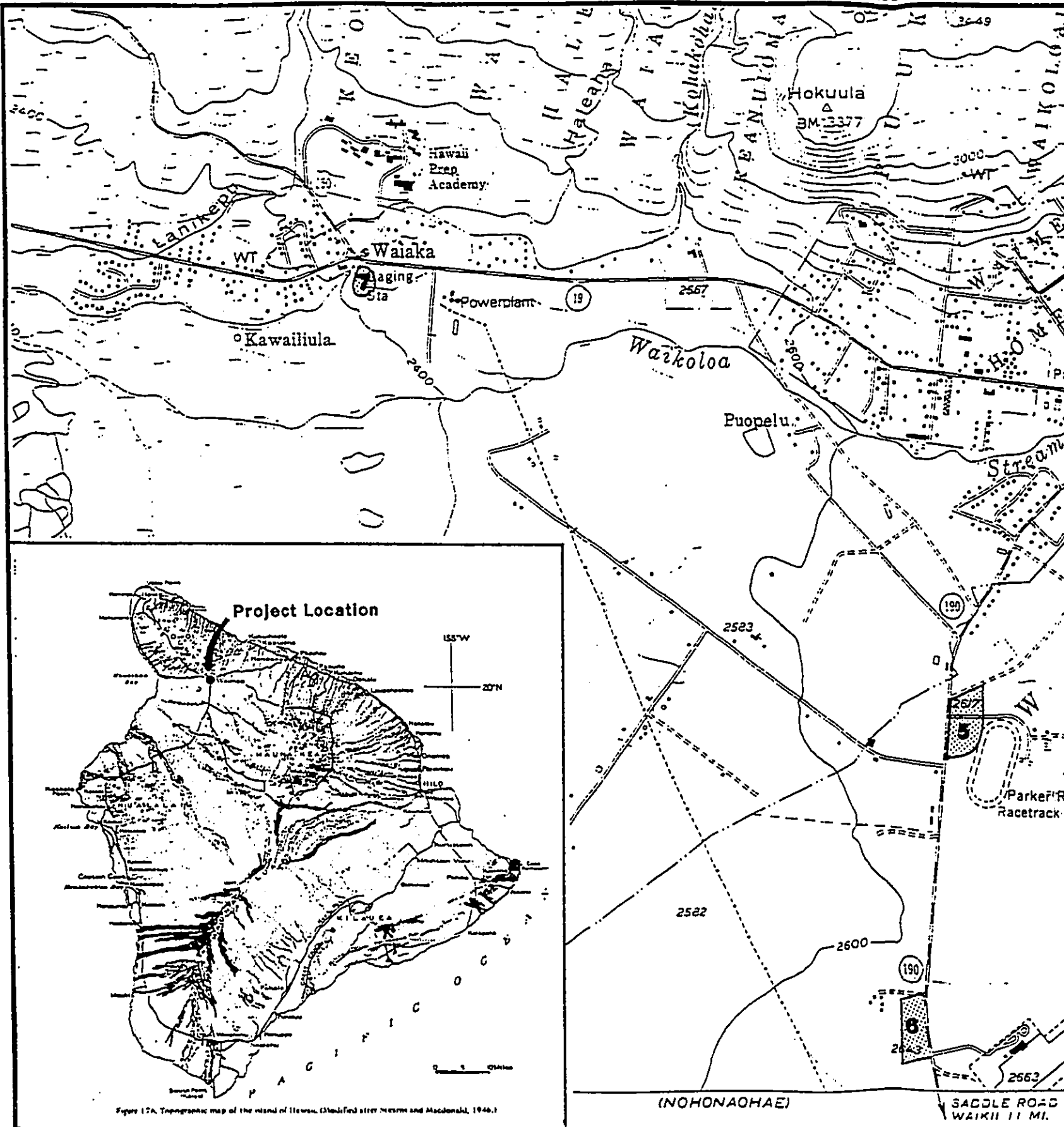
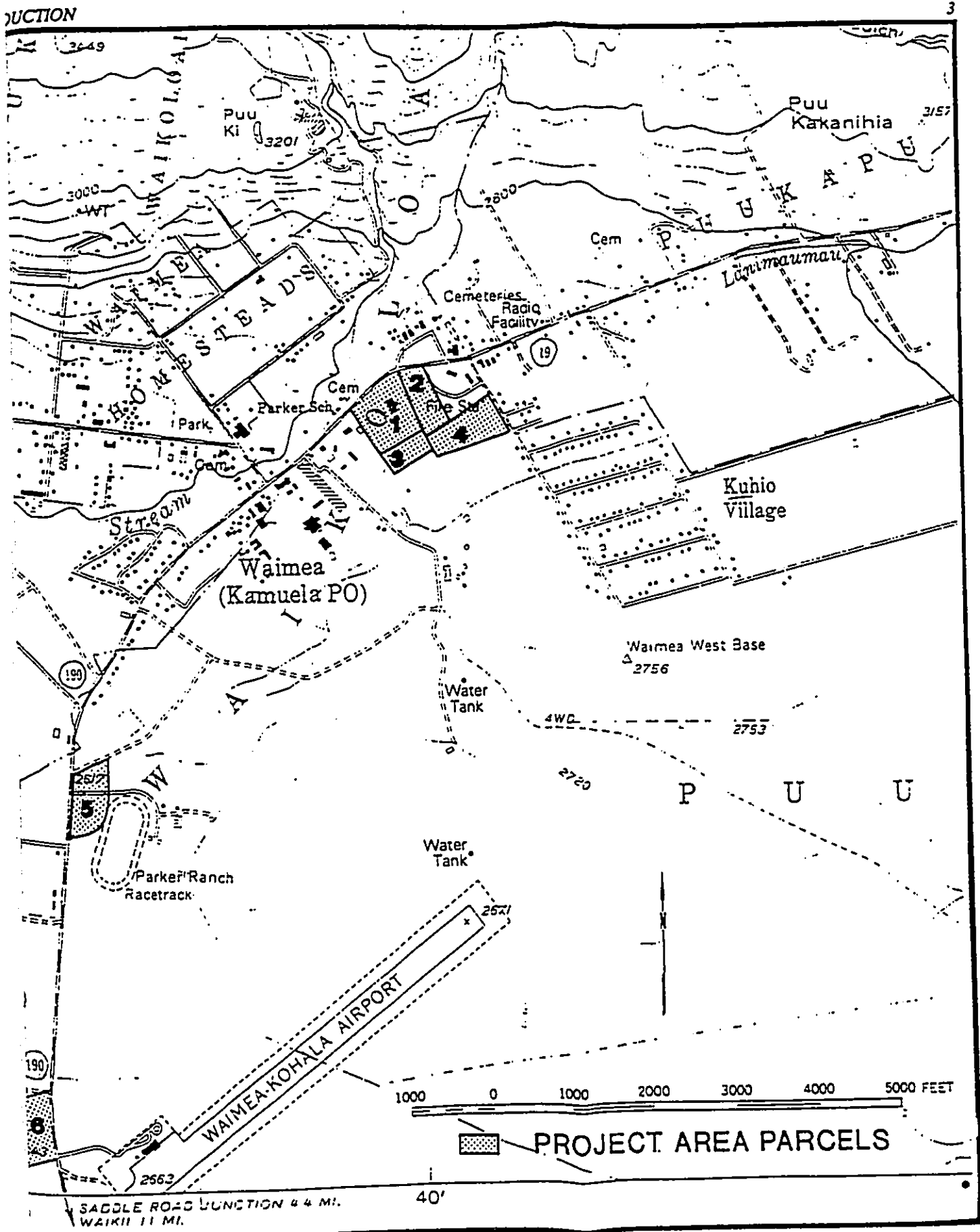


Figure 1. Project Area Location Map

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Area Location Map

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905-092391

INTRODUCTION

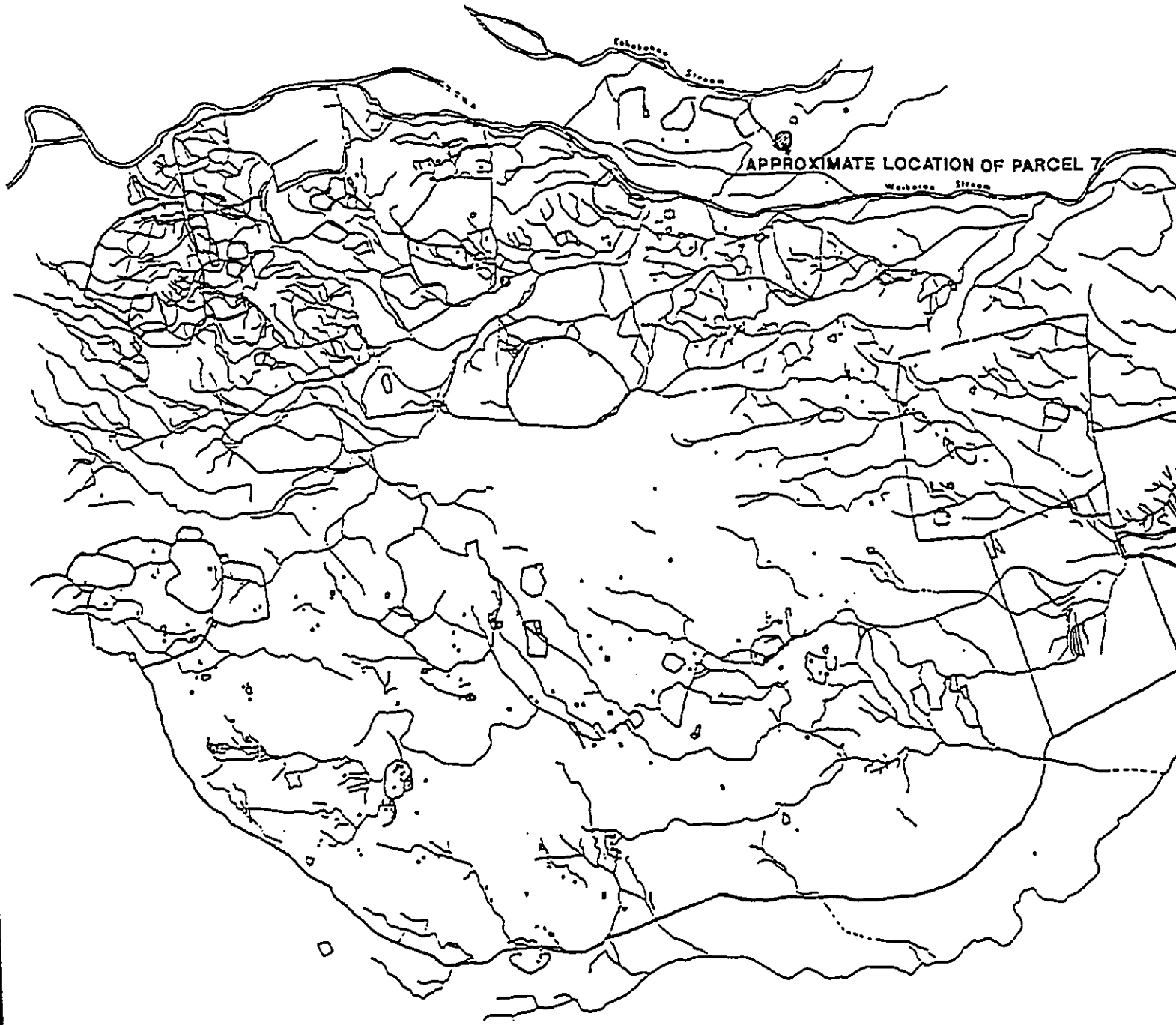
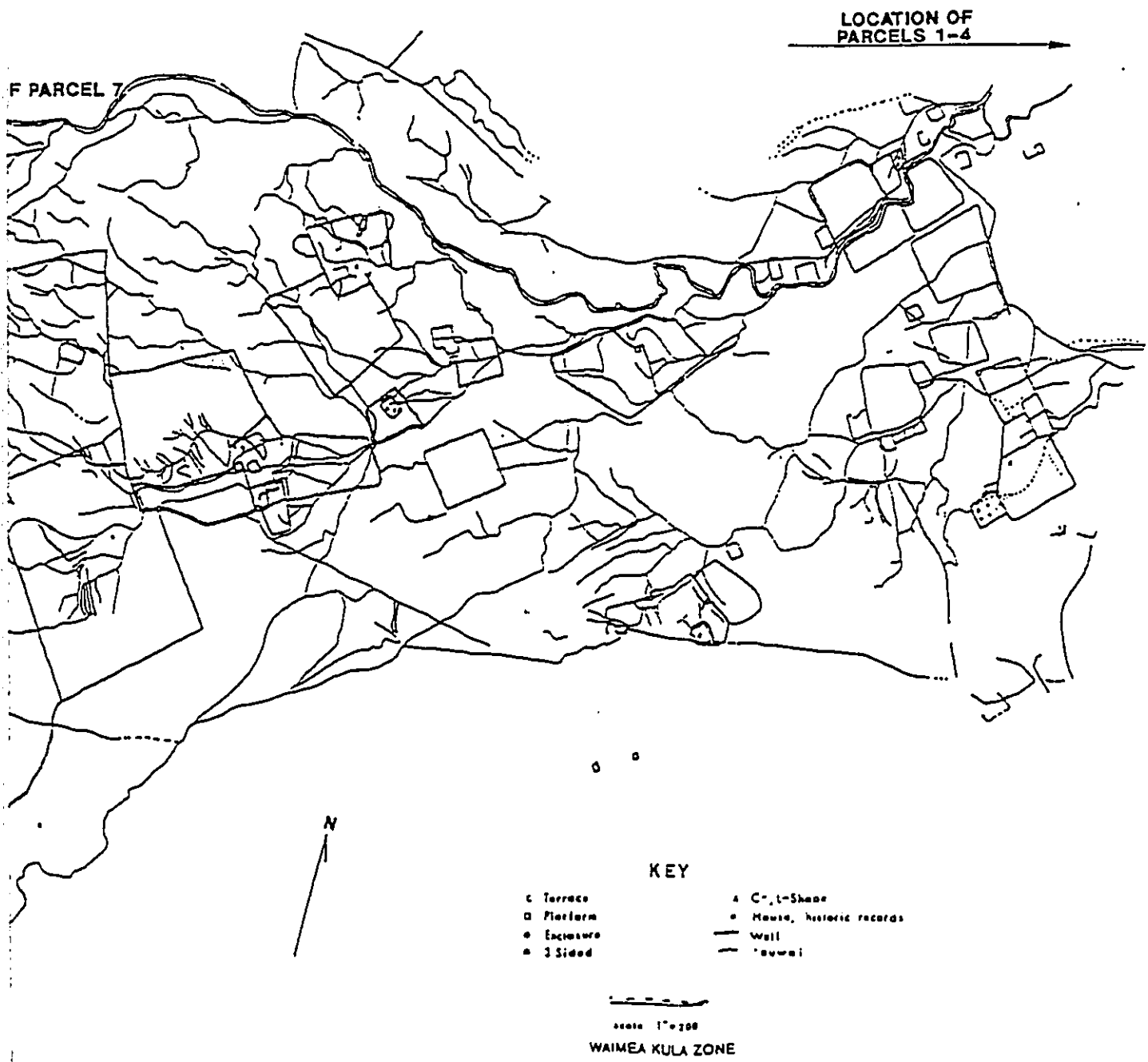


Figure 2. Copy of Waimea Kula Zone map (From Clar

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RODUCTION

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map (From Clark 1987; fig.10.1)

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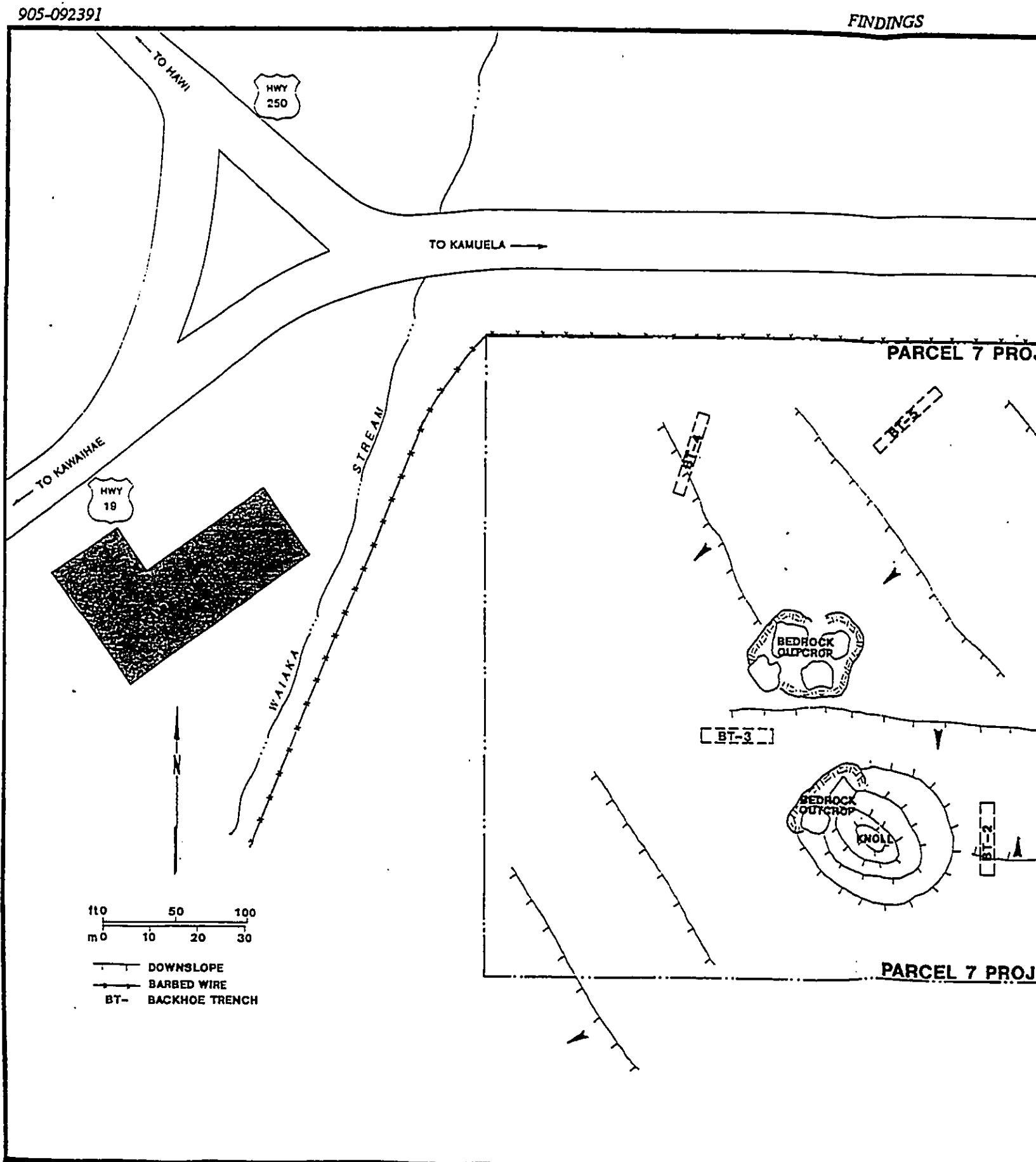


Figure 5. Project Area and Subsurface Testing Locations

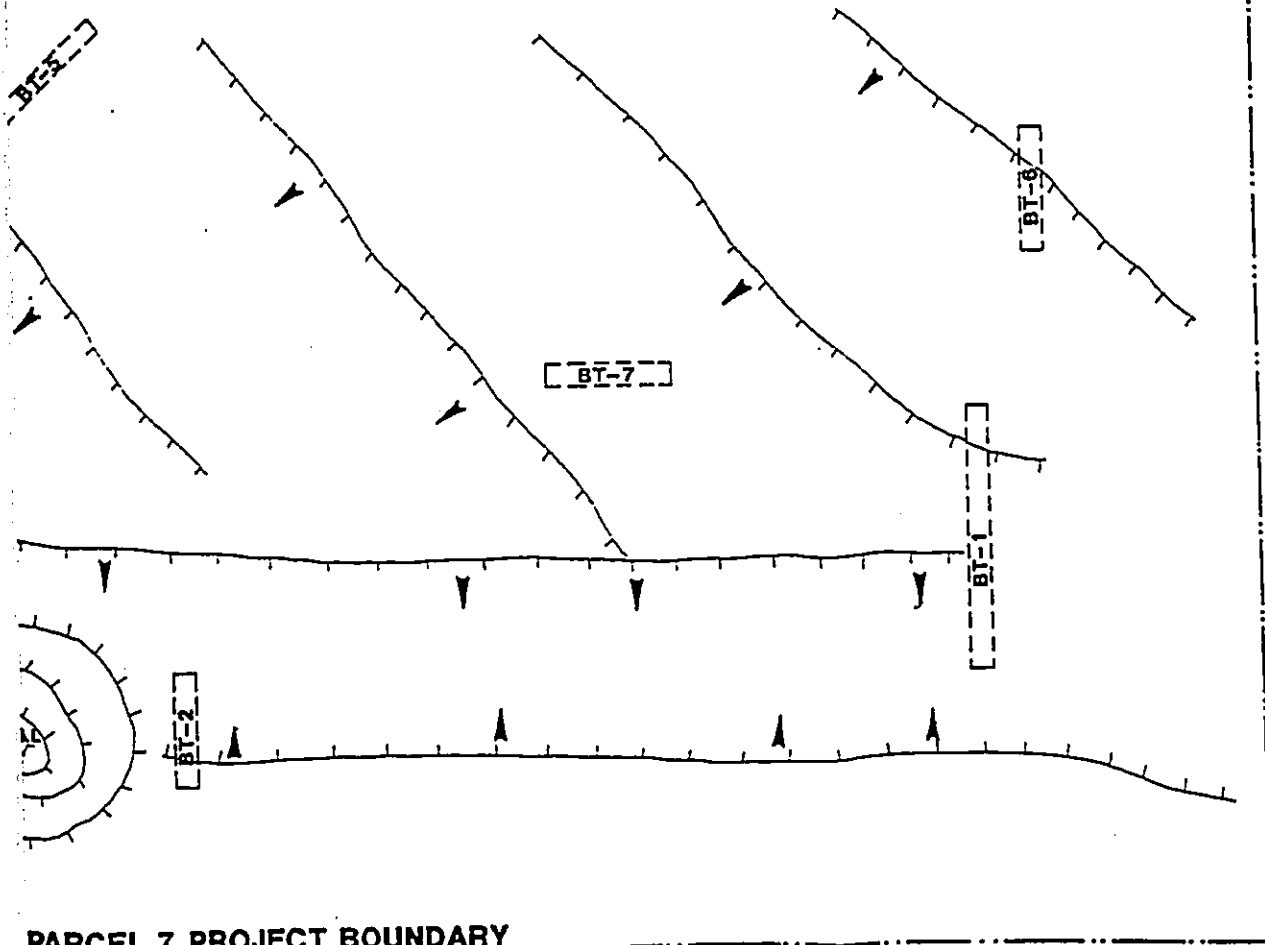
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PARCEL 7 PROJECT BOUNDARY



bsurface Testing Location Map (Parcel 7)

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APPENDIX A

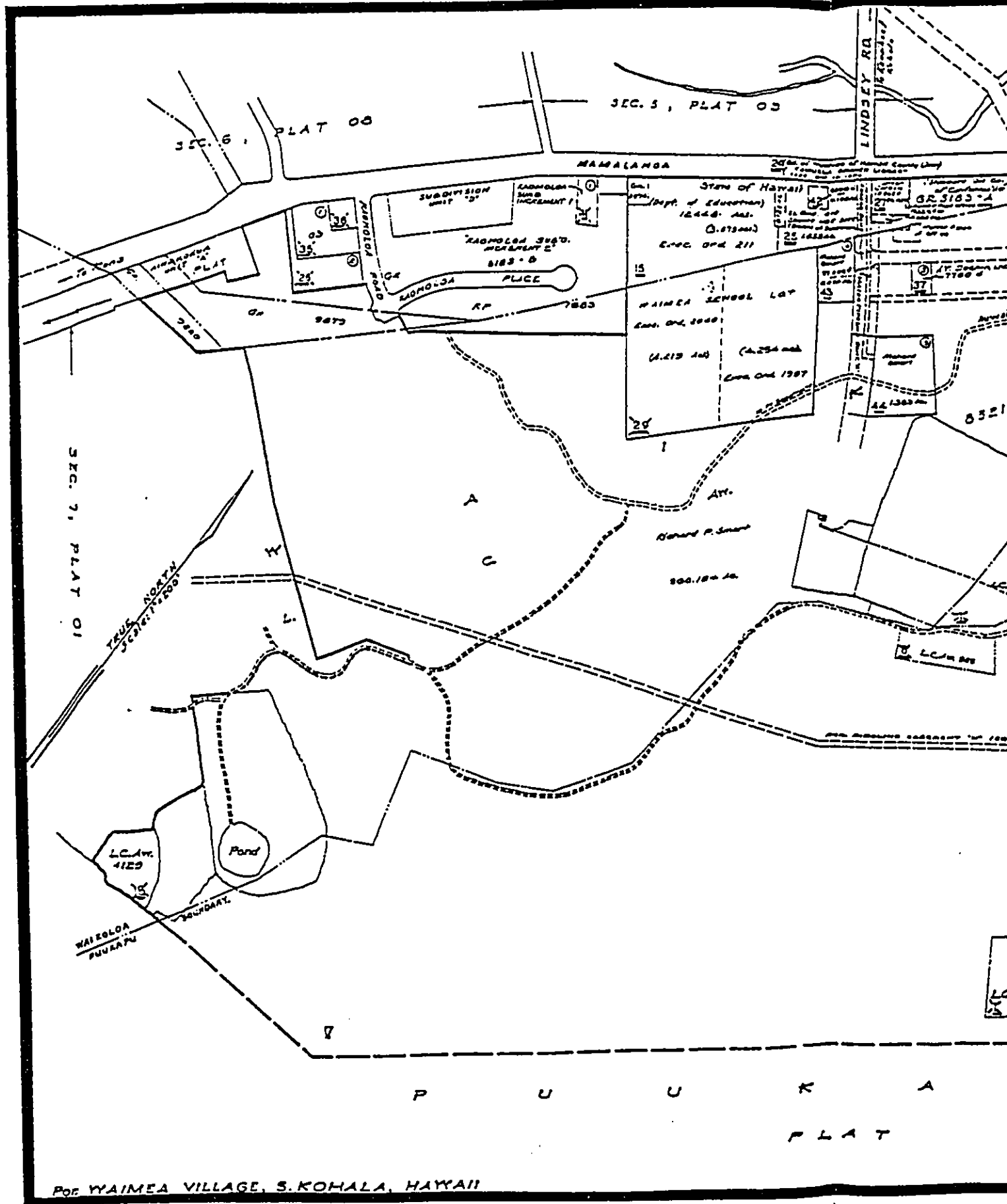
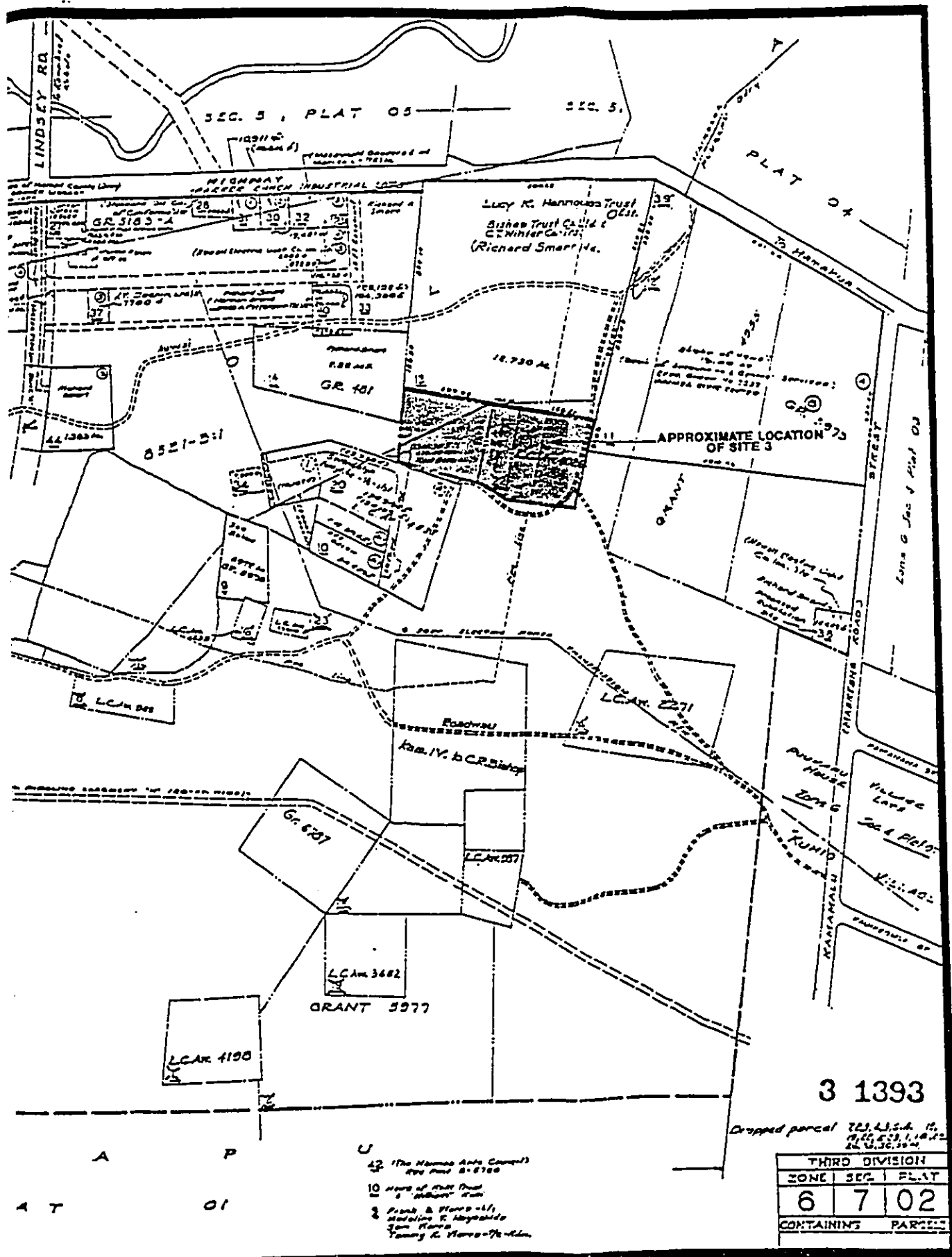


Figure A-2. Portion of 1955 Tax Map 3-6-

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APPENDIX A

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APPENDIX A

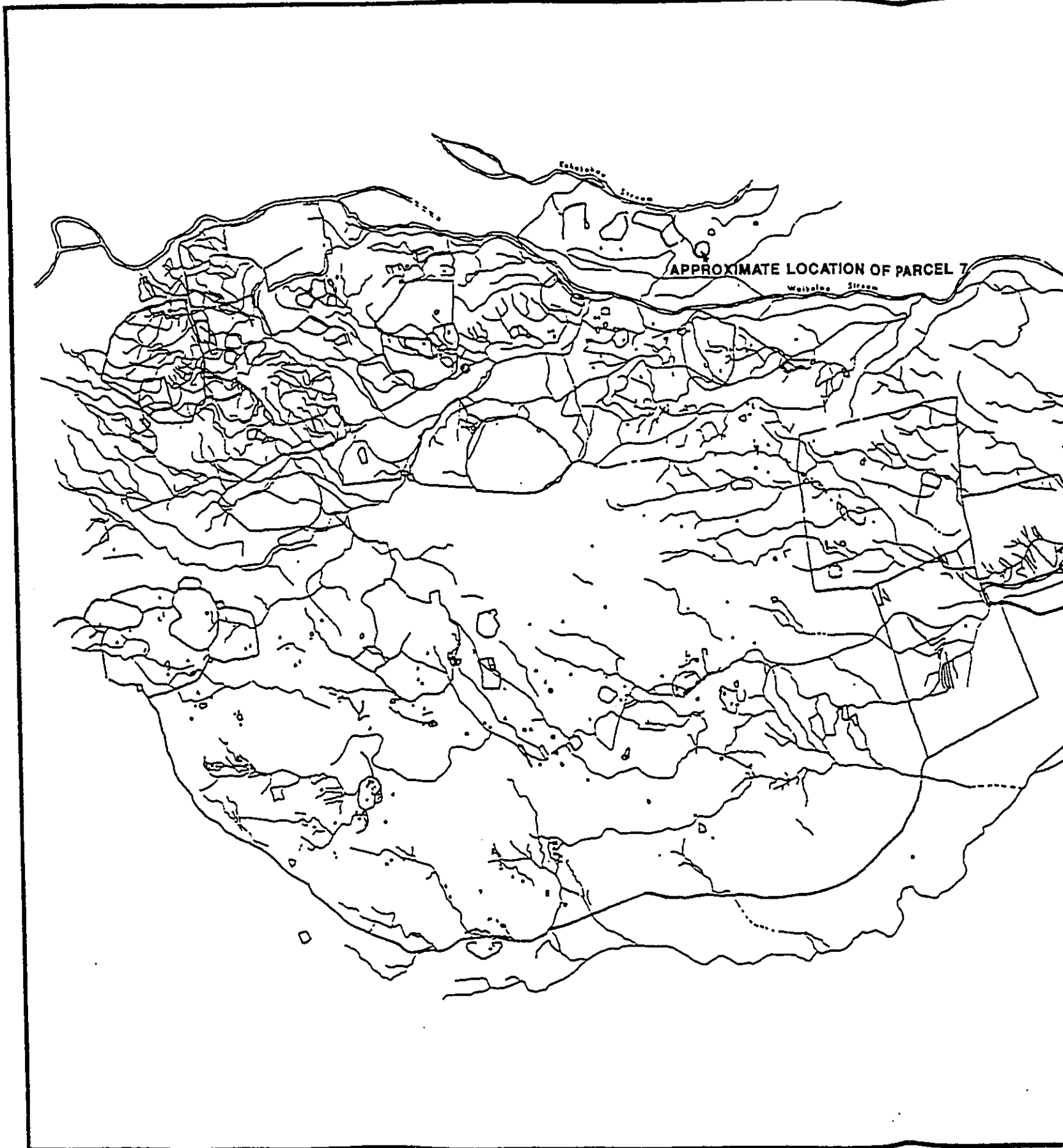
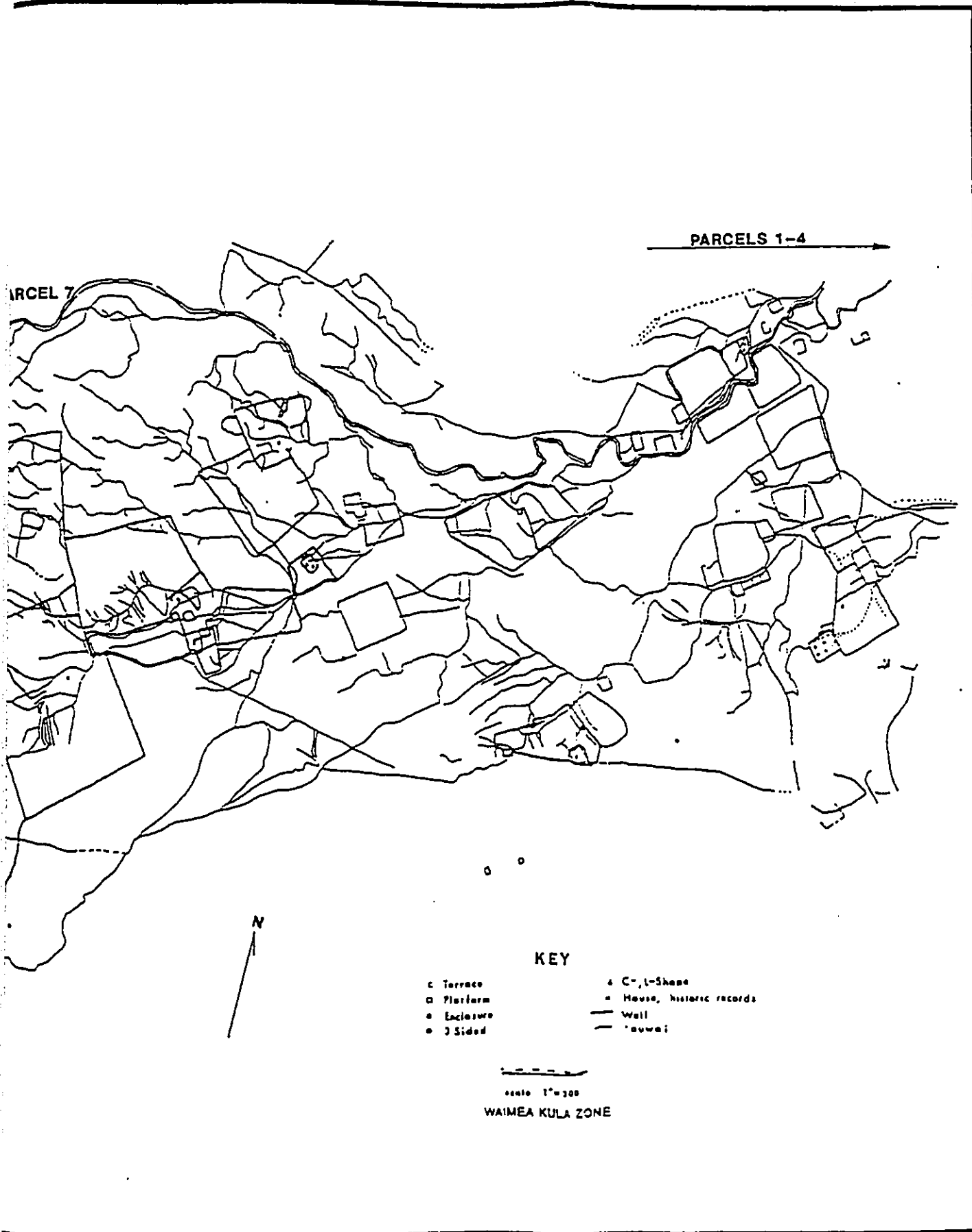


Figure A-4. Copy of Waimea Kula Zone map (From

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XA

30



Zone map (From Clark 1987; fig.10.1)