OFFICE OF THE MAYOR

COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) PROGRAM

COUNTY OF MAUI
200 SOUTH HIGH STREET, WAILUKU, HAWAII 96793

JAMES "KIMO" APANA
Mayor
GLENN VARES
Coordinator
ALSON TAMASHIRO
Staff Assistant

(808) 270-7213

May 26, 2000

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

Subject: Hana Community Healthcare Campus
Final Environmental Assessment (EA)/Finding of No Significant Impact
Tax Map Keys: 1-4-3: 2 and 24
Hana, Maui, Hawaii

The County of Maui Mayor's Office has reviewed the Final EA for the subject project, and has determined a Finding of No Significant Impact (FONSI) is appropriate. Please publish notice of availability for this project in the June 23, 2000 issue of the OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form, four copies of the Final EA, and the project summary disk. Please contact me at (808)270-7213 if you have any questions.

Sincerely,

Mr. Glenn Vares
CDBG Coordinator

cc: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.

2000-06-23-MA-FEA-

Final Environmental Assessment / Finding of No Significant Impact

Hana Community Healthcare Campus

Hana, Maui, Hawaii

Prepared for
Kober / Hanssen / Mitchell Architects

Prepared by
Wilson Okamoto & Associates, Inc.
Engineers and Planners

May 2000

Final Environmental Assessment

THE HANA COMMUNITY HEALTHCARE CAMPUS

Hana, Maui, Hawaii

Prepared for:

Kober/Hanssen/Mitchell Architects

55 Merchant Street, Suite 1400

Honolulu, Hawaii 96813

Prepared by:

Wilson Okamoto & Associates, Inc.

Engineers and Planners

1907 South Beretania Street, Suite 400

Honolulu, Hawaii 96826

May 2000

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF PHOTOGRAPHS

PREFACE

This Final Environmental Assessment (EA) has been prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Title 11, Chapter 200, Administrative Rules, Department of Health, State of Hawaii, and 24 Code of Federal Regulations Part 58 regarding the U.S. Housing and Urban Development's environmental review procedures for Community Development Block Grant (CDBG) programs. Proposed is an agency action by the County of Maui Mayor's Office to develop a new comprehensive healthcare facility at the site of the existing Hana Community Health Center in Hana on the Island of Maui. The project will be developed by the Hana Community Healthcare Center, a non-profit community-based organization that operates the current healthcare center. Compliance with the provisions of 24 CFR part 58 is required in conjunction with the acquisition of CDBG funding for the design and construction of the proposed project. The accepting authority for the EA is the County of Maui Mayor's Office.

SUMMARY

Applicant:	County of Maui, Mayor's Office
Accepting Agency:	County of Maui, Mayor's Office
Project Location:	Hana, Maui, Hawaii
Tax Map Keys:	(2) 1-4-03: 22 and 24
Area:	12.106 acres
Recorded Fee Owner:	State of Hawaii (Currently under General Lease No. S-5548 to the Hana Community Health Center, Inc.)
Existing Use:	Hana Community Health Center
State Land Use Classification:	Parcel 22 - Agricultural/Rural Parcel 24 - Rural
Community Plan Designation:	Public/Quasi-Public
County Zoning Designation:	Interim
Proposed Action:	Community Health Campus
Impacts:	Flora and Fauna: Most of the existing vegetation, particularly the overgrowth in the untended mauka ten acres in Parcel 22, will be cleared. To the extent possible, however, the existing large monkeypod, coconut, and other significant trees will be preserved and incorporated into the landscaping for the proposed facility. According to the U.S. Fish and Wildlife Service, no Federally threatened or endangered species have been identified on the project site. They further indicated that they have no objections to the project. Historic and Archaeological Resources: There are currently five structures located on the project site. With the exception of the

existing health center building, it is probable that one or more of the buildings may meet the minimum age criterion of 50 years to be eligible for inclusion on the Register of Historic Places. In addition, there is a concrete incinerator structure located near the center of the property that may also meet this criterion. Contingent on consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site, with the exception of the health center building, which is planned for renovation. The SHPD was consulted during the Draft EA comment period on the disposition of the structures on both parcels with regard to their historic significance. They, and the County of Maui Planning Department, have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that their historic significance, if any, can be substantiated and an appropriate strategy for their treatment determined.

An archaeological survey and subsequent mitigation program and data recovery study were conducted on Parcel 22, which comprises most of the project site. No further work is recommended for the parcel. The State Historic Preservation Division (SHPD) has indicated that both parcel 22 and 24 (the site of the existing health center) that the project will have no effect on archaeological resources.

Traffic: The proposed project will have a negligible effect on traffic conditions along Hana Highway fronting the project site. Traffic conditions during the morning, mid-day, and afternoon peak hours are anticipated to remain at level-of-service "A", indicating ideal operating conditions. In addition, the volume-to-capacity ratios for all peak periods indicate that traffic demand will be well within the capacity of the roadway.

Noise: Noise from construction activities will likely be unavoidable during the entire construction period. Unavoidable construction noise impacts will be mitigated to some degree by the contractor's compliance with provisions of the State DOH Administrative Rules, Title 11, Chapter 46, "Community Noise

Control." noise control regulations. These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable noise levels. In the long term, no significant noise impacts from the operation of the proposed facility are anticipated.

Air Quality: The proposed project will have short-term construction-related impacts on air quality, including the generation of dust and emissions from construction vehicles, equipment, and commuting construction workers. The construction contractor will be responsible for complying with State DOH Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control". Mitigation measures to address short-term impacts include: Minimizing the movement of construction vehicles during peak traffic periods, frequently watering areas of exposed soil, and revegetating as soon as possible on completed areas.

Determination: Finding of No Significant Impact

Parties Consulted During Pre-Assessment:

State of Hawaii Department of Land and Natural Resources
County of Maui, Planning Department

Parties Consulted During Draft EA:

Federal Agencies

U.S. Department of Agriculture - Natural Resources Conservation Service
U.S. Department of the Army - Corps of Engineers
U.S. Department of the Interior - Fish and Wildlife Service
U.S. Department of the Interior - Geological Survey

State of Hawaii

Department of Land and Natural Resources (DLNR)
DLNR State Historic Preservation Division
DLNR Land Division
Department of Transportation

State of Hawaii (continued)
Department of Business, Economic Development and Tourism – Land Use Commission
Department of Health (DOH)
DOH Environmental Division
Office of Environmental Quality Control

County of Maui
Planning Department
Department of Public Works and Waste Management
Department of Water Supply
Police Department
Fire Department

Organizations
Hana Community Association
Maui Electric Co., Ltd.
GTE Hawaiian Tel

1. SETTING AND PROJECT DESCRIPTION

1.1 Project Background

The existing Hana Community Health Center was established by the State of Hawaii in 1996 to serve the Hana District, which comprises 37 percent of the total land area of the Island of Maui. This includes the communities from Keanae to the north and Kaupo to the south, including Nahiku, Hana, and Kipahulu.

Efforts to improve the delivery of health care in Hana began as a community project in February 1993, and culminated in the passage of Act 263 (SLH 1996), which transferred the then State-operated Hana Medical Center to the current non-profit Hana Community Health Center. The actual transfer occurred on July 1, 1997.

1.2 Project Need

Due to the growth in the resident population of Hana, the center is currently inadequate to serve the medical needs of the community. According to the 1990 U.S. Census report, 1,895 residents lived in the Census Tract 301 which comprises most of the Hana District. This represents a 33.2 percent increase from the 1980 population of 1,423. Further, it is projected that the population of the Hana region will increase to 2,170 by the end of year 2000 and to 2,349 to 2,452 by the year 2010. The new facility is needed to properly serve the current and future generations of the Hana district.

The long-range need for health services in the Hana District stems from its geographic isolation from the remainder of the island by its physical boundaries and substantial travel distance. The nearest emergency room located in Wailuku requires a 2-hour drive through 57 miles of arduous roadway and more than 50 single-lane bridges. The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District and, thereby preclude the need for residents to drive to Wailuku for their medical needs.

1.3 Project Location And Ownership

The project site is located in Hana Town on the east coast of Maui. It is situated along mauka side of Hana Highway just north of Uakea Road. The project site is L-shaped encompassing

approximately 12.1 acres on two parcels identified as Tax Map Keys 1-4-03:22 and 24 (See Figures 1 and 2). Both parcels are owned in fee by the State of Hawaii and leased by the Hana Community Health Center.

1.4 Existing and Surrounding Uses

Parcel 24 is bounded by Hana Highway to the east, by private undeveloped property to the south, and by Parcel 22 to the north and west. Parcel 22 is bounded by Parcel 24 to the east, and by private parcels to the north, south, and west. Parcel 22 includes an adjoining sliver of land located along the northern boundary of Parcel 24. Parcel 24 occupies 2.035 acres of land, while Parcel 24 occupies 10.07 acres, for a total of approximately 12 acres.

Parcel 24 is occupied by four structures, including:

1) The 4,020-square foot (s.f.) Hana Community Health Center facility (See Photograph 1);
2) A 1,392-s.f. building which is occupied by the office and residence of the facility's executive director ;
3) A 1,233-s.f. building which is occupied by the emergency medical service (a portion of this structure also lies within Parcel 24);
4) A 1,100-s.f. structure which houses an emergency generator, and refuse storage area.

Photographs 1 through 3 depict three of the four structures. In addition, two cargo containers are situated on the property and are used for archiving patient records and storing yard maintenance equipment.

With the exception of a single, 580-s.f. structure, Parcel 22 is heavily overgrown with vegetation and is not occupied by buildings or other structures. A former commercial plant nursery previously occupied the property, however the business has since ceased its operation. The parcel is otherwise not occupied by any structures.

Surrounding uses in the immediate vicinity of the project site include the Hana Police Station and neighboring Hana Fire Station, both located along Hana Highway to the south of the project site. Single family residences are also situated to the south of the project site along Uakea Road. (See Photographs 4 and 5). Areas to the immediate north and east of the project site are undeveloped.

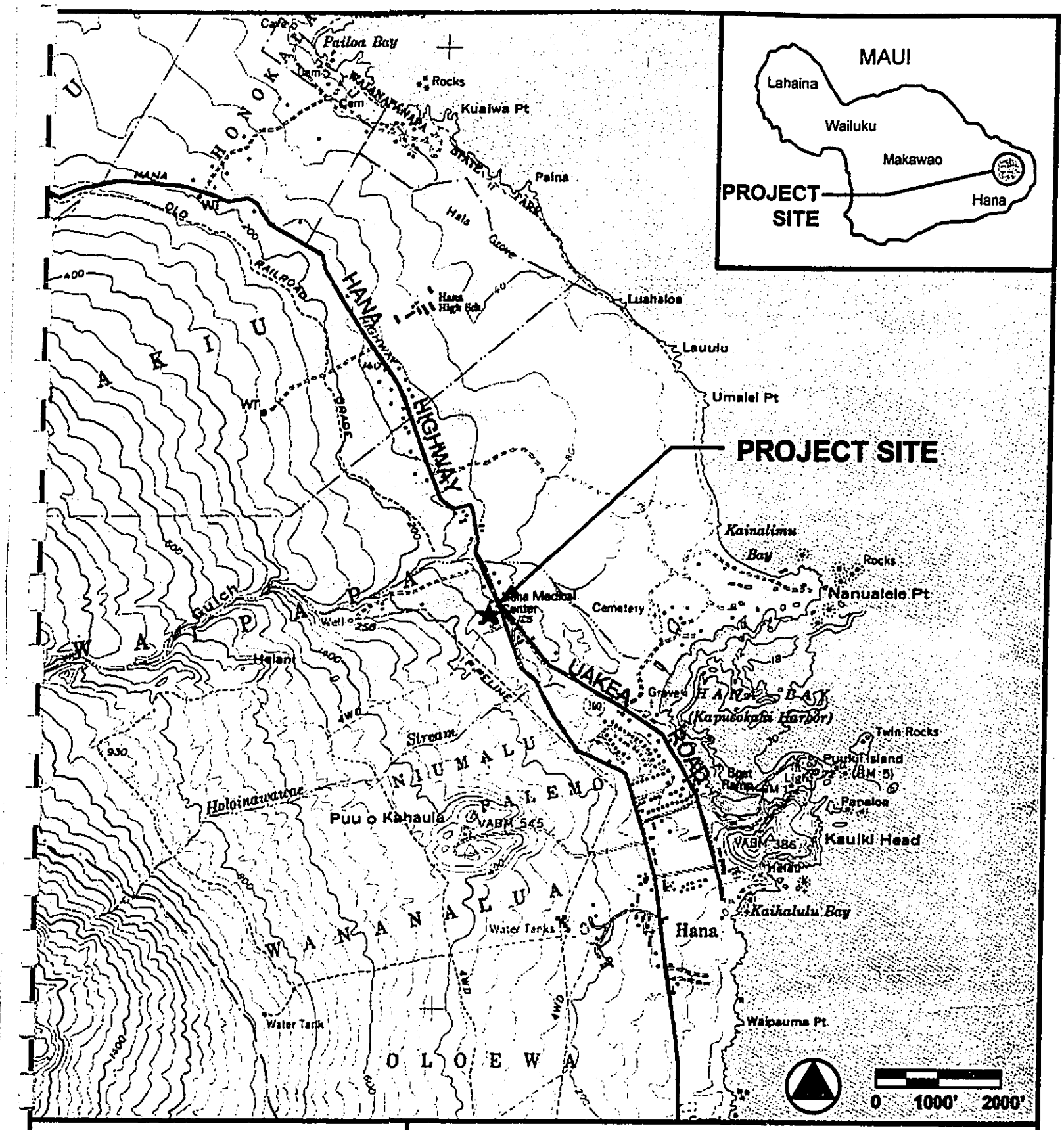


Fig. 1

Hana Community Healthcare Campus

Location Map

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

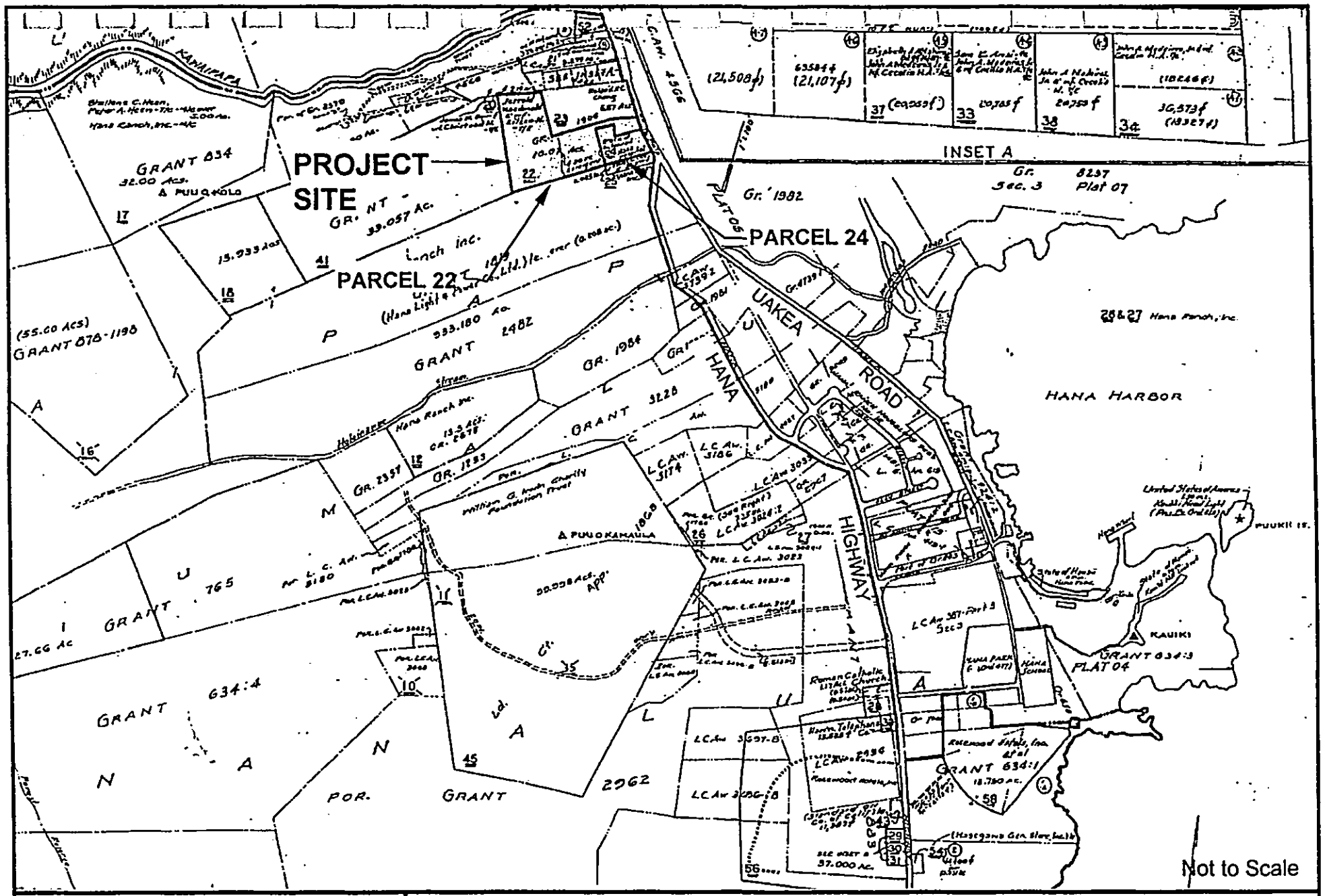


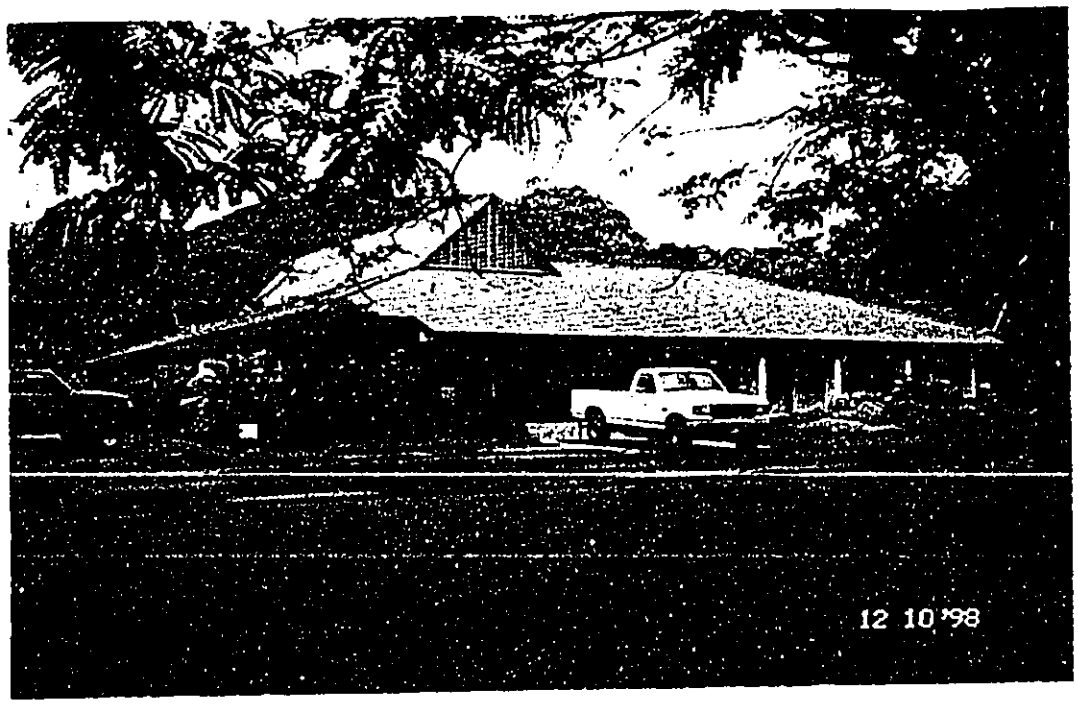
Fig. 2

Hana Community Healthcare Campus

Tax Map Key 1-4-03:22 and 24

Prepared for:
Kober/Hanssen/Mitchell Architects

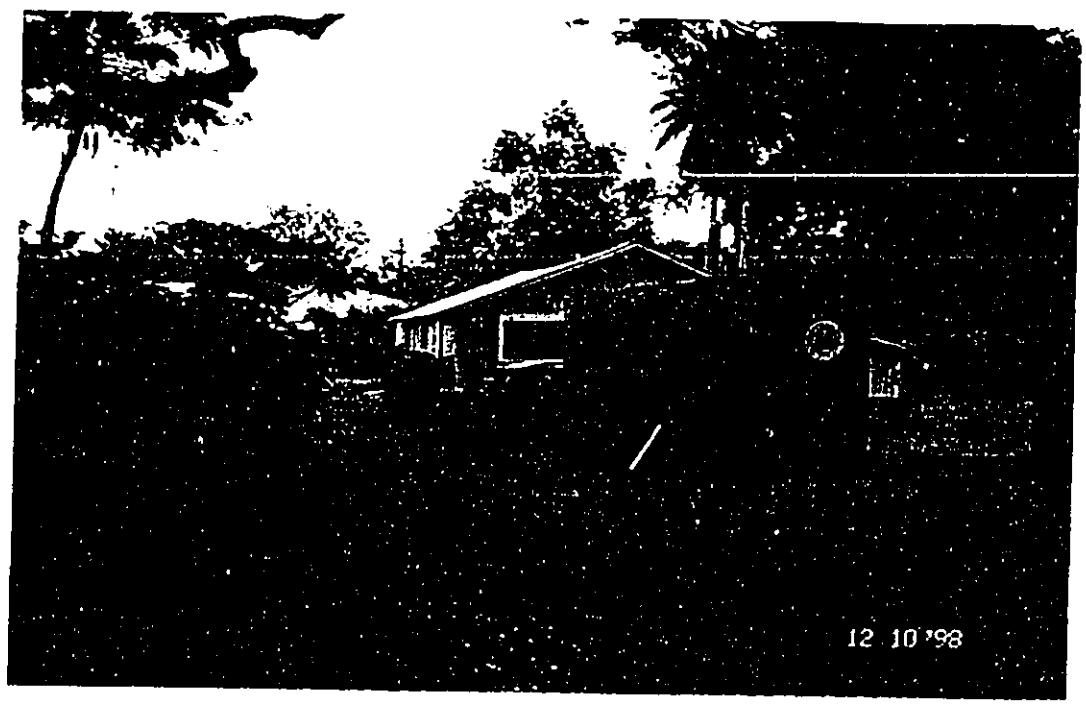
Prepared by:
Wilson Okamoto & Associates, Inc.



Photograph 1: Hana Community Health Center Building

Photograph 2: Residence and office of the executive director

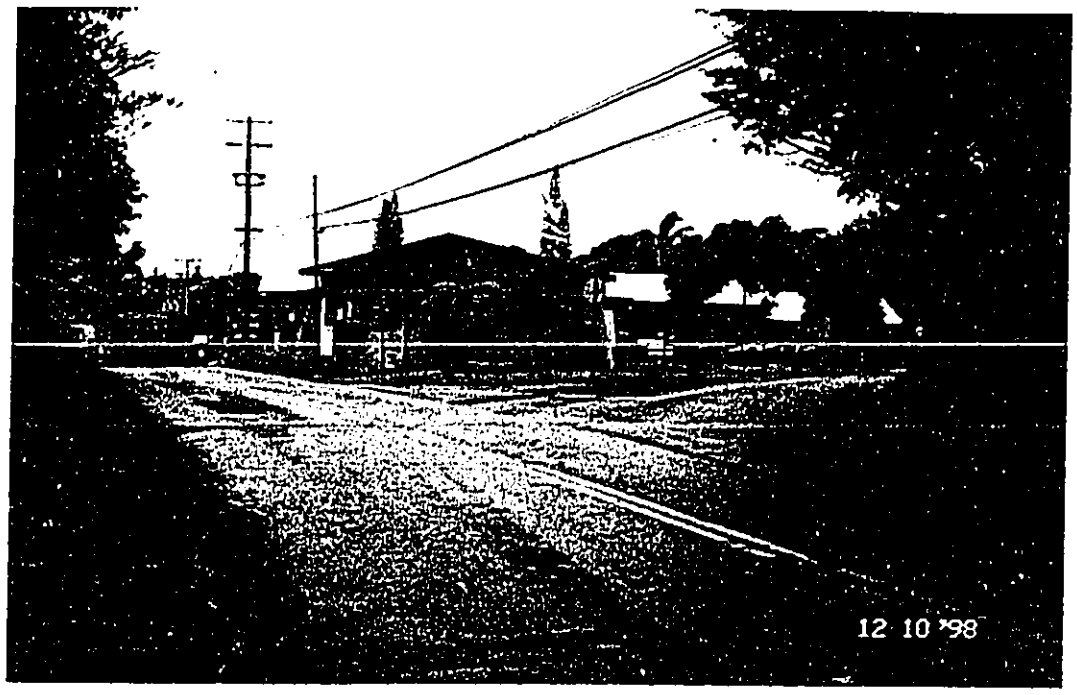
Hana Community Healthcare Campus	**Photographs 1 & 2**
	Prepared for: Kober/Hanssen/Mitchell Architects
	Prepared by: Wilson Okamoto & Associates, Inc.



Former Cargo Container which houses patient records (foreground)

Emergency generator and storage building (reargound)

Hana Community Healthcare Campus	Photograph 3
	Prepared for: Kober/Hanssen/Mitchell Architects
	Prepared by: Wilson Okamoto & Associates, Inc.



Photograph 4: Hana Police Station at intersection of Uakea Road and Hana Highway

Photograph 5: Residence located along Uakea Road across from Hana Police Station

Hana Community Healthcare Campus	Photographs 4 & 5	
	Prepared for: Kober/Hanssen/Mitchell Architects	Prepared by: Wilson Okamoto & Associates, Inc.

1.5 Project Description

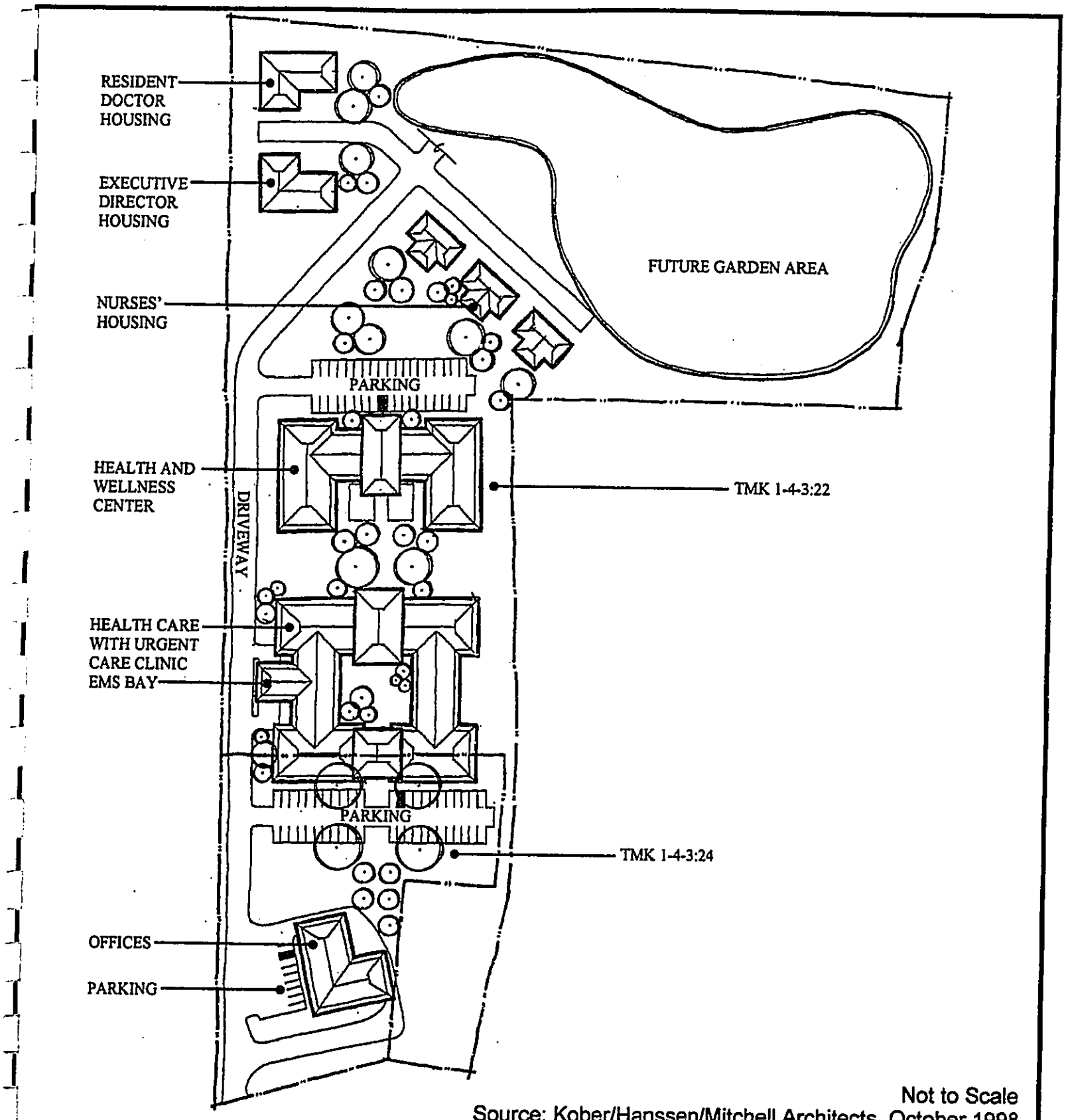
The proposed Hana Community Healthcare Campus will include:

- Construction of a 10,850 s.f. Community Healthcare Center housing facilities for medical and ancillary services, as well as shared administrative and support uses,
- Construction of a 10,360 s.f. Health and Wellness Center housing a conference center, gym, pool, and office,
- Construction of 9,800 s.f. of employee housing for the executive director, on-site physician, and staff nurses,
- Renovation of 4,020 s.f. of floor area within the existing health center building.
- Construction of a total of approximately 104 parking stalls; and
- Establishment of a future garden area
- Demolition of all existing structures with the exception of the health center building

Figure 3 illustrates the conceptual site plan planned for the proposed campus, while Figure 4 illustrates the conceptual elevation envisioned for the Community Healthcare Center.

1.6 Project Schedule and Cost

Construction of the proposed project is anticipated to commence in 2000with completion estimated by 2002, contingent upon the acquisition of project funding. The estimated construction cost of the proposed project is $4.2 million. Funding assistance will be sought from the Community Development Block Grant program for the detailed design and construction of the project.



Not to Scale

Source: Kober/Hanssen/Mitchell Architects, October 1998

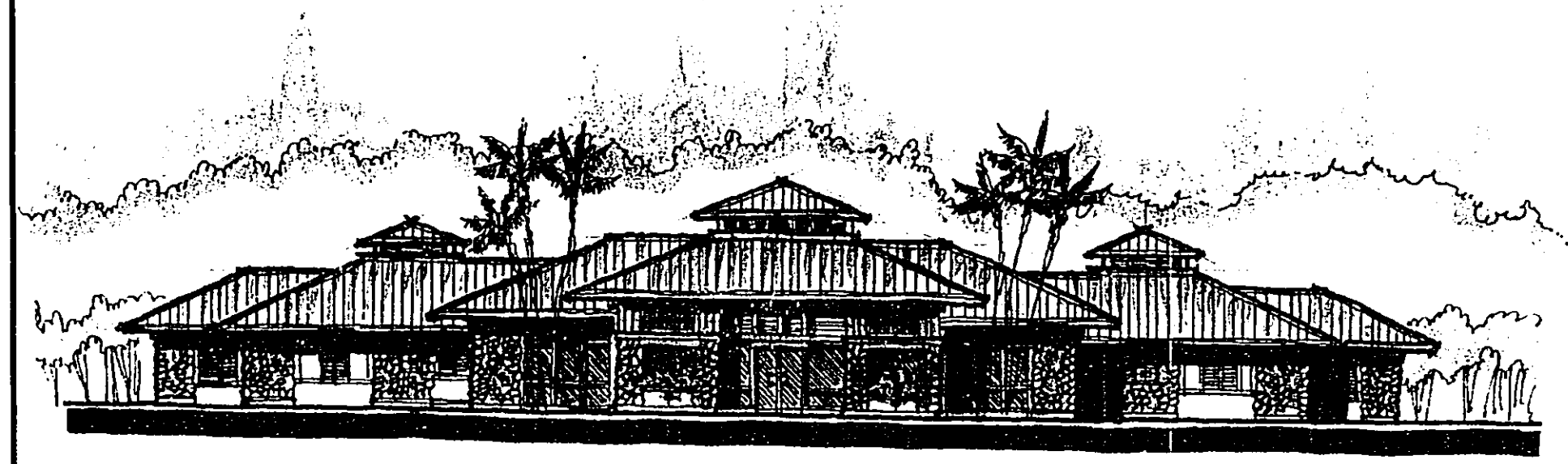
Fig. 3

Hana Community Healthcare Campus

Conceptual Site Plan

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.



Source: Kober/Hanssen/Mitchell Architects, October 1998

Fig. 4

Hana Community Healthcare Campus

Conceptual Elevation

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

2. DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES

The following is a description of the existing environment, assessment of potential project impacts and measures proposed to mitigate potential impacts from the various improvements.

2.1 Climate

Typical of windward areas in the Hawaiian islands, the climate in the area is characterized by cool temperatures, high rainfall, and persistent northeasterly trade winds. Average temperatures range from a low of approximately 71 degrees Fahrenheit (°F) in the coolest month, to a high of approximately 77 degrees in the warmest month. Annual rainfall averages about 83 inches. Northeasterly trade winds ranging from 16 to 18 knots are present most of the year.

Impacts

The proposed project will not affect regional climate.

2.2 Geology and Topography

Maui is composed of two major volcanoes; the older West Maui, and the younger East Maui or Haleakala. The broad, gently sloping plain connecting the two volcanoes was formed when lava from Haleakala banked against the already existing West Maui volcano. East Maui was created from three volcanic series of Haleakala Volcano; the Honomanu, Kula and Hana volcanic series. The project area lies along the eastern slope of Haleakala, and is largely underlain by lava flows of the Hana volcanic series.

Small spatter cones and larger cinder cones associated with the Hana eruptions form prominent hills along the south and east portions of Hana. At an elevation of approximately 160 feet above mean sea level, the project site and surrounding areas are relatively flat and contains no unique or unusual topographic features.

Impacts and Mitigation Measures

No significant impacts on the geology or topography of the project site are anticipated as a result of constructing the proposed facility. Construction will require grading and excavation activities for the building's foundation work. The excavated areas will either be built over, paved over, or backfilled and landscaped to existing contours. To achieve required elevations, grading may slightly alter the current topography of the project site.

2.3 Soils

According the U.S. Department of Agriculture Natural Resources Conservation Service, the soil at the project site is classified as Hana extremely stony silty clay loam, moderately deep variant (HKOC), with 3 to 15 percent slopes. Developed in volcanic ash, soils of the Hana series are typically well-drained. The surface layer is dark-brown silty clay loam that consists of 10 to 15 percent gravel and cobblestones. The subsoil is about 6 to 14 inches thick and consists of a reddish-brown, very friable silty clay loam that has weak, subangular, blocky structure containing 20 to 30 percent gravel and cobblestones. The substratum, at a depth of 20 to 30 inches is fragmental a'a lava. Stones cover 3 to 15 percent of the surface. Runoff is slow to medium, and the erosion hazard is slight to moderate.

The *Detailed Land Classification - Island of Maui* published by the University of Hawaii Land Study Bureau (LSB), evaluates the quality or productive capacity of certain lands on Maui for selected crops and overall suitability in agricultural use. A five-class productivity rating system was established with "A" representing the class of highest productivity and "E" the lowest. Typical of the stony to rocky land of Hana, the project site is classified as "D."

Impacts and Mitigation Measures

No significant impacts on soils at the project site are anticipated with the construction and operation of the proposed facility. Excavation and grading activities associated with construction of the proposed project will be regulated by Chapter 20.08 of the Maui County Code and the National Pollutant Discharge Elimination System (NPDES) permit requirement administered by the State Department of Health (DOH).

An NPDES General Permit for Storm Water Discharges Associated with Construction Activity (Notice of Intent Form C) may be required by the State DOH for construction of the proposed project as the area of soil disturbance from activities such as clearing and grubbing, grading and stockpiling will likely be in excess of five (5) acres. The permit requires a Best Management Practices (BMP) plan which, in turn, requires compliance with County ordinances pertaining to grading, grubbing, stockpiling, soil erosion and sedimentation.

An erosion control plan will be prepared and submitted to the County of Maui Department of Public Works and Waste Management for approval. As appropriate, guidelines provided by the Hawaii Coastal Zone Management Non-Point Source Plan will be incorporated into the erosion control plan. Mitigative measures that will be considered in the erosion control plan include:

- Conduct grubbing and grading activities during the low rainfall months;
- Clear only areas essential for construction;
- Locate potential nonpoint pollutant sources away from steep slopes, water bodies, and critical areas;
- Protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells;
- Cover or stabilize topsoil stockpiles;
- Properly dispose of sediment and debris from construction activities;
- Replant or cover bare areas as soon as grading or construction is completed.

In addition, sediment basins, sediment traps, filter fences, straw bale barriers, or vegetative filter strips will be implemented as appropriate to mitigate erosion.

2.4 Hydrology

2.4.1 Groundwater

The island of Maui has been divided into six aquifer sectors, one of which is the Hana aquifer sector. The project site overlies the Kawaipapa aquifer system, one of four aquifer systems within the Hana sector. Within the Kawaipapa aquifer system, basal groundwater reaches to at

least two miles inland. It is protected at the coast by caprock. Inland, high level dike water in Honomanu basalt lies far below the surface. The estimated sustainable yield of 48 milling gallons per day (mgd) reflects high rainfall in the system.

Impacts and Mitigation Measures

No significant impact to groundwater underlying the project site are anticipated during construction and operation of the proposed facility. Construction activities are not likely to introduce or release to the soil any materials which could adversely affect groundwater. A BMP will be developed to protect the integrity of groundwater resources which, in the project area includes the Kawaipapa aquifer.

2.4.2 Surface Water

There are no natural surface water bodies on the project site. Two perennial streams are located within one-half mile of the project site. Kawaipapa Gulch is located approximately 1,200 feet to the north, and Holoinawawae Stream is located approximately 1,400 feet to the south. The *Hawaii Stream Assessment,* compiled by the State Department of Land and Natural Resources Commission on Water Resource Management represents Hawaii's first step in an attempt to identify streams and rivers with significant natural and cultural qualities that may be appropriate for protection. One purpose of the study was to identify streams with high value stream-related "beneficial uses." These uses or "resources" were categorized into the following four units:

- Aquatic Resources
- Riparian Resources
- Cultural Resources
- Recreational Resources

Elements of these resource categories were identified and ranked as: Outstanding; Substantial; Moderate; Limited; and Unknown. Kawaipapa Stream is classified as "interrupted", identifying streams that flow year-round in the upper portions, and intermittently at lower elevations. The Kawaipapa Gulch was ranked as having moderate recreational resources due to swimming opportunities, and substantial cultural resources. Cultural resources identified include, six historic sites, associated taro cultivation, and the significance of the valley based on National

Register of Historic Places Criteria. Holoinawawae Stream is not listed in the *Hawaii Stream Assessment.*

Impacts and Mitigation Measures

There are no surface water sources on the project site. The closest streams, the Kawaipapa Stream and the Holoinawawae Stream are both located approximately one-half mile from the project site. Construction and operation activities of the proposed facility are not anticipated to affect stream flows or cultural resources associated with the stream.

2.5 Flood Hazard

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panel Number 150003 0320 B (revised June 1, 1981), the project site is designated Zone C, areas of minimal flooding. Due to its elevation and distance from shore, the project site is not subject to coastal hazards such as storm waves and tsunami inundation.

Impacts and Mitigation Measures

Due to its location on a gently sloping site, it is unlikely that construction and operation of the proposed facility would result in flooding of the project site or lower elevation properties.

2.6 Flora and Fauna

The two-acre Parcel 24 (upon which the existing Hana Health Center sits) is presently landscaped with grassy lawns, a large monkeypod tree, shower trees, coconut trees, ti, and a variety of other common yard and garden trees and plants.

The remaining approximately ten acres of Parcel 22 are heavily vegetated with both introduced and native species. The site was previously used for commercial cultivation which may explain the presence of the introduced species. Existing species include breadfruit (*Artocarpus communis*), ti (*ki*; *Cordyline terminalis* L. Kunth), taro (*kalo*; *Colocasia esculenta* L. Schott), palmetto (*Sabal palmetto* [Walt.] Lodd. and Schott. f.), coconut (*Cocos nucifera*), bird-of-

paradise (*Strelitzia reginae*), red ginger (*awapuhi ulaula*; *Alpinia purpurata* Viell.; K. Schum.), mango (*manako*; *Manifera indica* L.), bamboo (*Bambusa* sp.), Africa tulip (*Spathodea campanulata*), *milo* (*Thespesia populnea* L.), false *kamani* (*kamani-haole; Terminalia catappa* L.), Hawaiian tree fern (*Niroli; Filicium decipiens*), papaya (*Carica papaya* L.), areca palm (*Chrysalidocarpus lutescens*), wiliwili (*Erythrina sandwicensis* Degener), *kukui* (*Aleurites moluccana* L. Willd.), and banana (*Musa paraadisiaca* L.).

Mammal species likely to be found in the area include mongoose, cats, dogs, mice and rats. Avifauna that may be found in the area include the mynas, doves, sparrows, finches, and cardinals.

According to the U.S. Fish and Wildlife Service, no Federally threatened or endangered species have been identified on the project site. They further indicated that they have no objections to the project.

Impacts and Mitigation Measures

Most of the existing vegetation, particularly the overgrowth in the untended mauka ten acres in Parcel 22, will be cleared. To the extent possible, however, the existing large monkeypod, coconut, and other significant trees will be preserved and incorporated into the landscaping for the proposed facility. In addition, native Hawaiian plans and trees will be used in the facility's landscaping. The Arborist Committee will be consulted in conjunction with the development of the landscaping plan regarding the disposition of the significant trees currently located on the project site.

As required by the County of Maui Department of Public Works and Waste Management, the project will comply with all requirements for vector control prior to any site work.

2.7 Historic and Archaeological Resources

2.7.1 Historic Resources

As aforementioned in Section 1.4, there are currently four structures located on Parcel 24, including Hana Health Center facility, the office and residence of the facility's executive director,

the emergency medical service building (a portion of this structure also lies within Parcel 24), and the emergency generator/storage building. In addition, a single structure occupies Parcel 22.

Buildings that are 50 years or older may be eligible for inclusion on the Register of Historic Places depending on their historic significance. With the exception of the existing health center building, it is probable that one or more of the buildings may meet this minimum age criterion. In addition, there is a former concrete oven structure located near the center of the property that may also meet the age criterion (See Photographs 6 and 7). If it is determined that the buildings and oven structure are at least 50 years old, it is possible that they may be eligible for inclusion on the Register of Historic Places.

Based on preliminary discussions with the State Historic Preservation Division (SHPD), there is no documentation regarding the potential significance of the design or construction dates of the existing structures (Staff Communication, December 14, 1998).

Impacts and Mitigation Measures

Contingent on consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site to accommodate the proposed project, with the exception of the health center building, which is planned for renovation.

The SHPD was consulted during the Draft EA comment period on the disposition of the structures on both parcels specifically with regard to their historic significance. They, and the County of Maui Planning Department, have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that

Hana Community Healthcare Campus

Photographs 6 & 7
Former Concrete Oven

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

their historic significance can be substantiated and an appropriate strategy for their treatment determined.

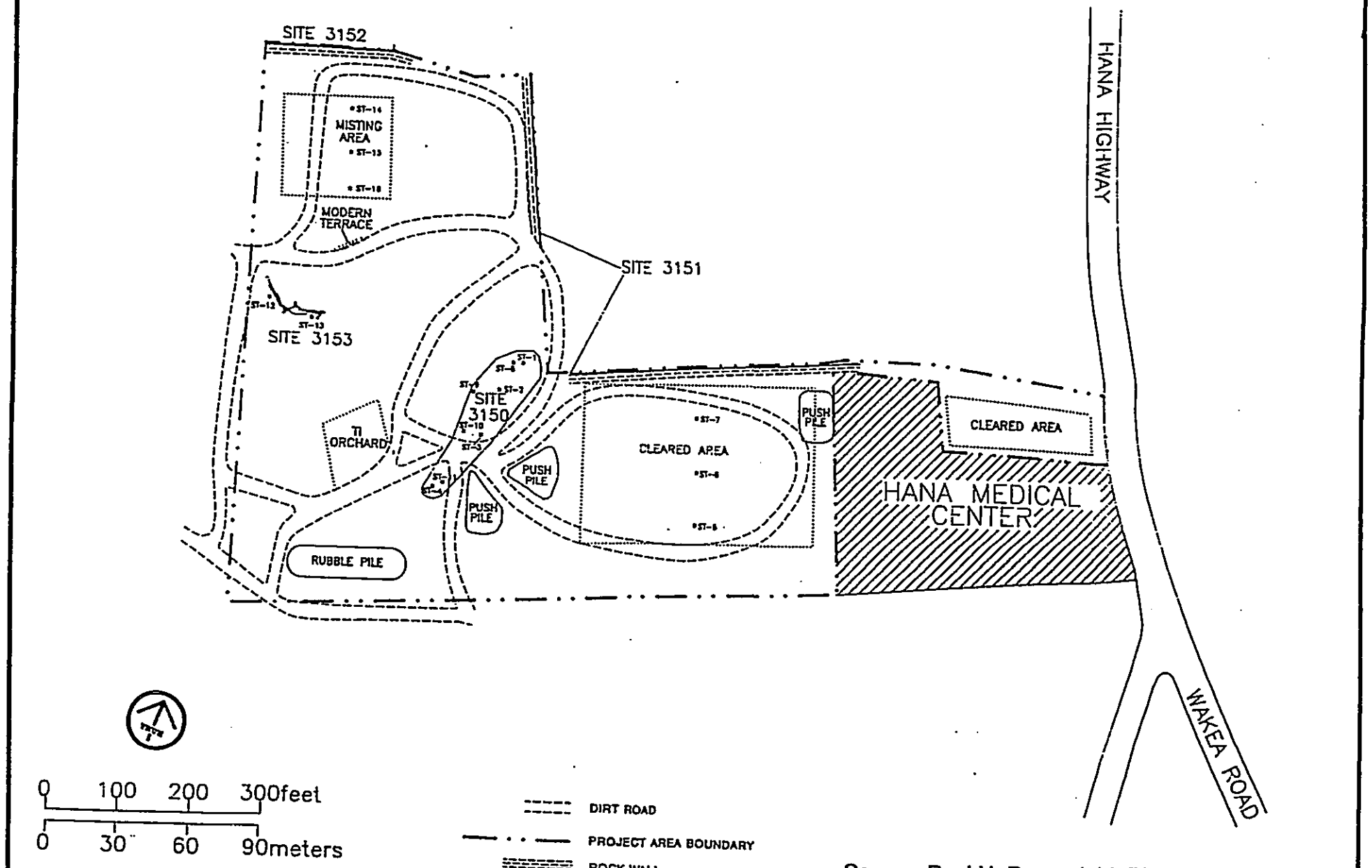
As necessary, the project will comply with all requirements for asbestos inspection and removal.

2.7.2 Archaeological Resources

Based on preliminary discussions with the SHPD, the existence of archaeological resources within Parcel 24 (the site of the existing health center) is unlikely because the parcel has been in its current state of development for many years. The SHPD will formally be consulted to verify the absence of any archaeological remains (Staff communication, December 14, 1998).

With regard to Parcel 22, an Archaeological Inventory Survey was conducted for the property in May 1993 (see Appendix A). The study was prepared by Paul H. Rosendahl, Ph.D., Inc. for the State of Hawaii Department of Accounting and General Services. The survey included historic documentary research, as well as a surface field survey. During the surface survey four sites were identified including two complexes (Sites 3150 and 3153) and two boundary walls (Sites 3151 and 3152) (See Figure 5).

Sites 3151 and 3152 consisted of boundary walls, and Site 3153 consisted of a wall and a terrace. No datable samples were obtained from any of these sites. Although the boundary walls correspond to the boundaries of historic land grants, no evidence was found suggesting that they date to this period; the walls may, in fact, have been modern property walls. Site 3153, based on the lack of cultural indicators and informant testimony, is probably recent. All three sites were identified under the significance category "X" pursuant to the National Register criteria for evaluation as outlined in the Code of Federal Regulations (36 CFR Part 60). Category "X" sites are defined as being important for information content, but which no further data collection is necessary. According to the report, the data collected from these sites was sufficient and there was no preservation potential. In a letter dated July 23, 1993, the Department of Land and Natural Resources State Historic Preservation Division (SHPD) concurred that the sites were



Source: Paul H. Rosendahl, Ph.D., Inc., May 1993

Fig. 5

Hana Community Healthcare Campus

Site and Shovel Test Locations

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

"...'no longer significant', having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey".

No datable samples were recovered. It was determined that Site 3150 was identified under significance category "A", which is important for information content and which requires further data collection. Additional cultural materials as well as specialized samples might remain within a subsurface component of Site 3150, and that such cultural materials could be useful in further dating the site and its features. Site 3150 involved a complex of four features which included: A small rectangular enclosure; A large rectangular enclosure; An L-shaped enclosure; and A rectangular platform. Shovel tests at the site recovered glass and ceramics suggest the features were historic. Therefore, the site was recommended for further archaeological work, and a mitigation plan was prepared for the site.

Subsequently, in April 1996 Paul H. Rosendahl, Ph.D., Inc conducted an Archaeological Mitigation Program for Site 3150 (See Appendix B). The study included a mitigation program and additional data recovery. None of the four features within the site contained significant subsurface deposits, although portable remains were collected. Most of the remains were historic, dating to the last half of the 19th and early 20th centuries. A few remains were similar to indigenous Hawaiian artifacts. As a result of this data recovery, the SHPD determined in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work within Parcel 22 was recommended.

Impacts and Mitigation Measures

With regard to the potential for archaeological resources within Parcel 24 (the site of the existing health center), the State Historic Preservation Division (SHPD) preliminarily indicated during the pre-assessment phase of the project that there was little potential for encountering such resources because the site has been extensively developed. Subsequently, the SHPD was consulted during the Draft EA review period and confirmed that the project will have no effect on archaeological resources on Parcel 24. Further, based on findings of the completed data recovery plan for Parcel 22, the SHPD also determined that the project would have no effect on archaeological resources on this parcel. Should any archaeological resources including human burials be encountered

during construction, however, all work in the immediate vicinity will cease and the State Historic Preservation Division contacted at once.

2.8 Traffic

Hana Highway is the only paved roadway that provides vehicular access for resident and tourists to Hana Town. The state-owned highway traverses the north-northeast coastline of the island linking the various communities and commercial/industrial centers along its alignment, from Kaahumanu Avenue in Kahului to Hana Bay. Fronting Hana Community Health Center, Hana Highway is a two-lane, two-way roadway. Just south of the health center, it intersect Uakea Street. The intersection is not signalized.

The scenic drive to Hana Town is a major visitor attraction, as are Hamoa Beach, Seven Pools, and Kipahulu Falls, which are located further south on the highway. Consequently, tourists comprise a large portion of the traffic on the highway through Hana.

A traffic assessment was prepared for the project by Wilson Okamoto & Associates, Inc. in December 1998. Excerpts from the assessment are included in the following section, while the report in its entirety is attached as Appendix C. Traffic volumes on Hana Highway obtained from the State Department of Transportation (DOT) were taken on May 5, 1997. Based on the data, the average daily traffic (ADT) along Hana Highway is comprised of approximately 1,700 trips, which are distributed relatively evenly between the hours of 6:00 AM and 8:00 PM. There are, however, minor peaks in traffic during the morning, mid-day, and afternoon periods which generally occur between 8:00 and 9:00 AM, 10:00 and 11:00 AM, and 3:15 and 4:15 PM, respectively. The morning and afternoon peak periods are generally indicative of normal commuter traffic, while the mid-day peak period is reflective of tourist traffic.

The highway capacity analysis performed for this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, 1994, and the "Highway Capacity Software", developed by the Federal Highway Administration.

Level of Service (LOS) is a quantitative and qualitative assessment of traffic operations, which are described alphabetically as LOS "A" through LOS "F", representing a range of operating

conditions from ideal to undesirable. In addition, a Volume-to-Capacity (v/c) ratio indicates the relative traffic demand to the carrying capacity of a road. A v/c ratio of one (1.00) indicates that the roadway is operating at capacity, while a v/c ratio of greater than 1.00 indicates that traffic demand exceeds the road's capacity.

As summarized in Table 1, the section of roadway which fronts the project site operates at LOS "A" during all peak hours, and at v/c ratios of 0.08. 0.11, and 0.09 during the AM, mid-day, and PM peak periods, respectively. These indicators are representative of light traffic conditions with no observed operational problems.

Table 1
Existing Traffic Conditions

Peak Hour	Southbound Vehicles	Northbound Vehicles	Total Vehicles	LOS	v/c Ratio
AM Peak Period	112	44	156	A	0.08
Mid-Day Peak Period	186	38	224	A	0.11
PM Peak Period	137	32	169	A	0.09

Impacts and Mitigation Measures

The proposed project will have a negligible effect on traffic conditions along Hana Highway fronting the project site. As summarized in Table 2, traffic conditions during all peak hours are anticipated to continue to operate at LOS "A". In addition, v/c ratios will remain consistent at 0.08. 0.12, and 0.11 during the AM, mid-day, and PM peak periods, respectively.

Table 2
Projected Traffic Conditions

Peak Hour	Southbound Vehicles	Northbound Vehicles	Total Vehicles	LOS	v/c Ratio
AM Peak Period	124	60	184	A	0.09
Mid-Day Peak Period	213	49	262	A	0.12
PM Peak Period	47	164	211	A	0.11

The following measures are recommended to maintain the traffic conditions at the intersection of Hana Highway and the project driveway:

- Provide sufficient sight distances for motorists to safely enter and exit the project driveway;
- Provide adequate patient loading and off-loading areas;
- Provide adequate turn-around area for delivery and refuse vehicles to maneuver on the project site; and
- Provide sufficient roadway width to accommodate safe vehicular ingress and egress.

The State of Hawaii Department of Transportation has indicated that the project is not expected to significantly impact Hana Highway, and concurred with the aforementioned recommendations for the driveway to the proposed project. In addition, the County of Maui Police Department concurs that the access to and from the project should not significantly impact Hana Highway.

The project will comply with all requirements for off-street parking, loading spaces, and landscaping pursuant to Maui County Code, Chapter 19.36.

2.9 Noise

Typical of rural communities, noise levels in the vicinity of the project site is predominantly attributable to natural conditions and vehicular traffic traveling along Hana Highway. Helicopter and ambulance services associated with emergency responses at the existing medical facility currently contribute to ambient noise levels at the project site.

Impacts and Mitigation Measures

Noise from construction activities will likely be unavoidable during the entire construction period. Unavoidable construction noise impacts will be mitigated to some degree by the contractor's compliance with provisions of the State DOH Administrative Rules, Title 11, Chapter 46, "Community Noise Control." noise control regulations. These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels stated in the Chapter 46 rules. It shall be the contractor's responsibility to minimize noise by properly maintaining noise mufflers and other noise-attenuating equipment, and to maintain noise levels within regulatory limits. Also, the guidelines for the hours of heavy equipment operation and noise curfew times as set forth by the DOH noise control rules will be adhered to. During construction, the

specific location where construction activity will be occurring will change such that the actual length of exposure to construction noise from any particular receptor location will likely be less than the total construction time for the project.

In the long term, no significant noise impacts from the operation of the proposed facility are anticipated. Ambient noise levels in the immediate vicinity of the project will increase slightly as a result of the associated vehicular activity. Noise from helicopter and ambulance services will continue at their existing levels. No expansion of the services are proposed at this time and, as such, no new noise impacts are anticipated. Authorized emergency vehicles responding to an emergency call or acting in an emergency are exempt from the provisions of Chapter 11-46.

2.10 Air Quality

Within the immediate vicinity, air quality is typical of rural communities. The sparsity of development and exposure to trade winds promote good air quality in the project areas. The only identifiable source of emissions is the light volume of traffic along Hana Highway.

Currently, there are two DOH air monitoring stations on the island of Maui, but only PM_{10} is measured at both stations. One station is located in Kihei, the other in Paia. Since the two stations began operation in June and August of 1996, respectively, PM_{10} levels are well below the 50 $\mu g/m^3$ annual and 150 $\mu g/m^3$ 24-hour State and Federal ambient air quality standards (AAQS).

Impacts and Mitigation Measures

The proposed project will have short-term construction-related impacts on air quality, including the generation of dust and emissions from construction vehicles, equipment, and commuting construction workers. The construction contractor is responsible for complying with State DOH Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control," specifically Section 11-60.1-33 regarding fugitive dust and the prohibition of visible dust emissions at property boundaries.

Mitigation measures to address short-term impacts include:

- Minimizing the movement of construction vehicles during peak traffic periods; and,
- Controlling the generation of fugitive dust through frequent watering of unpaved roads and areas of exposed soil and planting landscaping as soon as possible on completed areas.

In the long term, it is not anticipated that traffic associated with the proposed project will adversely affect air quality, since no significant increase in traffic attributable to the project is projected.

2.11 Utilities

Water: The Hana region is serviced in part by the County of Maui Department of Water Supply. The County's water system is served by two deep wells, on at Wakiu and one at Hamoa, located at the north and south ends of the system, respectively. A series of pipelines connect these sources to Hana Town. The water system in the project vicinity includes a 12-inch line under Hana Highway. South of the intersection of Hana Highway and Uakea Road, the 12-inch line continues under Uakea Road. A 1 1/2-inch line is located under Hana Highway. The project overlies the Kawaipapa aquifer.

Impacts and Mitigation Measures

As the project design progresses, the Department of Water Supply will be consulted regarding the projected water demand of the new facility and the adequacy of the current water system to accommodate this demand. A recommended by the Department of Water Supply the following measures will be considered to reduce the water demand of the proposed project:

- Eliminate Single-Pass Cooling;
- Utilize Low-Flow Fixtures and Devices;
- Maintain Fixtures to Prevent Leaks;
- Use Climate-Adapted Plants; and
- Prevent-Over-Watering by Automated Systems

A BMP will be developed to protect the integrity of groundwater resources which, in the project area includes the Kawaipapa aquifer.

Wastewater : The Hana region is not presently served by a municipal wastewater system or treatment facility. Residences and small businesses in the region provide on-site, individual wastewater treatment systems such as septic tanks, cesspools, and packaged treatment plants.

Impacts and Mitigation Measures

A new individual wastewater system will be required to accommodate wastewater generated by the proposed project. Pursuant to Chapter 62, State Department of Health Administrative Rules, the Hana region is indicated as a critical wastewater disposal area, and that individual systems such as septic tanks or package treatment plants are required as a means for wastewater disposal for such areas. Plans for the proposed wastewater system will be determined as the project design progresses, and will be submitted for approval to the Maui District Health Office prior to construction.

Drainage: The County of Maui, Department of Public Works & Waste Management does not have a drainage master plan for the Hana region. Throughout the region, storm runoff typically drains into natural drainageways and subsequently into the ocean. A drainage report will be submitted to the County of Maui Department of Public Works and Waste Management prior to construction of the project.

2.12 Solid Waste

Solid waste in the vicinity of the project vicinity is collected by the County of Maui Department of Public Works, or by private collection services and transported to the Hana landfill. Hana landfill is a County maintained facility located on a 30-acre site makai of Hana Highway near Kainalimo Cove.

Impacts and Mitigation Measures

The project will contribute a relatively small increase in solid waste disposal at the Hana landfill site. Solid waste generated by the project during its construction and operation will be collected and disposed of by a private collection contractor, and therefore will not

impact municipal services. A Solid Waste Management Plan will be submitted to the County of Maui Department of Public Works and Waste Management for review and approval prior to project construction.

2.13 Electrical

The Maui Electric Company, Ltd. was consulted during the Draft EA review process and will continue to be consulted as the project design progresses and details regarding electrical requirements become available.

2.14 Socio-Economic Characteristics

The following summary of the socio-economic environment is based on demographic and housing data from the 1990 U.S. Census of Population and Housing. Based on this data, the project site is within the boundaries of the Hana District Census Tract 301. This census tract encompasses the entire Hana District extending from its northern shoreline at Makaiwa Bay, mauka along Oopuola and Waikamoi Streams, then along the boundaries of Haleakala National Park and the Kahikinui Forest Reserve, and makai along the boundary between Auahi and Kanaio to Kanaloa Point on the southern shoreline of the region.

2.14.1 Population and Economy

In 1990, the resident population of Maui County was 100,374, approximately 9 percent of the State of Hawaii's total population. Hana District had a resident population of 1,895, a 33.2 percent increase from its 1980 population of 1,423. Table 3 highlights the demographic characteristics of the Hana District.

The region's economy is based primarily on diversified agriculture, the visitor industry, government services, and subsistence activities. Diversified agricultural activities include ranching, tropical fruit, flower and foliage, and taro cultivation. Visitor accommodations, including the Hotel Hana-Maui, are centered in Hana Town.

Table 3
1990 Demographic Characteristics

CHARACTERISTICS	HANA Census Tract 301	MAUI COUNTY
Total Population	1,895	100,374
Age		
Median Age	31.1	33.4
Under 18 years	641	26,883
Over 65 years	175	11,359
Sex		
Male	998	51,201
Female	897	49,173
Ethnicity		
White	737	39,766
Black	7	494
Amer. Indian, Eskimo, or Aleutian	15	521
Asian or Pacific Islander	1,124	57,885
Other	12	1,708
Hispanic Origin (any race)	174	7,781
Housing		
Total Housing Units	763	42,160
Occupied Housing Units	589 (77.1%)	33,145 (78.6%)
Owner occupied	332 (43.5%)	19,083 (45.2%)
Renter occupied	257 (33.6%)	14,062 (33.3%)
Units with 1 or more persons per room	152 (19.9%)	5,411 (12.8%)
Monthly Rent		
Less than $250	31	1,368
$250 to $499	41	2,359
$499 to $749	35	3,878
$749 to $999	10	2,639
$1,000 or more	7	1,999

Source: Maui County Data Book 1996 - 1997

Impacts and Mitigation Measures

The proposed project will have generally positive social and economic impacts in the region. In the short-term, the project will confer some positive benefits in the local area. The project will add construction jobs in the vicinity, thereby stimulating that sector of the economy. Direct economic benefits will result from construction expenditures both through the purchase of materials from local suppliers and through the employment of local labor. Indirect economic impacts may include benefits to local retail businesses

resulting from construction activities. Construction activities associated with the proposed project will create some adverse impacts such as minor disruptions of traffic and increased noise nuisances in the immediate vicinity of the project site.

Once operational, the proposed project will increase employment opportunities in the Hana region. The project will also aid the long-term economic viability of the region by ensuring the availability of medical services for residents and businesses. Additionally, improved medical services resulting from the proposed project will promote the public health, safety and welfare of the Hana region. It is projected that the population of the Hana region will increase to 2,170 by the year 2000 and to 2,349 to 2,452 by the year 2010. The proposed project will be well-equipped to serve the existing and future generations of the Hana region.

2.14.2 Police, Fire and Medical Services

Police Protection: The Maui County Police Department is headquartered at its Wailuku Station. The Hana region is served by the Hana District Police Station, which is located at the intersection of Uakea Road and Hana Highway approximately 500 feet south of the project site.

Impacts and Mitigation Measures

The project is not anticipated to significantly impact the operations of the police department.

Fire Protection: Fire protection in the Hana District is provided by the Maui County Fire Department Hana Station. The Hana Fire Station, is staffed by nine firefighters and equipped with two trucks. Located approximately 500 feet from the project site, the station provides 24-hour protection and assistance in medical emergency situations.

Impacts and Mitigation Measures

The project is not anticipated to significantly impact the operations of the fire department.

Medical Facilities: Maui Memorial Medical Center is the only full-service medical facility on the island of Maui. Located at the project site, the existing Hana Community Health Center

provides medical and dental services to community residents from Keanae to the north and Kaupo to the south, including Nahiku, Hana, and Kipahulu.

Impacts and Mitigation Measures

The proposed project will result in positive benefits to the Hana District by providing a comprehensive medical facility that is better equipped than the existing health center to service its residents. Due to the growth in the resident population of Hana, the existing center is inadequate to serve the medical needs of the community. As aforementioned in Section 2.13.1, according to the 1990 U.S. Census report, the Hana District experienced a 33.2 percent increase in population from the 1,423 in 1980 to 1,895 in 1990. Further, it is projected that the population of the Hana region will increase to 2,170 by the year 2000 and to 2,349 to 2,452 by the year 2010.

In addition, because of Hana's geographic isolation from the remainder of the island, its residents must travel a 2-hour, 57-mile course to the nearest emergency room located in Wailuku. Thus, the medical needs of these residents will be met via the provision of the proposed quality healthcare facility in proximity to Hana Town.

3. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

This section discusses State and County of Maui land use controls, and County plans and policies relating to the proposed project.

3.1 State Land Use District

The Hawaii Land Use Law of Chapter 205, Hawaii Revised Statutes, classifies all land in the State into four land use districts: Urban, Agricultural, Conservation, and Rural. The project site is designated within both the agricultural and rural districts. As illustrated in Figure 6, TMK 1-4-03:22 lies within the Agricultural and Rural Districts, while TMK 1-4-03:24 lies within the Rural District. Healthcare facilities are not designated as a permitted use within either land use classification. According to the County of Maui Planning Department, a special permit from the County of Maui Planning Commission will be required for the portion of Parcel 22 that lies within the Agricultural District.

3.2 County of Maui General Plan

The General Plan for the County of Maui (adopted 1991) was amended by the Maui County Council in 1993. The Plan is a narrative document which sets forth strategies to shape the County's physical, social and economic environments. These strategies are expressed as statements of objectives and policies which are used by the County in decision-making and in developing and implementing plans and programs. The Maui County Charter, in expressing the intent of the General Plan, provides that:

> *"The purpose of preparing a general plan is to recognize and state the major problems and opportunities concerning the needs and the development of the county and the social, economic and environmental effects of such development to set forth the desired sequence, patterns and characteristics of future development."*

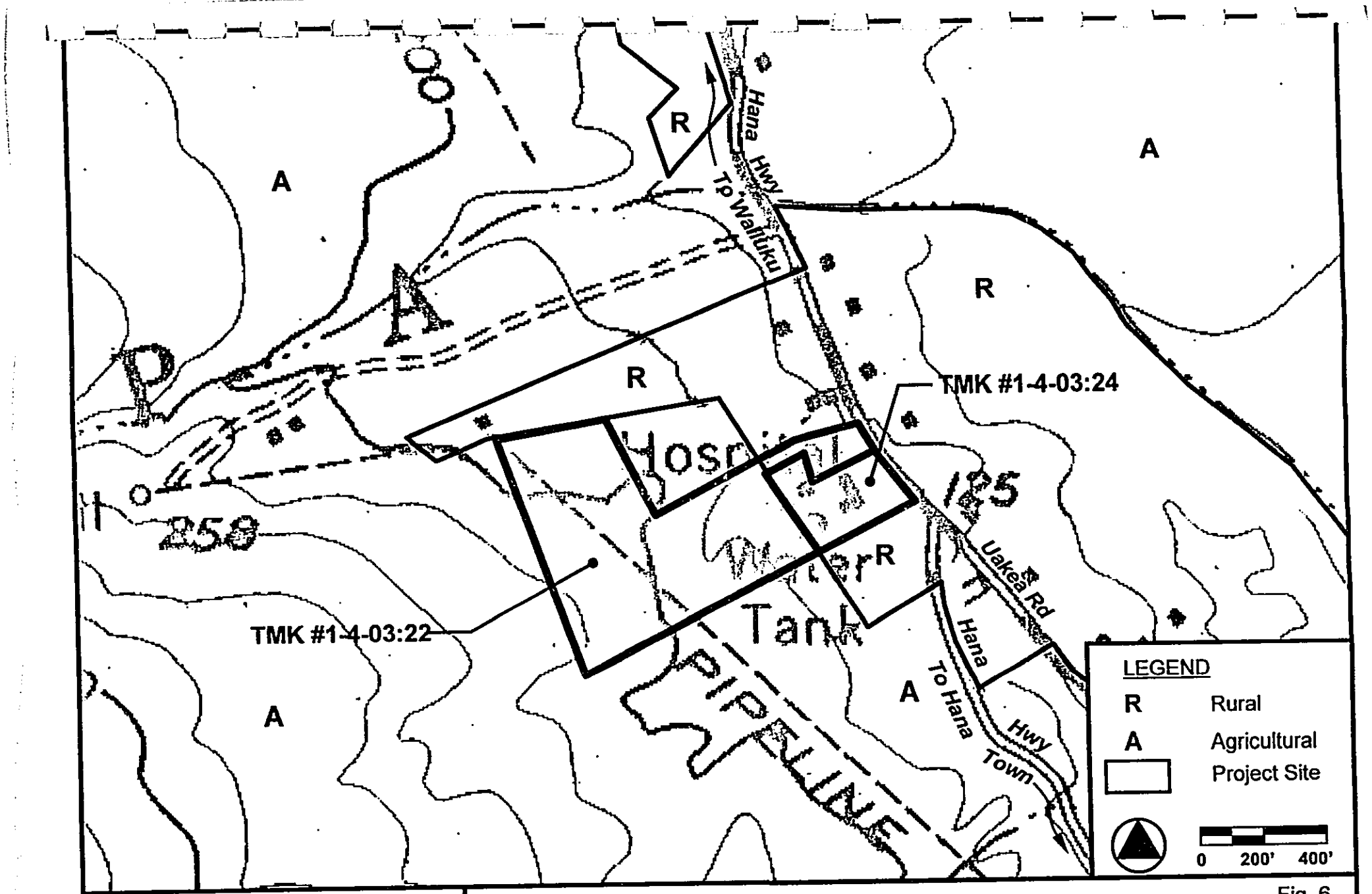


Fig. 6

Hana Community Healthcare Campus

State Land Use District Map

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

Furthermore,

> *"It shall contain statements of the general, social, economic, environmental and design objectives to be achieved for the general welfare and prosperity of the county through government action, county, state or federal."*

The relationship of the proposed project to the relevant objectives and policies of the General Plan are as follows:

V. SOCIAL INFRASTRUCTURE

C. Health and Family

Objective

1. To meet the health needs of all residents and visitors

Policies

a. Encourage the expansion and improvement of our hospitals and our public and private medical facilities.

The proposed project will improve the availability of medical services to residents and visitors in the Hana region.

3.3 County of Maui Hana Community Plan

The Hana Community Plan, one of nine (9) community plans for Maui County, reflects current and anticipated conditions in the Hana region, and advances planning goals, objectives, policies and implementation considerations to guide decision making in the region through the year 2010. The Hana Community Plan provides specific recommendations to address the goals, objectives and policies contained in the General Plan, while recognizing the values and unique attributes of Hana, in order to enhance the region's overall living environment. The project site is consistent with the following Hana Community Plan goals, objectives and policies:

LAND USE

Goal

An efficient distribution of urban, rural and agricultural land uses in order to provide for the social and economic well-being of residents in the Hana Community Plan region.

Preservation and enhancement of the current land use patterns which establish and enrich the Hana CommunityPlan region's unique and diverse qualities.

Objectives and Policies

8. Discourage urban land uses and Special Use Permits outside of the Hana Town area except to allow those activities which are essential to the region's economic well-being, which provide essential services for the residents of the Hana District, or which provide for the essential domestic needs of remote communities such as Ke`anae, Kipahulu and Kaupo. Such activities shall not adversely affect surrounding neighborhoods and shall be supportive of the agricultural activities of the area.

Comment: As the sole medical facility in the Hana region, the Hana Community Medical Center provides essential medical and healthcare needs to the Hana region, including remote communities such as Keanae, Nahiku, Kipahulu, and Kaupo. The center is currently inadequate to serve the essential medical needs of the community, and the new facility is needed to properly serve the existing and future generations of the Hana district. The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District and, thereby preclude the need for residents to drive more than 50 arduous miles to Wailuku for their medical needs. The proposed project represents the expansion and improvement of a vital existing land use, rather than a new urban-intensive land use.

CULTURAL RESOURCES

Goal

Identification, preservation, protection, and where appropriate, restoration of significant cultural resources and practices, that provide a sense of history and identity for the Hana region.

Objectives and Policies

1. Identify, preserve and protect historically, archaeologically and culturally significant areas, sites, and features within the Hana District.

Implementing Actions

2. *Require development projects to identify all cultural resources within or adjacent to the project area as part of the County development review process. Further require that all proposed development include appropriate mitigation measures including site avoidance, adequate buffer areas and interpretation.*
3. *General site types and areas that should be flagged for preservation during development review include the following:*
   Plantation era structures and homes

Comment: As discussed in Section 2.7.2, the Archaeological Inventory Survey prepared by Paul .H. Rosendahl, Ph.D., Inc. (PHRI) in May identified four subsurface archaeological sites. Of these, three were identified under the significance category "X", pursuant to the National Register criteria for evaluation as outlined in the Code of Federal Regulations (36 CFR Part 60). Category "X" sites are defined as being important for information content, but which no further data collection is necessary. According to the report, the data collected from these sites was sufficient and there was no preservation potential. In a letter dated July 23, 1993, the Department of Land and Natural Resources State Historic Preservation Division (SHPD) concurred that the sites were "...'no longer significant', having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey".

The fourth site, comprised of a complex of four features, was identified under significance category "A", which is important for information content and which requires further data collection. SHPD also concurred with this recommendation and, subsequently, PHRI prepared an Archaeological Mitigation Program in April 1996. The SHPD determined in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work was recommended.

There are five structures located on the project site, including the Hana Health Center facility, the office and residence of the facility's executive director, the emergency medical service building, the emergency generator/storage building, and a single structure.

Buildings that are 50 years or older may be eligible for inclusion on the Register of Historic Places depending on their historic significance. With the exception of the existing health center building, it is probable that one or more of the buildings may meet this minimum age criterion. In addition, there is a former concrete incinerator structure located near the center of the property that may also meet the age criterion. If it is determined that the buildings and oven structure are at least 50 years old, it is possible that they may be eligible for inclusion on the Register of Historic Places. Based on preliminary discussions with the State Historic Preservation Division (SHPD), there is no documentation regarding the potential significance of the design or construction dates of the existing structures (Staff Communication, December 14, 1998).

Contingent on consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site to accommodate the proposed project, with the exception of the health center building, which is planned for renovation.

The SHPD and the County of Maui Planning Department have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined.

ECONOMIC ACTIVITY

Goal

A balanced local economy which provides long-term viability and sustainability while meeting resident's needs and respecting the cultural and natural resources of Hana.

Objectives and Policies

1. *Encourage a local economy which provides employment choices for the region's residents and which provides future employment opportunities for the region's youth.*
2. *Utilize existing components of the local economy to establish a framework for balanced regional economic development.*
12. *Encourage contractors to employ qualified Hana District residents when constructing facilities or other structures within the Hana District.*

Comment: The proposed project will help to support the long-term viability and sustainability of the Hana District by providing essential healthcare and emergency medical services to its residents, as well as by providing long-term employment opportunities associated with the operation of the facility. In addition, short-term construction-related employment opportunities will also be created by the proposed project. These jobs will become available to qualified individuals including residents of Hana District. The proposed project represents an expansion and improvement of an existing land use that is vital to the region.

URBAN DESIGN

Goal

Harmony between the natural and man-made environments through building, infrastructure and landscaping design which ensures that the natural beauty and character of the Hana region is preserved.

Objectives and Policies

1. *Support design controls for Hana Town and the Hana region based on maintaining the existing low rise character and rural scale of the area*

Implementing Actions

3. *Limit building height to two stories or thirty-five (35) feet above grade throughout the region.*

Comment: The proposed project is consistent with the design standards of the Hana Community Design Guidelines. All proposed structures will be single story and well within the 35-foot height limit. The design will utilize building materials of moss lava rock, board and batten siding and metal roofs. Building colors will be naturally hued with matte finishes so as not to detract from the rural character of Hana.

SOCIAL INFRASTRUCTURE

Goal

An efficient and responsive system of people-oriented public services which enable residents to live a safe, healthy and enjoyable lifestyle, and offer the youth and adults of the region opportunities and choices for self and community improvement.

Objectives and Policies

Public Health and Safety

4. *Improve emergency rescue services and medical services for the Hana region.*
5. *Encourage the provision of public health education programs, including mental health counseling services.*
8. *Encourage upgrading and expanding the facilities at the Hana Medical Center.*

Comment: The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District. The new facility will provide improved and expanded emergency rescue and expanded medical services the District.

3.3.1 Community Plan Land Use Map

The Hana Community Plan Land Use Map designates the project site as "P" Public/Quasi-Public (see Figure 7). Public/Quasi-Public uses are defined to include; schools, libraries, fire/police stations, government building, public utilities, hospitals, churches, cemeteries, and community centers. Staff communication of December 12, 1998 confirmed the proposed facility is consistent with the Public/Quasi-Public designation.

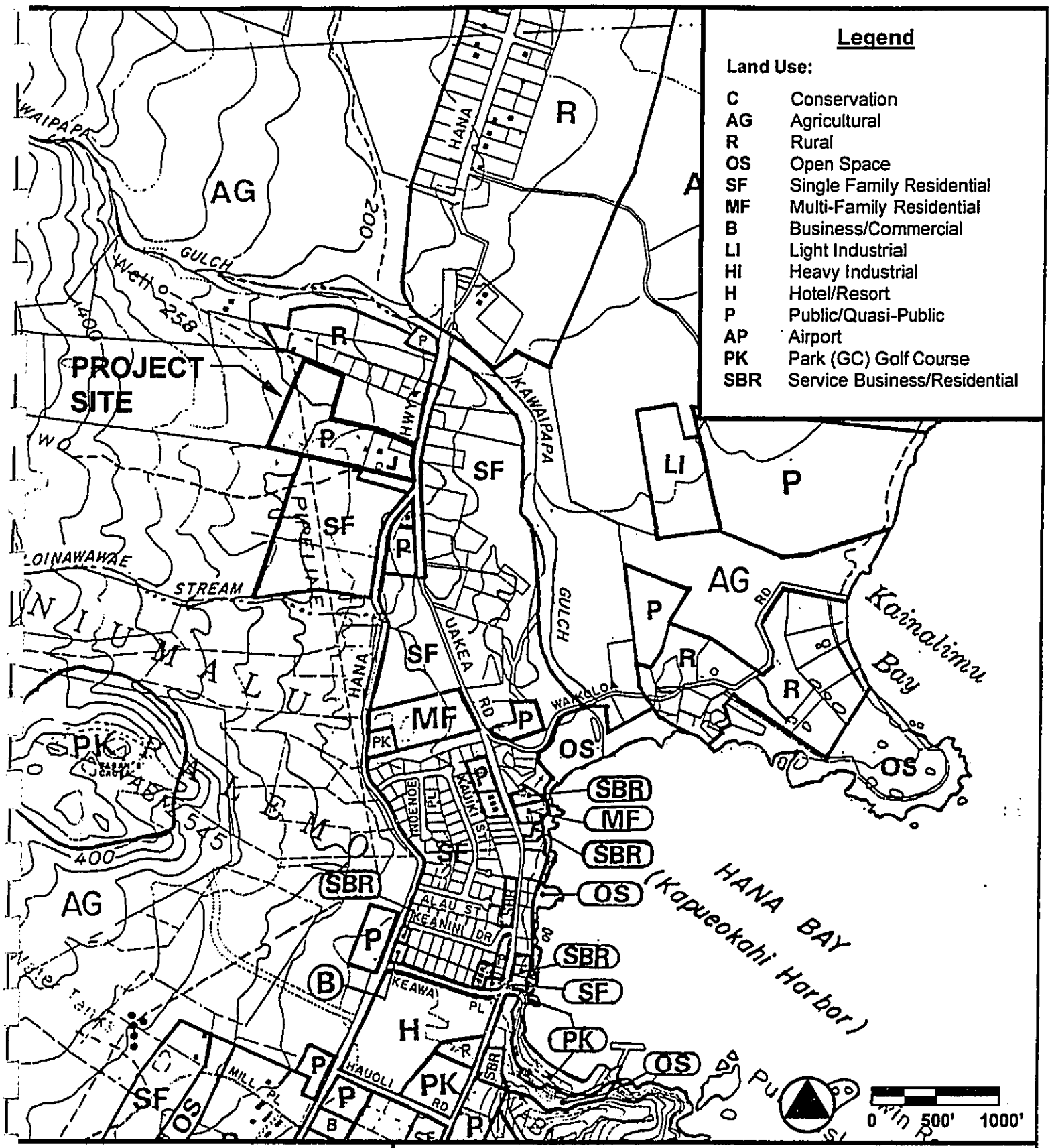


Fig. 7

Hana Community Healthcare Campus

Hana Community Plan Map

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

3.3.2 Hana Community Design Guidelines

The purpose of the Hana Community Design Guidelines, prepared in November 1997, establish architectural, landscape architectural, and engineering design guidelines for the business and commercial district established by the Hana Community Plan. The Guidelines also establishes design parameters for areas and uses outside of the business and commercial district including Service Business Residential uses, Public/Quasi Public uses and facilities, Hotel uses, and Commercial uses and subdivisions in the Rural and Agricultural Districts. The guidelines implement provisions of the Maui County General Plan (1991), the Hana Community Plan (1994), and the Maui County Code chapter 19.15 regarding Country Town Business Districts (1987).

The preliminary design plans for the proposed project are consistent with the design standards of the Hana Community Design Guidelines. A conceptual elevation of the proposed facility is illustrated in Figure 4. All proposed structures will be single story and well within the 35-foot height limit. The design will utilize building materials of moss lava rock, board and batten siding and metal roofs. Building colors will be naturally hued with matte finishes so as not to detract from the rural character of Hana. The design of the proposed facility will embrace a courtyard layout to optimize the natural ventilation, as well as facilitate outdoor views of the landscaping. All signage will be indirectly lit.

The existing Hana Medical Center building, identified on Page 23 as one of Hana's noteworthy structures, will be retained in the proposed facility.

3.4 County of Maui Zoning

The County of Maui Interim Zoning Ordinances for various districts of Maui are for the purpose of providing interim regulations pending the formal adoption of a comprehensive zoning ordinance and map. Hospitals are a permitted property use designated by the interim zoning regulations. (Staff communication of December 12, 1998 confirmed the proposed facility is consistent with the Interim Zoning Ordinances.) The project will comply with all interim zoning provisions pursuant to the County Zoning Code.

3.5 Special Management Area

The County of Maui Planning Department has indicated that the project lies outside the Special Management Area (SMA) boundary and, as such, is not subject to SMA rules.

4. DETERMINATION OF ANTICIPATED FONSI

A. Applicant

County of Maui, Mayor's Office

B. Accepting Authority:

County of Maui, Mayor's Office

C. Description of the Proposed Action

The Applicant proposes to replace the existing medical facility with a new comprehensive healthcare campus. The new facility will be constructed on approximately 12.1 acres of land located in Hana on the Island of Maui. The proposed project is comprised of several components including the construction of a Community Healthcare Center, Health and Wellness Center, on-site employee housing, and approximately 104 parking stalls, as well as the renovation of the existing health center building. In addition, a gardening area will be established in the future as part of the proposed project.

D. Determination and Reasons Supporting Determination

In general, construction and operation of the proposed Hana Community Healthcare Campus will not:

(1) Involve an irrevocable commitment to loss or destruction of any natural cultural resource;

With regard to the potential for archaeological resources within Parcel 24 (the site of the existing health center), the State Historic Preservation Division (SHPD) preliminarily indicated during the pre-assessment phase of the project that there was little potential for encountering such resources because the site has been extensively developed. Subsequently, the SHPD was consulted during the Draft EA review period and confirmed that the project will have no effect on archaeological resources on Parcel 24. Further, based on findings of the completed data recovery plan for Parcel

22, the SHPD also determined that the project would have no effect on archaeological resources on this parcel. Should any archaeological resources including human burials be encountered during construction, however, all work in the immediate vicinity will cease and the State Historic Preservation Division contacted at once.

Contingent on further consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site to accommodate the proposed project, with the exception of the health center building, which is planned for renovation.

The SHPD and the County of Maui Planning Department have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined.

(2) Curtail the range of beneficial uses of the environment;

The proposed project will not curtail the beneficial uses of the environment. Use of the project site for the proposed project would be consistent with its current use as a health center. In addition, the proposed project involves the redevelopment of a site within a rural area with uses that are consistent with the Maui General Plan and Hana Community Plan objectives, as well as Hana Community Plan Land Use and zoning designations.

(3) Conflict with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

The proposed project does not conflict with long-term environmental policies, goals, and guidelines of the State of Hawaii. As presented in this EA, the project's potential adverse impacts are associated only with short-term construction-related activities and can be mitigated through adherence to standard construction mitigation practices.

(4) Substantially affect the economic or social welfare of the community or state;

The proposed project would provide short-term economic benefits in the form of construction jobs, and long-term economic benefit through the creation of medical and health-related employment opportunities. The proposed project would positively impact the welfare of the community by providing a comprehensive medical facility that is well equipped to service the Hana District and, thereby preclude the need for residents to drive to Wailuku for their medical needs.

(5) Substantially affect public health;

Due to the growth in the resident population of Hana, the center is currently inadequate to serve the medical needs of the community. According to the 1990 U.S. Census report, 1,895 residents live in the Census Tract 301 which comprises most of the Hana Distinct. This represents a 33.2 percent increase from the 1980 population of 1,423. Further, it is projected that the population will increase to 2,170 by the year 2000 and to 2,349 to 2,452 by the year 2010. The new facility will properly serve the current and future generations of the Hana district.

(6) Involve substantial secondary impacts, such as population changes or effects on public facilities;

No secondary effects are anticipated with the construction or operation of the proposed project. The project, in and of itself, is not anticipated to affect the population of the Hana District. Rather, the facility is proposed to fulfill an essential community need. With regard to public facilities, the proposed project is not anticipated to significantiy impact traffic flow on Hana Highway. The project will, however, require connections to the County's water system and the Department of Water Supply will continue to be consulted as the project design progresses and details regarding water system needs become available. In addition, a new individual wastewater system will be required to accommodate wastewater generated by the proposed project. Plans for the proposed wastewater system will be determined as the project design progresses, and will be submitted for approval to the Maui District Health Office prior to construction.

(7) Involve a substantial degradation of environmental quality;

Construction activities associated with the proposed project are anticipated to result in relatively insignificant short-term impacts to noise, air quality, and traffic in the immediate project vicinity. With the incorporation of the recommended mitigation measures during the construction period, the project will not result in degradation to the environmental quality.

(8) Individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

No cumulative effects are anticipated, inasmuch as the proposed project involves redevelopment of the site within a rural area with uses that are consistent with the County land use plans and designations.

(9) Substantially affect a rare, threatened, or endangered species, or its habitat;

The U.S. Fish and Wildlife Service has confirmed that there are no known rare, threatened or endangered species of flora or fauna or associated habitat that have been identified on the project site that could be adversely affected by the construction and operation of the proposed project.

(10) Detrimentally affect air or water quality or ambient noise levels;

There are no surface water sources on or near the project site. Streams located in closest proximity to the project site, include the Kawaipapa Stream and the Holoinawawae Stream which are both located approximately one-half mile from the project site. Similarly, the shoreline is located approximately one-half mile from the project site. Thus, no significant short-or long-term impact to water quality are anticipated as a result of the project.

Operation of construction equipment would temporarily elevate ambient noise and concentrations of exhaust emission in the immediate vicinity of the project site. The proposed project will have short-term construction-related impacts on air quality, including the generation of dust and emissions from construction vehicles, equipment, and commuting construction workers. The

construction contractor is responsible for complying with State DOH Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control," specifically Section 11-60.1-33 regarding fugitive dust and the prohibition of visible dust emissions at property boundaries. Unavoidable construction noise impacts will be mitigated to some degree by the contractor's compliance with provisions of the State DOH Administrative Rules, Title 11, Chapter 46, "Community Noise Control." noise control regulations. These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels stated in the Chapter 46 rules. Operation of the proposed project will have no significant long-term impact on air quality or ambient noise levels in the vicinity.

(11) Affect or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;

The project is not located within a flood plain or otherwise environmentally sensitive area. A drainage report and erosion control report will be submitted to the County of Maui Department of Public Works and Waste Management.

(12) Substantially affect scenic vistas and viewplanes identified in county or state plans or studies; or,

The proposed project will alter the visual setting by replacing older structures with new ones. The new structures, however, will comply with applicable development standards of the existing zoning and community plan designations, as well as the Hana Community Design Guidelines.

(13) Require substantial energy consumption.

Construction and operation of the project will not require substantial increases in energy consumption.

5. ALTERNATIVES TO THE PROPOSED ACTION

5.1 No Action Alternative

In the no action alternative, the project site would remain in its current state. The existing healthcare center would continue to be inadequate to meet the healthcare needs of the Hana residents, and residents would still be required to travel to Wailuku for specific medical procedures. Parcel 22 would remain in its current overgrown and underutilized condition.

5.2 Alternative Site Development Concept

An elderly assisted living component was previously considered for incorporation into the project. Results of a market feasibility analysis, however, indicated that such a component would not be viable and was therefore eliminated from consideration. The proposed project is considered to be an economically viable alternative for the project site. The project design is in the conceptual stage and, therefore, some modifications to the proposed project may occur as design development progresses.

6. PERMITS AND APPROVALS

The following is a list of permits and approvals, which may be required prior to construction of the proposed project:

State of Hawaii

Department of Health

- National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges Associated with Construction Activity
- Noise Variance Permit
- Permit for Air Emissions
- Commission on Persons With Disabilities (Review pursuant to Americans With Disabilities Act Accessibility Guidelines (ADAAG))

County of Maui

- Subdivision Approval
- Special Permit
- Grubbing and/or Grading Permits

7. PARTIES CONSULTED DURING THE DRAFT EA COMMENT PERIOD

The following agencies and organizations were consulted during the public review period of the Draft EA. Of the 16 parties that formally replied during the review period, some had no comments while other provided substantive comments as indicated by the ✓ and ✓✓, respectively. All written comments are reproduced herein.

Federal Agencies

✓✓ U.S. Department of Agriculture - Natural Resources Conservation Service
✓ U.S. Department of the Army - Corps of Engineers
✓✓ U.S. Department of the Interior - Fish and Wildlife Service
U.S. Department of the Interior - Geological Survey

State of Hawaii

Department of Land and Natural Resources (DLNR)
✓✓ DLNR State Historic Preservation Division
DLNR Land Division
✓✓ Department of Transportation
✓✓ Department of Business, Economic Development and Tourism – Land Use Commission
✓✓ Department of Health (DOH)
DOH Environmental Division
✓✓ Office of Environmental Quality Control

County of Maui

✓✓ Planning Department
✓✓ Department of Public Works and Waste Management
✓✓ Department of Water Supply
✓✓ Police Department
✓ Fire Department

Organizations and Elected Officials

✓ Councilmember J. Kalani English
Hana Community Association
✓✓ Maui Electric Co., Ltd.
GTE Hawaiian Tel
✓✓ Hana Affordable Housing and Community Development Corporation

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

REPLY TO ATTENTION OF

March 18, 1999

Civil Works Branch

Mr. David Ching
Office of the Mayor
County of Maui
Community Development Block Grant Program
200 South High Street
Wailuku, Maui, Hawaii 96793

MAR 19 1999

Dear Mr. Ching:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) for the Hana Community Healthcare Campus, Hana, Maui (TMKs 1-4-3: 22 and 24). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, a DA permit will not be required for the project.

b. The flood hazard information provided on pages 2-4 to 2-5 of the DEA is correct.

Sincerely,

Paul Mizue, P.E.
Chief, Civil Works Branch

Copies Furnished:

Mr. James Stone
Kober, Hanssen, Mitchell Architects
55 Merchant Street, Suite 1400
Honolulu, Hawaii 96813-4313

✓Mr. Earl Matsukawa
Wilson Okamoto and Associates
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

6272-01
May 22, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808) 946-2277
FAX (808) 946-2253

Mr. Paul Mizue, P.E.
Chief, Civil Works Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Attention: Civil Works Department

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Mizue:

We are in receipt of your letter dated March 18, 1999 commenting the subject EA. We appreciate the information you provided that the project will not require a Department of the Army permit, as well as your verification of the flood hazard designation. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

USDA

United States Department of Agriculture

Natural Resources Conservation Service

P.O. Box 50004
Honolulu, HI
96850

Our People...Our Islands...In Harmony

March 19, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

Subject: Draft Environmental Assessment (DEA) - Hana Community Campus, Hana, Maui, Hawaii

We have reviewed the above mentioned document and have no comments to offer at this time.

Thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc:
Mr. James Stone, AIA, Kober/Hanssen/Mitchell Architects, 55 Merchant Street, Suite 1400, Harbor Court, Honolulu, Hawaii 96813-4313
Mr. Earl Matsukawa, AICP, Wilson Okamoto & Associates, Inc., 1907 South Beretania Street, Suite 400, Honolulu, Hawaii 96826

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Mr. Kenneth M. Kaneshiro
State Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Kaneshiro:

We are in receipt of your letter dated March 19, 1999 stating that you have no comments on the subject EA. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

LM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

RECEIVED
JUL 15 1999
WILSON OKAMOTO & ASSOC., INC.

JUL - 9 ~~1999~~

In Reply Refer To: MR

Laura Mau
Wilson Okamoto and Associates, Inc.
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Re: Hana Community Healthcare Campus Draft Environmental Assessment

Dear Ms. Mau

This memorandum confirms a July 8, 1999 telephone call from Mike Richardson to you in which he stated that to the best of our knowledge, the U.S. Fish and Wildlife Service (Service) has not identified any Federally threatened or endangered species in the proposed project area. Furthermore, the Service has no objections to the project based upon the information your agency provided in the Draft EA.

We appreciate the opportunity to comment on the proposed project and apologize for the delay. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Mike Richardson by telephone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

Sincerely,

Barbara A. Mafield, acting
for Robert P. Smith,
Pacific Islands Manager

6272-01
May 22, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS PLANNERS
1907 S. BERETANIA ST. SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX (808)946-2253

Mr. Robert P. Smith
Pacific Islands Manager
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

Attention: Mr. Mike Richardson

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Smith:

We are in receipt of your letter dated July 9, 1999 verifying that no Federally threatened or endangered species have been identified in the project area. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

March 10, 1999

Mr. David Ching
Community Development Block Grant
Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
MAR 12 1999
WILSON OKAMOTO & ASSOC., INC.

Dear Mr. Ching:

Subject: Draft Environmental Assessment (DEA) for the Hana Community Healthcare Campus, Hana, Maui, Hawaii, TMK 1-4-03: 22 and 24

We have reviewed the DEA for the subject project and confirm that TMK 1-4-03: 22 is designated within the State Land Use Agricultural and Rural Districts, and that TMK 1-4-03: 24 is designated within the State Land Use Rural District.

We suggest that the Final EA include a map showing the subject parcels in relation to the State land use districts.

We have no further comments to offer at this time. We appreciate the opportunity to comment on the subject DEA.

Should you have any questions, please feel free to call me or Bert Saruwatari of our office at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

cc: James Stone
Earl Matsukawa
OEQC

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Ms. Esther Ueda, Executive Officer
State of Hawaii
Department of Business, Economic Development and Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Ms. Ueda:

We are in receipt of your letter dated March 10, 1999 confirming the land use designations the study area. Pursuant to your suggestion, we will include in the Final EA a map indicating the two parcels that comprise the study area in relation to the State land use districts. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

EM

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

March 23, 1999

David Ching
Office of the Mayor
County of Maui
200 South High Street
Wailuku, HI 96793

Dear Mr. Ching:

Subject: Draft Environmental Assessment (EA) for Hana Community Healthcare Campus, TMK: 1-4-3:22 and 24

In order to reduce bulk and conserve paper, we recommend printing on both sides of the pages in the final document. In addition we have the following comments:

1. Contacts: In the final EA include copies of any correspondence made during the preconsultation phase of this project.

2. Landscaping: Some landscaping is shown in the facility renderings, but not discussed in the text. We encourage the use of native Hawaiian plants and trees to landscape the new facility.

3. Sustainable Building Design: Please consider applying sustainable building techniques as presented in the enclosed "Guidelines for Sustainable Building Design in Hawaii." In the final EA include a description of any of the techniques you will implement.

4. Emergency facilities:

   Ambulances:The draft EA mentions the use of an ambulance. Will additional ambulances be employed with the new facility? Discuss the impacts expected and mitigation measures which will be used to reduce these impacts.

   Helicopters: If new or additional helicopter use is being considered, a supplemental draft EA must be submitted, disclosing full details of this use, along with potential impacts and related mitigation measures.

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

Sincerely,

for GARY GILL

Enc.

c: Earl Matsukawa, Wilson Okamoto
Kober/Hanssen/Mitchell Architects

DRAFT

Guidelines for Sustainable Building Design in Hawaii

A planner's checklist OEQC September 1998

Introduction:
What is a "sustainable" building?
A sustainable building is built to minimize energy use, expense, waste, and impact on the environment. It seeks to improve the region's sustainability by meeting the needs of today's market without compromising the needs of future generations. Compared to conventional projects, a resource-efficient building project will:

I. Use less energy for operation and maintenance

II. Contain less *embodied* energy (e.g. locally produced building products contain less *embodied* energy than imported products because they require less energy-consuming transportation to the site)

III. Protect the environment by preserving/conserving water and other natural resources and by minimizing impact on the site ecosystem

IV. Minimize health risks to those who construct, maintain, and occupy the building

V. Minimize construction waste

VI. Recycle and reuses generated construction wastes

VII. Use resource-efficient building materials

VIII. Provide the highest quality product practical at competitive (affordable) prices

Hawaii law calls for efforts to conserve natural resources, promote careful use of water, efficient use of energy and recycle all waste products. To meet this goal, special care must be taken to plan a project from the very beginning to be in keeping with sustainable building design concepts.

The purpose of the state's environmental review law (HRS Ch. 343) is to encourage full, accurate and complete analysis of proposed actions, promote public participation and support enlightened decision making by public officials. To assist agencies and applicants in meeting this legal purpose, the Office of Environmental Quality Control offers the following guidelines for preparers of environmental reviews under the authority of HRS 343.

These guidelines do not constitute rules or law. They have been refined by staff and peer review

to provide a helpful checklist of items that will assist planners to design projects that will have a minimal effect on Hawaii's environment and make wise use of our natural resources. In a word, projects that are *sustainable*.

In order to avoid excessive overlapping of items, the checklist is designed to be read in totality, not just as individual sections. This checklist tries to address large scale projects as well as smaller projects. Please use items that are appropriate to the scale of the project.

Although this list will help promote careful and sensitive planning, mere compliance with this checklist does not confirm sustainability. Compliance and knowledge of current building codes by users of this checklist is also required.

TABLE OF CONTENTS

I. Team Building

___ Hold programming team meeting with client representative, Project Manager, planning consultant, architectural consultant, civil engineer, mechanical, electrical, plumbing (MEP) engineer, structural engineer, landscape architect, interior designer, sustainability consultant and other consultants as required by the project. Identify project and environmental goals. Client representatives and consultants to work closely to ensure that environmental and project goals are met.

___ Develop sustainable guideline goals to insert into outline specifications as part of the Schematic Design documents. Extract applicable goals from the following sections as appropriate to project.

___ Use Benefit Cost Method for economic analysis of the sustainability measures chosen. (Benefit Cost Method is a method of evaluating projects or investments by comparing the present value or annual value of expected benefits to the present value or annual value of expected cost.)

___ Include "Commissioning" in the project budget and schedule. (Commissioning is the process of verifying that equipment and systems are installed and are able to operate according to the design and operational needs. It improves the performance of building, resulting in energy conservation and efficiency, improves air quality and lowers operation costs. *Refer to Section IX.*)

II. Building Design

___ Consider renovating an existing building instead of demolishing and/or constructing a new building.

___ Plan for high flexibility while designing building shell and interior spaces to accommodate changing needs of the occupants, and hence possibly extend life span of building.

___ Design for re-use and/or disassembly. For building products, see Section VII.

___ Provide facilities for bike/walking commuters (showers, lockers, bike racks).

___ Plan for comfortable and healthy work environment. Include inviting outdoor spaces, wherever possible. *(Refer to Sections VII and VIII.)*

___ Design space for recycling/waste diversion opportunities during occupancy.

___ Design with an integrated pest management approach. Investigate using products such as Termi-mesh, Basaltic Termite Barrier and Sentricon to limit pest access into structure.

___ Design building that is energy efficient and resource efficient. *(See Sections III, IV, V, VI, VII.)* Determine building by-products such as heat, gray-water etc., and plan to minimize them or find alternate uses for them.

___ For natural cooling, use
1. Reflective roof, radiant barrier or insulation, roof vents
2. Light colored paving (concrete) and building surfaces
3. Tree Planting to shade buildings and paved areas
4. Building orientation and design to capture trade winds.

III. Site Selection & Site Design

Site Selection

___ Understand the site through careful analysis and assessment of site characteristics such as vegetation, topography, geology, climate, natural access to site, solar orientation patterns, water and drainage, existing utility and transportation infrastructure to determine the appropriate use of site, and design to minimize the environmental impact of the development.

___ Select site in a neighborhood, when feasible, on which the project could have a positive social, economic and environmental impact.

___ Select a site with short connections to existing municipal infrastructure (water, waste water treatment plant, roads, electricity, telephone, data and gas). Select a site close to mass transportation, bicycle routes and pedestrian access.

Site Preparation and Design

___ Preserve existing resources and natural features to enhance the design and add aesthetic, economic and practical value. Design to minimize the environmental impact on vegetation and topography.

___ Site building(s) to take advantage of natural features and maximize their function such as solar access, day-lighting and natural cooling. Design ways to integrate the building(s) with the site that maximizes site efficiencies, enhances human comfort, safety and health, as well as, achieves operational efficiencies.

___ Locate the building(s) to encourage bike and pedestrian access and pedestrian oriented uses.

___ Retain existing topsoil and maintain soil health by clearing only the areas carefully marked for construction of streets, driveways, parking areas, and building foundations. Replant exposed areas when practical. Reuse soils and vegetation excavated for fill or mulch.

___ Grade slopes to ratio less than 2 : 1 (run to rise). Balance cut and fill to eliminate hauling. Check grading frequently to prevent accidental over excavation.

___ Minimize altering natural water drainage. Provide siltation basins to protect the site during and after construction, especially, in the event of a major storm.

___ Minimize area required for the building footprint. Consolidate utility and infrastructure into common corridors to reduce unnecessary site degradation, and minimize cost, improve efficiency, centralize runoff, and reduce impermeable surfaces.

___ For ground treatment, avoid the use of pesticides or other toxic chemicals. Use alternative methods such as Termi-mesh, Basaltic Termite barrier, and Sentricon, etc.

IV. Energy Use

___ Facilitate site sensitive orientation by :
1. Minimizing impact on cooling load through site shading and east-west orientation.

2. Incorporating natural ventilation through channeling trade winds.
3. Using day lighting where possible.

___ Maximize efficiencies for Lighting, Heating, Ventilation, Air Conditioning (HVAC) and other equipment.
___ Design south, east and west shading devices to minimize solar heat gain.
___ Utilize low shading co-efficient window system to minimize solar heat gain. Minimize effects of thermal bridging in walls, roof and window systems.
___ Eliminate hot water in restrooms when possible.
___ Pressurize building to reduce mold and mildew.
___ Obtain a copy of State of Hawaii Model Energy Code (available through the Hawaii State Energy Division, at Tel.(808)-587-3811). Exceed its requirements.
___ Use renewable energy. Consider the use of solar water heaters and photovoltaics. (Contact State Energy Office at Tel. (808)-587-3810 for information on the utility-sponsored Commercial and Industrial Energy Efficiency Programs which offer incentives to businesses for installing qualifying energy efficient technologies.)
___ Use available energy resources such as waste heat.
___ Consider design for tenant sub-metering to encourage utility use accountability.

Energy Lighting

___ Design for at least 15% lower interior lighting power allowance than the Energy code.
___ Select lamps with high efficiency, compatible with the desired light source and color rendering capabilities.
___ Select luminaires which maximize system efficacy (i.e. which deliver the light to the task, not the surrounding areas).
___ Reduce light absorption on surfaces by selecting colors and finishes with high reflectance values, but avoid glare.
___ Use task lighting with low ambient light levels.
___ Use luminaires with heat removal and recovery capabilities.
___ Maximize integration of day lighting through the use of vertical fenestration, light shelves, clerestories /monitors, and building form as well as through translucent/transparent/modular interior partitions. Coordinate electrical lighting with day lighting for maximum electrical efficiency.
___ Incorporate day lighting control, or photo/motion sensors in low or intermittent use areas.
___ Avoid light spillage in exterior lighting by using directional fixtures.
___ Minimize light overlap in exterior lighting schemes.
___ Use lumen maintenance controls.

Mechanical Systems

___ Design to comply with the Energy code and to exceed it's energy conserving requirements.
___ Utilize thermal storage for reduction of peak energy usage.
___ Use Variable air volume systems to save fan power.
___ Use variable speed drives on pumping systems and fans for cooling towers and air handlers.

___ Use air -cooled refrigeration equipment or use cooling towers designed to reduce drift.
___ Reduce need for mechanical ventilation by reducing sources of indoor air pollution. Use high efficiency air filters. Use ASHRAE standards as minimum.
___ Locate fresh air intake away from polluted or overheated areas. Locate on roof where possible. Separate air intake from air exhausts by at least 40 ft.
___ Use separate HVAC systems to serve areas that operate on widely differing schedules or design conditions.
___ Use shut off or set back controls on HVAC system when areas are not occupied.
___ Evaluate the potential use of condenser heat, waste heat or solar energy to reduce water heating energy cost. (Contact State Energy Office at Tel. (808)-587-3810 for information on the utility-sponsored Commercial and Industrial Energy Efficiency Programs which offer incentives to businesses for installing qualifying energy efficient technologies.)
___ Evaluate plug-in loads for energy efficiency and power saving features.
___ Improve comfort and save energy by reducing the relative humidity by waste reheat, heat pipes or solar heat.
___ Minimize heat gain from equipment and appliances by using:
1. Environmental Protection Agency (EPA) Energy Star rated appliances.
2. Hoods to remove heat from concentrated sources.
3. Specify high performance water heating that exceeds the Energy Code.
4. Specify HVAC system "commissioning" period to reduce occupant exposure to Indoor Air Quality (IAQ) contaminants.
5. Specify premium efficiency motors.

V. Water Use

Building Water

___ Install water efficient fixtures as required by the Uniform Plumbing Code.
___ If practical, eliminate hot water in restrooms.
___ Use infrared sensors for flushing of toilets and urinals.
___ Use self closing faucets (infrared sensors or spring loaded faucets) for lavatories and sinks.

Landscaping and Irrigation

(See Section VI.)

VI. Landscape and Irrigation

___ Incorporate water efficient landscaping (xeriscaping) using the following principles:
1. Planning. Efficient irrigation: Create watering zones for different conditions. Separate vegetation types by different watering requirements. Install moisture sensors to avoid operation of the irrigation system in the rain and if the soil has adequate moisture. Use

different types of (appropriate) sprinkler heads.
2. Soil analysis/improvement: Use (locally made) soil amendments and compost for plant nourishment, better absorption and water holding capacity.
3. Appropriate plant selection: Use drought tolerant and/or slow growing hardy grasses, native plants, shrubs, ground covers, trees, appropriate for local conditions, hence minimizing the need for irrigation. Maintain existing vegetation to encourage bio-diversity and protect nutrients.
4. Practical turf areas: Turf only in areas where it provides functional benefits.
5. Mulches: Use mulches to minimizes evaporation, reduce weed growth, retard erosion.

___ Protect existing natural site features and save native trees to prevent erosion. Establish tree protection areas well before construction.
___ Limit staging area and prevent unnecessary grading of site to protect native vegetation.
___ Use native top soil from the structure's footprint, stockpiled on the site with a silt fence in order to reduce the need for imported top soil.
___ Irrigate with non-potable water or reclaimed water. Harvest rainwater from the roof for irrigation.
___ Sub-meter the irrigation system. Locate irrigation controller within visual site of the irrigated area to verify that the system is operating properly.
___ Use pervious paving instead of concrete or asphalt paving. Integrate natural and man-made berms, hills and swales to control water runoff.
___ Avoid materials that leach out pollutants which can contaminate the water runoff. Contact the Clean Water Branch at 586-4309 to determine whether a NPDES (National Pollutant Discharge Elimination System) permit is required.
___ Use trees and bushes that are felled at the building site (i.e. mulch, fence posts, trim).
___ Use recycled landscape materials such as plastic lumber for planters and benches.

VII. Building Materials & Solid Waste Management

Design for Material

___ Use durable products. Opt for natural products or products with low embodied energy.
___ Specify and use products with recycled content such as steel, concrete with fly ash or glass, drywall, carpet etc. Use ground recycled concrete, graded glass cullet or asphalt as base or fill material.
___ Specify low toxic or non -toxic materials whenever possible, such as low VOC. (Volatile Organic Compounds) paints, sealers and adhesives, low or formaldehyde-free materials). Also avoid products with CFCs (Chloro-fluoro-carbons).
___ Use locally produced products such as plastic lumber, insulation, hydromulch, glass tiles, compost.
___ Use advanced framing systems, two stud corners, engineered structural products and panel systems.
___ Use materials which require limited or no application of finishing or surface preparation. (i.e. finished concrete floor surface).

___ Use re-milled salvaged lumber where appropriate and as available. Minimize the use of old growth timber.
___ Use sustainably harvested timber.
___ Commit to a material selection matrix for efficient and environmentally sensitive use of raw materials and building materials, and locally available building materials. (A list of Earth friendly products and materials is available through the Green House Hawaii Project. Call Clean Hawaii Center, Tel. (808)-587-3802 for the list.)

Develop a Solid Waste Management, Recycling and Diversion Plan

___ Prepare and post a job-site recycling plan at the site office.
___ Conduct pre-construction waste minimization training for employees and sub-contractors.
___ Use a central area for all cutting.
___ Establish a dedicated waste separation/diversion area. Include Waste/Compost/Recycling collection area and collection system for both construction process and building operation.
___ Separate and divert all unused or waste cardboard, ferrous scrap, construction materials, fixtures for recycling or to a salvage exchange facility. Information on "Minimizing C&D (construction and demolition) waste in Hawaii" is available through Department of Health, Office of Solid Waste Management, Tel. (808)-586-4240.
___ Use on site or divert all green waste, untreated wood and clean drywall for soil amendments.
___ Use on-site or divert all concrete and asphalt rubble.
___ Manage waste from the use of solvents, paints, sealants, etc. separate from C&D (construction and demolition) waste. Donate paint to non-profit organizations or list on HIMEX (Hawaii Materials Exchange). HIMEX is a free service operated by Maui Recycling Group, that offers an alternative to landfill disposal of usable materials, and facilitates no-cost trades. See web site, www.himex.org.
___ Use suppliers that re-use or recycle packaging material whenever possible.

VIII. Indoor Air Quality

___ Provide IAQ requirements during design and contract document phases. Requirements are to be followed during construction in order to minimize or contain IAQ contaminant sources during construction, renovation and remodeling, especially if there are occupants in the building.
___ Notify the occupants of any type of construction, renovation and remodeling.
___ Allow a flush-out period after construction, renovation and remodeling to minimize exposure to any chemicals and debris.
___ Use low-emitting materials, products, and solvents. Reduce sources of interior formaldehyde. Select furnishing and cabinetry with no VOC (Volatile Organic Compounds) off-gassing.
___ Research the original usage and design of the building before it is reoccupied to ensure that adequate amounts of fresh air is available and distributed to the occupants.

___ Asbestos and lead paint are not allowed in new buildings. Inspect for the same in existing buildings and abate as needed.
___ Stage finish application to prevent absorption of Volatile Organic Compounds (VOC's) into surrounding materials.
___ Supply workers with, and ensure use of, VOC-safe masks.
___ Install separate exhaust fans in rooms where office equipment is used, and exhaust to the exterior of the building.
___ Place bird guards over air intakes to prevent pollution of shafts.
___ Use low or non-toxic cleaners.

IX. Commissioning & Construction Project Closeout

___ Project Manager to coordinate Commissioning activities during project closeout. Criteria to be established by Architect/Engineer Consultant.
___ Provide as-built drawings and documentation for all systems and their control strategies as well as maintenance and cleaning manuals for finish materials.
___ Involved parties should successfully demonstrate all systems before final acceptance.
___ Provide flush-out period to remove air borne contaminants from the building and systems.

X. Occupancy and Operation

General Objectives

___ Develop User's Manual for building occupants that illustrates the commitment to sustainable operations.
___ Administrator's responsibilities must include ensuring that the department's sustainability policies are being carried out.

Energy

___ Purchase EPA rated, Energy Star, energy-efficient office equipment, appliances, computers, and copiers. (Energy Star is a program sponsored by U.S. Dep. Of Energy, implies that product will contribute to reduced energy costs for buildings and reduce air pollution.)
___ Institute an employee education program about efficient use of building, appliances, occupants impact on water use, energy use, etc.
___ Re-commission systems whenever modifications are made to the systems.

Water

___ Start the watering cycle in early morning in order to minimize evaporation.
___ To reduce cooling tower water consumption, increase cycles of concentration utilizing chemical treatment.

Air

___ Provide incentives which encourage building occupants to use alternatives to single occupancy vehicles.
___ Provide location map of services within walking distance (child care, restaurants, gyms, shopping).
___ Periodically monitor or check for indoor pollutants in building.
___ Provide an IAQ plan for tenants and management to establish a policy/documentation response procedure. This helps tenants understand their responsibility to protect the air quality of the facility.

Materials and Products

___ Purchase business products with recycled content such as paper, toners, ribbons.
___ Purchase Furniture made with natural, sustainably harvested wood, or with recycled materials, which will not off gas VOC's.
___ Remodeling and painting should comply or improve on original sustainable design intent.
___ Use low VOC, non-toxic, phosphate and chlorine free, biodegradable cleaning products.

Solid Waste

___ Collect recyclable business waste such as paper, soda cans, and cardboard boxes.
___ Avoid single use items such as paper or Styrofoam cups and plates, and plastic utensils.

XI. Resources

Buy Recycled in Hawaii. Clean Hawaii Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997. (Call 587-3802 for publication)

Guide to Resource-Efficient Building in Hawaii. University of Hawaii at Manoa, School of Architecture and Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, October 1998. (Call 587-3804 for publication)

Minimizing Construction and Demolition Waste. Office of Solid Waste Management, Department of Health and Clean Hawaii Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, February 1998. (Call 586-4240 for publication)

Hawaii Model Energy Code. Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997. (Call 587-3810 for publication)

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808)946-2277
FAX: (808)946-2253

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

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Ms. Salmonson:

We are in receipt of your letter dated March 23, 1999 commenting on the subject project. The following is offered in response to your comments:

1. Contacts: There is no formal correspondence of the pre-assessment consultation for the project.

2. Landscaping: The landscaping shown in Figure 3 is provided for illustrative purposes only. At this time, the project design is in the conceptual stage and, a landscaping plan has yet to be developed. The proposed landscape design for the facility will incorporate native Hawaiian plants and trees.

3. Sustainable Building Design: We appreciate the information you provided for "Guidelines for Sustainable Building Design in Hawaii". To the extent possible, the project will consider and incorporate measures regarding team building, building design, site selection and design, energy use, water use, landscape and irrigation, building materials and solid waste management, indoor air quality, commissioning and construction project closeout, and occupancy and operation.

4. Emergency facilities: Helicopter and ambulance services are currently provided by the facility. These services will continue, however, no expansion of the services are proposed at this time and, as such, no new impacts are anticipated.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
File:

April 26, 1999

99-044/epo

Mr. David Ching
Community Development Block
Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

Subject: Draft Environmental Assessment (DEA)
Hana Community Health Care Campus
Hana, Maui
TMK: 1-4-3: 22 & 24

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Polluted Runoff Control

Proper planning, design and use of erosion control measures and management practices will substantially reduce the total volume of runoff and limit the potential impact to the coastal waters from polluted runoff. Please refer to the *Hawaii's Coastal Nonpoint Source Control Plan*, pages III-117 to III-119 for guidance on these management measures and practices for specific project activities. To inquire about receiving a copy of this plan, please call the Coastal Zone Management Program in the Planning Office of the Department of Business and Economic Development and Tourism at 587-2877.

The following practices are suggested to minimize erosion during construction activities:

1. Conduct grubbing and grading activities during the low rainfall months (minimum erosion potential).

2. Clear only areas essential for construction.

3. Locate potential nonpoint pollutant sources away from steep slopes, water bodies, and critical areas.

4. Protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells.

5. Cover or stabilize topsoil stockpiles.

6. Intercept runoff above disturbed slopes and convey it to a permanent channel or storm drain.

7. On long or steep slopes, construct benches, terraces, or ditches at regular intervals to intercept runoff.

8. Protect areas that provide important water quality benefits and/or are environmentally sensitive ecosystems.

9. Protect water bodies and natural drainage systems by establishing streamside buffers.

10. Minimize the amount of construction time spent in any stream bed.

11. Properly dispose of sediment and debris from construction activities.

12. Replant or cover bare areas as soon as grading or construction is completed. New plantings will require soil amendments, fertilizers and temporary irrigation to become established. Use high planting and/or seeding rates to ensure rapid stand establishment. Use seeding and mulch/mats. Sodding is an alternative.

The following practices are suggested to remove solids and associated pollutants in runoff during and after heavy rains and/or wind:

1. Sediment basins.

2. Sediment traps.

3. Fabric filter fences.

4. Straw bale barriers.

5. Vegetative filter strips.

Any questions regarding these matters should be directed to the Polluted Runoff Control Program in the Clean Water Branch at 586-4309.

Asbestos

The Federal Register, 40 CFR Part 61, National Emission Standard for Hazardous Air Pollutants, Asbestos NESHAP Revision; Final rule, November 20, 1990, requires inspection of all affected areas to determine whether asbestos is present prior to any demolition activities.

Under the NESHAP regulation, the project would be required to file with the Noise, Radiation and Indoor Air Quality Branch of the Department of Health an Asbestos Demolition/Renovation notification ten working days prior to demolition of each building or the disturbance of regulated asbestos-containing materials. All regulated quantities and types of asbestos-containing materials would be subject to emission control, proper collection, containerizing, and disposal at a permitted landfill.

Questions concerning asbestos requirements should be directed to Mr. Robert H. Lopes at 586-5800. Should there be additional concerns, please contact Mr. Jerry Haruno, Environmental Health Program Manager of the Noise, Radiation and Indoor Air Quality Branch at 586-4701.

Vector Control

The property may be harboring rodents which will be dispersed to the surrounding areas when the site is cleared. The applicant is required by Chapter 11-26, "Vector Control," Hawaii Administrative Rules to eradicate any rodents prior to clearing the site and to notify the Department of Health by submitting Form VC-12 to the local Vector Control Branch when such action is taken.

The Vector Control Branch phone numbers are as follows:
Oahu: 831-6767
Kauai: 241-3306
Hawaii--Hilo: 974-4238, Kona: 322-7011
Maui (includes Molokai and Lanai): 873-3560

Wastewater

The Department of Health would like to see a treatment individual wastewater system (noncesspool) installed to handle wastewater generated from the proposed project. Plans must be

submitted to and approved by the Maui District Health Office prior to construction.

If there are any questions on this matter, please contact Mr. Herbert Matsubayashi, District Environmental Health Program Chief at 984-8230.

Sincerely,

GARY GILL
Deputy Director for
Environmental Health

c: CWB
NR&IAQB
VCB
WWB
MDHO
Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Assoc., Inc.

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808) 946-2277
FAX (808) 946-2253

6272-01
May 22, 2000

Mr. Gary Gill
Deputy Director for Environmental Health
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Gill:

We are in receipt of your letter dated April 26, 1999 (Ref. 99-044/epo) commenting on the subject EA. The following is offered in response to your comments:

Polluted Runoff Control: The guidelines provided by the Hawaii Coastal Zone Management Non-Point Source Plan, as well as your suggestions will be considered in developing appropriate mitigation measures for erosion runoff during the construction phase of the proposed project. We appreciate the information you provided and will incorporate measures into the design plans for implementation by the construction contractor. In addition, we note that as the project design progresses, a drainage report and Best Management Practices Plan for erosion control will be submitted to the County of Maui Department of Public Works and Waste Management for review and approval.

Asbestos Control: The project will comply with all requirements for asbestos inspection and removal.

Vector Control: The project will comply with all requirements for vector control prior to site work.

Wastewater: Plans for the project's wastewater system have not been developed. We understand, according to Chapter 62, State Department of Health Administrative Rules, that the Hana region is indicated as a critical wastewater disposal area, and that individual systems such as septic tanks or package treatment plants are required as a means for wastewater disposal for such areas. Plans for the proposed wastewater system will be determined as the project design progresses, and will be submitted for approval to the Maui District Health Office prior to construction.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
[illegible]

May 18, 1999

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

LOG NO: 23391
DOC NO: 9905tm10
Architecture

RECEIVED
MAY 27 1999

Attention: Mr. [illegible]

Dear Mr. [illegible]:

SUBJECT: Hana Community Healthcare Campus
Draft Environmental Assessment
TMK: [illegible], Hana, Maui

We reviewed the Draft Environmental Assessment for the Hana Community Healthcare [illegible] project. We apologize for the tardiness of our reply. The majority of the [illegible] on the property do not appear to be eligible for listing on the Hawaii or National Registers of Historic Places. However, the residence and concrete structure [illegible] appear to meet criteria for listing.

[illegible] we recommend keeping the concrete structure and relocating the house [illegible] and continue utilizing it as one of the residences or as a [illegible]. If this is not feasible, please provide greater in-depth information such as when the structures were constructed, by whom and for what [illegible] mitigative measures for the possible adverse [illegible].

[illegible] we believe this [illegible] archaeological resources. If, however, in the course of [illegible] including human burials are found, all work [illegible] and this office contacted at [illegible].

Dev[illegible] Program

[illegible]ld you require fur[illegible]rmation, please call Tonia Moy at (808)692-8030. For [illegible]haeological concerns, please call Cathy Dagher at (808)692-8024. Thank you for the [illegible]portunity to comment.

Aloha,

DON HIBBARD
Deputy State Historic Preservation Officer

TM:jk

c: ✓ James Stone, Earl Matsukawa, Wilson Okamoto & Associates, Inc., [illegible] Beretania St., #400, Honolulu, HI 96826

CORRECTION

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

EM

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

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

May 18, 1999

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
MAY 27 1999
WILSON OKAMOTO & ASSOC., INC.

LOG NO: 23391
DOC NO: 9905tm10
Architecture

Attention: Mr. David Ching

Dear Mr. Ching:

SUBJECT: **Hana Community Healthcare Campus**
Draft Environmental Assessment
TMK: 1-4-03:22 & 24, Hana, Maui

We received the Draft Environmental Assessment for the Hana Community Healthcare Campus project. We apologize for the tardiness of our reply. The majority of the structures on the property do not appear to be eligible for listing on the Hawaii or National Registers of Historic Places. However, the residence and concrete structure resembling an incinerator appears to meet criteria for listing.

Therefore, we recommend keeping the concrete structure and relocating the house to the back of the larger parcel and continue utilizing it as one of the residences or as a feature in the garden. If this is not feasible, please provide greater in-depth information such as when the structures were constructed, by whom and for what purpose so that we can better determine mitigative measures for this possible adverse effect of demolition.

Since the data recovery has been completed on these two parcels, we believe this project will have no effect on archaeological resources. If, however, in the course of routine construction activities, historic sites, including human burials are found, all work in the immediate vicinity must stop and this office contacted at 692-8015.

Should you require further information, please call Tonia Moy at (808)692-8030. For archaeological concerns, please call Cathy Dagher at (808)692-8023. Thank you for the opportunity to comment.

Aloha,

DON HIBBARD
Deputy State Historic Preservation Officer

TM:jk

c: ✓ James Stone, Earl Matsukawa, Wilson Okamoto & Associates, Inc., 1907 S. Beretania St., #400, Honolulu, HI 96826

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Don Hibbard, Ph.D.
Deputy State Historic Preservation Officer
State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Dr. Hibbard:

We are in receipt of your letter dated May 18, 1999 (Ref. Log No. 23391, Doc No. 9905tm10 Architecture) commenting the subject EA.

With regard to the office and residence of the executive director as well as the concrete structure, both will be considered for incorporation within the proposed project. As the project is in the preliminary design stages, however, it is unclear whether this can be achieved. In the event that it is determined unsafe for habitation or otherwise infeasible to retain either structure, a historic assessment will be prepared and submitted to your office for review. Further, neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined. The project developer, DKI and Associates, Inc., will continue to consult with your office throughout the design process as to the disposition of both structures.

We appreciate your determination that the project will have no effect on archaeological resources.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JUN 14 1999

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
HWY-PS
2.4131

Mr. David Ching
Community Development Block Grants
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
JUN 15 1999
WILSON OKAMOTO & ASSOC., INC

Dear Mr. Ching:

Subject: Draft Environmental Assessment, Hana Community Healthcare Campus, Hana, Maui, TMK: 1-4-3: 22, 24

The proposed renovations and expansion of the Hana Community Health Center in Hana is not anticipated to have a significant impact on Hana Highway, our State facility.

The recommendations for roadway improvements stated in the traffic assessment should be implemented to assure the safety of the traveling public.

Very truly yours,

PERICLES MANTHOS
Administrator
Highways Division

c: Mr. James Stone, Kober/Hanssen/Mitchell Architects
Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX (808)946-2253

6272-01
May 22, 2000

Mr. Pericles Manthos, Administrator
State of Hawaii
Department of Transportation
Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Manthos:

We are in receipt of your letter dated June 14, 1999 (Ref. HWY-PS 2.4131) regarding the subject project. We appreciate your determination that the project will not have a significant impact on Hana Highway, as well as your concurrence with the roadway improvements recommended in the traffic assessment.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE
at
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

March 19, 1999

THOMAS M. PHILLIPS
CHIEF OF POLICE

CHARLES H.P. HALL
DEPUTY CHIEF OF POLICE

EM

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, HI 96793

RECEIVED
MAR 23 1999
WILSON OKAMOTO & ASSOC., INC.

Attention: Mr. David Ching

Gentlemen:

Subject: Hana Community Healthcare Campus
Draft Environmental Assessment
Tax Map Key: 1-4-03:22 and 24
Hana, Maui, Hawaii

This is in response to the letter dated March 4, 1999 from Mr. Earl Matsukawa, AICP, Project Manager for Wilson Okamoto & Associates, Inc. regarding the above mentioned subject.

We have reviewed the Draft Environmental Assessment for the Hana Community Healthcare Campus project. Enclosed are our comments. Thank you for giving us the opportunity to comment on this project.

Very truly yours,

THOMAS M. PHILLIPS
Chief of Police

Enclosure

xc: Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Associates, Inc.

TO : THOMAS PHILLIPS, CHIEF OF POLICE

VIA : CHANNELS AC JN 3/16/99

FROM : MILTON MATSUOKA, LIEUTENANT, HANA DISTRICT

SUBJECT : DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HANA COMMUNITY HEALTHCARE CAMPUS PROJECT

The company of Wilson Okamoto and Associates, Inc. is requesting an environmental assessment for the Hana Community Healthcare Campus project. This project is being proposed by the County of Maui Mayor's office.

Checks ware made of the property, where the Hana medical facility now sits, along with surrounding properties. Checks were also made of the associated roadways that allow access to the property.

Construction noise should not be a factor on the south and west areas as there are no residences located in these areas. There are residences located on the east and north sides, however, there is sufficient distances from the residences that normal construction noise would not make a significant impact. In the companies noise impact statement it states that the construction company will be required to obtain a noise permit if noise will exceed allowable levels.

Ingress and Egress should not make a significant impact on Hana Highway. When exiting the property there is good sight distance on the north side and reasonable sight distance on the south side for the speed limit in the area. There are children crossing signs on either side of this intersection which should slow traffic even further. If any motor vehicle accidents occur at this intersection, due to traffic violations, this can be remedied by traffic enforcement and placement of speed limit signs closer to the area. When gaining access to the property, making a left turn from Hana Highway, there should not be a problem. Per the traffic impact statement, contained in this report, traffic levels for this section of roadway is well below capacity so a left turn lane does not appear to be necessary at this time.

Please forward copies of this report to Kober/Hanssen/Mitchell Architects and Wilson Okamoto & Associates.

Milton M. MATSUOKA 6948
03/17/99 0930 hrs.

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Thomas M. Phillips, Chief of Police
Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Phillips:

We are in receipt of your letter dated March 19, 1999 commenting that significant impacts to noise and traffic safety are not anticipated as a result of the subject project. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
Mayor
JOHN E. MIN
Director
CLAYTON I. YOSHIDA
Deputy Director

RECEIVED MAR 2 4 1999

COUNTY OF MAUI
DEPARTMENT OF PLANNING

March 22, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

RE: Draft Environmental Assessment for the Hana Community Healthcare Campus at TMK: 1-4-003:022 and 024, Hana, Maui, Hawaii

The Maui Planning Department (Department) has reviewed the Draft Environmental Assessment (EA) Report for the above-referenced project and has the following comments:

Land Use:

State Land Use Districts:

According to the Draft EA, the subject parcels are located within the Agricultural and Rural Districts, however, a map identifying the boundaries certified by the State Land Use Commission was not included. The Planning Department concurs that a healthcare facility is not a permitted use in the State Agricultural District and a State Land Use Commission Special Use Permit will be required.

However, in the State Rural District, "public, quasi-public, and public utility facilities" are identified as permitted uses. As a healthcare facility, we find that the proposed use is a public use. Chapter 205 of the Hawaii Revised Statutes does not include definitions that define "public, quasi-public and public utility facilities." However, Maui County Code, Chapter 19.04, Section 19.04.040, defines "public facility or public use" as follows:

> "...means a use conducted by, or a facility or structure owned or managed by, the government of the United States, the State of

> Hawaii or the County of Maui which provides a governmental function, activity, or service for public benefit."

It further defines "quasi-public use or quasi-public facility" as follows:

> "...means a use conducted by, or a facility or structure owned or operated by, a non-profit, religious, or eleemosynary institution which provides educational, cultural, recreational, religious, or other similar types of public services."

The County of Maui is providing the funds for the healthcare facility with the non-profit organization, Hana Community Healthcare Center, developing the project. Pursuant to the above-referenced definitions, the Planning Department determines that the healthcare facility is a permitted use in the State Rural District and a State Special Use Permit is not required.

Hana Community Plan:

The Hana Community Plan (Plan) is more than compliance to the Land Use Map. The Draft EA should address the goals, objectives and policies of the Plan relating to the Hana Planning Region. There were four areas of concern raised in the Plan. One of these concerns related to Government Services. The Plan states that:

> "a greater level of resource commitment is required in the region to satisfy the community's social, educational, recreational and emergency service needs. While the region's geographic isolation from the more urbanized areas of the island is acknowledged as a reason for the existing level of government service, it is necessary to provide a level of service which will ensure the health, safety and well-being of Hana's residents. Areas of concern with regard to government services include the lack of vocational educational programs, fire protection service, and the turnover in government personnel serving the region."

The following additional goals, objectives and policies applicable to the proposed project should be addressed:

LAND USE (pp. 11-12)

Goal

An efficient distribution of urban, rural and agricultural land uses in order to provide for the social and economic well-being of residents in the Hana Community Plan region.

Preservation and enhancement of the current land use patterns which establish and enrich the Hana Community Plan region's unique and diverse qualities.

Objectives and Policies

8. Discourage urban land uses and Special Use Permits outside of the Hana Town area except to allow those activities which are essential to the region's economic well-being, which provide essential services for the residents of the Hana District, or which provide for the essential domestic needs of remote communities such as Keanae, Kipahulu and Kaupo. Such activities shall not adversely affect surrounding neighborhoods and shall be supportive of the agricultural activities of the area.

CULTURAL RESOURCES (pp. 15-17)

Goal

Identification, preservation, protection, and where appropriate, restoration of significant cultural resources and practices, that provide a sense of history and identity for the Hana region.

Objectives and Policies

1. Identify, preserve and protect historically, archaeologically and culturally significant areas, sites, and features within the Hana District.

Implementing Actions

2. Require development projects to identify all cultural resources within or adjacent to the project area as part of the County development review process. Further require that all proposed development include appropriate mitigation measures including site avoidance, adequate buffer areas and interpretation.

3. General site types and areas that should be flagged for preservation during development review include the following:

Piilani Trail/Old government roads ...
Plantation era structures and homes...

URBAN DESIGN (p. 20)

Goal

Harmony between the natural and man-made environments through building, infrastructure and landscaping design which ensures that the natural beauty and character of the Hana region is preserved.

Objectives and Policies

1. Support design controls for Hana Town and the Hana region based on maintaining the existing low rise character and rural scale of the area.

Implementing Actions

1. Limit building height to two stories or thirty-five (35) feet above grade throughout the region.

2. Limit the height of man-made walls to avoid visual obstruction of coastal and scenic mauka areas.

SOCIAL INFRASTRUCTURE (pp. 23-24)

Objectives and Policies

Public Health and Safety

9. Encourage the provision of services and development of facilities to meet the current and future "elderly care" needs of the Hana District.

County Zoning:

The subject properties are zoned "Interim" and are subject to the Interim Zoning provisions. Within the Interim District the following uses are permitted:

"Hospitals and/or sanitariums (except those for contagious, mental, or drug or liquor addict cases) and/or convalescent homes; provided that any buildings used in connection with such institutions shall be erected a distance of not less than three hundred feet from the main highways; and provided further, that the minimum lot area for such uses shall be

twenty thousand square feet with a minimum lot width of one hundred feet. No building, including accessory buildings, shall be located less than twenty feet from all lot boundaries;"

"Publicly owned buildings;"

The healthcare facility will be located on publicly owned lands owned by the State of Hawaii and funded by the County of Maui. If the building remains under public ownership, then it will be a permitted use in the Interim District. Although the facility is not intended to provide the wide range of hospital care or convalescent care associated with hospitals, it will provide similar healthcare services offered in a hospital including emergency medical services to an isolated community, and as such, can be considered a hospital use which is permitted in the Interim District.

Hana Community Design Guidelines:

The Draft EA does not address the Hana Community Design Guidelines which are the recommended design criteria for the region which resulted from the recommendations established in the Hana Community Plan. The guidelines are applicable to "public/quasi-public uses and facilities" in the Hana region. According to the guidelines "all government and utility facilities and improvements built in the Hana region should conform to the design recommendations." The Draft EA should address the compliance of the preliminary plans for the healthcare facility with these guidelines.

Special Management Area:

The subject properties are outside of the Special Management Area of the County of Maui and are, therefore, not subject to the provisions of the Special Management Area Rules of the Maui Planning Commission.

Historic, Cultural, Archaeological Resources:

The Draft EA should include the Archaeological Inventory Survey conducted in May 1993 and the follow-up study on Site 3150 conducted in April 1996 by Paul H. Rosendahl, Ph.D., as appendices to the report. According to the section on Archaeological Resources, Sites 3151 and 3152 (boundary walls) were four of the surface sites observed. The summary does not conclusively determine whether the walls are historic or modern property walls. Until further research is conducted on the boundary walls, the walls should remain untouched during any construction or development phase of the project. In addition, the EA does not indicate that any subsurface testing was conducted on the site. Due to the historic significance of the

Hana Region, we would recommend that subsurface testing be conducted on the site prior to ground excavations, especially on the undisturbed areas.

The Draft EA should also include an analysis of the significance of the old concrete oven. When was it built and what was it used for should be included in the analysis.

Based on the photographs in the EA, we note that the residence and office of the executive director (Photograph 2), is typical of plantation homes and appears to retain much of the original architectural details (windows, doors, roof). We would recommend rehabilitation of the building rather than removal. The EA did not include photographs of the emergency medical services building, and as such, an assessment cannot be made on this building.

Topography

The Draft EA should include a topography map which identifies the location of the existing structures, roadways, etc., as well as the larger trees on the property. There appears to be some significant trees on the site, and as much as is practicable, these trees should be retained onsite. The site planning for the facility should make reasonable accommodations for the larger significant trees. The Arborist Committee should be contacted for their recommendation.

Infrastructure

The section on Utilities should include both the existing facilities that service the properties and the projected demand that will result from the Hana Healthcare Facility. The impacts should be analyzed based upon the adequacy of the existing services and the impacts resulting from the projected demand.

Mitigation

Mitigation to potential impacts should include more than a statement that the appropriate State or County agency would be consulted. Actual measures to mitigate potential impacts should be included such as participation in source assessments, system upgrades, etc.

Determination of Anticipated FONSI

The Draft EA should include enough supporting documentation upon which the conclusions were made in the FONSI. Some of the conclusion do not have adequate

supporting documentation in the analysis portion of the EA. For example, the following criteria:

> *"Involve an irrevocable commitment to loss or destruction of any natural cultural resource;*
>
> The proposed action is not anticipated to involve any construction activity that might lead to a loss or destruction of any natural or cultural resource."

The EA does not adequately address the natural and cultural resources of the project to make such a conclusion. There are several unresolved issues such as the buildings that are greater than 50 years, the adequacy of the archaeological survey and the existing landscaping on the site.

Each criteria should be included in the analysis portion of the EA to substantiate the conclusions reached in order to issue a FONSI.

Permits and Approvals

Under the County of Maui, the Draft EA should also include compliance to the Hana Community Design Guidelines.

Parties to Be Consulted

Under the County of Maui, the Arborist Committee should be included to review the significant trees onsite.

Thank you for the opportunity to comment on the subject Draft EA. If additional clarification is required, please contact Ms. Colleen Suyama, Staff Planner, of this office at 243-7735.

Very truly yours,

JOHN E. MIN
Director of Planning

JEM:CMS:dsa
c: Clayton Yoshida, AICP, Deputy Director of Planning
Aaron Shinmoto, Planning Program Administrator
Colleen Suyama, Staff Planner
Kobor/Hanssen/Mitchell Architects
Wilson Okamoto & Associates, Inc.
Project File
General File (S:\CMS\hanacamp)

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808) 946-2277
FAX (808) 946-2253

Mr. John E. Min, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Min:

We are in receipt of your letter dated March 22, 1999 commenting on the subject project. The following is offered in response to your comments:

Land Use:
State Land Use District: Thank you for clarifying that State Special Use Permit is required only for the portion of the project which lies within the Agricultural District. The Final EA will be revised accordingly.

Hana Community Plan: The Final EA will include a discussion of the applicable objectives, policies, and implementing actions expressed in the Hana Community Plan in relation to the proposed project. We appreciate your assistance in identifying the applicable provisions.

County Zoning: The project will comply with all Interim Zoning provisions pursuant to the County Zoning Code.

Hana Community Guidelines: The preliminary design plans for the proposed project are consistent with the design standards of the Hana Community Design Guidelines. All proposed structures will be single story and well within the 35-foot height limit. The design will utilize building materials of moss lava rock, board and batten siding and metal roofs. Building colors will be naturally hued with matte finishes so as not to detract from the rural character of Hana. The design of the proposed facility will embrace a courtyard layout to optimize the natural ventilation, as well as facilitate outdoor views of the landscaping.

Special Management Area: We appreciate your verification that the project is not subject to Special Management Area rules.

Historic, Cultural, Archaeological Resources:
According to the Archaeological Inventory Survey prepared by Paul .H. Rosendahl, Ph.D., Inc. (PHRI) in May 1993, Sites 3151 and 3152 (boundary walls) and Site 3153 (a complex) were identified under the significance category "X" pursuant to the National Register criteria for evaluation as outlined in the Code of Federal Regulations (36 CFR Part 60). Category "X" sites are defined as being important for information content, but which no further data collection is necessary. According to the report, the data collected from these sites was sufficient and there was no preservation potential. In a letter dated July 23, 1993, the Department of Land and Natural Resources State Historic Preservation Division (SHPD) concurred that the sites were "...'no longer significant', having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey".

On the other hand, Site 3150 was identified under significance category "A", which is important for information content and which requires further data collection. SHPD also concurred with this recommendation and, subsequently, PHRI prepared an Archaeological Mitigation Program in April 1996. The SHPD determined in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work was recommended. Further, SHPD determined during the Draft EA review process that the project will have no effect on archaeological resources.

The Archaeological Inventory Survey dated May 1993 and follow-up Archaeological Mitigation Program dated April 1996 prepared by Paul H. Rosendahl, Ph.D. will be included in the Final EA. In addition, the Final EA will be revised to include a discussion of the archaeological data recovery process.

With regard to the office and residence of the executive director, as well as the concrete structure, both will be considered for incorporation within the proposed project. As the project is in the preliminary design stages, however, it is unclear whether this can be achieved. In the event that it is determined infeasible to retain either structure, a historic assessment will be prepared and submitted to the SHPD for review. Further, neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined. The project developer, DKI and Associates, Inc., will continue to consult with the SHPD throughout the design process as to the disposition of both structures.

Topography
As the project is currently in the conceptual design phase, a topographic map has yet to be prepared. A map will be prepared during the subsequent design phase and will indicate the location of existing structures, roadway, significant trees and other pertinent site information.

At this time, the project design is in the conceptual stage and, a landscaping plan is yet to be developed. The Arborist Committee will be consulted in conjunction with the development of the landscaping plan regarding the disposition of the significant trees currently located on the project site. As noted in Section 2.6 (Page 2-6) of the Draft EA, existing large or significant trees will be preserved and incorporated into the proposed project to the extent possible.

Infrastructure/Mitigation
As the project is in the conceptual design stage, details regarding the projected demand for water and wastewater have yet to be developed. The Department of Water Supply and Department of Public Work and Waste Management have been consulted in conjunction with the Draft EA review process and will continue to be consulted as the project design progresses and details on infrastructure needs become available. Based on the preliminary status of the current project design, it is premature to speculate on specific mitigation measures, and it is appropriate to consult with administering agencies once project details are available.

Determination of Anticipated FONSI
Where appropriate, a discussion of the criteria used to substantiate the conclusions of the determination will be included in the Final EA.

Permits and Approvals
A discussion of the project's compliance with the Hana Community Design Guidelines will be provided in Section 3 of the Final EA pertaining to Relationship to Plans, Policies and Controls.

Parties to Be Consulted
As noted above, the Arborist Committee will be consulted as the project design progresses in conjunction with the development of a landscape plan regarding the disposition of the significant trees currently located on the project site.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

MAUI COUNTY COUNCIL

Councilmember J. Kalani English
East Maui

Chair
Land Use Committee
Vice Chair
Budget Committee
Planning Committee
Member
Committee of the Whole
Public Works and Water Committee

RECEIVED
MAR 30 1999
WILSON OKAMOTO & ASSOC., INC.

March 24, 1999

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Matsukawa:

Thank you for sending me a copy of the Draft Environmental Assessment for the Hana Community Healthcare Campus project. I am reviewing it and will present official comments on it soon.

Again, thank you for your consideration.

Sincerely,

J. Kalani English

JKE:det

200 South High Street, Room 818, Wailuku, Maui, Hawai'i 96793
Phone: (808) 243-7765 Fax (808) 243-7117 E-mail: jkalani@aloha.net Web site: www.aloha.net/~jkalani

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Councilmember J. Kalani English
200 South High Street, Room 818
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. English:

We are in receipt of your letter dated March 24, 1999 stating your intention to comment officially on the subject EA. As no comments were received as this date, we are finalizing the EA. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 243-7845
Fax: (808) 243-7955

RECEIVED APR 19 99

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

ANDREW M. HIROSE
Solid Waste Division

April 16, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
HANA COMMUNITY HEALTHCARE CAMPUS
TMK: (2) 1-4-003:022 & 024

Dear Mr. Ching:

We reviewed the subject application and have the following comments.

1. Submit a Solid Waste Management Plan for disposal and/or recycling of construction waste material to minimize the impact on the Hana landfill.

2. Only non-hazardous waste materials should be handled by Public Works refuse collectors. A private contractor should handle and correctly dispose of all hazardous materials.

3. Off-street parking, loading spaces, and landscaping shall be provided per Maui County Code, Chapter 19.36.

4. Regarding page 6-1, Item 6 - Permits and Approvals:
The proposed healthcare facility building straddles over the property between parcels 22 & 24. Final subdivision approval to consolidate the two parcels is required prior to construction of the proposed project.

5. A detailed final drainage report and an erosion control Best Management Practices (BMP) plan shall be submitted with the construction plans for review and approval prior to issuance of grading or building permits. The drainage report shall include hydrologic and hydraulic calculations and the schemes for disposal and runoff waters. It must comply with the provisions of the "Rules for Design of Storm Drainage Facilities in the County of Maui" and must provide verification that the grading and runoff water generated by the project will not have an adverse effect on the adjacent and downstream properties. The BMP plan shall show the location and details of structural and non-structural measures to control erosion.

If you have any questions, please call David Goode at 243-7845.

Sincerely,

CHARLES JENCKS
Director of Public Works
and Waste Management

DG:msc/mt
xc: Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Associates
Corporation Counsel

S:\LUCA\CZM\HANACOM.WPD

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX (808)946-2253

Mr. Charles Jencks, Director
Department of Public Works and Waste Management
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Jencks:

We are in receipt of your letter dated April 16, 1999 commenting on the subject project. The following is offered in response to your concerns:

1. A Solid Waste Management Plan will be submitted to your office for review and approval prior to project construction;

2. As is the current practice, a private contractor will continue to manage the disposal of all hazardous materials resulting from the proposed project;

3. The proposed project will comply with all County off-street parking, loading spaces and landscaping;

4. Prior to construction, the proposed project will comply with all County requirements for subdivision approval to consolidate both parcels; and

5. A drainage report and Best Management Practices Plan for erosion control will be submitted to your office for review and approval.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
MAYOR

CLAYTON T. ISHIKAWA
CHIEF

FRANK E. FERNANDEZ, JR
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561
FAX (808) 243-7919

May 4, 1999

Mr. Earl Matsukawa, Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street
Honolulu, HI 96826

RE: Hana Community Healthcare Campus; TMK: 1-04-003-022 and 024

Dear Mr. Matsukawa,

Thank you for the opportunity to comment on the Hana Community Healthcare Campus draft environmental assessment.

The Department of Fire Control has reviewed the documents submitted and wishes to reserve comment until plans and specifications are submitted for review by the various agencies.

If you have any questions, direct them in writing to the Fire Prevention Bureau, 21 Kinipopo Street, Wailuku, HI 96793

Sincerely,

LEONARD F NIEMCZYK
Captain, Fire Prevention Bureau

6272-01
May 22, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808)946-2277
FAX: (808)946-2253

Mr. Leonard F. Niemczyk, Captain
Fire Prevention Bureau
Department of Fire Control
County of Maui
21 Kinipopo Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Niemczyk:

We are in receipt of your letter dated May 4, 1999 stating your intention to reserve comment until plans and specifications are available for agency review. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

Em

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

5/5/99

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 High Street
Wailuku, Maui, Hawaii 96793

for

Mr. Earl Matsukawa, AICP
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

SUBJECT: Hana Community Healthcare Campus, Draft Environmental Assessment, TMK: 1-4-2:22 and 24, Hana, Maui, Hawaii

Dear Mr. Matsukawa,

Thank you for the opportunity to provide comments in preparation of the Draft Environmental Assessment (EA).

The EA should include the sources and expected potable and non-potable water usage. This project is served by Wakiu well located in the Hana system. Water availability will be reviewed at the time of application for meter or meter reservation.

Enclosed is a portion of our water system map pertaining to the project area. Domestic, fire, and irrigation calculations will be reviewed in detail during the development process. Actual fire demand for structures is determined by fire flow calculations performed by a certified engineer. DWS-approved fire flow calculation methods are contained in "Fire Flow" - Hawaii Insurance Bureau, 1991.

It is required by County Code that water conservation practices be incorporated into project design. As much of the water demand as possible should be delivered from non-potable sources (reclaimed or brackish). Where appropriate, the applicants should consider these measures:
Eliminate Single-Pass Cooling: Single-pass, water-cooled systems should be eliminated per Maui County Code Subsection 14.21.20. Although prohibited by code, single-pass water cooling is still manufactured into some models of air conditioners, freezers, and commercial refrigerators.

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20A.680 requires the use of low flow water fixtures and devices in faucets, showerheads, urinals, water closets and hose bibs. Water conserving washing machines, ice-makers and other units are also available.
Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout, "The Costly Drip". The applicant should establish a regular maintenance program.
Use Climate-adapted Plants: Native plants adapted to the area, conserve water and further protect the watershed from degradation due to invasive alien species. The project site is located in "Maui County Planting Plan" - Plant Zones 1 and 5. Please refer to the attached documents, "XERISCAPE: Water Conservation Through Creative Landscaping", "Maui County Planting Plan", and "Hawaiian Alien Plant Studies."
Prevent Over-Watering By Automated Systems: Provide rain-sensors on all automated irrigation controllers. Check and reset controllers at least once a month to reflect the monthly changes in evapotranspiration rates at the site.

The project overlies the Kawaipapa aquifer. The Department of Water Supply strives to protect the integrity of surface water and groundwater resources by encouraging applicants to adopt best management practices (BMPs) relevant to potentially polluting activities. We list a few BMP references here. Additional information can be obtained from the State Department of Health.

"Water Quality Best Management Practices Manual For Commercial and Industrial Business", Prepared for the City of Seattle by Resource Planning Associates, June 30, 1989.
"The Megamanual - Nonpoint Source Management Manual - A Guidance Document for Municipal Officials." Massachusetts Department of Environmental Protection.
"Guidance Specifying Management Measures For Sources of Nonpoint Pollution In Coastal Waters." United States Environmental Protection Agency, Office of Water.

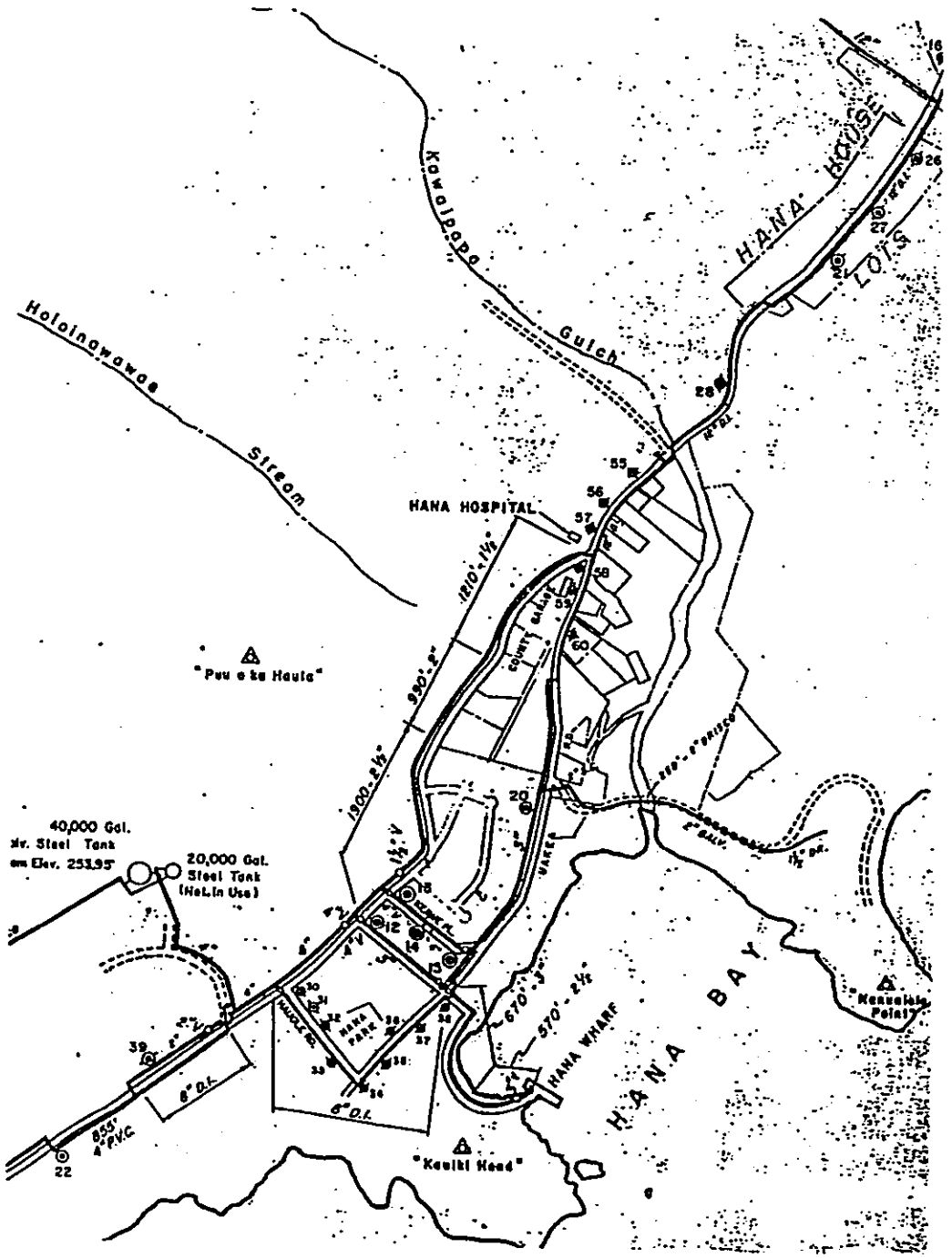
If you have any other questions or need additional information, please call our Water Resources and Planning Division anytime at (808) 243-7199.

Sincerely,

David Craddick
Director
emb

cc: engineering division
Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Associates, Inc.

attachments:
"The Costly Drip"
"Maui County Planting Plan"
"Hawaiian Alien Plant Studies - Pest Plants of Native Hawaiian Ecosystems"
Ordinance 2108 - An ordinance amending Chapter 16.20 of the Maui County Code, pertaining to the plumbing code"
"XERISCAPE - Water Conservation through Creative Landscaping"
"A Checklist for Water Conservation Ideas for Cooling"
"A Checklist for Water Conservation Ideas for Commercial Buildings"



Plant Pests of Hawaiian Native Ecosystems
Clifford Smith, UH Botany Department

Plant Pests of Hawaiian Native Ecosystems - These alien plant species are among the greatest threats to native Hawaiian biota.
(Reference: http://www.botany.hawaii.edu/faculty/cw_smith/aliens.htm)

Common Name(s)	Scientific Name	Plant Family
	Jasminum fluminense	Oleaceae
	Mimosa invisa	Mimosaceae
	Rubus sieboldii	Rosaceae
African Tulip Tree	Spathodea campanulata	Bignoniaceae
Aramina	Urena lobata	Malvaceae
Australian Blackwood	Acacia melanoxylon	Mimosaceae
Australian Red Cedar	Toona ciliata	Meliaceae
Australian Tree Fern	Cyathea cooperi	Cyatheaceae
Banana Poka	Passiflora mollissima	Passifloraceae
Beggar's Tick, Spanish Needle	Bidens pilosa	Asteraceae
Bengal Trumpet, Blue Trumpet Vine	Thunbergia grandiflora	Acanthaceae
Black-eyed Susan Vine	Thunbergia alata	Acanthaceae
Black Wattle	Acacia meamsii	Mimosaceae
Blue Gum	Eucalyptus globulus	Myrtaceae
Bocconia	Bocconia frutescens	Papaveraceae
Broad-leaved Cordia	Cordia glabra	Boraginaccae
Broomsedge, Yellow Bluestem	Andropogon virginicus	Poaceae
Brush Box, Brisbane Box, Vinegar Tree	Lophostemon confertus	Myrtaceae
Buffelgrass	Cenchrus ciliaris	Poaceae
Bush Beardgrass, Little Bluestem	Schizachyrium condensatum	Poaceae
Butterfly Bush, Smoke Bush	Buddleja madagascariensis	Buddlejaceae
California Grass	Brachiaria mutica	Poaceae
Castor Bean	Ricinus communis	Euphorbiaceae
Cats Claw, Mysore Thorn, Wait-a-bit	Caesalpinia decapetala	Caesalpiniaceae
Charcoal Tree, Gunpowder Tree	Trema orientalis	Ulmaceae
Chinaberry, Pride-of-India	Melia azedarach	Meliaceae
Chinese Banyon, Maylayan Banyon	Ficus microcarpa	Moraceae
Chinese Violet	Asystasia gangetica	Acanthaceae
Chinese Wisteria	Wisteria sinensis	Fabaceae
Christmas Berry	Schinus terebinthifolius	Anacardiaceae
Cluster Pine	Pinus pinaster	Pinaceae
Common Ironwood	Casuarina equisetifolia	Casuarinaceae
Common velvet Grass, Yorkshire Fog	Holcus lanatus	Poaceae
Fiddlewood	Citharexylum spinosum	Verbenaceae
Firethorn	Pyracantha angustifolia	Rosaceae
Firetree, Fayatree	Myrica faya	Myricaceae
Formosan Koa	Acacia confusa	Mimosaceae

Fountain Grass	Pennisetum setaceum	Poaceae
German Ivy, Italian Ivy	Senecio mikanioides	Asteraceae
Glenwood Grass	Sacciolepis indica	Poaceae
Glorybower	Clerodendrum laponicum	Verbenaceae
Glorybush, Cane Tī	Tibouchina herbacea	Melastomataceae
Gorse, Furze, Whin	Ulex europaeus	Fabaceae
Guava	Psidium guajava	Myrtaceae
Guinea Grass	Panicum maximum	Poaceae
Hairy Cat's Ear, Gosmore	Hypochoeris radicata	Asteraceae
Hill or Mysore Raspberry	Rubus niveus	Rosaceae
Hilo Grass	Paspalum conjugatum	Poaceae
Huehue Haole	Passiflora suberosa	Passifloraceae
Indian Fleabane	Pluchia indica	Asteraceae
Indian Rhododendron	Melastoma candidum	Melastomataceae
Ivy Gourd, Scarlet-fruited Gourd	Coccinea grandis	Cucurbitaceae
Japanese Honeysuckle	Lonicera japonica	Caprifoliaceae
Java Plum, Jambolan Plum	Syzygium cumini	Myrtaceae
Jhalna	Terminalia myriocarpa	Combretaceae
Juniper Berry	Citharexylum caudatum	Verbenaceae
Kahili Flower	Grevillea banksii	Proteaceae
Kahili Ginger	Hedychium gardnerianum	Zingiberaceae
Kikuyu Grass	Pennisetum clandestinum	Poaceae
Klu, Popinac	Acacia farnesiana	Mimosaceae
Koa Haole	Leucaena leucocephala	Mimosaceae
Koster's Curse	Clidemia hirta	Melastomataceae
Lantana	Lantana camara	Verbenaceae
Lasiandra	Tibouchina urvilleana	Melastomataceae
Logwood, Bloodwood Tree	Haematoxylon campechianum	Caesalpiniaceae
Loquat	Eriobotrya japonica	Rosaceae
Mahogany	Swietenia mahagoni	Meliaceae
Mauritius Hemp	Furcraea foetida	Agavaceae
Meadow Ricegrass	Ehrharta stipoides	Poaceae
Melochia	Melochia umbellata	Sterculiaceae
Mesquite, Kiawe, Algaroba	Prosopis pallida	Mimosaceae
Mexican Ash, Tropical Ash	Fraxinus uhdei	Oleaceae
Mexican Tulip Poppy	Hunnemannia fumariifolia	Papaveraceae
Mexican Weeping Pine	Pinus patula	Pinaceae
Miconia	Miconia calvescens	Melastomataceae
Molasses Grass	Melinis minutiflora	Poaceae
Molucca Albizia	Paraserianthes falcataria	Mimosaceae
Monkeypod, Rain Tree, 'Ohai	Samanea saman	Mimosaceae
Mules foot, Madagascar Tree Fern	Angiopteris evecta	Marattiaceae
Mullein	Verbascum thapsus	Scrophulariaceae
Narrow-leaved Carpetgrass	Axonopus fissifolius	Poaceae
New Zealand Flax, New Zealand Hemp	Phormium tenax	Agavaceae
New Zealand Laurel, Karakaranut	Corynocarpus laevigatus	Corynocarpaceae
New Zealand Tea	Leptospermum scoparium	Myrtaceae
Oleaster	Elaeagnus umbellata	Elaeagnaceae

Olive	Olea europaea ssp. africana	Oleaceae
Opiuma	Pithecellobium dulce	Mimosaceae
Oriental Mangrove	Bruguiera gymnorrhiza	Rhizophoraceae
Oxyspora	Oxyspora paniculata	Melastomataceae
Padang Cassia	Cinnamomum burmanii	Lauraceae
Palmgrass	Setaria palmifolia	Poaceae
Panama Rubber Tree, Mexican Rubber Tree	Castilloa elastica	Moraceae
Paper Bark, Cajeput	Melaleuca quinquenervia	Myrtaceae
Passionfruit, Liliko'i, Purple Granadilla	Passiflora edulis	Passifloraceae
Pearl Flower	Heterocentron subtriplinervium	Melastomataceae
Prickly Florida Blackberry	Rubus argutus	Rosaceae
Purple allamanda, Laurel-leaved Thunbergia	Thunbergia laurifolia	Acanthaceae
Quinine Tree	Cinchona pubescens	Rubiaceae
Raspberry	Rubus glaucus	Rosaceae
Red mangrove, American Mangrove	Rhizophora mangle	Rhizophoraceae
Rose Apple	Syzygium jambos	Myrtaceae
Rose Myrtle, Downy Myrtle	Rhodomyrtus tomentosa	Myrtaceae
Satin Leaf, Caimitillo	Chrysophyllum oliviforme	Sapotaceae
Shoebutton Ardisia	Ardisia elliptica	Myrsinaceae
Silkwood, Queensland Maple	Flindersia brayleyana	Rutaceae
Silky Oak, Silver Oak	Grevillea robusta	Proteaceae
Slash Pine	Pinus caribaea	Pinaceae
Sourbush	Pluchia symphytifolia	Asteraceae
Stinkweed, Marigold	Tagetes minuta	Asteraceae
Strawberry Guava	Psidium cattleianum	Myrtaceae
Swamp Oak, Saltmarsh or Longleaf Ironwood	Casuarina glauca	Casuarinaceae
Sweet Granadilla	Passiflora ligularis	Passifloraceae
Sweet Vernalgrass	Anthoxanthum odoratum	Poaceae
Tree Daisy, Montanoa	Montanoa hibiscifolia	Asteraceae
Tree Manuka	Leptospermum ericoides	Myrtaceae
Tree of Heaven	Ailanthus altissima	Simaroubaceae
Tropical Almond, False Kamani, Kamani-haole	Terminalia catappa	Combretaceae
Trumpet Tree, Guarumo	Cecropia obtusifolia	Cecropiaceae
Umbrella Tree, Octopus Tree	Schefflera actinophylla	Araliaceae
Wedelia	Wedelia trilobata	Asteraceae
White Ginger	Hedychium coronarium	Zingiberaceae
White Moho	Heliocarpus popayanensis	Tiliaceae
Wood Rose	Merremia tuberosa	Convolvulaceae
Yellow Ginger, Awapuhi Melemele	Hedychium flavescens	Zingiberaceae
Yellow Granadilla	Passiflora laurifolia	Passifloraceae
Yellow Himalyan Raspberry	Rubus ellipticus	Rosaceae

Zone-specific Native and Polynesian plants for Maui County

Zone 5

TYPE: F Fern G Grass Gr Ground Cover Sh Shrub P Palm S Sedge Tr Tree V Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Boerhavia repens	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Cressa truxillensis	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Heliotropium anomalum var. argenteum	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Sesuvium portulacastrum	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lycium sandwicense	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Artemisia australis	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Bidens mauiensis	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Gossypium tomentosum	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 5

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet
V	Ipomoea pes-caprae	beach morning glory, pohuehue	1			

Zone-specific Native and Polynesian plants for Maui County

Zone 1

TYPE: F Fern G Grass Gr Ground Cover Sh Shrub P Palm S Sedge Tr Tree V Vine

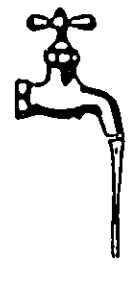
Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
F	Sadleria cyatheoides	'ama'u, ama'uma'u				
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia arecina	lo'ulu, hawane	40'	10'	1,000' to 3,000'	Dry to Wet
P	Pritchardia forbesiana	lo'ulu	15'			
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Cordyline fruticosa	ti, ki	6			
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Tr	Acacia koa	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Charpentiera obovata		15'			
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
V	Alyxia oliviformis	maile	Vine		sea to 6,000'	Medium to Wet

"THE COSTLY DRIP"

Slowly Dripping Spigot Wastes 15 Gallons a day.

1/32" Leak Wastes 25 Gallons a day.

1/16" Stream Wastes 100 Gallons a Day.



1/8" Stream Wastes 400 Gallons a day.

A Checklist of Water Conservation Ideas
For

COOLING TOWERS

Understanding Your System

[ ] Prepare an inventory of each cooling tower you have, its cooling capacity, and the equipment or processes that it serves.

[ ] Meter and record the amount of make-up water added to each tower, and the amount of blow-down water discharged from each tower.

[ ] If you purchase chemicals for the treatment of the recirculating cooling tower water, have the chemical vendor explain the purpose and action of each chemical.

[ ] Have your chemical vendor provide a written report of each service call, and be sure that the vendor explains the meaning of each analysis performed, as well as the test results.

[ ] Tell your chemical vendor that water conservation is a priority at your facility. Ask your vendor to tell you about alternative programs that could reduce the amount of water that is bled-off from the towers.

Water Conservation Opportunities

[ ] If you are using conventional water treatment, work with your chemical vendor to increase your cycles of concentration, thereby decreasing the amount of water bled off.

[ ] Establish a performance-based specification, and have vendors make proposals for your facility's cooling tower water treatment. Require that vendors commit to a predetermined minimum level of water-efficiency. Have them provide figures showing projected annual water and chemical consumption and costs.

[ ] Consider incorporating sulfuric acid in your treatment program. This could enable you to reduce carbonate scale and achieve significantly higher cycles of concentration. If you use sulfuric acid, e sure to observe the appropriate safety precautions.

[ ] Ozone is another alternative to consider for cooling water treatment in appropriate situations. Ozone can help remove dissolved minerals and act as a biocide. Again, observe the appropriate safety precautions.

[ ] If available, use reclaimed water as a source of cooling tower make-up water. Be sure to verify that the water is sufficiently clean for use in your system.

[ ] Re-use blow-down for lower-grade non-potable uses.

EVAPORATIVE COOLERS

[ ] Be sure your coolers have pumps to recirculate the water through them.

[ ] Check to make sure you are not bleeding off an excessive amount of water. For a typical small cooler, anything more than a few gallons per hour may be excessive.

[ ] Pipe the bleed-off from your coolers to help water a landscaped area.

ONCE-THROUGH COOLING

§14.21 of The Maui County Code prohibits discharge of drainage or filter backwash from cooling systems into the public wastewater system, or private wastewater systems connected to the public wastewater system.

[ ] Eliminate all uses of water for once-through or "single-pass" cooling, unless you reuse the water elsewhere for a beneficial purpose.

[ ] Many items of water-cooled equipment can be replaced by very similar air-cooled models.

[ ] Connect to a recirculating cooling water loop (such as the plant chilled water system) instead of using once-through cooling.

This checklist provides water conservation tips successfully implemented by facilities which utilize cooling systems. This list has been revised from the original copy first published and distributed by the City of Phoenix Water Conservation and Resources Division. For more information, contact the Board of Water Supply's Water Resources Planning Division at 243-7835, or the Public Works Department's Wastewater Division at 243-7417.

A Checklist of Water Conservation Ideas
For

Commercial Buildings

This checklist provides water conservation tips successfully implemented by industrial and commercial users. This list has been revised from the original copy first published and distributed by the Los Angeles Department of Water and Power.

General suggestions

Increase employee awareness of water conservation.

Install signs encouraging water conservation in employee and customer restrooms.

When cleaning with water is necessary, use budgeted amounts.

Determine the quantity and purpose of water being used.

Read water meter weekly to monitor success of water conservation efforts.

Assign an employee to monitor water use and waste.

Seek employee suggestions on water conservation; put suggestion boxes in prominent areas.

Determine other methods of water conservation.

Building maintenance

Check water supply for leaks.

Turn off any unnecessary flows.

Repair dripping faucets and showers and continuously running or leaking toilets.

Install faucet aerators where possible.

Reduce toilet water use by adjusting flush valves or installing dams and flapper mechanisms.

As appliances or fixtures wear out, replace them with water-saving models.

Shut off water supply to equipment rooms not in use.

Minimize the water used in cooling equipment in accordance with manufacturers recommendations. Shut off cooling units when not needed.

Cafeteria area

Turn off continuous flow used to clean the drain trays.

Turn off dishwasher when not in use. Wash full loads only.

Use water from steam tables to wash down cooking area.

Do not use running water to melt ice or frozen foods.

Use water-conserving ice makers.

Exterior areas

Convert from water intensive lawns, trees, and shrubs to Xeriscape -- Landscape design incorporating plants that provide beautiful color and require less water.

Inventory outdoor water use for landscaped areas.

Water landscape only when needed. Two-to-three times a week is usually sufficient.

Water in the early morning or evening.

Make sure that water does not run into the streets or alleys.

Stop hosing down sidewalks, driveways, and parking lots.

Use time controllers on sprinkler systems.

Do not water on windy days.

Water in winter only during prolonged hot and dry periods. (During spring and fall, most plants need approximately half the amount they need during the summer.)

For more information, contact:

California Department of Water Resources
Water Conservation Office
1416 Ninth Street
P.O. Box 942836
Sacramento, California 94236-0001
Telephone: (916) 323-5580

water conservation for Schools and Public Buildings

General Suggestions
- Increase employee, faculty and student awareness of water conservation. Brochures explaining how to conserve water at home are available from the Board of Water Supply.
- Read water meter daily to monitor the success of water conservation efforts.
- Conduct contests for employees, students and faculty (e.g., posters, slogans or conservation ideas); locate suggestion boxes in prominent areas.
- Install signs that encourage water conservation in restrooms-leaflets suitable for display or distribution are available from the Board of Water Supply.
- When cleaning with water is necessary, use budgeted amounts.

Physical Plant - Building Maintenance
- Minimize the water used in cooling equipment, such as air compressors, in accordance with the manufacturer's recommendations.
- Reduce the load on air conditioning units by shutting air conditioning off when and where it is not needed.
- Maintain insulation on hot water pipes.
- Check water supply system for leaks, and turn off any unnecessary flows.
- Repair dripping faucets, showers, and continuously running toilets.
- Avoid excessive boiler and air conditioner blowdown. Monitor total dissolved solids levels, and blowdown only when needed.
- Reduce the water used in toilet flushing by either adjusting the vacuum flush mechanism or installing toilet tank displacement devices (dams, bottles, or bags).
- Instruct clean-up crews to use less water for mopping.
- Change window cleaning schedule from periodic to an on-call, as required bases.
- Install flow reducers and faucet aerators in all plumbing fixtures.
- As appliances or fixtures wear out, replace with water-saving models.

Cafeteria and Food Service
- Turn off the continuous flow used to clean the drain trays of the coffee/milk/soda beverage island; clean the trays only as needed.
- Turn dishwashers off when dishes are not being processed. Wash full loads only. Replace spray heads to reduce water flow.
- Recycle rinse water from the dishwasher or recirculate it to the garbage disposer.
- Presoak utensils and dishes in ponded water instead of using a running water rinse.
- Avoid thawing foods under running water by using other available alternatives, including microwave ovens
- Wash vegetables in ponded water, do not let water n in prep sink.
- Minimize use of ice machines and adjust them to dispense less ice.
- Use water from the steam table in place of fresh wate to wash down the cook's area.

Pool
- Lower pool water to reduce amount of water splashe out.
- Reduce amount of water used to backflush pool filter
- Use a pool cover to reduce evaporation when pool is not being used.

Laundry
- Water conservation ideas for Laundries can be obtained from the Board of Water Supply.

Exterior Areas
- Wash autos, buses and trucks less often.
- Discontinue using water to clean sidewalks, driveway loading docks, and parking lots. Consider using broom or motorized sweepers.
- Avoid landscape fertilizing and pruning that stimulate excessive growth.
- Remove unhealthy plants so that remaining plants c benefit from the water saved.
- In many cases, older, established plants require only infrequent irrigation. Look for indications of water nee such as wilt, change of color, or dry soils.
- Limit landscaping additions and alterations. In the future, design landscapes which require less water. Incorporate xeriscape (water management) techniques into the design.
- Install soil moisture overrides or timers on sprinkler systems. Time waterings, when possible, to occur in t morning when wind and evaporation are lowest. Irriga tion equipment should apply water uniformly.
- Investigate the advantages of installing drip irrigatio systems.
- Mulch around plants to reduce evaporation and discourage weeds.
- Remove thatch and aerate turf to encourage the movement of water to the root zone.
- Begin a flexible watering schedule, watering only wh needed and not on windy or rainy days.
- Avoid runoff, and make sure sprinklers cover just th lawn or garden, not sidewalks, driveways or gutters.

ORDINANCE NO. 2108

BILL NO. 6 (1992)
Draft 1

A BILL FOR AN ORDINANCE AMENDING CHAPTER 16.20 OF THE MAUI COUNTY CODE, PERTAINING TO THE PLUMBING CODE

BE IT ORDAINED BY THE PEOPLE OF THE COUNTY OF MAUI:

CTION 1. Title 16 of the Maui County Code is amended by adding a section to Chapter 10 of the Uniform Plumbing Code to be c ted and to read as follows:

"16.20.675 Section 1050 added. Chapter 10 of the iform Plumbing Code is amended by adding a new section, rtaining to low-flow water fixtures and devices, to be signated and to read as follows:

Sec. 1050 Low-flow water fixtures and devices. (a) This section establishes maximum rates of water flow or discharge for plumbing fixtures and devices in order to promote water conservation.

(b) For the plumbing fixtures and devices covered in is section, manufacturers or their local distributors shall ovide proof of compliance with the performance requirements tablished by the American National Standards Institute NSI) and such other proof as may be required by the rector of public works. There shall be no charge for this gistration process.

(c) Effective December 31, 1992, only plumbing fixtures d devices specified in this section shall be offered for le or installed in the County of Maui, unless otherwise dicated in this section. All plumbing fixtures and devices ich were installed before December 31, 1992, shall be llowed to be used, repaired or replaced after December 31, 992.

(1) Faucets (kitchen): All kitchen and bar sink faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two-tenths gallons per minute at sixty pounds per square inch of water pressure.

(2) Faucets (lavatory): All lavatory faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two tenths gallons per minute at sixty pounds per square inch of water

pressure.

(3) Faucets (public rest rooms): In addition to the lavatory requirements set forth in paragraph (2), lavatory faucets located in rest rooms intended for use by the general public shall be of the metering or self-closing types.

(4) Hose bibbs: Water supply faucets or valves shall be provided with approved flow control devices which limit flow to a maximum three gallons per minute.

EXCEPTIONS: (A) Hose bibbs or valves not used for fixtures or equipment designated by the director of public works.

(B) Hose bibbs, faucets, or valves serving fixed demand, timing, or water level control appliances, and equipment or holding structures such as water closets, pools, automatic washers, and other similar equipment.

(5) Showerheads: Showerheads, except where provided for safety or emergency reasons, shall be designed, manufactured, or installed with a flow limitation device which will prevent a water flow rate in excess of two and one-half gallons per minute at eighty pounds per square inch of water pressure. The flow limitation device must be a permanent and integral part of the showerhead and must not be removable to allow flow rates in excess of two and one-half gallons per minute or must be mechanically retained requiring force in excess of eight pounds to remove.

(6) Urinals: Urinals shall be designed, manufactured, or installed so that the maximum flush will not exceed one gallon of water. Adjustable type flushometer valves may be used provided they are adjusted so the maximum flush will not exceed one and six tenths gallons of water.

(7) Water closets (toilets): Water closets shall be designed, manufactured, or installed so that the maximum flush will not exceed one and six tenths gallons of water.

(d) Beginning December 31, 1992, it is unlawful to sell : install any plumbing fixtures or devices not specified in ils section, except as permitted under this section.

(e) The director of public works may exempt the use of ow-flow water fixtures and devices if there is a finding at the use of such fixtures and devices would not be onsistent with accepted engineering practices and would be strimental to the public health, safety and welfare.

(f) Any person violating this section shall be fined 50 for each violation and shall correct all instances of n-compliance for which a citation is issued. Violation of is section shall constitute a violation as defined in ction 701-107 Hawaii Revised Statutes and shall be forceable by employees of the department of public works. e foregoing fine may also be imposed in a civil, ministrative proceeding pursuant to Rules and Regulations opted by the department of public works in accordance with apter 91 Hawaii Revised Statutes."

CTION 2. New material is underscored. In printing this bill, nty Clerk need not include the underscoring.

CTION 3. This ordinance shall take effect upon its approval.

AP ROVED AS TO FORM
ND LEGALITY:

H. FUKUSHIMA
Corporation Counsel
of Maui
.\ords\flows4\pk

CERTIFY that the foregoing BILL NO. 6 (19 92), Draft 1

ed FINAL READING at the meeting of the Council of the County of Maui, State of
n the 1st day of May , 1992 , by the following votes:

Patrick S. KAWANO Vice-Chair	Vince G. BAGOYO, Jr.	Goro HOKAMA	Alice L. LEE	Ricardo MEDINA	Wayne K. NISHKI	Joe S. TANAKA	Lenaala TERUYA DRUMMOND
Aye	Excused	Excused	Aye	Aye	Aye	Aye	Aye

s transmitted to the Mayor of the County of Maui, State of Hawaii, on the 1st day
, 1992 .

WAILUKU, MAUI, HAWAII, this 1st day of May , 1992 .

HOWARD S. KIHUNE, CHAIR
Council of the County of Maui

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

THE FOREGOING BILL IS HEREBY APPROVED THIS 5TH DAY OF MAY , 1992 .

LINDA CROCKETT LINGLE, MAYOR
County of Maui

BY CERTIFY that upon approval of the foregoing BILL by the Mayor of the County of
id BILL was designated as ORDINANCE NO. 2108 of the County of Maui, State

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

t Reading on January 17, 1992.
ate of Ordinance May 5, 1992.

I HEREBY CERTIFY that the foregoing is a true and correct copy of Ordinance No. 2108 , the original of which is on file in the Office of the County Clerk, County of Maui, State of Hawaii.

Dated at Wailuku, Hawaii, on

County Clerk, County of Maui

XERISCAPE

Water Conservation Through Creative Landscaping

Xeriscape Defined
Seven Water Conservation Fundamentals
Planning and Design
Soil Improvement
Efficient, Zoned Irrigation
Limited Turf Area
Use of Mulches
Use Of Low Water-Demand Plants
Appropriate Maintenance
Community Water Management

XERISCAPE

The Department of Water Supply is faced with increasingly more difficult demands regarding water--its supply, quality, distribution, purification, management, and associated costs. Potable water is becoming scarce and the costs of building delivery systems and water treatment plants prohibitive. Consequently, there is a need to conserve water, not only during droughts, but to reduce demands of peak loading on systems in an attempt to delay construction of larger, expensive facilities. Saving water saves energy while conserving other valuable resources.

Water conservation takes on two broad aspects. First, efficient manipulation of physical factors in the landscape - delivery and irrigation systems, soils, percent hardscape used in a design, plants, microclimates, mulch, etc. Secondly, the people factors, which are often more important.

The incorrect perception that water is "cheap" or "inexpensive" has led to the ideas that the water supply is not finite and that it flows towards money. This in turn has fostered a national consciousness that high water use landscapes are normal, desirable and acceptable. Little has been done to change this mind set, particularly as it relates to water conservation in the landscape.

With the increased, continuous demand for high quality water exceeding supply of both surface and below ground sources, a new, philosophy for conservation must be engendered: billing must reflect the real costs of water and people must learn and practice the "whys" and "hows" of water conservation. This is why Xeriscape began.

Xeriscape Defined

XERISCAPE (zir' i scap) is an integrated approach to landscape water conservation. Xeriscape was coined from the Greek word "xero" for dry. Thus, Xeriscape means dryscape or low water use landscaping. Xeriscapes are designed through wise planning, plant and construction materials selection, and proper installation to provide beautiful, water efficient, low maintenance landscapes.

In Hawaiian E' Malama Wai meaning "Cherish Our Water" is used to refer to Xeriscaping.

Many have misread the term as zeroscape, which would imply noscape or no landscape plantings. Others have equated Xeriscape landscaping with "rockscapes," many of which are not aesthetically pleasing and may not always conserve water or energy. Rockscapes are harsh, produce glare, and do little to prevent noise and air pollution, making them a poor substitute for Xeriscape landscaping.

Seven Water Conservation Fundamentals

The Xeriscape motto, "Water conservation through creative landscaping," provides the umbrella under which a wide variety of landscape water conservation activities may be taught and employed in a community. And although there are many landscape and horticultural techniques that conserve water, Xeriscape programming has focused on seven broad, fundamental areas.

1. Planning and Design
2. Soil Improvement
3. Efficient, Zoned Irrigation
4. Limited Turf Areas
5. Use of Mulches
6. Use of Low Water Demand Plants
7. Appropriate Maintenance

Planning and Design

Architects, planners, and homeowners are encouraged and taught to incorporate standard design elements of function, circulation, topography, exposure, seasonal color, texture, safety, etc. into existing landscapes and new designs with emphasis on conserving, limiting and/or reusing water. 40% to 60% of the water homeowners use goes for yard watering. Appropriate design and planning can provide these very necessary aspects of urban life and conserve water at the same time. Xeriscapes can ameliorate the impact of a severe drought and avoid the costly clean-up resulting from a "boom and bust" water policy. Tree removal, replanting of landscapes and turfgrass fields are eliminated and real savings to Maui County.

Thayer and Richman (1984) suggest that designing water-conserving landscapes should be considered in two parts. First, the physical ecology of plants and plant communities must be integrated within the microclimates of the landscape. Logically, plants best adapted to the climate, temperatures, sun, wind, and physical nuances of the site thrive best and require the least expenditures for water, energy and maintenance. Secondly, landscape designers must accept that there is a "human ecology" of water use in landscapes. That is, the intensity of human

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activity dictates landscape water use. This includes all uses, whether functional or aesthetic. Thayer and Richman coined the term "hydrozone" to describe the type and intensity of human activity in the landscape and identified four classes of hydrozones. These will be discussed under the heading "Efficient, Zoned Irrigation".

Soil Improvement

Residential soils can be difficult soils to manage because they have been badly disturbed by construction and urban activities. Normal soil horizons are mixed unevenly both vertically and horizontally. Often, hardpans exist and impede drainage, and most urban soils have been compacted by heavy equipment or traffic. Many of the physical and chemical soil properties plants require for growth are present at less than optimum levels in urban soils. Soil improvements must correct poor water infiltration, percolation, and drainage, while providing adequate water holding capacity and improving the nutritional status of the soil. Organic amendments meet most of these requirements and improve tilth, making it easier to till the soil and manage weeds. Adding 3-5 cubic yards of well composted organic matter per 1000 square feet and tilling it into the top 8-12 inches of soil is recommended.

Other amendments such as lime be added to adjust an undesirable acid soil condition. These adjustments should be made prior to planting.

Efficient, Zoned Irrigation

Matching the amount of water supplied to each plant with the plant's water requirement is the most efficient way to irrigate.

Until recently this was difficult to do and most landscapes were irrigated to meet the needs of the turfgrass or other plants with high water requirements. Sprinklers cover large areas without regard to the water needs of individual plants. To eliminate waste by overwatering and run-off, group plants according to their water requirements and use zoned irrigation systems to deliver water to individual plants or to plants with similar moisture requirements (Figure 10-2). Fewer plants will develop disease or die from overwatering.

Not only are irrigation zones established to meet the physical or ecological water needs of plants, but Xeriscape landscaping also recognizes that human activity will impact plant water needs. Thayer and Richman (1984) describe this irrigation zoning to match man's activity as hydrozone planning, and they define four irrigation regimes (Figure 10-3).

The Principal Hydrozone represents the area with the greatest human activity and consequently the greatest water and energy use: sites in yards, parks, and play fields where people frequently, play, sit, walk, gather, or relax: places where people regularly contact plants.

The Secondary Hydrozone is less physically impacted by humans, but is visually important: areas of passive activities space delineation or focal interest such as flower and shrub beds, entrances, prominent plantings, etc; areas of high visual impact, but seldom touched by humans.

Buffer zones, distant views, median strips, parkways, and embankments-these make up the third hydrozone, called the Minimal Hydrozone. In this case, plants are selected that need minimal supplemental water to survive the natural climatic conditions.

The Elemental hydrozone constitutes landscape plantings that require only natural precipitation to survive and seldom, if ever, incur human activity. Utility areas, mulched native plantings, and naturally sustainable, exotic vegetation belong to this hydrozone (Figure 10-4).

Flexible sprinkler heads and nozzles, adjustable delivery rates and coverage, modern valves, and automated controllers - these allow greater water conservation through zoned irrigation. On-off watering is easily programmed to match water infiltration rates into soils, thus avoiding surface runoff. Also, water is better applied to meet specific plant needs as impacted by seasonal human activity and changes in the weather.

Collection systems should be designed and constructed throughout the landscape to gather storm runoff from roofs, walks, drives, and slopes. By grouping high or moderate water requiring plants near swales and collection basins, much of their water needs can be met by natural moisture accumulations rather than irrigation. On the other hand, drought tolerant species may succumb to frequent accumulations of water and should be located on southern exposures or at the tops of slopes. Because they often only require supplemental irrigation during establishment or during a severe drought, a permanent irrigation system may not be needed.

Limited Turf Area

Turfgrass plays a primary role in most landscapes. Turfgrasses make excellent ground covers. They tolerate heavy foot traffic in the backyard, at the park, or on the athletic field. And mowed or unmowed, they stabilize slopes and prevent erosion. They serve to unify designs and instill a sense of pride in home and neighborhood when well kept. Moreover, turf helps keep homes and communities cleaner by reducing particulate and chemical air pollution. Unfortunately, a lawn consumes approximately half the landscape water and requires weekly care. As well, equipment, pest control and periodic cultural practices, such as coring or dethatching contribute to the expense, both in time and money, of maintaining a lawn.

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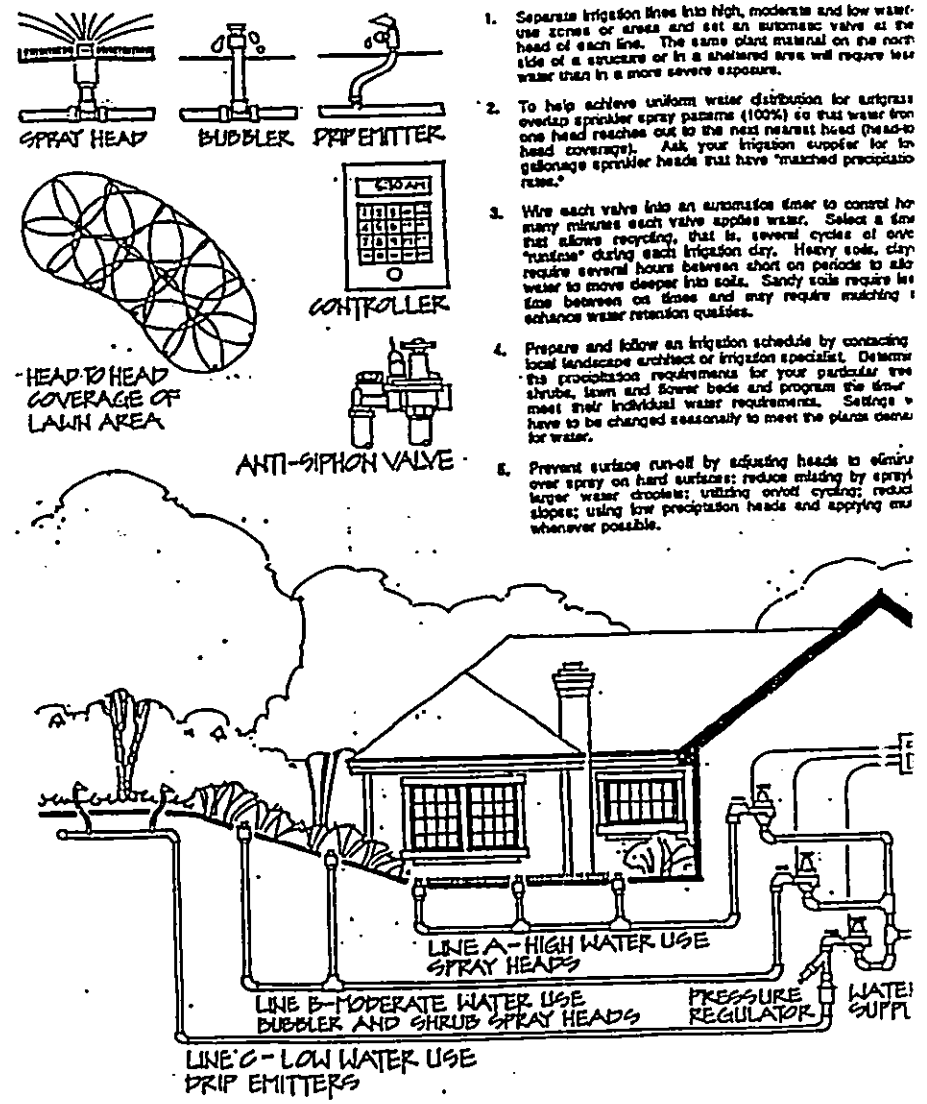

1. Separate irrigation lines into high, moderate and low water-use zones or areas and set an automatic valve at the head of each line. The same plant material on the north side of a structure or in a sheltered area will require less water than in a more severe exposure.
2. To help achieve uniform water distribution for turfgrass overlap sprinkler spray patterns (100%) so that water from one head reaches out to the next nearest head (head-to-head coverage). Ask your irrigation supplier for low gallonage sprinkler heads that have "matched precipitation rates."
3. Wire each valve into an automatic timer to control how many minutes each valve applies water. Select a time that allows recycling, that is, several cycles of one "runtime" during each irrigation day. Heavy soils, clays require several hours between short on periods to allow water to move deeper into soils. Sandy soils require less time between on times and may require mulching to enhance water retention qualities.
4. Prepare and follow an irrigation schedule by contacting local landscape architect or irrigation specialist. Determine the precipitation requirements for your particular trees, shrubs, lawn and flower beds and program the timer to meet their individual water requirements. Settings will have to be changed seasonally to meet the plants demand for water.
5. Prevent surface run-off by adjusting heads to eliminate over spray on hard surfaces; reduce misting by spraying larger water droplets; utilizing on/off cycling; reduce slopes; using low precipitation heads and applying mulch whenever possible.

Figure 10-2. Five Steps to Efficient Irrigation

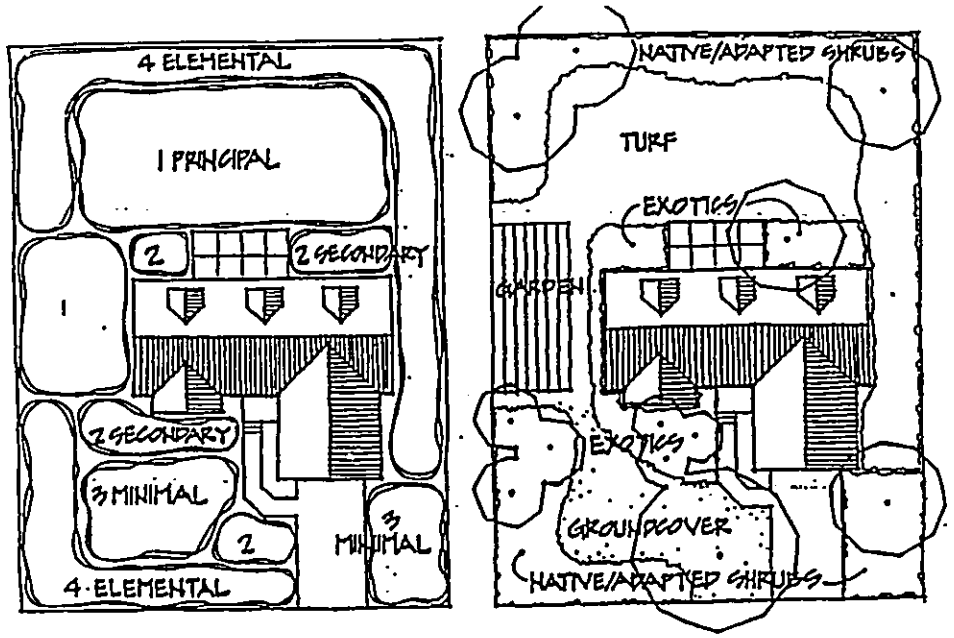

Figure 10-3. Hydrozone Concept Applied to Suburban Lot

Turf should be limited by design to high-use areas in landscapes and separated from other plantings with different water needs. After reviewing the landscape plans, classify the turf areas as either passive or active use and seed and irrigate accordingly. Plant drought-tolerant species with poor resistance to heavy traffic in less-frequented sites.

Not only should the total turf areas be reduced in a landscape, but the perimeter measurement also must be reduced as much as possible. Long, narrow strips of turf are diffcult to properly mow, fertilize, keep pest free, and irrigate. Such strips require hand work to keep them attractive, which increases maintenance time and labor costs. Water from over-spraying turf in narrow planter islands, parkways, side yards, and around entrances not only runs off and is wasted but also contributes to the deterioration of paint, walls, walks, and asphalt in parking lots and streets. Mulches or groundcovers and shrubs on drip or underground irrigation can appropriately replace turf in many landscape sites. Drip emitters or bubblers can be used to irrigate individual plants and eliminate waste caused by overspray. Mulches need no water, and well chosen groundcovers require less water and maintenance than turf.

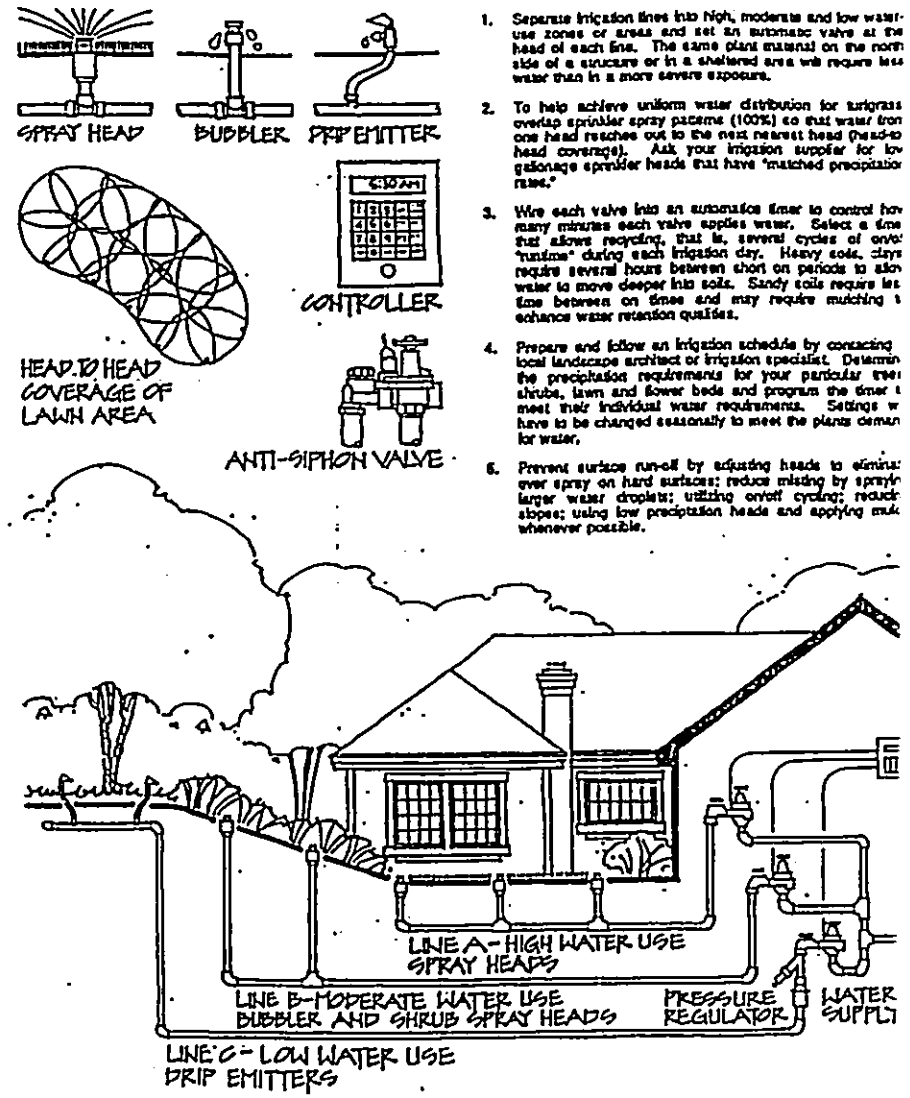

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Figure 10-2. Five Steps to Efficient Irrigation

Likewise, the amount of turfgrass in a landscape may be reduced by increasing the hardscape. Patios, wooden decks, rocked and graveled walks limit the turf area while reducing the water requirement.

Use of Mulches

Mulches function to buffer soils against climatic extremes. In summer, they reduce soil heating and slow evaporation water loss from soil surfaces. They also reduce weeds and make those present easier to remove. Proper use of mulches reduces or prevents soil erosion. Organic mulches also contribute to the nutritional level and tilth of the soil as they breakdown.

These practical functions are important; however, many mulches are included in the landscape for their design flexibility and attractiveness, not simply because they save water, protect roots, and reduce maintenance.

Mulches are classified as organic, inorganic, and living. Organic mulches include plant refuse, such as chips and slash from tree trimming operations, saw dust, composted leaves and manures, peat moss, and graded bark products. Sized and washed rocks and gravels are popular inorganic mulches which come in many sizes, colors, and textures. Impervious sheet plastics covered with either organic or inorganic mulches were popular, but because sheet plastic prevents gas and water exchange between air and soil and creates a water-logged root environment, woven, porous plastics are now preferred. Mulches are applied 3 to 4 inches deep over bare soil and only 2 to 3 inches deep over woven fabrics. Living mulches include low growing groundcovers and low maintenance turfgrasses. They function well as mulches, but may be heavy competitors for water and nutrients under newly planted trees and shrubs. If used, select hardy, drought-tolerant species that resist common diseases. These species provide the best results and require less maintenance.

Use Of Low Water-Demand Plants

Many beautiful and functional plants, both exotics and natives, are available that thrive with natural precipitation or small amounts of supplemental water.

Chapter Two lists tree characteristics including their water requirements ranging from dry (less-thirsty) to wet (very-thirsty).

All types of plants with low water requirements are now available and more will become available as demand increases. The range of drought-tolerant plant species and those with low water requirements is now wide enough to permit selecting for function, beauty, and seasonal interest. As with all plant selections and planting, take care to match the specific needs of the plant to the environmental conditions and the intensity of human activity at the planting site. This is critical when using drought tolerant and low water use plants in the landscape. Choosing the proper plants and planting them correctly will reduce water consumption and maintenance costs over many years.

Appropriate Maintenance

Low maintenance is not <u>no maintenance.</u> The use of all or most of the Xeriscape principles will reduce but not eliminate maintenance. And generally, the greater the human activity at a site, the greater its maintenance requirements will be. Trees, shrubs, groundcovers, and turfgrasses are living organisms that require care. Timely fertilizing, watering, pruning, pest management, and other cultural practices are necessary in Xeriscape landscapes, but at reduced levels compared to conventional landscape plantings. Even mulched sites without plants must have litter removed periodically. Irrigation components for drip and sprinkler systems require routine checks and servicing. Xeriscape landscaping coupled with sound maintenance produces water and energy savings and environmentally adapted landscapes that are aesthetically pleasing.

As has been stressed, integrating these principles in landscapes will conserve water and reduce annual maintenances costs. Most importantly though, Xeriscape landscaping provides these benefits without sacrificing function or beauty. And although these seven points are stressed in Xeriscape literature and are the basis for Xeriscape programming, there is no substitute for creativity as a means of discovering and sharing new ways to conserve water without making yards and parks into zeroscapes.

Community education in Xeriscape landscaping is the key to a successful water conservation program. The principles of Xeriscape landscaping challenge the widespread but mistaken belief that water is cheap, unlimited resource which will always be available. Hopefully, the public will recognize that this is a misconception and that water conserving landscapes are necessary and should be considered "normal" within our society. At the same time, it teaches people the "whys" and "hows" of effective water conserving horticulture. To reach these objectives requires the cooperation of government leaders,

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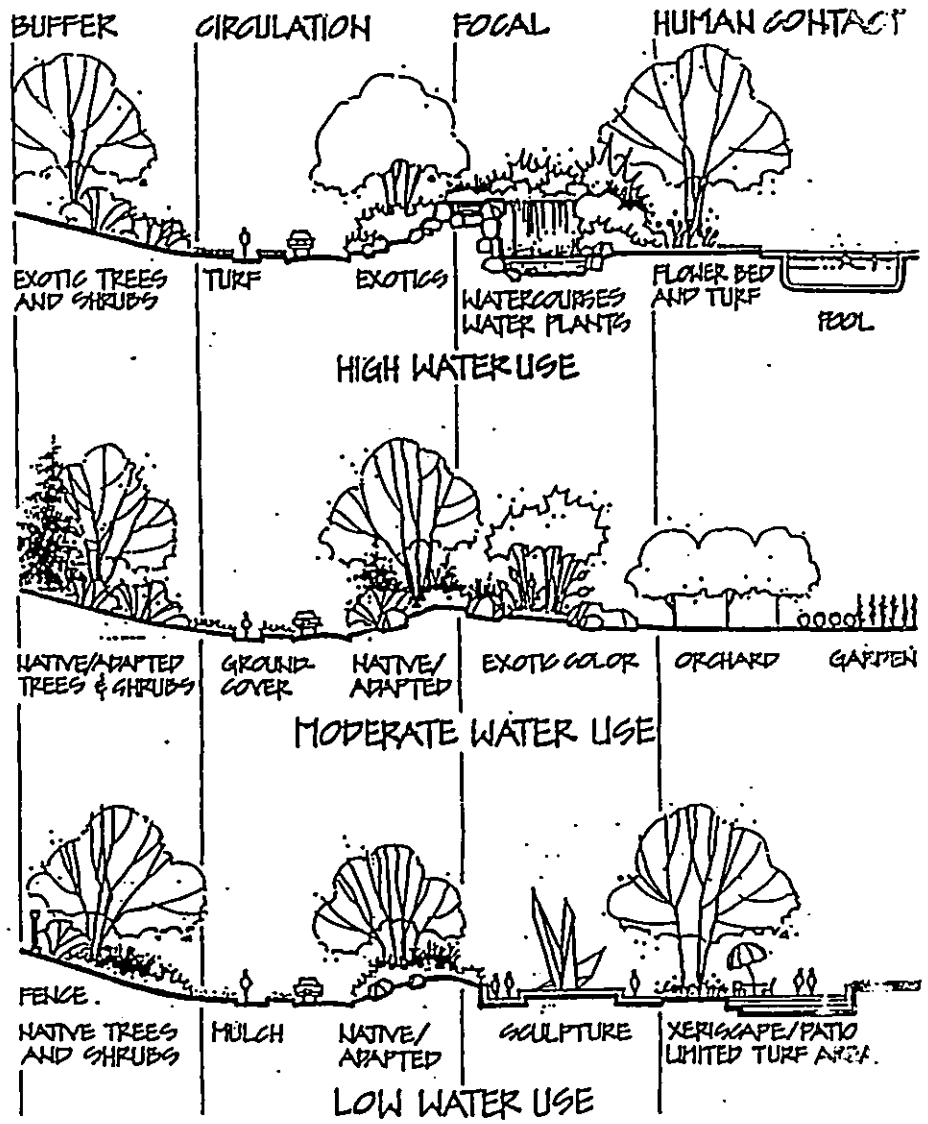

Figure 10-4. Water Use Relating to Human Use—Three Approaches

agencies, landscape professionals, horticulturists, irrigation specialists, concerned citizens, and an army of volunteers enthusiastically supporting and promoting Xeriscape programming.

Community Water Management

Xeriscape landscaping, when followed, will conserve water, reduce maintenance costs, and establish beautiful, environmentally sound landscapes, parks, recreational facilities and greenspaces throughout a community. Conserving water averts the need to construct costly new delivery systems and waste treatment plants that would otherwise be needed to meet periods of peak loading. Xeriscaping also leads to changes in attitudes about water quality, water use, and how a community's water should be managed, especially in landscape irrigation.

Literature Cited

Urban and Community Forestry - A Guide for the Interior Western United States - United States Department of Agriculture - Forest Service

Thayer, Jr., Robert L. and TG. Richman, "Water-Conserving Landscape Design," In Energy Conserving Site Design, Ed. G. McPherson, Am. Soc. Landscape Architects, 1984.

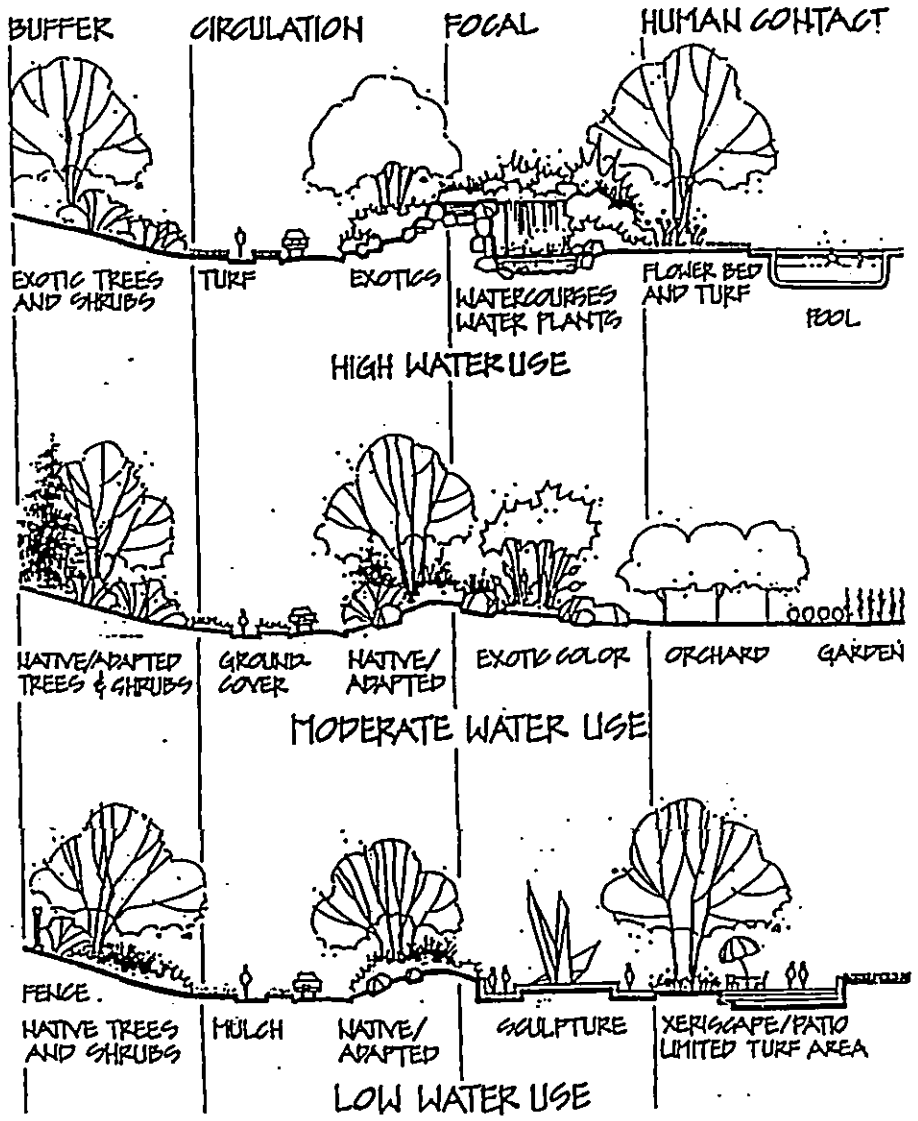

Figure 10-4. Water Use Relating to Human Use—Three Approaches

LOW WATER USE/DROUGHT TOLERANT PLANT LIST

All plants require water for establishment. After they are rooted and growing well their water requirements will vary.

The following is an incomplete list of drought tolerant plants. It is provided for your convenience.

Please review the following reference lists for many other suggestions.

1. Drought Resistant Plants For Hawaiian ardens by Norman C. Benzona, County Extension Agent, Cooperative Extension Service.

2. Drought Tolerant Native Hawaiian Plants for the Landscape – by Heidi Bornhorst Horticulturist, Honolulu Botanic Gardens.

3. Halawa Xeriscape Garden Registry of Nurseries that grow Less-Thirstry-Plants-Honolulu Board of Water Supply, November 1989.

Key to Symbols

A Accent Plant
F Flower Color
GC Groundcover
G Grass
OG Ornamental Grass
S Shrub
SC Succulent
ST Small Tree
MT Medium Tree
LT Large Tree
V Vines

Key to Zones

Zone 1 – Normal watering level. Includes lush lawns and gardens.

Zone 2 – Moderate watering level. Includes lawns, ground covers and shrubs.

Zone 3 – Low watering level. Includes self-sustaining plant materials and natural vegetation with emphasis on plants that require little or no supplemental irrigation.

Type	Botanical Name	Zone	Common Name
S	Abutilon menziesii	3	Ko'o Loa'ula
MT	Acacia koa	2	Koa
A,F,S,SC	Adenium obeseum	3	Desert Rose
A,F,GC	Agapanthus africanus	2	Lily of the Nile
A,SC,S	Agave attenuata	3	Agave
MT	Aleurites moluccana	2	Kukui
S,GC,F	Aniscanthus thurberi	3	Desert Honeysuckle
V,GC,F	Antigonon leptopus	3	Mexican Creeper(3 colors
S,GC,A	Asparagus densiflorus cv 'Meyers'	2	Foxtail Asparagus
S,GC,A	A. densiflorus 'Sprengeri'	2	Sprenger Asparagus
A	Aspidistra elatior 'variegata'	2	Cast Iron Plant
GC	Asystasia gangetica	3	Asystasia
V,SC,GC	Aptenia cordifolia	3	Hearts and Flowers
MT,F	Bauhinia blakeana	2	Hong Kong Orchid Tree
V,F	B. galpinii	2	Red Bauhinia
ST,F	B. tomentosa	3	Yellow Bauhinia
A,SC,ST	Beaucarnea recurvata	3	Pony tail
A,V,F	Bougainvillea 'Crimson Jewel'	2	
A,V,F	Bougainvillea 'Jamaica White'	2	
A,V,F	Bougainvillea 'Rosenka'	2	
A,V,F	Bougainvillea 'Temple Fire	2	
ST	Brexia madagascariensis	2	Brexia

LOW WATER USE/DROUGHT TOLERANT PLANT LIST

All plants require water for establishment. After they are rooted and growing well their water requirements will vary.

The following is an incomplete list of drought tolerant plants. It is provided for your convenience.

Please review the following reference lists for many other suggestions.

1. Drought Resistant Plants For Hawaiian ardens by Norman C. Benzona, County Extension Agent, Cooperative Extension Service.

2. Drought Tolerant Native Hawaiian Plants for the Landscape - by Heidi Bornhorst Horticulturist, Honolulu Botanic Gardens.

3. Halawa Xeriscape Garden Registry of Nurseries that grow Less-Thirstry-Plants-Honolulu Board of Water Supply, November 1989.

Key to Symbols

A Accent Plant
F Flower Color
GC Groundcover
G Grass
OG Ornamental Grass
S Shrub
SC Succulent
ST Small Tree
MT Medium Tree
LT Large Tree
V Vines

Key to Zones

Zone 1 - Normal watering level. Includes lush lawns and gardens.

Zone 2 - Moderate watering level. Includes lawns, ground covers and shrubs.

Zone 3 - Low watering level. Includes self-sustaining plant materials and natural vegetation with emphasis on plants that require little or no supplemental irrigation.

Type	Botanical Name	Zone	Common Name
MT	Caesalpinia ferrea	2	Brazilian Ironwood
A,S,F	Caesalpinia pulcherrima	3	Ohai ali'i(3 colors)
S	Calotropis gigantea	3	Crown Flower
ST	Canthium odoratum	3	Alahe'e
S	Carissa grandiflora	3	Natal Plum
S,GC	C. grandiflora prostrata	3	Creeping Natal Plum
S,ST,F	C. surratensis	3	Kolomona
SC,GC	Carpobrotus edulis	3	Hotentot Fig
MT,F	Cassia fistula	2	Yellow Shower
MT,F	Cassia fistula x C. javanica		Rainbow Shower (All Colors)
ST	Ceratonia siliqua	3	Carob Tree
V,GC,S	Clerodendron inerme	3	Glory Bower
MT	Clusia rosea	3	Autograph Tree
S	Clusia sp.	3	Small Leaf Clusia
MT,F	Cochlospermum vitifilum	3	Buttercup Tree
MT,F	Cordia subcordata	2	Kou
OG	Cortaderia selloana	3	Pampas Grass
S,SC,A	Crassula argentea	3	Jade Plant
ST	Cresentia cujete	3	Calabash Tree
V	Cryptostegia grandiflora	3	India Rubber Vine
A,S	Cycas revoluta	2	Sago Palm
G	Cynodon dactylon	3	Bermuda Grass
A,S,SC	Dasyliron wheeleri	3	Spoon Flower
MT,A,F	Delonix regia	2	Royal Poinciana (3 colors)
S	Dodonaea viscosa	3	'A'ali'i
LT	Enterolobium cyclocarpum	3	Earpod
MT	Eriobotrya japonica	2	Loquat
MT	Erythrina sandwicensis	3	Wiliwili
MT	Erythrina "Tropic Coral"	2	Tropic Coral
MT	E. variegata var. orientalis	2	Wiliwili
S,SC,A	Euphorbia cotinifolia	2	Tigers Claw
A,GC,SC	E. millii	3	Hierba mala
ST,A	Feijoa sellowiana	2	Crown of Thorns
S	Ficus buxifolia	2	Pineapple Guava
ST,A	Ficus carica	3	Boxwood Ficus
S,A	F. diversifolia	2	Fig
LT	F. microcarpa	2	Mistletoe Fig
S,GC	F. microcarpa var. crassifolia	3	Chinese Banyan
A,SC	Furcraea aff. giantea variegata	3	Taiwan Ficus
			Variegated Furcr

Type	Botanical Name	Zone	Common Name
S,A	Gardenia brighamii	2	Nanu
S,GC	G. radican	2	Creeping Gardenia
S	Gossypium tomentosum	3	Ma'o
S,A	Grewia occidentalis	2	Lavendar Star
ST,A	Guaiacum officinale	3	Lignum Vitae
S,A,F	Hibiscus brackenridge	2	Ma'o hau hele
S,GC	H. calyphyllus	3	Rock's Hibiscus
S,A,F	H. 'Carnation'	2	Carnation Hibiscus
S,A,F	H. 'Cooperi'	2	Calico Hibiscus
S,A,F	H. schizopetalus	2	Coral Hibiscus
S,A,F	H. schizopetalus 'Pagoda'	2	Pagoda Hibiscus
S,A,F	H. waimeae	2	Koki'o ke'o ke'o
S,F	Jasminum sambac	2	Pikake
S,F	J. sambac 'Duke of Tuscany'	2	Giant Pikake
GC	Juniperus chinensis procumbens	2	Japanese Garden Juniper
S,GC,F	Lantana camara 'Radiation'	2	Lantana
GC,F	Lantana cv 'Gold Mound'	2	Trailing Lantana
GC,F	L. montevidensis	2	Bay Laurel
S,A	Laurus nobilis	3	Naio
ST	Myoporum sandwicense	2	Dwarf Nandina
S,A	Nandina domestica compacta nana	3	Oleander
S,F	Nerium oleander	3	Dwarf Oleander
S,F	Nerium oleander f. 'dwarf'	3	Kului
S	Nototrichium sandwicensis	3	Olive
MT	Olea europaea	3	'Ulei
S	Osteomeles anthyllidifolia	2	Seashore Paspalum
G	Paspalum vaginatum	2	Variegated Opiuma
MT	Pithecellobium dulce 'variegata'	2	Wheeler's Pittosporum
S,GC	Pittosporum tobira 'wheeleri'	3	Cape Leadwort
S,F	Plumbago auriculata	3	'Ilie'e
S,GC	P. zeylanicum	2	Plumeria
MT,F	Plumeria hybrid(and spp.)	3	Miniature Jade
S,A,SC	Potulacaria afra	2	Pink Bombax
MT,F	Pseudobombax ellipticum	3	Pomegranate
S,ST	Punica granatum	3	Dwarf Pomegranate
A,GC	P. granatum nana		

Type	Botanical Name	Zone	Common Name
MT	Caesalpinia ferrea	2	Brazilian Ironwood
A,S,F	Caesalpinia pulcherrima	3	Ohai ali'i(3 colors)
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ST	Canthium odoratum	3	Alahe'e
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S,GC	C. grandiflora prostrata	3	Creeping Natal Plum
S,ST,F	C. surratensis	3	Kolomona
SC,GC	Carpobrotus edulis	3	Hotentot Fig
MT,F	Cassia fistula	3	Yellow Shower
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MT	Eriobotrya japonica	2	Loquat
MT	Erythrina sandwicensis	3	Wiliwili
MT	Erythrina "Tropic Coral"	2	Tropic Coral Wiliwili
MT	E. variegata var. orientalis	2	Tigers Claw
S,SC,A	Euphorbia cotinifolia	2	Hierba mala
A,GC,SC	E. millii	3	Crown of Thorns
ST,A	Feijoa sellowiana	2	Pineapple Guava
S	Ficus buxifolia	2	Boxwood Ficus
ST,A	Ficus carica	3	Fig
S,A	F. diversifolia	2	Mistletoe Fig
LT	F. microcarpa	3	Chinese Banyan
S,GC	F. microcarpa var. crassifolia	3	Taiwan Ficus
A,SC	Furcraea aff. giantea variegata	3	Variegated Furcraea

Type	Botanical Name	Zone	Common Name
S	Rosemarinus offcinalis	3	Rosemary
GC	R. officinalis var. prostrata	3	Creeping Rosemary
S,A,F	Russelia equisetifolia	2	Coral Plant
T	Samanea saman	3	Monkey Pod
A	Sansevieria spp.	3	Sansevieria
MT	Sapindus saponaria	2	Soapberry Tree
S	Scaevola taccada	3	Naupaka
ST	Schinus molle	3	California Pepper Tree
GC,SC	Sedum spp.	3	Sedum
V,F	Senecio confusus	2	Mexican Flame Vine
V,GC	Stapelia nobilis	3	Giant Carrion Flower
G	Stenotaghrum secundatum	2	St. Augustine Grass
OG	S. secundatum variegatum	2	Variegated St. Augustine Grass
A,F	Strelitzia reginae	2	Bird of Paradise
MT	Tabebuia argentea	2	Silver Trumpet Tree
LT	T. chrysantha	2	Trumpet Tree
LT	T. donnel-smithii	2	Gold Tree
MT	Tamarix aphylla	3	Desert Athel
V,GC,F	Thevetia peruviana	3	Be-still Tree
GC	Tradescantia spathacea	3	Oyster Plant
S,GC	Wikstroemia uva-ursi	3	'Akia
A,SC	Yucca gloriosa	3	Spanish Bayonet
G	Zoysia tenuifolia 'Elegance'	2	
G	Z. tenuifolia 'Emerald'	2	

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6272-01
May 22, 2000

Mr. David Craddick, Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Craddick:

We are in receipt of your letter dated May 5, 1999 commenting on the subject EA. As the project is in the conceptual design stage, details regarding the projected demand for water have yet to be developed. We will continue to consult with your office, however, as the project design progresses and details on water system needs become available.

We appreciate the information you provided regarding the existing water system in the project area and required water conservation practices, and will incorporate the information into the project design.

With regard to the protection of water resources, a drainage report and Best Management Practices Plan for erosion control will be submitted to the Department of Public Works and Waste Management for review and approval prior to project construction.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

tav
EM

Hana Affordable Housing
and
Community Development Corporation
Post Office Box 129 Hana, Maui, Hawaii 96713
Office Telephone: (808) 248-7294

April 6, 1999.

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793
Attention: David Ching

Subject: Comments to Draft Environmental Assessment for Hana Community Healthcare Campus

Dear David:

Enclosed, from Hana Affordable Housing and Community Development Corporation (HAH&CDC), are its Comments regarding the Draft Environmental Assessment for Hana Community Healthcare Campus.

In offering its Comments, HAH&CDC, while supportive of upgrading medical facilities and services within the Hana region, is primarily concerned with the limited discussion and the lack of supportive information provided within the Draft Environmental Assessment regarding provision of elderly housing, consistent with the Land Use Designation of the Hana Community Plan for parcel TMK (2)-1-4-03:022. Secondary concerns include (a) planning and designing of the proposed project, compatible with the standards and design guidelines of the Hana Community Plan; (b) operational viability of proposed facilities; and, (c) justification for proposed expanded facilities and additional services. Other important concerns include project funding; zoning of parcels; economic benefits to the community; the project's housing component; and Archeological Site 3150.

Should you have questions, feel free to call me.

Bill Fuhrmann
Executive Director

cc: with Comments to:

James Stone
Kober/Hanssen/Mitchell Architects

Earl Matsukawa
Wilson Okamoto & Associates, Inc.

Office of Environmental Quality Control

Comments
to
Draft Environmental Assessment
for
Hana Community Healthcare Campus

Compatibility with Hana Community Plan:

Land Use designation of Parcel TMK (2)-1-4-03:022,

A review of the legislative history of Ordinance No. 2347, the Hana Community Plan, regarding the land use designation of parcel TMK (2)-1-4-03:022 ("expansion parcel"), will show that this parcel is to be used for both medical center expansion and elderly housing. The Hana Community Plan Citizens Advisory Committee (the "Hana CAC"), in addressing the major problem of "Affordable Housing", based on the HOUSING IN HANA, MAUI, A Study of Housing Conditions and Needs, Prepared for Keola Hana Maui, Inc. by SMS Research in July 1991, recommended designation of 3 acres of the expansion parcel as MF for elderly housing and recommended designation of 7 acres of the expansion parcel as P/Q-P for the expansion of Hana Medical Center. The Planning Department concurred with the Hana CAC's Land Use recommendations for the use of the expansion parcel, however, as no specific plans were then (August/September 1993) available to delineate the meets and bounds of the elderly housing segment and the meets and bounds of the medical center expansion segment, the Planning Department recommended P/Q-P for the entire expansion parcel, noting that elderly housing is allowed in P/Q-P, "in order to provide flexibility in site planning.". The Hana Advisory Committee to the Maui Planning Commission, the Maui Planning Commission, the Land Use Committee of the Maui County Council, and finally the Maui County Council, all concurred with the Department's recommendation.

The proposed project, as presented and designed without inclusion of 3 acres of the expansion parcel for elderly housing, is incompatible with the Hana Community Plan Land Use Map, as adopted (See Page 2 of matrix entitled Proposed Revisions to the Hana Community Plan Land Use Map, an attachment of Exhibit "1" of ORDINANCE NO. 2347, BILL NO. 55 (1994), Effective Date: July 1,1994), by the Maui County Council.

The Draft Environmental Assessment ("Draft EA") should discuss the effects of the proposed project, with and without the inclusion of the 3 acre segment designated for elderly housing.

Planning Standards:

The Draft Environmental Assessment does not discuss the proposed project's "landscaping" plan, other than "To the extent possible, however, the existing large monkeypod, coconut, and other significant trees will be preserved and incorporated into the landscaping of the proposed facility."

The Hana Community Plan's Planning Standards, for development and design, specifically states "Native plant species which are found in the Hana region shall be utilized for public and quasi-public facilities to the greatest extent possible."

The Draft EA does not discuss whether the proposed project is designed in accordance with the design guidelines developed for Hana Town. Note: such design guidelines were adopted by the Maui Planning Commission in 1997.

Operational Viability of Proposed Facilities

Hana Community Health Center depends upon substantial funding from the State of Hawaii to provide current level of services in its current facilities. The Draft EA does not discuss the funding and/or operational viability of the additional services to be provided by the proposed project

Further, given the "current" economic conditions within the Hana Community, the Draft EA does not discuss whether "current" resident/users will provide sufficient revenue to provide the additional services of the proposed project.

The Draft EA, based on the inability of Hana Community Health Center to be self-supporting, should discuss the operational viability of the proposed additional services.

Justification for expanded facilities and services

The Draft EA, in discussing justification for the expanded facilities, refers primarily to projected population growth for the Hana Region, the geographic isolation of Hana from Central Maui, without discussing the needs of the resident population for such expanded facilities. (Note: The distance from Hana Medical Center to Maui Memorial Medical Center is less than 55 miles.)

The Draft EA does not discuss the "additional" services to be provided by the proposed expanded facilities other than "The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District".

The Draft EA should (a) define, with more clarity, the project's expanded facilities and additional services to be provided, and (b) discuss, in depth, the necessity for the project's expanded facilities and additional services.

Comments to Draft Environmental Assessment
Hana Community Healthcare Campus

Other General Comments

Project funding

The Draft EA needs to discuss funding for the construction and development of project.

Zoning of parcels

While the Draft EA does discuss both the allowance of the proposed project under the County's Interim Zoning, and the need to be granted State Special Use permits, based on the scope of the proposed development and the need to secure funding, the Draft EA should discuss the effects of not having the project's parcels zoned pursuant to Article 2 of Title 19 of the Maui County Code.

Economic benefits to community

While the Draft EA discusses as part of the project's long term economic benefits as "Once operational, the proposed project will increase employment opportunities in the Hana Region.", the Draft EA does not identify these employment opportunities. The Draft EA should identify these employment opportunities including the number of positions, employment status (Fulltime, Parttime, Regular, Relief, Casual), job duties, qualifications and pay ranges.

Project's housing component

The Draft EA presents no discussion on the housing component of the project. The Draft EA should discuss the Doctor's housing, as currently housing does exist within walking distance of the project site; the housing for Executive Director of the Healthcare Campus; and the housing for staff nurses, including the costs of occupancy of all proposed housing.

Archeological Site 3150

While the Draft EA discusses the Archeological Inventory Study regarding this site, the Draft EA does not discuss the "cultural significance" of this site, which purportedly served as a "*pu'u honua*". The Draft EA should discuss the "cultural significance" of Archeological Site 3150 and offer mitigation measures.

6272-01
May 22, 2000

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Mr. Bill Fuhrmann, Executive Director
Hana Affordable Housing and Community Development Corporation
P.O. Box 129
Hana Hawaii 96713

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Fuhrmann:

We are in receipt of your letter dated April 6, 1999 commenting on subject EA. The following is offered in response to your concerns:

Compatibility with Hana Community Plan

Land Use Designation of Parcel TMK (2)-1-4-03:022: According to the County of Maui Planning Department, 3-acre expansion parcel for elderly housing was not adopted as part of the Hana Community Plan Land use map (Staff communication, May 1999).

Planning Standards: At this time the project design is in the conceptual stage and, a landscaping plan has yet to be developed. Pursuant to the Planning Standards of the Hana Community Plan, the project will incorporate native Hawaiian plants and trees into the proposed facility. Further, the Arborist Committee will be consulted as the project design progresses in conjunction with the development of a landscape plan regarding the disposition of the significant trees currently located on the project site.

The Final EA will include a discussion regarding the project's compliance with the design guidelines developed for Hana.

Operational Viability of Proposed Facilities
The provisions of Chapter 343 of the Hawaii Revised Statutes, Title 11, Chapter 200 , Administrative Rules, Department of Health, and 24 Code of Federal Regulations Part 58 regarding environmental review procedures for projects require the early processing of environmental assessments. At this early juncture in the project development, the operational viability aspects of the project are yet to be developed. These aspects will be evaluated as the project development progresses. An economic feasibility study will be prepared and submitted to the County of Maui Mayor's Office for review and approval as part of the procurement process for the project.

Justification For Expanded Facilities and Services
As the project is in the conceptual design stage, details regarding the project's facilities and services have yet to be developed. The necessity for a comprehensive medical facility is clear, however, based on the geographic isolation and projected population increase of the region.

Other General Comments

Project Funding: Funding assistance for the detailed design and construction of the proposed project will be sought from the Community Development Block Grant program.

Zoning of Parcels: As stated in Section 3.4 (Page 3-3) of the Draft EA, "The County of Maui Interim Zoning Ordinances for various districts of Maui are for the purpose of providing interim regulations pending the formal adoption of a comprehensive zoning ordinance and map. Hospitals are a permitted property use designated by the interim zoning regulations."

Economic Benefits to Community: The employment opportunities resulting from the project will be contingent upon the final mix of services provided at the new facility. These services will be determined as the project design and consultation with the funding agency progress. An economic feasibility study will be prepared and submitted to the County of Maui Mayor's Office for review and approval as part of the procurement process for the project.

Project's Housing Component:
Section 1.5 (Page 1-7) of the Draft EA states that 9,800 square feet of employee housing will be provided for the executive director, on-site physician, and staff nurses. In addition, Figure 3 (Conceptual Plan on Page 1-9) illustrates that the residences will be sited near the western (mauka) portion of the project site. As the project is in the conceptual design stage, no further details regarding the housing component of the project have yet to be developed.

Archaeological Site 3150:
According to the Archaeological Inventory Survey prepared by Paul .H. Rosendahl, Ph.D., Inc. (PHRI) in May 1993, Site 3150 was identified under significance category "A", which is important for information content and which requires further data collection. SHPD concurred with this recommendation and, subsequently, PHRI prepared an Archaeological Mitigation Program in April 1996. The SHPD determined

in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work was recommended. Further, the SHPD determined during the Draft EA consultation period that the project will have no effect on archaeological resources.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

Maui Electric Company, Ltd. • [illegible] West Kamehameha Avenue • PO Box 398 • K[illegible]ui, Maui, HI 96733-6898 • (808) 871-8451

March 8, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

Subject: Hana Community Healthcare Campus
Draft Environmental Assessment
(TMK: 1-4-05:22 and 24, Hana, Maui)

Thank you for allowing us to comment on the subject project.

In reviewing the information transmitted and our records, Maui Electric Company (MECO) at this time has no objections to the proposed project.

MECO encourages that the project's consultant meet with us as soon as practical so that we may plan for the project's electrical requirements.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Edward Reinhardt

Edward Reinhardt
Manager, Engineering

ER:fo

Cc: Mr. James Stone, AIA

6272-01
May 22, 2000

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& ASSOCIATES, INC.
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Mr. Edward Reinhardt, Manager
Engineering
Maui Electric Company, Ltd.
210 West Kamehemaha Avenue
P.O. Box 398
Kahului, Hawaii 96733-6898

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Reinhardt:

We are in receipt of your letter dated March 8, 1999 stating that you have no objections to the proposed project. The project designer will consult with your office once the project design progresses and details regarding electrical requirements become available.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

8. REFERENCES

Chris Hart & Partners. *Draft Environmental Assessment Hana Waterline Replacement Project Phase II.* October 1998.

Chris Hart & Partners. *Hana Community Design Guidelines.* November 1997.

County of Maui. *Hana Community Plan.* July 1994.

County of Maui Office of Economic Development. *Maui County Data Book 1996-97.* July 1997.

Macdonald, Gordon A., etal. *Volcanoes in the Sea, The Geology of Hawaii, Second Edition.* 1986.

Pacific Planning and Engineering. *Final Environmental Impact Statement for the Hana Ranch County Club.* November 1992.

Paul H. Rosendahl, Ph.D., Inc. *Archaeological Inventory Survey Hana Medical Center Project Area.* Prepared for the Department of Accounting and General Services Division of Public Works. May 1993.

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Stearns, Harold T. *Geology of the State of Hawaii, Second Edition.* 1985.

United States Department of Agriculture Soil Conservation Service. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii.* August 1972.

University of Hawaii Department of Geography. *Atlas of Hawaii, Second Edition.* 1983.

University of Hawaii Land Study Bureau. *Detailed Land Classification - Island of Maui.* May 1967.

Appendix A

Archeological Inventory Survey
Hana Medical Center Project Area
Land of Kawaipapa, Hana District, Island of Maui
(TMK: 1-4-03:22)

Paul H. Rosendahl, PhD., Inc.
May 1993

Archaeological Inventory Survey
Hana Medical Center Project Area

Land of Kawaipapa
Hana District, Island of Maui
(TMK:1-4-03:22)

by

Jack D. Henry, B.S.
Project Supervisor

and

Donna K. Graves, M.A.
Projects Manager - Hawaii

Prepared for

Department of Accounting and General Services
Division of Public Works
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96871-01198
(DAGS Job No. 15-20-6219)

May 1993

PHRI
Paul H. Rosendahl, Ph.D., Inc.
Archaeological · Historical · Cultural Resource Management Studies & Services
365 Mehani Street · Hilo, Hawaii 96720 · (808) 969-1763 · FAX (808) 961-8998
P.O. Box 12305 · C. M. P., Guam 96921 · (671) 472-3117 · FAX (671) 472-3131

SUMMARY

At the request of Mr. Allen Yamanoha, planner for the Department of Accounting and General Services (DAGS), State of Hawaii, Paul H. Rosendahl, Ph.D., Inc. (PHRI) recently conducted an archaeological inventory survey of the 10.07-ac Hana Medical Center project area, located in the Land of Kawaipapa, Hana District, Island of Maui (TMK:1-4-03:22). The basic objective of the survey was to provide information sufficient for satisfying the historic preservation requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD).

The survey included a 100% pedestrian survey of the project area and the excavation of 16 shovel tests. During the pedestrian survey, four archaeological sites were identified—two complexes (Sites 3150 and 3153) and two historic boundary walls (Sites 3151 and 3152). The sites comprised the following formal feature types: enclosure, L-shape enclosure, platform, wall, and terrace. The features comprised the following functional types: habitation, animal pen, agriculture, boundary marker, and indeterminate.

Sixteen shovel tests were excavated to test for the presence or absence of buried cultural deposits. The tests were placed in the vicinities of the identified sites (excluding the historic boundary walls), and in areas modified by recent agriculture. Subsurface cultural materials were identified in four shovel tests placed at Site 3150. One test unit was placed at one site (Site 3150) to test the site for human remains. No human remains were encountered in the unit.

Based on the findings of the current work, three identified sites (3151, 3152 and 3153) are assessed as significant solely for information content, and no further work is recommended for the sites. Site 3150 is assessed as significant for information content, and further data collection, (including appropriate data recovery excavations) is recommended. The purpose of the further work is to more precisely determine the age and function of Site 3150.

CONTENTS

ILLUSTRATIONS

TABLES

INTRODUCTION

BACKGROUND

At the request of Mr. Allen Yamanoha, planner for the Department of Accounting and General Services (DAGS), State of Hawaii, Paul H. Rosendahl, Ph.D., Inc. (PHRI) recently conducted an archaeological inventory survey of the 10.07-ac Hana Medical Center project area, located in the Land of Kawaipapa, Hana District, Island of Maui (TMK:1-4-03:22). The basic objective of the survey was to provide information sufficient for satisfying the historic preservation requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD).

The field work for the current project was conducted January 11-16 and April 20, 1993 by Project Supervisor Jack D. Henry, B.S., and Crew Chief Martin Boudreau, B.A. Projects Manager Donna K. Graves, M.A., and Hawaii Projects Director Alan Walker, B.A., provided overall guidance for the project. The field work took about 105 labor-hours to complete.

SCOPE OF WORK

The basic purpose of the inventory survey was to identify all sites and features of potential archaeological significance present within the project area. An inventory survey comprises an initial level of archaeological investigation. Basically, it determines the presence or absence of archaeological resources and indicates their general nature and variety, and their general distribution and density. Finally, it permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for such further work as might be necessary. Such work could include further data collection—additional data collection involving detailed recording of sites and features, and selected limited excavations; and possibly subsequent mitigation—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 current survey were fourfold: (a) to identify (find and locate) all sites and site complexes present in the parcel; (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 data collection or other mitigation work that might be necessary.

Based on a review of readily available background literature, and based on familiarity with the current requirements of review authorities and on discussions with Mr. Allen Yamanoha and with Ms. Annie Estioko-Griffin, DLNR staff archaeologist, the following specific tasks were determined to constitute an adequate scope for the inventory 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 variable coverage (partial to 100%), variable intensity surface reconnaissance survey of the project area, with (a) relatively higher intensity coverage being given to non-cultivated and otherwise minimally modified lands, and (b) relatively lower intensity coverage to areas extensively modified by historic period and/or recent cultivation;

3. Conduct limited subsurface testing of selected locations within the project area to determine the presence or absence of potentially significant buried cultural features or deposits; and

4. Analyze background and field data, and prepare appropriate reports.

The inventory survey was carried out in accordance with the standards for inventory-level survey recommended by DLNR-SHPD. The significance of all archaeological remains identified within the project area were assessed in terms of (a) the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60), and (b) the criteria for evaluation of traditional cultural values prepared by the national Advisory Council on Historic Preservation. DLNR-SHPD uses these criteria to evaluate eligibility for both the Hawaii State and National Register of Historic Places.

To further facilitate client management decisions regarding the subsequent treatment of resources, the general significance of all archaeological remains identified during the survey were also evaluated in terms of three PHRI Cultural Resource Management (CRM) value modes—scientific research, interpretive, and cultural values. The value modes and the above federal criteria are discussed in detail in the Conclusion section.

PROJECT AREA DESCRIPTION

The project area consists of about 10.07 acres. The main portion of the project area is bounded on the east by the existing Hana Medical Center facility, and on the north, south, and west by private parcels. The project area includes a small adjoining parcel located along the northern boundary of the existing medical facility (Figure 1).

The project area is c. 160-200 feet AMSL (above mean sea level). Rainfall in the general vicinity of the project area averages 75 inches per year, and the mean annual temperature in the vicinity is 70-75 degrees F (Armstrong 1973).

Terrain within the project area slopes moderately towards the sea and comprises primarily Hana extremely stony, silty clay loam (3-15% slopes)(Foote et al. 1972). This soil type is stony over 3 to 15 percent of the surface and has a dark brown silty clay loam surface layer overlying a reddish-brown, very friable silty clay loam subsoil. Beneath the soil is a substratum of fragmented aa lava extending to a depth of 20 to 30 inches. According to Foote et al., "runoff [on the soil type] is slow to medium, and the erosion hazard is slight to moderate" (1972:37).

The project area contains both introduced and native species of plants. The introduced species are present perhaps because the area has been used for commercial cultivation. The species include breadfruit (*Artocarpus communis*), ti (*ki*; *Cordyline terminalis* L. Kunth), taro (*kalo*; *Colocasia esculenta* L. Schott),-palmetto (*Sabal palmetto* [Walt.] Lodd. and Schult. f.), coconut (*Cocos nucifera*), bird-of-paradise (*Strelitzia reginae*), red ginger (*'awapuhi-'ula'ula*; *Alpinia purpurata* Vieill.; K. Schum.), mango (*manako*; *Manifera indica* L.), bamboo (*Bambusa sp.*), Africa tulip (*Spathodea campanulata*), *milo* (*Thespesia populnea* L.), false *kamani* (*kamani-kaole*; *Terminalia catappa* L.), Hawaiian tree fern (*Niroli*; *Filicium decipiens*), papaya (*Carica papaya* L.), areca palm (*Chrysalidocarpus lutescens*), *will-will* (*Erythrina sandwicensis* Degener), *kukui* (*Aleurites moluccana* L. Willd.), and banana (*Musa paradisiaca* L.).

PREVIOUS ARCHAEOLOGICAL WORK-PROJECT AREA VICINITY

The present study represents the initial archaeological research within the current project area. Previous archaeological work conducted in the vicinity of the project area includes investigations by Walker (1931), Sterling (1969), Pearson (1970), Bevacqua (1972), Landrum (1984), and Borthwick et al. (1992). A brief summary of these previous investigations is presented in Table 1. *Figure 2* shows the locations of the investigations.

In 1931, Winslow Walker conducted an archaeological survey of the Island of Maui (Walker 1931). Walker identified six *heiau* in the Land of Kawaipapa, and another six in Wananalua Region to the south. According to Walker, the majority of these *heiau* were destroyed prior to his investigation.

In 1969, Elspeth Sterling conducted a walk-through archaeological survey of the Hana area with local informant Mathew Kalalau (Sterling 1969). This survey identified a number of platforms and enclosures in an aa lava flow adjacent to the Mormon Cemetery.

In 1969, Richard Pearson conducted an archaeological reconnaissance survey of Wai'anapanapa State Park, located in the *ahupua'a* of Waiklu (1970). Pearson identified 34 archaeological features, including one *heiau*, five cave shelters, a trail, one pictograph, six *ahu*, two U-shaped enclosures, five miniature enclosures, three shelter walls, two house platforms, and several walls and enclosures.

In 1972, Robert Bevacqua conducted a walk-through archaeological survey of the proposed Hana Elementary and High School area (Bevacqua 1972). Bevacqua noted considerable mechanical disturbance in the area, and the remains of a partially destroyed habitation site.

In 1984, Jim Landrum conducted an archaeological reconnaissance survey of a 14-acre parcel within the Land of Kawaipapa. No archaeological remains were identified during the survey.

In 1992, Borthwick et al. conducted an archaeological inventory survey of the proposed c. 400-acre Hana Ranch Country Club (1992). The survey resulted in the identification 36 agricultural sites, 13 habitation sites, and three religious sites. Most of the identified sites dated to the historic period.

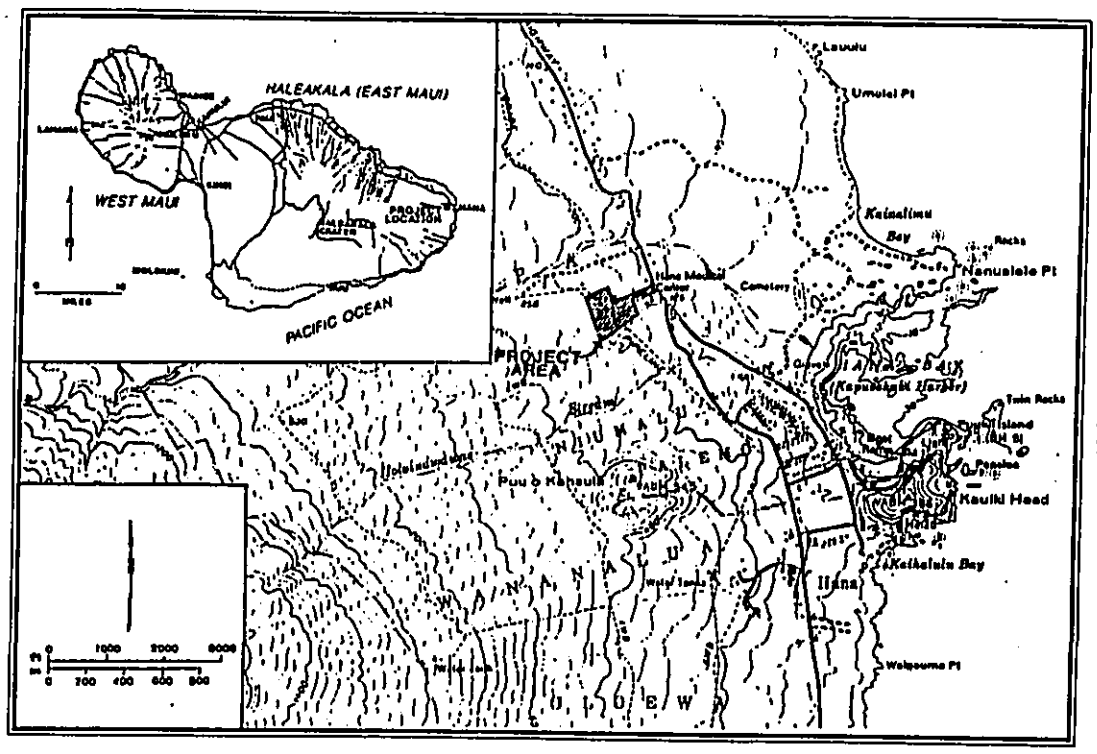


Figure 1. Project Area Location Map

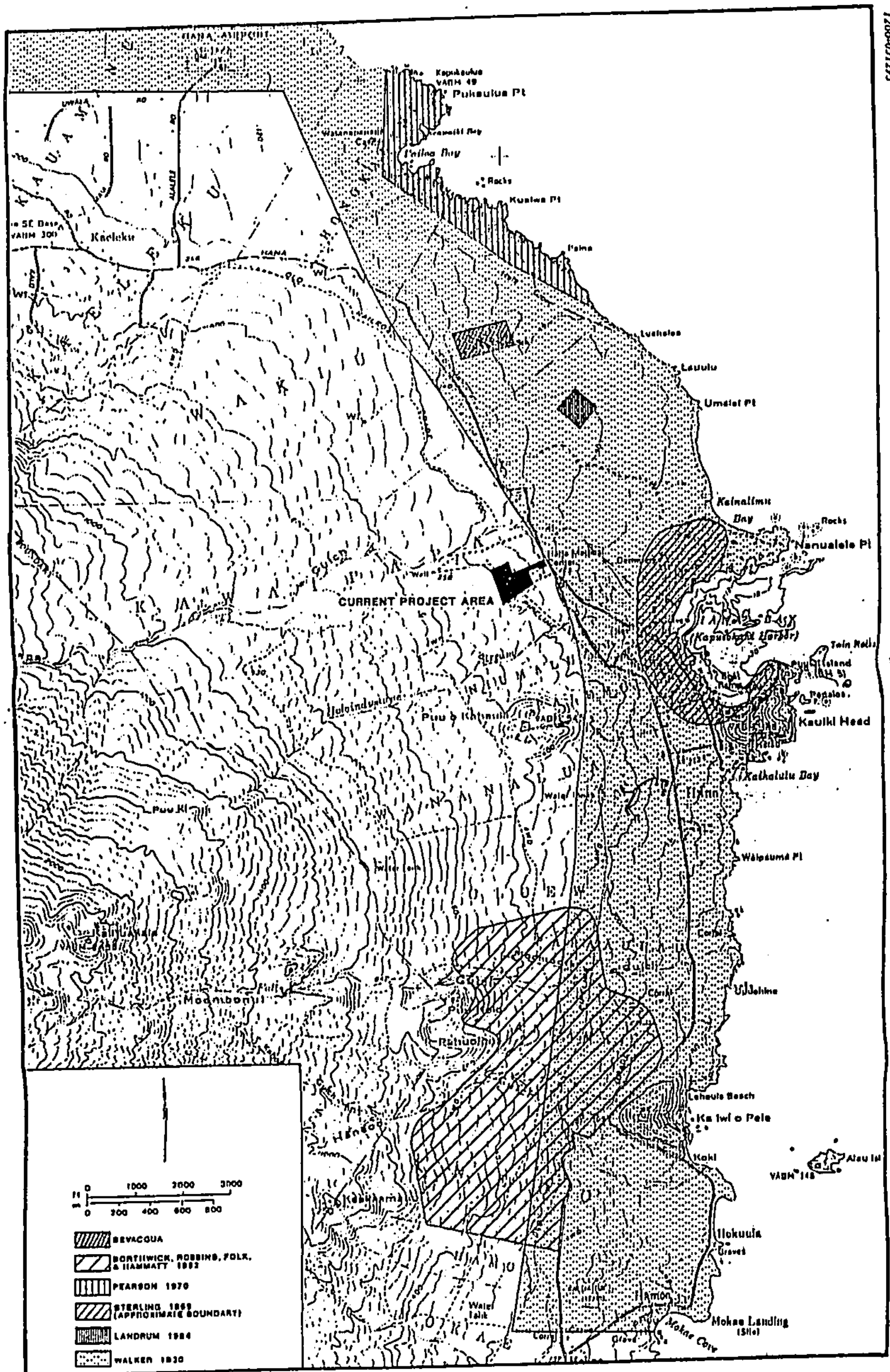


Figure 2. Previous Archaeological Investigations in the Vicinity of the Project Area

Table 1.

SUMMARY OF PREVIOUS ARCHAEOLOGICAL WORK IN THE VICINITY OF THE PROJECT AREA

Researcher	Year	Location	Level of Investigation
Walker	1931	Island of Maui	Reconnaissance Survey
Sterling	1969	Hana	Walk-through Survey
Pearson	1970	Waianapanapa State Park	Reconnaissance Survey
Bevacqua	1972	Hana High and Elemen. School	Walk-through Survey
Landrum	1984	Kawaipapa	Reconnaissance Survey
Borthwick, Robbins, Folk and Hammatt	1992	Hana Country Club	Inventory Survey

SUMMARY OF HISTORICAL DOCUMENTARY RESEARCH

This section briefly summarizes archival research conducted by Historical Researcher Lehua Kalima and Cultural Resources Specialist Kepa Maly (see Appendix A). The section includes findings from limited informant interviews conducted during the project field work.

Hana is where Maui is closest to Hawaii Island. The closeness permitted interaction between the islands during times of war and peace. Beckwith states that the Hana area was the site of many important battles—battles which eventually led to the unification of the Hawaiian Islands (1940:319). The many *heiau* in the vicinity, as well as the hilltop fortress of Ka'uiki, located on Hana Bay, reflect Hana's importance as a battleground.

During peacetime Hana was a desireable place to live due to its abundant resources. Thrum states that agriculture was extensive in the area and included cultivation of dry and wet taro, sweet potatoes, yams, and *awa*, for which the area is famous. The numerous fishponds along the coast suggests there was much aquaculture in the area (1940:380).

Sugar cane was introduced to the area in 1860, by Kelk and Needham, who also established a bullock-powered grinding mill (Clark 1980). The Ka'eleku Sugar company was formed at this time and operated until 1930. Paul Fagan purchased the plantation and turned it into the Hana Ranch Company. The ranch raised cattle on the grassy slopes above the town, and provided the economic basis for the local residents. The Hotel Hana Ranch, was opened to the public on June 15, 1947; later, in 1948, the name of the hotel was changed to Hotel Hana Maui (Clark 1980:23). The hotel continues to operate today.

During the current field work, several local informants provided information on the project area. A respected Hana *kupuna*, Mrs. Apollonia Day, indicated the area currently occupied by the Hana Medical Center was historically the site of a *pu'uhonua*, or place of refuge (pers. comm. 1-13-92). Mr. Wilfred Kala and Mr. Patrick Cosma, current employees of the Hana Medical Center, were knowledgeable about the general area. Mr. Kala has worked for the medical center as a maintenance man since it was constructed, and was involved in the initial clearing of the property. He states that at the time the land was cleared, no structures even suggesting a *pu'uhonua* were present in the area (pers. comm. 1-14-93). Cultural Resources Specialist Kepa Maly subsequently conducted further historical research concerning this matter (Appendix A). Mr. Maly concluded that there were no *pu'uhonua* within the project area but there was a *pu'uhonua* in a parcel adjacent to the project area.

SETTLEMENT PATTERNS

Despite the limited archaeological data for the Hana area, a generalized chronology of settlement and land utilization for the area can be proferred. This chronology is based on the previous archaeological research in the area, historical documentary research, and previously postulated models of settlement. Refinement of this chronology should be possible in the future as additional information is collected.

Kirch postulated a chronology of archipelago-wide aboriginal settlement and social development (Kirch 1985). In his sequence, five periods of development were defined:

Colonization — AD 300-600
Occupation of ecologically favorable area; windward valleys, & land near fishing grounds - material culture similar to East Polynesia - social structure similar to ancestral Polynesian hereditary Cheifdom;

Developmental — AD 600-1100
Population Growth - settlement of all major islands - distinctive Hawaiian material and social culture develops - social structure: some status differentiation, but still corporate descent groups;

Expansion — AD 1100-1650
Population growth - dispersal of population into leeward areas - intensified food production - altered social & political organization - class stratification - *Ahupua'a* system solidified - development of *Makahiki* - larger regions politically integrated;

Proto-Historic — AD 1650-1795
Intensified food production - elaboration of social system - cycles of conquest, integration, collapse;

Historic — 1795-present
Great Mahele - increase in trade with outside world.

Radiocarbon dates, which can provide a chronological framework for an area, are lacking for the Hana region. At present, only one archaeological investigation in the vicinity of the project area has yielded radiometric age determinations. Borthwick et al.'s (1992) examination of the proposed Hana Ranch Country Club produced three datable carbon samples. One sample dated to AD 1345-1650 (Site 2711); another to AD 1425-1950 (Site 2835); and one site dated to AD 1640-1950 (Site 2749) (Borthwick et al. 1992:6).

Borthwick et al.'s radiometric results indicate that the Hana area was occupied well into Kirch's Expansion Period. Further evidence of an Expansion Period occupation is suggested by the sheer number of important ceremonial structures in the Hana area. Walker's 1930 survey of Maui identified 11 *heiau* (Sites 105-117) within the districts of Hana and Kawaipapa (1930). Pearson's archaeological examination of Waianapanapa State Park likewise identified a large *heiau* and associated cave complex (Site 36,343). These large structures attest not only to Hana's social and political importance, but suggest the presence of a large population. According to Kirch, such temples "...evinced the power and authority of ruling chiefs, and served as constant reminders of the role in the life of the community of an extended pantheon." (Kirch 1985:6).

Evidence of social stratification and the political integration of larger regions is further reflected in ethnohistorical accounts of the Hana area. Historic documentary research suggests that the districts of Ko'olau, Hana, Kipahulu, and Kaupo were governed separately from the rest of the island, and its chiefs were often grouped about the fortified hill of Ka'uiki on Hana Bay. This broadening and integration of power bases is typical of Expansion Period political development.

The numerous Hawaiian legends and myths concerning Hana are useful in placing the occupation of Hana in a temporal framework. Soehren states that the earliest war between the islands of Hawaii and Maui is attributed to King Hua, who is said to have lived at Hana where he built the *heiau* of Honua'ula. After his successful raid on Hawaii, he returned and built Kuamalu Heiau (1931:1-25). Historian King David Kalakaua places King Hua's reign during the mid-12th century (1973). Although exact dates for Hua's exploits are unknown, it is apparent that at least several of the *heiau* in the Hana area date to the early Expansion Period.

According to Walker, Hana was also the home of Kihapiilani, a famous hero of many legends, who is said to have built the trail which circles the western portion of Maui (1931:23). Pearson's work at Waianapanapa State Park resulted in the identification of what he interpreted as a coastal portion of Kihapiilani Trail (1970:7). This trail, according to Handy and Handy, was constructed in AD 1516 after Kihapiilani's unification of Maui, further suggesting an Expansion era occupation of the Hana area (1940:398).

Both the archaeological and historical records indicate that the occupation of the Hana area continued through Kirch's Expansion Period to the present. As reflected in the historic documentary research, the increase in trade between Hana and the outside world resulted in the expanded cultivation of numerous cash crops, including sugar cane.

Borthwick et al. documented numerous historic features in Hana, including railroad structures, walls associated with cane cultivation and cattle exclusion, and terraces and mounds

used for the cultivation of sweet potato and taro (1992). As the latter two feature types were within cane fields, they were deemed historic.

Based on the above, it is apparent that the aboriginal occupation of the Hana area extended to at least the Expansion Period. Whether the initial settlement and occupation of Hana preceded the Expansion Period is presently unknown. It is hoped that as future archaeological research is conducted in the area, and the database is enlarged, Hana's earliest stage of occupation can be more accurately described.

Implications for the Current Project Area

Although the current project area had been historically disturbed it was still expected to contain archaeological sites. Evidence of prehistoric occupation was expected. Walker reported that a *heiau* (Site 106) once existed about 300 m north of the current project area. According to Walker:

> Kawaipapa was a heiau located near the point where the road crosses the gulch of the same name. It was destroyed by building the road, also a freshet washed out the remainder (Walker 1931:181).

It was thought possible that the project area would contain habitation structures associated with the *heiau*. The structures perhaps would represent either permanent, peripheral dwellings once associated with Kawaipapa temple, or would comprise more temporary features associated with agriculture—mounds and terraces possibly for cultivation of dryland taro.

Evidence of historic occupation was also expected—boundary walls, animal enclosures, or remnant structures associated with either sugar cane cultivation or cattle ranching.

FIELD METHODS AND PROCEDURES

The field work for the current project was conducted January 11-16, and April 20, 1993 by Project Supervisor Jack D. Henry, B.S., and Field Archaeologist Martin Boudreau, B.A. The field work took about 105 labor-hours to complete.

The field work consisted of a surface survey and subsurface testing. The surface survey was conducted by way of pedestrian sweeps, with crew members spaced at 10 m intervals. One hundred percent of the project area was ground surveyed. When sites or features were identified, flagging tape inscribed with the PHRI project number, temporary site number (T-), date and recorder's initials were affixed to the site's southwest corner. Sites were later assigned permanent SIHP site numbers: T-1(3150), T-2(3151), T-3(3152), and T-4(3153). Sites and features were recorded on standardized PHRI forms; site locations were plotted on topographic maps; and black-and-white photographs of each site were taken.

The subsurface survey comprised excavating 16 shovel tests (STs) and one test unit. The STs were placed either within or near features, or within areas cleared for agriculture. The test unit was placed at Site 3150, Feature D, to test the feature for human remains. All soils excavated from the STs were screened through 1/8" mesh. Portable remains recovered were bagged, assigned accession numbers, and were transported to PHRI's laboratory in Hilo for analysis. The approximate locations of the STs were plotted on a topographic map, and detailed stratigraphic information was recorded on standardized PHRI forms, following standard procedures and terminology as set forth in the *Soil Survey Manual* (Soil Survey Staff 1962). Detailed stratigraphic descriptions for the shovel tests are presented in Appendix B.

FINDINGS

During the surface survey four sites were identified—two complexes (Sites 3150 and 3153) and two boundary walls (Sites 3151 and 3152). Site locations are shown in *Figure 3*. The sites are summarized in terms of site number, site type and function, Cultural Resource Management (CRM) value mode assessments, and recommended field work tasks in Table 2.

The subsurface survey included excavating 16 shovel tests. The STs were placed either within or near features, or within areas cleared for agriculture. The locations of all STs are shown in *Figure 3*. Detailed stratigraphic descriptions for all STs are presented in Appendix B. One test unit was placed at Site 3150, Feature D. This unit is discussed in detail below.

SITE 3150

Site 3150 is a complex of four features. The site extends from the top of a N-S trending ridge, southward, across a dirt road for approximately 70 m *(Figure 4)*. Eight STs were placed at the site—two at each feature.

Feature A

This a small, rectangular enclosure 5.6 by 5 m. The average height of the walls is 0.6 m above ground surface. The walls consist of three to four courses of stacked subangular to subrounded pahoehoe and aa cobbles and small boulders (0.25-0.45 m in diameter). The walls are core-filled with small basalt cobbles 0.07-0.14 m in diameter. The walls are in relatively good condition; all are collapsed in places.

There are two entrances to the enclosure. One is about 0.4 m wide and is near the southeast corner of the eastern wall. There are upright aa boulders on both sides of this opening. The second opening is in the center of the southern wall, and there is a single similar upright on the eastern edge of the opening. The opening is about 0.5 m wide. Both openings extend from the ground surface to the top of the walls. A fallen upright of waterworn basalt is present on the exterior northeast corner of the enclosure, and a waterworn basalt cobble is present near the southern entrance.

STs 1 and 8 were placed at Feature A. The STs yielded a dark organic soil, charcoal flecks, marine shell, historic glass fragments and several waterworn pebbles. Feature A's shape and size, and the portable remains at the feature, suggest the feature functioned for historic habitation.

Feature B

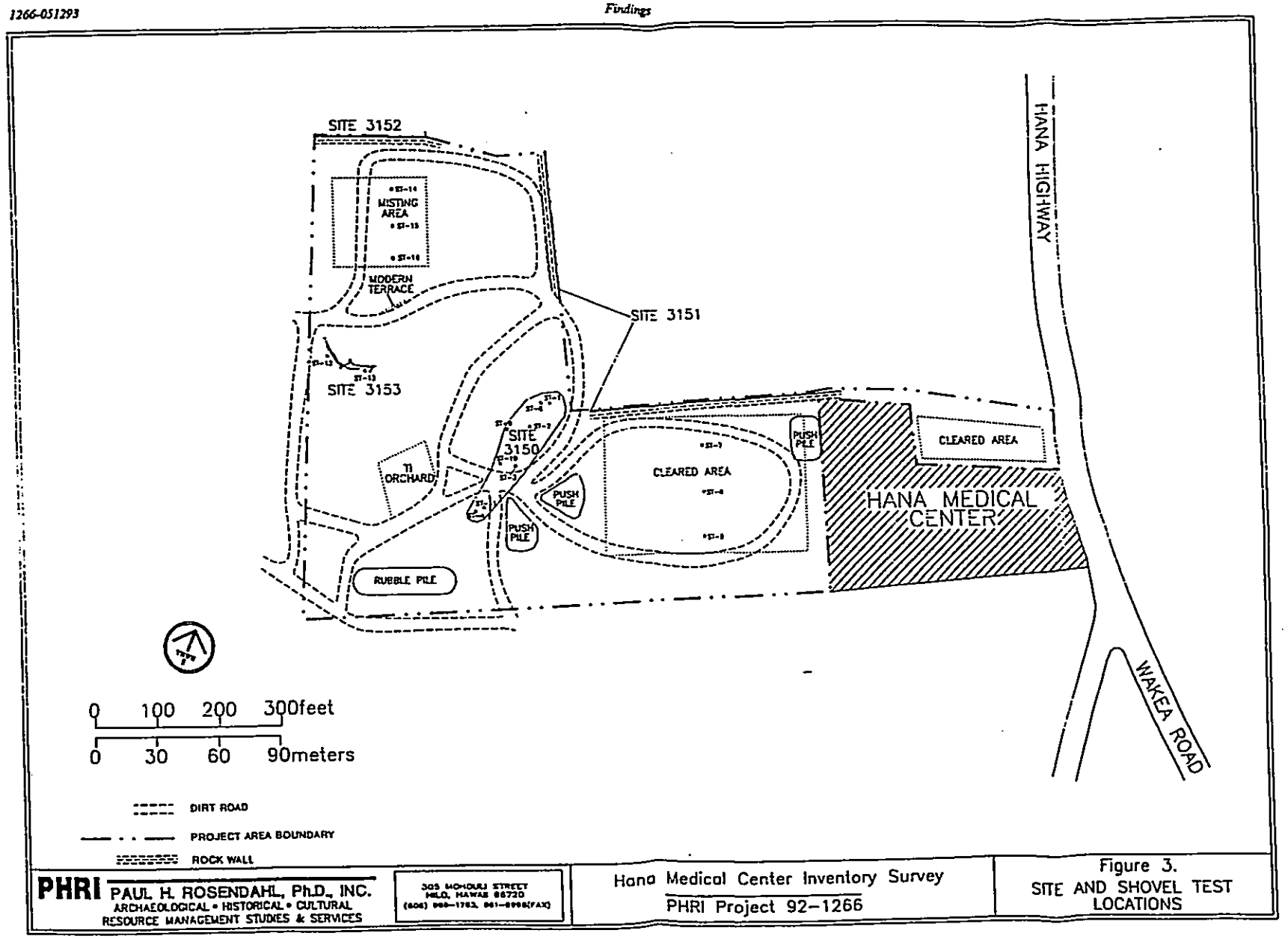
Feature B is a large rectangular enclosure about 12 m southeast of Feature A. This enclosure is oriented NW/SE and is 13.7 m long and 10.5 m wide. The enclosure walls are constructed of stacked, subangular to subrounded aa boulders and cobbles 0.25-0.40 m in diameter. The walls are six to seven courses high, and average 1.10 m above ground surface, and approximately 0.50 m thick. Large basalt boulders in excess of 1.0 m in diameter are in the northwest, northeast, and southwest corners of the structure. Portions of the enclosure along the west, south and eastern walls are collapsed. The intact portions are capped with small basalt cobbles 0.25 to 0.30 m in diameter.

A portion of the northern wall curves outward slightly to the northwest, to accommodate a large false *kamani* tree. As this portion of the enclosure appears to have been constructed around the tree, it is likely of relatively recent origin. Glass bottles and jars are scattered around the perimeter of the enclosure. Located approximately five meters from the southeast exterior corner of Feature B are five 50-gallon metal drums, and several sheets of corrugated metal roofing. The enclosure has no entrances. The lack of entrances and the height of the walls suggest the feature functioned as an animal enclosure.

Two STs were excavated at Feature B. ST-2 was placed in the center of the enclosure and yielded a small amount of burned coconut shell. ST-9 was placed west of the enclosure and yielded a single cowry shell.

Feature C

Feature C is an L-shaped enclosure and associated terrace located about 20 m southeast of Feature B. The feature is constructed of crudely aligned a'a boulders and measures approximately 3 by 3 m. The boulders are of varying sizes; some are as little as 0.50 m in diameter and others are about 1.10 m long by 0.75 m wide. The L-shape encloses an area bounded on the NE by an a'a outcrop incorporated into a terrace wall (1.0 to 1.1 m high). A dirt road is present below the terrace. The L-shaped alignment forms crude walls on the north and west. The alignment is one course wide. Recent beer cans (aluminum) were noted in the vicinity of the feature. Two STs were excavated at Feature C. ST-3 was in the center of the alignment, and ST-10 was placed outside the feature to the west. Both STs yielded no cultural materials. Feature C


SITE 3152
MISTING AREA
MODERN TERRACE
SITE 3151
SITE 3153
SITE 3150
TI ORCHARD
PUSH PILE
PUSH PILE
PUSH PILE
CLEARED AREA
CLEARED AREA
HANA MEDICAL CENTER
HANA HIGHWAY
RUBBLE PILE
WAKEA ROAD
0 100 200 300feet
0 30 60 90meters
DIRT ROAD
PROJECT AREA BOUNDARY
ROCK WALL
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PHRI Project 92-1266
Figure 3.
SITE AND SHOVEL TEST LOCATIONS

Table 2.

SUMMARY OF IDENTIFIED SITES AND FEATURES

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks Recommended DR	SC	EX
3150	Complex (4)	Multiple	M	M	L	+	-	+
A	Enclosure	Habitation						
B	Enclosure	Animal pen						
C	L-shape align. and terrace	Indeterminate						
D	Platform	Indeterminate						
3151	Wall	Boundary	L	L	L	-	-	-
3152	Wall	Boundary	L	L	L	-	-	-
3153	Complex (2)	Multiple	L	L	L	-	-	-
A	Wall	Boundary						
B	Terrace	Agriculture						

SIHP Number = State Inventory of Historic Places numbers. SIHP numbers are five-digit numbers prefixed by 50-50-13 (50=State of Hawaii; 50=Island of Maui; 13=USGS 7.5' series quad map ["Hana, Maui"]).

Cultural Resource Management
Value Mode Assessment —Nature: R = scientific research
I = interpretive
C = cultural
—Degree: H = high
M = moderate
L = low

Field Work Tasks Recommended:
DR = detailed recording (scaled drawings, photographs, and written descriptions)
SC = surface collections
EX = test excavations

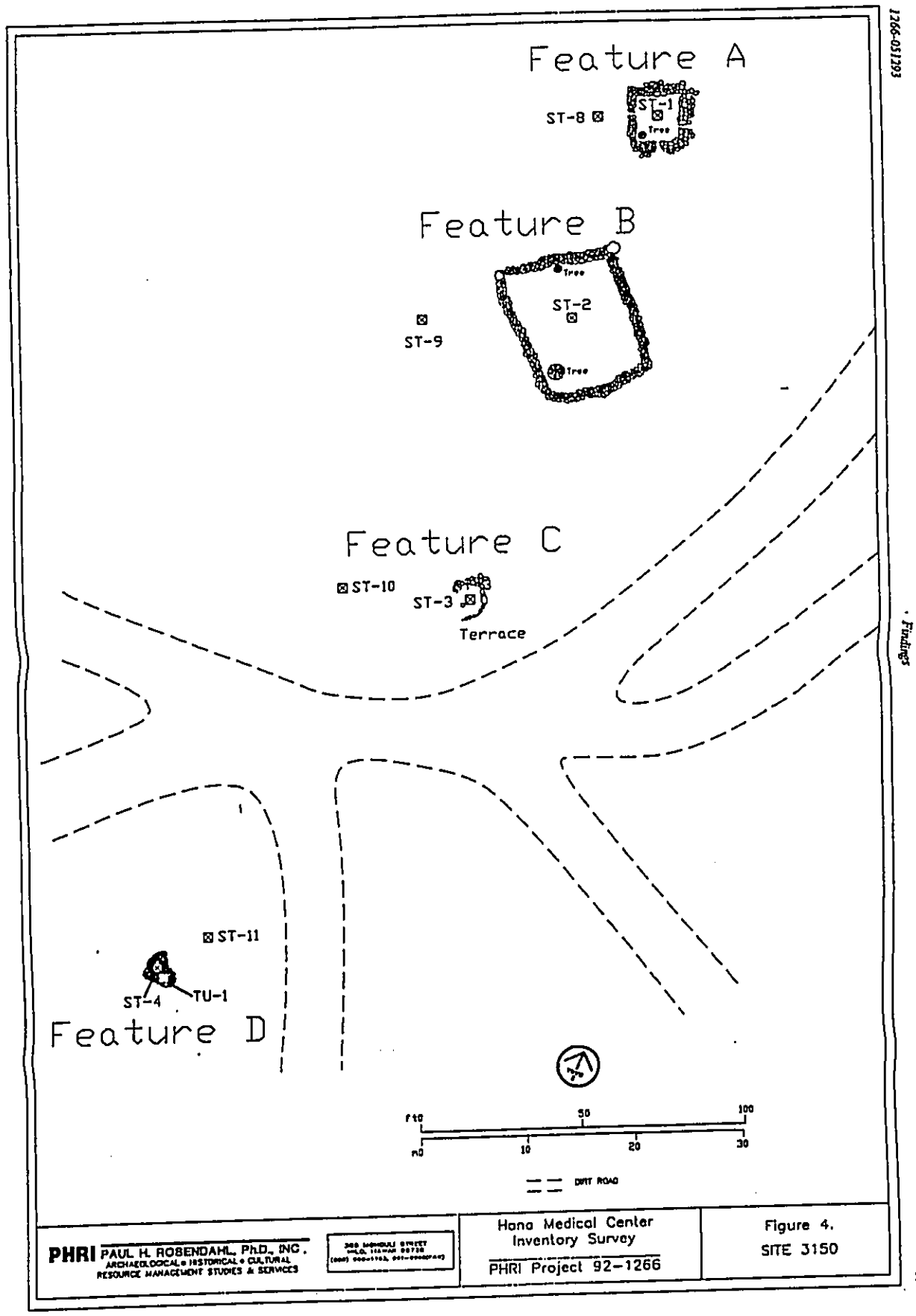

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Figure 4.
SITE 3150

was assigned an indeterminate function due to its poor condition and lack of cultural material.

Feature D

Feature D is an amorphous platform 2.5 by 2.0 m in plan. The platform is constructed of aa cobbles and small boulders (two to five courses high) and incorporates aa bedrock along its western wall. The exterior walls, except for the eastern wall, are one to three courses high. The walls are 0.36-0.78 m high. The platform is paved with large pebbles to medium cobbles and the surface is flat. A small terrace paved with small to large cobbles abuts the east wall of the platform.

Two STs were excavated at Feature D. ST-11, placed adjacent to the platform to the northeast, was culturally sterile. ST-4 was placed in the center of the platform and yielded marine shell, a waterworn stone, and historic glass and ceramic fragments. Due to sidewall collapse, ST-4 was terminated 0.39 m below the surface of the platform. It was determined that a more formal excavation unit could more comprehensively test the platform; therefore, Test Unit 1 (TU-1) (1.0 by 1.0 m) was placed in Feature0 D. The unit was placed near ST-4 to test the area for human remains *(Figure 4)*. The unit comprised two layers, which both contained cultural materials (ceramics, faunal bone, shell, and a glass button [in Layer II]). The historic artifacts noted in Layer II may have migrated downward into the layer. No human remains were located in TU-1, and the unit did not yield radiocarbon samples. TU-1 was terminated on bedrock The unit displayed the following stratigraphy:

TU-1, North Face

Layer	*Description*
I	(0.00-0.24 m BD) - Layer consisting of aa cobbles and small boulders. The layer contained historic ceramics (crockery and porcelain), possible pig bone, and *opihi* shell.
II	(0.18-0.54 m BD) - Black (10YR 2/1 moist); moderate, very fine crumb structure; soft, slightly sticky, plastic consistence. Historic items were noted; these may have migrated in from above.

Based on the results of the test unit, Feature D was assigned an indeterminate function.

SITE 3151

Site 3151 is a rock wall bordering the northeast portion of the project area *(Figure 3)*. No subsurface testing was undertaken at the site. Two segments of the wall were noted. One is near the medical center along the central NE portion of the project area. It is about 150 m long. A second section is along the NE boundary of the project area; this section is about 70 m long. The walls are constructed of stacked cobbles (about 0.2 m in diameter) and boulders (about 0.35 m in diameter). The walls are three to eight courses high. Remains of a fence were found at the wall—milled, wooden fence posts, barbed wire, and fence wire (6" by 4" pattern). It is clear that Site 3151 is a boundary wall. The wall segments correspond to a 1906 land grant awarded to Kohoolilimoku. It is not known, however, whether the wall segments date to this period.

SITE 3152

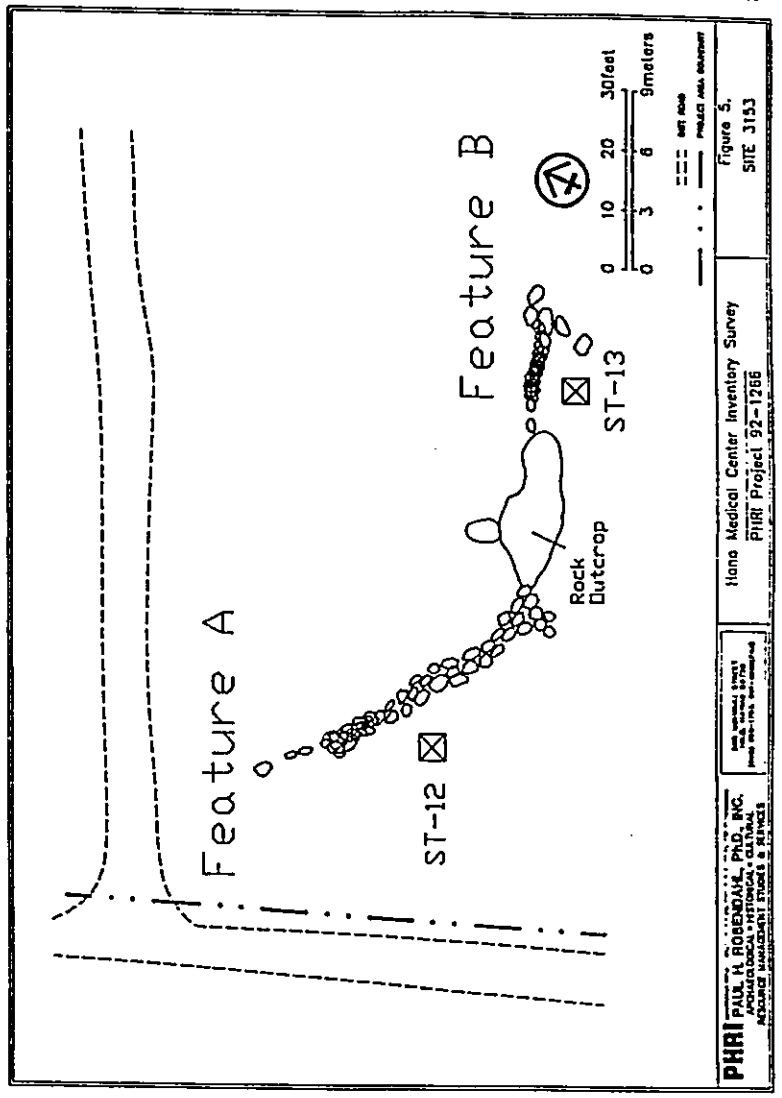
Site 3152 is a rock boundary wall bordering the northern edge of the project area *(Figure 3)*. The wall is core-filled with large pebbles to large cobbles. The exterior of the wall is constructed of cobbles (about 0.20 m in diameter) stacked four to eight course high and boulders (about 0.60 m in diameter). Overall, the wall is about 0.85 m wide, 0.90 m high, and 60.0 m long. No portable remains were noted at the site. This wall corresponds with a boundary for Land Claim Award 4566 to Wahinaea, though whether it dates to this period is unknown. No subsurface testing was undertaken at the wall.

SITE 3153

Site 3153, a complex near the western boundary of the project area, consists of two component features *(Figure 5)*. The overall dimensions of the site are approximately 25 E-W by 6 m N-S. Local informant Patrick Cosma, who worked on the property for the previous land owner (Howard Cooper), suggests that the complex may have been created within the last 20 years to accommodate the growing of anthuriums.

Feature A

Feature A is a winding rock wall in the western portion of the site. The wall is about 15 m long and is constructed of stacked aa and pahoehoe boulders and cobbles (boulders are up to 0.70 long). The wall abuts an exposed aa outcrop at the eastern end and turns southward for approximately four



meters. This four-meter section is largely collapsed and consists of cobbles and boulders up to 0.4 m in diameter. The western end of the wall is very collapsed. Sections of the middle portion of the wall are intact. Intact portions are about 0.90 m high and 0.80 m wide. The base of the wall consists of upright boulders (largest measuring 70 by 35 by 35 cm). The top of the wall is flat and is composed of medium-sized cobbles. There was no evidence that the wall functioned as a land grant boundary.

One shovel test, ST-12, was excavated west of and adjacent to Feature A. No cultural materials were noted in the unit.

Feature B

Feature B is a small terrace (6.0 by 6.0 m) on an E-W ridge approximately 8.0 m east of Feature B. The terrace was created by modifying the natural outcrop along the northern ridge edge, creating a level area to the south. The terrace wall is constructed of aa cobbles and boulders (c. 0.65 m diameter) stacked two to five courses high and one to three courses wide. The wall is 0.70-1.35 m high. The area behind the terrace is level and extends southward about 6.0 m. The ridge top westward to and past the wall is also level.

One shovel test, ST-13, was excavated on the level area at Feature B. A few charcoal flecks were recovered.

SHOVEL TESTING IN NON-SITE AREAS

A cultivated area of ti plants is in the western portion of the project area. To the north is a large "misting area," created by former land owner Howard Cooper for the fostering of young plants (pers. comm., P. Cosma). The tall, vertical plastic irrigation pipes used to create the mist are still present. To determine if subsurface cultural materials were present within the misting area, three STs were excavated (STs 14-16). No cultural material was found in the STs.

According to Mr. Cosma, former employee of Mr. Cooper, the large area immediately west of the existing medical center was cleared to cultivate pink ginger, a species introduced to Hawaii by Mr. Cooper (pers. comm.). To test for subsurface deposits in the area, three STs were excavated (STs 5-7). No cultural materials were found in any of the units. The parcel of land adjacent to the medical center, to the north, also appears to have been recently cleared and leveled.

DATA ANALYSES

PORTABLE ARTIFACTS

Fifty-five artifacts, all recent historic, were identified in the deposits associated with Features A and D of Site 3150. A detailed tabulation of the artifacts by provenience is presented in Table 3. The artifacts are described by type below.

Domestic Items

Ceramics - Most of the artifacts identified in the project area are ceramics. Of the 42 ceramic specimens, one is of low grade porcelain, five are stoneware, and 36 are earthenware. The porcelain fragment is a rim from a small bowl (diameter = 15 cm). It is finished with a thick, glossy, grayish-green glaze on the interior and exterior surfaces and is undecorated.

The stoneware fragments are all finished with a glossy white glaze on the interior and exterior. Specimen #4 is a body fragment from an unidentified vessel and, except for some crazing of the glaze, is undecorated. Specimens #12 and 13 comprise four fragments which cross-mended to form approximately 30% of a small plate *(Figure 6)*. The plate has a partial maker's mark on the base; the mark consists of a crest, "& Sons" and "...nd" (probably England). Based on the absence of the main portion of the mark, however, no definitive date or place of manufacture can be assigned to the plate.

The earthenware fragments are from at least three vessels: (a) a small vase with an unglazed base and a medium brown matte glaze on the interior and exterior surfaces, (b) a vessel of unknown shape finished with an orange-brown glaze on the interior and a speckled brown matte glaze on the exterior, and (c) a vessel of unknown shape finished with a clear glaze over orange clay on the interior and a very dark brown glossy glaze on the exterior. Twenty-six fragments of Type (a) were collected from the deposits of Feature D—ten from Layer I of TU-1, 15 from Layer II of TU-1 and one from Layer I of ST-1 *(Figure 7)*. Although it is possible that all 24 fragments belong to the same vessel, only a small number of the fragments could be cross-mended. Four fragments of vessel Type (b) were encountered in Layer I of TU-1, all of which cross-mended to form a large curved body fragment, while a fifth fragment was encountered in Layer II of ST-1. Finally, nine fragments of Type (c) were collected from Layer I of TU-1 (of which only four could be cross-mended), and one fragment was collected from Layer II of ST-1.

Glassware - The glassware consists of one bottle fragment and seven non-diagnostic glass fragments. The bottle fragment is a neck/mouth fragment from a medicine bottle. It is manufactured of clear glass (post 1880) using a semi-automatic bottling machine and has a patent neck finish. The glass fragments include four manufactured of clear glass and one manufactured of pale green glass. One of the fragments is from a window pane, while the others are vessel fragments. Although a maximum age of 1880 AD can be provided by glass color, little definitive information concerning date or place of manufacture can be derived from this assemblage.

Miscellaneous

Four fragments of an unidentified metal object were collected from Layer I of TU-1, Feature D. The fragments are manufactured from sheet metal, possibly iron, but are extremely corroded *(Figure 8)*. Place and date of manufacture, and function, could not be determined for these items.

Personal Adornment

One item of personal adornment was collected from Layer II of TU-1, Feature D. The item is a button manufactured of milk glass. It is a sew-through button with four holes and a concave center. The button measures 1.5 cm in diameter and is 4 cm thick. Mold lines are visible along the button edge, indicating fairly recent manufacture.

ECOFACTUAL REMAINS

Objectives and Methods

Ecofactual remains are archaeologically significant on a number of levels, as the variety and content of food remains contained within a given deposit provide useful information concerning prehistoric diet and resource utilization. The analysis of ecofactual remains for inventory survey projects has two primary objectives:

1. To determine the variety and distribution of the remains for each cultural deposit encountered within the project area; and

2. To provide an indication of dietary and resource exploitation patterns for each site, and for the project area as a whole.

Table 3.

DISTRIBUTION OF PORTABLE ARTIFACTS

Category	Site 3150 Fea.A ST-1 I	Fea.D ST-4 I	II	(ST-4) Total	TU-1 Sub I	II	(TU-1) Sub Total	(Fea.D) Total	Grand Total
Non-Indigenous									
Domestic Items									
Ceramic									
Fragments	-	1	3	4	23	15	38	42	42
Glass									
Bottle	-	-	-	0	1	-	1	1	1
Fragments	1	2	-	2	3	1	4	6	7
Subtotal Domestic Items	1	3	3	6	27	16	43	49	50
Miscellaneous									
Metal									
Unidentified	-	-	-	0	4	-	4	4	4
Subtotal Miscellaneous	0	0	0	0	4	0	4	4	4
Personal Adornment									
Glass									
Button	-	-	-	0	-	1	1	1	1
Subtotal Personal Adornment	0	0	0	0	0	1	1	1	1
Total	1	3	3	6	31	17	48	54	55

ST=Shovel Test; TU=Test Unit

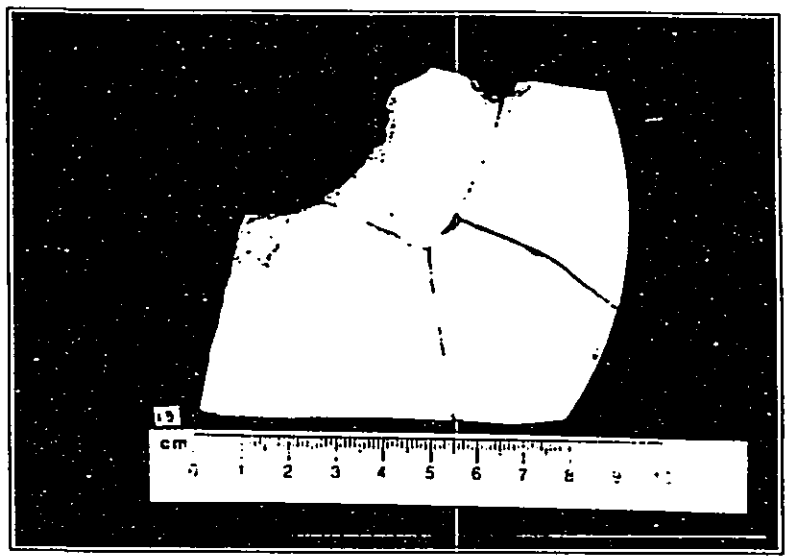


Figure 6. Cross-mended Earthenware Fragments (Neg.4433-11)

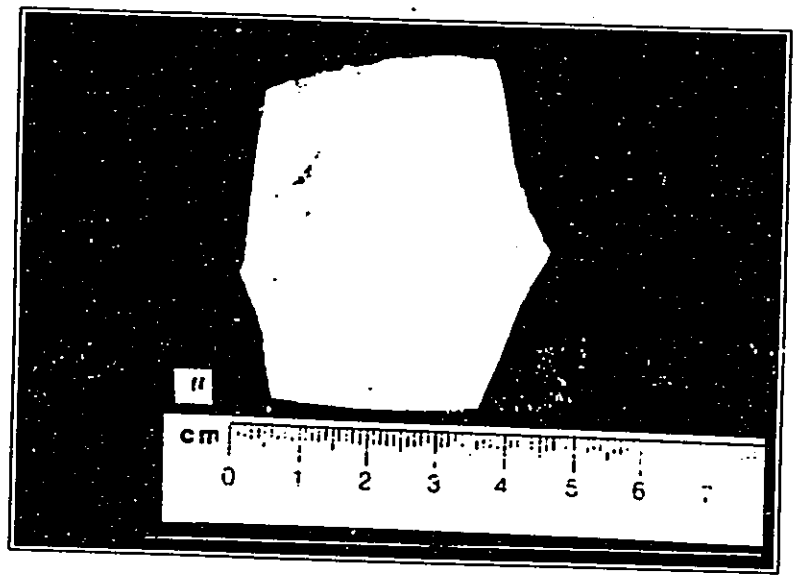


Figure 7. Ceramic Fragment (Neg.4433-8)

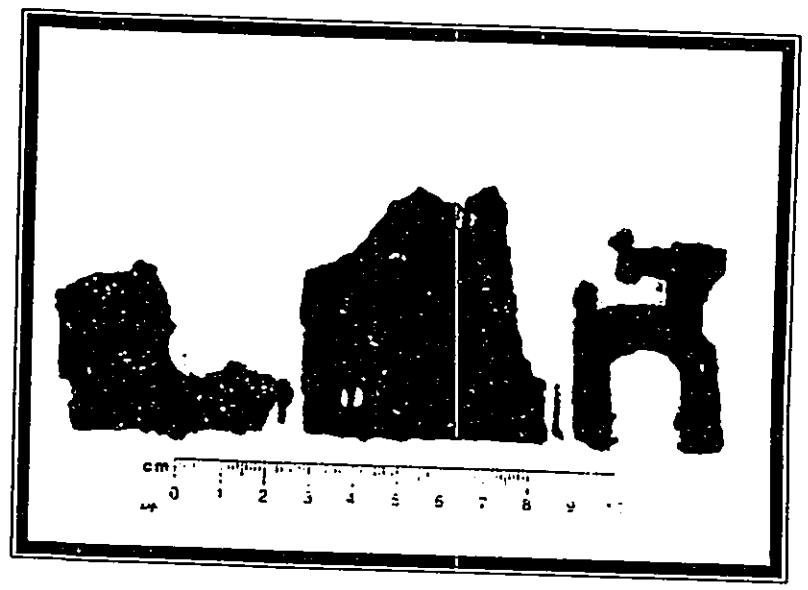


Figure 8. Unidentified Metal Fragments (Neg.4433-13)

All ecofactual remains recovered underwent detailed analysis in the laboratory. Detailed analysis involved splitting the sample into two size classes by passing each sample through 1/4-in and 1/8-in screens. One hundred percent of the material retained in the 1/4-in screen was completely sorted to the lowest taxonomic level possible, while the material retained in the 1/8-in screen was inspected both for artifacts and for taxa not encountered in the larger portion of the sample. Marine shell identifications were verified and augmented using Kay (1979). The vertebrate faunal remains derived from PHRI's investigations were submitted to Dr. Alan Ziegler for identification.

The sampling design outlined above is adapted from Kirch (1979) and is based on a series of experiments measuring the relative distribution of molluscan and bone material retained on each screen. Kirch concluded that use of the screening process increased the speed of the sorting process without decreasing either the accuracy or statistical validity of the overall analysis. The taxonomic distribution and weight of material retained on the 1/4-in screen should thus be considered as representative of the variety and relative percentages of each taxon present in the entire sample.

Results

Ecofactual remains were encountered in Layers I and II of TU-1 at Site 1266-1 (Table 4). The remains in both layers consisted of small quantities of *Cellana sp.* and large mammal bone. Layer I contained 82% of the remains while Layer II contained 18%. No other ecofactual remains were noted in the project area. Given the small size of the sample, few definitive conclusions can be drawn concerning subsistence practices in the project area. The results of the ecofactual analysis indicate that subsistence included the collection and consumption of Patellidae. Members of the family Patellidae (limpets, or *'opihi*) were extremely well-liked as a food. The favorite method of preparation was raw and salted, either with or without seaweed. They were sometimes washed clean and were then cooked in the shell; hot stones were placed in a calabash of water and the limpets were cooked in the heated water. The shells were picked out later. Using this method, broth *(kai)* was produced, and the broth was used, especially by the sick and young. The meat was pulled from the shells or sometimes was scooped out with a smaller, empty *'opihi* shell. *'Opihi*, especially *'opihi'awa*, was used extensively as medicine, and was also associated with sorcery. The empty *'opihi* shells were often used for scooping, peeling and scraping because of their sharp edges. *'Opihi* shells found in the current project area did not evidence use.

Within the Hawaiian chain, *Cellana spp.* are generally found on basalt shorelines from the spray zone seaward to the calcareous algal zone, except for *C. talcosa* which occurs at depth of 1 to 10 cm along abrupt coastlines. Taxa recognized by the Hawaiians included *C. talcosa ('opihi ko'ele)*, *C. sandwichensis ('opihi 'alinalina)* and *C. exarata ('opihi makiauli)* (taken from Titcomb *et al.* (1978: 337-353).

The large mammal remains in the assemblage indicates that terrestrial resources were utilized by local populations. The vertebrate assemblage could not be identified to family or species, but given the association of the vertebrate remains with historic artifacts, they probably represent historically utilized or introduced taxa.

Table 4.

DISTRIBUTION OF ECOFACTUAL REMAINS

Material	Site 3150 TU-1		
	Layer I	Layer II	Grand Total
Invertebrates			
Mollusca			
Gastropoda			
Patellidae			
Cellana sp.	18.88	4.25	23.13
Vertebrates			
Mammalia			
Order and Family Indeterminate			
Large mammal	48.52	11.37	59.89
Total	67.40	15.62	83.02

CONCLUSION

SUMMARY AND DISCUSSION

The findings during the current project generally concur with the expectations derived from the background research for the project. The background research indicated that the project area had been historically disturbed. The area, however, was still expected to contain archaeological sites. Evidence of prehistoric occupation was expected. It was thought that habitations associated with Kawaipapa Heiau, which once existed north of the project area, might be identified. Also expected were features associated with agriculture (mounds and terraces perhaps for the cultivation of dryland taro) and features associated with historic occupation (boundary walls, animal enclosures, or remnant structures associated with either sugar cane cultivation or cattle ranching).

During the current work it was confirmed the project area had been modified extensively. *Figure 3* shows the extent of the alterations. In the project area are numerous dirt roads, and bulldozer push piles, and areas cleared for cultivation. Also present is a modern stacked stone terrace supporting a portion of a dirt road *(Figure 9)*. Subsurface testing in the cleared areas evidenced no buried cultural deposits.

Four sites were identified in the project area—two complexes (Sites 3150 and 3153), and two boundary walls (Sites 3151 and 3152). The sites comprised the following feature types: enclosure, L-shape enclosure, platform, wall, and terrace; and the following functional types: habitation, animal pen, boundary, agriculture, and indeterminate.

Sites 3151 and 3152 are boundary walls, and Site 3153 consists of a wall and a terrace. No datable samples were obtained from any of these sites. Although the boundary walls correspond to the boundaries for historic land grants, no evidence was found suggesting that they date to this period; the walls might, in fact, be modern property walls. Site 3153, based on the lack of cultural indicators and informant testimony, is probably recent.

Site 3150 consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped enclosure; and Feature D, a rectangular platform. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. No datable samples were recovered, but the presence of the glass and ceramics suggests the features are historic. Because it was thought Feature D might contain a burial, it was subsequently determined to require further testing (memo dated 25 March 1993, from D. Hibbard, DLNR-SHPD, to G. Matsuoka, Dept. of Accounting and General Services). On April 20, 1993 PHRI archaeologists placed a formal test excavation unit in the center of Feature G, near the shovel test placed earlier. The unit yielded ceramics, faunal bone, shell, and a glass button. The findings suggest the feature is historic. No human remains were found in the unit.

During the current field work, a local informant indicated the project area might contain a *pu'ukonua*, and later, in a memo from the DLNR-SHPD (dated 25 March 93, from D. Hibbard, DLNR-SHPD to G. Matsuoka, Dept. of Accounting and General Services) it was recommended that further historical research be conducted to determine if there indeed was a *pu'ukonua* in the project area. PHRI Cultural Resources Specialist, Kepa Maly, subsequently conducted the further research and concluded there were no *pu'ukonua* in the project area, but that there once was a *pu'ukonua* in a parcel adjacent to the project area (see Appendix A).

GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

To facilitate outside review, general significance assessments and recommended general treatments for all identified sites are summarized in Table 5. 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 uses these criteria for evaluating cultural resources. Sites determined to be potentially significant for information content (Category A, Table 5) 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 (Category B) are evaluated under Criterion C, which defines significant resources as those which "...embody the distinctive 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 (Category C) are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled

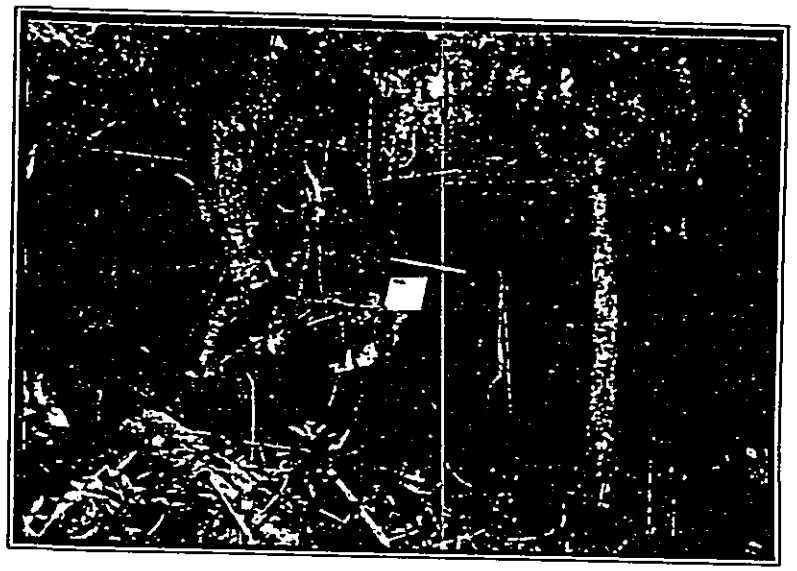


Figure 9. Modern Terrace (Neg.1266:1:21)

Table 5.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

Site Number	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
3151	-	+	-	-	-	+	-	-
3152	-	+	-	-	-	+	-	-
3153	-	+	-	-	-	+	-	-
Subtotal	0	3	0	0	0	3	0	0
3150	+	-	-	-	+	-	-	-
Subtotal	1	0	0	0	1	0	0	0
Total	1	3	0	0	1	3	0	0

General Significance Categories:

- *A = Important for information content, further data collection necessary (PHRI=research value);*
- *X = Important for information content, no further data collection necessary (PHRI=research value, SHPD=not significant)*
- *B = Excellent example of site type at local, regional, island, state, or national level (PHRI=interpretive value); and*
- *C = Culturally significant (PHRI=cultural value).*

Recommended General Treatments:

- *FDC = Further data collection necessary (further survey and testing, and possibly subsequent data recovery/mitigation excavations);*
- *NFW = No further work necessary, sufficient data collected, no preservation potential (possible inclusion into landscaping suggested for consideration);*
- *PID = Preservation with some level of interpretive development recommended (including appropriate related data recovery work); and*
- *PAI = Preservation "as is", with no further work (and possible inclusion into landscaping, or minimal further data collection necessary*

"Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (Draft Report, August 1985). The guidelines define cultural value 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."

Based on the above federal criteria, three sites (3151, 3152 and 3153) identified during the present survey are assessed as important solely for information content. These three sites have been documented to the extent that no further archaeological work is recommended. Site 3150 is also assessed as important for information content, but further data collection is recommended at this site. The further work should include appropriate excavations and should be aimed at more precisely determining the age and function of Site 3150.

It should be noted that the above evaluations and recommendations have been based on the findings of an inventory-level surface survey and limited subsurface testing. There is always the possibility, however remote, that potentially significant unidentified cultural remains might be encountered in the course of future development involving the modification of the ground surface. In such a situation, archaeological consultation should be sought immediately.

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APPENDIX A

HISTORICAL DOCUMENTARY RESEARCH AND INFORMANT INTERVIEWS

by Lehua Kalima, B.A., and Kepa Maly

The project area is in the Hana District, in the *ahupua'a* of Kawaipapa. "Hana" refers not only to the district, but to the general area surrounding Hana Bay. The Hana area has a rich cultural history, as it was the site of important battles which led to the unity of the Hawaiian Islands. Hana was also the home of chiefs and chiefesses.

There are several references to Hana in Mary Kawena Pukui's *'Olelo No'eau* (1983):

Hana i ka i'a iki.
Hana of the little fish.

Hana was known in ancient times as the land where fish were scarce. Believing slanderous tales about Ku'ula and his wife, Hinahele, the ruling chief of Hana ordered them destroyed. Having *mana* over the fish of the sea, the two caused a scarcity until their son 'Ai'ai brought them back to life. Ku'ula and Hinahele were worshipped as deities by fishermen (451).

Hana, mai Ko'olau a Kaupo.
Hana, from Ko'olau to Kaupo.

The extent of the district of Hana, Maui (460).

I 'auhe'e o Ka'uiki i ka wai'ole.
Ka'uiki was defeated for the lack of water.

When 'Umi, ruler of Hawai'i, went to Hana to battle against Lono-a-Pi'ilani of Ka'uiki, thirst weakened the Maui warriors. Often used later to mean "without water or the needed supplies we cannot win" (1151).

Ka haka o ka moa kane, ua kau 'ia e ka moa wahine.
The perch of the cock is now occupied by a hen.

Said by Puna, whom Kalaniopu'u places as governor in Hana, Maui. Mahihelelima wanted Puna out of the way and lied that Kalaniopu'u had sent word for Puna to meet him in Hawai'i at once. When Puna arrived in Hawai'i, he discovered that he had been duped and the Ka'uiki hill in Hana had been taken by the Maui chiefs in the meantime. The saying was later used to mean that a superior worker had been replaced by another who was not as good (1289).

Ka ua kea o Hana.
The white rain of Hana.

Refers to the misty rain of Hana, Maui, that comes in from the sea (1566).

Ka ua Lanilia'aha'a o Hana.
The rain-of-the-low-sky of Hana.

Refers to Hana, Maui. Once the young warrior chief Ka'eokulani ran to a banana grove to escape a sudden squall. As he stood safe and dry in the shelter of the banana leaves he lifted his spear. It accidentally pierced through the leaves and a trickle of water came through. He remarked that the sky where he stood was so low he had pierced it (1578).

I ewa ka waha o ka puhi o Laumeki.
The mouth of the eel of Laumeki gapes.

Said of one who talks so much that his mouth is hardly ever closed. Laumeki was an eel-man who lived at Wailau, Moloka'i. When he saw that Ka'ula's fishpond at Hana, Maui, was always full of fish, he decided to assume his eel form and go there to steal some. On one of his thieving expeditions, he was caught by a magic hook and drawn ashore, where his jaw was smashed and left gaping (1990).

Malia Hana ke ahowale nei Kaihuokala.
Hana is calm, for Kaihuokala is clearly seen.

Kaihuokala is a hill on the Hana side of Haleakala. When no cloud rests upon it, it is a sign of clear weather. Also expressed *Malie Maui, ke waiho mai la Kaihuokala* (2124).

O Hana ia, he 'aina au peku.
That is Hana, land where lack was known. (2359).

O Wanaralua la 'aina; o Punahoa ka wai; o Ka'uiki ka pu'u.

Wanaralua is the land; Punahoa is the pool; Ka'uiki is the hill.

Noted places in Hana (2548).

The present Hana Beach Park is located on the shoreline of Hana Bay, or Kapueokahi as it was formerly known. Kapueokahi, "the single owl," is said in one legend to have been a *kupua*, a supernatural being who could take the form of an animal or a human. Kapueokahi wanted to marry a woman named Kapoulakinau, so he changed himself from an owl to a man. This incident took place in Kawaipapa, which has its seaward edge on the bay. From that time on, the bay as well as its lone sand beach were called Kapueokahi (Clark 1980:24).

Hana Bay and a small hillock in Hana, Ka'uiki, figure in the history of the *ali'i* of Maui and Hawaii, partly because they are where Maui comes closest to Hawaii Island. Alenuihaha Channel, between the islands, could easily be crossed in a couple of hours when the winds were ideal. Because of its location Hana was a sanctuary, both in wartime and peacetime, for the *ali'i* of both islands (Beckwith 1940:319).

The bay below Ka'uiki is known in legends as the home of the gods Kane and Kanaloa. The bay evidences subsidence, most likely associated with volcanic action. It is said that Kane and Kanaloa once had a garden in the area now below water; they point out two rocks, "the coconuts of Kane and Kanaloa" (Beckwith 1940:320).

From the time of La'a-mai-kahiki to the time of Umi, East Maui, comprising Ko'olau, Hana, Kipahulu, and Kaupo districts, was governed separately from the rest of the island. East Maui chiefs were often grouped about the fortified hill of Ka'uiki. There are many stories about Ka'uiki's origin. Some say that it sprang from the navel of Hanoa; others say it was born to the parents of Pele, or to the hill Kaihuakala, by his wife Kahaule. Others stories tell how Kalalawalu brought the hill from Kahiki as an adopted child, but grew tired of its nibbling at her breasts; Kalalawalu tried to leave it along the way, first at Kaloa, then at Kaena, then at Kawaipapa stream (Beckwith 1940:379).

Hana was called "a land beloved of chiefs because of the fortress of Kauiki (sic) and the ease of living in that place" (Beckwith 1940:380). On the summit was spread a springy plant which could serve as beds. Fishponds below furnished unlimited fish. Large quantities of awa root in the area "delighted the nostrils of the dear firstborn chiefs" (ibid.). The area was also loved for its fine surfing. Two other reasons why Hana was favored were (a) the best wood for making scaffolds and ladders (to scale fortresses) was in Hana, and (b) Hana had the best round smooth stones for use in slingshots (Handy and Handy 1972:504).

Pi'ilani, the older brother of Kihapi'ilani, who built the great road around Maui, was said to have dwelt at Ka'uiki (Fornander IN Handy and Handy 1972). Kaleikini was another chief who dwelt at Ka'uiki. He was much loved by the farmers. His concern for the farmers is apparent in this anecdote:

> The waves driven by tradewinds swept into underground caverns and sent up geysers through blowholes on the Hana coast. The wind would carry the spray inland and the salt in the spray would harm the plants. Kaleikini sent canoes to Lanai to retrieve the hard, durable *kauila* tree, which grew there in abundance. With logs of *kauila* he sealed the holes so that no more salt spray blew over the land. Hawaiians say that the logs can still be seen in some places, such as Honokalani. (Adapted from Handy and Handy 1972:504)

Ka'uiki's elevation is barely 400 feet, yet it stood much taller in the mythology of the early Hawaiians. One chant describes it thus:

> Engulfed is lofty Kauiki,
> Where Hanaiakamalama dwelt.
> Shooting up to heaven is Kauiki,
> Below is the cluster of islands,
> In the sea they are gathered up, O Kauiki!
> O Kauiki, mountain bending over (Thrum 1919:67).

One legend says that Hanaiakamalama leapt to the moon from Ka'uiki's summit. She is said to have been provoked by her children, Puna and Hema, and to have gone up to the moon to live. While ascending, her husband caught her by the leg and tore it off; she was thus called "Locomuku" (maimed or crippled Lono) (Thrum 1919:67-8).

Until only a few years ago the ruins of one of Maui's famous *heiau*, Honuaula, graced the base of Ka'uiki. This *heiau* was erected by King Hua-a, who, stopping enroute to a raid upon Hilo, sought to obtain the aid of the gods. The expedition proved successful and when he returned to Hana he built another smaller *heiau*, known as Kuawalu, in the same area (Thrum 1919:67).

In the story of Laieikawai, it is said that Aiwohikupua, on his way from Kauai to Hawaii, arrived in Hana during a surfing contest in which the chiefess of the district was the

center of attraction. Alwohilaupua was attracted to the chiefess and his involvement with her later caused him a great deal of distress (Thrum 1919:68).

Kiha-a-Piilani, visiting Hana from Waikiki incognito, was another who lost his heart to a charming surfrider. The contest took place off Pueokahi. Koleamoku, the daughter of the high chief Hoolae, at the close of the surfing contest betrothed herself to Kiha-a-Piilani, and in taking him "for better or worse", without seeking paternal consent, she was disowned and disinherited. Kiha-a-Piilani's later revealed who he really was. Koleamoku and her parents learned that, unsuspectingly, Keoleamoku had chosen the very one she had been pledged to. Her father then forgave her (Thrum 1919:68).

Kiha-a-Piilani is said to have been the builder of a roadway which circled the western part of the island. Remains of the roadway are still found in some places, but most of it is beneath the modern Pi'ilani Highway. Piilani is also the name of a *heiau* at Hana—Hale-o-Pi'ilani (House of Pi'ilani) (Speakman 1978:10).

One legend refers to a fishpond at Hana. The pond was called "Keko'ona" and it was associated with Ku'ula, the god of fishermen. Ku'ula and his wife Hina, and their son 'Ai'ai are said to have lived near the pond, which Ku'ula is believed to have built during a famine in Hana. With his magic hook he lured fish into the pond for the people. The pond was always full of fish until a giant eel broke the wall enclosing it and ate the fish. The eel was caught by Ku'ula and his men and was killed. The pond was then restored (Cornell In Handy and Handy 1972:504).

In the 1750s, during the early, peaceful years of Kahekili's reign, his sister, the High Chiefess Kalola, became the principal wife of Kalani'opu'u, who later launched a long war between himself and his brother-in-law by "mercilessly beating the people of Kaupo with clubs" and mistreating them. Kahekili retaliated by taking the fortress of Ka'uiki, killing its defenders, and driving out the Hawaiian chiefs who had long controlled the districts of Hana, Kipahulu, and Kaupo. About 1775, Kalani'opu'u returned with his war canoes and raided the Hana district but was defeated at Kaupo. The following year he mounted a full-scale attack, took Hana, and proceeded with his fleet of war canoes to Makena and then to Ma'alaea (Speakman 1978:16).

Ka'uiki was the birthplace of Kaahumanu, the favorite wife of Kamehameha I. An earlier queen, Piikea, also was born in Hana (Thrum 1919:67).

HEIAU

The following is a list of *heiau* in the Kawaipapa and Hana regions. These *heiau* were documented by Andrew Walker in his 1931 survey of Maui. The locations of the *heiau* are shown on *Figure A-1*.

Kawaipapa Region - Heiau Site 105, 106

Names: Kaniomoku, Kawaipapa
Location: The cane lands above the road.

Description: Kaniomoku is mentioned by Thrum as the place where Kaahumanu spent her childhood. Her birthplace was in a large cave on the side of Kauiki Hill on the bay. The heiau has been totally destroyed.

Kawaipapa was a heiau located near the point where the road crosses the gulch of the same name. It was destroyed by building the road, also a freshet washed out the remainder (Walker 1931:181).

Heiau Site 107

Name: Heiau at Waikaloa
Location: In the rough lava flow beyond the Mormon cemetery.

Description: A simple platform of rock 5 feet high, 75 feet long, 15 feet wide. There is no evidence of its being a heiau except that it looks too large for a burial platform. No coral, pebbles or beach stones are used in its construction (ibid:182).

Heiau Site 108

Name: Unknown
Location: On Keanini Point beyond the factory, 100 feet from the shore.

Description: A small heiau probably of the Kuula class. It is little more than a level spot in the lava, 30 x 35 feet. The front is toward the bay, and a line of stones marks the edge of a step terrace. On the east a natural rock ledge forms a wall, and there are indications of a small terrace below it. The back is formed by a platform 3 feet high, 10 feet wide, and 35 feet long. A large part of the interior of the heiau is occupied by a double platform whose edges do

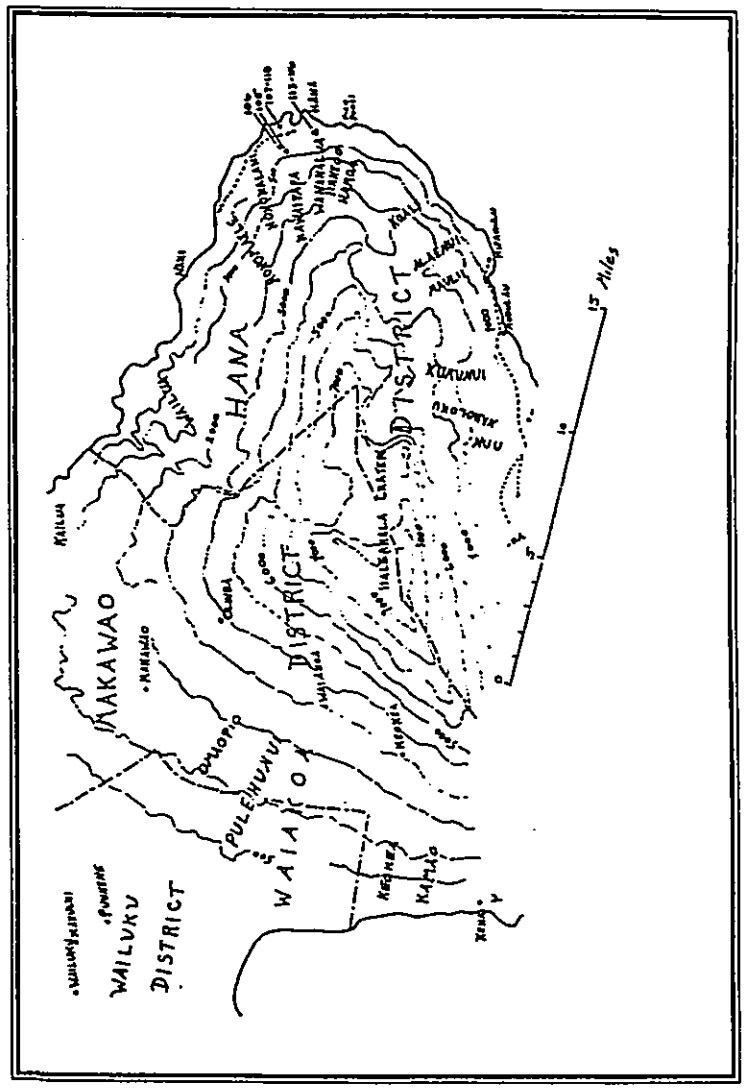

Figure A-1. Locations of Heiau in Hana (Taken from Walker 1931)

not coincide with the edge of the terrace. It is likely a burial platform. Large pieces of Aa make up the terrace with beach stones used for the divisions. Few pieces of coral seen. Drums heard near here (ibid:183).

Heiau Site 109

Name: Kauleiula?
Location: About 50 yards east of Site on the point of Nanualele.

Description: A stone platform on a rise of ground 6 to 8 feet high. It measures 60 x 95 feet and there is an additional 30 feet of level hill-top which may have been included in the heiau. On the side below the hill is a large natural pond, one of several in that vicinity. A path of stepping-stones leads across this pond and up onto the hill, crossing one corner of the heiau. The heiau is built of chunks of lava and water-worn boulders. There is a low wall on one end and several terraced platforms. Two of these at least, are graves. A house enclosure 12 x 25 feet is set [at] an angle with the heiau platforms and does not seem to conform to the general plan of the heiau. The interior of the heiau is lower than the sides, but many of the terrace edges have been broken and the stones removed for other purposes (ibid:184).

Heiau Site 110

Name: Kauleilepo-Kauleiula

Location: At Kainalimu on the point of rocks just north of Hana Bay.

Description: A twin or double heiau consisting of two elevated open platforms connected by a causeway. The larger is toward the sea and measures 42 x 54 feet. The causeway is 25 feet long, 8 feet high and 4 feet wide. On the other end is the smaller platform 22 x 26 feet and slightly lower than the front one. The south side of the larger has been terraced to a height of 15 feet. Construction is of water-worn boulders with pieces of Aa lava and coral sprinkled over the top. Modern houses and sheds have been built on the front of the heiau thus destroying much of the surface of the platform...Thrum gives the double name to this heiau but my informant, N. Silva, said the Kauleiula heiau was the nearby one site 109 which we at first thought was only a graveyard (ibid:185).

Hana Region - Heiau Sites 113-116

Names: Kaikalea (113), Kilinui (114), Lanakila (115), Puuheewale (116)
Location: The cane lands in the vicinity of Hana.

Description: All have been destroyed. Thrum's list for 1917 says they were medium-sized heiaus. Kilinui was said to be sacrificial and Lanakila a Place of Refuge (ibid:126).

Use of the Hana area during times of war is reflected in the number of important *heiau* in the area, not only in Hana, but also in the neighboring districts of Kipahulu and Kaupo. Kamehameha I alone is said to have repaired and dedicated four *heiau* in the area. The *heiau* were dedicated to the war god, Kuka'ilimoku. Kamehameha I was the last chief to use the Hana area for such purposes, however, ending a long tradition (Clark 1980:23).

AGRICULTURE

The Hana District is one of the wettest and most verdant coastal areas in the Hawaiian Islands. North Hana is gently sloping and is covered by a recent lava flow; therefore, there are no constantly flowing streams and associated agricultural terraces in the area. Other areas of Hana have rich soil composed of a mixture of humus and decomposed lava. Dry taro thrives in the area. It is grown in Hoookalani, a large native settlement above the sea cliffs, and also in the fresh-water lava caves of Waimapanapa, just north of Hana town is moderately sloping forest land called Helani. Here a number of Hawaiians recently planted patches of dry taro. In the forest zone above Hana town, at an elevation of about 1,500 feet, is a small valley below Olopawa Peak, where taro was once cultivated during the dry seasons (Handy and Handy 1972:504-505).

Yams and sugar cane were also grown in the area. Handy and Handy suggest that *'awa*, from which a favored narcotic drink was brewed, as well as *wauke* and *olona* (for cloth and cord making) were most certainly also grown in the area (Handy and Handy 1972:505). In historic times, specifically in the 1930s, the level lands between the shore and the gently sloping *kula* land was planted in sugar cane. Later the same area was used as ranch land.

On the broad flat seaward peninsula south of Hana town and Ka'uiki is Hamoa. Long ago, subsistence there depended mainly on sweet potatoes and fish. There is a large *loko i'a* (fishpond) where fish was farmed as a supplement to seasonal fishing. The pond was called Haneo'o and was said to be one of the homes of Kihawahine, the *mo'o* (lizard) goddess who

lived mainly at Lahaina in West Maui. The pond was still intact in 1934; its inlet was paved with very large flat stones said to have been brought long ago from many places on Maui.

LAND TENURE

In 1848, during the reign of Kamehameha III, the traditional Hawaiian land ownership system was replaced with a more Western-style system. This 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 Matsio Kekuanaoa and Ione II. The last Mahele was signed by the King and E. Enoka 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 quitclaimed 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. The awards were to be free of commutation except for house lots 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.

No *kuleana* were awarded within the present project area. However, two parcels were awarded adjacent to the present project area, on the north (LCA 4566 and 4846). The testimonies for these parcels are presented here and their locations are shown on *Figure A-2:*

Foreign Testimony Vol. 5:423
Claim 4846 to Kaholokai

Kauamu Sworn Keonihali an Ili in Kawaipapa has been a family possession since 1819. It now belongs to the Clt. he having received it from his father.

Mauka by Piipii's land, Koolau by Kanehailua's land, Makai by Kawainui and Kauanui's land. Kapahulu by Kahina's land.

A patch in Puako, on all sides by konohiki.
One piece more in Keonihali. Mauka by Kapawa's land, Koolau by Wahineaea's land, Makai by the Konohiki, Kipahulu by Momehu's land.

Nat. Register Vol. 6:107
No. 4846 - Kaholokai

I hereby tell of my land, at Kawaipapa, East Maui. The name of my *'ili* is Onehale. It begins at the Government Road and lies inland to the *pauku* of Kamamoku. It was given me by Looaukai, who had it in ancient times. I desire to secure this land for myself and my heirs.
Kaholokai

Nat. Register Vol. 6:183
No. 4566 - Wahineaa

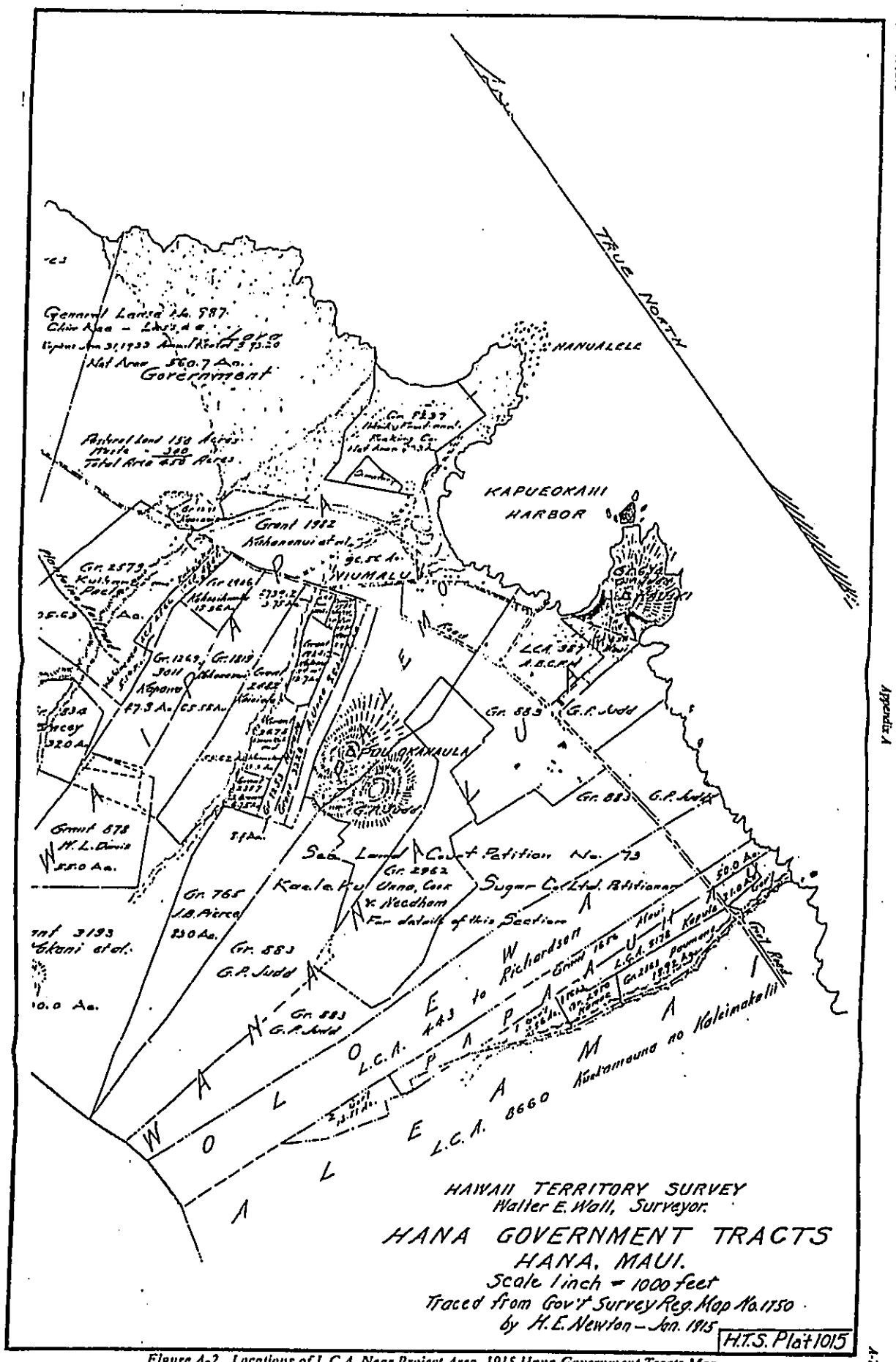

Figure A-2. Locations of L.C.A. Near Project Area, 1915 Hana Government Tracts Map (Taken from State Survey Office, Reg. Map No. 1750)

To the Land Commissioners: I hereby tell you of my land at Kawaipapa, East Maui. The name of my *'ili* is Kaniamako. On the east is the land of Puco, on the southeast is the land of Kekihinalani, on the southwest is the land of Kekalaihi. It was given to my *kupuna* by Keaumoku. I desire to secure it for myself and my heirs.

Wahineaa

Nat. Test. Vol. 5:373
No. 4566 to Wahineaa June 16, 1849

Pahili sworn He has seen Wahineaa's land, Kaniamako of Kawaipapa, a bequest land since the birth of Kaahumanu in Hana. Keeaumoku had given to Wahineaa's grandparents from that time to 1848, Kawainui took the land by force.

Section 1	Mauka	Keliipahea
	Koolau	Stream
	Makai	Puco
	Kipahulu	Kahalokai
Section 2	Mauka	Puco
	Koolau	Kalua
	Makai	Kahalokai
	Kipahulu	Kapawa

Kawainui has agreed he (Wahineaa) has lived on this land a long time without oppositions and it had been from his parents (grand).

The present project area was once a part of Grant 1906 to Kahooilimoku. The grant award for this parcel lists this grant being at Kaululoa, Kawaipapa, Hana.

E Ho'omaka ana ma ke kihi Hema a e holo ana
Akau 51 1/2° Hiki 1830 kaula ma Kahanaumi
Akau 35° Koon 893 " " Alanui Aupuni
Hema 70° Koon 1638 " " Kahalokai
Hema 15 1/2 ° Hik 680 " " Kapawa
Hema 33 3/10° Hik 540 " " a hiki i ke kihi mua

He 18 56/100 eka

Dec. 20, 1855

Roughly translated this grant reads:

Starting at the south corner and running thus:
North 51 1/2 east 1830 chains along Kahanaumi['s property]
North 35 west 893 " " the government road
South 70 west 1638 " " Kahalokai['s property]
South 15 1/2 east 680 " " Kapawa['s property]
South 33 3/10 east 540 " until the point of commencement

Comprises an area of 18 56/100 acres

Notes within the Land File Index at the State Archives list the following for Kawaipapa, Hana, Maui:

Int. Dept. Bk. 16:276 July 18, 1879
Certificate certifying that the Hawaiian Govt. has let unto his majesty, Kalakaua, 8 loko's [fishponds] on the above land, at the rate of $10 per annum, payable annually.

Int. Dept. June 19, 1891
S.W. Kaai applied to lease 7 fish ponds for 10 years, November 24, 1893 J.P. Sylva applied to lease 4 small fish ponds, June 1, 1895 J.W. Kalua applied to lease Govt. fishponds for 10 years, Oct. 1, 1891 J.H.S. Kaleo wanted to lease 8 small ponds in Kawaipapa...

Int. Dept. 1858
Is report by J.T. Gower of a/c sales showing that 18 56/100 acres of land in the above place had been sold to Kahooilimoku at $1 per acre. Also forwarding a survey of same, for which a patent is wanted.

POST-MAHELE ACTIVITIES

Sugar cane was first planted in Hana about 1860 by Kelk and Needham, who also constructed a bullock-powered grinding mill. Out of these early beginnings came the Ka'eleku Sugar Company, which formed the economic foundation for Hana until the 1930s when it closed.

After Ka'eleku Sugar Company closed, some of the resulting unemployment was offset when Paul L. Fagan purchased the plantation and hired workers (Clark 1980:23). Fagan, a member by marriage of the locally prominent Irwin family, was a millionaire sportsman, rancher, and part-owner of a professional baseball team, the San Francisco Seals. Fagan had originally planned to ranch the former plantation land but realized the implications this would have on the town and native population, who would be out of work. He decided that Hana would be an ideal spot for a tourist retreat and decided to enlarge upon his original

plan. He formed the Hana Ranch Company and built the Hotel Hana Ranch (Paradise of the Pacific, October 1946:17). It was officially opened to the public on June 15, 1947 and was primarily a resort for the rich. The hotel's present name, Hotel Hana Maui, was adopted in 1948 (Clark 1980:23).

ADDITIONAL RESEARCH
by Kepa Maly

The following is in response to a DLNR request for additional historical information concerning the possible presence of a *pu'uhonua* in the project area (memorandum dated 25 March 1993 from D. Hibbard, SHPD, to G. Matsuoka, Dept. Accounting and Gen. Services).

Mr. Sam Kalalau Jr. of the Maui/Lanai Islands Burial Council mentioned that a Hana elder had mentioned the possibility there was a *pu'uhonua* in the project area. I subsequently contacted several friends and native residents of Hana about this matter (memorandum dated 12/28/92). Mr. Wilfred Kala and Mrs. Rose Nahi, both of whom have had a long intimate relationship with Kawaipapa, along with several other residents, all stated that they were either unaware of, or did not believe there was a *heiau* within the project area. Another resident, *kupuna* Mrs. A. Day, told PHRI Project Supervisor Dave Henry that she believed there was a *pu'uhonua* somewhere in the area.

I briefly reviewed the original Mahele narratives hoping additional references on this matter might be located. Experience had indicated that the Native Registers/ Testimonies often contained references that had been omitted from the Indices of Awards, or current translations of it. In addition, it has been generally found that claims indexed in the Indices of Awards as being associated with a particular *ahupua'a* or land parcel often included information on other parcels as well. The review clarified one point—that the *'ili* (land parcel) of Kaniamako (also written as Kauiamako and Kamamoku in LCA translations) is situated in the *ahupua'a* of Kawaipapa; this *'ili* is listed in LCAs 4846 to Kahalokai and 4566 to Wahineaea. The review also identified additional LCA information: by association with the lands granted to Piele (Grant 2579), LCA 4534 to Uhunabele appears to be a little north of the project area, though not marked on the 1915 Survey Map. Another award mentioned, LCA 4074 to Akaa, has not been located on any maps to date. Both these LCAs state that coconut groves were planted upon the parcels, and Akaa lived upon the land as well. They document both agricultural and residential use of land near the project area.

As described in the above work by Kalima, the Land of Kahooilimoku (Grant 1906) lies within Kawaipapa Abupua'a, in the *'ili* of Kauhiloa. Part of the northern portion of Kahooilimoku is bounded by the *kuleana* of Kahalokai and Wahineaea.

Kahalokai's *kuleana*, in the parcel of Keoiehali, ran from the Government Road *mauka* to the boundary of Wahineaea's *kuleana*, which is identified as the beginning of the land parcel of Kaniamako. In June of 1849, when Kahalokai provided his testimony, the land granted to Kahooilimoku in 1855 was identified as the land of Momehu (Foreign Testimony 8:276).

It is important to remember here that the land granted to Kahooilimoku, and subsequently the land contained within the present project area, is called Kaululoa. To the north of Kaululoa and associated with the *kuleana* of Wahineaea is the *'ili* or *puuki* (small land parcel) of Kaniamako. The identification of Kaniamako as being within Kawaipapa Abupua'a helps clarify the confusion regarding the presence/ absence of a *heiau - puuhonua* in the project area. Hawaiian historian Samuel Kamakau and archaeologist Winslow M. Walker document some of the history of Kaniamako, and their narratives are presented below.

While describing events related to the death of Kaahumanu at Minoa, Oahu in 1832, Kamakau (1961) reflected on her birth in 1768:

> The chiefess Ka-ahu-manu was born at Mapuwena, called Paliuli, at Kauiki, Hana Maui, in a small cave on the side of the hill, and her afterbirth was taken and buried at Kani-a-makō in Kawaipapa above Pihehe...(1961:309)

> ...Women alone attended at the birth of Ka-ahu-manu, and these were her grandmother Haalou, Apo, Eleele-i-oho, and Wahine-aa. She was brought up in the land of Kawaipapa and was a great favorite with her father Kee-au-moku and the beloved child of her aunts, uncles, and grandmother... (1961:310)

It should be noted here that the name of the recipient of LCA 4566 is written in two ways, one is Wahineaea, and the other is Wahineaa. As referenced above in Kamakau's narrative, a woman by the name of Wahineaa was one of the attendants during Kaahumanu's birth. It is possible that this LCA recipient was a descendant of Wahineaa, indicating a long-term relationship with the land and royal families.

The next reference to Kaniamako is found in Kamakau (1968) when he describes the nature of *puuhonua* or places of refuge. Puuhonua lands had been handed down from ancient

times and remained sacred, but after Kamehameha unified the islands, he abolished the old *puuhonua* and established new ones. This was done because he awarded lands including *puuhonua* to his war leaders and warriors—"therefore they ceased to be puuhonua" (1968:17-18).

The concept (*ana*) of *puuhonua* came down from ancient times, and *puuhonua* lands had always existed. They were sacrosanct and inviolable lands; the blood of wrongdoers could not be shed once they entered into these *puuhonua* lands. Persons who violated *kapu* or shed blood without cause would be safe in a *puuhonua*. In the time when Kamehameha was ruling chief of the kingdom, all the lands belonging to his favorite wife Kaahumanu and to his war god (*akua kaua*) Kukailimoku were made *puuhonua* lands. Kaahumanu's lands that were set aside as puuhonua were: Paunau for Lahaina, Waipukua for Waihee, and Kaniamoku [Kaniamaku] for Hana on Maui. There were also other lands belonging to Kaahumanu and the war god of Kamehameha. Kaahumanu herself was at times a *puuhonua*, as when a lawbreaker ran to her and was thus saved from death (1968:18-19)

It must be assumed that the act of burying Kaahumanu's afterbirth in the Land of Kaniamako is the source Kaniamako's designation as a *puuhonua*. The *puuhonua* could be a specific feature upon the land or the entire parcel itself. Later, when W.M. Walker (1931) documented sites in Kawaipapa his informants identified a *heiau* named Kaniomoku (i.e., Kaniamako):

Kawaipapa Region
Heiau Site 105, 106

Names: Kaniomoku [and] Kawaipapa
Location: The cane lands above the road.

Description: Kaniomoku is mentioned by Thrum as the place where Kaahumanu spent her childhood. Her birthplace was in a large cave on the side of Kauiki Hill on the bay. The heiau has been totally destroyed .

Kawaipapa was a heiau located near the point where the road crosses the gulch of the same name. It was destroyed by building the road, also a freshet washed out the remainder (Walker 1931:181).

It is likely that his informant(s) was a parent or grandparent of one of the *kupuna* dwelling in this area of Hana today.

In summary, the above narratives from Mahele records, along with those from Kamakau and Walker, do a great deal to clarify the location of the *puuhonua* in Kawaipapa. The Mahele narratives identify the project area land as Kauhuloa, while portions of the *kuleana* on the northern boundary of Kauhuloa include the land parcel called Kaniamako. The narratives recorded by Kamakau and Walker confirm that a *puuhonua* and possibly a *heiau* were associated with Kaniamako. Though the exact location of the *puuhonua* is not known, the above indicates it was generally located in a parcel adjacent to the current project area. The recollection by at least one *kupuna*, that there is a *puuhonua* in Kawaipapa, is indeed accurate.

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APPENDIX B

SUMMARY OF SHOVEL TEST STRATIGRAPHY

SITE 3150
FEATURE A, ST-1

LAYER	*DESCRIPTION*
I	0-25 cmbs; black (10YR 2/1 moist); sandy loam; moderate, fine to medium granular structure; soft, very friable, non-sticky, non-plastic consistence; common micro to coarse roots; many micro to coarse pores; cultural material includes sparse charcoal and historic glass; abrupt, irregular boundary;
II	25-36 cmbs; very dark gray (10YR 3/1 moist); sandy loam; moderate, fine to medium granular structure; soft, very friable, non-sticky, non-plastic consistence; many micro to coarse roots; many micro to coarse pores; layer terminates on bedrock.

FEATURE A, ST-8

LAYER	*DESCRIPTION*
I	0-28 cmbs; black (10YR 2/1 moist); silt loam; moderate, fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many micro to coarse interstitial pores; cultural material includes sparse charcoal, shell and waterworn pebbles; layer terminates on rock layer.

FEATURE B, ST-2

LAYER	*DESCRIPTION*
I	0-40 cmbs; dark brown (7.5YR 3/2 moist); sandy loam; moderate, fine blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many micro to coarse interstitial pores; cultural material includes burnt coconut fragments; layer terminates on bedrock.

FEATURE B, ST-9

LAYER	*DESCRIPTION*
I	0-27 cmbs; very dark gray (7.5YR 3/0 moist); silt loam; moderate, medium to coarse blocky structure; soft, very friable, non-sticky, non-plastic consistence; common medium tubular roots; common micro interstitial pores; cultural material includes sparse shell; layer terminates on rock layer.

FEATURE C, ST-3

LAYER	*DESCRIPTION*
I	0-24 cmbs; black (7.5YR 2/0 moist); sandy loam; moderate, fine to coarse blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse vesicular roots; many fine to coarse interstitial pores; culturally sterile; layer terminates on bedrock.

FEATURE C, ST-10

LAYER	*DESCRIPTION*
I	0-26 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate, fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many medium tubular roots; many medium interstitial pores; cultural material limited to waterworn pebbles; abrupt, wavy boundary;
II	26-30 cmbs; dark brown (10YR 3/3 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; common medium tubular roots; common medium interstitial pores; layer terminates on bedrock.

FEATURE D, ST-4

LAYER	*DESCRIPTION*
I	0-9 cmbs; architectural platform; cultural material includes historic glass, ceramics and shell; abrupt, wavy boundary;
II	9-39 cmbs; very dark brown (10YR 2/2 moist); sandy loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many medium tubular roots; many medium interstitial pores; cultural material includes historic ceramics and shell; layer terminated on large rock slab.

FEATURE D, ST-11

LAYER	*DESCRIPTION*
I	0-13 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common medium to coarse tubular roots; common medium to coarse interstitial pores; culturally sterile; clear, irregular boundary;
II	13-30 cmbs; strong brown (7.5YR 4/8 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; common medium to coarse tubular roots; common medium to coarse interstitial pores; culturally sterile; layer terminated on rock layer.

SITE 3153
FEATURE A, ST-15

LAYER	*DESCRIPTION*
I	0-24 cmbs; very dark brown (10YR 2/2 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many fine to coarse interstitial pores; culturally sterile; layer terminates on rock layer.

FEATURE B, ST-16

LAYER	DESCRIPTION
I	0-22 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many fine to coarse interstitial pores; cultural materials includes sparse charcoal flecks; abrupt, wavy boundary;
II	22-32 cmbs; strong brown (7.5YR 4/6 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; many fine to coarse interstitial pores; layer terminates on rock layer.

OTHER (NON-SITE) UNITS

ST-5

LAYER	DESCRIPTION
I	0-13 cmbs; dark brown (7.5YR 3/2 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; clear, irregular boundary;
II	13-35 cmbs; dark yellowish brown (10YR 3/4 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-6

LAYER	DESCRIPTION
I	0-16 cmbs; dark brown (7.5YR 3/2 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-7

LAYER	DESCRIPTION
I	0-13 cmbs; dark brown (7.5YR 3/2 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; clear, irregular boundary;
II	13-29 cmbs; dark yellowish brown (10YR 3/4 moist); moderate medium to coarse blocky structure; soft, friable, slightly sticky, slightly plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-14

LAYER	DESCRIPTION
I	0-24 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; common fine to medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-15

LAYER	DESCRIPTION
I	0-21 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; common fine to medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-16

LAYER	DESCRIPTION
I	0-25 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; common fine to medium interstitial pores; culturally sterile; layer terminates on rock layer.

Appendix B

Archeological Mitigation Program
Hana Medical Center Project Area
Land of Kawaipapa, Hana District, Island of Maui
(TMK: 1-4-03:22)

Paul H. Rosendahl, PhD., Inc.
April 1996

Archaeological Mitigation Program
Hana Medical Center Project Area

Land of Kawaipapa, Hana District, Island of Maui, Hawai'i (TMK:1-4-03:22)

DAGS Job No. 1-5-20-6219
Contract No. 34174, Attachment 1

BY

Warren Wulzen, B.A. • Projects Supervisor

AND

Paul H. Rosendahl, Ph.D. • Principal Archaeologist

WITH

Susan T. Goodfellow, Ph.D. • Laboratory Director

PREPARED FOR

State of Hawai'i
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APRIL 1996

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SUMMARY

At the request of Mr. Allen Yamanoha of the State of Hawai'i Department of Accounting and General Services, Division of Public Works, Paul H. Rosendahl, Ph.D., Inc. (PHRI), conducted archaeological data recovery work at the Hana Medical Center project area (TMK:1-4-03:22), situated in the Land of Kawaipapa, Hana District, Island of Maui. The work comprised Phase II of the Archaeological Mitigation Program for the project, as outlined in the project's Archaeological Mitigation Plan (Rosendahl 1994). The field work was conducted on July 5-7, 1995, and immediately after completion of the field work, an interim report of findings was completed (Rosendahl 1995). The present work constitutes the final report on archaeological activities at this site.

The purpose of the Archaeological Mitigation Program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources (DLNR) Rules Governing Procedures for Historic Preservation Review (draft - November 1994). The specific purpose of the Mitigation Plan was to guide the archaeological work required by DLNR to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 50-50-13-3150.

An earlier inventory survey of the project area, conducted by PHRI (Henry and Graves 1993), identified four sites. Two of the sites are complexes (Sites 3150 and 3153), and two are boundary walls (Sites 3151 and 3152). All four sites yielded evidence of historic activities only. All four sites were evaluated as significant solely for information content. Because the documentation of three of the sites during the inventory survey was considered to have recovered all of the significant information represented by these sites (3151, 3152, and 3153), all three were determined to be no longer significant, and no further work was recommended. For the remaining site (3150), it was determined that additional portable cultural materials as well as specialized samples might remain within a subsurface component, and that such cultural materials could be useful in further dating of the site and its component features and further evaluating feature function. Therefore, the site was recommended for further archaeological work, and a mitigation plan was prepared for the site (see Appendix A for correspondence between the DLNR, client, and PHRI, concerning the mitigation plan). The present work presents the findings of the additional work.

All four features at Site 3150 were subject to further excavation, and some additional recording. None of the features contained significant subsurface deposits, but some portable remains were collected. Most of these remains were historic, dating to the last half of the 19th and the early 20th centuries; a few remains were similar to indigenous Hawaiian artifacts.

Feature C was found to be the result of recent road grading within the parcel. The enclosures at Features A and B may be remnants of thatched houses, while the Feature D platform appears to have been used for food consumption, on an episodic basis. Features A, B, and D were assigned habitation functions.

The information potential of Site 3150 has been exhausted, as the mitigation plan has been fulfilled and the data recovery is complete. No further archaeological work in the Hana Medical Center parcel is recommended.

Contents

Contents (cont.)

Illustrations

Illustrations (cont.)

Tables

INTRODUCTION

BACKGROUND

At the request of Mr. Allen Yamanoha of the State of Hawai'i Department of Accounting and General Services, Division of Public Works, Paul H. Rosendahl, Ph.D., Inc. (PHRI), recently conducted archaeological data recovery work at the Hana Medical Center project area (TMK:1-4-03:22), situated in the Land of Kawaipapa, Hana District, Island of Maui. The work comprised Phase II of the Archaeological Mitigation Program for the project and was outlined in the project's Archaeological Mitigation Plan (Rosendahl 1994). The field work was conducted on July 5-7, 1995 under the supervision of Projects Supervisor Warren Walzen, B.A., assisted by Projects Supervisor James A. Head, B.A., Field Archaeologist Keith Colvin, B.A., and Field Technician Diane Trembly, M.D. Overall supervision for the project was provided by PHRI President and Principal Archaeologist Paul H. Rosendahl, Ph.D. The data recovery work required 12 person-days of labor. Immediately after completion of the field work, an interim report of findings was completed (Rosendahl 1995).

SCOPE OF WORK

The purpose of the Archaeological Mitigation Program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources (DLNR) Rules Governing Procedures for Historic Preservation Review (DLNR 1994). The specific purpose of the Mitigation Plan is to guide the archaeological work required by DLNR to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 50-50-13-3150.

The earlier inventory survey of the project area, conducted by PHRI (Henry and Graves 1993), identified four sites. Two of the sites were complexes (Sites 3150 and 3153), and two were boundary walls (Sites 3151 and 3152). Three of the four sites (Sites 3151, 3152, and 3153) were evaluated as significant solely for information content. Because the documentation of these sites during the inventory survey was considered to have recovered all of the significant information at the sites, all three were determined to be no longer significant, and no further work was recommended (Henry and Graves 1993:25). The Department of Land and Natural Resources - State Historic Preservation Division (DLNR-SHPD) concurred with these findings in its review of the inventory survey report (letter dated 23 July 1994, from Mr. Keith W. Ahue, Chairperson, DLNR-SHPD, to Honorable Robert P. Takushi, Department of Accounting and General Services) (see Appendix A).

For the remaining project area site (Site 3150), PHRI's original conclusion was that the site was significant not only for information content, but was also provisionally significant for cultural value. PHRI therefore recommended additional data collection work to evaluate one of the features of the site (Feature D) for the presence of human remains. This work was undertaken in April of 1993, following completion of the inventory survey field work, and the findings were presented in the final version of the inventory survey report (Henry and Graves 1993). In addition to summarizing the findings of the additional work, the inventory survey report also described the primary features at Site 50-50-13-3150, as follows:

> ...Site 3150 consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped enclosure; and Feature D, a rectangular platform. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. No datable samples were recovered, but the presence of the glass and ceramics suggests the features are historic. Because it was thought Feature D might contain a burial, it was subsequently determined to require further testing (Memo dated 25 March 1993, from D. Hibbard, DLNR-SHPD, to G. Matsuoka, Dept. of Accounting and General Services). On April 20, 1993 PHRI archaeologists placed a formal test excavation unit in the center of Feature G, near the shovel test placed earlier. The unit yielded ceramics, faunal bone, shell, and a glass button. The findings suggest the feature is historic. No human remains were found in the unit (Henry and Graves 1993:22).

Because the excavation unit placed within Feature D failed to identify human remains, the site was no longer considered potentially significant for cultural value. However, in its review of a draft of the final survey report, DLNR-SHPD stated that additional portable cultural materials as well as specialized samples might remain at the site, within a subsurface component, and that such cultural materials could be useful in (a) further dating of the site and its component features, and (b) further evaluating feature function. For these reasons, DLNR-SHPD recommended that the site be subjected to data recovery work designed to recover additional artifacts, ecofactual remains, and other specialized samples. Moreover, DLNR requested that this work be preceded by preparation of an appropriate archaeological treatment plan, which was subsequently completed (Rosendahl 1994) (see Appendix A: Correspondence).

Based on existing information concerning the site, and pursuant to DLNR's specific comments above, the primary goal of the present data recovery at Site 3150 was to more precisely date and more thoroughly evaluate the functions of the four primary features at Site 3150. This work was to be accomplished through additional detailed recording, excavation, and analysis. Variable levels of additional detailed recording were undertaken at the site's four features, and the site map was modified. All four features of Site 3150 were subjected to formal excavation. A total of seven 1.0 by 1.0 m and one 1.0 by 0.5 m excavation units (EU-1 through -8) were dug at the four features in the project area in order to identify subsurface cultural deposits: one at Feature A, four at Feature B, one at Feature C; and two at Feature D. Some surface collection was also conducted at Feature D. All collected materials were returned to the PHRI laboratory for processing and analysis.

PROJECT AREA DESCRIPTION

The Hana Medical Center project area consists of 10.07 acres (4.03 hectares) and includes a small strip adjoining the northern boundary of the existing medical facility *(Figure 1)*. The project area is bounded on the north, south, and west by private parcels. Site 50-50-13-3150 is located in the center of the project area, west and *mauka* of the existing Hana Medical Center facility. Elevations in the project area range from c. 120 feet (36.6 meters) above mean sea level (AMSL) at the Hana Highway up to c. 250 feet (76.2 meters) AMSL at the west end of the parcel (USGS 1983). Rainfall in the general vicinity of the project area averages 75 inches (191

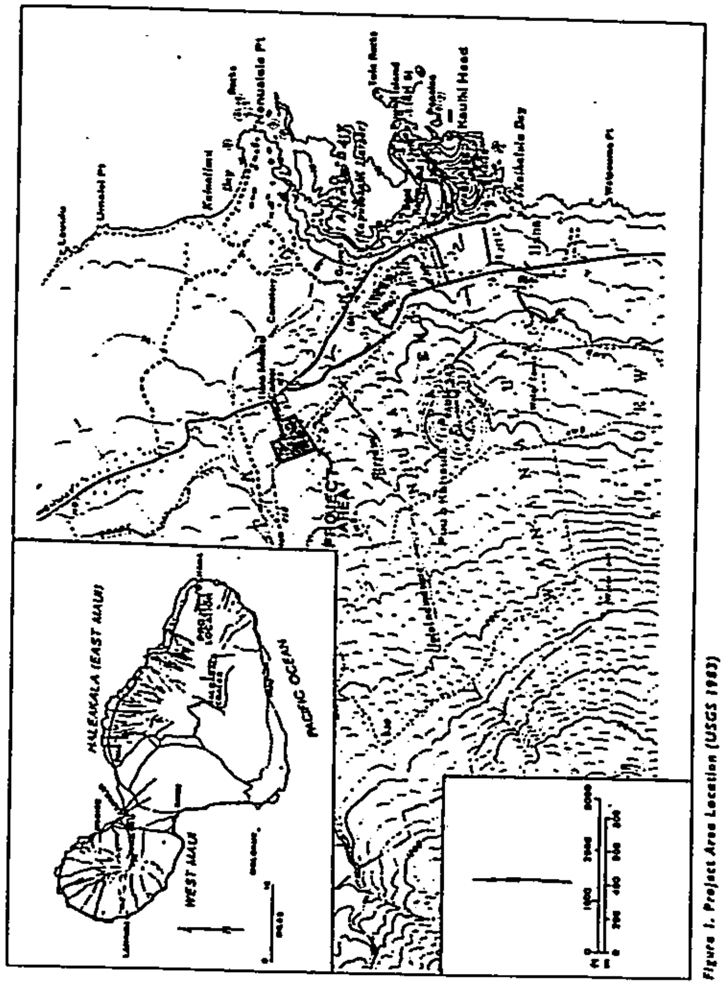

Figure 1. Project Area Location (USGS 1983)

centimeters) per year, and the mean annual temperature is 70-75 degrees F (21-24 degrees C) (Armstrong 1973).

Terrain within the project area slopes moderately from the west towards the ocean to the east. Soils are comprised primarily of Hana extremely stony, silty clay loam, a dark brown silty clay loam surface layer overlying a reddish-brown, very friable silty clay loam subsoil (Foote et al. 1972). Beneath the soil is a substratum of fragmented aa lava extending to a depth of 20 to 30 inches (50 to 76 centimeters). Several roads have been graded around and through the parcel.

The project area contains both introduced and native species of plants. Some of the introduced species are present because the area has been used for commercial cultivation (Henry and Graves 1993:22). The species (Neal 1965) include breadfruit (*Artocarpus communis*), ti (*ki*; *Cordyline terminalis*), taro (*kalo*; *Colocasia esculenta*), palmetto (*Sabal palmetto*), coconut (*Cocos nucifera*), bird-of-paradise (*Strelitzia reginae*), red ginger (*'awapuhi-'ula'ula*; *Alpinia purpurata*), mango (*manako*; *Manifera indica*), bamboo (*Bambusa* sp.), Africa tulip tree (*Spathodea campanulata*), *milo* (*Thespesia populnea*), false *kamani* (*kamani-haole*; *Terminalia catappa*), Hawaiian tree fern (*Nioli*; *Filicium decipiens*), papaya (*Carica papaya*), areca palm (*Chrysalidocarpus lutescens*), *wili-wili* (*Erythrina sandwicensis*), *kukui* (*Aleurites moluccana*), and banana (*Musa paradisiaca*). Small patches of the introduced pangola pasture grass (*Digitaria decumbens*) are also to be found in open areas.

It should be stated, however, that 50 years ago and earlier the landscape was one of rolling cane fields or grassland, with hardly a tree to be seen, except in the stream beds. The upper slopes of the Hana Medical Center property would have afforded a clear view of Hanalike Bay and Kapueokahi Harbor, and would have been exposed to the trade winds.

PREVIOUS ARCHAEOLOGICAL WORK

Very little archaeological work has been conducted in the Hana area, despite its rich cultural history. Previous archaeological work conducted in the vicinity of the project area includes investigations by Walker (1931), Soehren (1963), Sterling (1969), Cordy (1970) Pearson (1970), Bevacqua (1972), Chapman and Kirch (1979), Landrum (1984), and Kolb (1991). The majority of these center on the *heiau* of the area. Borthwick et al. (1992) conducted an inventory of 400 acres south of Hana town. The previous investigations are summarized in *Table 1*. The inventory survey (Henry and Graves 1993:10) and the present study is the only archaeological research conducted within the Hana Medical Center parcel.

In 1931, Winslow Walker conducted an archaeological survey of the Island of Maui. Walker's work, which was conducted through informant interviews and site visits, has never been published, and remains more an overview of some of the archaeology of Maui rather than an in depth study. Walker (1931:181-185) identified six *heiau* in the Land of Kawaipapa (Sites 105 through 110), most located *makai* of the project area, near the ocean. He mentions the presence of two *heiau* near the project area, Kaniomoku and Kawaipapa, both identified as in the cane lands above the road (probably the "old government road," which followed a route *makai* of the present highway [see Landrum 1984]). Kaniomoku Heiau is repeatedly mentioned by Thrum (1907, 1908, 1917) as the place where Kaahumanu spent her childhood, but this *heiau* has been totally destroyed. Kawaipapa was a *heiau* located near the point where the road crosses the gulch of the same name (c. 400 m north of the Hana Medical Center). It was destroyed by

Table 1.
Previous Archaeological Work in the Hana Area

Pub. Year	Author(s)	Institution	Location	Type of Investigation
1931	Walker	BPBM	Maui (general)	Site descriptions
1969	Sterling	BPBM	Western O'ahu Plain	Site descriptions
1970	Cordy	BPBM	Pillanihale Heiau	Site mapping
1970	Nakkim	—	Ulaino - Pu'uiki	Reconnaissance survey
1970	Pearson	DLNR	Honolulunui and Waiklu	Survey
1972	Bevacqua	BPBM	Waiaka (Hana H S)	Reconnaissance
1979	Chapman and Kirch	BPBM	Southeast Maui	Rockshelter excavations
1984	Landrum	BPBM	Kawaipapa	Recording, excavation
1987	Cleghorn	BPBM	Hana Ranch Lands	Reconnaissance survey
1987	Cleghorn and Rogers	BPBM	Hana Ranch Lands	Reconnaissance survey
1991	Kolb	UCLA	Maui Heiau	Recording, excavation
1992	Borthwick et al.	CSH	Papa'auhau - Haneo'o	Inventory survey, testing
1993	Henry and Graves	PHRI	Kawaipapa (Hana Med Ctr)	Inventory survey, testing

Key to Institutions:
BPBM B.P. Bishop Museum, Dept. of Anthropology
CSH Cultural Surveys Hawaii
DLNR Department of Lands and Natural Resources
PHRI Paul H. Rosendahl, Ph.D., Inc.
UCLA University of California, Los Angeles

construction of the road, and stream flooding reportedly washed away the remainder (Walker 1931:181).

The Kipahulu and Kaupo *ahupua'a*, southwest of Hana, were surveyed by the Bishop Museum staff. The report states:

> Most house sites, agricultural terraces and ditches in Kipahulu were demolished by the operations of a sugar plantation. The majority of those which survive today, and included in this report, are probably contemporaneous with the plantation, which closed about 1923. A middle-aged informant., born and raised at Kipahulu, recalls visiting, in her childhood, residents of thatched stone wall houses as at sites [identified in the survey]....(Soehren 1963:22)

This form of thatched house was a variant on the Traditional Hawaiian form, influenced by the missionaries and other westerners (Apple 1971).

Elspeth Sterling (1969) conducted a walk-through archaeological survey of the Hana area with local informant Matthew Kalalau. The unpublished notes of this survey identified a number of platforms and enclosures in an aa lava flow adjacent to the Mormon Cemetery in Hana. No sites are specifically located in Kawaipapa.

In 1969, Richard Pearson (1970) conducted an archaeological reconnaissance survey of Wai'anapanapa State Park, located in the *ahupua'a* of Waiklu. Pearson identified 34 archaeological features, including one *heiau*, five cave shelters, a trail, one pictograph, six *ahu*, two U-shaped enclosures, five miniature enclosures, three shelter walls, two house platforms, and several walls and enclosures.

In 1972, Robert Bevacqua conducted a walk-through archaeological survey of the proposed Hana Elementary and High School area (Bevacqua 1972). Bevacqua noted considerable mechanical disturbance in the area, and the remains of a partially destroyed habitation site.

Lynn Nakkim (1970) conducted a reconnaissance level survey from the Land of Ulaino on the north to Pu'uiki on the south. She reported 66 sites, but none in the Hana Medical Center parcel. In 1987, additional reconnaissance survey was conducted by Paul Cleghorn (Cleghorn 1987; Cleghorn and Rogers 1987). Both of these surveys were able to locate some remnant agricultural features on the periphery of sugar cane land.

In 1984, Jim Landrum conducted an archaeological reconnaissance survey of a 14-acre parcel within the Land of Kawaipapa, *makai* of the present road (Landrum 1984). No prehistoric archaeological remains were identified during the survey, although a short segment of the "old government road" was identified.

On the coast, north of the project area, the largest *heiau* on Maui, Piilanihale, has been the subject of some of the most interesting archaeological work in the Hana District. Cordy (1970) produced a detailed description of the site. Kolb (1991) conducted excavations aimed at delineating the stages of construction of this massive structure, comparing it to other *heiau* on Maui, and relating this evidence to political change on the island. Radiocarbon dates obtained from this *heiau* are discussed below.

In 1992, Cultural Surveys Hawaii conducted an archaeological inventory survey of c. 400 acres in the proposed Hana Ranch Country Club, Lands of Papa'auhau, Alemai, and Haneo'o (Borthwick et al. 1992). The survey resulted in the identification of 50 sites; 31 of probable historic age and 19 which may be prehistoric. The prehistoric sites included a *heiau*, seven habitation sites, six agricultural sites (three that exhibited both habitation and agricultural features), a burial, and one wall with undetermined function. Sites were inferred to be prehistoric based on circumstantial evidence:

> The presence of certain manuports, especially large water-rounded boulders, was utilized in attempting to affix probable age determinations. The Hana area, specifically Alemai ahupua'a , is the legendary home of Ku'ula. The worship of Ku'ula is associated with water-rounded stones from the ocean. Observed during this survey were a number of large ocean (non-stream) rounded boulders termed "rollers." It was thus postulated that sites or site remnants that contained rollers, or Ku'ula stones may be pre-contact sites. (Borthwick et al. 1992:25).

Of the historic sites, 25 were assigned an agricultural function, two were habitation locations, and three were other kinds of sites.

Excavations at 14 features in 13 of the sites during the Hana Country Club survey produced only a small collection of ecofacts and artifacts (seven features were completely sterile of portable remains). Three radiocarbon dates were returned, but two were contaminated with

bomb carbon. One did yield a date range of 1345 - 1650 AD. This report demonstrates that archaeological remnants of both historic and prehistoric activities may have survived alteration of the land by mechanical agricultural (sugar and cattle) practices (Borthwick et al. 1992:105-107).

The only other inventory-level survey of a parcel in the Hana area was the first phase of the current project, the inventory survey of the Hana Medical Center. The project area was found to contain numerous dirt roads, bulldozer push piles, and areas cleared for cultivation. Four sites were identified in the project area—two complexes (Sites 3150 and 3153), and two boundary walls (Sites 3151 and 3152). Site 3150, the subject of the present data recovery work, consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped alignment; and Feature D, a rectangular platform. The features were assigned functional types of habitation, animal pen, boundary, agriculture, and indeterminate, respectively. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. Feature D was additionally tested for a possible burial, but yielded only ceramics, faunal bone, shell, and a glass button. The findings suggested that the features are of historic age. Subsurface testing in the cleared areas between sites and features yielded no evidenced of buried cultural deposits.

SUMMARY OF HISTORICAL DOCUMENTARY RESEARCH

This section summarizes historical documentary research available in the inventory survey report (Kalima and Maly 1993) and also includes additional material from other sources.

The project area is in the Hana District, in the *ahupua'a* of Kawaipapa. "Hana" refers not only to the district, but to the general area surrounding Hana Bay. The name is a shortened version of Hanaikaualaniha'aho'a (Hana of the low skies) (Soehren 1962:1). The Hana area has a rich cultural history, as it was the home of chiefs and chiefesses (Pukui 1983). From the time of La'a-mai-kahiki to the time of Umi, East Maui, comprising Ko'olau, Hana, Kipahulu, and Kaupo districts, was governed separately from the rest of the island. East Maui chiefs were often grouped about the fortified hill of Ka'uiki. Ka'uiki was the birthplace of Kaahumanu, the favorite wife of Kamehameha I. An earlier queen, Piikea, also was born in Hana (Thrum 1917).

Hana is a natural bay, formerly known as Kapueokahi. Kapueokahi, "the single owl," is said in one legend to have been a *kupua*, a supernatural being who could take the form of an animal or a human. Kapueokahi wanted to marry a woman named Kapoulakinau, so he changed himself from an owl to a man. This incident took place in Kawaipapa, which has its seaward edge on the bay. From that time on, the bay as well as its lone sand beach were called Kapueokahi (Clark 1980:24).

Hana Bay and a cinder cone forming the bay, Ka'uiki, figure in the history of the *ali'i* of Maui and Hawai'i, partly because it is a good canoe landing and is near Hawai'i Island. Alenuihaha Channel, between the islands, could easily be crossed in a couple of hours when the winds were ideal. Because of its location Hana was a sanctuary, both in wartime and peacetime, for the *ali'i* of both islands (Beckwith 1970:319). The Hana area is reported to have been the site of many important battles (ibid.; Speakman 1978), some of which eventually led to the unification of the Hawaiian Islands. The many *heiau* in the vicinity, as well as the hilltop fortress of Ka'uiki, overlooking Hana Bay, reflect the importance of Hana as a battleground. Kamehameha

I alone is said to have repaired and dedicated four *heiau* in the area. The *heiau* were dedicated to the war god, Kuka'ilimoku. Kamehameha I was the last chief to use the Hana area for such purposes, however, ending a long tradition (Clark 1980:23).

During peacetime Hana was a desirable place to live, with abundant resources. Agriculture was extensive in the area and included cultivation of dry and wet taro, sweet potatoes, yams, and *'awa*, for which the area is famous (Thrum 1907). The Hana District is one of the wettest and most verdant coastal areas in the Hawaiian Islands. North Hana is gently sloping and is covered by a recent lava flow; therefore, there are no constantly flowing streams and associated agricultural terraces in the area. Other areas of Hana have rich soil composed of a mixture of humus and decomposed lava. Dry taro thrives in the area. In the forest zone above Hana town, at an elevation of about 1,500 feet, is a small valley below Olopawa Peak, where taro was once cultivated during the dry seasons (Handy and Handy 1972:504-505).

Yams and sugar cane were also grown in the area. Handy and Handy suggest that *'awa*, from which a favored narcotic drink was brewed, as well as *wauke* and *olona* (for cloth and cord making) were most certainly also grown in the area (Handy and Handy 1972:505). Hana also had the best wood for making scaffolds and ladders (to scale fortresses), and had the best round smooth stones for use in slingshots (Handy and Handy 1972:504).

South of Hana town, there is a large *loko i'a* (fishpond) where fish were farmed as a supplement to seasonal fishing. The pond was called Haneo'o and was said to be one of the homes of Kihawahine, the *mo'o* (lizard) goddess who lived mainly at Lahaina in West Maui. The pond was still intact in 1934; its inlet paved with very large flat stones which were said to have been brought long ago from many places on Maui (Maly i.p.).

In 1848, during the reign of Kamehameha III, the traditional Hawaiian land ownership system was replaced with a more Western-style system. This 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 in charge of tracts of land on behalf of the king or a chief (Chinen 1958:vii; Chinen 1961:13).

These resolutions also 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. The awards were to be free of commutation (Chinen 1958:29). Before receiving their awards from the Land Commission, the native tenants were required to prove that they cultivated the land for a living. 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). No *kuleana* were awarded within the present project area. However, two parcels adjacent to the present project area, on the north, were awarded (LCA 4566 and 4846).

Subsequent to the Great Mahele, portions of the Government Lands were sold to defray the costs of government; purchasers were issued documents called grants (Chinen 1958:27). The Hana Medical Center project area was a portion of Grant 1906 to Kahooilimoku (Kalima and Maly 1993:A-8). Numerous other grants were sold in Kawaipapa *ahupua'a*, most of which were eventually consolidated into Hana Plantation lands.

Hana was an early center for growing sugar cane as a cash crop. Large-scale cane farming was introduced to the area in 1861, when August Unna began consolidation of small land holdings. By the end of the 19th century, the major producer in the area was Hana Plantation, which had spread across the *ahupua'a* of Hamoa on the south to Honomaele on the north

(Borthwick et al. 1992). Mechanization of the plantation was instituted, and a railroad and flume system carried the cane to the mill.

After the turn of the century, when the business fell on hard times, the Ka'eleku Sugar company was formed under Theo. H. Davies (Conde and Best 1973: 241-246). The new owners concentrated on the cane lands closest to the mill. The 1907-1909 fields map (Borthwick et al. 1992:19) depicts the current project area as under cultivation. The Hana Medical Center Property is also shown as being crossed by the railroad grade, *mauka* of the road, and bounded on the north by a "permanent flume," which apparently delivered water from Kawaipapa Gulch to the fields and mill.

Census figures (Schmitt 1968:117) for the Hana District reflect the decline of the sugar industry and a concomitant decline in employment at this time. In 1900, there were 5,276 persons in Hana; 3,100 in 1920; 2,663 in 1940; and only 1,073 in 1960. This would suggest that many former houses might have been abandoned in the area.

The plantation was transferred to C. Brewer & Co. in 1933, and closed by 1945 (Conde and Best 1973:245). The remaining 14,000 acres were purchased by Paul Fagan, who turned it into the Hana Ranch Company, raising cattle on the grassy slopes above the town. Fagan soon realized the implications that no industry was having on the town and the native population, who were out of work. He decided that Hana would be an ideal spot for a tourist resort and decided to enlarge upon his original plan, building the Hotel Hana Maui, which was opened in 1947 (Clark 1980). Tourists and cattle continue to be the mainstays of economic life in Hana.

The *mauka* portion of the Hana Medical Center project area parcel was cane land, and was used as an anthurium growing ground after World War II (Henry and Graves 1993:12). The grading and other modifications may be attributed to the latter activity.

SETTLEMENT PATTERN

Despite the limited archaeological data for the Hana area, a generalized chronology of settlement and land utilization for the area can be proffered. This chronology is based on the previous archaeological research in the area, historical documentary research, and previously postulated models of settlement. Refinement of this chronology should be possible in the future as additional information is collected.

Kirch postulated a chronology of archipelago-wide aboriginal settlement and social development (Kirch 1985:298-308). In his sequence, five periods of development were defined:

Colonization, AD 300-600 — Occupation of ecologically favorable areas; windward valleys, and land near fishing grounds; - material culture similar to East Polynesia - social structure similar to ancestral Polynesian hereditary Chiefdom;

Developmental, AD 600-1100 — Population Growth - settlement of all major islands - distinctive Hawaiian material and social culture develops - social structure: some status differentiation, but still corporate descent groups;

Expansion, AD 1100-1650 — Population growth - dispersal of population into leeward areas - intensified food production - altered social & political organization - class stratification - *Ahupua'a* system solidified - development of *Makahiki* - larger regions politically integrated;

Proto-Historic, AD 1650-1795 — Intensified food production - elaboration of social system - cycles of conquest, integration, collapse;

Historic, 1795-present — Population decline - breakdown of traditional social structure, Great Mahele - increase in trade with outside world.

The latter period could be further subdivided, based on the sweeping changes in Hawaiian society. The first wave of European contact arrived on Maui November 26, 1778, when the ships of Captain James Cook put in near present day Kahului (Speakman 1978:22-29). He arrived as Ka-hekili and Ka-lani'opu'u were conducting a war for control of Maui. Ka-hekili paid a visit to the ships off Kahului. A few days later, cruising eastward along the Hana shore, Cook was visited by Ka-lani'opu'u, accompanied by the young Kamehameha. Kamehameha, the future ruler of all of Hawai'i, spent the night aboard the ship, *Resolution*, observing western ways and technology for the first time. He was to use this knowledge later in his drive to unify the island chain.

At this time, the *ahupua'a* system of social organization was firmly established, with land units generally forming pie-shaped wedges extending from the mountains to the sea. The *ahupua'a* were controlled by local chiefs and were integrated at the district level. Districts were ruled by paramount chiefs through a system of taxation and redistribution. Social stratification was defined by a class separation between the ruling *ali'i* (chiefs) at one end, and the *maka'ainana* (commoners) at the other. Kamehameha I eventually united all of the Hawaiian islands and freely participated in the European-introduced market economy (Kamakau 1961).

European influence in the Hawaiian Islands was felt immediately, in the form of disease. Also the Hawaiians became enamored of specific trade goods, and the European sailors took advantage of the demand to replenish their shipboard supplies. The introduction of horses, cattle, and goats by the Europeans put new pressure on traditional agricultural practices—walls began to be built to protect the gardens. Lahaina, Maui became the center of the Pacific whaling industry, and the capitol of the unified Hawaiian Kingdom under Kamehaha, drawing natives away from their traditional homes and resource bases.

Traditional land use patterns saw a rapid shift after the Great Mahele in 1848. At this time land ownership was defined by grants and awards by the king (Kamehameha III) to the chiefs and other retainers. By 1850, laws were enacted under which commoners could also own land (*kuleana*) if they could prove that they actually occupied those lands. In addition, the Mahele allowed land to be sold to foreigners. By the mid-19th century, settlements were shifting away from marginal areas where earlier population increases had mandated adoption of dryland farming practices. These were now abandoned in favor of more productive resource zones on the windward side of the islands. In addition, native populations were decimated by disease and a depressed birth rate. Walled complexes became the dominant residential structure as families enclosed their holdings to protect them from feral cattle and to clearly define their *kuleana* boundaries.

By the early 20th century, a cash economy governed Hawaii society, and settlements were no longer based on traditional subsistence patterns. At this point most communities were

centered around sugar mills and were socially stratified within a plantation hierarchy. Workers were imported for the fields and mills, altering the population demographics drastically. Some remnants of traditional farming practices subsisted in areas on the margins of the cane fields. In Hana, the sugar mill closed earlier than many, and the former cane lands were subsequently used almost exclusively for cattle grazing.

ARCHAEOLOGICAL EVIDENCE

Only a few radiocarbon dates are available for the Hana region. At present, only one archaeological investigation in the vicinity of the project area has yielded radiometric age determinations. The work at the proposed Hana Ranch Country Club produced three datable carbon samples (Borthwick et al. 1992). One sample dated to AD 1345-1650 (Site 2711); another to AD 1425-1950 (Site 2835); and the third, AD 1640-1950 (Site 2749) (Borthwick et al. 1992:121). Kolb's work at Piilanihale *heiau* (1991:25) yielded weighted average dates of AD 1270-1440 and AD 1480-1954. These radiometric results indicate that the Hana area was occupied during the Expansion Period (AD 1100-1650).

Further evidence of an Expansion Period occupation is suggested by the sheer number of important ceremonial structures in the Hana area. Walker's (1931) survey of Maui identified 11 *heiau* (Sites 105-117) within the districts of Hana and Kawaipapa. Pearson's archaeological examination of Wai'anapanapa State Park likewise identified a large *heiau* and an associated cave complex. These structures attest not only to the social and political importance of Hana, but suggest the presence of a large population. Such temples "...evinced the power and authority of ruling chiefs, and served as constant reminders of the role in the life of the community of an extended pantheon." (Kirch 1985:6).

Kolb (1991) demonstrates that Lanikele and Pi'ilanihale Heiau were originally constructed between 1276 and 1415 A.D. Evidence of social stratification and the political integration of larger regions is further reflected in ethnohistorical accounts of the Hana area. Historic documentary research suggests that the districts of Ko'olau, Hana, Kipahulu, and Kaupo were governed separately from the rest of the island, and its chiefs were often grouped about the fortified hill of Ka'uiki on Hana Bay. This broadening and integration of power bases is typical of inferred Expansion Period political development.

The numerous Hawaiian legends and myths concerning Hana are useful in placing the occupation of Hana in a temporal framework. Soehren states that the earliest war between the islands of Hawaii and Maui is attributed to King Hua, who is said to have lived at Hana where he built the *heiau* of Honua'ula. After his successful raid on Hawaii, he returned and built Kuamalu Heiau (Walker 1931:1-25). Historian King David Kalakaua (1973) places King Hua's reign during the mid-12th century. Although exact dates for Hua's exploits are unknown, it is apparent that at least several of the *heiau* in the Hana area date to the early Expansion Period.

According to Walker (1931:23), Hana was also the home of Kihapiilani, a famous hero of many legends, who is said to have built the trail which circles the western portion of Maui. Pearson (1970:7) identified a coastal portion of Kihapiilani Trail at Wai'anapanapa State Park. This trail may have been constructed in AD 1516, after Kihapiilani's unification of Maui, further suggesting an Expansion era occupation of the Hana area (Handy and Handy 1972:398).

Both the archaeological and historical records indicate that the occupation of the Hana area continued through Kirch's Expansion Period to the present. As reflected in the historical documentary research, the increase in trade between Hana and the outside world resulted in the expanded cultivation of numerous cash crops, including sugar cane.

Borthwick et al. (1992) documented numerous historic features in Hana, including railroad structures, walls associated with cane cultivation and cattle exclusion, and terraces and mounds used for the cultivation of sweet potato and taro. As the latter two feature types were within cane fields, they were deemed historic.

Based on the above, it is apparent that the aboriginal occupation of the Hana area dates from at least the Expansion Period. Whether the initial settlement and occupation of Hana preceded the Expansion Period is currently unknown, although the Hana area offers the optimum conditions called for in the Colonization and Developmental Periods. One goal of research in the area must be to find evidence to better explicate the dates and ranges of settlement in Hana.

IMPLICATIONS FOR THE CURRENT PROJECT

The inventory survey (Henry and Graves 1993) demonstrated that although the Hana Medical Center project area has been heavily disturbed during historic to recent times, it contains archaeological sites. As other work in the area (especially Borthwick et al. 1992) has suggested, evidence of prehistoric activities may have survived the impacts.

Kawaipapa Heiau (Site 106) once existed about 400 m north of the current project area "...near the point where the road crosses the gulch of the same name" (Walker 1931:181). The *heiau* was destroyed by construction of the road and stream runoff. Henry and Graves (1193:7) had speculated that the project area would contain habitation structures associated with the *heiau*, or would comprise agricultural mounds and terraces. No clearly prehistoric features were located, however.

Evidence of historic activities had also been predicted (ibid.), including boundary walls, animal enclosures, or other remnant structures associated with either sugar cane cultivation or cattle ranching. The project area had been a part of the Hana Plantation, and was under cultivation after the turn of the 20th century (Borthwick et al 1992). The inventory survey (Henry and Graves 1193:8-14) revealed historic deposits, but evidence of prehistoric activities might still be sealed below these deposits. Further refinement of the dating of the historic activities might also be possible.

METHODS AND PROCEDURES

The data recovery consisted of work conducted exclusively at Site 50-50-13-3150. Detailed inventory-level recording at all sites and features had been completed during the first phase of work (Henry and Graves 1993). During the data recovery work reported here, the previous feature records from Site 3150 were compared to the evidence available on site, and a few minor corrections were made, including modification of maps presented in the earlier report. One additional potential site was noted on the periphery of the project area, and is discussed below. The main thrust of the data recovery phase of work was to conduct excavation at selected archaeological features.

EXCAVATION METHODS

All four features of Site 50-50-13-3250 were subjected to formal excavation. A total of seven excavation units (1.0 by 1.0 m and one 1.0 by 0.5 m) (EU-1 through -8) were dug in order to identify subsurface cultural deposits: one at Feature A (EU-1), four at Feature B (EU-2 through -5), one at Feature C (EU-6); and two at Feature D (EU-7 and -8). A summary of the excavations conducted at Site 3150 may be found in *Table 2*. A surface collection of artifacts was conducted at Feature D.

Excavation units were placed in the least disturbed portion of the features, and against the architecture (*Figure 2*). One goal of the excavation was to detail the relationship of the basal architecture of the feature to the surrounding and underlying soil layers. Also important was the goal of recovering portable remains that would provide information concerning feature age and function.

At Feature A, EU-1 was placed in the northwest interior corner of the rectangular enclosure. At Feature B, the units (EU-2 through -5) were placed away from the large trees on the west, and through the wall collapse, which might have sealed some deposits. Another advantage of the southeast corner was that it might prove to have the thickest deposit, with the floor sloping downhill in that direction. At Feature C, EU-6 was placed against the north alignment. At Feature D, EU-7 was placed on the exterior of the platform to test the lower terrace and the base of the platform architecture, while EU-8 was placed in the last undisturbed portion of the platform.

Excavation proceeded by hand using carefully controlled methods. Units were excavated according to cultural or natural soil layers. When necessary, excavation by arbitrary 10 cm levels was employed within thick or stratigraphically complex layers, or where cultural and natural layers could not be clearly identified during excavation. A datum was established for stratigraphic control. Line levels, trowels, brushes, dust pans and various other small instruments were employed. Excavation of the units terminated on bedrock or at the bottom of an arbitrary 10 cm level within a layer of sterile soil.

To facilitate recovery of portable remains, all material collected from the units was screened through 1/4- and 1/8-in. mesh. Ecofacts and artifacts were hand-picked from the 1/4-in. screen. After excavation was completed, one representative wall was profiled, and the soils in each natural layer were described on standard PHRI stratigraphic forms, according to U.S. Soil Conservation Guidelines (Soil Survey Staff 1962) and Munsell Soil Color Charts (Kollmorgen Instruments Corp. 1990). All units were backfilled, and features were restored to their original

Table 2.
Summary of Excavation Units at Site 3150

Feature	Designation	Max. Depth (mbs)	Unit Size (meters)	Unit Volume (cm)	Gastropods (grams)	Osteichthyes (grams)	Mammals (grams)	Indigenous Artifacts (#)	Historic Artifacts (#)	No. Architectural Layers	No. Soil Layers	No. Cultural Soil Layers
Data Recovery Phase												
A	EU-1	0.43	1.0 x 1.0	0.43	2.76	0.96	8.00	8	10	1	1	1
B	EU-2 to -5	0.55	4.0 x 1.0	1.10	0.29	-	-	0	49	2	1	1
C	EU-6	0.21	1.0 x 0.5	0.11	-	-	-	-	-	1	1	0
D	EU-7	0.28	1.0 x 1.0	0.28	-	-	-	2	0	1	1	0
D	EU-8	0.37	1.0 x 1.0	0.51	291.68	0.74	92.28	-	95	1	1	1
Inventory Survey Phase (Henry and Graves 1993)												
A	ST-1	0.36	0.5 X 0.5	0.09	+	-	-	-	1	0	2	1
A	ST-8	0.28	0.5 X 0.5	0.07	+	-	-	-	-	0	1	1
B	ST-2	0.40	0.5 X 0.5	0.10	-	-	-	-	-	0	1	1
B	ST-9	0.27	0.5 X 0.5	0.07	+	-	-	-	-	0	1	1
C	ST-3	0.24	0.5 X 0.5	0.06	-	-	-	-	-	0	1	0
C	ST-10	0.30	0.5 X 0.5	0.08	-	-	-	-	-	0	2	0
D	TU-1	0.39	1.0 x 1.0	0.98	+	-	+	-	49	1	1	1
D	ST-4	0.39	0.5 X 0.5	0.98	+	-	-	-	6	1	1	1
D	ST-11	0.30	0.5 X 0.5	0.08	-	-	-	-	-	0	2	0

Key: *EU = Excavation unit (data recovery)*
ST = Shovel test (inventory survey)
TU = Test unit (inventory survey)
+ = Present
- = Absent

condition. An aluminum strip bearing the site number, feature designation, excavation unit number, the letters PHRI, the project number (94-1481), the excavator's initials, and the date was left at each unit datum. All collected materials were returned to the PHRI laboratory for processing and analysis.

LABORATORY METHODS

Artifacts were photographed, classified as to type and material, weighed, and characterized in terms of metric attributes. Midden samples were sorted and weighed by major category (e.g., bivalves, gastropods, fish, mammal, etc.), with identifications made to the most specific levels appropriate or possible. All materials recovered during the present project were handled in compliance with Section 66.3(b) of the National Park Service's Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements, which recommends that recovered materials "...be maintained by a qualified institution or institutions as close as possible to their place of origin, and made available for future research" (CFR n.d.b).

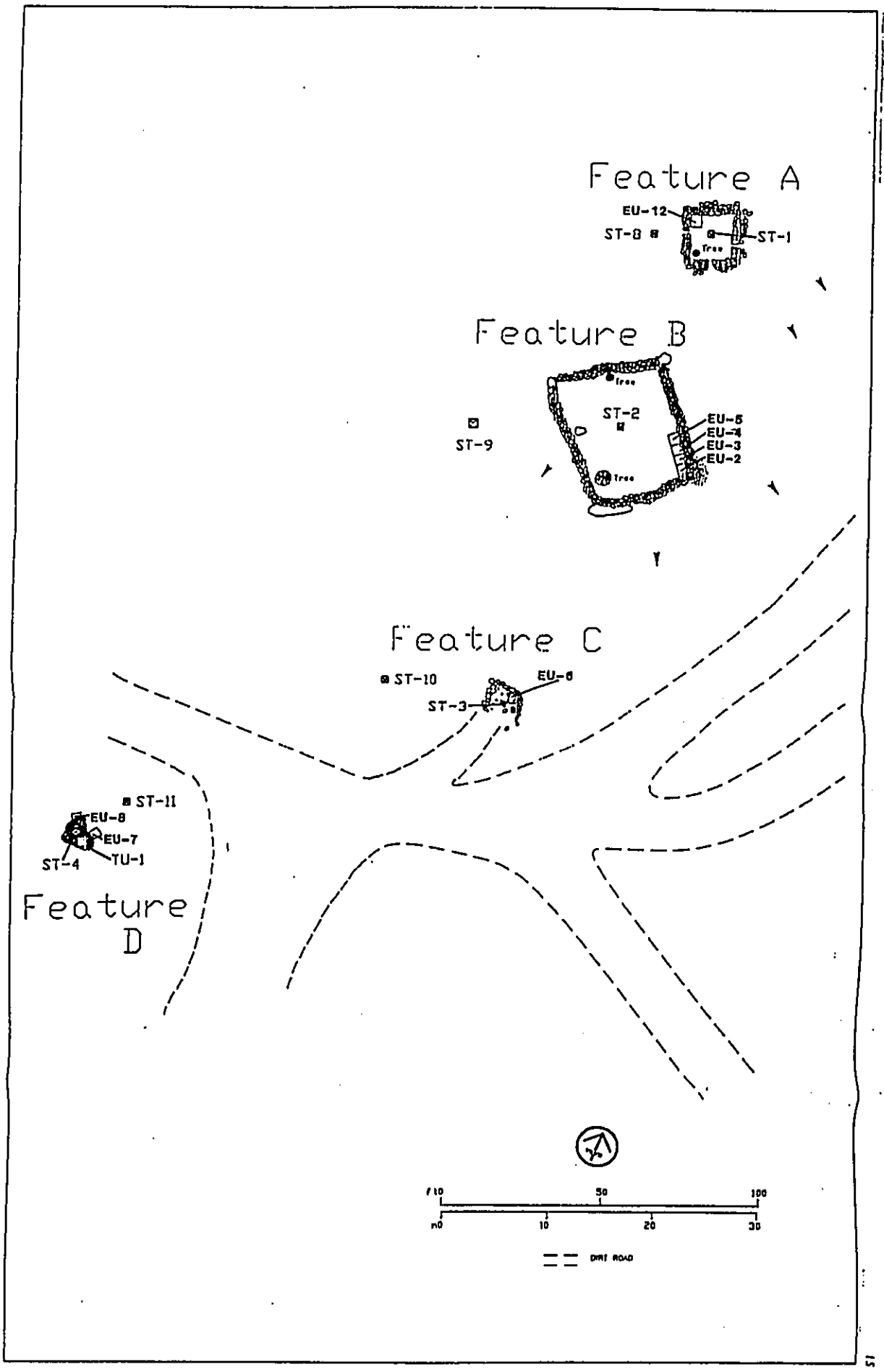

Figure 2. Plan View Map of Site 3150, Hana Medical Center

FINDINGS

Site 50-50-13-3150 is a complex of four features. The site is approximately 70 meters long and 20 meters wide, with an area of c. 942 square meters (0.094 hectares). It runs from Feature A, on a bench in the top of a N-S trending slope, to the southwest and across a graded dirt road to Feature D (*Figure 2*; note that this map is different from the previously published map). The results of the excavation units, surface collections, and additional recording are reported here, by feature.

FEATURE A

Feature A is a rectangular enclosure measuring 5.6 m (N-S) by 5.0 m, and with an interior floor space of c. 17 m². It is located on a flat bench in a northeast-facing slope (*Figure 3*). The average height of the walls is 0.6 m above ground surface. The walls consist of three to four courses of stacked subangular to subrounded pahoehoe and aa cobbles and small boulders (0.25-0.45 m in diameter). The walls are core-filled with small basalt cobbles 0.07-0.14 m in diameter. The walls are in relatively good condition; however, all four exhibit some collapse.

There are two breaks in the walls, apparent entrances to the enclosure. One is about 0.4 m wide and is near the southeast corner of the eastern wall. There are upright aa boulders on both sides of this opening. The second opening, about 0.5 m wide, is in the center of the southern wall, and there is a single similar upright on the eastern edge of the opening. A fallen upright of waterworn basalt was observed just outside the northeast corner of the enclosure, and a waterworn basalt cobble was present near the southern entrance.

During the inventory survey, two shovel tests (ST-1 and -8) were placed at Feature A, one (ST-1) in the center of the feature, and a second (ST-8) outside the feature to the northeast. The STs yielded a dark organic soil, charcoal flecks, marine shell, historic glass fragments and several waterworn pebbles. Based on Feature A's shape and size, and the portable remains at the feature, it was concluded that the feature functioned for historic habitation (Henry and Graves 1993:10).

One additional 1.0 by 1.0 m excavation unit (EU-1) was placed in the northwest interior corner of Feature A (*Figure 4*). The elevational datum for this unit was set at soil surface, in the southeast corner (corners at [cmbd]: SW 4, NW 5, SE 0, NE 5). Grid north was set at 14 degrees. A post-excavation photo of EU-1 is attached as *Figure 5*. Only one soil layer was revealed, and the unit was terminated on bedrock.

EU-1, West Face

Layer	Description
I	0-41 cmbd; 34-41 cm thick; black (10YR 2/1 moist); silt loam; black (10YR 2/1 dry); strong, fine, granular structure; hard, firm, slightly sticky, slightly plastic consistence; few, micro to very fine, vesicular roots; clear, irregular boundary; cultural layer.

The collection of ecofactual remains found in EU-1 is shown in *Table 3*. These included a total of 11.72 grams of ecofactual remains, 15.1 grams of wood charcoal, and 18 artifacts. By weight, the food remains comprise 23.55% marine gastropods, 8.19% unidentified fish bone,

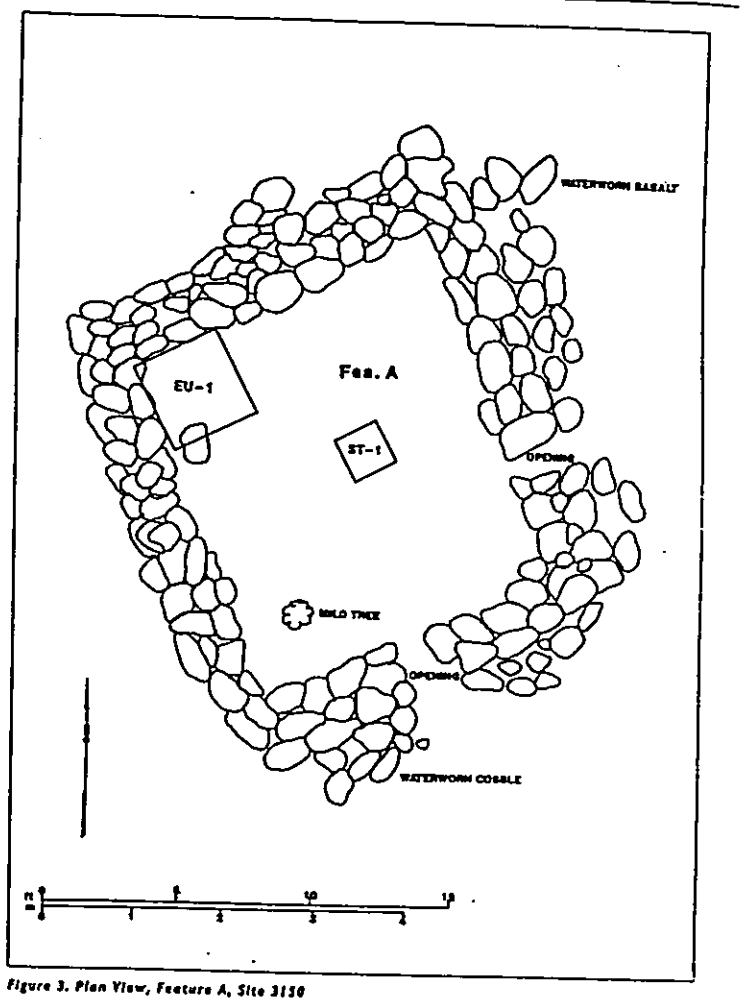

Figure 3. Plan View, Feature A, Site 3150

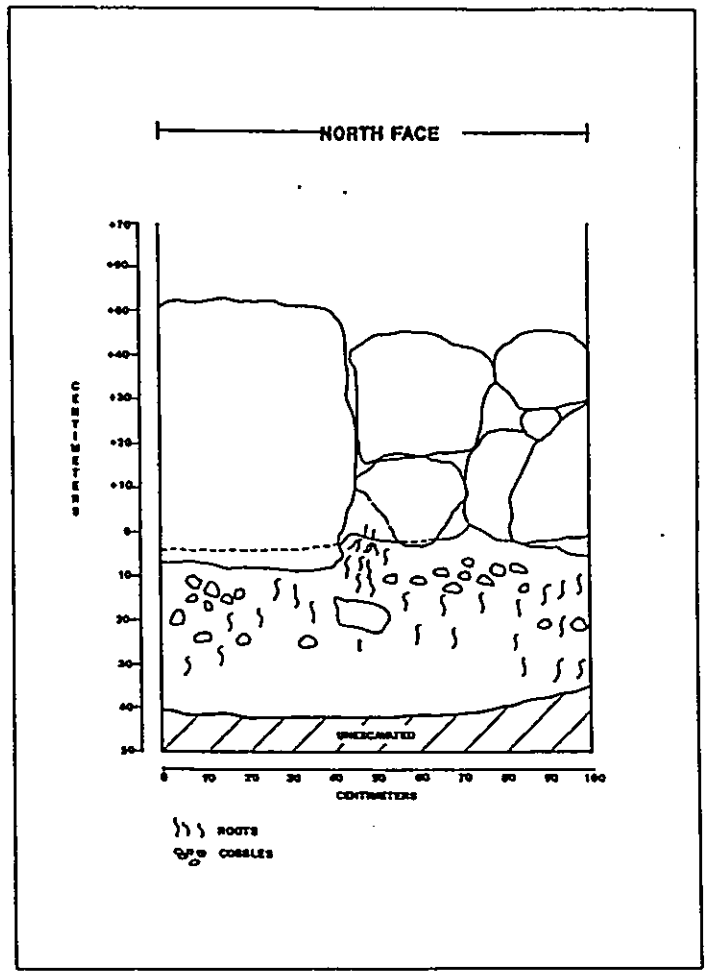

Figure 4. Profile, EU-1, West Wall, Feature A, Site 3158

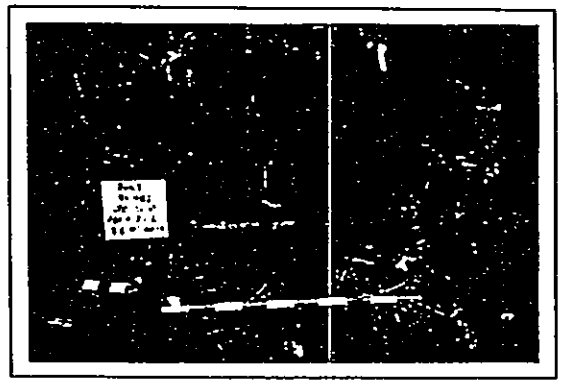

Figure 5. Feature A, EU-1, Post-excavation (Neg.4915:4a)

Table 3.
Distribution of
Ecofacts in EU-1, Feature A

Depth (cm below datum)	20-35	30-43	Feature
Layer/Level	1-2	1-3	Totals
Gastropods			
Cellana sp.	-	0.78	0.78
Thaididae	-	1.98	1.98
Subtotal Gastropods	0.00	2.76	2.76
Vertebrates			
Unidentified fish	0.96	-	0.96
Capra hircus/Ovis sp.	-	8.00	8.00
Subtotal Vertebrates	0.96	8.00	8.96
Wood Charcoal	-	15.10	15.10
Total (grams)	0.96	25.86	26.82

Table 4.
Distribution of
Artifacts in EU-1, Feature A

Depth (cm below datum)	20-35	30-43	Feature
Layer/Level	I-2	I-3	Totals
Flaked Basalt	7	-	7
Basalt, Uncertain Function	-	1	1
Nail (metal)	1	-	1
Fragment (slate)	4	3	7
Button (glass)	1	-	1
Button (wood)	-	1	1
Total (count)	13	5	18

and 68.26% sheep or goat bone. With the exception of the unidentified fish remains, all of the ecofactual materials recovered from Feature A derived from Layer I-3 of EU-1 at depths of 30 to 43 cm, just above bedrock.

The artifactual remains found in EU-1 are depicted in *Table 4*. The 18 artifacts include eight basalt fragments; one exhibits a rounded, waterworn face, and must be a manuport; the other seven are classed as flakes, although only one is recognizable as flaked rock. Seven slate fragments, all smooth on one face, may have been part of a chalkboard. One square nail piece, a wood button, and a glass button (possibly a shoe button) round out the inventory.

The sparse collection of historic domestic items and possible food remains indicates only temporary use of this enclosure for habitation. The artifact collection suggests an early 20th century date for the earliest possible use of the structure. No evidence of any occupation predating historic times was located, and clearly historic materials (the nail and buttons) were dispersed through both levels containing portable remains. EU-1 was placed on the interior of the corner of the north and west walls. The architecture does not extend more than five cm below the soil surface (*Figure 4*), underscoring the relatively recent age of the structure.

FEATURE B

Feature B is a large rectangular enclosure, located about 12 m southeast of Feature A (*Figure 6*). This enclosure measures 13.7 m long and 10.5 m wide and has an aa cobble-paved floor (c. 99 m²) which slopes from northwest to southeast. The enclosure walls are constructed of stacked, subangular to subrounded aa boulders and cobbles 0.25-0.40 m in diameter. The walls are six to seven courses high, and average 1.10 m above ground surface, and approximately 0.50 m thick. Large basalt boulders in excess of 1.0 m in diameter are in the northwest, northeast, and southwest corners of the structure. Portions of the enclosure along the west, south and eastern walls are collapsed, especially the southeast corner. The intact portions are capped with small basalt cobbles 0.25 to 0.30 m in diameter.

A portion of the northern wall curves outward slightly to the northwest, to accommodate a large false *kamani* tree. As this portion of the enclosure appears to have been constructed around the tree, it is likely of relatively recent origin. The north wall consists of an upthrust basalt bedrock ledge, topped with small boulders and cobbles, and measures 0.3 to 0.7 m high.

Glass bottles and jars of recent age are scattered around the perimeter of the enclosure. Located approximately five meters from the southeast exterior corner of Feature B are five 50-gallon metal drums, and several sheets of corrugated metal roofing. The enclosure exhibits no wall openings, but the low north wall affords easy entrance and exit.

Two STs were excavated at Feature B. ST-2 was placed in the center of the enclosure and yielded a small amount of burned coconut shell. ST-9 was placed west of the enclosure and yielded a single cowrie shell.

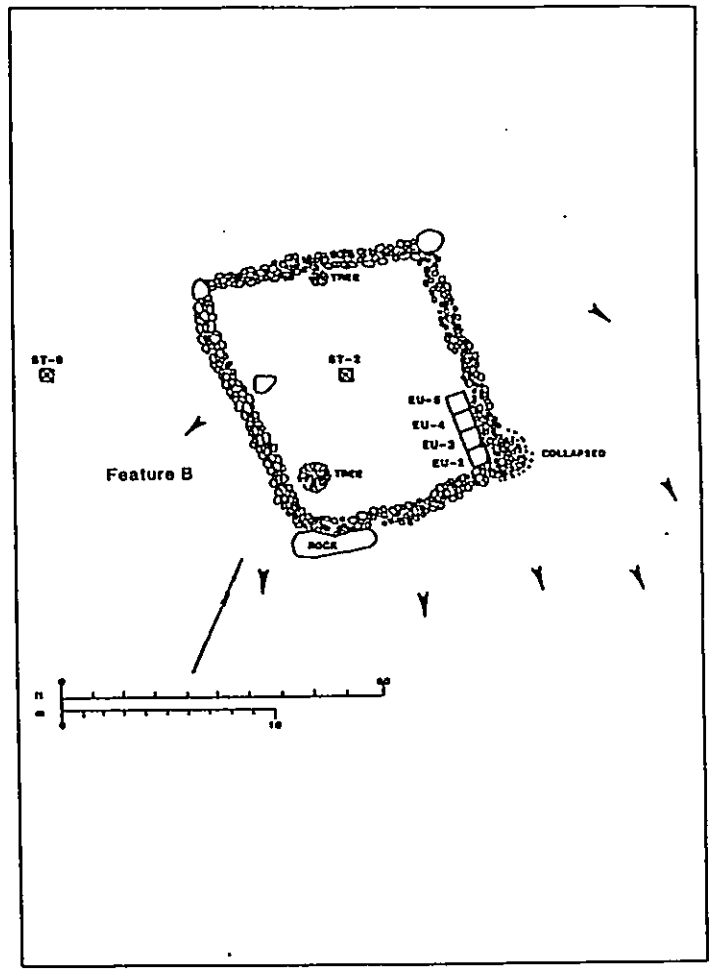

Figure 6. Plan View, Feature B, Site 3150

Four 1.0 by 1.0 m excavation units (EU-2 through -5) were placed in a block along the southeast interior wall of Feature B (*Figure 7*). The elevational datum for this unit was set at soil surface, in the northwest corner (overall corners at [cmbd]: SW 45, NW 0, SE +60, NE +95). Grid north was set at 15 degrees. A post-excavation photo of EU-2 and -3 is attached as *Figure 8*. After clearing away leaf mold, the first layer of the unit consisted of an aa gravel and cobble pavement. Upon removing the pavement, a soil layer was revealed. The unit was terminated after removal of a complete level of Layer II in EU-4 and -5, where no portable remains were recovered. In EU-2 and -3, where all of the artifacts were recovered, Layer II was taken down through three levels, and was terminated after the third level yielded no additional portable materials (*Figure 8*). Basalt bedrock was encountered in the deepest part of the excavation.

EU-2 through -5, East Face

Layer	Description
I	0-42 cmbd; 10-32 cm thick; gravel and cobbles; many roots; clear, wavy boundary; architectural layer.
II	28-81+ cmbd; very dark brown (10YR 2/2 moist); gravelly clay; dark brown (7.5YR 3/2 dry); strong, fine, medium, granular structure; extremely hard, very firm, sticky, plastic consistence; many roots; cultural layer.

The extremely sparse collection of ecofactual remains found in Feature B is depicted in *Table 5*. These comprised only 0.29 grams of *Cellana sp.* (*'opihi*). *Table 6* depicts the distribution of the 49 artifacts that were located in Feature B. All of the artifacts were located near the surface of Layer II, and appeared to have filtered down through the pavement, rather than sealed beneath it. Nail fragments (n=47, some identifiable as square, some round) constituted almost all of the artifacts. A white glass button and a small piece of tan plastic were the only other two items recovered.

This feature had previously been identified as an animal pen, but the construction deems this unlikely. The low north wall, especially, could not have restrained livestock. The large number of nails suggests that a wooden structure may have been supported by the rock walls. Since food remains or any other class of artifacts are lacking, it may be that the structure served as a sleeping shelter. The size of the structure and the investment in labor in construction further indicates that it may have been used on a recurrent or permanent basis. As at Feature A, the architecture has been demonstrated to have been constructed very near the present soil surface (*Figure 7*). The piece of plastic and pieces of round nail suggest mid-20th century use.

Table 5.
Distribution of Ecofacts in Feature B

Depth (cm BD)	6-55	16-45	Feature
Layer/Level	II-1	II-2	Totals
Cellana sp. (Gastropod)	0.29	-	0.29
Total (grams)	0.29	0.00	0.29

Table 6.
Distribution of Artifacts in Feature B

Depth (cm BD)	6-55	16-45	Feature
Layer/Level	II-1	II-2	Totals
Nail (metal)	38	9	47
Button (glass)	1	-	1
Fragment (plastic)	1	-	1
Total (count)	40	9	49

FEATURE C

Feature C was previously described (Henry and Graves 1993:10) as an "L-shaped enclosure" and associated terrace. Located about 20 m south-southeast of Feature B (*Figure 2*), Feature C consists of a bench in a southeast facing slope, with a bladed road looping

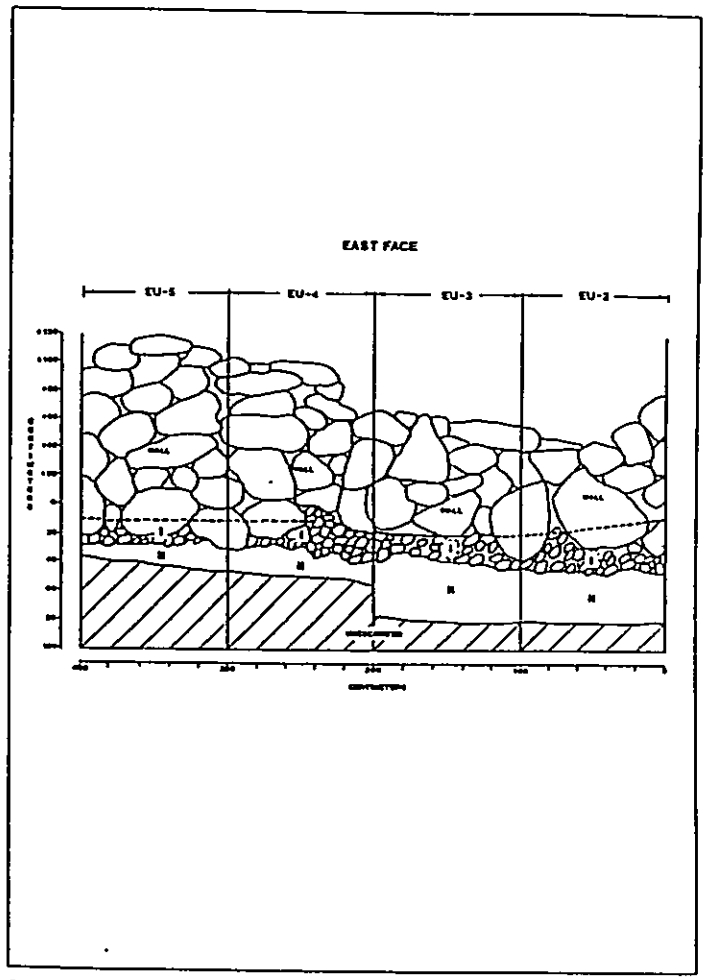

Figure 7. EU-2 through -5, Profile, East Wall, Feature B, Site 3150

Figure 8. Feature B, EU-2 and -3, Post-excavation (Neg. 4916:20a)

around the south and east sides (*Figure 9*). The terrace was said to be defined by a wall of aa boulders. In fact, there is no wall, only a loose alignment, and there appears to be some grading extending onto the "terrace." Thus, the feature may have been constructed by road grading and this may also be the means by which the boulders were aligned.

Two shovel tests were excavated during the inventory survey at Feature C. ST-3 was placed in the center of the terrace, and ST-10 was placed outside the feature to the west. Neither ST yielded any cultural materials. EU-6 was laid out as a 1.0 by 1.0 m unit against the interior of the north alignment. An unexpected, large boulder was encountered in the west half of the unit, so the EU was reduced to 0.5 by 1.0 (*Figure 10*). This unit, as with the inventory survey STs, did not yield any ecofacts or artifacts.

An elevational datum for EU-6 was established on a sapling outside the southwest corner of the unit (corners at [cmbd]: SW 104, NW 99, SE 102, NE 105). Grid north was set at True North. A post-excavation photo of EU-6 is attached as *Figure 11*. After clearing away leaf mold, the first layer of the unit consisted of an aa gravel and cobble pavement. The rocks bordering the unit were assigned Layer I, and the single soil layer was termed Layer II.

EU-6, West Face

Layer	Description
II	104-125 cmbd; 19-24 cm thick; dark brown (7.5YR 3/2 dry); stony clay loam; moderate, medium, subangular blocky structure; slightly hard, firm, sticky, plastic consistence; common, fine roots; common, medium pores; non-cultural layer.

Feature C had been assigned an indeterminate function (Henry and Graves 1993:10). It now seems clear that Feature C is unrelated to Features A, B, and D, and is most likely the result of

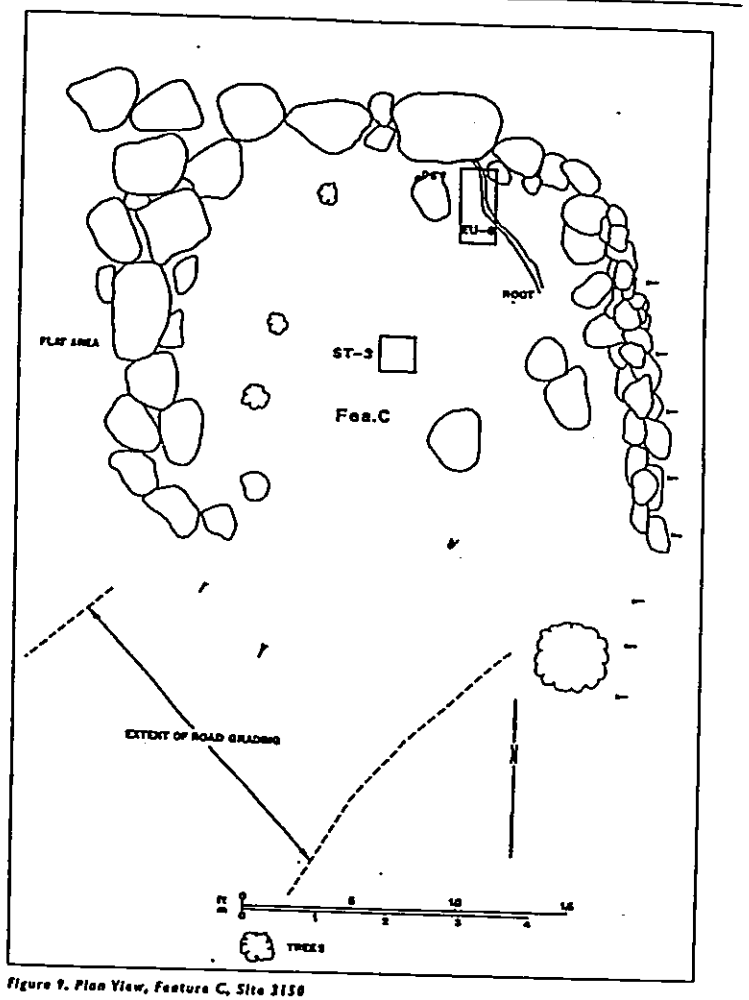

Figure 9. Plan View, Feature C, Site 3150

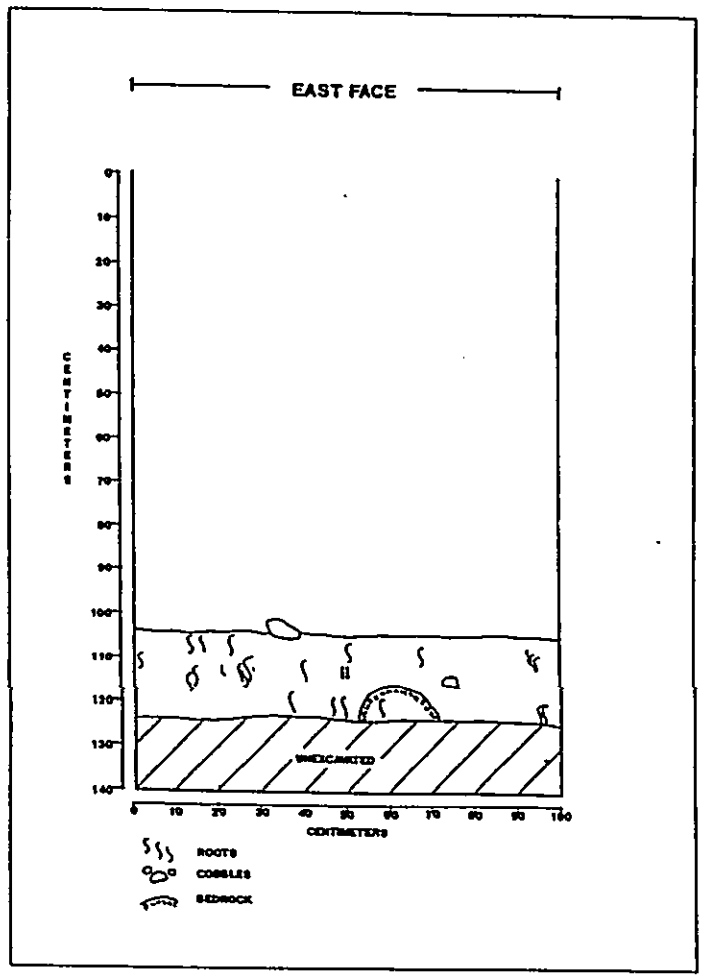

Figure 10. EU-6, Profile, East Wall, Feature C, Site 3158

Figure 11. Feature C, EU-6, Post-excavation (Neg. 4915:9a)

bulldozing of the parcel in recent time. This conclusion is based on the dearth of any ecofacts or artifacts within the feature, as well as the lack of any formal architecture.

FEATURE D

Feature D was previously described as an amorphous platform, constructed of aa cobbles and boulders, 2.5 by 2.0 m in plan (Henry and Graves 1993:12). The feature does qualify as a platform, with faced walls on the east and south sides, but only a single course of boulders raises the surface above ground level on the north and west. The platform incorporates basalt bedrock along its eastern wall. The exterior walls are constructed of one to four courses of basalt rock, faced on the east, and measure 0.36-0.78 m high. The platform is paved with large pebbles to medium cobbles, and the surface is flat. A small terrace paved with small to large cobbles was noted at the base of the east wall of the platform. The platform appears roughly triangular in plan view (*Figure 12*).

Two STs were excavated at Feature D, during the inventory survey. ST-11, placed adjacent to the platform to the northeast, was culturally sterile. ST-4 was placed in the center of the platform and yielded marine shell, a waterworn stone, and historic glass and ceramic fragments. Due to sidewall collapse, ST-4 was terminated 0.39 m below the surface of the platform. It was determined that a more formal excavation unit could more comprehensively test the platform; therefore, Test Unit 1 (TU-1) (1.0 by 1.0 m) was placed in Feature D, with the additional goal of testing for human remains (*Figure 12*). The unit comprised two layers, which both contained cultural materials (ceramics, faunal bone, shell, and a glass button [in Layer II]). No human remains were encountered, and TU-1 was terminated on bedrock.

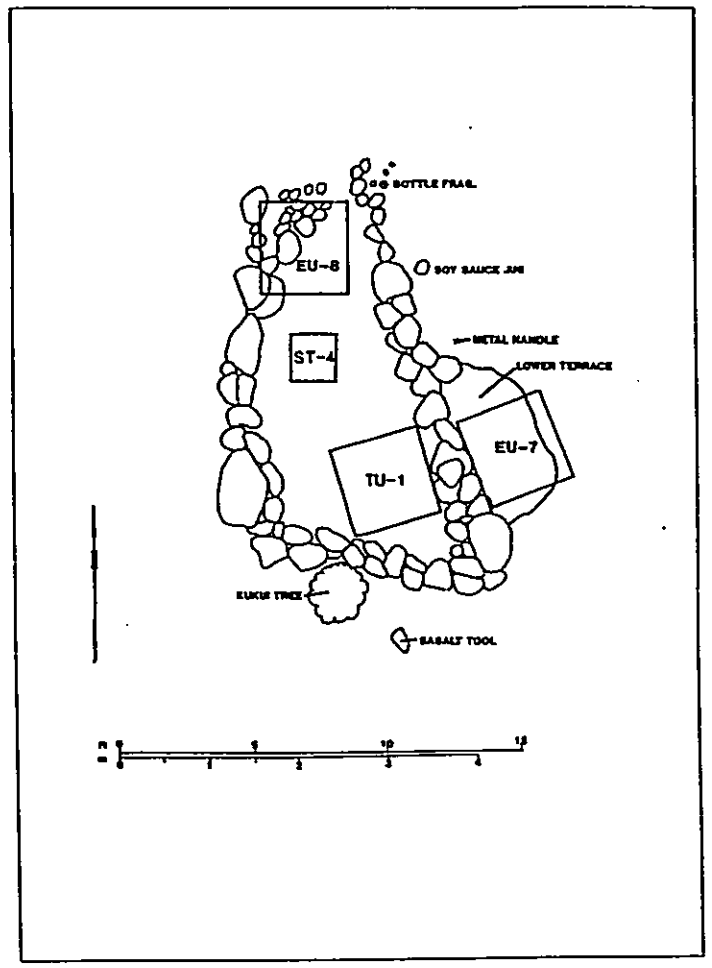

Figure 12. Plan View, Feature D, Site 3158

Two excavation units were placed at Feature D during the data recovery work. EU-7 *(Figure 13)* tested the terrace pavement to the east of the platform, while EU-8 *(Figure 14)* was excavated into the north edge of the platform (the only previously undisturbed area). An elevational datum for both of the excavations at Feature D, as well as the surface collection, was established on a *kukui* on the south edge of the platform outside the southwest corner of the unit (corners at [cmbd]: SW 104, NW 99, SE 102, NE 105). Grid north for EU-7 was set at 340°, and the corners were located at (cm BD): SW 90, NW 93, SE 106, NE 118. Grid north for EU-8 was also aligned to 340°, and the corners were located at (cmbd): SW 83, NW 84, SE 100, NE 115. A post-excavation photo of EU-7 is attached as *Figure 15*, while EU-8 is depicted in *Figure 16*.

EU-7, West Face

Layer	Description
I	83-109 cmbd; 12-20 cm thick; cobbles and gravel; clear boundary; architectural layer.
II	98-115+ cmbd; black (10YR 2/1 moist); clay; very dark brown (10YR 2/2 dry); strong, fine to coarse, granular structure; extremely hard, very firm, sticky, plastic consistence; non-cultural layer.

EU-8, South Face

Layer	Description
I	104-142 cmbd; 10-38 cm thick; stones; gradual, irregular boundary; aa pavement atop platform, architectural layer.
II	125-185 cmbd; 10-42 cm thick; dark brown (7.5YR 3/2 moist); clay loam; very dark grayish brown (10YR 3/2 dry); strong, medium, subangular blocky structure; hard, extremely firm, sticky, plastic consistence; few, fine roots; common, coarse pores; very abrupt, wavy boundary; cultural layer.

EU-7 revealed two layers, a pavement of aa cobbles and gravel over a soil that turned out to be sterile of cultural material. EU-8 also revealed two layers. The pavement of the platform was constructed using a larger average-size cobble than at the terrace where EU-7 was located. The soil beneath was very similar to that in EU-7, however.

EU-7 was sterile, except for one small waterworn basalt pebble (possibly an *'ili 'ili*) and a small amount of charcoal. EU-8 yielded a total of 374.70 grams of ecofactual remains (*Table 7*). The food remains comprised 77.84% marine gastropods, 0.20% Scaridae, 2.33% pig, and 19.63% unidentified mammal. The remains were recovered from Layers I (38.84%) and II (61.16%) of EU-8. The pig bone was sawn with a metal blade (see *Appendix B*)..

Artifactual materials, many from the surface collection, recovered from Feature D (*Table 8*) included a basalt manuport, two metal handles, two metal nail fragments, 25 fragments from an earthenware jug, eight fragments from white ware bowls, 12 non-diagnostic glass fragments, 198 non-diagnostic metal fragments, and a horseshoe.

In the previous report, Feature D was assigned an indeterminate function. It now appears that Feature D was constructed in two stages. The lower terrace which protrudes to the east, can be seen to continue beneath the wall forming the platform (*Figure 13* and *Figure 15*), and represents a first stage of construction. The platform is built up around the basalt bedrock noted in the southeast corner of the supporting wall; a portion of the bedrock forms the southeast corner of the platform and protrudes above the surface of the platform, between the locations of ST-4 and EU-8 (*Figure 16*).

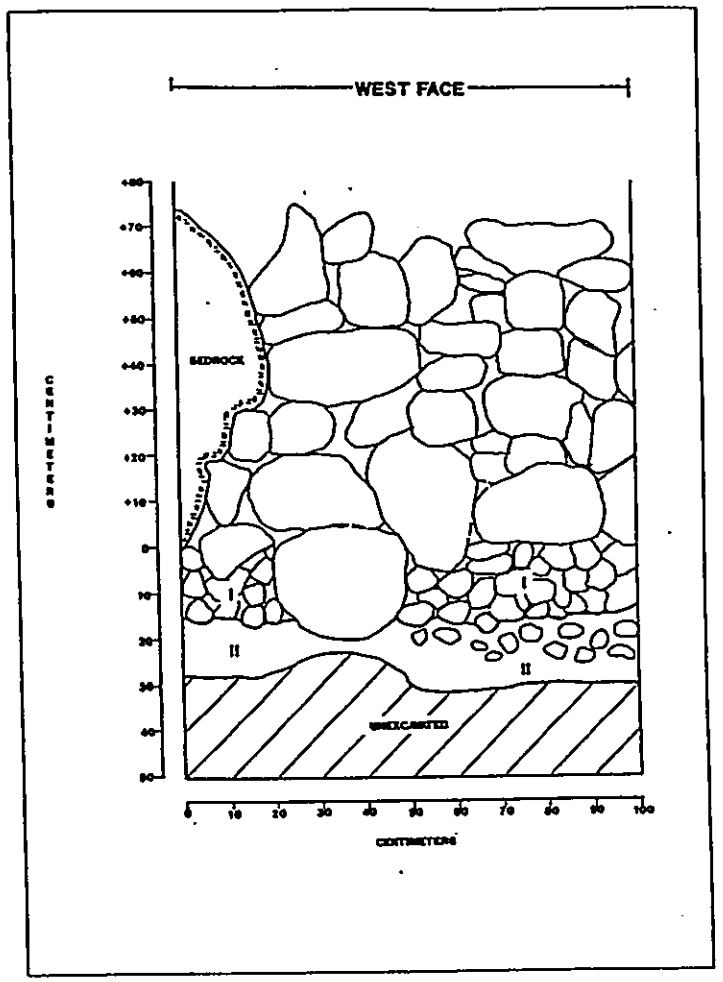

Figure 13. EU-7, Profile, West Wall, Feature D, Site 3150

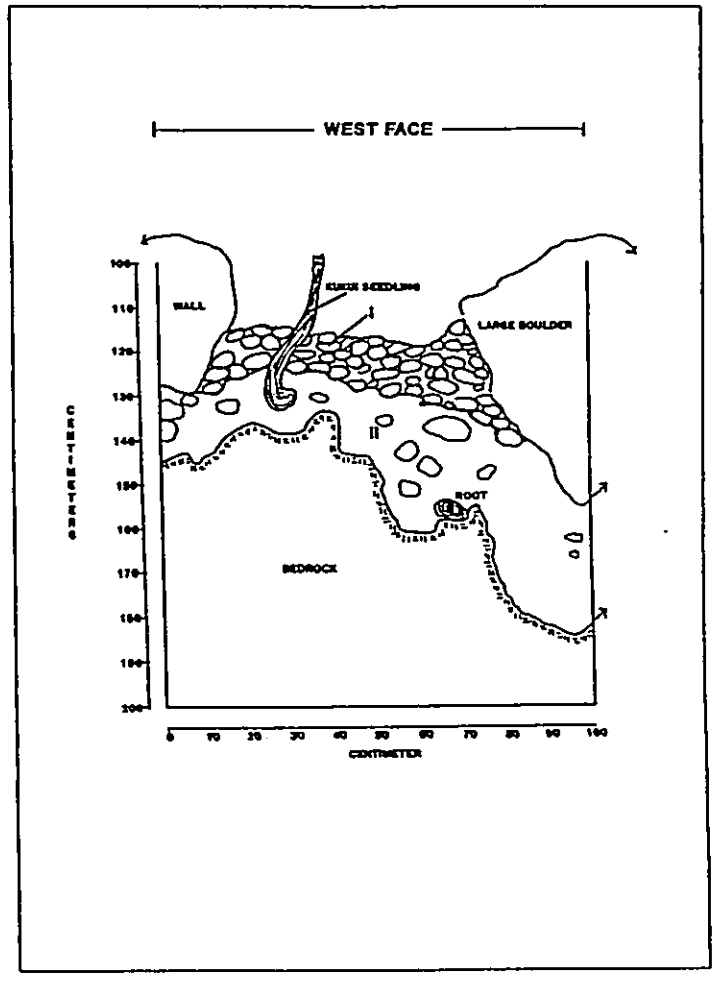

Figure 14. EU-8, Profile, West Wall, Feature D, Site 3150

Figure 15.
Feature D, EU-7, Post-excavation (Neg. 4916:12a)

Numerous (n=110) artifacts were collected at Feature D, including one fragment of waterworn basalt from the surface which exhibits some pecking on the end, and the possible *'ili'ili* from EU-7 mentioned above. While these are classed as indigenous artifacts, the association with numerous historic artifacts suggests that they may also be historic in origin. Few of the historic artifacts are date sensitive, but the fragments of square nails, brown ware (n=25, these may represent at least two soy jugs), and ceramic dishes suggest a late 19th to early 20th century date. This date is substantiated by the evidence of metal sawing on the recovered pig bone. The artifacts appear to post date the construction of the platform, as most were found littered among the pavement stones and on the surface. The pair of metal handles, which appear to have been end grips from a foot locker or trunk, were found in two locations, one on the exterior surface the other among the cobbles of the platform paving.

The high counts of gastropods and historic artifacts indicate more consumption activity at this feature than at the other features in Site 3150, although the lack of diversity in the collection suggests episodic use. The form of this feature suggests a sleeping platform, or temporary habitation. It is likely that it was used for an eating location, however, based on the high number of domestic artifacts, as well as the gastropod counts. Despite the high numbers, episodic use could have created the collections at Feature D.

Figure 16. Feature D, EU-8, Pre-excavation (Neg. 4916:9a)

OTHER OBSERVATIONS

Based on the results of the present investigation, the configuration of Site 3150 has been changed from that reported previously (Henry and Graves 1993:11). The new measured location of Feature D is approximately 25 meters northwest of the previous mapped location (*Figure 2*). The location of the other features remain unaltered.

While relocating the extant features in the parcel, a possible new site was located, but subsequently determined to be on private property to the south of the Hana Medical Center parcel. It was not recorded, but is reported here to aid other investigations in the area. The site consists of a fragment of water ditch with approximate dimensions of two meters wide and deep. It followed a contour of c 190 feet (57.9 meters) AMSL, and may be related to the "permanent flume" shown in the 1907-1909 plantation map (Borthwick et al. 1992). The ditch appears to have originally traversed the current project area, east of Feature D. It may have followed the route of a current dirt road which skirts to the east of Features A and B, but has been obliterated by grading activity.

Table 7.
Distribution of Ecofacts in Feature D

Depth (cm BD)		EU-7 89	EU-7 103-111	EU-8 108-153	EU-8 116-158	EU-8 126-168	Feature
Layer/Level	Surf	II	II-2	II	II-1	II-2	Total
Gastropods							
Cellana sp.	-	-	-	129.99	76.56	16.77	223.32
Cypraeidae	-	-	-	-	52.29	-	52.29
Thaididae	-	-	-	-	16.07	-	16.07
Subtotal Gastropods	0.00	0.00	0.00	129.99	144.92	16.77	291.68
Osteichthyes							
Sparidae	-	-	-	-	0.74	-	0.74
Subtotal Osteichthyes	-	-	-	-	0.74	-	0.74
Mammal							
Sus scrofa	-	-	-	2.81	5.17	0.74	8.72
S-to-M mammal	-	-	-	-	1.53	1.53	3.06
Medium mammal	-	-	-	12.73	54.67	1.10	70.50
Subtotal Mammal	0.00	0.00	0.00	15.54	63.37	3.37	82.28
Vegetal Remains							
Wood Charcoal	-	-	0.33	-	-	-	0.33
Subtotal Vegetal Remains	-	-	0.33	-	-	-	0.33
Total (grams)	0.00	0.00	0.33	145.53	209.03	20.14	374.93

Table 8.
Distribution of Artifacts in Feature D

Depth (cm BD)		EU-7 89	EU-7 103-111	EU-8 108-153	EU-8 116-158	EU-8 126-168	Feature
Layer/Level	Surf	II	II-2	II	II-1	II-2	Total
Indigenous							
Basalt, Uncertain Function	0	1	-	-	-	-	2
Subtotal Indigenous	0	1	-	-	-	-	2
Historic							
Nail (metal)	-	-	-	-	1	1	2
Handle (metal)	0	-	-	0	1	0	2
Jug (earthenware)	10	-	-	12	1	2	25
Bowl (stoneware)	-	-	-	5	1	-	6
Saucer (stoneware)	1	-	-	1	-	-	2
Fragment (glass)	-	-	-	2	8	2	12
Fragment (metal)	-	-	-	1	30	27	58
Horseshoe (metal)	1	-	-	-	-	-	1
Subtotal Historic	13	0	0	21	42	32	108
Total (count)	14	1	0	21	42	32	110

DATA ANALYSES

by Susan T. Goodfellow, Ph.D.

PORTABLE ARTIFACTS

A total of 177 portable artifacts or artifact fragments were recovered from data recovery excavations at Site 3150. A detailed tabulation of artifacts by feature, and unit is presented in *Table 9*. The results of the artifactual analysis are discussed below.

Indigenous Artifacts

In the following discussion, the artifact inventory is separated into two major categories: "indigenous" and "historic". The term "indigenous artifacts" generally refers to all artifacts made by indigenous people (in this case Hawaiian) regardless of temporal affiliation. Because it is often impossible to determine separate historic items used by indigenous peoples from those used by foreigners, however, for the purposes of the current discussion, "indigenous" is used to refer to the subset of artifacts manufactured through application of traditional Hawaiian manufacturing techniques, using locally available raw materials. "Historic" refers to items manufactured using non-indigenous manufacturing techniques or materials (glass, metal, plastic, etc.), regardless of the probable ethnicity of the people who used them.

The inventory of indigenous artifacts includes ten items, three of which are probable manuports and seven of which are flaked lithic items. The 167 remaining items are classified as historic items, and include fragments of domestic items, construction materials, and personal articles, as well as non-diagnostic metal, plastic and glass fragments.

The ten indigenous items were recovered from Features A and D. All are manufactured of basalt, which is a material that would have been readily obtained from local outcrops and stream beds. The indigenous artifacts are described by type below.

Manuports - The three basalt manuports are small, waterworn pebbles encountered in the matrix of Layer I at both Features A and D. They exhibit no evidence of modification and are interpreted as artifacts only because of their apparent association with the primary cultural deposit at the site. Although it is possible that these items are *'ili'ili* stones, the general scarcity of such items at each feature argues against this interpretation.

Flaked Lithics - A total of seven flaked lithic artifacts, all of which were manufactured from basalt, were recovered from Feature A of Site 3150. The flake lithic artifacts were evaluated with respect to flake/core type following established procedures for evaluating flaked stone material (Sullivan and Rozen 1985). In this system, lithic debitage is divided into four categories based on presence or absence of three variables: a single interior surface, a point of applied force, and margins. The categories are interpretation-free, as they are not linked to any particular reduction technique. Complete flakes have all three variable, including the point of applied force, where the bulb of percussion intersects the striking platform. Broken flakes lack intact margins, which include both a hinge or feather termination at the distal end and complete lateral margins. Flake fragments lack a point of applied force. Debris lacks a single discernible interior surface, such

Table 9.
Detailed Distribution of Portable Artifacts

Feature	A			B			C						D				Site Grand Total
Unit	EU-1	I-2	Total	Fea. EU 2-5	B-1	Total	EU-7 Surf.	EU-8 I	EU-8 II-1	EU-8 II-2	EU-8 Subtotal	Fea. Total	B-3	B-2	B-1	Total	
Layer-Level		I-3															
Indigenous																	
Flaked Lithics	7	*	7	*	*	0	*	*	*	*	0	0	*	*	*	0	7
Basalt																	0
Uncertain Function																	
Basalt	*	—	—	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Subtotal Indigenous	7	—	7	0	0	0	*	*	*	*	0	0	*	*	*	0	7
Historic																	
Construction Materials																	
Nail (metal)	—	*	—	38	9	47	*	*	*	*	0	0	*	*	*	0	47
Fragment (slate)	4	3	7	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Subtotal Const. Materials	5	3	8	38	9	47	*	*	*	*	0	0	*	*	*	0	47
Domestic Items																	
Handle (metal)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Jug (earthenware)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Bowl (stoneware)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Saucer (stoneware)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Fragment (glass)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Subtotal Domestic Items	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Personal Adornment																	
Button (glass)	—	*	—	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Button (wood)	—	—	—	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Subtotal Personal Adorn.	—	—	—	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Miscellaneous																	
Fragment (metal)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Fragment (plastic)	0	*	0	—	*	—	*	*	*	*	0	0	*	*	*	0	0
Horseshoe (metal)	0	*	0	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Subtotal Miscellaneous	0	0	0	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Subtotal Historic	4	3	8	38	9	47	*	*	*	*	0	0	*	*	*	0	47
Total	13	5	18	40	9	49	*	*	*	*	0	0	*	*	*	0	49

as a bulb of percussion or ripple marks, or if there are multiple occurrences of this trait, a single interior surface cannot be discerned. Cores tend toward multifaceted polyhedral shapes dominated by one or more platforms, and typically show little evidence of subsequent use as tools. Based on these criteria, the flaked stone inventory was separated as follows: three complete flakes, one broken flake, and three pieces of debris (*Figure 17*).

The three complete flakes measure 1.5-2.0 cm in length, 1.0-1.5 cm in width, and 0.4-0.5 cm in thickness. They are manufactured from a poor quality (slightly vesicular), aphanitic, dark gray basalt. Two exhibit feathered terminations, while one has a hinged termination. The hinged flake also has a single dorsal ridge. Striking platforms on all three flakes are unmodified, and bulbs of percussion are salient diffuse. None of the three flakes exhibited cortex.

The broken flake and pieces of debris are manufactured from the same poor quality basalt as the complete flakes. The broken flake measures 2.7 cm by 2.3 cm by 0.3 cm, and has an intact, unmodified striking platform. The pieces of debris measure 1.8-2.1 cm by 0.7-0.9 cm by 0.3-0.5 cm. No cortex was noted on any of these specimens.

The flakes recovered from Site 3150 are manufactured of poor quality basalt, and would have lacked the same fine cutting edge encountered on flakes manufactured of volcanic glass. It is therefore unlikely that these specimens functioned as cutting tools. The slightly vesicular texture of the basalt does give the specimens greater abrasiveness, making it more likely that the specimens functioned as scraping or abrading tools.

Historic Artifacts

Historic items were recovered from Features A, B, and D of Site 3150. Recovered items included 57 items identified as construction materials, 47 domestic items, three items of

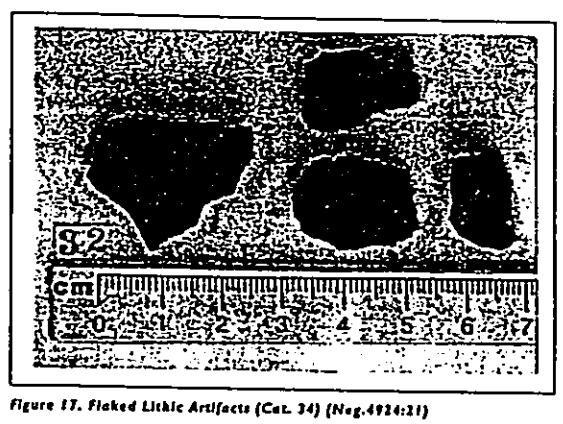

Figure 17. Flaked Lithic Artifacts (Cat. 34) (Neg.4924:21)

clothing/personal adornment, and 60 miscellaneous items. These are described by type below.

Construction Materials - The 57 items identified as construction materials consisted of 50 nail fragments, and seven slate fragments. The nails derive primarily from Feature B (47) and are extremely corroded. Three of the nails exhibited square heads; the remainder were too fragmentary to identify head type, although several were clearly cut square nails, which were manufactured in America from before 1820 until c. 1920 (Hume 1970:253-4). The slate fragments derive from Feature A, and appear to be fragments of roofing.

Domestic Items - Domestic items were recovered from Features B and D, and included two metal handles, 25 earthenware jug fragments, two stoneware saucer fragments, five stoneware bowl fragments, and 12 non-diagnostic glass fragments.

The handles were both recovered from Feature D, and were extremely corroded. They appear to have been end grips from a foot locker or trunk.

The earthenware fragments (Cat. 3, 8, 16, 18, 21, 22, 25) derive from the surface of Feature D and from Layers I and II of EU-8, and appear to represent either one or two vessels. A photograph of Cat. 25 is presented as *Figure 18*, below. Based on the morphological characteristics of the fragments, these vessels were small, flared mouth jugs measuring 12.0 cm in diameter at the base, 2.0 cm in diameter at the neck and 5.0 cm in diameter at the lip. The exterior of the jug was finished with a dark brown salt glaze—in places this glaze vitrified to form a lighter brown, glossy finish. The interior of the jug exhibited coil marks near the shoulder, and was finished with an irregular, thin brown glaze or slip. The interior base was finished with a medium brown glaze, while the exterior base was unglazed. These are characteristic of the type known as "soy jug," after the original purpose of the shipment of soy sauce from China (Munsey 1970:138).

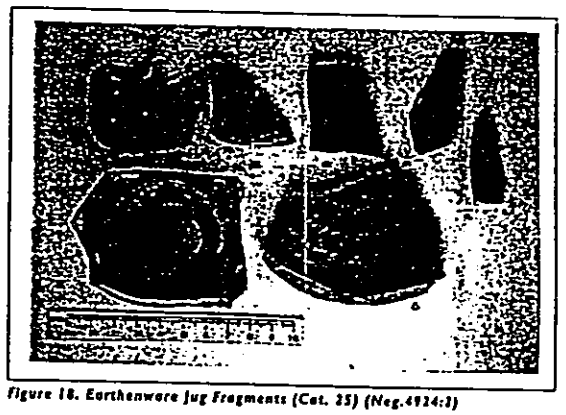

Figure 18. Earthenware Jug Fragments (Cat. 25) (Neg.4924:3)

Catalog Numbers 15 and 28 are two fragments of a whiteware (earthenware) saucer (*Figure 19*). The saucer is manufactured of white stoneware and finished with a glossy white glaze. The base has a molded foot. The saucer measures 15.0 cm in diameter. A partial maker's mark on the base of the saucer reads "Royal Patent..., George Jones ..., England". Vessels with this mark were manufactured after AD 1864.

Catalog Numbers 9, 17, and 23 comprise six fragments from a whiteware (earthenware) bowl. The paste of the fragments is white and porous, while the glaze is glossy white and crackled. The bowl appears to have been fairly shallow, with a wide, flat rim and a small molded foot. The exterior diameter of the bowl would have measured 25.5 cm. Four of the fragments (Cat.17) are shown in *Figure 20*.

The glass fragments include one clear fragment and 11 dark olive green fragments. Based on the color of the glass, the original vessels from which these fragments derived were manufactured after AD 1880 (Toulouse 1972).

Personal Adornment - The three items of clothing/personal adornment derive from Features A and B, and include two glass buttons and one wood button. Cat. 30 is a molded sew-through button manufactured of white milk glass. It has four holes and measures 1.7 cm in diameter by 0.4 cm in cross section. Cat. 38 is a one-piece button with a drilled back, and is manufactured of iridescent black glass. It measures 0.9 cm in diameter by 0.9 cm in cross section. Cat. 34 is a sew-through button with four holes. It is manufactured of a light brown wood and is extremely weathered. It measures 1.7 cm in diameter by 0.2 cm in cross section.

Miscellaneous Items - The miscellaneous items include a metal horseshoe, a non-diagnostic plastic fragment, and 58 non-diagnostic metal fragments. With the exception of the plastic fragment, all of the miscellaneous items derive from Feature D.

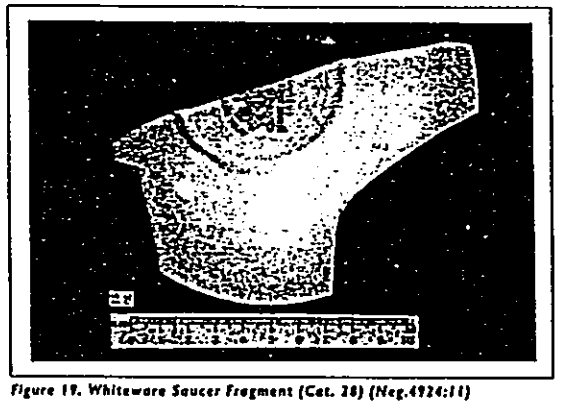

Figure 19. Whiteware Saucer Fragment (Cat. 28) (Neg.4924:11)

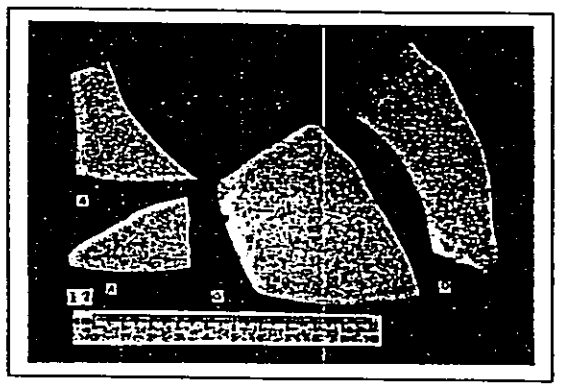

Figure 20. Whiteware Bowl Fragments (Cat. 17) (Neg.4924:13)

ECOFACTUAL REMAINS

Objectives and Methods

Ecofactual remains are archaeologically significant on a number of levels, as the variety and content of food remains contained within a given cultural deposit provide useful information concerning prehistoric diet and resource utilization patterns. The analysis of ecofactual remains for data recovery projects has three primary objectives:

To determine the variety and distribution of ecofactual remains present in each cultural deposit encountered within the project area;

To provide an indication of dietary and resource exploitation patterns for each site, and for the project area as a whole; and

To examine changes in dietary and resource exploitation patterns through time at each site, and for the project area as a whole.

All ecofactual remains recovered from the project area underwent detailed analysis in the laboratory. Detailed analysis involved splitting the sample into two size classes by passing it through 1/4-in and 1/8-in mesh screens. One hundred percent of the material retained in the 1/4-in screen was completely sorted to the lowest taxonomic level possible, while the material retained in the 1/8-in screen was inspected both for artifactual material and for taxa not encountered in the larger portion of the sample. Each category of identified invertebrate material

was then bagged and individually weighed. Relative percentages of invertebrate types were calculated for each provenience, as well as for the site as a whole. Marine shell identifications were verified and augmented using Kay (1979). Vertebrate faunal remains derived from PHRI's investigations were submitted to Dr. Alan Ziegler of Kaneohe, Oahu for identification.

The sampling design outlined above is adapted from Kirch (1979), based on a series of experiments measuring the relative distribution of mollusc and bone material retained on each screen. Kirch concluded that use of the screening process increased the speed of the sorting process without decreasing either the accuracy or statistical validity of the overall analysis. The taxonomic distribution and weight of material retained on the 1/4-in screen should thus be considered as representative of the variety and relative percentages of each taxon present in the entire sample.

Results

Ecofactual remains were recovered from Features A, B, and D of Site 3150 (*Table 10*). Total weights for each taxon (in grams) are tabulated by unit, with subtotals indicating the combined weight per site or feature for each larger material class (e.g., gastropods). The total weight of each taxon within the assemblage is provided in the final column of each table, while the final line of grand total represents the combined weight of all the ecofactual materials derived from the analyzed deposits.

By weight, 76.21% of the 386.71 grams of ecofactual remains recovered from Site 3150 is contributed by marine gastropods, 0.44% by Osteichthyes, and 23.34% by mammal. Marine gastropod taxa identified in the ecofactual samples were restricted to *Cellana sp.*, Cypraeidae, and Thaididae. Osteichthyes remains included Scaridae and unidentified fish, while mammal remains included pig, sheep/goat, small-to-medium mammal and medium mammal. Of these taxa, *Cellana sp.*, Cypraeidae and medium mammal contributed the greatest relative percentages of remains by weight. *Cellana sp.*, pig and medium mammal were also encountered in the greatest number of samples (i.e., these taxa were most ubiquitous).

Excavations at Feature A yielded a total of 11.72 grams of ecofactual remains; these comprised 23.55% marine gastropods (*Cellana sp.* and Thaididae only), 8.19% unidentified fish, and 68.26% sheep/goat. With the exception of the unidentified fish remains, all of the materials recovered from Feature A derived from Layer I-3 of EU-1.

Excavations at Feature B yielded a total of 0.29 grams of *Cellana sp.*; these were recovered from Layer II-1 of the excavation units.

Excavations at Feature D yielded a total of 374.70 grams of ecofactual remains; these comprised 77.84% marine gastropods, 0.20% Scaridae, 2.33% pig, and 19.63% unidentified mammal. The remains were recovered from Layers I (38.84%) and II (61.16%) of EU-8.

SUMMARY AND CONCLUSIONS

Data recovery excavations at Site 3150 yielded 177 portable artifacts and 386.71 grams of ecofactual remains. Although charcoal fragments were recovered from two excavation units, in both instances the fragments were directly associated with historic artifacts; because of the limited utility in submitting historic samples for radiocarbon dating, neither sample was

Table 10.
Detailed Distribution of Ecofactual Remains

	Feature	A				B		D			Site Grand Total
	Unit	EU-1		Feat.	EU-1	Feat.	EU-8		Feat.	
	Layer/Level	I-2	I-3	Subtot.	II-1	Subtot.	I	II	Subtot.	
Phylum/Class											
Gastropods											
Patellidae											
Cellana sp.			0.78	0.78	0.29	0.29	129.99		129.99	131.06
Cypraeidae				0.00	0.00	0.00			0.00	0.00
Thaididae			1.96	1.96	0.00	0.00			0.00	1.96
Subtotal Gastropods		0.00	2.74	2.74	0.29	0.29	129.99	0.00	129.99	133.02
Vertebrates										
Osteichthyes										
Scaridae				0.00	0.00	0.00			0.00	0.00
Unidentified fish		0.96		0.96	0.00	0.00			0.00	0.96
Subtotal Osteichthyes		0.96		0.96	0.00	0.00	0.00	0.00	0.00	0.96
Mammals										
Suidae										
Sus scrofa				0.00	0.00	0.00			0.00	0.00
Bovidae										
Capra hircus/Ovis sp.				0.00	0.00	0.00			0.00	0.00
Order & family indeterminate										
Small-M mammal				0.00	0.00	0.00			0.00	0.00
Medium mammal				0.00	0.00	0.00			0.00	0.00
Subtotal Mammalia		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetal										
Charcoal			15.10	15.10	0.00	0.00	0.23		0.23	15.33
Total		0.96	17.84	18.80	0.29	0.29	130.22	0.00	130.22	149.31

	Site Grand Total
	131.06
	0.00
	1.96
	133.02
	0.00
	0.96
	0.96
	0.00
	0.00
	0.00
	0.00
	15.33
	149.31

submitted for age determination analysis. The distribution of remains within each feature are discussed below, followed by a discussion of the range of activities and subsistence practices suggested by the portable inventory.

Portable remains were recovered from excavations and surface collections at Features A, B, and D of Site 3150. No portable remains were collected from Feature C, which was determined to be a bulldozer alignment during the data recovery phase field work. Materials recovered from Feature A included seven flaked lithic artifacts, a basalt manuport, a metal nail, seven slate fragments, two buttons, and 11.72 grams of ecofactual remains. Materials recovered from Feature B included 47 metal nail fragments, a button, a plastic fragment, and 0.29 grams of *Cellana sp*. Finally, materials recovered from Feature D included two basalt manuports, two metal handles, two metal nail fragments, 25 fragments from an earthenware jug, six fragments from a whiteware bowl, two fragments from a whiteware bowl, 12 non-diagnostic glass fragments, 58 non-diagnostic metal fragments, a horseshoe, and 374.70 grams of ecofactual remains.

Range of Activities and Period of Use

In general, the inventory of portable remains suggests that the site was used for a limited range of activities. Inhabitants of the site had access to marine resources (shellfish, fish); however, based on the absence of fishing gear at the site, it is possible that fish was obtained through trade or purchase rather than by direct procurement from the ocean. Domestic activities most likely included food preparation and consumption involving use of ceramic and glass items; manufacture and/or use of flaked lithic tools; and some type of construction activity (indicated by the nails).

The relative scarcity of indigenous artifacts recovered from the site indicates that use of the site was restricted to the historic period; based on the dates of manufacture for the ceramic and glass items, occupation of the site occurred after the AD 1880s. The relative abundance and diversity of items recovered from Feature D suggest that this feature was the primary locus of domestic activities, particularly with regards to food preparation or consumption. Features A and B may have served as work areas or may have been ancillary habitation features (sleeping rooms, storage areas, etc.). These interpretations are generally consistent with the field interpretations of the three features; all three of which were described as temporary habitations.

Subsistence

The results of the ecofactual analysis indicate that subsistence patterns in the project area included the collection and consumption of a limited variety of marine gastropods, and marine and terrestrial vertebrates. In general, the marine gastropods included in the assemblage are common inhabitants of the shorelines, shallow-water areas, solution benches and fringing reefs of the windward islands of the Hawaiian chain and would have been easily accessible to local populations. The most common taxa are noted below, with comments on their occurrence and probable economic value (taken from Titcomb 1978: 337-353).

Gastropods

Cypraeidae - Members of the family Cypraeidae were known as *leho* by the Hawaiians and were of major importance in the economy as food, ornaments, tools and octopus fishing lures. To prepare *leho* for consumption, the shells were broken open and the meat was removed and

worked with salt. The flesh was then wrapped in *ti* leaves and cooked over coals. Some people merely boiled the shell and then removed the meat. For the shells, small yellow and white *leho* were reserved for the *ali'i* to use as ornaments and were occasionally used as currency. Larger shells were used to make scrapers for removing the skin from cooked taro and breadfruit, and for grating coconut. Cowrie scrapers with a sharp, serrated edge were also used to incise *wauke* bark to remove it from the plant. The Mauritius and sometimes the tiger cowries were used as part of octopus lure assemblies.

In terms of habitat, the cowrie range from the intertidal zone to depths of about 100 m. The most common species in the Hawaiian Islands are found in shallow water under loose rocks and boulders along the shoreline and in crevices at the seaward edge of solution benches and fringing reefs (Titcomb 1978).

Patellidae - Members of the family Patellidae, or limpets, were grouped together and called *'opihi* by the Hawaiians. The *'opihi* were extremely well-liked as a food item and were reportedly the most commonly eaten shells. The favorite method of preparation was raw and salted, either with or without seaweed. They were sometimes washed clean and then cooked in the shell, using a calabash of water in which were placed hot stones. The shells were picked out later. This method enabled the broth (*kai*) to be used, especially by the sick and young. The meat was pulled from the shells or sometimes scooped out with a smaller, empty *'opihi*. *'Opihi* especially *'opihi'awa*, were used extensively as medicine, and were also associated with sorcery. Although no examples of utilized *'opihi* shells were encountered in the current project area, empty *'opihi* shells were often used for scooping, peeling and scraping because of their sharp edges.

Within the Hawaiian island chain, *Cellana spp.* are restricted in their occurrence to the shorelines of volcanic islands. They are generally found on basalt shorelines from the spray zone seaward to the calcareous algal zone, except for *C. talcosa* which occurs at depth of 1 to 10 cm along abrupt coastlines. Taxa recognized by the Hawaiians included *C. talcosa* (*'opihi ka'ele*), *C. sandwicensis* (*'opihi 'alinalina*) and *C. exarata* (*'opihi makaiauli*) (Titcomb 1978).

Thaididae - Members of the Thaididae family were known variously as *aupupu, 'awa, makaloa,* and *pupu makaloa*. They were primarily used as a food source, but larger specimens with a long, sharp, strong lip were often made into small adzes. *Morula spp.* are common in the intertidal zone, on hard substrates where there is strong wave action, while *Drupa spp.* are common on benches, reefs and basalt shores, where there is heavy surf action, and on rocky substrates, to depths of 15 m. The shells are often covered with a growth of coralline algae (Titcomb 1978, Kay 1979).

Vertebrates

Vertebrate faunal remains derived from Site 3150 were submitted to Dr. Alan Ziegler of Kaneohe, Oahu for identification. A complete report is attached as Appendix B. Weights of the identified bone are tallied in *Table 10*. The number of identified specimens (NISP) and minium number of individuals (MNI) are reported in *Table 11*.

Marine Vertebrates - Fish provided an additional marine resource for inhabitants of Site 3150. It is likely that fish were obtained from nearshore reefs, using a variety of techniques, including gathering, trapping, poisoning, snaring, spearing, netting, or shallow-line angling (Kirch 1979:208).

Table 11. Distribution of Faunal Material

Feature	A						D							
Unit	EU-1			Feature A Subtotal			EU-8			B-1			Site Grand Total	
Layer/Level	L-2		L-1				L							
*Count Type	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	NISP	MNI	NISP	NISP	MNI
Osteichthyes														
Sparidae	1	1	0	0	0	0	1	1	1	1	1	1	3	3
Unidentified fish	1	1	0	0	1	1	0	0	0	1	1	1	2	2
Subtotal Osteichthyes	2	2	0	0	1	1	0	0	0	2	2	2	5	5
Hummelo														
Scales														
Sea scrub					0	0	1	1	3	2	2	2	5	5
Bovidae														
Capra hircus/Ovis sp.			1	1	1	1	1	1	1	1	1	1	3	3
Order & family indeterminate														
Small-Medium mammal					0	0	0	1	4	8	4	4	12	4
Medium-Large mammal					0	0	2	2	30	4	3	3	36	5
Subtotal Mammals	0	0	1	1	1	1	4	4	34	13	8	8	51	12
Total Specimens	2	2	1	1	2	2	4	4	40	15	10	10	56	17

*Count Type: NISP = Number of Individual Specimens; MNI = Minimum Number of Individuals; L = Unable to Determine.

Three marine vertebrate specimens were recovered, two in EU-1, Feature A, and one in EU-8, Feature D. Sparidae, known popularly as grand-eyed porgy or bigeye emperor fish (MNI), was the only taxon identified of the fish remains. The only known species of Sparid in Hawai'i is *Monotaxis grandoculis*. This deer shore reef dweller is characterized by a high, compressed body, continuous dorsal fin, large eyes and mouth, which contains grinding teeth. Large specimens reach a length of 24 to 30 inches. This is a good food fish (Titcomb 1978:228-229).

Terrestrial Resources - Fifty-eight terrestrial vertebrate samples were identified during the present work. Only seven of these were identifiable; six are examples of *Sus scrofa* and one of *Capra hircus or Ovis*. The presence of pig and goat or sheep remains at Site 3150 indicates that terrestrial resources were also utilized by the site's inhabitants. Although the pig is a Polynesian introduction, pigs were domesticated and tended throughout prehistoric and historic times. Goats and sheep were not introduced to Hawai'i until 1778 and 1791, respectively. Based on the association of the pig bone at Site 3150 with historic artifacts, and since most of the pig bone exhibits sawing with a metal tool (Appendix B), it is likely that the pig remains identified at Feature D are historic period deposits.

CONCLUSION

PROJECT SUMMARY

The State of Hawai'i Department of Accounting and General Services, Division of Public Works, is planning for eventual expansion of the Hana Medical Center (TMK:1-4-03:22), situated in the Land of Kawaipapa, Hana District, Island of Maui. Phase I Inventory Survey of the parcel was conducted in 1993 (Henry and Graves 1993). Subsequently, guided by DLNR-SHPD recommendations, an archaeological treatment plan was submitted (Rosendahl 1994). Phase II Archaeological Data Recovery fieldwork, following the treatment plan, was conducted in July, 1995, and is reported here.

The purpose of the Archaeological Mitigation Program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources Rules Governing Procedures for Historic Preservation Review (DLNR 1994). The specific purpose of the Mitigation Plan is to guide the archaeological work required by DLNR-SHPD to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 50-50-13-3150.

DISCUSSION

Feature A

One Excavation Unit (EU-1) and two Shovel Tests (ST-1 and ST-8) were placed at this rectangular walled enclosure. Only one soil layer, a black silt loam, was revealed, and the unit was terminated on bedrock at a depth of 0.41 m. The portable remains included a total of 11.72 grams of ecofacnual remains and 18 artifacts. The only diagnostic artifacts are one square nail piece, a wooden button, and a glass button. The architecture was shown to not extend more than 5.0 cm below the present soil surface.

The evidence at this feature points to a historic date, possibly around the beginning of the 20th century. The presence of two buttons indicates domestic use of this feature, while the nail attests to the possibility of additional wooden structure above the walls. All are of types readily available in the late 1800s (Hume 1970:90-92 and 252-254).

At least one large, waterworn basalt rock is located on the flat beside this feature. Based on the discussion of Ku'ula stones in Borthwick et al. (1992:25), a Traditional Hawaiian presence might be indicated by this manuport. However, a use date cannot be assigned on this artifact, which might also be a carryover of prehistoric tradition into historic times. Borthwick et al (ibid.) do point out that such stones are often associated with habitations. The sparse deposits argue for a temporary or sporadic use of this structure.

Feature B

Four Excavation Units (EU-2 through EU-5) and two Shovel Tests (ST-2 and ST-9) were placed around the large rectangular enclosure at Feature B. Two layers were revealed, an aa gravel and cobble pavement overlay a dark brown gravelly clay. Portable remains include 0.29 grams of *Cellana sp.* (*'opihi*) and 49 artifacts (47 nail fragments, a button and a piece of plastic); all were found near the surface of the soil layer, and appeared to have filtered down through the pavement gravel.

The artifact collection at this feature appears younger than at Feature A. The piece of plastic and pieces of round nails suggest a mid-20th century use date. A few square nail pieces are also present, so the range of use may have begun as early as at Feature A (Hume 1970:252-4). The shallow penetration of the architecture into the soil further argues for a relatively recent age for this enclosure. The presence of a button again suggests domestic use of the feature.

Feature C

Feature C was originally described as an "L-shaped enclosure" and associated terrace (Henry and Graves 1993:10). The terrace was said to be defined by a wall of aa boulders. In fact, there is no wall, only a loose alignment of boulders, and there appears to be some grading extending onto the terrace from the road to the south. The two shovel tests (ST-3 and ST-10) and single excavation unit (EU-6) that were placed at Feature C were all devoid of portable remains.

Examination of this feature reveals differences between it and the other three features at Site 3150. Features A, B, and D are marked by careful construction and purposeful design, while Feature C lacks both of these characteristics. The available data suggests that the terrace form was constructed by road grading, and this may also be the means by which the boulders were aligned.

Feature D

The data recovery potential of Feature D has been virtually exhausted with two shovel tests (ST-4 and ST-11), a test unit (TU-1), and two excavation units (EU-7 and EU-8). Surface collection has also been conducted there. These activities have yielded 374.70 grams of ecofactual remains (by weight, 77.8% marine gastropods) and 110 artifacts.

Two of the artifacts, a fragment of waterworn basalt cobble and a possible *'ili 'ili*, resemble indigenous items, while the rest are historic, including glass and earthenware fragments, a horseshoe, metal handles, and numerous unidentifiable glass and metal fragments. One fragment of a saucer carries a maker's mark which dates the manufacture after 1864. The discard of the item could have been much later. The glass fragments were manufactured after 1880, based on color characteristics (Toulouse 1972). No specifically modern items were located at Feature D, so a use-age towards the end of the 19th and extending into the 20th century seems possible. The presence of possible soy jars (Munsey 1970:138) might indicate that the spot was used by cane workers from China or Japan, rather than by traditional Hawaiians.

Excavation of EU-7 on the exterior of Feature D revealed two stages of building: a paved terrace preceded the construction of the platform. This is evidence of a use-history spread over time. EU-7, which tested the stratigraphy of the first stage of construction, yielded only the one *'ili 'ili* stone. Thus, it is difficult to speculate on the beginning date of the use of this feature.

During the inventory survey, speculation that Feature D might be a burial platform was discounted, based on TU-1 results (Henry and Graves 1993). The lack of any sign of human remains from four excavations at this feature has now disproved this hypothesis.

Site 3150

The excavations at Site 50-50-13-3150 during both the inventory survey and the present work have revealed cultural deposits at three of the four features (Features A, B, and D). Feature C contains no cultural deposits and appears to be the result of road grading rather than any intentional construction. The deposits at the three other features appear to date to the late 19th century, at the earliest, and reflect continued use into the 20th century. All three of these features exhibit care and effort in construction, but Features A and B contain only sparse collections of portable remains and Feature D only a moderate amount.

The initial use-range (late 19th century) of Features A, B, and D is contemporary with the maximum extension of the Hana sugar plantation fields, which spread across several *ahupua'a* both north and south of the Hana Medical Center project area, in Kawaipapa. Although one reference (Borthwick et al. 1992:19) indicates that sugar was cultivated the project area in 1909, the archaeological evidence suggests that the structures at Site 3150 must have been in place by this time. As Soehren (1963:22) indicates, stone wall remains of thatched houses, occupied by field workers and contemporary with the plantations, were found on the fringes of fields at Kipahulu, south of Hana. The same pattern probably obtained in Hana, although the survey of a larger parcel to the south (Borthwick et al. 1992) did not identify any such sites.

The location of Features A and B, on the ridge of a rocky hill that may have been difficult to cultivate may explain why they survived the mechanical grading of the surrounding land. As at Kipahulu, the rock walls may have provided the base for a thatched roof, and the structures provided shelter for field hands. The nails that were found in the excavation units could have been used in the support structure for the thatching (Apple 1971:200). Both features yielded buttons, which have been taken as evidence of domestic use (i.e. habitation). Feature A, with lesser interior floor space (c. 17 m²), may have been used only as a sleeping structure. The organization of Feature B is unusual, with a sloping floor and lack of door openings. The northern wall of Feature B consists of a short basalt ledge lined with rocks, which would have afforded easy access, if the roof were peaked in this direction. The slope of the pavement would have made for an unsteady base for furnishings and uncomfortable sleeping, unless some kind of level floor were installed. Neither Feature A nor Feature B appeared to have served cooking or food consumption functions, based on the dearth of portable remains. Several explanations for this are possible:

1. Another nearby site for cooking or consumption has gone undetected;
2. The evidence of cooking or food consumption in Features A and B has gone undetected;
3. Food was prepared and consumed in a remote location, as a dining hall or other communal site;
4. Feature D served as the cooking or consumption area.

Suggestion 1 may be correct, although the small parcel has been thoroughly surveyed. Suggestion 2 is unlikely, based on the sparse portable collections of remains and the lack of

evidence of cooking fires. At Feature A, the small interior size would preclude a distinct activity area without mixing of refuse items throughout the deposit. At Feature B, the excavations were made in the downhill corner of the structure, where refuse might collect. Suggestion 3 is plausible, as laborers were sometimes fed in dining halls (Takaki 1985:64), but there is no clear evidence that this was the case in Hana.

The last explanation, that Feature D served as kitchen or dining area for the residents of Features A or B, is one possible interpretation of the portable remains excavated here. However, food remains are not numerous. The collection of ecofacts from Feature D could be the result of only a few (or even a single) meal or meals, based on both the small quantity and the lack of variety found here. The brownware artifacts (soy jugs) suggest the presence of Chinese or Japanese immigrants. The stoneware is European, however. The horseshoe and handles denote the transportation of goods to the site. A better explanation for this collection is that it reflects episodic events, picnics, or outings. Feature D may have been very near the banks of the ditch that passed through the property, and thus may have afforded water recreation, or at least a cool spot with a view of Kainalimu Bay and Kapueokahi Harbor.

All three cultural features at Site 3150 exhibit care and effort in construction but do not contain evidence of use as primary residences. The occupations were likely temporary or episodic, as the collections are very sparse at two features (A and B) and only moderate at Feature D. Features A and B are assigned functions of habitation and were probably used as sleeping shelters. Feature D is also assigned a habitation function, but must have been a temporary or episodic gathering place.

The archaeology conflicts with the documentary evidence that the Hana Medical Center property was planted to sugar cane as early as the 1860s and well into the 20th century. The Feature D pavement and platform, especially, appears to have been in use across this span of time. It may be that small rocky areas were not cultivated, and the local populace retreated to these at intervals for respite or on holidays.

The excavations demonstrated that there is not a significant subsurface deposit at Site 3150. Portable remains are scarce, and were not found in datable contexts. It appears that the potential for additional archaeological information from Site 50-50-13-3150 is minimal. The data recovery has been accomplished and no further work at the site is recommended. It should be noted, however, that there is always the possibility that previously unidentified cultural remains will be encountered in the course of development activities. In such cases, archaeological consultation should be sought immediately.

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APPENDIX A:
Correspondence

JOHN WAIHEE
GOVERNOR OF HAWAII

RECEIVED
Mar 29 12 11 PM '93
DIV. OF [illegible]

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

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March 25, 1993

LOG NO: 7633
DOC NO:9303AG25

MEMORANDUM

TO: Gordon Matsuoka, State Public Works Engineer
Department of Accounting and General Services

FROM: Don Hibbard, Administrator
State Historic Preservation Division

SUBJECT: Historic Preservation Review of an Archaeological Report
Hana, Maui
TMK: 1-4-03: 22

Thank you for the opportunity to comment on the draft copy of this report entitled Archaeological Inventory Survey, Hana Medical Center Project Area (Henry and Graves 1993).

We have reviewed this report and have the following comments:

I. Identification of historic sites

The background research, both historical documents and previous archaeological work, appears to be adequate. The regional and project area settlement pattern has also been presented. It seems from the description of the field methods that all historic sites have been identified in the project area. Four historic sites consisting of 2 complexes and 2 walls were identified.

Under the section on Findings, the historic sites are adequately described. The findings from the shovel tests, however, should be presented in more detail. The marine shells and the time period (19th or 20th century?) of the glass fragments should be identified. Two sites, 3151 and 3152, are identified as boundary walls. A wall and a terrace (3153) are identified as modern structures for boundary and agriculture.

Site 3150, a complex of 4 features, needs improved interpretation. It is interpreted as having been used for habitation, animal pen, and possible burial, and possibly as a

pu'uhonua. The possibility of burials being present needs to be resolved, before we are able to evalulate significance of this site. (Note, our Maui Island Burial Council would also make such a requirement prior to voting on mitigation proposals.) We recommend testing, which can be done as soon as the applicant wishes. Also, the report proposes additional documentary research to evaluate whether a pu'uhonua was present. We recommend that the research occur as soon as possible, because this could also affect the significance evaluation of the site. Findings can be submitted as an addendum to the initial report. Until these aspects of the function of site 3150 (burial, pu'uhonua) are resolved, we are unable at this time to finalize the significance evaluations and mitigation proposals for this site.

II. Significance Assessment

We concur with the assessment that the other three sites (excluding 3150) are significant for their information content (Criterion D). For site 3150, resolution of functional interpretations is needed before we can process a significance evaluation. We agree that criterion D applies, but it is uncertain if the site is significant for traditional cultural significance and, if so, for what reasons.

III. Mitigation Measures

This report finds that no further work is necessary for sites 3151, 3152 and 3153. We concur with this determination with the condition that the missing figures in this draft copy are included in the final report.

At this time, until the functional and significance of site 3150 are determined, we are unable to comment on the proposed site 3150 mitigation measures. We would like to note that in the report for site 3150, further data collection and preservation are recommended (Table 3), but the text on page 24 describes what appears to be data recovery. This contradiction needs resolution, when the mitigation proposal is considered after the additional survey work.

Also, we would appreciate two copies of the report when accepted by your office. Should you have any questions about these comments, please contact Annie Griffin at 587-0013.

AG:amk

94-1481

PHRI

Project 92-1266

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

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July 23, 1993

LOG NO: 8954
DOC NO: 9307AG23

Honorable Robert P. Takushi
State Comptroller
Department of Accounting and General Services
P. O. Box 119
Honolulu, Hawaii 96810

Attention: Mr. Allen Yamanoha

Dear Mr. Takushi:

SUBJECT: Chapter 6E Compliance -- Historic Preservation Review of An Archaeological Report on the Hana Medical Center Hana, Maui
TMK: 1-4-03: 22

Thank you for the opportunity to comment on the prefinal survey report entitled *Archaeological Inventory Survey, Hana Medical Center Project Area* (Henry and Graves 1993).

We reviewed a draft version of this report in our letter dated March 25, 1993. The previous review did not address the site significance assessments pending determination of the function of Feature D, Site 3150 (tentatively assigned as burial) and oral/historical information regarding the presence of a *pu'uhonua* in the project area. According to this report, additional testing was conducted in Feature D. No burial was found and historic period artifacts recovered indicate that the feature is historic in age, but the function is still undetermined (page 12). The additional historic data indicate that a *pu'uhonua* existed in Kawaipapa, but not in the project area. We now find this report adequate and acceptable.

Based on these findings, we are now able to determine final site significance assessment and mitigation measures. The report has assessed the four historic sites (3150, 3151, 3152 and 3153) to be "no longer significant", having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey. We concur with this assessment for three of the sites, but we believe that site 3150, a habitation complex of historic period features, is still significant for its information content. Its specific age and some of its features' function need better documentation.

So far subsurface excavations, with the exception of one test pit in Feature D, have been limited only to a few shovel tests, so clearly more excavation work is meritted. Thus, we believe that one significant historic sites is present in the project area.

Archaeological data recovery of site 3150 would be an appropriate mitigation measure for this project, resulting in a "no adverse effect" determination. Please let us know in writing what mitigation approach you wish to follow, however.

Should you have any questions about these comments, please contact Ms. Annie Griffin at 587-0013.

Sincerely,

KEITH W. AHUE, Chairperson

c: Dr. Paul H. Rosendahl, PHRI

AG:lll

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JOHN WAIHEE
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
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DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

March 3, 1995

Mr. Allan Yamanoha, Engineer
Planning Branch, Education Section
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, Hawaii 96813

LOG NO: 14037
DOC NO: 9503KH02

Dear Mr. Yamanoha:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan -Hana Medical Center Project, Kawaipapa, Hana District, Maui
TMK: 1-4-03: 22

A draft mitigation plan for Historic Site 50-50-13-3150, located within the Hana Medical Center project area was reviewed by our office in October, 1994 (letter to Dr. Paul H. Rosendahl, October 6, 1994). The plan discusses proposed excavation and detailed recording to be conducted at four component features within the site (Feature A, a small enclosure, Feature B, a large enclosure, Feature C, an L-shaped enclosure, and Feature D, a platform). In our review letter, we indicated that the plan contains sufficient background information and presents an adequate research design. We recommended that the proposed scope of excavations be increased for Feature B, the large enclosure, in order to ensure a representative sampling of the cultural deposit within the feature. All other proposed excavations were acceptable. The recommended revisions have been made, and the corrected pages were sent to our office (Paul H. Rosendahl letter to Don Hibbard October 26, 1994). As indicated in the October 6 letter, our review of the plan is completed, and it is acceptable.

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We have requested that our Maui office be notified when the fieldwork is scheduled, so that we can verify successful completion of the data recovery work. To our knowledge, the field work has not commenced to date.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

JOHN WAIHEE
GOVERNOR OF HAWAII

FILE

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
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October 6, 1994

Dr. Paul H. Rosendahl
Paul H. Rosendahl, Ph.D., Inc.
305 Mohouli Street
Hilo, Hawaii 96720

LOG NO: 12855
DOC NO: 9409KD31

Dear Dr. Rosendahl:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan - Hana Medical Center Project
Kawaipapa, Hana District, Island of Maui
TMK: 1-4-03: 22

Thank you for submitting a plan for archaeological data recovery work at Site 50-50-13-3150, located within the proposed Hana Medical Center project area, Kawaipapa, Hana (PHRI letter to Don Hibbard July 22, 1994).

The plan discusses proposed excavation and detailed recording to be conducted at four component features of Site 50-13-3150 (A, a small enclosure; B, a large enclosure; C, an L-shaped enclosure; and D, a platform). The data recovery work was recommended following inventory survey work with limited subsurface testing at the site (*Archaeological Inventory Survey, Hana Medical Center, Land of Kawaipapa, Hana District, Island of Maui*, J.D. Henry and D.K. Graves 1993). The State Historic Preservation Division concurred with the recommendation, and indicated that Site 3150 was significant for information content. We also concurred that data recovery would be an appropriate mitigation measure for a determination of "no adverse effect" (Keith Ahue letter to R.F. Takushi July 23, 1993).

We find that the mitigation plan contains sufficient background information and presents adequate research issues to be addressed in the report of findings. The proposed scope of excavations appears to be adequate, with the exception of Feature B. This enclosure has an area of 143.85 sq m; proposed excavations are 2-4 m sq, which is the same excavation area proposed for Feature D (5.0 sq m area). Prior excavation in this feature was limited to two shovel tests. We feel that 4-8 m sq would provide a more representative subsurface sample of this feature.

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The mitigation plan is acceptable with the minor change as suggested above. You may forward a single page (3) indicating the revision of Table 1. Our review of this plan is considered complete at this time.

As indicated in a previous Memorandum to Gordon Matsuoka (December 3, 1993), we request that our office be notified of your field schedule at Site 3150, so that we may verify successful completion of the data recovery work.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

c: Allen Yamanoka, DAGS - Planning Division

94-1481 mwlw

WILLIAM J. CAYETANO
GOVERNOR OF HAWAII

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March 3, 1995

Mr. Allan Yamancha, Engineer
Planning Branch, Education Section
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, Hawaii 96813

LOG NO: 14037
DOC NO: 9503KD02

Dear Mr. Yamancha:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan -Hana Medical Center Project, Kawaipapa, Hana District, Maui
TMK: 1-4-09: 22

A draft mitigation plan for Historic Site 50-50-13-3150, located within the Hana Medical Center project area was reviewed by our office in October, 1994 (letter to Dr. Paul H. Rosendahl, October 6, 1994). The plan discusses proposed excavation and detailed recording to be conducted at four componant features within the site (Feature A, a small enclosure, Feature B, a large enclosure, Feature C, an L-shaped enclosure, and Feature D, a platform). In our review letter, we indicated that the plan contains sufficient background information and presents an adequate research design. We recommended that the proposed scope of excavations be increased for Feature B, the large enclosure, in order to ensure a representative sampling of the cultural deposit within the feature. All other proposed excavations were acceptable. The recommended revisions have been made, and the corrected pages were sent to our office (Paul H. Rosendahl letter to Don Hibbard October 26, 1994). As indicated in the October 6 letter, our review of the plan is completed, and it is acceptable.

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We have requested that our Maui office be notified when the fieldwork is scheduled, so that we can verify successful completion of the data recovery work. To our knowledge, the field work has not commenced to date.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

JOHN WAIHEE
GOVERNOR OF HAWAII

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October 6, 1994

Dr. Paul H. Rosendahl
Paul H. Rosendahl, Ph.D., Inc.
305 Mohouli Street
Hilo, Hawaii 96720

LOG NO: 12855
DOC NO: 9409KD31

Dear Dr. Rosendahl:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan - Hana Medical Center Project
Kawaipapa, Hana District, Island of Maui
TMK: 1-4-03: 22

Thank you for submitting a plan for archaeological data recovery work at Site 50-50-13-3150, located within the proposed Hana Medical Center project area, Kawaipapa, Hana (PHRI letter to Don Hibbard July 22, 1994).

The plan discusses proposed excavation and detailed recording to be conducted at four component features of Site 50-13-3150 (A, a small enclosure; B, a large enclosure; C, an L-shaped enclosure; and D, a platform). The data recovery work was recommended following inventory survey work with limited subsurface testing at the site (*Archaeological Inventory Survey, Hana Medical Center, Land of Kawaipapa, Hana District, Island of Maui*, J.D. Henry and D.K. Graves 1993). The State Historic Preservation Division concurred with the recommendation, and indicated that Site 3150 was significant for information content. We also concurred that data recovery would be an appropriate mitigation measure for a determination of "no adverse effect" (Keith Ahue letter to R.F. Takushi July 23, 1993).

We find that the mitigation plan contains sufficient background information and presents adequate research issues to be addressed in the report of findings. The proposed scope of excavations appears to be adequate, with the exception of Feature B. This enclosure has an area of 143.85 sq m; proposed excavations are 2-4 m sq, which is the same excavation area proposed for Feature D (5.0 sq m area). Prior excavation in this feature was limited to two shovel tests. We feel that 4-8 m sq would provide a more representative subsurface sample of this feature.

The mitigation plan is acceptable with the minor change as suggested above. You may forward a single page (3) indicating the revision of Table 1. Our review of this plan is considered complete at this time.

As indicated in a previous Memorandum to Gordon Matsuoka (December 3, 1993), we request that our office be notified of your field schedule at Site 3150, so that we may verify successful completion of the data recovery work.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

c: Allen Yamanoka, DAGS - Planning Division

PHRI Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services
305 Mahalani Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-8996
P.O. Box 23261 • G.M.F., Guam 96921 • (671) 472-3117 • FAX (671) 472-3111

Report 1481-071194 July 22, 1994

Dr. Don Hibbard, Administrator
Department of Land and Natural Resources
State Historic Preservation Division
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Attention: Dr. Ross Cordy

Subject: Archaeological Mitigation Plan for No Adverse Effect
Hana Medical Center Project, Land of Kawaipapa,
Hana District, Island of Maui

Dear Dr. Hibbard:

This mitigation plan has been prepared at the request of Mr. Allen Yamanoha, Planner with the State of Hawai'i Department of Accounting and General Services, Division of Public Works. The plan comprises Phase I of a two-phased Archaeological Mitigation Program for the Hana Medical Center project area, in the Land of Kawaipapa, Hana District, Island of Maui. The purpose of the program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources Rules Governing Procedures for Historic Preservation Review (third draft - November 1989). The specific purpose of the Mitigation Plan is to guide further archaeological work required by DLNR to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 3150.

Previous archaeological work conducted by PHRI (Henry and Graves 1993) identified four sites within the project area. Two of the sites represent complexes (Sites 3150 and 3153), and two represent boundary walls (Sites 3151 and 3152). Three of these four sites (Sites 3151, 3152, and 3153) were evaluated as significant solely for information content. Because the documentation of these sites during the inventory survey was considered to have recovered all of the significant information represented by these sites, all three were determined to be no longer significant, and no further work was recommended for them (Henry and Graves 1993:25). The Department of Land and Natural Resources - State Historic Preservation Division (DLNR-SHPD) concurred with these findings in its review of the inventory survey report (letter dated 23 July 1994, from Mr. Keith W. Ahue, Chairperson, DLNR-SHPD, to Honorable Robert P. Takushi, Department of Accounting and General Services).

For the remaining project area site (Site 3150), PHRI's original conclusion was that the site was significant not only for information content, but was also provisionally significant for cultural value. PHRI therefore recommended additional data collection work to evaluate one of the features of the site (Feature D) for the presence of human remains. This work was undertaken in April of 1993, following completion of the inventory survey field work, and the findings were presented in the final version of the inventory survey report (Henry and Graves 1993). In addition to summarizing the specific findings of this additional work, the inventory survey report also describes the primary features at Site 3150, as follows:

> ...Site 3150 consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped enclosure; and Feature D, a rectangular platform. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. No datable samples were recovered, but the presence of the glass and ceramics suggests the features are historic. Because it was thought Feature D might contain a burial, it was subsequently determined to require further testing (Memo dated 25 March 1993, from D. Hibbard, DLNR-SHPD, to G. Matsuoka, Dept. of Accounting and General Services). On April 20, 1993 PHRI archaeologists placed a formal test excavation unit in the center of Feature G, near the shovel test placed earlier. The unit yielded ceramics, faunal bone, shell, and a glass button. The findings suggest the feature is historic. No human remains were found in the unit. (Henry and Graves 1993:22)

Because the excavation unit placed within Feature D failed to identify evidence of primary burials or scattered human remains, the site was no longer considered potentially significant for cultural value. However, in its review of a draft of the final survey report, DLNR-SHPD stated that additional portable cultural materials as well as specialized samples might remain at the site, within a subsurface component, and that such cultural materials could be useful in (a) further dating of the site and its component features, and (b) further evaluating feature function. For these reasons, DLNR-SHPD recommended that the site be subjected to data recovery work designed to recover additional artifacts, ecofactual remains, and other specialized samples. Moreover, DLNR requested that this work be preceded by preparation of an appropriate archaeological treatment plan (this document).

Based on existing information concerning the site, and pursuant to DLNR's specific comments (above), the primary goal of data recovery at Site 3150 will be to more precisely date and more thoroughly evaluate the functions of the four primary features at Site 3150. This work is to be accomplished through additional detailed recording, excavation, and analysis. PHRI proposes the following specific tasks be undertaken.

Detailed Recording and Surface Collections

Variable levels of additional detailed recording will occur at the site's four features, particularly as these features are exposed during excavation work. This additional recording will be directed toward determining the full extent of each feature and will be accompanied by appropriate modifications to existing feature drawings.

Excavations

All four features will be subjected to formal excavation. Excavation units will vary in size from 1.0 m sq to 8.0 m sq and will be excavated according to cultural or natural stratigraphic layers. If necessary, excavation by arbitrary 10 cm levels will be employed for thick or stratigraphically complex layers, or where cultural or natural layers cannot be clearly identified. All fill will be screened through 1/8-inch screen, and a minimum 25% sample of the screened material will be retained for laboratory analysis.

Subsurface features will be numbered sequentially within excavations; i.e., the first horizontal feature encountered in each excavation unit will be designated HF-1, the second HF-2, and so on. Any such features will be plan-mapped, excavated, and sampled for laboratory analyses. When possible, given the confines of a one-meter-square excavation unit, subsurface features will be sectioned, and appropriate cross-section drawings will be prepared. Cross-section drawings will be prepared for a minimum of one test unit face within each excavated feature. Layers will be described in accordance with Munsell Color Notation and U.S. Soil Conservation Service guidelines, through a combination of field examination and subsequent laboratory analysis of representative fill samples. The locations of all test units will be plotted on the appropriate site map.

The level of excavation considered appropriate for each feature is indicated below, in Table 1.

Table 1. Features to Be Excavated

Feature Designation	Type	Surface Area to be Excavated
Feature A	Small, rectangular enclosure	1-2 m sq
Feature B	Large, rectangular enclosure	4-8 m sq
Feature C	L-shaped enclosure	1-2 m sq
Feature D	Rectangular platform	2-4 m sq

Laboratory

All recovered artifacts and midden remains will be cleaned and sorted in the laboratory. Artifacts will be sketched (when appropriate), classified as to type and material, weighed, and characterized in terms of metric attributes. Midden samples will be sorted and weighed by major category (e.g., bivalves, gastropods, fish, mammal, etc.), with identifications made to the most specific levels appropriate or possible. Dating analyses will include radiocarbon age determinations (including C-13/C-12 stable isotope ratio determinations). Carbon samples will be preliminarily sorted, weighed, and described prior to submission for dating to Beta Analytic, of Miami, Florida. Floral and faunal samples will be submitted for specialized analysis, if such analysis is determined appropriate.

Report Preparation

A final report will present findings of the data recovery work, as outlined in the draft guideline standards for Archaeological Data Recovery Studies and Reports prepared by DLNR-SHPD (DLNR 1989). The primary emphasis for the present project will be on interpreting Site 3150 in terms of function and age, based on the sum of findings at the individual features.

Although the range of research issues that can be addressed on the basis of information available at Site 3150 is clearly limited, an effort will be made to confront topics of regional interest concerning early historic-era occupation and habitation within the Hana area. The primary research questions guiding proposed data recovery work include the following:

- Can the intensity and duration of occupation be more clearly specified on the basis of recovered assemblage, or through evaluation of patterns of deposition and layering?
- Does it appear that a fully prehistoric episode of occupation predates the already documented historic-era use of one or more of the site's four features?
- If occupation appears fully historic in age, what is the date of initial use of the features?
- Was this site utilized in conjunction with early ranching activities? Does the site represent a locale at which "ranch hands" may have camped but engaged in essentially "traditional" subsistence activities? If so, what estimated level of subsistence may have been derived from "traditional" means, as compared with subsistence that depended on imported foodstuffs or other commodities?

- If cultigens are identified among the specialized samples recovered, which forms are present and is it likely that these were being grown at or near the site area?
- What kinds of artifacts were imported to this site, and is dating adequate to segregate any changes through time in the kinds of artifact types being utilized?

Treatment of Recovered Materials

All materials recovered during the present project will be handled in compliance with Section 66.3(b) of the National Park Service's Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements, which recommends that recovered materials "... be maintained by a qualified institution or institutions as close as possible to their place of origin, and made available for future research" (CFR).

Monitoring of Initial Construction Work

Monitoring of initial grubbing and construction work, following implementation of data recovery work, may be appropriate and warranted. However, this decision should be made following completion of data recovery field work, and in consultation with DLNR-SHPD. If such work is deemed necessary, a formal monitoring plan will be needed in order to ensure proper identification, evaluation, and treatment of any potentially significant cultural resources that might be discovered during initial construction phases of the project. The basic objectives of any such archaeological monitoring will be the following:

1. To identify and evaluate the potential significance of any archaeological remains that might be revealed during construction;
2. To immediately notify DLNR-SHPD upon discovery of any potentially significant archaeological, historical, or cultural properties or objects, in order to (a) establish the significance of such properties or objects, and (b) determine the nature and extent of any data recovery and/or preservation measures that might be warranted; and
3. To carry out an appropriate level of data recovery work—consisting of detailed recording (including plan mapping and profiles, written descriptions, and photographs), collection of portable artifacts and appropriate samples of ecofactual remains and dating materials, and any needed mitigation excavations—in order to preserve the significant archaeological information contained within any identified remains.

At a pre-construction meeting, construction personnel and project representatives will be briefed on (a) the primary locations of the potentially significant archaeological remains that had been excavated within the project area, and (b) the procedures to follow should any new archaeological remains warranting further evaluation be identified during construction.

The archaeological monitoring crew will normally consist of one person who will be on-site during initial grubbing and grading within the vicinity of the sites at which data recovery work had been completed. In general, the archaeologist will conduct the monitoring in order to identify any unique types or types that had not been evaluated during the data recovery. In the event that such archaeological remains are identified during monitoring, the archaeologist will record and collect the exposed data as expeditiously as possible. If significant remains are revealed and should the scale of work involved in the recording and data recovery be beyond the capacity of a single archaeologist, additional archaeological field personnel will be provided as appropriate and necessary.

The significance of any such unevaluated archaeological remains identified during monitoring will be assessed in terms of (a) the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60), and (b) the criteria for evaluation of traditional cultural values prepared by the National Advisory Council on Historic Preservation (ACHP). Upon completion of monitoring field work, a memorandum report will be prepared, which will summarize (a) the findings of monitoring field work, (b) appropriate interpretation and evaluation of these findings, and (c) any recommendations for additional work that might be appropriate or justified. If, at the time of monitoring, the final report for the data recovery program has not yet been submitted, the findings of monitoring will be incorporated within that document and no separate memorandum report will be necessary. In either case, all findings will be presented in a manner compatible with the draft guideline standards for Archaeological Data Recovery Studies and Reports prepared by DLNR-SHPD, as referenced above.

In the opinion of PHRI, implementation of the data recovery program (including possible archaeological monitoring), as outlined herein, will ensure that construction of the Hana Medical Center facility will have no adverse effect on the archaeological resource identified as Site 3150. If you have any questions or comments, please contact me at our main Hilo office (808) 969-1763.

Sincerely yours,

Paul H. Rosendahl /kb

Paul H. Rosendahl, Ph.D.
President and Principal
Archaeologist

Attachments: 1. Plan Map, Site 3150, Showing Feature Locations
2. Certification of Curation Facilities

PI/kb
cc: Mr. Allen Yamanoha, DAGS

References Cited

CFR (Code of Federal Regulations)

36 CFR Part 60: National Register of Historic Places. Department of the Interior, National Park Service, Washington, D.C. Historic Sites Section, Division of State Parks, Department of Land and Natural Resources.

36 CFR Part 66: Proposed Guidelines: Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements. Department of the Interior, National Park Service, Washington, D.C.

DLNR (Department of Land and Natural Resources)

1989 Title 13, Subtitle 6, Chapter 146. Rules Governing Procedures for Historic Preservation Review. Department of Land and Natural Resources - Division of State Parks, Outdoor Recreation and Historic Sites. (Third Internal Working Draft, November 1989)

Henry, J.D., and D. Graves

1993 Archaeological Inventory Survey, Hana Medical Center Project Area, Land of Kawaipapa, Hana District, Island of Maui (TMK:1-4-03:22). PHRI Report 1266-051293. Prepared for Department of Accounting and General Services, Division of Public Works, State of Hawaii.

APPENDIX B: FAUNAL ANALYSIS (Memorandum)

by Alan C. Ziegler, Ph.D.

ALAN C. ZIEGLER, Ph.D.
Zoological Consultant

45-636 Liula Place
Kane'ohe, Hawai'i 96744

Telephone:
(808) 247-5318

MEMORANDUM

DATE: 28 July 1995

TO: Paul H. Rosendahl, Ph.D., Inc.
(Attn.: Dr. Susan T. Goodfellow, Lab Director)

FROM: Alan C. Ziegler, Zoological Consultant

SUBJECT: Identification of faunal material from PHRI Project 94-1481, Hāna, Maui, Hawai'i, (Site 3150, Fea. A and Fea. D), received 28 July 1995.

I have identified this faunal material to the lovest taxonomic level possible for me, and am returning it all to you along with this MEMO in one box by prepaid Certified First Class mail, Return Receipt Requested. An INVOICE covering the 2 hours spent on this work is also enclosed here.

Each of the labeled plastic bags I received contained primarily the vertebrate faunal remains from a discrete excavation unit (i.e., from a particular site, feature, unit, layer and/or level, etc.). For each of these excavation units I have identified and separated the material into various faunal categories, and placed the remains of each category in an individual stapled plastic bag along with a yellow-paper slip giving the name of the particular category represented, and sometimes a pertinent comment on the material (--but, note, to keep the identification time to a minimum, not the provenience, which appears only on the labeled original plastic container bag(s) kept with the material).

To allow possible future weighing of the material from each faunal category without the time and trouble of removing the material from each of my faunal-category bags, I might note that each of these bags is of (approximately) the same weight as all of the others, bears one staple, and contains a single paper-slip label of uniform weight; thus you should be able to deduct an identical tare weight throughout any in-bag weighing procedure.

All of the lots of stapled faunal category bags from each excavation unit have then been put in a sandwich-size plastic bag along with the original labeled container bag(s). (These various stapled bags with yellow-paper identification slips are arranged within each zip-loc bag in the same order as the category names appear on the Faunal Category List described below.) Any remains identified as "Artifact" have similarly been placed in individual stapled bags, with an identification of the faunal material or non-faunal substance apparently represented by the original raw material. Additionally, from the original bags I segregated and saved in individual stapled plastic bags any non-faunal and invertebrate items encountered; although you may not need some of them, this retention and segregation will allow their weights to be deducted from the "Bone" weights appearing on the original container bags if this is desired.

To explain the faunal categories used for the present material, I have included with this MEMO a 2 March 1995 revision of essentially the same general Faunal Category List used in all earlier work for you, which still contains all previously identified categories, and which did not need updating because no new faunal categories appeared in the present material. It should be noted in this Faunal Category List that when I mention the common or scientific name of genera or species in explanations of the more-generalized faunal categories--as, for example, in "Medium Bird" or "Small-to-Medium Mamal"--unless it is obviously indicated otherwise, I intend these names to convey only an idea of the general size of the animal represented rather than to definitely indicate that any specific taxon mentioned is necessarily present in the material.

For some identifications on the yellow-paper slips, I have prefixed the name of a family, genus, or species with "cf.". This means that the material seems extremely close osteologically to the taxon named and quite likely belongs to it, but I cannot entirely rule out the possibility that an extinct, accidental, or extremely rare, morphologically similar form--although, usually of the same order, family, or genus--is represented instead. For most later compilation purposes, however, I would advise simply omitting the "cf." whenever you see it in my identifications (--I guess the main reason I use it at all is to let any possible future identifiers examining the bones know that I did realize that in some cases there was an alternative, although unlikely, identification possible).

In the case of fish other than sharks, rays, and eels, whenever vertebrae were present, I have given approximate total lengths of the particular individuals involved (written as "Len's. = ..."), based on comparison of vertebra size with that of prepared skeletal specimens of known length. These estimates could well be off by perhaps 20-30% (depending on species represented and position of the vertebrae in the spinal column) but they will serve to give you at least a general idea of the size of many of the fish present.

I have not attempted to age birds, except to note on the yellow-paper slips any obviously immature bones present (usually meaning nestlings in species other than chicken and other precocial ground-living birds), lack of any such notation meaning that the bird bones are apparently of adult individuals. For mammals other than rodents, whenever possible I have endeavored to give a general idea of age at death (in the case of appropriate material often estimating the probable minimum and/or maximum chronological age at death by reference to published tables--when available--of dental replacement sequence or stage of long-bone epiphyseal union).

You may already routinely present the following in each of your archaeological excavation reports but, in case you do not, I hope you will consider including a minimal faunal-data table in each such final paper. That is, a simple table (similar to the sample included as an ATTACHMENT to this MEMO) for each test pit or other equivalent unit, giving at least the actual numbers and/or weights of the bones/fragments per level assigned to each faunal category that occurs in the excavation unit. This is so possible future investigators will always have available these raw faunal data, along with other information such as midden volumes contained in your

report, for use in faunal analysis calculations that, for one reason or another, you may not have carried out.

As I mentioned to you previously, I usually do not write up a formal faunal analysis report per se (--having found that, in terms of the amount that would have to be paid for my time, this is much more expeditiously done by personnel who have more ready access than I do to the complete original excavation data in your files--) but, instead, I provide a series of general and specific, largely subjective, comments (as I have done below) regarding the identified faunal material. I assume these comments would be most meaningful to you when considered jointly with any tabulation you may make of the material. These comments can then be quoted or paraphrased, or the information contained in them otherwise utilized in the manner most suitable to the style of the final overall project report.

COMMENTS ON PHRI PROJ. 94-1481, HĀNA, MAUI, HAWAI'I, FAUNAL MATERIAL

Both of the Features excavated seem obviously related to human activity during at least the Historic Period, both containing presumed discarded food remains. There is no evidence that the areas were ever significantly used by a nonhuman mammalian or avian predator. Remains of only two vertebrate classes are present: bony fishes and mammals; none of the latter type seems obviously to be human.

FEA. A. The material from this sample comprises only a medium-sized fish of undetermined family, and an adult Domestic Goat/Sheep; the presence of the latter category indicates a post-Contact deposition time.

FEA. D. The only fish represented in this sample is apparently a "Sparid", and is of relatively very large body size (50-60 or more cm in length?) for the single species of the family found in Hawai'i. This fish was probably hooked over the reef (as opposed somewhere in the open ocean), with or without the use of a watercraft, but, of course, it could also possibly have been speared, netted, or taken in some other manner in this same area.

As far as the mammals are concerned, at least two pig individuals are represented, both of which are relatively well grown, that is, fairly large in body size. Remains of a "Large Mammal" (--terrestrial, and thus post-Contact--) are also present, and some of these bones as well as probably those of pig are metal-sawed, confirming a post-Contact deposition time for at least part of the sample.

The preceding information is obviously limited because of the relatively small size of both samples, but I hope it will still be of some interest and aid to you. Many thanks for the chance to work on this material, and please be sure to let me know if there are any questions on any of my procedures, identifications, or comments. Continued best in everything !!

• • •

Appendix C

Traffic Assessment for the Proposed Hana Community Healthcare Campus

Wilson Okamoto & Associates, Inc.
December 1998

TRAFFIC ASSESSMENT

FOR THE PROPOSED

HANA COMMUNITY HEALTHCARE CAMPUS

Prepared For:

KOBER/HANSSEN/MITCHELL ARCHITECTS
55 Merchant Street
Honolulu, HI 96813

Prepared By:

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

December 1998

TABLE OF CONTENTS

LIST OF EXHIBITS

APPENDICES

TRAFFIC ASSESSMENT
FOR THE PROPOSED
HANA COMMUNITY HEALTHCARE CAMPUS

I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to identify and assess the potential traffic impacts resulting from the redevelopment of the Hana Community Healthcare Campus, which is located on Hana Highway on the island of Maui. The proposed project will include the redevelopment of the existing health care facility as well as a health and wellness center, on-site staff housing, administrative and medical support facilities, and additional parking.

B Scope of Study

This report presents the findings and conclusions of the traffic study, the scope of which includes:

1. Description of the existing and proposed functions.
2. Description of the proposed redevelopment.
3. Evaluation of existing traffic operations in the immediate vicinity of the project.
4. Development of trip generation characteristics for the proposed project.
5. Evaluation of site-generated traffic and traffic distribution.
6. Analysis of future roadway and traffic conditions.
7. Identification and analysis of traffic impacts resulting from the proposed redevelopment.

8. Recommendations of improvements, if appropriate, that would mitigate the traffic impact resulting from the proposed redevelopment.

II. PROJECT DESCRIPTION

A. Location

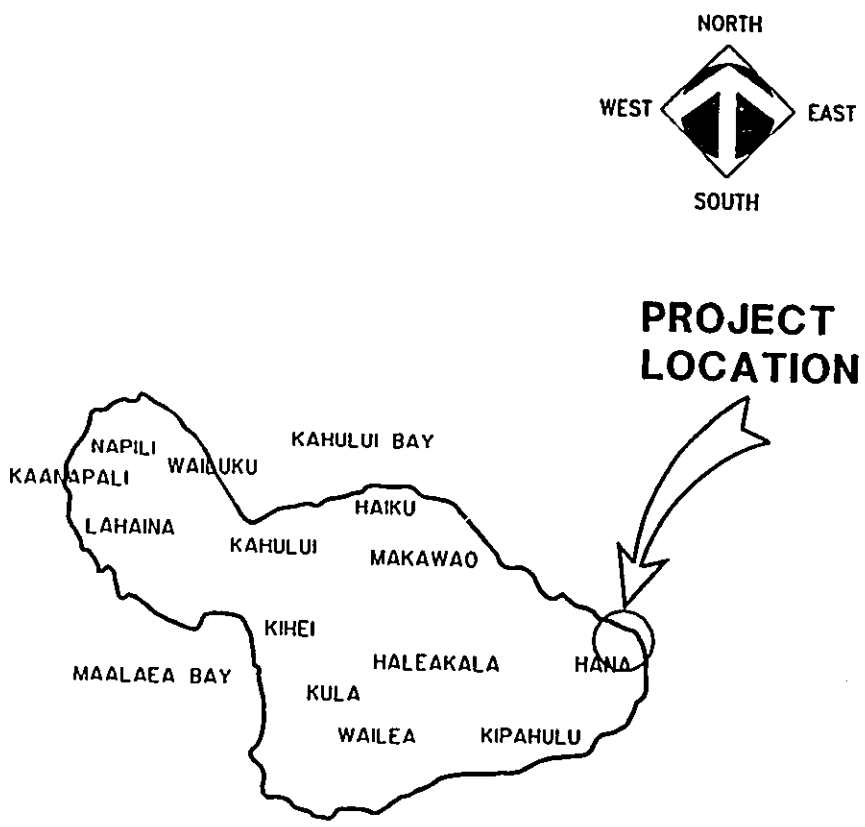
The project site is located on Hana Highway in Hana, Maui, as shown on Exhibit 1. The project site is further identified as Tax Map Key: 2-1-4-03: 24 and 22. Access to the site is through a driveway intersecting Hana Highway just north of the intersection with Uakea Road.

B. Project Characteristics

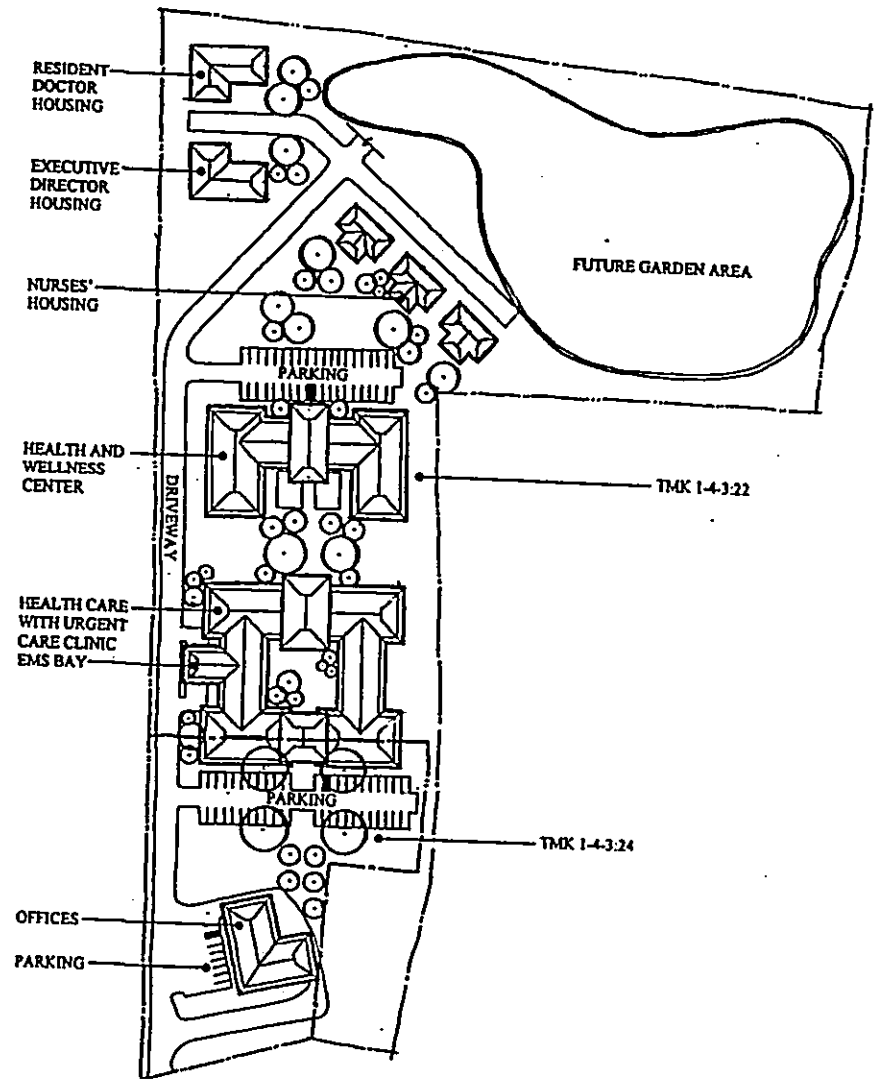
The Hana Community Healthcare Campus redevelopment plans include the following proposed floor areas and respective functions:

1. Additional Medical Facilities	3,530 square feet (sf)
2. Ancillary Medical Service Facilities	480 sf
3. Miscellaneous Shared Facilities	1,550 sf
4. Administrative Facilities	2,840 sf
5. Utility Support Facilities	280 sf
6. Health and Wellness Center	10,360 sf
7. Staff Housing	9,800 sf
8. Existing Clinic Renovation	3,700 sf
TOTAL PROJECT AREA =	34,710 sf

Exhibit 2 shows the proposed site plan.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS	EXHIBIT
	LOCATION MAP	1



KOBER/HANSSEN/MITCHELL ARCHITECTS

WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS	EXHIBIT
	PROJECT SITE PLAN	2

The existing Hana Medical Center is a 4,020 square-foot (sf) building that is accompanied by a 1,392 sf office and residence of the facility's Executive Director, a 1,233 sf building used for emergency medical services, and a 1,100 sf structure used for storage and utility purposes. The gross floor area for the existing Hana Medical Center is approximately 7,745 sf.

III. EXISTING TRAFFIC CONDITIONS

A. General

Hana Highway is the only paved roadway that provides vehicular access for residents and tourists to Hana Town, a community that is remote from Maui's urbanized areas. The scenic drive to Hana Town is a major visitor attraction for the island. Consequently, tourists comprises a large portion of the traffic on the highway. The highway provides access to other popular tourist areas south of Hana Town, including Hamoa Beach, Seven Pools, and Kipahulu Falls.

B. Area Roadway System

Hana Highway traverses the north-northeast portions of the island linking the various communities and commercial/industrial centers along its alignment. Hana Highway is oriented along the coast from Kaahumanu Avenue in Kahului to Hana Bay. Fronting Hana Medical Center, Hana Highway is a two-lane, two-way roadway that traverses Hana Town. Just south of the Hana Medical Center, Hana Highway intersects Uakea Street to form an unsignalized intersection.

C. Traffic Volumes and Conditions

1. General

a. Vehicular Traffic Survey

Traffic volumes on Hana Highway obtained from the State Department of Transportation (DOT) were taken on May 5, 1997 at the closest count station located on Hana Highway at Kailua Bridge, north of the project site. Average Daily Traffic (ADT) along Hana Highway is comprised of approximately 1700 trips, which is distributed fairly consistently between the hours of 6:00 AM and 8:00 PM. However, the data indicates that there are minor peaks in traffic during the morning, mid-day, and afternoon periods which generally occur between 8:00 and 9:00 AM, 10:00 AM and 11:00 AM, and 3:15 and 4:15 PM, respectively. For the purpose of this study, the traffic volumes in each study period were increased by 20% to conservatively account for internal vehicular trips within Hana Town.

b. Capacity Analysis Methodology

The highway capacity analysis performed for this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, 1994, and the "Highway Capacity Software", developed by the Federal Highway Administration.

Level of Service (LOS) is a quantitative and qualitative assessment of traffic operations. Levels of

Service are defined by LOS "A" representing a desirable or an ideal operating condition and LOS "F" representing an undesirable operating condition. The LOS definitions are attached for reference.

"Volume-to-Capacity" (v/c) ratio is another measure indicating the relative traffic demand to the road carrying capacity. A v/c ratio of one (1.00) indicates that the roadway is operating at capacity. A v/c ratio of greater than 1.00 indicates that the projected traffic demand exceeds the road's carrying capacity.

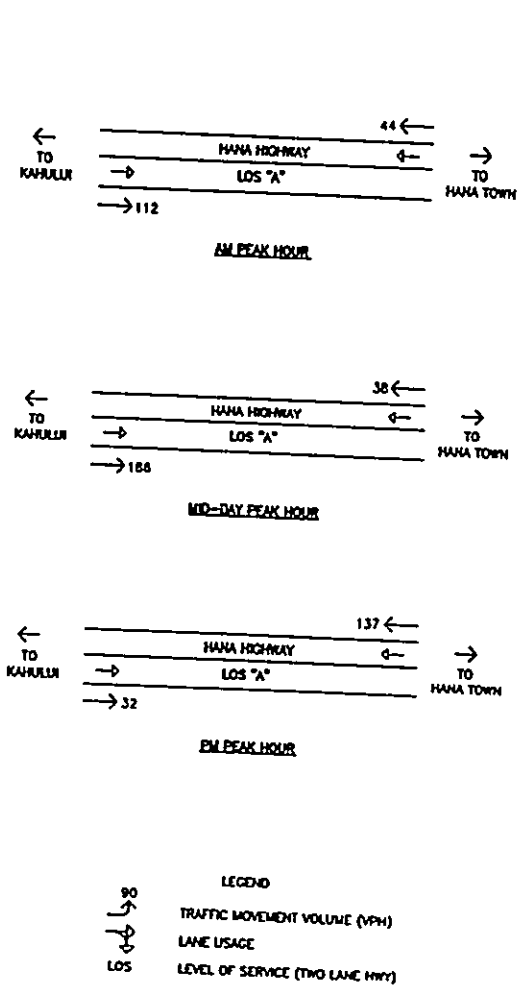
2. Existing Peak Hour of Traffic

a. General

Exhibit 3 shows the existing AM, mid-day, and PM peak hour traffic volumes and operating traffic conditions. The aforementioned AM peak hour of traffic would generally occur between 8:00 AM and 9:00 AM on Hana Highway fronting the Hana Medical Center. The mid-day peak hour would generally occur between 10:00 AM and 11:00 AM. The PM peak hour would generally occur between 3:15 PM and 4:15 PM.

b. AM Peak Hour

During the existing AM peak hour of traffic, Hana Highway, fronting the Hana Medical Center carries approximately 156 vehicles, 112 vehicles southbound and 44 vehicles northbound. This section of roadway operates at LOS "A" and at a v/c ratio of 0.08. Traffic is generally light with no observed traffic operational problems.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS	EXHIBIT
	EXISTING PEAK HOUR TRAFFIC	3

c. Mid-Day Peak Hour

During the existing mid-day peak hour of traffic, Hana Highway, fronting the Hana Medical Center carries approximately 224 vehicles, 186 vehicles southbound and 38 vehicles northbound. This section of roadway operates at LOS "A" and at a v/c ratio of 0.11. No traffic operational problems were also observed during the mid-day peak hour of traffic.

d. PM Peak Hour

During the PM peak hour of traffic, Hana Highway, fronting Hana Medical Center, carries approximately 169 vehicles, 137 vehicles northbound and 32 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ratio of 0.09. Similar to the AM and mid-day peak hour operations, traffic is generally light with no observed traffic operational problems.

IV. PROJECTED TRAFFIC CONDITIONS

A. Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 5th Edition", 1991. The ITE trip rates are developed empirically, by correlating the vehicle trip generation data with land use characteristics, such as the total number of vehicle trips generated per 1,000 gross square feet of the facility. Table 1 shows a summary of the project vehicle trip generation.

TABLE 1. TRIP GENERATION SUMMARY

INDEPENDENT VARIABLE: GROSS SQUARE FEET INCREASE			
			TRIP ENDS (PROJECTED)
PEAK HOUR OF ADJACENT STREET	AM PEAK HOUR	ENTER	56
		EXIT	17
		TOTAL	73
	MID-DAY PEAK HOUR	ENTER	64
		EXIT	33
		TOTAL	97
	PM PEAK HOUR	ENTER	33
		EXIT	77
		TOTAL	110

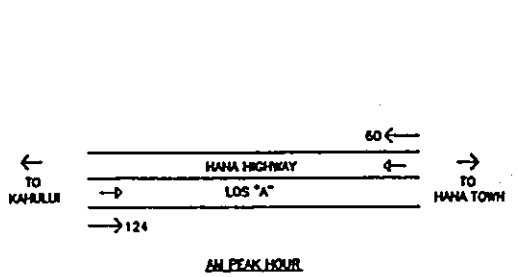
2. Trip Distribution

The projected site-generated trips were assigned to Hana Highway based upon the existing travel characteristics and directional distribution of traffic on the roadway.

For the purpose of this study, it is assumed that this directional distribution of traffic generated by the proposed project would remain the same as existing. Although traffic volumes are expected to increase minimally, the distribution of traffic should remain similar to existing conditions.

D. Total Traffic Volumes With Project

Exhibit 4 shows the projected cumulative AM, mid-day, and PM peak hour traffic conditions resulting from the proposed Hana Community Healthcare Campus. The cumulative volumes consist of site-generated traffic superimposed over existing traffic demands.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS PEAK HOUR TRAFFIC WITH PROJECT	EXHIBIT 4

V. TRAFFIC IMPACT ANALYSIS

A. Projected AM Peak Hour of Traffic

During the projected AM peak hour of traffic, Hana Highway, just north of Uakea Road, would carry 184 vehicles, 60 vehicles northbound and 124 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ratio of 0.09. The traffic impact to existing traffic conditions on Hana Highway fronting the project site would be relatively minimal as a result of the proposed medical facility.

B. Projected Mid-Day Peak Hour of Traffic

During the projected mid-day peak hour of traffic, Hana Highway, just north of Uakea Road, would carry 262 vehicles, 49 vehicles northbound and 213 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ration of 0.12. Traffic operations during the mid-day peak period would operate satisfactorily

C. Projected PM Peak Hour of Traffic

During the projected PM peak hour of traffic, Hana Highway, just north of Uakea Road, is expected to carry 211 vehicles, 164 vehicles northbound and 47 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ratio of 0.11.

Similar to projected AM and mid-day traffic conditions, vehicular traffic would continue to operate at satisfactory conditions.

VI. CONCLUSIONS

The proposed Hana Community Healthcare Campus would not have a significant impact on traffic operations in the vicinity of the project. The vehicular traffic generated by the proposed project during the AM peak hour and PM peak hour is relatively low and near the suggested minimum of 100 vehicles per hour to warrant a traffic impact study as recommended by ITE. The majority of the traffic

demand on Hana Highway resulting from the project would primarily be spread evenly throughout the study peak periods.

The following section presents recommendations to improve or maintain traffic conditions at the intersection of Hana Highway and the project driveway.

VII. RECOMMENDATIONS

1. Maintain sufficient sight distances for motorists to safely enter and exit the project driveway.
2. Provide adequate patient loading and off-loading areas.
3. Provide adequate turn-around area for delivery and refuse vehicles to maneuver on the project property.
4. Provide sufficient roadway width to accommodate safe vehicular ingress and egress.

APPENDIX A

LOS DEFINITIONS

LEVELS OF SERVICE CRITERIA FOR TWO-LANE HIGHWAYS

The highest quality of traffic service occurs when motorists are able to drive at their desired speed, representative of Level of Service A. Almost no platoons of three or more vehicles are observed. Drivers would be delayed no more than 30 percent of the time by slow-moving vehicles. A maximum flow rate of 420 pcph, total in both directions, may be achieved under ideal conditions.

Level of Service B characterizes the region of traffic flow where drivers are delayed up to 45 percent of the time on the average. Service flow rates of 750 pcph, total in both directions, can be achieved under ideal conditions. Above this flow rate, the number of platoons forming in the traffic stream begins to increase dramatically.

Further increases in flow characterize Level of Service C, resulting in noticeable increases in platoon formation, platoon size, and frequency of passing impediment. At high volume levels, chaining of platoons and significant reductions in passing capacity begin to occur. While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles. Percent time delays are up to 60 percent. A service flow rate of up to 1,200 pcph, total in both directions, can be accommodated under ideal conditions.

Unstable traffic flow is approached as traffic flows enter Level of Service D. The two opposing traffic streams essentially begin to operate separately at higher volume levels. Mean platoon sizes of 5 to 10 vehicles are common, although speeds of 50 mph can still be maintained under ideal conditions. The fraction of no passing zones along the roadway section usually has little influence on passing. Turning vehicles and/or roadside distractions cause major shockwaves in the traffic stream. The percentage of time motorists are delayed approaches 75 percent. Maximum service flow rates of 1,800 pcph, total in both directions, can be maintained under ideal conditions. This is the highest flow rate that can be maintained for any length of time over an extended section of level terrain without a high probability of breakdown.

Level of Service E is defined as traffic flow conditions on two-lane highways having a percent time delay of greater than 75 percent. Passing is virtually impossible under Level of Service E conditions, and platooning becomes intense when slower vehicles or other interruptions are encountered.

The highest volume attainable under Level of Service E defines the capacity of the highway. Under ideal conditions, capacity is 2,800 pcph, total in both directions. Operating conditions at capacity are unstable and difficult to predict. Traffic operations are seldom observed near capacity on rural highways, primarily because of a lack of demand.

As with other highway types, Level of Service F represents heavily congested flow with traffic demand exceeding capacity. Volumes are lower than capacity. Level of Service E is seldom attained over extended sections on level terrain as more than a transient condition; most often, perturbations in traffic flow as Level E is approached cause a rapid transition to Level of Service F.

APPENDIX B

CAPACITY ANALYSIS CALCULATIONS (Existing Condition)

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... AM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.81
DIRECTIONAL DISTRIBUTION (UP/DOWN)	28 / 72
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.82	1
B	2.2	2	2.5	1	.82	1
C	2.2	2	2.5	1	.82	1
D	2	1.6	1.6	1	.82	1
E	2	1.6	1.6	1	.82	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 156
ACTUAL FLOW RATE: 193

LOS	SERVICE FLOW RATE	V/C
A	344	.15
B	620	.27
C	987	.43
D	1469	.64
E	2296	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... MID-DAY PEAK
DATE OF ANALYSIS..... 12-28-98
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.94
DIRECTIONAL DISTRIBUTION (UP/DOWN)	17 / 83
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.81	1
B	2.2	2	2.5	1	.81	1
C	2.2	2	2.5	1	.81	1
D	2	1.6	1.6	1	.81	1
E	2	1.6	1.6	1	.81	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 224
ACTUAL FLOW RATE: 238

LOS	SERVICE FLOW RATE	V/C
A	339	.15
B	609	.27
C	970	.43
D	1444	.64
E	2257	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... PM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.84
DIRECTIONAL DISTRIBUTION (UP/DOWN)	81 / 19
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.82	1
B	2.2	2	2.5	1	.82	1
C	2.2	2	2.5	1	.82	1
D	2	1.6	1.6	1	.82	1
E	2	1.6	1.6	1	.82	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 169
ACTUAL FLOW RATE: 201

LOS	SERVICE FLOW RATE	V/C
A	345	.15
B	621	.27
C	990	.43
D	1473	.64
E	2302	1

LOS FOR GIVEN CONDITIONS: A

D

APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
(Projected Conditions)

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... AM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION.... WITH PROJECT

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.81
DIRECTIONAL DISTRIBUTION (UP/DOWN)	33 / 67
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.91	1
B	2.2	2	2.5	1	.91	1
C	2.2	2	2.5	1	.91	1
D	2	1.6	1.6	1	.91	1
E	2	1.6	1.6	1	.91	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 184
ACTUAL FLOW RATE: 227

LOS	SERVICE FLOW RATE	V/C
A	382	.15
B	688	.27
C	1096	.43
D	1631	.64
E	2548	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... MID-DAY PEAK
DATE OF ANALYSIS..... 12-28-98
OTHER INFORMATION.... W/ PROJECT

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.94
DIRECTIONAL DISTRIBUTION (UP/DOWN)	19 / 81
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.82	1
B	2.2	2	2.5	1	.82	1
C	2.2	2	2.5	1	.82	1
D	2	1.6	1.6	1	.82	1
E	2	1.6	1.6	1	.82	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 262
ACTUAL FLOW RATE: 279

LOS	SERVICE FLOW RATE	V/C
A	345	.15
B	621	.27
C	990	.43
D	1473	.64
E	2302	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... PM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION.... WITH PROJECT

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.84
DIRECTIONAL DISTRIBUTION (UP/DOWN)	78 / 22
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.84	1
B	2.2	2	2.5	1	.84	1
C	2.2	2	2.5	1	.84	1
D	2	1.6	1.6	1	.84	1
E	2	1.6	1.6	1	.84	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 211
ACTUAL FLOW RATE: 251

LOS	SERVICE FLOW RATE	V/C
A	354	.15
B	637	.27
C	1014	.43
D	1509	.64
E	2358	1

LOS FOR GIVEN CONDITIONS: A

2000-06-23-MA-FEA-

Final Environmental Assessment / Finding of No Significant Impact

Hana Community Healthcare Campus

Hana, Maui, Hawaii

Prepared for
Kober / Hanssen / Mitchell Architects

Prepared by
Wilson Okamoto & Associates, Inc.
Engineers and Planners

May 2000

Final Environmental Assessment

THE HANA COMMUNITY HEALTHCARE CAMPUS

Hana, Maui, Hawaii

Prepared for:

Kober/Hanssen/Mitchell Architects

55 Merchant Street, Suite 1400

Honolulu, Hawaii 96813

Prepared by:

Wilson Okamoto & Associates, Inc.

Engineers and Planners

1907 South Beretania Street, Suite 400

Honolulu, Hawaii 96826

May 2000

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF PHOTOGRAPHS

PREFACE

This Final Environmental Assessment (EA) has been prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Title 11, Chapter 200, Administrative Rules, Department of Health, State of Hawaii, and 24 Code of Federal Regulations Part 58 regarding the U.S. Housing and Urban Development's environmental review procedures for Community Development Block Grant (CDBG) programs. Proposed is an agency action by the County of Maui Mayor's Office to develop a new comprehensive healthcare facility at the site of the existing Hana Community Health Center in Hana on the Island of Maui. The project will be developed by the Hana Community Healthcare Center, a non-profit community-based organization that operates the current healthcare center. Compliance with the provisions of 24 CFR part 58 is required in conjunction with the acquisition of CDBG funding for the design and construction of the proposed project. The accepting authority for the EA is the County of Maui Mayor's Office.

SUMMARY

Applicant:	County of Maui, Mayor's Office
Accepting Agency:	County of Maui, Mayor's Office
Project Location:	Hana, Maui, Hawaii
Tax Map Keys:	(2) 1-4-03: 22 and 24
Area:	12.106 acres
Recorded Fee Owner:	State of Hawaii (Currently under General Lease No. S-5548 to the Hana Community Health Center, Inc.)
Existing Use:	Hana Community Health Center
State Land Use Classification:	Parcel 22 - Agricultural/Rural Parcel 24 - Rural
Community Plan Designation:	Public/Quasi-Public
County Zoning Designation:	Interim
Proposed Action:	Community Health Campus
Impacts:	Flora and Fauna: Most of the existing vegetation, particularly the overgrowth in the untended mauka ten acres in Parcel 22, will be cleared. To the extent possible, however, the existing large monkeypod, coconut, and other significant trees will be preserved and incorporated into the landscaping for the proposed facility. According to the U.S. Fish and Wildlife Service, no Federally threatened or endangered species have been identified on the project site. They further indicated that they have no objections to the project. Historic and Archaeological Resources: There are currently five structures located on the project site. With the exception of the

existing health center building, it is probable that one or more of the buildings may meet the minimum age criterion of 50 years to be eligible for inclusion on the Register of Historic Places. In addition, there is a concrete incinerator structure located near the center of the property that may also meet this criterion. Contingent on consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site, with the exception of the health center building, which is planned for renovation. The SHPD was consulted during the Draft EA comment period on the disposition of the structures on both parcels with regard to their historic significance. They, and the County of Maui Planning Department, have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that their historic significance, if any, can be substantiated and an appropriate strategy for their treatment determined.

An archaeological survey and subsequent mitigation program and data recovery study were conducted on Parcel 22, which comprises most of the project site. No further work is recommended for the parcel. The State Historic Preservation Division (SHPD) has indicated that both parcel 22 and 24 (the site of the existing health center) that the project will have no effect on archaeological resources.

Traffic: The proposed project will have a negligible effect on traffic conditions along Hana Highway fronting the project site. Traffic conditions during the morning, mid-day, and afternoon peak hours are anticipated to remain at level-of-service "A", indicating ideal operating conditions. In addition, the volume-to-capacity ratios for all peak periods indicate that traffic demand will be well within the capacity of the roadway.

Noise: Noise from construction activities will likely be unavoidable during the entire construction period. Unavoidable construction noise impacts will be mitigated to some degree by the contractor's compliance with provisions of the State DOH Administrative Rules, Title 11, Chapter 46, "Community Noise

Control." noise control regulations. These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable noise levels. In the long term, no significant noise impacts from the operation of the proposed facility are anticipated.

Air Quality: The proposed project will have short-term construction-related impacts on air quality, including the generation of dust and emissions from construction vehicles, equipment, and commuting construction workers. The construction contractor will be responsible for complying with State DOH Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control". Mitigation measures to address short-term impacts include: Minimizing the movement of construction vehicles during peak traffic periods, frequently watering areas of exposed soil, and revegetating as soon as possible on completed areas.

Determination: Finding of No Significant Impact

Parties Consulted During Pre-Assessment:

State of Hawaii Department of Land and Natural Resources
County of Maui, Planning Department

Parties Consulted During Draft EA:

Federal Agencies

U.S. Department of Agriculture - Natural Resources Conservation Service
U.S. Department of the Army - Corps of Engineers
U.S. Department of the Interior - Fish and Wildlife Service
U.S. Department of the Interior - Geological Survey

State of Hawaii

Department of Land and Natural Resources (DLNR)
DLNR State Historic Preservation Division
DLNR Land Division
Department of Transportation

State of Hawaii (continued)
Department of Business, Economic Development and Tourism – Land Use Commission
Department of Health (DOH)
DOH Environmental Division
Office of Environmental Quality Control

County of Maui
Planning Department
Department of Public Works and Waste Management
Department of Water Supply
Police Department
Fire Department

Organizations
Hana Community Association
Maui Electric Co., Ltd.
GTE Hawaiian Tel

1. SETTING AND PROJECT DESCRIPTION

1.1 Project Background

The existing Hana Community Health Center was established by the State of Hawaii in 1996 to serve the Hana District, which comprises 37 percent of the total land area of the Island of Maui. This includes the communities from Keanae to the north and Kaupo to the south, including Nahiku, Hana, and Kipahulu.

Efforts to improve the delivery of health care in Hana began as a community project in February 1993, and culminated in the passage of Act 263 (SLH 1996), which transferred the then State-operated Hana Medical Center to the current non-profit Hana Community Health Center. The actual transfer occurred on July 1, 1997.

1.2 Project Need

Due to the growth in the resident population of Hana, the center is currently inadequate to serve the medical needs of the community. According to the 1990 U.S. Census report, 1,895 residents lived in the Census Tract 301 which comprises most of the Hana District. This represents a 33.2 percent increase from the 1980 population of 1,423. Further, it is projected that the population of the Hana region will increase to 2,170 by the end of year 2000 and to 2,349 to 2,452 by the year 2010. The new facility is needed to properly serve the current and future generations of the Hana district.

The long-range need for health services in the Hana District stems from its geographic isolation from the remainder of the island by its physical boundaries and substantial travel distance. The nearest emergency room located in Wailuku requires a 2-hour drive through 57 miles of arduous roadway and more than 50 single-lane bridges. The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District and, thereby preclude the need for residents to drive to Wailuku for their medical needs.

1.3 Project Location And Ownership

The project site is located in Hana Town on the east coast of Maui. It is situated along mauka side of Hana Highway just north of Uakea Road. The project site is L-shaped encompassing

approximately 12.1 acres on two parcels identified as Tax Map Keys 1-4-03:22 and 24 (See Figures 1 and 2). Both parcels are owned in fee by the State of Hawaii and leased by the Hana Community Health Center.

1.4 Existing and Surrounding Uses

Parcel 24 is bounded by Hana Highway to the east, by private undeveloped property to the south, and by Parcel 22 to the north and west. Parcel 22 is bounded by Parcel 24 to the east, and by private parcels to the north, south, and west. Parcel 22 includes an adjoining sliver of land located along the northern boundary of Parcel 24. Parcel 24 occupies 2.035 acres of land, while Parcel 24 occupies 10.07 acres, for a total of approximately 12 acres.

Parcel 24 is occupied by four structures, including:

1) The 4,020-square foot (s.f.) Hana Community Health Center facility (See Photograph 1);
2) A 1,392-s.f. building which is occupied by the office and residence of the facility's executive director ;
3) A 1,233-s.f. building which is occupied by the emergency medical service (a portion of this structure also lies within Parcel 24);
4) A 1,100-s.f. structure which houses an emergency generator, and refuse storage area.

Photographs 1 through 3 depict three of the four structures. In addition, two cargo containers are situated on the property and are used for archiving patient records and storing yard maintenance equipment.

With the exception of a single, 580-s.f. structure, Parcel 22 is heavily overgrown with vegetation and is not occupied by buildings or other structures. A former commercial plant nursery previously occupied the property, however the business has since ceased its operation. The parcel is otherwise not occupied by any structures.

Surrounding uses in the immediate vicinity of the project site include the Hana Police Station and neighboring Hana Fire Station, both located along Hana Highway to the south of the project site. Single family residences are also situated to the south of the project site along Uakea Road. (See Photographs 4 and 5). Areas to the immediate north and east of the project site are undeveloped.

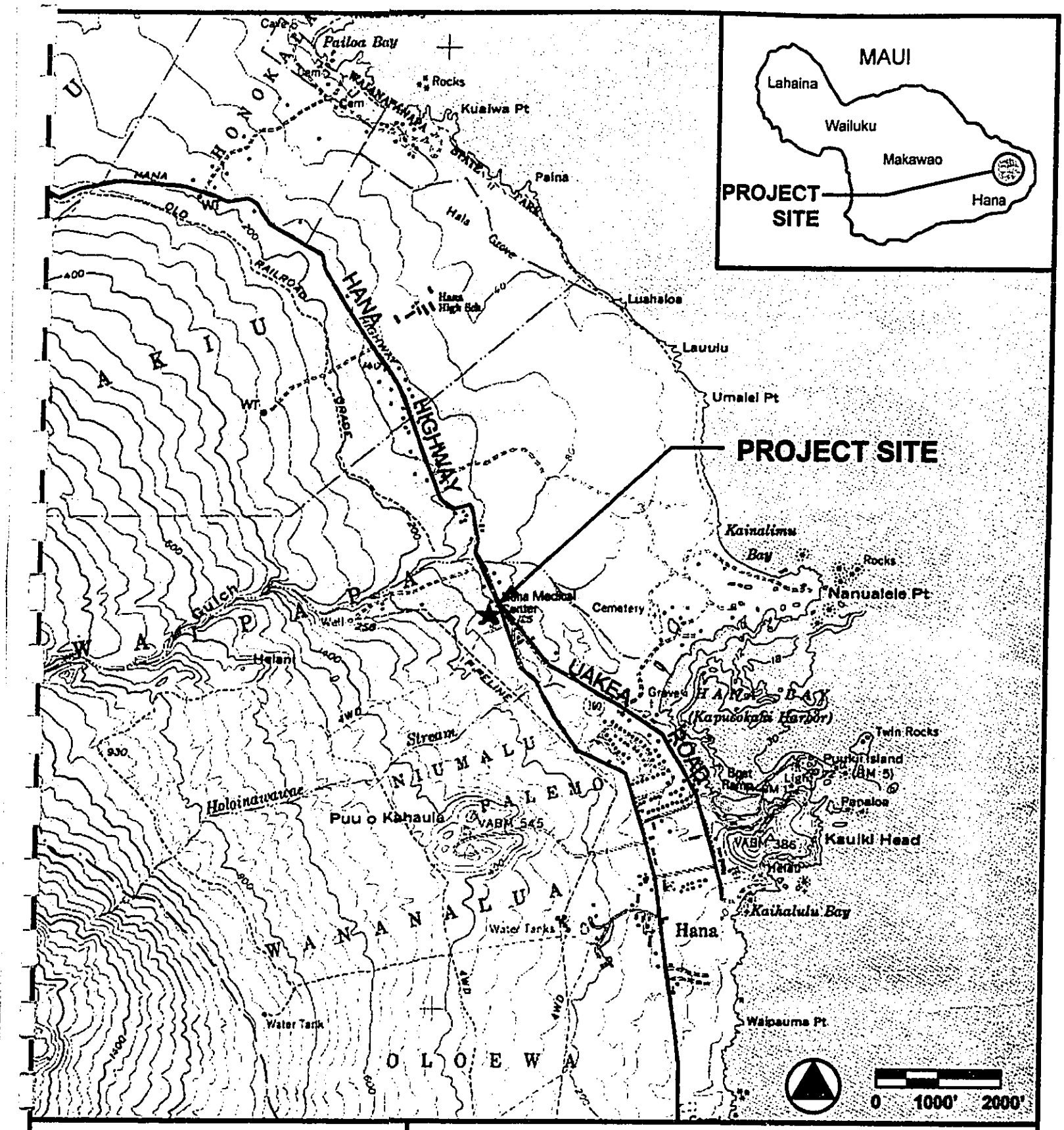


Fig. 1

Hana Community Healthcare Campus

Location Map

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

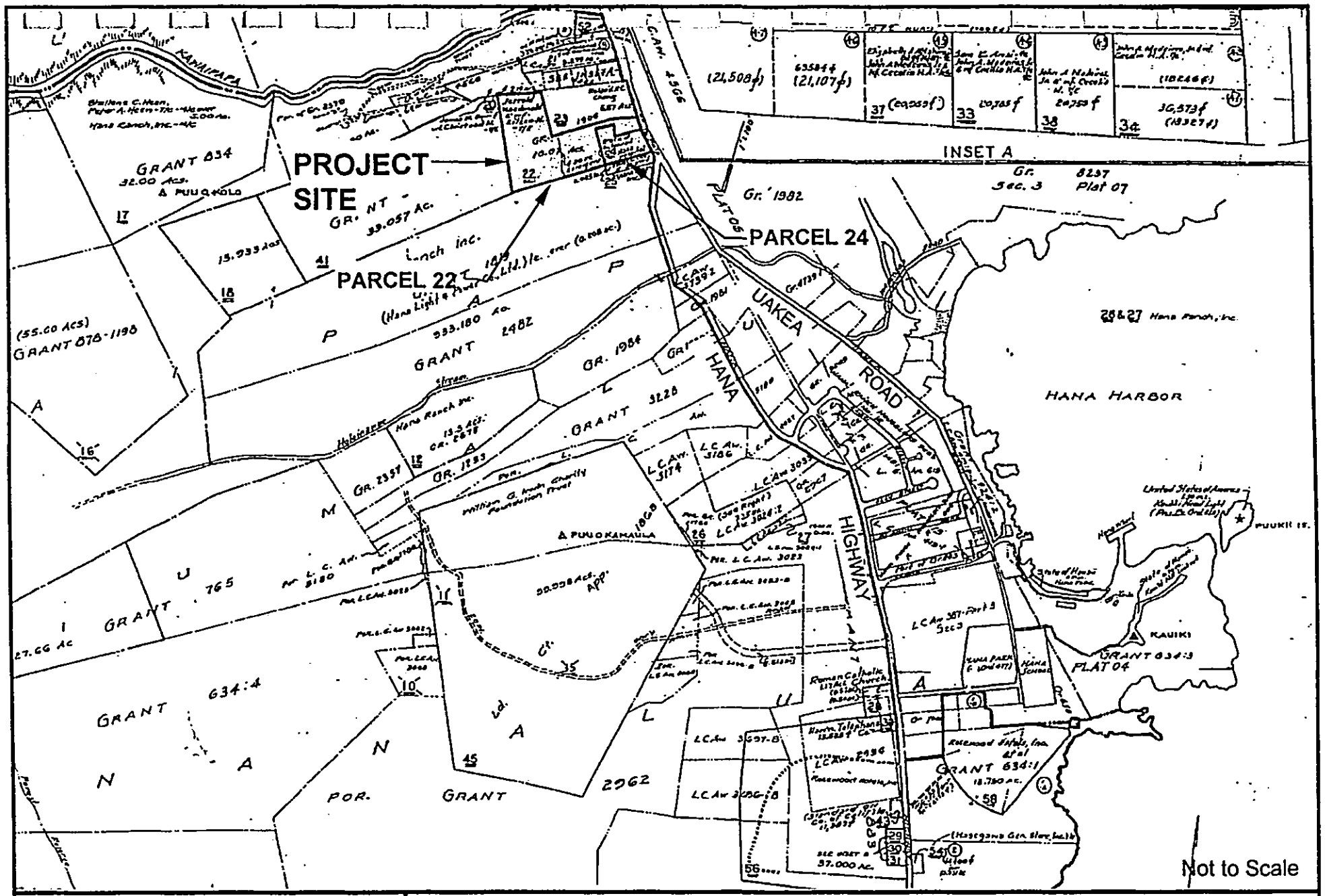


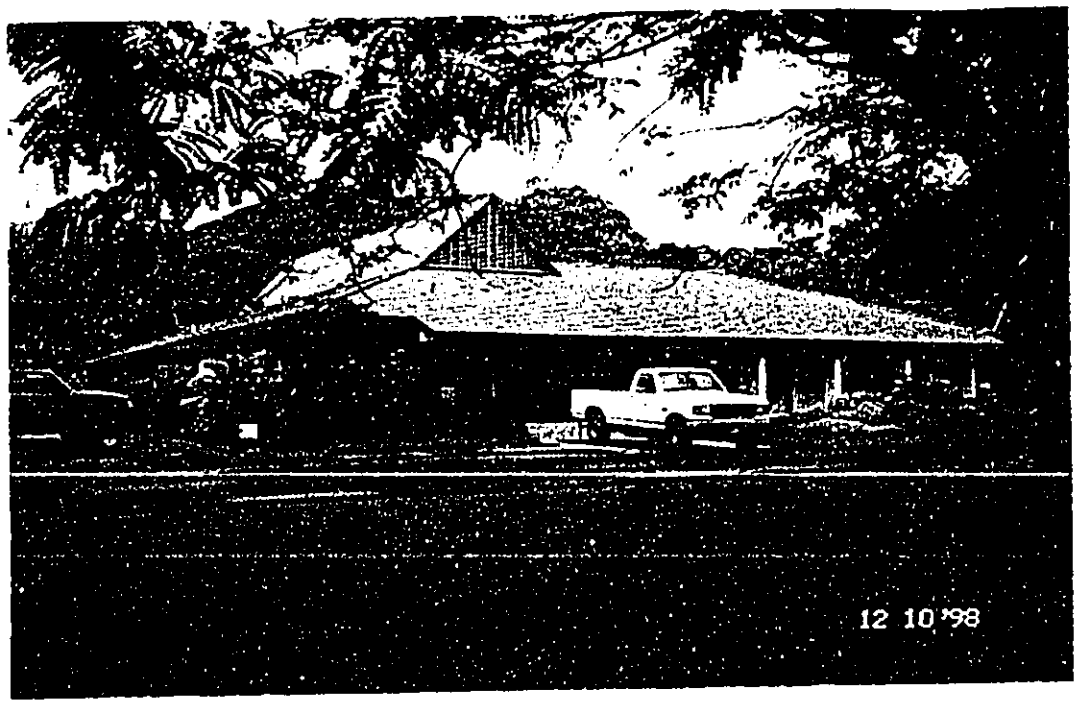
Fig. 2

Hana Community Healthcare Campus

Tax Map Key 1-4-03:22 and 24

Prepared for:
Kober/Hanssen/Mitchell Architects

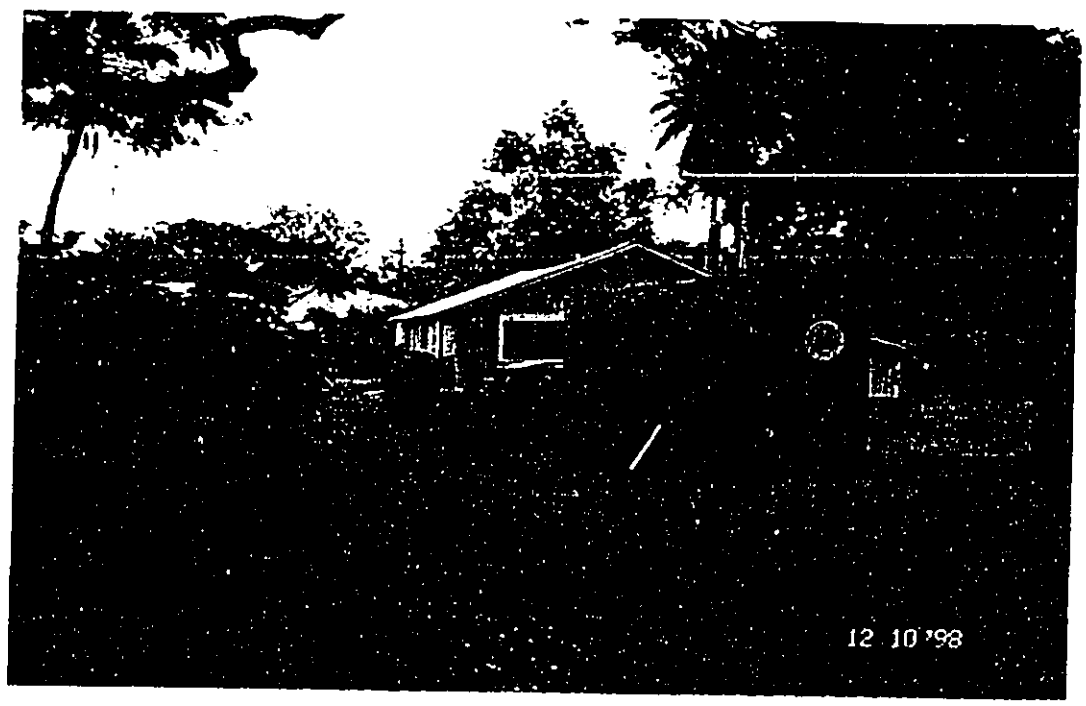
Prepared by:
Wilson Okamoto & Associates, Inc.



Photograph 1: Hana Community Health Center Building

Photograph 2: Residence and office of the executive director

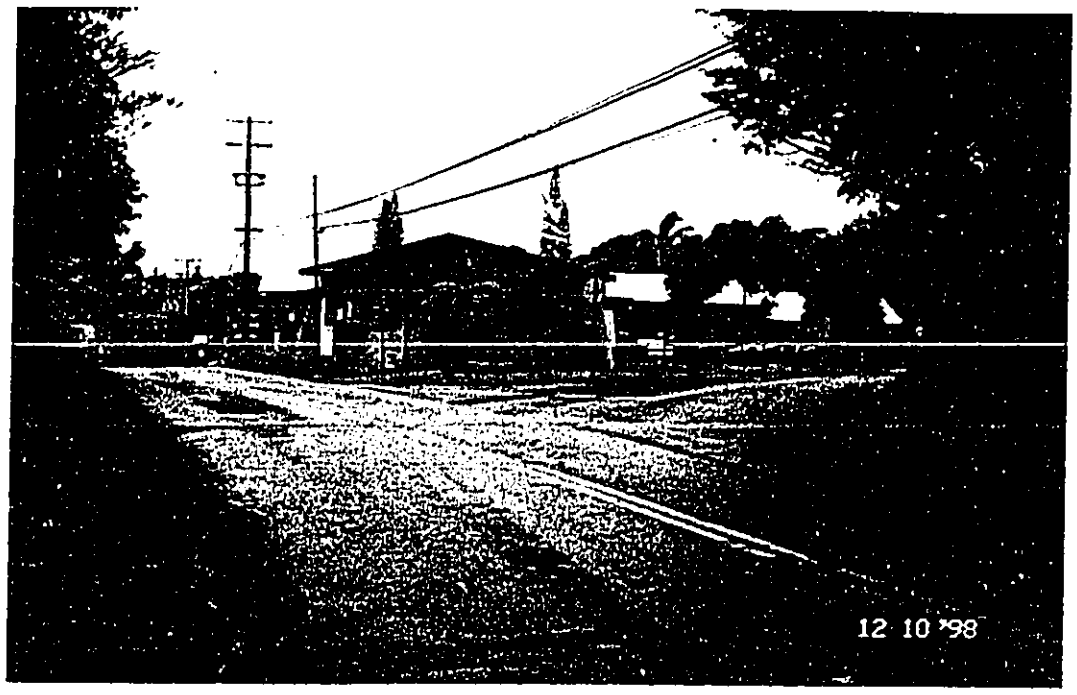
Hana Community Healthcare Campus	**Photographs 1 & 2**
	Prepared for: Kober/Hanssen/Mitchell Architects
	Prepared by: Wilson Okamoto & Associates, Inc.



Former Cargo Container which houses patient records (foreground)

Emergency generator and storage building (reargound)

Hana Community Healthcare Campus	Photograph 3
	Prepared for: Kober/Hanssen/Mitchell Architects
	Prepared by: Wilson Okamoto & Associates, Inc.



Photograph 4: Hana Police Station at intersection of Uakea Road and Hana Highway

Photograph 5: Residence located along Uakea Road across from Hana Police Station

Hana Community Healthcare Campus	Photographs 4 & 5	
	Prepared for: Kober/Hanssen/Mitchell Architects	Prepared by: Wilson Okamoto & Associates, Inc.

1.5 Project Description

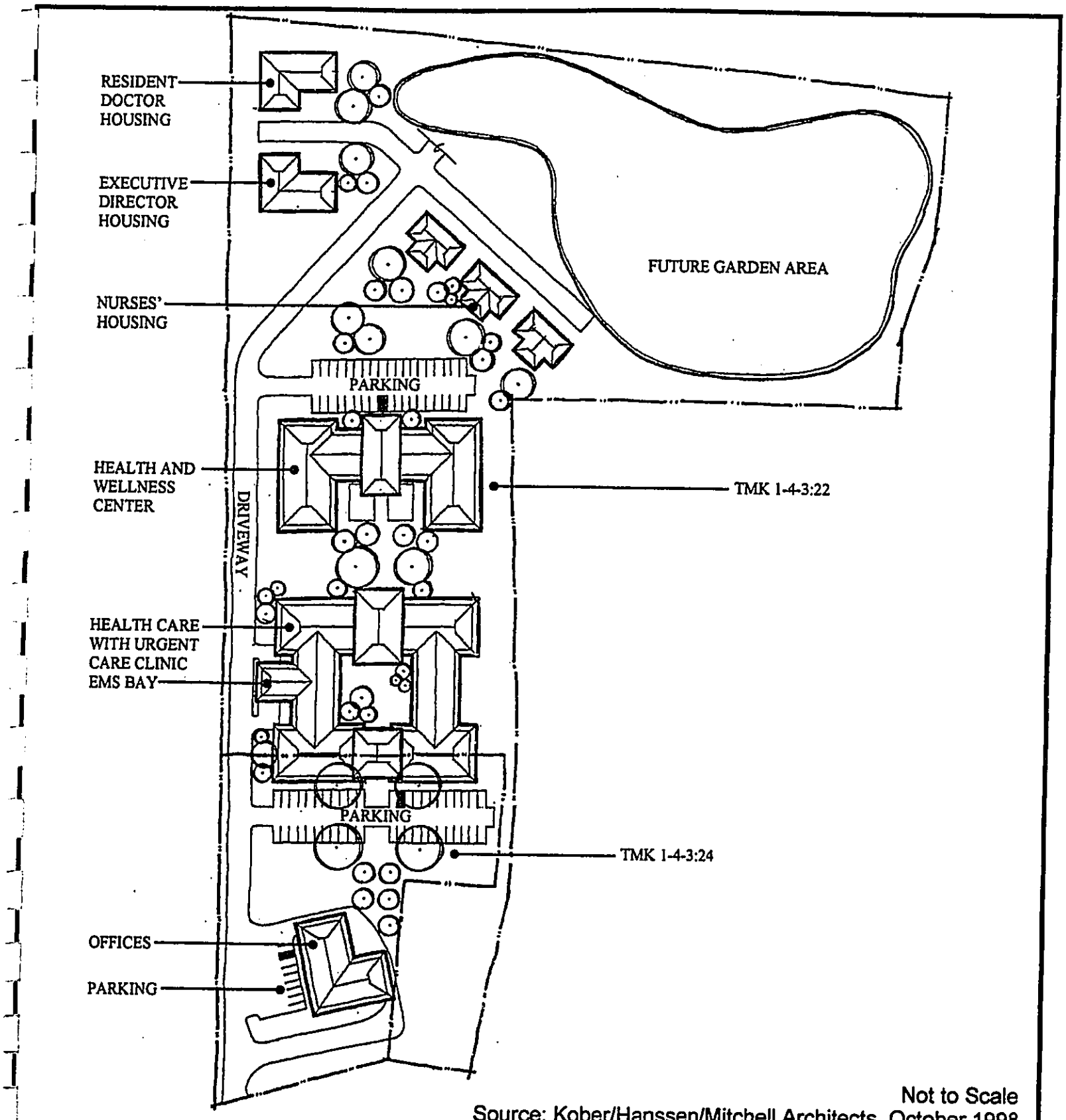
The proposed Hana Community Healthcare Campus will include:

- Construction of a 10,850 s.f. Community Healthcare Center housing facilities for medical and ancillary services, as well as shared administrative and support uses,
- Construction of a 10,360 s.f. Health and Wellness Center housing a conference center, gym, pool, and office,
- Construction of 9,800 s.f. of employee housing for the executive director, on-site physician, and staff nurses,
- Renovation of 4,020 s.f. of floor area within the existing health center building.
- Construction of a total of approximately 104 parking stalls; and
- Establishment of a future garden area
- Demolition of all existing structures with the exception of the health center building

Figure 3 illustrates the conceptual site plan planned for the proposed campus, while Figure 4 illustrates the conceptual elevation envisioned for the Community Healthcare Center.

1.6 Project Schedule and Cost

Construction of the proposed project is anticipated to commence in 2000with completion estimated by 2002, contingent upon the acquisition of project funding. The estimated construction cost of the proposed project is $4.2 million. Funding assistance will be sought from the Community Development Block Grant program for the detailed design and construction of the project.



Not to Scale

Source: Kober/Hanssen/Mitchell Architects, October 1998

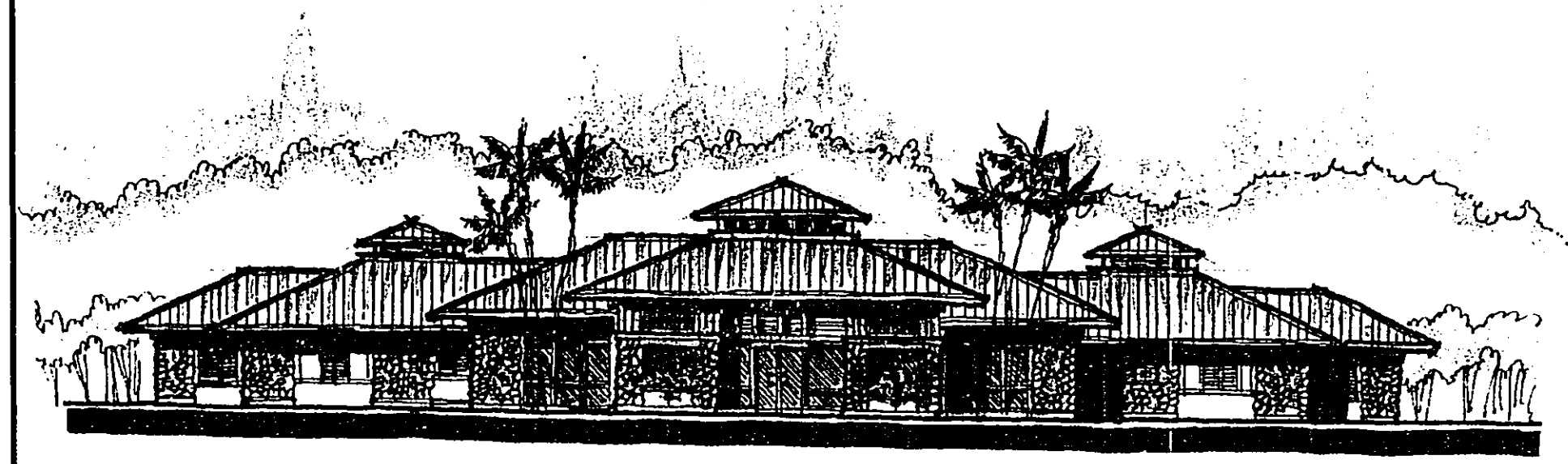
Fig. 3

Hana Community Healthcare Campus

Conceptual Site Plan

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.



Source: Kober/Hanssen/Mitchell Architects, October 1998

Fig. 4

Hana Community Healthcare Campus

Conceptual Elevation

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

2. DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES

The following is a description of the existing environment, assessment of potential project impacts and measures proposed to mitigate potential impacts from the various improvements.

2.1 Climate

Typical of windward areas in the Hawaiian islands, the climate in the area is characterized by cool temperatures, high rainfall, and persistent northeasterly trade winds. Average temperatures range from a low of approximately 71 degrees Fahrenheit (°F) in the coolest month, to a high of approximately 77 degrees in the warmest month. Annual rainfall averages about 83 inches. Northeasterly trade winds ranging from 16 to 18 knots are present most of the year.

Impacts

The proposed project will not affect regional climate.

2.2 Geology and Topography

Maui is composed of two major volcanoes; the older West Maui, and the younger East Maui or Haleakala. The broad, gently sloping plain connecting the two volcanoes was formed when lava from Haleakala banked against the already existing West Maui volcano. East Maui was created from three volcanic series of Haleakala Volcano; the Honomanu, Kula and Hana volcanic series. The project area lies along the eastern slope of Haleakala, and is largely underlain by lava flows of the Hana volcanic series.

Small spatter cones and larger cinder cones associated with the Hana eruptions form prominent hills along the south and east portions of Hana. At an elevation of approximately 160 feet above mean sea level, the project site and surrounding areas are relatively flat and contains no unique or unusual topographic features.

Impacts and Mitigation Measures

No significant impacts on the geology or topography of the project site are anticipated as a result of constructing the proposed facility. Construction will require grading and excavation activities for the building's foundation work. The excavated areas will either be built over, paved over, or backfilled and landscaped to existing contours. To achieve required elevations, grading may slightly alter the current topography of the project site.

2.3 Soils

According the U.S. Department of Agriculture Natural Resources Conservation Service, the soil at the project site is classified as Hana extremely stony silty clay loam, moderately deep variant (HKOC), with 3 to 15 percent slopes. Developed in volcanic ash, soils of the Hana series are typically well-drained. The surface layer is dark-brown silty clay loam that consists of 10 to 15 percent gravel and cobblestones. The subsoil is about 6 to 14 inches thick and consists of a reddish-brown, very friable silty clay loam that has weak, subangular, blocky structure containing 20 to 30 percent gravel and cobblestones. The substratum, at a depth of 20 to 30 inches is fragmental a'a lava. Stones cover 3 to 15 percent of the surface. Runoff is slow to medium, and the erosion hazard is slight to moderate.

The *Detailed Land Classification - Island of Maui* published by the University of Hawaii Land Study Bureau (LSB), evaluates the quality or productive capacity of certain lands on Maui for selected crops and overall suitability in agricultural use. A five-class productivity rating system was established with "A" representing the class of highest productivity and "E" the lowest. Typical of the stony to rocky land of Hana, the project site is classified as "D."

Impacts and Mitigation Measures

No significant impacts on soils at the project site are anticipated with the construction and operation of the proposed facility. Excavation and grading activities associated with construction of the proposed project will be regulated by Chapter 20.08 of the Maui County Code and the National Pollutant Discharge Elimination System (NPDES) permit requirement administered by the State Department of Health (DOH).

An NPDES General Permit for Storm Water Discharges Associated with Construction Activity (Notice of Intent Form C) may be required by the State DOH for construction of the proposed project as the area of soil disturbance from activities such as clearing and grubbing, grading and stockpiling will likely be in excess of five (5) acres. The permit requires a Best Management Practices (BMP) plan which, in turn, requires compliance with County ordinances pertaining to grading, grubbing, stockpiling, soil erosion and sedimentation.

An erosion control plan will be prepared and submitted to the County of Maui Department of Public Works and Waste Management for approval. As appropriate, guidelines provided by the Hawaii Coastal Zone Management Non-Point Source Plan will be incorporated into the erosion control plan. Mitigative measures that will be considered in the erosion control plan include:

- Conduct grubbing and grading activities during the low rainfall months;
- Clear only areas essential for construction;
- Locate potential nonpoint pollutant sources away from steep slopes, water bodies, and critical areas;
- Protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells;
- Cover or stabilize topsoil stockpiles;
- Properly dispose of sediment and debris from construction activities;
- Replant or cover bare areas as soon as grading or construction is completed.

In addition, sediment basins, sediment traps, filter fences, straw bale barriers, or vegetative filter strips will be implemented as appropriate to mitigate erosion.

2.4 Hydrology

2.4.1 Groundwater

The island of Maui has been divided into six aquifer sectors, one of which is the Hana aquifer sector. The project site overlies the Kawaipapa aquifer system, one of four aquifer systems within the Hana sector. Within the Kawaipapa aquifer system, basal groundwater reaches to at

least two miles inland. It is protected at the coast by caprock. Inland, high level dike water in Honomanu basalt lies far below the surface. The estimated sustainable yield of 48 milling gallons per day (mgd) reflects high rainfall in the system.

Impacts and Mitigation Measures

No significant impact to groundwater underlying the project site are anticipated during construction and operation of the proposed facility. Construction activities are not likely to introduce or release to the soil any materials which could adversely affect groundwater. A BMP will be developed to protect the integrity of groundwater resources which, in the project area includes the Kawaipapa aquifer.

2.4.2 Surface Water

There are no natural surface water bodies on the project site. Two perennial streams are located within one-half mile of the project site. Kawaipapa Gulch is located approximately 1,200 feet to the north, and Holoinawawae Stream is located approximately 1,400 feet to the south. The *Hawaii Stream Assessment,* compiled by the State Department of Land and Natural Resources Commission on Water Resource Management represents Hawaii's first step in an attempt to identify streams and rivers with significant natural and cultural qualities that may be appropriate for protection. One purpose of the study was to identify streams with high value stream-related "beneficial uses." These uses or "resources" were categorized into the following four units:

- Aquatic Resources
- Riparian Resources
- Cultural Resources
- Recreational Resources

Elements of these resource categories were identified and ranked as: Outstanding; Substantial; Moderate; Limited; and Unknown. Kawaipapa Stream is classified as "interrupted", identifying streams that flow year-round in the upper portions, and intermittently at lower elevations. The Kawaipapa Gulch was ranked as having moderate recreational resources due to swimming opportunities, and substantial cultural resources. Cultural resources identified include, six historic sites, associated taro cultivation, and the significance of the valley based on National

Register of Historic Places Criteria. Holoinawawae Stream is not listed in the *Hawaii Stream Assessment.*

Impacts and Mitigation Measures

There are no surface water sources on the project site. The closest streams, the Kawaipapa Stream and the Holoinawawae Stream are both located approximately one-half mile from the project site. Construction and operation activities of the proposed facility are not anticipated to affect stream flows or cultural resources associated with the stream.

2.5 Flood Hazard

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panel Number 150003 0320 B (revised June 1, 1981), the project site is designated Zone C, areas of minimal flooding. Due to its elevation and distance from shore, the project site is not subject to coastal hazards such as storm waves and tsunami inundation.

Impacts and Mitigation Measures

Due to its location on a gently sloping site, it is unlikely that construction and operation of the proposed facility would result in flooding of the project site or lower elevation properties.

2.6 Flora and Fauna

The two-acre Parcel 24 (upon which the existing Hana Health Center sits) is presently landscaped with grassy lawns, a large monkeypod tree, shower trees, coconut trees, ti, and a variety of other common yard and garden trees and plants.

The remaining approximately ten acres of Parcel 22 are heavily vegetated with both introduced and native species. The site was previously used for commercial cultivation which may explain the presence of the introduced species. Existing species include breadfruit (*Artocarpus communis*), ti (*ki*; *Cordyline terminalis* L. Kunth), taro (*kalo*; *Colocasia esculenta* L. Schott), palmetto (*Sabal palmetto* [Walt.] Lodd. and Schott. f.), coconut (*Cocos nucifera*), bird-of-

paradise (*Strelitzia reginae*), red ginger (*awapuhi ulaula*; *Alpinia purpurata* Viell.; K. Schum.), mango (*manako*; *Manifera indica* L.), bamboo (*Bambusa* sp.), Africa tulip (*Spathodea campanulata*), *milo* (*Thespesia populnea* L.), false *kamani* (*kamani-haole; Terminalia catappa* L.), Hawaiian tree fern (*Niroli; Filicium decipiens*), papaya (*Carica papaya* L.), areca palm (*Chrysalidocarpus lutescens*), wiliwili (*Erythrina sandwicensis* Degener), *kukui* (*Aleurites moluccana* L. Willd.), and banana (*Musa paraadisiaca* L.).

Mammal species likely to be found in the area include mongoose, cats, dogs, mice and rats. Avifauna that may be found in the area include the mynas, doves, sparrows, finches, and cardinals.

According to the U.S. Fish and Wildlife Service, no Federally threatened or endangered species have been identified on the project site. They further indicated that they have no objections to the project.

Impacts and Mitigation Measures

Most of the existing vegetation, particularly the overgrowth in the untended mauka ten acres in Parcel 22, will be cleared. To the extent possible, however, the existing large monkeypod, coconut, and other significant trees will be preserved and incorporated into the landscaping for the proposed facility. In addition, native Hawaiian plans and trees will be used in the facility's landscaping. The Arborist Committee will be consulted in conjunction with the development of the landscaping plan regarding the disposition of the significant trees currently located on the project site.

As required by the County of Maui Department of Public Works and Waste Management, the project will comply with all requirements for vector control prior to any site work.

2.7 Historic and Archaeological Resources

2.7.1 Historic Resources

As aforementioned in Section 1.4, there are currently four structures located on Parcel 24, including Hana Health Center facility, the office and residence of the facility's executive director,

the emergency medical service building (a portion of this structure also lies within Parcel 24), and the emergency generator/storage building. In addition, a single structure occupies Parcel 22.

Buildings that are 50 years or older may be eligible for inclusion on the Register of Historic Places depending on their historic significance. With the exception of the existing health center building, it is probable that one or more of the buildings may meet this minimum age criterion. In addition, there is a former concrete oven structure located near the center of the property that may also meet the age criterion (See Photographs 6 and 7). If it is determined that the buildings and oven structure are at least 50 years old, it is possible that they may be eligible for inclusion on the Register of Historic Places.

Based on preliminary discussions with the State Historic Preservation Division (SHPD), there is no documentation regarding the potential significance of the design or construction dates of the existing structures (Staff Communication, December 14, 1998).

Impacts and Mitigation Measures

Contingent on consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site to accommodate the proposed project, with the exception of the health center building, which is planned for renovation.

The SHPD was consulted during the Draft EA comment period on the disposition of the structures on both parcels specifically with regard to their historic significance. They, and the County of Maui Planning Department, have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that

Hana Community Healthcare Campus

Photographs 6 & 7
Former Concrete Oven

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

their historic significance can be substantiated and an appropriate strategy for their treatment determined.

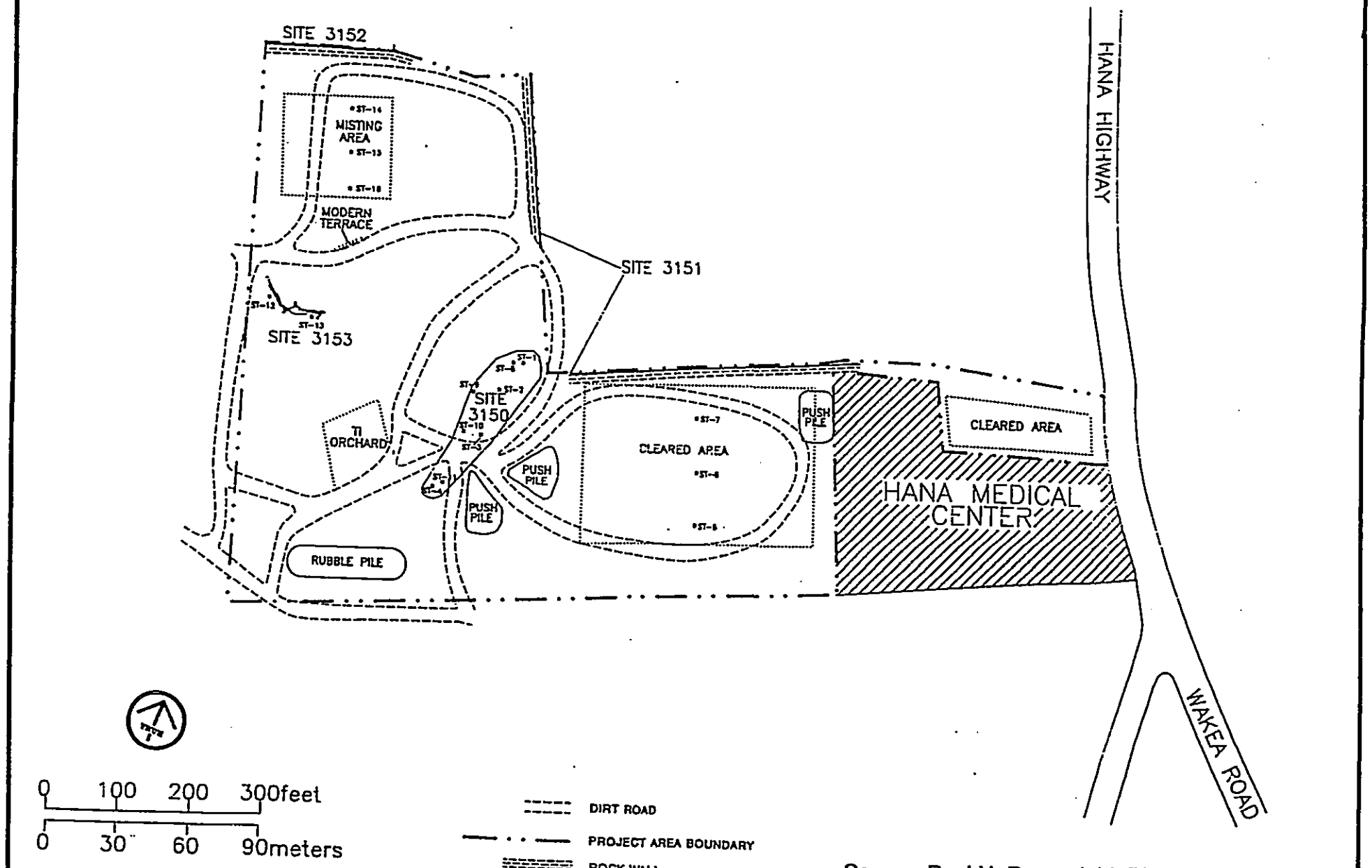
As necessary, the project will comply with all requirements for asbestos inspection and removal.

2.7.2 Archaeological Resources

Based on preliminary discussions with the SHPD, the existence of archaeological resources within Parcel 24 (the site of the existing health center) is unlikely because the parcel has been in its current state of development for many years. The SHPD will formally be consulted to verify the absence of any archaeological remains (Staff communication, December 14, 1998).

With regard to Parcel 22, an Archaeological Inventory Survey was conducted for the property in May 1993 (see Appendix A). The study was prepared by Paul H. Rosendahl, Ph.D., Inc. for the State of Hawaii Department of Accounting and General Services. The survey included historic documentary research, as well as a surface field survey. During the surface survey four sites were identified including two complexes (Sites 3150 and 3153) and two boundary walls (Sites 3151 and 3152) (See Figure 5).

Sites 3151 and 3152 consisted of boundary walls, and Site 3153 consisted of a wall and a terrace. No datable samples were obtained from any of these sites. Although the boundary walls correspond to the boundaries of historic land grants, no evidence was found suggesting that they date to this period; the walls may, in fact, have been modern property walls. Site 3153, based on the lack of cultural indicators and informant testimony, is probably recent. All three sites were identified under the significance category "X" pursuant to the National Register criteria for evaluation as outlined in the Code of Federal Regulations (36 CFR Part 60). Category "X" sites are defined as being important for information content, but which no further data collection is necessary. According to the report, the data collected from these sites was sufficient and there was no preservation potential. In a letter dated July 23, 1993, the Department of Land and Natural Resources State Historic Preservation Division (SHPD) concurred that the sites were



Source: Paul H. Rosendahl, Ph.D., Inc., May 1993

Fig. 5

Hana Community Healthcare Campus

Site and Shovel Test Locations

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

"...'no longer significant', having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey".

No datable samples were recovered. It was determined that Site 3150 was identified under significance category "A", which is important for information content and which requires further data collection. Additional cultural materials as well as specialized samples might remain within a subsurface component of Site 3150, and that such cultural materials could be useful in further dating the site and its features. Site 3150 involved a complex of four features which included: A small rectangular enclosure; A large rectangular enclosure; An L-shaped enclosure; and A rectangular platform. Shovel tests at the site recovered glass and ceramics suggest the features were historic. Therefore, the site was recommended for further archaeological work, and a mitigation plan was prepared for the site.

Subsequently, in April 1996 Paul H. Rosendahl, Ph.D., Inc conducted an Archaeological Mitigation Program for Site 3150 (See Appendix B). The study included a mitigation program and additional data recovery. None of the four features within the site contained significant subsurface deposits, although portable remains were collected. Most of the remains were historic, dating to the last half of the 19th and early 20th centuries. A few remains were similar to indigenous Hawaiian artifacts. As a result of this data recovery, the SHPD determined in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work within Parcel 22 was recommended.

Impacts and Mitigation Measures

With regard to the potential for archaeological resources within Parcel 24 (the site of the existing health center), the State Historic Preservation Division (SHPD) preliminarily indicated during the pre-assessment phase of the project that there was little potential for encountering such resources because the site has been extensively developed. Subsequently, the SHPD was consulted during the Draft EA review period and confirmed that the project will have no effect on archaeological resources on Parcel 24. Further, based on findings of the completed data recovery plan for Parcel 22, the SHPD also determined that the project would have no effect on archaeological resources on this parcel. Should any archaeological resources including human burials be encountered

during construction, however, all work in the immediate vicinity will cease and the State Historic Preservation Division contacted at once.

2.8 Traffic

Hana Highway is the only paved roadway that provides vehicular access for resident and tourists to Hana Town. The state-owned highway traverses the north-northeast coastline of the island linking the various communities and commercial/industrial centers along its alignment, from Kaahumanu Avenue in Kahului to Hana Bay. Fronting Hana Community Health Center, Hana Highway is a two-lane, two-way roadway. Just south of the health center, it intersect Uakea Street. The intersection is not signalized.

The scenic drive to Hana Town is a major visitor attraction, as are Hamoa Beach, Seven Pools, and Kipahulu Falls, which are located further south on the highway. Consequently, tourists comprise a large portion of the traffic on the highway through Hana.

A traffic assessment was prepared for the project by Wilson Okamoto & Associates, Inc. in December 1998. Excerpts from the assessment are included in the following section, while the report in its entirety is attached as Appendix C. Traffic volumes on Hana Highway obtained from the State Department of Transportation (DOT) were taken on May 5, 1997. Based on the data, the average daily traffic (ADT) along Hana Highway is comprised of approximately 1,700 trips, which are distributed relatively evenly between the hours of 6:00 AM and 8:00 PM. There are, however, minor peaks in traffic during the morning, mid-day, and afternoon periods which generally occur between 8:00 and 9:00 AM, 10:00 and 11:00 AM, and 3:15 and 4:15 PM, respectively. The morning and afternoon peak periods are generally indicative of normal commuter traffic, while the mid-day peak period is reflective of tourist traffic.

The highway capacity analysis performed for this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, 1994, and the "Highway Capacity Software", developed by the Federal Highway Administration.

Level of Service (LOS) is a quantitative and qualitative assessment of traffic operations, which are described alphabetically as LOS "A" through LOS "F", representing a range of operating

conditions from ideal to undesirable. In addition, a Volume-to-Capacity (v/c) ratio indicates the relative traffic demand to the carrying capacity of a road. A v/c ratio of one (1.00) indicates that the roadway is operating at capacity, while a v/c ratio of greater than 1.00 indicates that traffic demand exceeds the road's capacity.

As summarized in Table 1, the section of roadway which fronts the project site operates at LOS "A" during all peak hours, and at v/c ratios of 0.08. 0.11, and 0.09 during the AM, mid-day, and PM peak periods, respectively. These indicators are representative of light traffic conditions with no observed operational problems.

Table 1
Existing Traffic Conditions

Peak Hour	Southbound Vehicles	Northbound Vehicles	Total Vehicles	LOS	v/c Ratio
AM Peak Period	112	44	156	A	0.08
Mid-Day Peak Period	186	38	224	A	0.11
PM Peak Period	137	32	169	A	0.09

Impacts and Mitigation Measures

The proposed project will have a negligible effect on traffic conditions along Hana Highway fronting the project site. As summarized in Table 2, traffic conditions during all peak hours are anticipated to continue to operate at LOS "A". In addition, v/c ratios will remain consistent at 0.08. 0.12, and 0.11 during the AM, mid-day, and PM peak periods, respectively.

Table 2
Projected Traffic Conditions

Peak Hour	Southbound Vehicles	Northbound Vehicles	Total Vehicles	LOS	v/c Ratio
AM Peak Period	124	60	184	A	0.09
Mid-Day Peak Period	213	49	262	A	0.12
PM Peak Period	47	164	211	A	0.11

The following measures are recommended to maintain the traffic conditions at the intersection of Hana Highway and the project driveway:

- Provide sufficient sight distances for motorists to safely enter and exit the project driveway;
- Provide adequate patient loading and off-loading areas;
- Provide adequate turn-around area for delivery and refuse vehicles to maneuver on the project site; and
- Provide sufficient roadway width to accommodate safe vehicular ingress and egress.

The State of Hawaii Department of Transportation has indicated that the project is not expected to significantly impact Hana Highway, and concurred with the aforementioned recommendations for the driveway to the proposed project. In addition, the County of Maui Police Department concurs that the access to and from the project should not significantly impact Hana Highway.

The project will comply with all requirements for off-street parking, loading spaces, and landscaping pursuant to Maui County Code, Chapter 19.36.

2.9 Noise

Typical of rural communities, noise levels in the vicinity of the project site is predominantly attributable to natural conditions and vehicular traffic traveling along Hana Highway. Helicopter and ambulance services associated with emergency responses at the existing medical facility currently contribute to ambient noise levels at the project site.

Impacts and Mitigation Measures

Noise from construction activities will likely be unavoidable during the entire construction period. Unavoidable construction noise impacts will be mitigated to some degree by the contractor's compliance with provisions of the State DOH Administrative Rules, Title 11, Chapter 46, "Community Noise Control." noise control regulations. These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels stated in the Chapter 46 rules. It shall be the contractor's responsibility to minimize noise by properly maintaining noise mufflers and other noise-attenuating equipment, and to maintain noise levels within regulatory limits. Also, the guidelines for the hours of heavy equipment operation and noise curfew times as set forth by the DOH noise control rules will be adhered to. During construction, the

specific location where construction activity will be occurring will change such that the actual length of exposure to construction noise from any particular receptor location will likely be less than the total construction time for the project.

In the long term, no significant noise impacts from the operation of the proposed facility are anticipated. Ambient noise levels in the immediate vicinity of the project will increase slightly as a result of the associated vehicular activity. Noise from helicopter and ambulance services will continue at their existing levels. No expansion of the services are proposed at this time and, as such, no new noise impacts are anticipated. Authorized emergency vehicles responding to an emergency call or acting in an emergency are exempt from the provisions of Chapter 11-46.

2.10 Air Quality

Within the immediate vicinity, air quality is typical of rural communities. The sparsity of development and exposure to trade winds promote good air quality in the project areas. The only identifiable source of emissions is the light volume of traffic along Hana Highway.

Currently, there are two DOH air monitoring stations on the island of Maui, but only PM_{10} is measured at both stations. One station is located in Kihei, the other in Paia. Since the two stations began operation in June and August of 1996, respectively, PM_{10} levels are well below the 50 $\mu g/m^3$ annual and 150 $\mu g/m^3$ 24-hour State and Federal ambient air quality standards (AAQS).

Impacts and Mitigation Measures

The proposed project will have short-term construction-related impacts on air quality, including the generation of dust and emissions from construction vehicles, equipment, and commuting construction workers. The construction contractor is responsible for complying with State DOH Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control," specifically Section 11-60.1-33 regarding fugitive dust and the prohibition of visible dust emissions at property boundaries.

Mitigation measures to address short-term impacts include:

- Minimizing the movement of construction vehicles during peak traffic periods; and,
- Controlling the generation of fugitive dust through frequent watering of unpaved roads and areas of exposed soil and planting landscaping as soon as possible on completed areas.

In the long term, it is not anticipated that traffic associated with the proposed project will adversely affect air quality, since no significant increase in traffic attributable to the project is projected.

2.11 Utilities

Water: The Hana region is serviced in part by the County of Maui Department of Water Supply. The County's water system is served by two deep wells, on at Wakiu and one at Hamoa, located at the north and south ends of the system, respectively. A series of pipelines connect these sources to Hana Town. The water system in the project vicinity includes a 12-inch line under Hana Highway. South of the intersection of Hana Highway and Uakea Road, the 12-inch line continues under Uakea Road. A 1 1/2-inch line is located under Hana Highway. The project overlies the Kawaipapa aquifer.

Impacts and Mitigation Measures

As the project design progresses, the Department of Water Supply will be consulted regarding the projected water demand of the new facility and the adequacy of the current water system to accommodate this demand. A recommended by the Department of Water Supply the following measures will be considered to reduce the water demand of the proposed project:

- Eliminate Single-Pass Cooling;
- Utilize Low-Flow Fixtures and Devices;
- Maintain Fixtures to Prevent Leaks;
- Use Climate-Adapted Plants; and
- Prevent-Over-Watering by Automated Systems

A BMP will be developed to protect the integrity of groundwater resources which, in the project area includes the Kawaipapa aquifer.

Wastewater : The Hana region is not presently served by a municipal wastewater system or treatment facility. Residences and small businesses in the region provide on-site, individual wastewater treatment systems such as septic tanks, cesspools, and packaged treatment plants.

Impacts and Mitigation Measures

A new individual wastewater system will be required to accommodate wastewater generated by the proposed project. Pursuant to Chapter 62, State Department of Health Administrative Rules, the Hana region is indicated as a critical wastewater disposal area, and that individual systems such as septic tanks or package treatment plants are required as a means for wastewater disposal for such areas. Plans for the proposed wastewater system will be determined as the project design progresses, and will be submitted for approval to the Maui District Health Office prior to construction.

Drainage: The County of Maui, Department of Public Works & Waste Management does not have a drainage master plan for the Hana region. Throughout the region, storm runoff typically drains into natural drainageways and subsequently into the ocean. A drainage report will be submitted to the County of Maui Department of Public Works and Waste Management prior to construction of the project.

2.12 Solid Waste

Solid waste in the vicinity of the project vicinity is collected by the County of Maui Department of Public Works, or by private collection services and transported to the Hana landfill. Hana landfill is a County maintained facility located on a 30-acre site makai of Hana Highway near Kainalimo Cove.

Impacts and Mitigation Measures

The project will contribute a relatively small increase in solid waste disposal at the Hana landfill site. Solid waste generated by the project during its construction and operation will be collected and disposed of by a private collection contractor, and therefore will not

impact municipal services. A Solid Waste Management Plan will be submitted to the County of Maui Department of Public Works and Waste Management for review and approval prior to project construction.

2.13 Electrical

The Maui Electric Company, Ltd. was consulted during the Draft EA review process and will continue to be consulted as the project design progresses and details regarding electrical requirements become available.

2.14 Socio-Economic Characteristics

The following summary of the socio-economic environment is based on demographic and housing data from the 1990 U.S. Census of Population and Housing. Based on this data, the project site is within the boundaries of the Hana District Census Tract 301. This census tract encompasses the entire Hana District extending from its northern shoreline at Makaiwa Bay, mauka along Oopuola and Waikamoi Streams, then along the boundaries of Haleakala National Park and the Kahikinui Forest Reserve, and makai along the boundary between Auahi and Kanaio to Kanaloa Point on the southern shoreline of the region.

2.14.1 Population and Economy

In 1990, the resident population of Maui County was 100,374, approximately 9 percent of the State of Hawaii's total population. Hana District had a resident population of 1,895, a 33.2 percent increase from its 1980 population of 1,423. Table 3 highlights the demographic characteristics of the Hana District.

The region's economy is based primarily on diversified agriculture, the visitor industry, government services, and subsistence activities. Diversified agricultural activities include ranching, tropical fruit, flower and foliage, and taro cultivation. Visitor accommodations, including the Hotel Hana-Maui, are centered in Hana Town.

Table 3
1990 Demographic Characteristics

CHARACTERISTICS	HANA Census Tract 301	MAUI COUNTY
Total Population	1,895	100,374
Age		
Median Age	31.1	33.4
Under 18 years	641	26,883
Over 65 years	175	11,359
Sex		
Male	998	51,201
Female	897	49,173
Ethnicity		
White	737	39,766
Black	7	494
Amer. Indian, Eskimo, or Aleutian	15	521
Asian or Pacific Islander	1,124	57,885
Other	12	1,708
Hispanic Origin (any race)	174	7,781
Housing		
Total Housing Units	763	42,160
Occupied Housing Units	589 (77.1%)	33,145 (78.6%)
Owner occupied	332 (43.5%)	19,083 (45.2%)
Renter occupied	257 (33.6%)	14,062 (33.3%)
Units with 1 or more persons per room	152 (19.9%)	5,411 (12.8%)
Monthly Rent		
Less than $250	31	1,368
$250 to $499	41	2,359
$499 to $749	35	3,878
$749 to $999	10	2,639
$1,000 or more	7	1,999

Source: Maui County Data Book 1996 - 1997

Impacts and Mitigation Measures

The proposed project will have generally positive social and economic impacts in the region. In the short-term, the project will confer some positive benefits in the local area. The project will add construction jobs in the vicinity, thereby stimulating that sector of the economy. Direct economic benefits will result from construction expenditures both through the purchase of materials from local suppliers and through the employment of local labor. Indirect economic impacts may include benefits to local retail businesses

resulting from construction activities. Construction activities associated with the proposed project will create some adverse impacts such as minor disruptions of traffic and increased noise nuisances in the immediate vicinity of the project site.

Once operational, the proposed project will increase employment opportunities in the Hana region. The project will also aid the long-term economic viability of the region by ensuring the availability of medical services for residents and businesses. Additionally, improved medical services resulting from the proposed project will promote the public health, safety and welfare of the Hana region. It is projected that the population of the Hana region will increase to 2,170 by the year 2000 and to 2,349 to 2,452 by the year 2010. The proposed project will be well-equipped to serve the existing and future generations of the Hana region.

2.14.2 Police, Fire and Medical Services

Police Protection: The Maui County Police Department is headquartered at its Wailuku Station. The Hana region is served by the Hana District Police Station, which is located at the intersection of Uakea Road and Hana Highway approximately 500 feet south of the project site.

Impacts and Mitigation Measures

The project is not anticipated to significantly impact the operations of the police department.

Fire Protection: Fire protection in the Hana District is provided by the Maui County Fire Department Hana Station. The Hana Fire Station, is staffed by nine firefighters and equipped with two trucks. Located approximately 500 feet from the project site, the station provides 24-hour protection and assistance in medical emergency situations.

Impacts and Mitigation Measures

The project is not anticipated to significantly impact the operations of the fire department.

Medical Facilities: Maui Memorial Medical Center is the only full-service medical facility on the island of Maui. Located at the project site, the existing Hana Community Health Center

provides medical and dental services to community residents from Keanae to the north and Kaupo to the south, including Nahiku, Hana, and Kipahulu.

Impacts and Mitigation Measures

The proposed project will result in positive benefits to the Hana District by providing a comprehensive medical facility that is better equipped than the existing health center to service its residents. Due to the growth in the resident population of Hana, the existing center is inadequate to serve the medical needs of the community. As aforementioned in Section 2.13.1, according to the 1990 U.S. Census report, the Hana District experienced a 33.2 percent increase in population from the 1,423 in 1980 to 1,895 in 1990. Further, it is projected that the population of the Hana region will increase to 2,170 by the year 2000 and to 2,349 to 2,452 by the year 2010.

In addition, because of Hana's geographic isolation from the remainder of the island, its residents must travel a 2-hour, 57-mile course to the nearest emergency room located in Wailuku. Thus, the medical needs of these residents will be met via the provision of the proposed quality healthcare facility in proximity to Hana Town.

3. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

This section discusses State and County of Maui land use controls, and County plans and policies relating to the proposed project.

3.1 State Land Use District

The Hawaii Land Use Law of Chapter 205, Hawaii Revised Statutes, classifies all land in the State into four land use districts: Urban, Agricultural, Conservation, and Rural. The project site is designated within both the agricultural and rural districts. As illustrated in Figure 6, TMK 1-4-03:22 lies within the Agricultural and Rural Districts, while TMK 1-4-03:24 lies within the Rural District. Healthcare facilities are not designated as a permitted use within either land use classification. According to the County of Maui Planning Department, a special permit from the County of Maui Planning Commission will be required for the portion of Parcel 22 that lies within the Agricultural District.

3.2 County of Maui General Plan

The General Plan for the County of Maui (adopted 1991) was amended by the Maui County Council in 1993. The Plan is a narrative document which sets forth strategies to shape the County's physical, social and economic environments. These strategies are expressed as statements of objectives and policies which are used by the County in decision-making and in developing and implementing plans and programs. The Maui County Charter, in expressing the intent of the General Plan, provides that:

> *"The purpose of preparing a general plan is to recognize and state the major problems and opportunities concerning the needs and the development of the county and the social, economic and environmental effects of such development to set forth the desired sequence, patterns and characteristics of future development."*

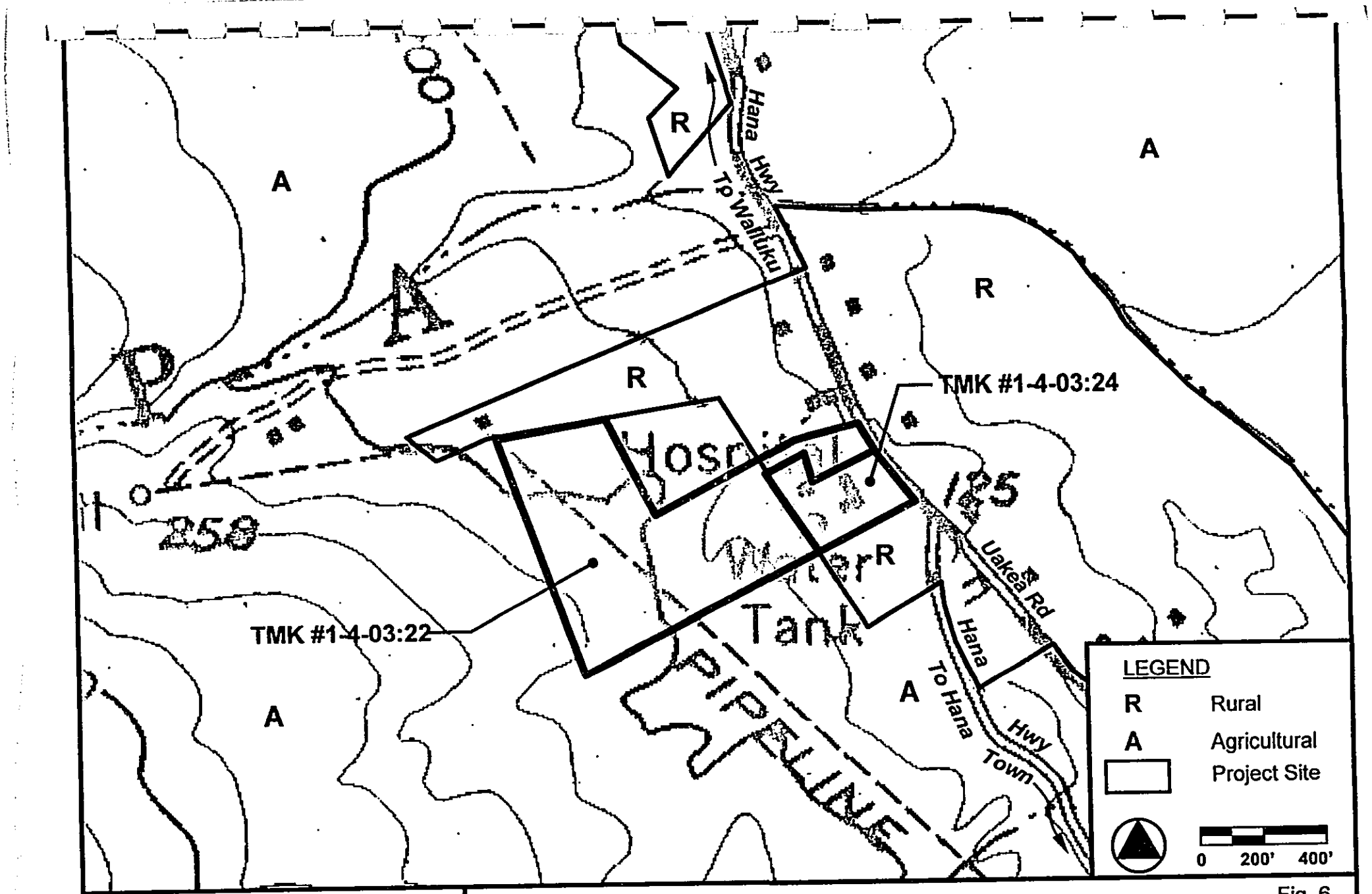


Fig. 6

Hana Community Healthcare Campus

State Land Use District Map

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

Furthermore,

> *"It shall contain statements of the general, social, economic, environmental and design objectives to be achieved for the general welfare and prosperity of the county through government action, county, state or federal."*

The relationship of the proposed project to the relevant objectives and policies of the General Plan are as follows:

V. SOCIAL INFRASTRUCTURE

C. Health and Family

Objective

1. To meet the health needs of all residents and visitors

Policies

a. Encourage the expansion and improvement of our hospitals and our public and private medical facilities.

The proposed project will improve the availability of medical services to residents and visitors in the Hana region.

3.3 County of Maui Hana Community Plan

The Hana Community Plan, one of nine (9) community plans for Maui County, reflects current and anticipated conditions in the Hana region, and advances planning goals, objectives, policies and implementation considerations to guide decision making in the region through the year 2010. The Hana Community Plan provides specific recommendations to address the goals, objectives and policies contained in the General Plan, while recognizing the values and unique attributes of Hana, in order to enhance the region's overall living environment. The project site is consistent with the following Hana Community Plan goals, objectives and policies:

LAND USE

Goal

An efficient distribution of urban, rural and agricultural land uses in order to provide for the social and economic well-being of residents in the Hana Community Plan region.

Preservation and enhancement of the current land use patterns which establish and enrich the Hana CommunityPlan region's unique and diverse qualities.

Objectives and Policies

8. Discourage urban land uses and Special Use Permits outside of the Hana Town area except to allow those activities which are essential to the region's economic well-being, which provide essential services for the residents of the Hana District, or which provide for the essential domestic needs of remote communities such as Ke`anae, Kipahulu and Kaupo. Such activities shall not adversely affect surrounding neighborhoods and shall be supportive of the agricultural activities of the area.

Comment: As the sole medical facility in the Hana region, the Hana Community Medical Center provides essential medical and healthcare needs to the Hana region, including remote communities such as Keanae, Nahiku, Kipahulu, and Kaupo. The center is currently inadequate to serve the essential medical needs of the community, and the new facility is needed to properly serve the existing and future generations of the Hana district. The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District and, thereby preclude the need for residents to drive more than 50 arduous miles to Wailuku for their medical needs. The proposed project represents the expansion and improvement of a vital existing land use, rather than a new urban-intensive land use.

CULTURAL RESOURCES

Goal

Identification, preservation, protection, and where appropriate, restoration of significant cultural resources and practices, that provide a sense of history and identity for the Hana region.

Objectives and Policies

1. Identify, preserve and protect historically, archaeologically and culturally significant areas, sites, and features within the Hana District.

Implementing Actions

2. *Require development projects to identify all cultural resources within or adjacent to the project area as part of the County development review process. Further require that all proposed development include appropriate mitigation measures including site avoidance, adequate buffer areas and interpretation.*
3. *General site types and areas that should be flagged for preservation during development review include the following:*
   Plantation era structures and homes

Comment: As discussed in Section 2.7.2, the Archaeological Inventory Survey prepared by Paul .H. Rosendahl, Ph.D., Inc. (PHRI) in May identified four subsurface archaeological sites. Of these, three were identified under the significance category "X", pursuant to the National Register criteria for evaluation as outlined in the Code of Federal Regulations (36 CFR Part 60). Category "X" sites are defined as being important for information content, but which no further data collection is necessary. According to the report, the data collected from these sites was sufficient and there was no preservation potential. In a letter dated July 23, 1993, the Department of Land and Natural Resources State Historic Preservation Division (SHPD) concurred that the sites were "...'no longer significant', having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey".

The fourth site, comprised of a complex of four features, was identified under significance category "A", which is important for information content and which requires further data collection. SHPD also concurred with this recommendation and, subsequently, PHRI prepared an Archaeological Mitigation Program in April 1996. The SHPD determined in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work was recommended.

There are five structures located on the project site, including the Hana Health Center facility, the office and residence of the facility's executive director, the emergency medical service building, the emergency generator/storage building, and a single structure.

Buildings that are 50 years or older may be eligible for inclusion on the Register of Historic Places depending on their historic significance. With the exception of the existing health center building, it is probable that one or more of the buildings may meet this minimum age criterion. In addition, there is a former concrete incinerator structure located near the center of the property that may also meet the age criterion. If it is determined that the buildings and oven structure are at least 50 years old, it is possible that they may be eligible for inclusion on the Register of Historic Places. Based on preliminary discussions with the State Historic Preservation Division (SHPD), there is no documentation regarding the potential significance of the design or construction dates of the existing structures (Staff Communication, December 14, 1998).

Contingent on consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site to accommodate the proposed project, with the exception of the health center building, which is planned for renovation.

The SHPD and the County of Maui Planning Department have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined.

ECONOMIC ACTIVITY

Goal

A balanced local economy which provides long-term viability and sustainability while meeting resident's needs and respecting the cultural and natural resources of Hana.

Objectives and Policies

1. *Encourage a local economy which provides employment choices for the region's residents and which provides future employment opportunities for the region's youth.*
2. *Utilize existing components of the local economy to establish a framework for balanced regional economic development.*
12. *Encourage contractors to employ qualified Hana District residents when constructing facilities or other structures within the Hana District.*

Comment: The proposed project will help to support the long-term viability and sustainability of the Hana District by providing essential healthcare and emergency medical services to its residents, as well as by providing long-term employment opportunities associated with the operation of the facility. In addition, short-term construction-related employment opportunities will also be created by the proposed project. These jobs will become available to qualified individuals including residents of Hana District. The proposed project represents an expansion and improvement of an existing land use that is vital to the region.

URBAN DESIGN

Goal

Harmony between the natural and man-made environments through building, infrastructure and landscaping design which ensures that the natural beauty and character of the Hana region is preserved.

Objectives and Policies

1. *Support design controls for Hana Town and the Hana region based on maintaining the existing low rise character and rural scale of the area*

Implementing Actions

3. *Limit building height to two stories or thirty-five (35) feet above grade throughout the region.*

Comment: The proposed project is consistent with the design standards of the Hana Community Design Guidelines. All proposed structures will be single story and well within the 35-foot height limit. The design will utilize building materials of moss lava rock, board and batten siding and metal roofs. Building colors will be naturally hued with matte finishes so as not to detract from the rural character of Hana.

SOCIAL INFRASTRUCTURE

Goal

An efficient and responsive system of people-oriented public services which enable residents to live a safe, healthy and enjoyable lifestyle, and offer the youth and adults of the region opportunities and choices for self and community improvement.

Objectives and Policies

Public Health and Safety

4. *Improve emergency rescue services and medical services for the Hana region.*
5. *Encourage the provision of public health education programs, including mental health counseling services.*
8. *Encourage upgrading and expanding the facilities at the Hana Medical Center.*

Comment: The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District. The new facility will provide improved and expanded emergency rescue and expanded medical services the District.

3.3.1 Community Plan Land Use Map

The Hana Community Plan Land Use Map designates the project site as "P" Public/Quasi-Public (see Figure 7). Public/Quasi-Public uses are defined to include; schools, libraries, fire/police stations, government building, public utilities, hospitals, churches, cemeteries, and community centers. Staff communication of December 12, 1998 confirmed the proposed facility is consistent with the Public/Quasi-Public designation.

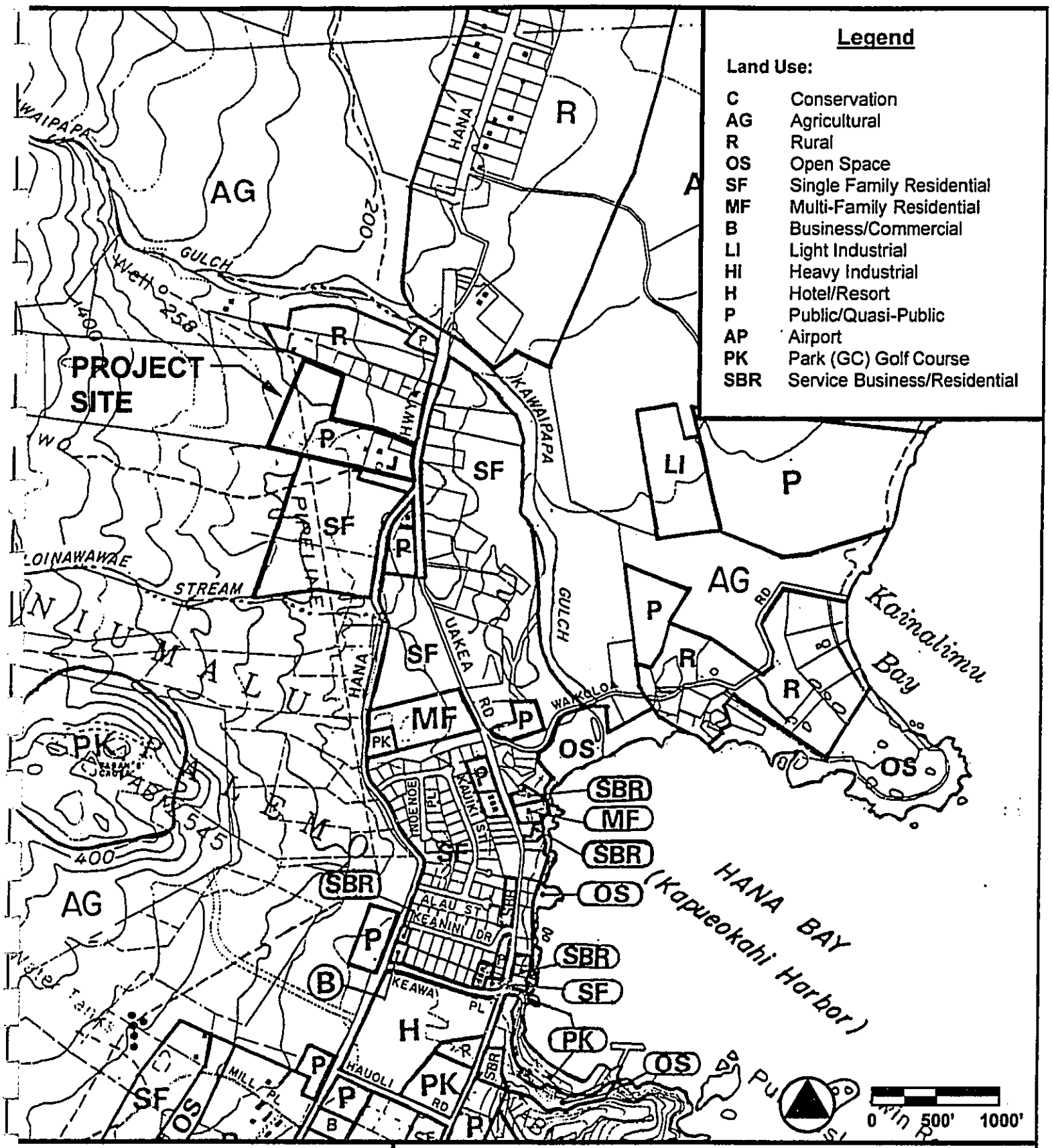


Fig. 7

Hana Community Healthcare Campus

Hana Community Plan Map

Prepared for:
Kober/Hanssen/Mitchell Architects

Prepared by:
Wilson Okamoto & Associates, Inc.

3.3.2 Hana Community Design Guidelines

The purpose of the Hana Community Design Guidelines, prepared in November 1997, establish architectural, landscape architectural, and engineering design guidelines for the business and commercial district established by the Hana Community Plan. The Guidelines also establishes design parameters for areas and uses outside of the business and commercial district including Service Business Residential uses, Public/Quasi Public uses and facilities, Hotel uses, and Commercial uses and subdivisions in the Rural and Agricultural Districts. The guidelines implement provisions of the Maui County General Plan (1991), the Hana Community Plan (1994), and the Maui County Code chapter 19.15 regarding Country Town Business Districts (1987).

The preliminary design plans for the proposed project are consistent with the design standards of the Hana Community Design Guidelines. A conceptual elevation of the proposed facility is illustrated in Figure 4. All proposed structures will be single story and well within the 35-foot height limit. The design will utilize building materials of moss lava rock, board and batten siding and metal roofs. Building colors will be naturally hued with matte finishes so as not to detract from the rural character of Hana. The design of the proposed facility will embrace a courtyard layout to optimize the natural ventilation, as well as facilitate outdoor views of the landscaping. All signage will be indirectly lit.

The existing Hana Medical Center building, identified on Page 23 as one of Hana's noteworthy structures, will be retained in the proposed facility.

3.4 County of Maui Zoning

The County of Maui Interim Zoning Ordinances for various districts of Maui are for the purpose of providing interim regulations pending the formal adoption of a comprehensive zoning ordinance and map. Hospitals are a permitted property use designated by the interim zoning regulations. (Staff communication of December 12, 1998 confirmed the proposed facility is consistent with the Interim Zoning Ordinances.) The project will comply with all interim zoning provisions pursuant to the County Zoning Code.

3.5 Special Management Area

The County of Maui Planning Department has indicated that the project lies outside the Special Management Area (SMA) boundary and, as such, is not subject to SMA rules.

4. DETERMINATION OF ANTICIPATED FONSI

A. Applicant

County of Maui, Mayor's Office

B. Accepting Authority:

County of Maui, Mayor's Office

C. Description of the Proposed Action

The Applicant proposes to replace the existing medical facility with a new comprehensive healthcare campus. The new facility will be constructed on approximately 12.1 acres of land located in Hana on the Island of Maui. The proposed project is comprised of several components including the construction of a Community Healthcare Center, Health and Wellness Center, on-site employee housing, and approximately 104 parking stalls, as well as the renovation of the existing health center building. In addition, a gardening area will be established in the future as part of the proposed project.

D. Determination and Reasons Supporting Determination

In general, construction and operation of the proposed Hana Community Healthcare Campus will not:

(1) Involve an irrevocable commitment to loss or destruction of any natural cultural resource;

With regard to the potential for archaeological resources within Parcel 24 (the site of the existing health center), the State Historic Preservation Division (SHPD) preliminarily indicated during the pre-assessment phase of the project that there was little potential for encountering such resources because the site has been extensively developed. Subsequently, the SHPD was consulted during the Draft EA review period and confirmed that the project will have no effect on archaeological resources on Parcel 24. Further, based on findings of the completed data recovery plan for Parcel

22, the SHPD also determined that the project would have no effect on archaeological resources on this parcel. Should any archaeological resources including human burials be encountered during construction, however, all work in the immediate vicinity will cease and the State Historic Preservation Division contacted at once.

Contingent on further consultation with the SHPD, all existing buildings and structures are proposed to be removed from the project site to accommodate the proposed project, with the exception of the health center building, which is planned for renovation.

The SHPD and the County of Maui Planning Department have expressed interest in retaining the existing residence and office of the executive director, as well as the concrete oven structure and incorporating both within the design of the proposed project. As a result, consultation with the SHPD will continue throughout the design process as to the disposition of both structures. Neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined.

(2) Curtail the range of beneficial uses of the environment;

The proposed project will not curtail the beneficial uses of the environment. Use of the project site for the proposed project would be consistent with its current use as a health center. In addition, the proposed project involves the redevelopment of a site within a rural area with uses that are consistent with the Maui General Plan and Hana Community Plan objectives, as well as Hana Community Plan Land Use and zoning designations.

(3) Conflict with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

The proposed project does not conflict with long-term environmental policies, goals, and guidelines of the State of Hawaii. As presented in this EA, the project's potential adverse impacts are associated only with short-term construction-related activities and can be mitigated through adherence to standard construction mitigation practices.

(4) Substantially affect the economic or social welfare of the community or state;

The proposed project would provide short-term economic benefits in the form of construction jobs, and long-term economic benefit through the creation of medical and health-related employment opportunities. The proposed project would positively impact the welfare of the community by providing a comprehensive medical facility that is well equipped to service the Hana District and, thereby preclude the need for residents to drive to Wailuku for their medical needs.

(5) Substantially affect public health;

Due to the growth in the resident population of Hana, the center is currently inadequate to serve the medical needs of the community. According to the 1990 U.S. Census report, 1,895 residents live in the Census Tract 301 which comprises most of the Hana Distinct. This represents a 33.2 percent increase from the 1980 population of 1,423. Further, it is projected that the population will increase to 2,170 by the year 2000 and to 2,349 to 2,452 by the year 2010. The new facility will properly serve the current and future generations of the Hana district.

(6) Involve substantial secondary impacts, such as population changes or effects on public facilities;

No secondary effects are anticipated with the construction or operation of the proposed project. The project, in and of itself, is not anticipated to affect the population of the Hana District. Rather, the facility is proposed to fulfill an essential community need. With regard to public facilities, the proposed project is not anticipated to significantiy impact traffic flow on Hana Highway. The project will, however, require connections to the County's water system and the Department of Water Supply will continue to be consulted as the project design progresses and details regarding water system needs become available. In addition, a new individual wastewater system will be required to accommodate wastewater generated by the proposed project. Plans for the proposed wastewater system will be determined as the project design progresses, and will be submitted for approval to the Maui District Health Office prior to construction.

(7) Involve a substantial degradation of environmental quality;

Construction activities associated with the proposed project are anticipated to result in relatively insignificant short-term impacts to noise, air quality, and traffic in the immediate project vicinity. With the incorporation of the recommended mitigation measures during the construction period, the project will not result in degradation to the environmental quality.

(8) Individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

No cumulative effects are anticipated, inasmuch as the proposed project involves redevelopment of the site within a rural area with uses that are consistent with the County land use plans and designations.

(9) Substantially affect a rare, threatened, or endangered species, or its habitat;

The U.S. Fish and Wildlife Service has confirmed that there are no known rare, threatened or endangered species of flora or fauna or associated habitat that have been identified on the project site that could be adversely affected by the construction and operation of the proposed project.

(10) Detrimentally affect air or water quality or ambient noise levels;

There are no surface water sources on or near the project site. Streams located in closest proximity to the project site, include the Kawaipapa Stream and the Holoinawawae Stream which are both located approximately one-half mile from the project site. Similarly, the shoreline is located approximately one-half mile from the project site. Thus, no significant short-or long-term impact to water quality are anticipated as a result of the project.

Operation of construction equipment would temporarily elevate ambient noise and concentrations of exhaust emission in the immediate vicinity of the project site. The proposed project will have short-term construction-related impacts on air quality, including the generation of dust and emissions from construction vehicles, equipment, and commuting construction workers. The

construction contractor is responsible for complying with State DOH Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control," specifically Section 11-60.1-33 regarding fugitive dust and the prohibition of visible dust emissions at property boundaries. Unavoidable construction noise impacts will be mitigated to some degree by the contractor's compliance with provisions of the State DOH Administrative Rules, Title 11, Chapter 46, "Community Noise Control." noise control regulations. These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels stated in the Chapter 46 rules. Operation of the proposed project will have no significant long-term impact on air quality or ambient noise levels in the vicinity.

(11) Affect or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;

The project is not located within a flood plain or otherwise environmentally sensitive area. A drainage report and erosion control report will be submitted to the County of Maui Department of Public Works and Waste Management.

(12) Substantially affect scenic vistas and viewplanes identified in county or state plans or studies; or,

The proposed project will alter the visual setting by replacing older structures with new ones. The new structures, however, will comply with applicable development standards of the existing zoning and community plan designations, as well as the Hana Community Design Guidelines.

(13) Require substantial energy consumption.

Construction and operation of the project will not require substantial increases in energy consumption.

5. ALTERNATIVES TO THE PROPOSED ACTION

5.1 No Action Alternative

In the no action alternative, the project site would remain in its current state. The existing healthcare center would continue to be inadequate to meet the healthcare needs of the Hana residents, and residents would still be required to travel to Wailuku for specific medical procedures. Parcel 22 would remain in its current overgrown and underutilized condition.

5.2 Alternative Site Development Concept

An elderly assisted living component was previously considered for incorporation into the project. Results of a market feasibility analysis, however, indicated that such a component would not be viable and was therefore eliminated from consideration. The proposed project is considered to be an economically viable alternative for the project site. The project design is in the conceptual stage and, therefore, some modifications to the proposed project may occur as design development progresses.

6. PERMITS AND APPROVALS

The following is a list of permits and approvals, which may be required prior to construction of the proposed project:

State of Hawaii

Department of Health

- National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges Associated with Construction Activity
- Noise Variance Permit
- Permit for Air Emissions
- Commission on Persons With Disabilities (Review pursuant to Americans With Disabilities Act Accessibility Guidelines (ADAAG))

County of Maui

- Subdivision Approval
- Special Permit
- Grubbing and/or Grading Permits

7. PARTIES CONSULTED DURING THE DRAFT EA COMMENT PERIOD

The following agencies and organizations were consulted during the public review period of the Draft EA. Of the 16 parties that formally replied during the review period, some had no comments while other provided substantive comments as indicated by the ✓ and ✓✓, respectively. All written comments are reproduced herein.

Federal Agencies

✓✓ U.S. Department of Agriculture - Natural Resources Conservation Service
✓ U.S. Department of the Army - Corps of Engineers
✓✓ U.S. Department of the Interior - Fish and Wildlife Service
U.S. Department of the Interior - Geological Survey

State of Hawaii

Department of Land and Natural Resources (DLNR)
✓✓ DLNR State Historic Preservation Division
DLNR Land Division
✓✓ Department of Transportation
✓✓ Department of Business, Economic Development and Tourism – Land Use Commission
✓✓ Department of Health (DOH)
DOH Environmental Division
✓✓ Office of Environmental Quality Control

County of Maui

✓✓ Planning Department
✓✓ Department of Public Works and Waste Management
✓✓ Department of Water Supply
✓✓ Police Department
✓ Fire Department

Organizations and Elected Officials

✓ Councilmember J. Kalani English
Hana Community Association
✓✓ Maui Electric Co., Ltd.
GTE Hawaiian Tel
✓✓ Hana Affordable Housing and Community Development Corporation

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

REPLY TO ATTENTION OF

March 18, 1999

Civil Works Branch

Mr. David Ching
Office of the Mayor
County of Maui
Community Development Block Grant Program
200 South High Street
Wailuku, Maui, Hawaii 96793

MAR 19 1999

Dear Mr. Ching:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) for the Hana Community Healthcare Campus, Hana, Maui (TMKs 1-4-3: 22 and 24). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, a DA permit will not be required for the project.

b. The flood hazard information provided on pages 2-4 to 2-5 of the DEA is correct.

Sincerely,

Paul Mizue, P.E.
Chief, Civil Works Branch

Copies Furnished:

Mr. James Stone
Kober, Hanssen, Mitchell Architects
55 Merchant Street, Suite 1400
Honolulu, Hawaii 96813-4313

✓Mr. Earl Matsukawa
Wilson Okamoto and Associates
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

6272-01
May 22, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808) 946-2277
FAX (808) 946-2253

Mr. Paul Mizue, P.E.
Chief, Civil Works Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Attention: Civil Works Department

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Mizue:

We are in receipt of your letter dated March 18, 1999 commenting the subject EA. We appreciate the information you provided that the project will not require a Department of the Army permit, as well as your verification of the flood hazard designation. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

USDA

United States Department of Agriculture

Natural Resources Conservation Service

P.O. Box 50004
Honolulu, HI
96850

Our People...Our Islands...In Harmony

March 19, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

Subject: Draft Environmental Assessment (DEA) - Hana Community Campus, Hana, Maui, Hawaii

We have reviewed the above mentioned document and have no comments to offer at this time.

Thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc:
Mr. James Stone, AIA, Kober/Hanssen/Mitchell Architects, 55 Merchant Street, Suite 1400, Harbor Court, Honolulu, Hawaii 96813-4313
Mr. Earl Matsukawa, AICP, Wilson Okamoto & Associates, Inc., 1907 South Beretania Street, Suite 400, Honolulu, Hawaii 96826

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Mr. Kenneth M. Kaneshiro
State Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Kaneshiro:

We are in receipt of your letter dated March 19, 1999 stating that you have no comments on the subject EA. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

LM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

RECEIVED
JUL 15 1999
WILSON OKAMOTO & ASSOC., INC.

JUL - 9 ~~1999~~

In Reply Refer To: MR

Laura Mau
Wilson Okamoto and Associates, Inc.
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Re: Hana Community Healthcare Campus Draft Environmental Assessment

Dear Ms. Mau

This memorandum confirms a July 8, 1999 telephone call from Mike Richardson to you in which he stated that to the best of our knowledge, the U.S. Fish and Wildlife Service (Service) has not identified any Federally threatened or endangered species in the proposed project area. Furthermore, the Service has no objections to the project based upon the information your agency provided in the Draft EA.

We appreciate the opportunity to comment on the proposed project and apologize for the delay. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Mike Richardson by telephone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

Sincerely,

Barbara A. Mafield, acting
for Robert P. Smith,
Pacific Islands Manager

6272-01
May 22, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS PLANNERS
1907 S. BERETANIA ST. SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX (808)946-2253

Mr. Robert P. Smith
Pacific Islands Manager
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

Attention: Mr. Mike Richardson

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Smith:

We are in receipt of your letter dated July 9, 1999 verifying that no Federally threatened or endangered species have been identified in the project area. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

March 10, 1999

Mr. David Ching
Community Development Block Grant
Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
MAR 12 1999
WILSON OKAMOTO & ASSOC., INC.

Dear Mr. Ching:

Subject: Draft Environmental Assessment (DEA) for the Hana Community Healthcare Campus, Hana, Maui, Hawaii, TMK 1-4-03: 22 and 24

We have reviewed the DEA for the subject project and confirm that TMK 1-4-03: 22 is designated within the State Land Use Agricultural and Rural Districts, and that TMK 1-4-03: 24 is designated within the State Land Use Rural District.

We suggest that the Final EA include a map showing the subject parcels in relation to the State land use districts.

We have no further comments to offer at this time. We appreciate the opportunity to comment on the subject DEA.

Should you have any questions, please feel free to call me or Bert Saruwatari of our office at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

cc: James Stone
Earl Matsukawa
OEQC

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Ms. Esther Ueda, Executive Officer
State of Hawaii
Department of Business, Economic Development and Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Ms. Ueda:

We are in receipt of your letter dated March 10, 1999 confirming the land use designations the study area. Pursuant to your suggestion, we will include in the Final EA a map indicating the two parcels that comprise the study area in relation to the State land use districts. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

EM

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

March 23, 1999

David Ching
Office of the Mayor
County of Maui
200 South High Street
Wailuku, HI 96793

Dear Mr. Ching:

Subject: Draft Environmental Assessment (EA) for Hana Community Healthcare Campus, TMK: 1-4-3:22 and 24

In order to reduce bulk and conserve paper, we recommend printing on both sides of the pages in the final document. In addition we have the following comments:

1. Contacts: In the final EA include copies of any correspondence made during the preconsultation phase of this project.

2. Landscaping: Some landscaping is shown in the facility renderings, but not discussed in the text. We encourage the use of native Hawaiian plants and trees to landscape the new facility.

3. Sustainable Building Design: Please consider applying sustainable building techniques as presented in the enclosed "Guidelines for Sustainable Building Design in Hawaii." In the final EA include a description of any of the techniques you will implement.

4. Emergency facilities:

   Ambulances:The draft EA mentions the use of an ambulance. Will additional ambulances be employed with the new facility? Discuss the impacts expected and mitigation measures which will be used to reduce these impacts.

   Helicopters: If new or additional helicopter use is being considered, a supplemental draft EA must be submitted, disclosing full details of this use, along with potential impacts and related mitigation measures.

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

Sincerely,

for GARY GILL

Enc.

c: Earl Matsukawa, Wilson Okamoto
Kober/Hanssen/Mitchell Architects

DRAFT

Guidelines for Sustainable Building Design in Hawaii

A planner's checklist OEQC September 1998

Introduction:
What is a "sustainable" building?
A sustainable building is built to minimize energy use, expense, waste, and impact on the environment. It seeks to improve the region's sustainability by meeting the needs of today's market without compromising the needs of future generations. Compared to conventional projects, a resource-efficient building project will:

I. Use less energy for operation and maintenance

II. Contain less *embodied* energy (e.g. locally produced building products contain less *embodied* energy than imported products because they require less energy-consuming transportation to the site)

III. Protect the environment by preserving/conserving water and other natural resources and by minimizing impact on the site ecosystem

IV. Minimize health risks to those who construct, maintain, and occupy the building

V. Minimize construction waste

VI. Recycle and reuses generated construction wastes

VII. Use resource-efficient building materials

VIII. Provide the highest quality product practical at competitive (affordable) prices

Hawaii law calls for efforts to conserve natural resources, promote careful use of water, efficient use of energy and recycle all waste products. To meet this goal, special care must be taken to plan a project from the very beginning to be in keeping with sustainable building design concepts.

The purpose of the state's environmental review law (HRS Ch. 343) is to encourage full, accurate and complete analysis of proposed actions, promote public participation and support enlightened decision making by public officials. To assist agencies and applicants in meeting this legal purpose, the Office of Environmental Quality Control offers the following guidelines for preparers of environmental reviews under the authority of HRS 343.

These guidelines do not constitute rules or law. They have been refined by staff and peer review

to provide a helpful checklist of items that will assist planners to design projects that will have a minimal effect on Hawaii's environment and make wise use of our natural resources. In a word, projects that are *sustainable*.

In order to avoid excessive overlapping of items, the checklist is designed to be read in totality, not just as individual sections. This checklist tries to address large scale projects as well as smaller projects. Please use items that are appropriate to the scale of the project.

Although this list will help promote careful and sensitive planning, mere compliance with this checklist does not confirm sustainability. Compliance and knowledge of current building codes by users of this checklist is also required.

TABLE OF CONTENTS

I. Team Building

___ Hold programming team meeting with client representative, Project Manager, planning consultant, architectural consultant, civil engineer, mechanical, electrical, plumbing (MEP) engineer, structural engineer, landscape architect, interior designer, sustainability consultant and other consultants as required by the project. Identify project and environmental goals. Client representatives and consultants to work closely to ensure that environmental and project goals are met.

___ Develop sustainable guideline goals to insert into outline specifications as part of the Schematic Design documents. Extract applicable goals from the following sections as appropriate to project.

___ Use Benefit Cost Method for economic analysis of the sustainability measures chosen. (Benefit Cost Method is a method of evaluating projects or investments by comparing the present value or annual value of expected benefits to the present value or annual value of expected cost.)

___ Include "Commissioning" in the project budget and schedule. (Commissioning is the process of verifying that equipment and systems are installed and are able to operate according to the design and operational needs. It improves the performance of building, resulting in energy conservation and efficiency, improves air quality and lowers operation costs. *Refer to Section IX.*)

II. Building Design

___ Consider renovating an existing building instead of demolishing and/or constructing a new building.

___ Plan for high flexibility while designing building shell and interior spaces to accommodate changing needs of the occupants, and hence possibly extend life span of building.

___ Design for re-use and/or disassembly. For building products, see Section VII.

___ Provide facilities for bike/walking commuters (showers, lockers, bike racks).

___ Plan for comfortable and healthy work environment. Include inviting outdoor spaces, wherever possible. *(Refer to Sections VII and VIII.)*

___ Design space for recycling/waste diversion opportunities during occupancy.

___ Design with an integrated pest management approach. Investigate using products such as Termi-mesh, Basaltic Termite Barrier and Sentricon to limit pest access into structure.

___ Design building that is energy efficient and resource efficient. *(See Sections III, IV, V, VI, VII.)* Determine building by-products such as heat, gray-water etc., and plan to minimize them or find alternate uses for them.

___ For natural cooling, use
1. Reflective roof, radiant barrier or insulation, roof vents
2. Light colored paving (concrete) and building surfaces
3. Tree Planting to shade buildings and paved areas
4. Building orientation and design to capture trade winds.

III. Site Selection & Site Design

Site Selection

___ Understand the site through careful analysis and assessment of site characteristics such as vegetation, topography, geology, climate, natural access to site, solar orientation patterns, water and drainage, existing utility and transportation infrastructure to determine the appropriate use of site, and design to minimize the environmental impact of the development.

___ Select site in a neighborhood, when feasible, on which the project could have a positive social, economic and environmental impact.

___ Select a site with short connections to existing municipal infrastructure (water, waste water treatment plant, roads, electricity, telephone, data and gas). Select a site close to mass transportation, bicycle routes and pedestrian access.

Site Preparation and Design

___ Preserve existing resources and natural features to enhance the design and add aesthetic, economic and practical value. Design to minimize the environmental impact on vegetation and topography.

___ Site building(s) to take advantage of natural features and maximize their function such as solar access, day-lighting and natural cooling. Design ways to integrate the building(s) with the site that maximizes site efficiencies, enhances human comfort, safety and health, as well as, achieves operational efficiencies.

___ Locate the building(s) to encourage bike and pedestrian access and pedestrian oriented uses.

___ Retain existing topsoil and maintain soil health by clearing only the areas carefully marked for construction of streets, driveways, parking areas, and building foundations. Replant exposed areas when practical. Reuse soils and vegetation excavated for fill or mulch.

___ Grade slopes to ratio less than 2 : 1 (run to rise). Balance cut and fill to eliminate hauling. Check grading frequently to prevent accidental over excavation.

___ Minimize altering natural water drainage. Provide siltation basins to protect the site during and after construction, especially, in the event of a major storm.

___ Minimize area required for the building footprint. Consolidate utility and infrastructure into common corridors to reduce unnecessary site degradation, and minimize cost, improve efficiency, centralize runoff, and reduce impermeable surfaces.

___ For ground treatment, avoid the use of pesticides or other toxic chemicals. Use alternative methods such as Termi-mesh, Basaltic Termite barrier, and Sentricon, etc.

IV. Energy Use

___ Facilitate site sensitive orientation by :
1. Minimizing impact on cooling load through site shading and east-west orientation.

2. Incorporating natural ventilation through channeling trade winds.
3. Using day lighting where possible.

___ Maximize efficiencies for Lighting, Heating, Ventilation, Air Conditioning (HVAC) and other equipment.
___ Design south, east and west shading devices to minimize solar heat gain.
___ Utilize low shading co-efficient window system to minimize solar heat gain. Minimize effects of thermal bridging in walls, roof and window systems.
___ Eliminate hot water in restrooms when possible.
___ Pressurize building to reduce mold and mildew.
___ Obtain a copy of State of Hawaii Model Energy Code (available through the Hawaii State Energy Division, at Tel.(808)-587-3811). Exceed its requirements.
___ Use renewable energy. Consider the use of solar water heaters and photovoltaics. (Contact State Energy Office at Tel. (808)-587-3810 for information on the utility-sponsored Commercial and Industrial Energy Efficiency Programs which offer incentives to businesses for installing qualifying energy efficient technologies.)
___ Use available energy resources such as waste heat.
___ Consider design for tenant sub-metering to encourage utility use accountability.

Energy Lighting

___ Design for at least 15% lower interior lighting power allowance than the Energy code.
___ Select lamps with high efficiency, compatible with the desired light source and color rendering capabilities.
___ Select luminaires which maximize system efficacy (i.e. which deliver the light to the task, not the surrounding areas).
___ Reduce light absorption on surfaces by selecting colors and finishes with high reflectance values, but avoid glare.
___ Use task lighting with low ambient light levels.
___ Use luminaires with heat removal and recovery capabilities.
___ Maximize integration of day lighting through the use of vertical fenestration, light shelves, clerestories /monitors, and building form as well as through translucent/transparent/modular interior partitions. Coordinate electrical lighting with day lighting for maximum electrical efficiency.
___ Incorporate day lighting control, or photo/motion sensors in low or intermittent use areas.
___ Avoid light spillage in exterior lighting by using directional fixtures.
___ Minimize light overlap in exterior lighting schemes.
___ Use lumen maintenance controls.

Mechanical Systems

___ Design to comply with the Energy code and to exceed it's energy conserving requirements.
___ Utilize thermal storage for reduction of peak energy usage.
___ Use Variable air volume systems to save fan power.
___ Use variable speed drives on pumping systems and fans for cooling towers and air handlers.

___ Use air -cooled refrigeration equipment or use cooling towers designed to reduce drift.
___ Reduce need for mechanical ventilation by reducing sources of indoor air pollution. Use high efficiency air filters. Use ASHRAE standards as minimum.
___ Locate fresh air intake away from polluted or overheated areas. Locate on roof where possible. Separate air intake from air exhausts by at least 40 ft.
___ Use separate HVAC systems to serve areas that operate on widely differing schedules or design conditions.
___ Use shut off or set back controls on HVAC system when areas are not occupied.
___ Evaluate the potential use of condenser heat, waste heat or solar energy to reduce water heating energy cost. (Contact State Energy Office at Tel. (808)-587-3810 for information on the utility-sponsored Commercial and Industrial Energy Efficiency Programs which offer incentives to businesses for installing qualifying energy efficient technologies.)
___ Evaluate plug-in loads for energy efficiency and power saving features.
___ Improve comfort and save energy by reducing the relative humidity by waste reheat, heat pipes or solar heat.
___ Minimize heat gain from equipment and appliances by using:
1. Environmental Protection Agency (EPA) Energy Star rated appliances.
2. Hoods to remove heat from concentrated sources.
3. Specify high performance water heating that exceeds the Energy Code.
4. Specify HVAC system "commissioning" period to reduce occupant exposure to Indoor Air Quality (IAQ) contaminants.
5. Specify premium efficiency motors.

V. Water Use

Building Water

___ Install water efficient fixtures as required by the Uniform Plumbing Code.
___ If practical, eliminate hot water in restrooms.
___ Use infrared sensors for flushing of toilets and urinals.
___ Use self closing faucets (infrared sensors or spring loaded faucets) for lavatories and sinks.

Landscaping and Irrigation

(See Section VI.)

VI. Landscape and Irrigation

___ Incorporate water efficient landscaping (xeriscaping) using the following principles:
1. Planning. Efficient irrigation: Create watering zones for different conditions. Separate vegetation types by different watering requirements. Install moisture sensors to avoid operation of the irrigation system in the rain and if the soil has adequate moisture. Use

different types of (appropriate) sprinkler heads.
2. Soil analysis/improvement: Use (locally made) soil amendments and compost for plant nourishment, better absorption and water holding capacity.
3. Appropriate plant selection: Use drought tolerant and/or slow growing hardy grasses, native plants, shrubs, ground covers, trees, appropriate for local conditions, hence minimizing the need for irrigation. Maintain existing vegetation to encourage bio-diversity and protect nutrients.
4. Practical turf areas: Turf only in areas where it provides functional benefits.
5. Mulches: Use mulches to minimizes evaporation, reduce weed growth, retard erosion.

___ Protect existing natural site features and save native trees to prevent erosion. Establish tree protection areas well before construction.
___ Limit staging area and prevent unnecessary grading of site to protect native vegetation.
___ Use native top soil from the structure's footprint, stockpiled on the site with a silt fence in order to reduce the need for imported top soil.
___ Irrigate with non-potable water or reclaimed water. Harvest rainwater from the roof for irrigation.
___ Sub-meter the irrigation system. Locate irrigation controller within visual site of the irrigated area to verify that the system is operating properly.
___ Use pervious paving instead of concrete or asphalt paving. Integrate natural and man-made berms, hills and swales to control water runoff.
___ Avoid materials that leach out pollutants which can contaminate the water runoff. Contact the Clean Water Branch at 586-4309 to determine whether a NPDES (National Pollutant Discharge Elimination System) permit is required.
___ Use trees and bushes that are felled at the building site (i.e. mulch, fence posts, trim).
___ Use recycled landscape materials such as plastic lumber for planters and benches.

VII. Building Materials & Solid Waste Management

Design for Material

___ Use durable products. Opt for natural products or products with low embodied energy.
___ Specify and use products with recycled content such as steel, concrete with fly ash or glass, drywall, carpet etc. Use ground recycled concrete, graded glass cullet or asphalt as base or fill material.
___ Specify low toxic or non -toxic materials whenever possible, such as low VOC. (Volatile Organic Compounds) paints, sealers and adhesives, low or formaldehyde-free materials). Also avoid products with CFCs (Chloro-fluoro-carbons).
___ Use locally produced products such as plastic lumber, insulation, hydromulch, glass tiles, compost.
___ Use advanced framing systems, two stud corners, engineered structural products and panel systems.
___ Use materials which require limited or no application of finishing or surface preparation. (i.e. finished concrete floor surface).

___ Use re-milled salvaged lumber where appropriate and as available. Minimize the use of old growth timber.
___ Use sustainably harvested timber.
___ Commit to a material selection matrix for efficient and environmentally sensitive use of raw materials and building materials, and locally available building materials. (A list of Earth friendly products and materials is available through the Green House Hawaii Project. Call Clean Hawaii Center, Tel. (808)-587-3802 for the list.)

Develop a Solid Waste Management, Recycling and Diversion Plan

___ Prepare and post a job-site recycling plan at the site office.
___ Conduct pre-construction waste minimization training for employees and sub-contractors.
___ Use a central area for all cutting.
___ Establish a dedicated waste separation/diversion area. Include Waste/Compost/Recycling collection area and collection system for both construction process and building operation.
___ Separate and divert all unused or waste cardboard, ferrous scrap, construction materials, fixtures for recycling or to a salvage exchange facility. Information on "Minimizing C&D (construction and demolition) waste in Hawaii" is available through Department of Health, Office of Solid Waste Management, Tel. (808)-586-4240.
___ Use on site or divert all green waste, untreated wood and clean drywall for soil amendments.
___ Use on-site or divert all concrete and asphalt rubble.
___ Manage waste from the use of solvents, paints, sealants, etc. separate from C&D (construction and demolition) waste. Donate paint to non-profit organizations or list on HIMEX (Hawaii Materials Exchange). HIMEX is a free service operated by Maui Recycling Group, that offers an alternative to landfill disposal of usable materials, and facilitates no-cost trades. See web site, www.himex.org.
___ Use suppliers that re-use or recycle packaging material whenever possible.

VIII. Indoor Air Quality

___ Provide IAQ requirements during design and contract document phases. Requirements are to be followed during construction in order to minimize or contain IAQ contaminant sources during construction, renovation and remodeling, especially if there are occupants in the building.
___ Notify the occupants of any type of construction, renovation and remodeling.
___ Allow a flush-out period after construction, renovation and remodeling to minimize exposure to any chemicals and debris.
___ Use low-emitting materials, products, and solvents. Reduce sources of interior formaldehyde. Select furnishing and cabinetry with no VOC (Volatile Organic Compounds) off-gassing.
___ Research the original usage and design of the building before it is reoccupied to ensure that adequate amounts of fresh air is available and distributed to the occupants.

___ Asbestos and lead paint are not allowed in new buildings. Inspect for the same in existing buildings and abate as needed.
___ Stage finish application to prevent absorption of Volatile Organic Compounds (VOC's) into surrounding materials.
___ Supply workers with, and ensure use of, VOC-safe masks.
___ Install separate exhaust fans in rooms where office equipment is used, and exhaust to the exterior of the building.
___ Place bird guards over air intakes to prevent pollution of shafts.
___ Use low or non-toxic cleaners.

IX. Commissioning & Construction Project Closeout

___ Project Manager to coordinate Commissioning activities during project closeout. Criteria to be established by Architect/Engineer Consultant.
___ Provide as-built drawings and documentation for all systems and their control strategies as well as maintenance and cleaning manuals for finish materials.
___ Involved parties should successfully demonstrate all systems before final acceptance.
___ Provide flush-out period to remove air borne contaminants from the building and systems.

X. Occupancy and Operation

General Objectives

___ Develop User's Manual for building occupants that illustrates the commitment to sustainable operations.
___ Administrator's responsibilities must include ensuring that the department's sustainability policies are being carried out.

Energy

___ Purchase EPA rated, Energy Star, energy-efficient office equipment, appliances, computers, and copiers. (Energy Star is a program sponsored by U.S. Dep. Of Energy, implies that product will contribute to reduced energy costs for buildings and reduce air pollution.)
___ Institute an employee education program about efficient use of building, appliances, occupants impact on water use, energy use, etc.
___ Re-commission systems whenever modifications are made to the systems.

Water

___ Start the watering cycle in early morning in order to minimize evaporation.
___ To reduce cooling tower water consumption, increase cycles of concentration utilizing chemical treatment.

Air

___ Provide incentives which encourage building occupants to use alternatives to single occupancy vehicles.
___ Provide location map of services within walking distance (child care, restaurants, gyms, shopping).
___ Periodically monitor or check for indoor pollutants in building.
___ Provide an IAQ plan for tenants and management to establish a policy/documentation response procedure. This helps tenants understand their responsibility to protect the air quality of the facility.

Materials and Products

___ Purchase business products with recycled content such as paper, toners, ribbons.
___ Purchase Furniture made with natural, sustainably harvested wood, or with recycled materials, which will not off gas VOC's.
___ Remodeling and painting should comply or improve on original sustainable design intent.
___ Use low VOC, non-toxic, phosphate and chlorine free, biodegradable cleaning products.

Solid Waste

___ Collect recyclable business waste such as paper, soda cans, and cardboard boxes.
___ Avoid single use items such as paper or Styrofoam cups and plates, and plastic utensils.

XI. Resources

Buy Recycled in Hawaii. Clean Hawaii Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997. (Call 587-3802 for publication)

Guide to Resource-Efficient Building in Hawaii. University of Hawaii at Manoa, School of Architecture and Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, October 1998. (Call 587-3804 for publication)

Minimizing Construction and Demolition Waste. Office of Solid Waste Management, Department of Health and Clean Hawaii Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, February 1998. (Call 586-4240 for publication)

Hawaii Model Energy Code. Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997. (Call 587-3810 for publication)

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808)946-2277
FAX: (808)946-2253

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

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Ms. Salmonson:

We are in receipt of your letter dated March 23, 1999 commenting on the subject project. The following is offered in response to your comments:

1. Contacts: There is no formal correspondence of the pre-assessment consultation for the project.

2. Landscaping: The landscaping shown in Figure 3 is provided for illustrative purposes only. At this time, the project design is in the conceptual stage and, a landscaping plan has yet to be developed. The proposed landscape design for the facility will incorporate native Hawaiian plants and trees.

3. Sustainable Building Design: We appreciate the information you provided for "Guidelines for Sustainable Building Design in Hawaii". To the extent possible, the project will consider and incorporate measures regarding team building, building design, site selection and design, energy use, water use, landscape and irrigation, building materials and solid waste management, indoor air quality, commissioning and construction project closeout, and occupancy and operation.

4. Emergency facilities: Helicopter and ambulance services are currently provided by the facility. These services will continue, however, no expansion of the services are proposed at this time and, as such, no new impacts are anticipated.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
File:

April 26, 1999

99-044/epo

Mr. David Ching
Community Development Block
Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

Subject: Draft Environmental Assessment (DEA)
Hana Community Health Care Campus
Hana, Maui
TMK: 1-4-3: 22 & 24

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Polluted Runoff Control

Proper planning, design and use of erosion control measures and management practices will substantially reduce the total volume of runoff and limit the potential impact to the coastal waters from polluted runoff. Please refer to the *Hawaii's Coastal Nonpoint Source Control Plan*, pages III-117 to III-119 for guidance on these management measures and practices for specific project activities. To inquire about receiving a copy of this plan, please call the Coastal Zone Management Program in the Planning Office of the Department of Business and Economic Development and Tourism at 587-2877.

The following practices are suggested to minimize erosion during construction activities:

1. Conduct grubbing and grading activities during the low rainfall months (minimum erosion potential).

2. Clear only areas essential for construction.

3. Locate potential nonpoint pollutant sources away from steep slopes, water bodies, and critical areas.

4. Protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells.

5. Cover or stabilize topsoil stockpiles.

6. Intercept runoff above disturbed slopes and convey it to a permanent channel or storm drain.

7. On long or steep slopes, construct benches, terraces, or ditches at regular intervals to intercept runoff.

8. Protect areas that provide important water quality benefits and/or are environmentally sensitive ecosystems.

9. Protect water bodies and natural drainage systems by establishing streamside buffers.

10. Minimize the amount of construction time spent in any stream bed.

11. Properly dispose of sediment and debris from construction activities.

12. Replant or cover bare areas as soon as grading or construction is completed. New plantings will require soil amendments, fertilizers and temporary irrigation to become established. Use high planting and/or seeding rates to ensure rapid stand establishment. Use seeding and mulch/mats. Sodding is an alternative.

The following practices are suggested to remove solids and associated pollutants in runoff during and after heavy rains and/or wind:

1. Sediment basins.

2. Sediment traps.

3. Fabric filter fences.

4. Straw bale barriers.

5. Vegetative filter strips.

Any questions regarding these matters should be directed to the Polluted Runoff Control Program in the Clean Water Branch at 586-4309.

Asbestos

The Federal Register, 40 CFR Part 61, National Emission Standard for Hazardous Air Pollutants, Asbestos NESHAP Revision; Final rule, November 20, 1990, requires inspection of all affected areas to determine whether asbestos is present prior to any demolition activities.

Under the NESHAP regulation, the project would be required to file with the Noise, Radiation and Indoor Air Quality Branch of the Department of Health an Asbestos Demolition/Renovation notification ten working days prior to demolition of each building or the disturbance of regulated asbestos-containing materials. All regulated quantities and types of asbestos-containing materials would be subject to emission control, proper collection, containerizing, and disposal at a permitted landfill.

Questions concerning asbestos requirements should be directed to Mr. Robert H. Lopes at 586-5800. Should there be additional concerns, please contact Mr. Jerry Haruno, Environmental Health Program Manager of the Noise, Radiation and Indoor Air Quality Branch at 586-4701.

Vector Control

The property may be harboring rodents which will be dispersed to the surrounding areas when the site is cleared. The applicant is required by Chapter 11-26, "Vector Control," Hawaii Administrative Rules to eradicate any rodents prior to clearing the site and to notify the Department of Health by submitting Form VC-12 to the local Vector Control Branch when such action is taken.

The Vector Control Branch phone numbers are as follows:
Oahu: 831-6767
Kauai: 241-3306
Hawaii--Hilo: 974-4238, Kona: 322-7011
Maui (includes Molokai and Lanai): 873-3560

Wastewater

The Department of Health would like to see a treatment individual wastewater system (noncesspool) installed to handle wastewater generated from the proposed project. Plans must be

submitted to and approved by the Maui District Health Office prior to construction.

If there are any questions on this matter, please contact Mr. Herbert Matsubayashi, District Environmental Health Program Chief at 984-8230.

Sincerely,

GARY GILL
Deputy Director for
Environmental Health

c: CWB
NR&IAQB
VCB
WWB
MDHO
Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Assoc., Inc.

WILSON
OKAMOTO
& ASSOCIATES, INC.

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HONOLULU, HI 96826
PH. (808) 946-2277
FAX (808) 946-2253

6272-01
May 22, 2000

Mr. Gary Gill
Deputy Director for Environmental Health
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Gill:

We are in receipt of your letter dated April 26, 1999 (Ref. 99-044/epo) commenting on the subject EA. The following is offered in response to your comments:

Polluted Runoff Control: The guidelines provided by the Hawaii Coastal Zone Management Non-Point Source Plan, as well as your suggestions will be considered in developing appropriate mitigation measures for erosion runoff during the construction phase of the proposed project. We appreciate the information you provided and will incorporate measures into the design plans for implementation by the construction contractor. In addition, we note that as the project design progresses, a drainage report and Best Management Practices Plan for erosion control will be submitted to the County of Maui Department of Public Works and Waste Management for review and approval.

Asbestos Control: The project will comply with all requirements for asbestos inspection and removal.

Vector Control: The project will comply with all requirements for vector control prior to site work.

Wastewater: Plans for the project's wastewater system have not been developed. We understand, according to Chapter 62, State Department of Health Administrative Rules, that the Hana region is indicated as a critical wastewater disposal area, and that individual systems such as septic tanks or package treatment plants are required as a means for wastewater disposal for such areas. Plans for the proposed wastewater system will be determined as the project design progresses, and will be submitted for approval to the Maui District Health Office prior to construction.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

[illegible]

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

[illegible]

May 18, 1999

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Attention: Mr. [illegible]

Dear Mr. [illegible]:

RECEIVED
MAY 27 1999
[illegible]

LOG NO: 23391
DOC NO: 9905tm10
Architecture

SUBJECT: Hana Community Healthcare Campus
Draft Environmental Assessment
TMK: [illegible], Hana, Maui

We reviewed the Draft Environmental Assessment for the Hana Community Healthcare Campus project. [illegible] The majority of the [illegible] on the Hawaii or [illegible] However, the residence and concrete structure [illegible]

[illegible]

[illegible]

[illegible] Program

[illegible]d you require fur[illegible]rmation, please call [illegible] at (808)[illegible]. For [illegible]haeological concerns, please call Cathy Dagher at (808)[illegible]. Thank you for the [illegible]pportunity to comment.

Aloha,

DON HIBBARD
Deputy State Historic Preservation Officer

TM:jk

c: ✓ James Stone, Earl Matsukawa, [illegible], Beretania St., [illegible], Honolulu, HI [illegible]

CORRECTION

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

EM

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

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

May 18, 1999

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
MAY 27 1999
WILSON OKAMOTO & ASSOC., INC.

LOG NO: 23391
DOC NO: 9905tm10
Architecture

Attention: Mr. David Ching

Dear Mr. Ching:

SUBJECT: **Hana Community Healthcare Campus**
Draft Environmental Assessment
TMK: 1-4-03:22 & 24, Hana, Maui

We received the Draft Environmental Assessment for the Hana Community Healthcare Campus project. We apologize for the tardiness of our reply. The majority of the structures on the property do not appear to be eligible for listing on the Hawaii or National Registers of Historic Places. However, the residence and concrete structure resembling an incinerator appears to meet criteria for listing.

Therefore, we recommend keeping the concrete structure and relocating the house to the back of the larger parcel and continue utilizing it as one of the residences or as a feature in the garden. If this is not feasible, please provide greater in-depth information such as when the structures were constructed, by whom and for what purpose so that we can better determine mitigative measures for this possible adverse effect of demolition.

Since the data recovery has been completed on these two parcels, we believe this project will have no effect on archaeological resources. If, however, in the course of routine construction activities, historic sites, including human burials are found, all work in the immediate vicinity must stop and this office contacted at 692-8015.

Should you require further information, please call Tonia Moy at (808)692-8030. For archaeological concerns, please call Cathy Dagher at (808)692-8023. Thank you for the opportunity to comment.

Aloha,

DON HIBBARD
Deputy State Historic Preservation Officer

TM:jk

c: ✓ James Stone, Earl Matsukawa, Wilson Okamoto & Associates, Inc., 1907 S. Beretania St., #400, Honolulu, HI 96826

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Don Hibbard, Ph.D.
Deputy State Historic Preservation Officer
State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Dr. Hibbard:

We are in receipt of your letter dated May 18, 1999 (Ref. Log No. 23391, Doc No. 9905tm10 Architecture) commenting the subject EA.

With regard to the office and residence of the executive director as well as the concrete structure, both will be considered for incorporation within the proposed project. As the project is in the preliminary design stages, however, it is unclear whether this can be achieved. In the event that it is determined unsafe for habitation or otherwise infeasible to retain either structure, a historic assessment will be prepared and submitted to your office for review. Further, neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined. The project developer, DKI and Associates, Inc., will continue to consult with your office throughout the design process as to the disposition of both structures.

We appreciate your determination that the project will have no effect on archaeological resources.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JUN 14 1999

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
HWY-PS
2.4131

Mr. David Ching
Community Development Block Grants
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

RECEIVED
JUN 15 1999
WILSON OKAMOTO & ASSOC., INC

Dear Mr. Ching:

Subject: Draft Environmental Assessment, Hana Community Healthcare Campus, Hana, Maui, TMK: 1-4-3: 22, 24

The proposed renovations and expansion of the Hana Community Health Center in Hana is not anticipated to have a significant impact on Hana Highway, our State facility.

The recommendations for roadway improvements stated in the traffic assessment should be implemented to assure the safety of the traveling public.

Very truly yours,

PERICLES MANTHOS
Administrator
Highways Division

c: Mr. James Stone, Kober/Hanssen/Mitchell Architects
Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.

WILSON
OKAMOTO
& ASSOCIATES, INC.

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PH. (808)946-2277
FAX (808)946-2253

6272-01
May 22, 2000

Mr. Pericles Manthos, Administrator
State of Hawaii
Department of Transportation
Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Manthos:

We are in receipt of your letter dated June 14, 1999 (Ref. HWY-PS 2.4131) regarding the subject project. We appreciate your determination that the project will not have a significant impact on Hana Highway, as well as your concurrence with the roadway improvements recommended in the traffic assessment.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE
at
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

March 19, 1999

THOMAS M. PHILLIPS
CHIEF OF POLICE

CHARLES H.P. HALL
DEPUTY CHIEF OF POLICE

EM

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, HI 96793

RECEIVED
MAR 23 1999
WILSON OKAMOTO & ASSOC., INC.

Attention: Mr. David Ching

Gentlemen:

Subject: Hana Community Healthcare Campus
Draft Environmental Assessment
Tax Map Key: 1-4-03:22 and 24
Hana, Maui, Hawaii

This is in response to the letter dated March 4, 1999 from Mr. Earl Matsukawa, AICP, Project Manager for Wilson Okamoto & Associates, Inc. regarding the above mentioned subject.

We have reviewed the Draft Environmental Assessment for the Hana Community Healthcare Campus project. Enclosed are our comments. Thank you for giving us the opportunity to comment on this project.

Very truly yours,

THOMAS M. PHILLIPS
Chief of Police

Enclosure

xc: Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Associates, Inc.

TO : THOMAS PHILLIPS, CHIEF OF POLICE

VIA : CHANNELS AC JN 3/16/99

FROM : MILTON MATSUOKA, LIEUTENANT, HANA DISTRICT

SUBJECT : DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HANA COMMUNITY HEALTHCARE CAMPUS PROJECT

The company of Wilson Okamoto and Associates, Inc. is requesting an environmental assessment for the Hana Community Healthcare Campus project. This project is being proposed by the County of Maui Mayor's office.

Checks ware made of the property, where the Hana medical facility now sits, along with surrounding properties. Checks were also made of the associated roadways that allow access to the property.

Construction noise should not be a factor on the south and west areas as there are no residences located in these areas. There are residences located on the east and north sides, however, there is sufficient distances from the residences that normal construction noise would not make a significant impact. In the companies noise impact statement it states that the construction company will be required to obtain a noise permit if noise will exceed allowable levels.

Ingress and Egress should not make a significant impact on Hana Highway. When exiting the property there is good sight distance on the north side and reasonable sight distance on the south side for the speed limit in the area. There are children crossing signs on either side of this intersection which should slow traffic even further. If any motor vehicle accidents occur at this intersection, due to traffic violations, this can be remedied by traffic enforcement and placement of speed limit signs closer to the area. When gaining access to the property, making a left turn from Hana Highway, there should not be a problem. Per the traffic impact statement, contained in this report, traffic levels for this section of roadway is well below capacity so a left turn lane does not appear to be necessary at this time.

Please forward copies of this report to Kober/Hanssen/Mitchell Architects and Wilson Okamoto & Associates.

Milton M. MATSUOKA 6948
03/17/99 0930 hrs.

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
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HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Thomas M. Phillips, Chief of Police
Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Phillips:

We are in receipt of your letter dated March 19, 1999 commenting that significant impacts to noise and traffic safety are not anticipated as a result of the subject project. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
Mayor
JOHN E. MIN
Director
CLAYTON I. YOSHIDA
Deputy Director

RECEIVED MAR 2 4 1999

COUNTY OF MAUI
DEPARTMENT OF PLANNING

March 22, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

RE: Draft Environmental Assessment for the Hana Community Healthcare Campus at TMK: 1-4-003:022 and 024, Hana, Maui, Hawaii

The Maui Planning Department (Department) has reviewed the Draft Environmental Assessment (EA) Report for the above-referenced project and has the following comments:

Land Use:

State Land Use Districts:

According to the Draft EA, the subject parcels are located within the Agricultural and Rural Districts, however, a map identifying the boundaries certified by the State Land Use Commission was not included. The Planning Department concurs that a healthcare facility is not a permitted use in the State Agricultural District and a State Land Use Commission Special Use Permit will be required.

However, in the State Rural District, "public, quasi-public, and public utility facilities" are identified as permitted uses. As a healthcare facility, we find that the proposed use is a public use. Chapter 205 of the Hawaii Revised Statutes does not include definitions that define "public, quasi-public and public utility facilities." However, Maui County Code, Chapter 19.04, Section 19.04.040, defines "public facility or public use" as follows:

> "...means a use conducted by, or a facility or structure owned or managed by, the government of the United States, the State of

> Hawaii or the County of Maui which provides a governmental function, activity, or service for public benefit."

It further defines "quasi-public use or quasi-public facility" as follows:

> "...means a use conducted by, or a facility or structure owned or operated by, a non-profit, religious, or eleemosynary institution which provides educational, cultural, recreational, religious, or other similar types of public services."

The County of Maui is providing the funds for the healthcare facility with the non-profit organization, Hana Community Healthcare Center, developing the project. Pursuant to the above-referenced definitions, the Planning Department determines that the healthcare facility is a permitted use in the State Rural District and a State Special Use Permit is not required.

Hana Community Plan:

The Hana Community Plan (Plan) is more than compliance to the Land Use Map. The Draft EA should address the goals, objectives and policies of the Plan relating to the Hana Planning Region. There were four areas of concern raised in the Plan. One of these concerns related to Government Services. The Plan states that:

> "a greater level of resource commitment is required in the region to satisfy the community's social, educational, recreational and emergency service needs. While the region's geographic isolation from the more urbanized areas of the island is acknowledged as a reason for the existing level of government service, it is necessary to provide a level of service which will ensure the health, safety and well-being of Hana's residents. Areas of concern with regard to government services include the lack of vocational educational programs, fire protection service, and the turnover in government personnel serving the region."

The following additional goals, objectives and policies applicable to the proposed project should be addressed:

LAND USE (pp. 11-12)

Goal

An efficient distribution of urban, rural and agricultural land uses in order to provide for the social and economic well-being of residents in the Hana Community Plan region.

Preservation and enhancement of the current land use patterns which establish and enrich the Hana Community Plan region's unique and diverse qualities.

Objectives and Policies

8. Discourage urban land uses and Special Use Permits outside of the Hana Town area except to allow those activities which are essential to the region's economic well-being, which provide essential services for the residents of the Hana District, or which provide for the essential domestic needs of remote communities such as Keanae, Kipahulu and Kaupo. Such activities shall not adversely affect surrounding neighborhoods and shall be supportive of the agricultural activities of the area.

CULTURAL RESOURCES (pp. 15-17)

Goal

Identification, preservation, protection, and where appropriate, restoration of significant cultural resources and practices, that provide a sense of history and identity for the Hana region.

Objectives and Policies

1. Identify, preserve and protect historically, archaeologically and culturally significant areas, sites, and features within the Hana District.

Implementing Actions

2. Require development projects to identify all cultural resources within or adjacent to the project area as part of the County development review process. Further require that all proposed development include appropriate mitigation measures including site avoidance, adequate buffer areas and interpretation.

3. General site types and areas that should be flagged for preservation during development review include the following:

Piilani Trail/Old government roads ...
Plantation era structures and homes...

URBAN DESIGN (p. 20)

Goal

Harmony between the natural and man-made environments through building, infrastructure and landscaping design which ensures that the natural beauty and character of the Hana region is preserved.

Objectives and Policies

1. Support design controls for Hana Town and the Hana region based on maintaining the existing low rise character and rural scale of the area.

Implementing Actions

1. Limit building height to two stories or thirty-five (35) feet above grade throughout the region.

2. Limit the height of man-made walls to avoid visual obstruction of coastal and scenic mauka areas.

SOCIAL INFRASTRUCTURE (pp. 23-24)

Objectives and Policies

Public Health and Safety

9. Encourage the provision of services and development of facilities to meet the current and future "elderly care" needs of the Hana District.

County Zoning:

The subject properties are zoned "Interim" and are subject to the Interim Zoning provisions. Within the Interim District the following uses are permitted:

"Hospitals and/or sanitariums (except those for contagious, mental, or drug or liquor addict cases) and/or convalescent homes; provided that any buildings used in connection with such institutions shall be erected a distance of not less than three hundred feet from the main highways; and provided further, that the minimum lot area for such uses shall be

twenty thousand square feet with a minimum lot width of one hundred feet. No building, including accessory buildings, shall be located less than twenty feet from all lot boundaries;"

"Publicly owned buildings;"

The healthcare facility will be located on publicly owned lands owned by the State of Hawaii and funded by the County of Maui. If the building remains under public ownership, then it will be a permitted use in the Interim District. Although the facility is not intended to provide the wide range of hospital care or convalescent care associated with hospitals, it will provide similar healthcare services offered in a hospital including emergency medical services to an isolated community, and as such, can be considered a hospital use which is permitted in the Interim District.

Hana Community Design Guidelines:

The Draft EA does not address the Hana Community Design Guidelines which are the recommended design criteria for the region which resulted from the recommendations established in the Hana Community Plan. The guidelines are applicable to "public/quasi-public uses and facilities" in the Hana region. According to the guidelines "all government and utility facilities and improvements built in the Hana region should conform to the design recommendations." The Draft EA should address the compliance of the preliminary plans for the healthcare facility with these guidelines.

Special Management Area:

The subject properties are outside of the Special Management Area of the County of Maui and are, therefore, not subject to the provisions of the Special Management Area Rules of the Maui Planning Commission.

Historic, Cultural, Archaeological Resources:

The Draft EA should include the Archaeological Inventory Survey conducted in May 1993 and the follow-up study on Site 3150 conducted in April 1996 by Paul H. Rosendahl, Ph.D., as appendices to the report. According to the section on Archaeological Resources, Sites 3151 and 3152 (boundary walls) were four of the surface sites observed. The summary does not conclusively determine whether the walls are historic or modern property walls. Until further research is conducted on the boundary walls, the walls should remain untouched during any construction or development phase of the project. In addition, the EA does not indicate that any subsurface testing was conducted on the site. Due to the historic significance of the

Hana Region, we would recommend that subsurface testing be conducted on the site prior to ground excavations, especially on the undisturbed areas.

The Draft EA should also include an analysis of the significance of the old concrete oven. When was it built and what was it used for should be included in the analysis.

Based on the photographs in the EA, we note that the residence and office of the executive director (Photograph 2), is typical of plantation homes and appears to retain much of the original architectural details (windows, doors, roof). We would recommend rehabilitation of the building rather than removal. The EA did not include photographs of the emergency medical services building, and as such, an assessment cannot be made on this building.

Topography

The Draft EA should include a topography map which identifies the location of the existing structures, roadways, etc., as well as the larger trees on the property. There appears to be some significant trees on the site, and as much as is practicable, these trees should be retained onsite. The site planning for the facility should make reasonable accommodations for the larger significant trees. The Arborist Committee should be contacted for their recommendation.

Infrastructure

The section on Utilities should include both the existing facilities that service the properties and the projected demand that will result from the Hana Healthcare Facility. The impacts should be analyzed based upon the adequacy of the existing services and the impacts resulting from the projected demand.

Mitigation

Mitigation to potential impacts should include more than a statement that the appropriate State or County agency would be consulted. Actual measures to mitigate potential impacts should be included such as participation in source assessments, system upgrades, etc.

Determination of Anticipated FONSI

The Draft EA should include enough supporting documentation upon which the conclusions were made in the FONSI. Some of the conclusion do not have adequate

supporting documentation in the analysis portion of the EA. For example, the following criteria:

> *"Involve an irrevocable commitment to loss or destruction of any natural cultural resource;*
>
> The proposed action is not anticipated to involve any construction activity that might lead to a loss or destruction of any natural or cultural resource."

The EA does not adequately address the natural and cultural resources of the project to make such a conclusion. There are several unresolved issues such as the buildings that are greater than 50 years, the adequacy of the archaeological survey and the existing landscaping on the site.

Each criteria should be included in the analysis portion of the EA to substantiate the conclusions reached in order to issue a FONSI.

Permits and Approvals

Under the County of Maui, the Draft EA should also include compliance to the Hana Community Design Guidelines.

Parties to Be Consulted

Under the County of Maui, the Arborist Committee should be included to review the significant trees onsite.

Thank you for the opportunity to comment on the subject Draft EA. If additional clarification is required, please contact Ms. Colleen Suyama, Staff Planner, of this office at 243-7735.

Very truly yours,

JOHN E. MIN
Director of Planning

JEM:CMS:dsa
c: Clayton Yoshida, AICP, Deputy Director of Planning
Aaron Shinmoto, Planning Program Administrator
Colleen Suyama, Staff Planner
Kobor/Hanssen/Mitchell Architects
Wilson Okamoto & Associates, Inc.
Project File
General File (S:\CMS\hanacamp)

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808) 946-2277
FAX (808) 946-2253

Mr. John E. Min, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Min:

We are in receipt of your letter dated March 22, 1999 commenting on the subject project. The following is offered in response to your comments:

Land Use:
State Land Use District: Thank you for clarifying that State Special Use Permit is required only for the portion of the project which lies within the Agricultural District. The Final EA will be revised accordingly.

Hana Community Plan: The Final EA will include a discussion of the applicable objectives, policies, and implementing actions expressed in the Hana Community Plan in relation to the proposed project. We appreciate your assistance in identifying the applicable provisions.

County Zoning: The project will comply with all Interim Zoning provisions pursuant to the County Zoning Code.

Hana Community Guidelines: The preliminary design plans for the proposed project are consistent with the design standards of the Hana Community Design Guidelines. All proposed structures will be single story and well within the 35-foot height limit. The design will utilize building materials of moss lava rock, board and batten siding and metal roofs. Building colors will be naturally hued with matte finishes so as not to detract from the rural character of Hana. The design of the proposed facility will embrace a courtyard layout to optimize the natural ventilation, as well as facilitate outdoor views of the landscaping.

Special Management Area: We appreciate your verification that the project is not subject to Special Management Area rules.

Historic, Cultural, Archaeological Resources:
According to the Archaeological Inventory Survey prepared by Paul .H. Rosendahl, Ph.D., Inc. (PHRI) in May 1993, Sites 3151 and 3152 (boundary walls) and Site 3153 (a complex) were identified under the significance category "X" pursuant to the National Register criteria for evaluation as outlined in the Code of Federal Regulations (36 CFR Part 60). Category "X" sites are defined as being important for information content, but which no further data collection is necessary. According to the report, the data collected from these sites was sufficient and there was no preservation potential. In a letter dated July 23, 1993, the Department of Land and Natural Resources State Historic Preservation Division (SHPD) concurred that the sites were "...'no longer significant', having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey".

On the other hand, Site 3150 was identified under significance category "A", which is important for information content and which requires further data collection. SHPD also concurred with this recommendation and, subsequently, PHRI prepared an Archaeological Mitigation Program in April 1996. The SHPD determined in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work was recommended. Further, SHPD determined during the Draft EA review process that the project will have no effect on archaeological resources.

The Archaeological Inventory Survey dated May 1993 and follow-up Archaeological Mitigation Program dated April 1996 prepared by Paul H. Rosendahl, Ph.D. will be included in the Final EA. In addition, the Final EA will be revised to include a discussion of the archaeological data recovery process.

With regard to the office and residence of the executive director, as well as the concrete structure, both will be considered for incorporation within the proposed project. As the project is in the preliminary design stages, however, it is unclear whether this can be achieved. In the event that it is determined infeasible to retain either structure, a historic assessment will be prepared and submitted to the SHPD for review. Further, neither structure will be demolished until such time that their historic significance can be substantiated and an appropriate strategy for their treatment determined. The project developer, DKI and Associates, Inc., will continue to consult with the SHPD throughout the design process as to the disposition of both structures.

Topography
As the project is currently in the conceptual design phase, a topographic map has yet to be prepared. A map will be prepared during the subsequent design phase and will indicate the location of existing structures, roadway, significant trees and other pertinent site information.

At this time, the project design is in the conceptual stage and, a landscaping plan is yet to be developed. The Arborist Committee will be consulted in conjunction with the development of the landscaping plan regarding the disposition of the significant trees currently located on the project site. As noted in Section 2.6 (Page 2-6) of the Draft EA, existing large or significant trees will be preserved and incorporated into the proposed project to the extent possible.

Infrastructure/Mitigation
As the project is in the conceptual design stage, details regarding the projected demand for water and wastewater have yet to be developed. The Department of Water Supply and Department of Public Work and Waste Management have been consulted in conjunction with the Draft EA review process and will continue to be consulted as the project design progresses and details on infrastructure needs become available. Based on the preliminary status of the current project design, it is premature to speculate on specific mitigation measures, and it is appropriate to consult with administering agencies once project details are available.

Determination of Anticipated FONSI
Where appropriate, a discussion of the criteria used to substantiate the conclusions of the determination will be included in the Final EA.

Permits and Approvals
A discussion of the project's compliance with the Hana Community Design Guidelines will be provided in Section 3 of the Final EA pertaining to Relationship to Plans, Policies and Controls.

Parties to Be Consulted
As noted above, the Arborist Committee will be consulted as the project design progresses in conjunction with the development of a landscape plan regarding the disposition of the significant trees currently located on the project site.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

MAUI COUNTY COUNCIL

Councilmember J. Kalani English
East Maui

Chair
Land Use Committee
Vice Chair
Budget Committee
Planning Committee
Member
Committee of the Whole
Public Works and Water Committee

RECEIVED
MAR 30 1999
WILSON OKAMOTO & ASSOC., INC.

March 24, 1999

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Matsukawa:

Thank you for sending me a copy of the Draft Environmental Assessment for the Hana Community Healthcare Campus project. I am reviewing it and will present official comments on it soon.

Again, thank you for your consideration.

Sincerely,

J. Kalani English

JKE:det

200 South High Street, Room 818, Wailuku, Maui, Hawai'i 96793
Phone: (808) 243-7765 Fax (808) 243-7117 E-mail: jkalani@aloha.net Web site: www.aloha.net/~jkalani

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S BERETANIA ST
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HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Councilmember J. Kalani English
200 South High Street, Room 818
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. English:

We are in receipt of your letter dated March 24, 1999 stating your intention to comment officially on the subject EA. As no comments were received as this date, we are finalizing the EA. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 243-7845
Fax: (808) 243-7955

RECEIVED APR 19 99

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

ANDREW M. HIROSE
Solid Waste Division

April 16, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
HANA COMMUNITY HEALTHCARE CAMPUS
TMK: (2) 1-4-003:022 & 024

Dear Mr. Ching:

We reviewed the subject application and have the following comments.

1. Submit a Solid Waste Management Plan for disposal and/or recycling of construction waste material to minimize the impact on the Hana landfill.

2. Only non-hazardous waste materials should be handled by Public Works refuse collectors. A private contractor should handle and correctly dispose of all hazardous materials.

3. Off-street parking, loading spaces, and landscaping shall be provided per Maui County Code, Chapter 19.36.

4. Regarding page 6-1, Item 6 - Permits and Approvals:
The proposed healthcare facility building straddles over the property between parcels 22 & 24. Final subdivision approval to consolidate the two parcels is required prior to construction of the proposed project.

5. A detailed final drainage report and an erosion control Best Management Practices (BMP) plan shall be submitted with the construction plans for review and approval prior to issuance of grading or building permits. The drainage report shall include hydrologic and hydraulic calculations and the schemes for disposal and runoff waters. It must comply with the provisions of the "Rules for Design of Storm Drainage Facilities in the County of Maui" and must provide verification that the grading and runoff water generated by the project will not have an adverse effect on the adjacent and downstream properties. The BMP plan shall show the location and details of structural and non-structural measures to control erosion.

If you have any questions, please call David Goode at 243-7845.

Sincerely,

CHARLES JENCKS
Director of Public Works
and Waste Management

DG:msc/mt
xc: Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Associates
Corporation Counsel

S:\LUCA\CZM\HANACOM.WPD

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
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HONOLULU, HI 96826
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Mr. Charles Jencks, Director
Department of Public Works and Waste Management
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Jencks:

We are in receipt of your letter dated April 16, 1999 commenting on the subject project. The following is offered in response to your concerns:

1. A Solid Waste Management Plan will be submitted to your office for review and approval prior to project construction;

2. As is the current practice, a private contractor will continue to manage the disposal of all hazardous materials resulting from the proposed project;

3. The proposed project will comply with all County off-street parking, loading spaces and landscaping;

4. Prior to construction, the proposed project will comply with all County requirements for subdivision approval to consolidate both parcels; and

5. A drainage report and Best Management Practices Plan for erosion control will be submitted to your office for review and approval.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

JAMES "KIMO" APANA
MAYOR

CLAYTON T. ISHIKAWA
CHIEF

FRANK E. FERNANDEZ, JR
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561
FAX (808) 243-7919

May 4, 1999

Mr. Earl Matsukawa, Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street
Honolulu, HI 96826

RE: Hana Community Healthcare Campus; TMK: 1-04-003-022 and 024

Dear Mr. Matsukawa,

Thank you for the opportunity to comment on the Hana Community Healthcare Campus draft environmental assessment.

The Department of Fire Control has reviewed the documents submitted and wishes to reserve comment until plans and specifications are submitted for review by the various agencies.

If you have any questions, direct them in writing to the Fire Prevention Bureau, 21 Kinipopo Street, Wailuku, HI 96793

Sincerely,

LEONARD F NIEMCZYK
Captain, Fire Prevention Bureau

6272-01
May 22, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808)946-2277
FAX: (808)946-2253

Mr. Leonard F. Niemczyk, Captain
Fire Prevention Bureau
Department of Fire Control
County of Maui
21 Kinipopo Street
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Niemczyk:

We are in receipt of your letter dated May 4, 1999 stating your intention to reserve comment until plans and specifications are available for agency review. Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

Em

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

5/5/99

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 High Street
Wailuku, Maui, Hawaii 96793

for

Mr. Earl Matsukawa, AICP
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

SUBJECT: Hana Community Healthcare Campus, Draft Environmental Assessment, TMK: 1-4-2:22 and 24, Hana, Maui, Hawaii

Dear Mr. Matsukawa,

Thank you for the opportunity to provide comments in preparation of the Draft Environmental Assessment (EA).

The EA should include the sources and expected potable and non-potable water usage. This project is served by Wakiu well located in the Hana system. Water availability will be reviewed at the time of application for meter or meter reservation.

Enclosed is a portion of our water system map pertaining to the project area. Domestic, fire, and irrigation calculations will be reviewed in detail during the development process. Actual fire demand for structures is determined by fire flow calculations performed by a certified engineer. DWS-approved fire flow calculation methods are contained in "Fire Flow" - Hawaii Insurance Bureau, 1991.

It is required by County Code that water conservation practices be incorporated into project design. As much of the water demand as possible should be delivered from non-potable sources (reclaimed or brackish). Where appropriate, the applicants should consider these measures:
Eliminate Single-Pass Cooling: Single-pass, water-cooled systems should be eliminated per Maui County Code Subsection 14.21.20. Although prohibited by code, single-pass water cooling is still manufactured into some models of air conditioners, freezers, and commercial refrigerators.

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20A.680 requires the use of low flow water fixtures and devices in faucets, showerheads, urinals, water closets and hose bibs. Water conserving washing machines, ice-makers and other units are also available.
Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout, "The Costly Drip". The applicant should establish a regular maintenance program.
Use Climate-adapted Plants: Native plants adapted to the area, conserve water and further protect the watershed from degradation due to invasive alien species. The project site is located in "Maui County Planting Plan" - Plant Zones 1 and 5. Please refer to the attached documents, "XERISCAPE: Water Conservation Through Creative Landscaping", "Maui County Planting Plan", and "Hawaiian Alien Plant Studies."
Prevent Over-Watering By Automated Systems: Provide rain-sensors on all automated irrigation controllers. Check and reset controllers at least once a month to reflect the monthly changes in evapotranspiration rates at the site.

The project overlies the Kawaipapa aquifer. The Department of Water Supply strives to protect the integrity of surface water and groundwater resources by encouraging applicants to adopt best management practices (BMPs) relevant to potentially polluting activities. We list a few BMP references here. Additional information can be obtained from the State Department of Health.

"Water Quality Best Management Practices Manual For Commercial and Industrial Business", Prepared for the City of Seattle by Resource Planning Associates, June 30, 1989.
"The Megamanual - Nonpoint Source Management Manual - A Guidance Document for Municipal Officials." Massachusetts Department of Environmental Protection.
"Guidance Specifying Management Measures For Sources of Nonpoint Pollution In Coastal Waters." United States Environmental Protection Agency, Office of Water.

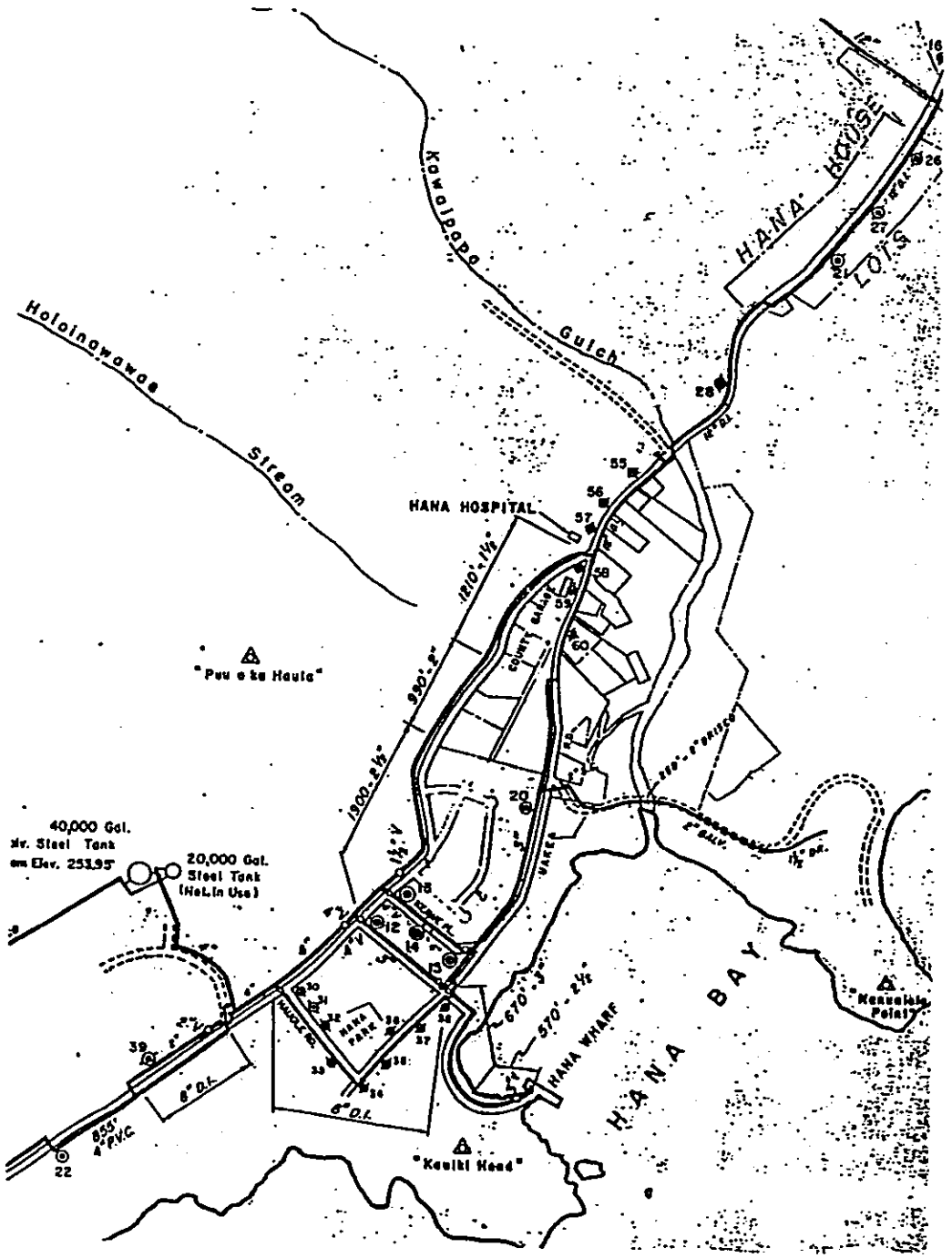
If you have any other questions or need additional information, please call our Water Resources and Planning Division anytime at (808) 243-7199.

Sincerely,

David Craddick
Director
emb

cc: engineering division
Kober/Hanssen/Mitchell Architects
Wilson Okamoto & Associates, Inc.

attachments:
"The Costly Drip"
"Maui County Planting Plan"
"Hawaiian Alien Plant Studies - Pest Plants of Native Hawaiian Ecosystems"
Ordinance 2108 - An ordinance amending Chapter 16.20 of the Maui County Code, pertaining to the plumbing code"
"XERISCAPE - Water Conservation through Creative Landscaping"
"A Checklist for Water Conservation Ideas for Cooling"
"A Checklist for Water Conservation Ideas for Commercial Buildings"



Plant Pests of Hawaiian Native Ecosystems
Clifford Smith, UH Botany Department

Plant Pests of Hawaiian Native Ecosystems - These alien plant species are among the greatest threats to native Hawaiian biota.
(Reference: http://www.botany.hawaii.edu/faculty/cw_smith/aliens.htm)

Common Name(s)	Scientific Name	Plant Family
	Jasminum fluminense	Oleaceae
	Mimosa invisa	Mimosaceae
	Rubus sieboldii	Rosaceae
African Tulip Tree	Spathodea campanulata	Bignoniaceae
Aramina	Urena lobata	Malvaceae
Australian Blackwood	Acacia melanoxylon	Mimosaceae
Australian Red Cedar	Toona ciliata	Meliaceae
Australian Tree Fern	Cyathea cooperi	Cyatheaceae
Banana Poka	Passiflora mollissima	Passifloraceae
Beggar's Tick, Spanish Needle	Bidens pilosa	Asteraceae
Bengal Trumpet, Blue Trumpet Vine	Thunbergia grandiflora	Acanthaceae
Black-eyed Susan Vine	Thunbergia alata	Acanthaceae
Black Wattle	Acacia meamsii	Mimosaceae
Blue Gum	Eucalyptus globulus	Myrtaceae
Bocconia	Bocconia frutescens	Papaveraceae
Broad-leaved Cordia	Cordia glabra	Boraginaccae
Broomsedge, Yellow Bluestem	Andropogon virginicus	Poaceae
Brush Box, Brisbane Box, Vinegar Tree	Lophostemon confertus	Myrtaceae
Buffelgrass	Cenchrus ciliaris	Poaceae
Bush Beardgrass, Little Bluestem	Schizachyrium condensatum	Poaceae
Butterfly Bush, Smoke Bush	Buddleja madagascariensis	Buddlejaceae
California Grass	Brachiaria mutica	Poaceae
Castor Bean	Ricinus communis	Euphorbiaceae
Cats Claw, Mysore Thorn, Wait-a-bit	Caesalpinia decapetala	Caesalpiniaceae
Charcoal Tree, Gunpowder Tree	Trema orientalis	Ulmaceae
Chinaberry, Pride-of-India	Melia azedarach	Meliaceae
Chinese Banyon, Maylayan Banyon	Ficus microcarpa	Moraceae
Chinese Violet	Asystasia gangetica	Acanthaceae
Chinese Wisteria	Wisteria sinensis	Fabaceae
Christmas Berry	Schinus terebinthifolius	Anacardiaceae
Cluster Pine	Pinus pinaster	Pinaceae
Common Ironwood	Casuarina equisetifolia	Casuarinaceae
Common velvet Grass, Yorkshire Fog	Holcus lanatus	Poaceae
Fiddlewood	Citharexylum spinosum	Verbenaceae
Firethorn	Pyracantha angustifolia	Rosaceae
Firetree, Fayatree	Myrica faya	Myricaceae
Formosan Koa	Acacia confusa	Mimosaceae

Fountain Grass	Pennisetum setaceum	Poaceae
German Ivy, Italian Ivy	Senecio mikanioides	Asteraceae
Glenwood Grass	Sacciolepis indica	Poaceae
Glorybower	Clerodendrum laponicum	Verbenaceae
Glorybush, Cane Tī	Tibouchina herbacea	Melastomataceae
Gorse, Furze, Whin	Ulex europaeus	Fabaceae
Guava	Psidium guajava	Myrtaceae
Guinea Grass	Panicum maximum	Poaceae
Hairy Cat's Ear, Gosmore	Hypochoeris radicata	Asteraceae
Hill or Mysore Raspberry	Rubus niveus	Rosaceae
Hilo Grass	Paspalum conjugatum	Poaceae
Huehue Haole	Passiflora suberosa	Passifloraceae
Indian Fleabane	Pluchia indica	Asteraceae
Indian Rhododendron	Melastoma candidum	Melastomataceae
Ivy Gourd, Scarlet-fruited Gourd	Coccinea grandis	Cucurbitaceae
Japanese Honeysuckle	Lonicera japonica	Caprifoliaceae
Java Plum, Jambolan Plum	Syzygium cumini	Myrtaceae
Jhalna	Terminalia myriocarpa	Combretaceae
Juniper Berry	Citharexylum caudatum	Verbenaceae
Kahili Flower	Grevillea banksii	Proteaceae
Kahili Ginger	Hedychium gardnerianum	Zingiberaceae
Kikuyu Grass	Pennisetum clandestinum	Poaceae
Klu, Popinac	Acacia farnesiana	Mimosaceae
Koa Haole	Leucaena leucocephala	Mimosaceae
Koster's Curse	Clidemia hirta	Melastomataceae
Lantana	Lantana camara	Verbenaceae
Lasiandra	Tibouchina urvilleana	Melastomataceae
Logwood, Bloodwood Tree	Haematoxylon campechianum	Caesalpiniaceae
Loquat	Eriobotrya japonica	Rosaceae
Mahogany	Swietenia mahagoni	Meliaceae
Mauritius Hemp	Furcraea foetida	Agavaceae
Meadow Ricegrass	Ehrharta stipoides	Poaceae
Melochia	Melochia umbellata	Sterculiaceae
Mesquite, Kiawe, Algaroba	Prosopis pallida	Mimosaceae
Mexican Ash, Tropical Ash	Fraxinus uhdei	Oleaceae
Mexican Tulip Poppy	Hunnemannia fumariifolia	Papaveraceae
Mexican Weeping Pine	Pinus patula	Pinaceae
Miconia	Miconia calvescens	Melastomataceae
Molasses Grass	Melinis minutiflora	Poaceae
Molucca Albizia	Paraserianthes falcataria	Mimosaceae
Monkeypod, Rain Tree, 'Ohai	Samanea saman	Mimosaceae
Mules foot, Madagascar Tree Fern	Angiopteris evecta	Marattiaceae
Mullein	Verbascum thapsus	Scrophulariaceae
Narrow-leaved Carpetgrass	Axonopus fissifolius	Poaceae
New Zealand Flax, New Zealand Hemp	Phormium tenax	Agavaceae
New Zealand Laurel, Karakaranut	Corynocarpus laevigatus	Corynocarpaceae
New Zealand Tea	Leptospermum scoparium	Myrtaceae
Oleaster	Elaeagnus umbellata	Elaeagnaceae

Olive	Olea europaea ssp. africana	Oleaceae
Opiuma	Pithecellobium dulce	Mimosaceae
Oriental Mangrove	Bruguiera gymnorrhiza	Rhizophoraceae
Oxyspora	Oxyspora paniculata	Melastomataceae
Padang Cassia	Cinnamomum burmanii	Lauraceae
Palmgrass	Setaria palmifolia	Poaceae
Panama Rubber Tree, Mexican Rubber Tree	Castilloa elastica	Moraceae
Paper Bark, Cajeput	Melaleuca quinquenervia	Myrtaceae
Passionfruit, Liliko'i, Purple Granadilla	Passiflora edulis	Passifloraceae
Pearl Flower	Heterocentron subtriplinervium	Melastomataceae
Prickly Florida Blackberry	Rubus argutus	Rosaceae
Purple allamanda, Laurel-leaved Thunbergia	Thunbergia laurifolia	Acanthaceae
Quinine Tree	Cinchona pubescens	Rubiaceae
Raspberry	Rubus glaucus	Rosaceae
Red mangrove, American Mangrove	Rhizophora mangle	Rhizophoraceae
Rose Apple	Syzygium jambos	Myrtaceae
Rose Myrtle, Downy Myrtle	Rhodomyrtus tomentosa	Myrtaceae
Satin Leaf, Caimitillo	Chrysophyllum oliviforme	Sapotaceae
Shoebutton Ardisia	Ardisia elliptica	Myrsinaceae
Silkwood, Queensland Maple	Flindersia brayleyana	Rutaceae
Silky Oak, Silver Oak	Grevillea robusta	Proteaceae
Slash Pine	Pinus caribaea	Pinaceae
Sourbush	Pluchia symphytifolia	Asteraceae
Stinkweed, Marigold	Tagetes minuta	Asteraceae
Strawberry Guava	Psidium cattleianum	Myrtaceae
Swamp Oak, Saltmarsh or Longleaf Ironwood	Casuarina glauca	Casuarinaceae
Sweet Granadilla	Passiflora ligularis	Passifloraceae
Sweet Vernalgrass	Anthoxanthum odoratum	Poaceae
Tree Daisy, Montanoa	Montanoa hibiscifolia	Asteraceae
Tree Manuka	Leptospermum ericoides	Myrtaceae
Tree of Heaven	Ailanthus altissima	Simaroubaceae
Tropical Almond, False Kamani, Kamani-haole	Terminalia catappa	Combretaceae
Trumpet Tree, Guarumo	Cecropia obtusifolia	Cecropiaceae
Umbrella Tree, Octopus Tree	Schefflera actinophylla	Araliaceae
Wedelia	Wedelia trilobata	Asteraceae
White Ginger	Hedychium coronarium	Zingiberaceae
White Moho	Heliocarpus popayanensis	Tiliaceae
Wood Rose	Merremia tuberosa	Convolvulaceae
Yellow Ginger, Awapuhi Melemele	Hedychium flavescens	Zingiberaceae
Yellow Granadilla	Passiflora laurifolia	Passifloraceae
Yellow Himalyan Raspberry	Rubus ellipticus	Rosaceae

Zone-specific Native and Polynesian plants for Maui County

Zone 5

TYPE: F Fern G Grass Gr Ground Cover Sh Shrub P Palm S Sedge Tr Tree V Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Boerhavia repens	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Cressa truxillensis	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Heliotropium anomalum var. argenteum	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Sesuvium portulacastrum	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lycium sandwicense	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Artemisia australis	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Bidens mauiensis	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Gossypium tomentosum	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 5

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet
V	Ipomoea pes-caprae	beach morning glory, pohuehue	1			

Zone-specific Native and Polynesian plants for Maui County

Zone 1

TYPE: F Fern G Grass Gr Ground Cover Sh Shrub P Palm S Sedge Tr Tree V Vine

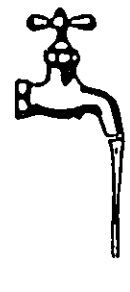
Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
F	Sadleria cyatheoides	'ama'u, ama'uma'u				
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia arecina	lo'ulu, hawane	40'	10'	1,000' to 3,000'	Dry to Wet
P	Pritchardia forbesiana	lo'ulu	15'			
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Cordyline fruticosa	ti, ki	6			
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Tr	Acacia koa	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Charpentiera obovata		15'			
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
V	Alyxia oliviformis	maile	Vine		sea to 6,000'	Medium to Wet

"THE COSTLY DRIP"

Slowly Dripping Spigot Wastes 15 Gallons a day.

1/32" Leak Wastes 25 Gallons a day.

1/16" Stream Wastes 100 Gallons a Day.



1/8" Stream Wastes 400 Gallons a day.

A Checklist of Water Conservation Ideas
For

COOLING TOWERS

Understanding Your System

[ ] Prepare an inventory of each cooling tower you have, its cooling capacity, and the equipment or processes that it serves.

[ ] Meter and record the amount of make-up water added to each tower, and the amount of blow-down water discharged from each tower.

[ ] If you purchase chemicals for the treatment of the recirculating cooling tower water, have the chemical vendor explain the purpose and action of each chemical.

[ ] Have your chemical vendor provide a written report of each service call, and be sure that the vendor explains the meaning of each analysis performed, as well as the test results.

[ ] Tell your chemical vendor that water conservation is a priority at your facility. Ask your vendor to tell you about alternative programs that could reduce the amount of water that is bled-off from the towers.

Water Conservation Opportunities

[ ] If you are using conventional water treatment, work with your chemical vendor to increase your cycles of concentration, thereby decreasing the amount of water bled off.

[ ] Establish a performance-based specification, and have vendors make proposals for your facility's cooling tower water treatment. Require that vendors commit to a predetermined minimum level of water-efficiency. Have them provide figures showing projected annual water and chemical consumption and costs.

[ ] Consider incorporating sulfuric acid in your treatment program. This could enable you to reduce carbonate scale and achieve significantly higher cycles of concentration. If you use sulfuric acid, e sure to observe the appropriate safety precautions.

[ ] Ozone is another alternative to consider for cooling water treatment in appropriate situations. Ozone can help remove dissolved minerals and act as a biocide. Again, observe the appropriate safety precautions.

[ ] If available, use reclaimed water as a source of cooling tower make-up water. Be sure to verify that the water is sufficiently clean for use in your system.

[ ] Re-use blow-down for lower-grade non-potable uses.

EVAPORATIVE COOLERS

[ ] Be sure your coolers have pumps to recirculate the water through them.

[ ] Check to make sure you are not bleeding off an excessive amount of water. For a typical small cooler, anything more than a few gallons per hour may be excessive.

[ ] Pipe the bleed-off from your coolers to help water a landscaped area.

ONCE-THROUGH COOLING

§14.21 of The Maui County Code prohibits discharge of drainage or filter backwash from cooling systems into the public wastewater system, or private wastewater systems connected to the public wastewater system.

[ ] Eliminate all uses of water for once-through or "single-pass" cooling, unless you reuse the water elsewhere for a beneficial purpose.

[ ] Many items of water-cooled equipment can be replaced by very similar air-cooled models.

[ ] Connect to a recirculating cooling water loop (such as the plant chilled water system) instead of using once-through cooling.

This checklist provides water conservation tips successfully implemented by facilities which utilize cooling systems. This list has been revised from the original copy first published and distributed by the City of Phoenix Water Conservation and Resources Division. For more information, contact the Board of Water Supply's Water Resources Planning Division at 243-7835, or the Public Works Department's Wastewater Division at 243-7417.

A Checklist of Water Conservation Ideas
For

Commercial Buildings

This checklist provides water conservation tips successfully implemented by industrial and commercial users. This list has been revised from the original copy first published and distributed by the Los Angeles Department of Water and Power.

General suggestions

Increase employee awareness of water conservation.

Install signs encouraging water conservation in employee and customer restrooms.

When cleaning with water is necessary, use budgeted amounts.

Determine the quantity and purpose of water being used.

Read water meter weekly to monitor success of water conservation efforts.

Assign an employee to monitor water use and waste.

Seek employee suggestions on water conservation; put suggestion boxes in prominent areas.

Determine other methods of water conservation.

Building maintenance

Check water supply for leaks.

Turn off any unnecessary flows.

Repair dripping faucets and showers and continuously running or leaking toilets.

Install faucet aerators where possible.

Reduce toilet water use by adjusting flush valves or installing dams and flapper mechanisms.

As appliances or fixtures wear out, replace them with water-saving models.

Shut off water supply to equipment rooms not in use.

Minimize the water used in cooling equipment in accordance with manufacturers recommendations. Shut off cooling units when not needed.

Cafeteria area

Turn off continuous flow used to clean the drain trays.

Turn off dishwasher when not in use. Wash full loads only.

Use water from steam tables to wash down cooking area.

Do not use running water to melt ice or frozen foods.

Use water-conserving ice makers.

Exterior areas

Convert from water intensive lawns, trees, and shrubs to Xeriscape -- Landscape design incorporating plants that provide beautiful color and require less water.

Inventory outdoor water use for landscaped areas.

Water landscape only when needed. Two-to-three times a week is usually sufficient.

Water in the early morning or evening.

Make sure that water does not run into the streets or alleys.

Stop hosing down sidewalks, driveways, and parking lots.

Use time controllers on sprinkler systems.

Do not water on windy days.

Water in winter only during prolonged hot and dry periods. (During spring and fall, most plants need approximately half the amount they need during the summer.)

For more information, contact:

California Department of Water Resources
Water Conservation Office
1416 Ninth Street
P.O. Box 942836
Sacramento, California 94236-0001
Telephone: (916) 323-5580

water conservation for Schools and Public Buildings

General Suggestions
- Increase employee, faculty and student awareness of water conservation. Brochures explaining how to conserve water at home are available from the Board of Water Supply.
- Read water meter daily to monitor the success of water conservation efforts.
- Conduct contests for employees, students and faculty (e.g., posters, slogans or conservation ideas); locate suggestion boxes in prominent areas.
- Install signs that encourage water conservation in restrooms-leaflets suitable for display or distribution are available from the Board of Water Supply.
- When cleaning with water is necessary, use budgeted amounts.

Physical Plant - Building Maintenance
- Minimize the water used in cooling equipment, such as air compressors, in accordance with the manufacturer's recommendations.
- Reduce the load on air conditioning units by shutting air conditioning off when and where it is not needed.
- Maintain insulation on hot water pipes.
- Check water supply system for leaks, and turn off any unnecessary flows.
- Repair dripping faucets, showers, and continuously running toilets.
- Avoid excessive boiler and air conditioner blowdown. Monitor total dissolved solids levels, and blowdown only when needed.
- Reduce the water used in toilet flushing by either adjusting the vacuum flush mechanism or installing toilet tank displacement devices (dams, bottles, or bags).
- Instruct clean-up crews to use less water for mopping.
- Change window cleaning schedule from periodic to an on-call, as required bases.
- Install flow reducers and faucet aerators in all plumbing fixtures.
- As appliances or fixtures wear out, replace with water-saving models.

Cafeteria and Food Service
- Turn off the continuous flow used to clean the drain trays of the coffee/milk/soda beverage island; clean the trays only as needed.
- Turn dishwashers off when dishes are not being processed. Wash full loads only. Replace spray heads to reduce water flow.
- Recycle rinse water from the dishwasher or recirculate it to the garbage disposer.
- Presoak utensils and dishes in ponded water instead of using a running water rinse.
- Avoid thawing foods under running water by using other available alternatives, including microwave ovens
- Wash vegetables in ponded water, do not let water n in prep sink.
- Minimize use of ice machines and adjust them to dispense less ice.
- Use water from the steam table in place of fresh wate to wash down the cook's area.

Pool
- Lower pool water to reduce amount of water splashe out.
- Reduce amount of water used to backflush pool filter
- Use a pool cover to reduce evaporation when pool is not being used.

Laundry
- Water conservation ideas for Laundries can be obtained from the Board of Water Supply.

Exterior Areas
- Wash autos, buses and trucks less often.
- Discontinue using water to clean sidewalks, driveway loading docks, and parking lots. Consider using broom or motorized sweepers.
- Avoid landscape fertilizing and pruning that stimulate excessive growth.
- Remove unhealthy plants so that remaining plants c benefit from the water saved.
- In many cases, older, established plants require only infrequent irrigation. Look for indications of water nee such as wilt, change of color, or dry soils.
- Limit landscaping additions and alterations. In the future, design landscapes which require less water. Incorporate xeriscape (water management) techniques into the design.
- Install soil moisture overrides or timers on sprinkler systems. Time waterings, when possible, to occur in t morning when wind and evaporation are lowest. Irriga tion equipment should apply water uniformly.
- Investigate the advantages of installing drip irrigatio systems.
- Mulch around plants to reduce evaporation and discourage weeds.
- Remove thatch and aerate turf to encourage the movement of water to the root zone.
- Begin a flexible watering schedule, watering only wh needed and not on windy or rainy days.
- Avoid runoff, and make sure sprinklers cover just th lawn or garden, not sidewalks, driveways or gutters.

ORDINANCE NO. 2108

BILL NO. 6 (1992)
Draft 1

A BILL FOR AN ORDINANCE AMENDING CHAPTER 16.20 OF THE MAUI COUNTY CODE, PERTAINING TO THE PLUMBING CODE

BE IT ORDAINED BY THE PEOPLE OF THE COUNTY OF MAUI:

CTION 1. Title 16 of the Maui County Code is amended by adding a section to Chapter 10 of the Uniform Plumbing Code to be c ted and to read as follows:

"16.20.675 Section 1050 added. Chapter 10 of the iform Plumbing Code is amended by adding a new section, rtaining to low-flow water fixtures and devices, to be signated and to read as follows:

Sec. 1050 Low-flow water fixtures and devices. (a) This section establishes maximum rates of water flow or discharge for plumbing fixtures and devices in order to promote water conservation.

(b) For the plumbing fixtures and devices covered in is section, manufacturers or their local distributors shall ovide proof of compliance with the performance requirements tablished by the American National Standards Institute NSI) and such other proof as may be required by the rector of public works. There shall be no charge for this gistration process.

(c) Effective December 31, 1992, only plumbing fixtures d devices specified in this section shall be offered for le or installed in the County of Maui, unless otherwise dicated in this section. All plumbing fixtures and devices ich were installed before December 31, 1992, shall be llowed to be used, repaired or replaced after December 31, 992.

(1) Faucets (kitchen): All kitchen and bar sink faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two-tenths gallons per minute at sixty pounds per square inch of water pressure.

(2) Faucets (lavatory): All lavatory faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two tenths gallons per minute at sixty pounds per square inch of water

pressure.

(3) Faucets (public rest rooms): In addition to the lavatory requirements set forth in paragraph (2), lavatory faucets located in rest rooms intended for use by the general public shall be of the metering or self-closing types.

(4) Hose bibbs: Water supply faucets or valves shall be provided with approved flow control devices which limit flow to a maximum three gallons per minute.

EXCEPTIONS: (A) Hose bibbs or valves not used for fixtures or equipment designated by the director of public works.

(B) Hose bibbs, faucets, or valves serving fixed demand, timing, or water level control appliances, and equipment or holding structures such as water closets, pools, automatic washers, and other similar equipment.

(5) Showerheads: Showerheads, except where provided for safety or emergency reasons, shall be designed, manufactured, or installed with a flow limitation device which will prevent a water flow rate in excess of two and one-half gallons per minute at eighty pounds per square inch of water pressure. The flow limitation device must be a permanent and integral part of the showerhead and must not be removable to allow flow rates in excess of two and one-half gallons per minute or must be mechanically retained requiring force in excess of eight pounds to remove.

(6) Urinals: Urinals shall be designed, manufactured, or installed so that the maximum flush will not exceed one gallon of water. Adjustable type flushometer valves may be used provided they are adjusted so the maximum flush will not exceed one and six tenths gallons of water.

(7) Water closets (toilets): Water closets shall be designed, manufactured, or installed so that the maximum flush will not exceed one and six tenths gallons of water.

(d) Beginning December 31, 1992, it is unlawful to sell : install any plumbing fixtures or devices not specified in ils section, except as permitted under this section.

(e) The director of public works may exempt the use of ow-flow water fixtures and devices if there is a finding at the use of such fixtures and devices would not be onsistent with accepted engineering practices and would be strimental to the public health, safety and welfare.

(f) Any person violating this section shall be fined 50 for each violation and shall correct all instances of n-compliance for which a citation is issued. Violation of is section shall constitute a violation as defined in ction 701-107 Hawaii Revised Statutes and shall be forceable by employees of the department of public works. e foregoing fine may also be imposed in a civil, ministrative proceeding pursuant to Rules and Regulations opted by the department of public works in accordance with apter 91 Hawaii Revised Statutes."

CTION 2. New material is underscored. In printing this bill, nty Clerk need not include the underscoring.

CTION 3. This ordinance shall take effect upon its approval.

AP ROVED AS TO FORM
ND LEGALITY:

H. FUKUSHIMA
Corporation Counsel
of Maui
.\ords\flows4\pk

CERTIFY that the foregoing BILL NO. 6 (19 92), Draft 1

ed FINAL READING at the meeting of the Council of the County of Maui, State of
n the 1st day of May , 1992 , by the following votes:

Patrick S. KAWANO Vice-Chair	Vince G. BAGOYO, Jr.	Goro HOKAMA	Alice L. LEE	Ricardo MEDINA	Wayne K. NISHKI	Joe S. TANAKA	Lenaala TERUYA DRUMMOND
Aye	Excused	Excused	Aye	Aye	Aye	Aye	Aye

s transmitted to the Mayor of the County of Maui, State of Hawaii, on the 1st day
, 1992 .

WAILUKU, MAUI, HAWAII, this 1st day of May , 1992 .

HOWARD S. KIHUNE, CHAIR
Council of the County of Maui

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

THE FOREGOING BILL IS HEREBY APPROVED THIS 5TH DAY OF MAY , 1992 .

LINDA CROCKETT LINGLE, MAYOR
County of Maui

BY CERTIFY that upon approval of the foregoing BILL by the Mayor of the County of
id BILL was designated as ORDINANCE NO. 2108 of the County of Maui, State

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

t Reading on January 17, 1992.
ate of Ordinance May 5, 1992.

I HEREBY CERTIFY that the foregoing is a true and correct copy of Ordinance No. 2108 , the original of which is on file in the Office of the County Clerk, County of Maui, State of Hawaii.

Dated at Wailuku, Hawaii, on

County Clerk, County of Maui

XERISCAPE

Water Conservation Through Creative Landscaping

Xeriscape Defined
Seven Water Conservation Fundamentals
Planning and Design
Soil Improvement
Efficient, Zoned Irrigation
Limited Turf Area
Use of Mulches
Use Of Low Water-Demand Plants
Appropriate Maintenance
Community Water Management

XERISCAPE

The Department of Water Supply is faced with increasingly more difficult demands regarding water--its supply, quality, distribution, purification, management, and associated costs. Potable water is becoming scarce and the costs of building delivery systems and water treatment plants prohibitive. Consequently, there is a need to conserve water, not only during droughts, but to reduce demands of peak loading on systems in an attempt to delay construction of larger, expensive facilities. Saving water saves energy while conserving other valuable resources.

Water conservation takes on two broad aspects. First, efficient manipulation of physical factors in the landscape - delivery and irrigation systems, soils, percent hardscape used in a design, plants, microclimates, mulch, etc. Secondly, the people factors, which are often more important.

The incorrect perception that water is "cheap" or "inexpensive" has led to the ideas that the water supply is not finite and that it flows towards money. This in turn has fostered a national consciousness that high water use landscapes are normal, desirable and acceptable. Little has been done to change this mind set, particularly as it relates to water conservation in the landscape.

With the increased, continuous demand for high quality water exceeding supply of both surface and below ground sources, a new, philosophy for conservation must be engendered: billing must reflect the real costs of water and people must learn and practice the "whys" and "hows" of water conservation. This is why Xeriscape began.

Xeriscape Defined

XERISCAPE (zir' i scap) is an integrated approach to landscape water conservation. Xeriscape was coined from the Greek word "xero" for dry. Thus, Xeriscape means dryscape or low water use landscaping. Xeriscapes are designed through wise planning, plant and construction materials selection, and proper installation to provide beautiful, water efficient, low maintenance landscapes.

In Hawaiian E' Malama Wai meaning "Cherish Our Water" is used to refer to Xeriscaping.

Many have misread the term as zeroscape, which would imply noscape or no landscape plantings. Others have equated Xeriscape landscaping with "rockscapes," many of which are not aesthetically pleasing and may not always conserve water or energy. Rockscapes are harsh, produce glare, and do little to prevent noise and air pollution, making them a poor substitute for Xeriscape landscaping.

Seven Water Conservation Fundamentals

The Xeriscape motto, "Water conservation through creative landscaping," provides the umbrella under which a wide variety of landscape water conservation activities may be taught and employed in a community. And although there are many landscape and horticultural techniques that conserve water, Xeriscape programming has focused on seven broad, fundamental areas.

1. Planning and Design
2. Soil Improvement
3. Efficient, Zoned Irrigation
4. Limited Turf Areas
5. Use of Mulches
6. Use of Low Water Demand Plants
7. Appropriate Maintenance

Planning and Design

Architects, planners, and homeowners are encouraged and taught to incorporate standard design elements of function, circulation, topography, exposure, seasonal color, texture, safety, etc. into existing landscapes and new designs with emphasis on conserving, limiting and/or reusing water. 40% to 60% of the water homeowners use goes for yard watering. Appropriate design and planning can provide these very necessary aspects of urban life and conserve water at the same time. Xeriscapes can ameliorate the impact of a severe drought and avoid the costly clean-up resulting from a "boom and bust" water policy. Tree removal, replanting of landscapes and turfgrass fields are eliminated and real savings to Maui County.

Thayer and Richman (1984) suggest that designing water-conserving landscapes should be considered in two parts. First, the physical ecology of plants and plant communities must be integrated within the microclimates of the landscape. Logically, plants best adapted to the climate, temperatures, sun, wind, and physical nuances of the site thrive best and require the least expenditures for water, energy and maintenance. Secondly, landscape designers must accept that there is a "human ecology" of water use in landscapes. That is, the intensity of human

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activity dictates landscape water use. This includes all uses, whether functional or aesthetic. Thayer and Richman coined the term "hydrozone" to describe the type and intensity of human activity in the landscape and identified four classes of hydrozones. These will be discussed under the heading "Efficient, Zoned Irrigation".

Soil Improvement

Residential soils can be difficult soils to manage because they have been badly disturbed by construction and urban activities. Normal soil horizons are mixed unevenly both vertically and horizontally. Often, hardpans exist and impede drainage, and most urban soils have been compacted by heavy equipment or traffic. Many of the physical and chemical soil properties plants require for growth are present at less than optimum levels in urban soils. Soil improvements must correct poor water infiltration, percolation, and drainage, while providing adequate water holding capacity and improving the nutritional status of the soil. Organic amendments meet most of these requirements and improve tilth, making it easier to till the soil and manage weeds. Adding 3-5 cubic yards of well composted organic matter per 1000 square feet and tilling it into the top 8-12 inches of soil is recommended.

Other amendments such as lime be added to adjust an undesirable acid soil condition. These adjustments should be made prior to planting.

Efficient, Zoned Irrigation

Matching the amount of water supplied to each plant with the plant's water requirement is the most efficient way to irrigate.

Until recently this was difficult to do and most landscapes were irrigated to meet the needs of the turfgrass or other plants with high water requirements. Sprinklers cover large areas without regard to the water needs of individual plants. To eliminate waste by overwatering and run-off, group plants according to their water requirements and use zoned irrigation systems to deliver water to individual plants or to plants with similar moisture requirements (Figure 10-2). Fewer plants will develop disease or die from overwatering.

Not only are irrigation zones established to meet the physical or ecological water needs of plants, but Xeriscape landscaping also recognizes that human activity will impact plant water needs. Thayer and Richman (1984) describe this irrigation zoning to match man's activity as hydrozone planning, and they define four irrigation regimes (Figure 10-3).

The Principal Hydrozone represents the area with the greatest human activity and consequently the greatest water and energy use: sites in yards, parks, and play fields where people frequently, play, sit, walk, gather, or relax: places where people regularly contact plants.

The Secondary Hydrozone is less physically impacted by humans, but is visually important: areas of passive activities space delineation or focal interest such as flower and shrub beds, entrances, prominent plantings, etc; areas of high visual impact, but seldom touched by humans.

Buffer zones, distant views, median strips, parkways, and embankments-these make up the third hydrozone, called the Minimal Hydrozone. In this case, plants are selected that need minimal supplemental water to survive the natural climatic conditions.

The Elemental hydrozone constitutes landscape plantings that require only natural precipitation to survive and seldom, if ever, incur human activity. Utility areas, mulched native plantings, and naturally sustainable, exotic vegetation belong to this hydrozone (Figure 10-4).

Flexible sprinkler heads and nozzles, adjustable delivery rates and coverage, modern valves, and automated controllers - these allow greater water conservation through zoned irrigation. On-off watering is easily programmed to match water infiltration rates into soils, thus avoiding surface runoff. Also, water is better applied to meet specific plant needs as impacted by seasonal human activity and changes in the weather.

Collection systems should be designed and constructed throughout the landscape to gather storm runoff from roofs, walks, drives, and slopes. By grouping high or moderate water requiring plants near swales and collection basins, much of their water needs can be met by natural moisture accumulations rather than irrigation. On the other hand, drought tolerant species may succumb to frequent accumulations of water and should be located on southern exposures or at the tops of slopes. Because they often only require supplemental irrigation during establishment or during a severe drought, a permanent irrigation system may not be needed.

Limited Turf Area

Turfgrass plays a primary role in most landscapes. Turfgrasses make excellent ground covers. They tolerate heavy foot traffic in the backyard, at the park, or on the athletic field. And mowed or unmowed, they stabilize slopes and prevent erosion. They serve to unify designs and instill a sense of pride in home and neighborhood when well kept. Moreover, turf helps keep homes and communities cleaner by reducing particulate and chemical air pollution. Unfortunately, a lawn consumes approximately half the landscape water and requires weekly care. As well, equipment, pest control and periodic cultural practices, such as coring or dethatching contribute to the expense, both in time and money, of maintaining a lawn.

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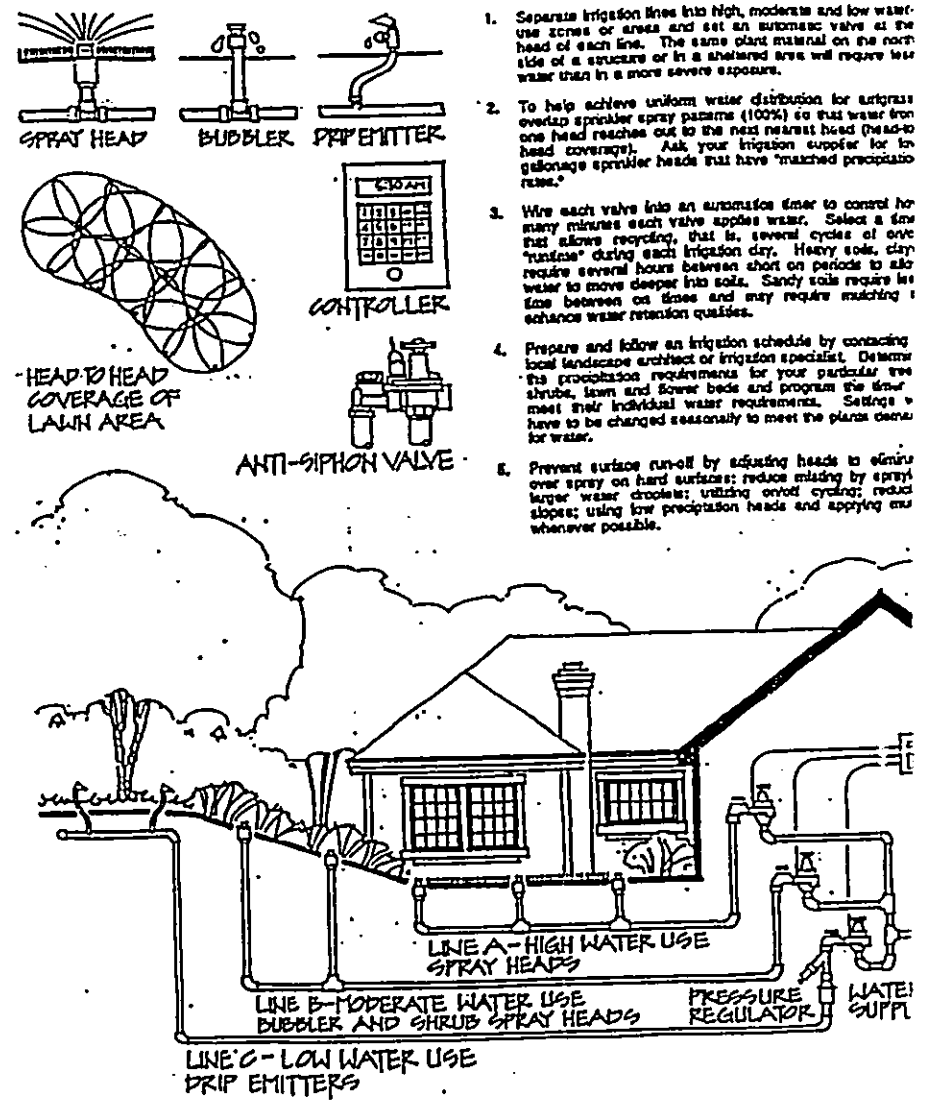


1. Separate irrigation lines into high, moderate and low water-use zones or areas and set an automatic valve at the head of each line. The same plant material on the north side of a structure or in a sheltered area will require less water than in a more severe exposure.
2. To help achieve uniform water distribution for turfgrass overlap sprinkler spray patterns (100%) so that water from one head reaches out to the next nearest head (head-to-head coverage). Ask your irrigation supplier for low gallonage sprinkler heads that have "matched precipitation rates."
3. Wire each valve into an automatic timer to control how many minutes each valve applies water. Select a time that allows recycling, that is, several cycles of one "runtime" during each irrigation day. Heavy soils, clays require several hours between short on periods to allow water to move deeper into soils. Sandy soils require less time between on times and may require mulching to enhance water retention qualities.
4. Prepare and follow an irrigation schedule by contacting local landscape architect or irrigation specialist. Determine the precipitation requirements for your particular trees, shrubs, lawn and flower beds and program the timer to meet their individual water requirements. Settings will have to be changed seasonally to meet the plants demand for water.
5. Prevent surface run-off by adjusting heads to eliminate over spray on hard surfaces; reduce misting by spraying larger water droplets; utilizing on/off cycling; reduce slopes; using low precipitation heads and applying mulch whenever possible.

Figure 10-2. Five Steps to Efficient Irrigation

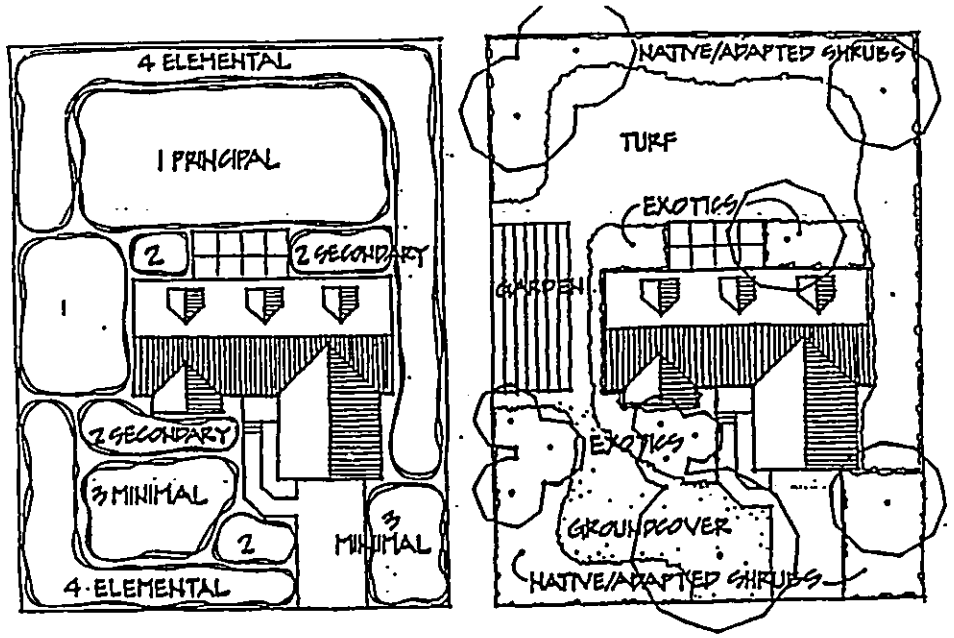
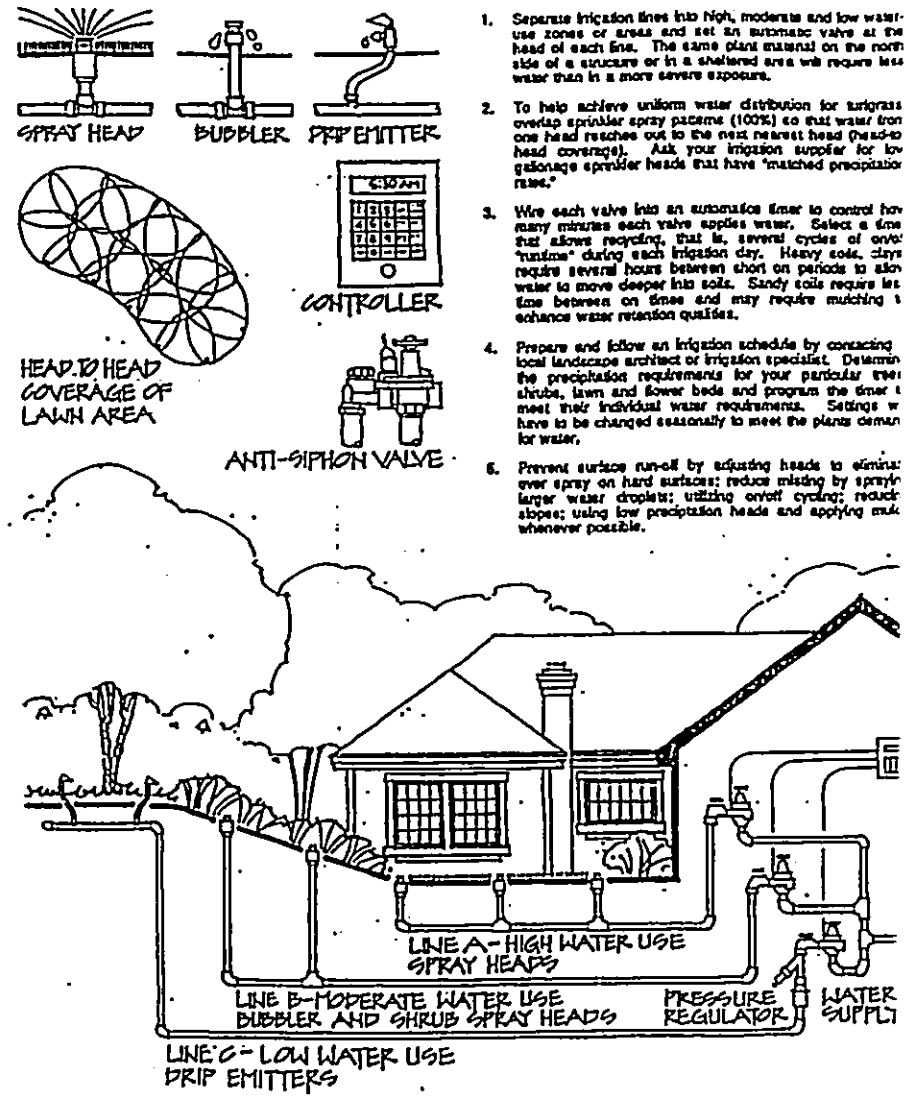


Figure 10-3. Hydrozone Concept Applied to Suburban Lot

Turf should be limited by design to high-use areas in landscapes and separated from other plantings with different water needs. After reviewing the landscape plans, classify the turf areas as either passive or active use and seed and irrigate accordingly. Plant drought-tolerant species with poor resistance to heavy traffic in less-frequented sites.

Not only should the total turf areas be reduced in a landscape, but the perimeter measurement also must be reduced as much as possible. Long, narrow strips of turf are diffcult to properly mow, fertilize, keep pest free, and irrigate. Such strips require hand work to keep them attractive, which increases maintenance time and labor costs. Water from over-spraying turf in narrow planter islands, parkways, side yards, and around entrances not only runs off and is wasted but also contributes to the deterioration of paint, walls, walks, and asphalt in parking lots and streets. Mulches or groundcovers and shrubs on drip or underground irrigation can appropriately replace turf in many landscape sites. Drip emitters or bubblers can be used to irrigate individual plants and eliminate waste caused by overspray. Mulches need no water, and well chosen groundcovers require less water and maintenance than turf.



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5. Prevent surface run-off by adjusting heads to eliminate over spray on hard surfaces; reduce misting by spraying larger water droplets; utilizing on/off cycling; reducing slopes; using low precipitation heads and applying mulch whenever possible.

Figure 10-2. Five Steps to Efficient Irrigation

Likewise, the amount of turfgrass in a landscape may be reduced by increasing the hardscape. Patios, wooden decks, rocked and graveled walks limit the turf area while reducing the water requirement.

Use of Mulches

Mulches function to buffer soils against climatic extremes. In summer, they reduce soil heating and slow evaporation water loss from soil surfaces. They also reduce weeds and make those present easier to remove. Proper use of mulches reduces or prevents soil erosion. Organic mulches also contribute to the nutritional level and tilth of the soil as they breakdown.

These practical functions are important; however, many mulches are included in the landscape for their design flexibility and attractiveness, not simply because they save water, protect roots, and reduce maintenance.

Mulches are classified as organic, inorganic, and living. Organic mulches include plant refuse, such as chips and slash from tree trimming operations, saw dust, composted leaves and manures, peat moss, and graded bark products. Sized and washed rocks and gravels are popular inorganic mulches which come in many sizes, colors, and textures. Impervious sheet plastics covered with either organic or inorganic mulches were popular, but because sheet plastic prevents gas and water exchange between air and soil and creates a water-logged root environment, woven, porous plastics are now preferred. Mulches are applied 3 to 4 inches deep over bare soil and only 2 to 3 inches deep over woven fabrics. Living mulches include low growing groundcovers and low maintenance turfgrasses. They function well as mulches, but may be heavy competitors for water and nutrients under newly planted trees and shrubs. If used, select hardy, drought-tolerant species that resist common diseases. These species provide the best results and require less maintenance.

Use Of Low Water-Demand Plants

Many beautiful and functional plants, both exotics and natives, are available that thrive with natural precipitation or small amounts of supplemental water.

Chapter Two lists tree characteristics including their water requirements ranging from dry (less-thirsty) to wet (very-thirsty).

All types of plants with low water requirements are now available and more will become available as demand increases. The range of drought-tolerant plant species and those with low water requirements is now wide enough to permit selecting for function, beauty, and seasonal interest. As with all plant selections and planting, take care to match the specific needs of the plant to the environmental conditions and the intensity of human activity at the planting site. This is critical when using drought tolerant and low water use plants in the landscape. Choosing the proper plants and planting them correctly will reduce water consumption and maintenance costs over many years.

Appropriate Maintenance

Low maintenance is not <u>no maintenance.</u> The use of all or most of the Xeriscape principles will reduce but not eliminate maintenance. And generally, the greater the human activity at a site, the greater its maintenance requirements will be. Trees, shrubs, groundcovers, and turfgrasses are living organisms that require care. Timely fertilizing, watering, pruning, pest management, and other cultural practices are necessary in Xeriscape landscapes, but at reduced levels compared to conventional landscape plantings. Even mulched sites without plants must have litter removed periodically. Irrigation components for drip and sprinkler systems require routine checks and servicing. Xeriscape landscaping coupled with sound maintenance produces water and energy savings and environmentally adapted landscapes that are aesthetically pleasing.

As has been stressed, integrating these principles in landscapes will conserve water and reduce annual maintenances costs. Most importantly though, Xeriscape landscaping provides these benefits without sacrificing function or beauty. And although these seven points are stressed in Xeriscape literature and are the basis for Xeriscape programming, there is no substitute for creativity as a means of discovering and sharing new ways to conserve water without making yards and parks into zeroscapes.

Community education in Xeriscape landscaping is the key to a successful water conservation program. The principles of Xeriscape landscaping challenge the widespread but mistaken belief that water is cheap, unlimited resource which will always be available. Hopefully, the public will recognize that this is a misconception and that water conserving landscapes are necessary and should be considered "normal" within our society. At the same time, it teaches people the "whys" and "hows" of effective water conserving horticulture. To reach these objectives requires the cooperation of government leaders,

Likewise, the amount of turfgrass in a landscape may be reduced by increasing the hardscape. Patios, wooden decks, rocked and graveled walks limit the turf area while reducing the water requirement.

Use of Mulches

Mulches function to buffer soils against climatic extremes. In summer, they reduce soil heating and slow evaporation water loss from soil surfaces. They also reduce weeds and make those present easier to remove. Proper use of mulches reduces or prevents soil erosion. Organic mulches also contribute to the nutritional level and tilth of the soil as they breakdown.

These practical functions are important; however, many mulches are included in the landscape for their design flexibility and attractiveness, not simply because they save water, protect roots, and reduce maintenance.

Mulches are classified as organic, inorganic, and living. Organic mulches include plant refuse, such as chips and slash from tree trimming operations, saw dust, composted leaves and manures, peat moss, and graded bark products. Sized and washed rocks and gravels are popular inorganic mulches which come in many sizes, colors, and textures. Impervious sheet plastics covered with either organic or inorganic mulches were popular, but because sheet plastic prevents gas and water exchange between air and soil and creates a water-logged root environment, woven, porous plastics are now preferred. Mulches are applied 3 to 4 inches deep over bare soil and only 2 to 3 inches deep over woven fabrics. Living mulches include low growing groundcovers and low maintenance turfgrasses. They function well as mulches, but may be heavy competitors for water and nutrients under newly planted trees and shrubs. If used, select hardy, drought-tolerant species that resist common diseases. These species provide the best results and require less maintenance.

Use Of Low Water-Demand Plants

Many beautiful and functional plants, both exotics and natives, are available that thrive with natural precipitation or small amounts of supplemental water.

Chapter Two lists tree characteristics including their water requirements ranging from dry (less-thirsty) to wet (very-thirsty).

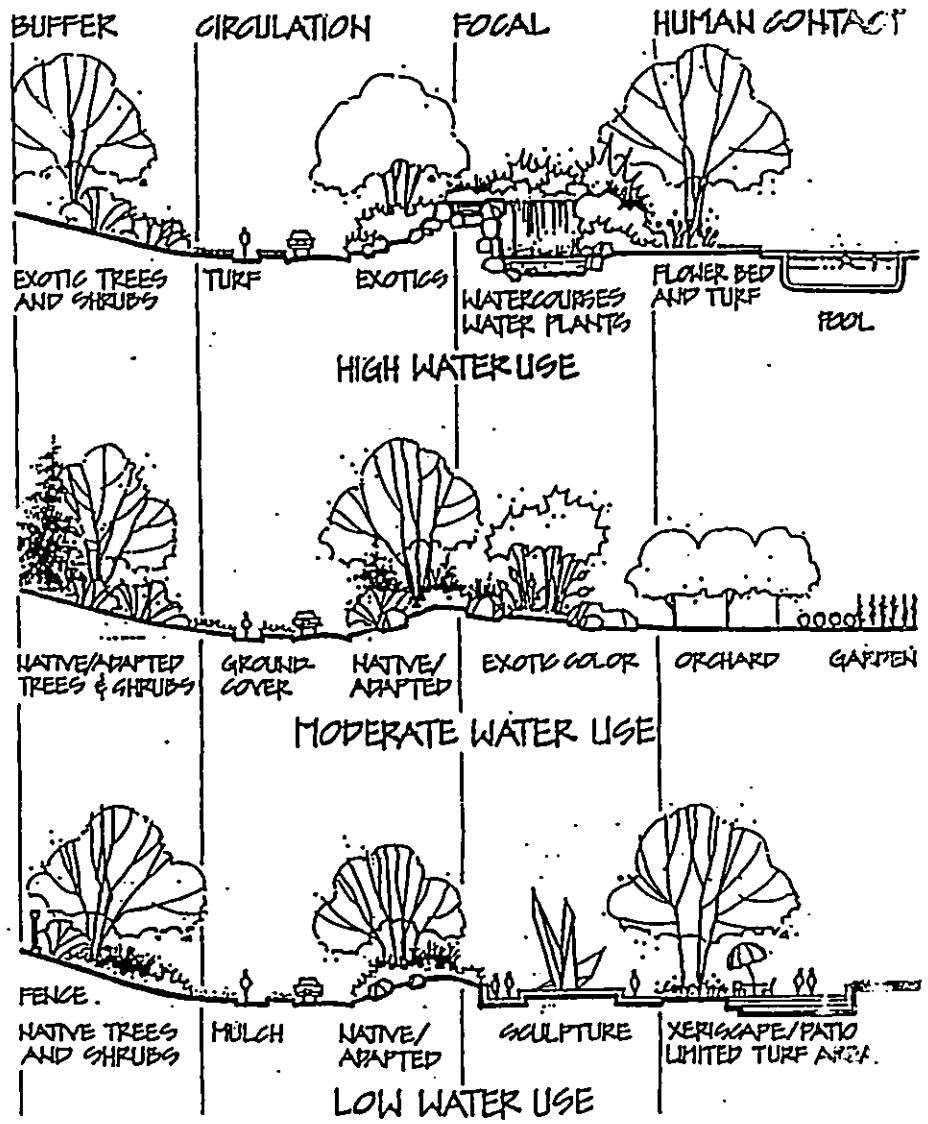

Figure 10-4. Water Use Relating to Human Use—Three Approaches

agencies, landscape professionals, horticulturists, irrigation specialists, concerned citizens, and an army of volunteers enthusiastically supporting and promoting Xeriscape programming.

Community Water Management

Xeriscape landscaping, when followed, will conserve water, reduce maintenance costs, and establish beautiful, environmentally sound landscapes, parks, recreational facilities and greenspaces throughout a community. Conserving water averts the need to construct costly new delivery systems and waste treatment plants that would otherwise be needed to meet periods of peak loading. Xeriscaping also leads to changes in attitudes about water quality, water use, and how a community's water should be managed, especially in landscape irrigation.

Literature Cited

Urban and Community Forestry - A Guide for the Interior Western United States - United States Department of Agriculture - Forest Service

Thayer, Jr., Robert L. and TG. Richman, "Water-Conserving Landscape Design," In Energy Conserving Site Design, Ed. G. McPherson, Am. Soc. Landscape Architects, 1984.

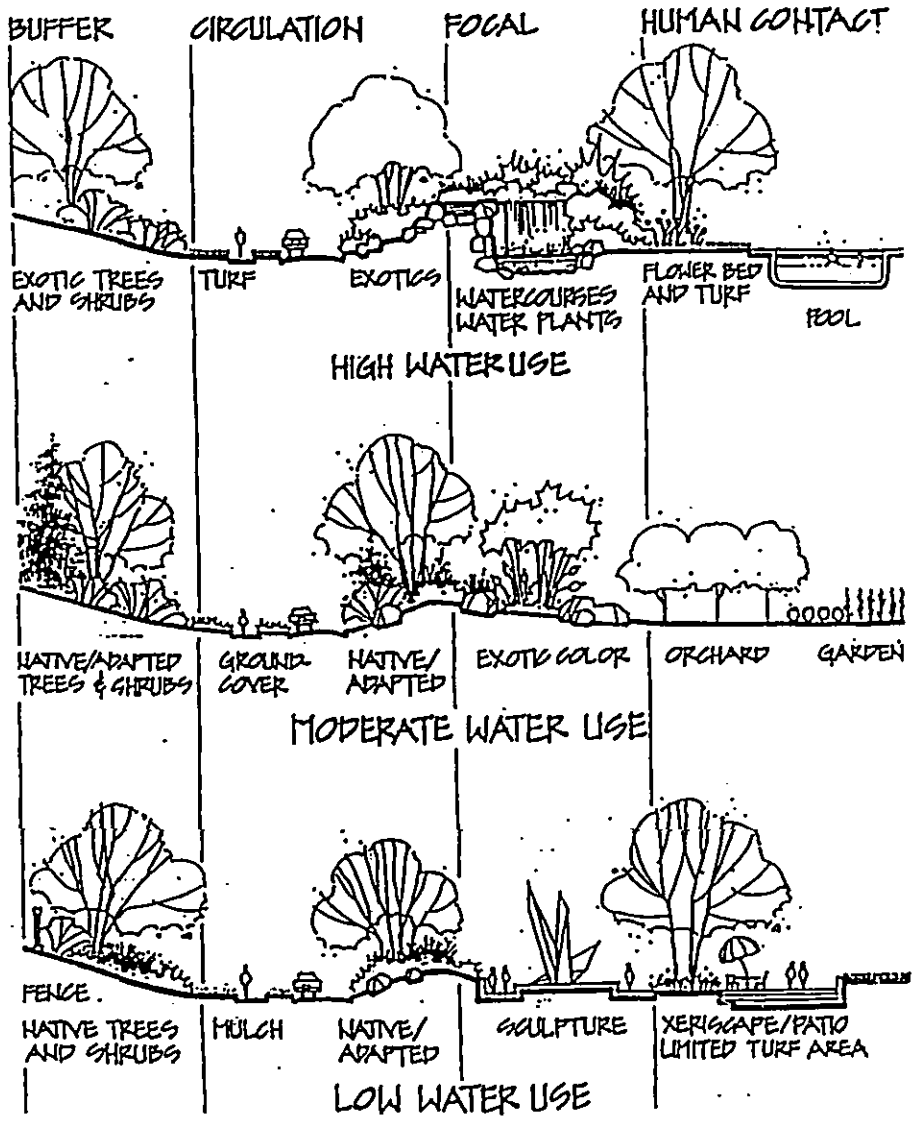

Figure 10-4. Water Use Relating to Human Use—Three Approaches

LOW WATER USE/DROUGHT TOLERANT PLANT LIST

All plants require water for establishment. After they are rooted and growing well their water requirements will vary.

The following is an incomplete list of drought tolerant plants. It is provided for your convenience.

Please review the following reference lists for many other suggestions.

1. Drought Resistant Plants For Hawaiian ardens by Norman C. Benzona, County Extension Agent, Cooperative Extension Service.

2. Drought Tolerant Native Hawaiian Plants for the Landscape – by Heidi Bornhorst Horticulturist, Honolulu Botanic Gardens.

3. Halawa Xeriscape Garden Registry of Nurseries that grow Less-Thirstry-Plants-Honolulu Board of Water Supply, November 1989.

Key to Symbols

A Accent Plant
F Flower Color
GC Groundcover
G Grass
OG Ornamental Grass
S Shrub
SC Succulent
ST Small Tree
MT Medium Tree
LT Large Tree
V Vines

Key to Zones

Zone 1 – Normal watering level. Includes lush lawns and gardens.

Zone 2 – Moderate watering level. Includes lawns, ground covers and shrubs.

Zone 3 – Low watering level. Includes self-sustaining plant materials and natural vegetation with emphasis on plants that require little or no supplemental irrigation.

Type	Botanical Name	Zone	Common Name
S	Abutilon menziesii	3	Ko'o Loa'ula
MT	Acacia koa	2	Koa
A,F,S,SC	Adenium obeseum	3	Desert Rose
A,F,GC	Agapanthus africanus	2	Lily of the Nile
A,SC,S	Agave attenuata	3	Agave
MT	Aleurites moluccana	2	Kukui
S,GC,F	Aniscanthus thurberi	3	Desert Honeysuckle
V,GC,F	Antigonon leptopus	3	Mexican Creeper(3 colors
S,GC,A	Asparagus densiflorus cv 'Meyers'	2	Foxtail Asparagus
S,GC,A	A. densiflorus 'Sprengeri'	2	Sprenger Asparagus
A	Aspidistra elatior 'variegata'	2	Cast Iron Plant
GC	Asystasia gangetica	3	Asystasia
V,SC,GC	Aptenia cordifolia	3	Hearts and Flowers
MT,F	Bauhinia blakeana	2	Hong Kong Orchid Tree
V,F	B. galpinii	2	Red Bauhinia
ST,F	B. tomentosa	3	Yellow Bauhinia
A,SC,ST	Beaucarnea recurvata	3	Pony tail
A,V,F	Bougainvillea 'Crimson Jewel'	2	
A,V,F	Bougainvillea 'Jamaica White'	2	
A,V,F	Bougainvillea 'Rosenka'	2	
A,V,F	Bougainvillea 'Temple Fire	2	
ST	Brexia madagascariensis	2	Brexia

LOW WATER USE/DROUGHT TOLERANT PLANT LIST

All plants require water for establishment. After they are rooted and growing well their water requirements will vary.

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Key to Symbols

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Zone 3 - Low watering level. Includes self-sustaining plant materials and natural vegetation with emphasis on plants that require little or no supplemental irrigation.

Type	Botanical Name	Zone	Common Name
MT	Caesalpinia ferrea	2	Brazilian Ironwood
A,S,F	Caesalpinia pulcherrima	3	Ohai ali'i(3 colors)
S	Calotropis gigantea	3	Crown Flower
ST	Canthium odoratum	3	Alahe'e
S	Carissa grandiflora	3	Natal Plum
S,GC	C. grandiflora prostrata	3	Creeping Natal Plum
S,ST,F	C. surratensis	3	Kolomona
SC,GC	Carpobrotus edulis	3	Hotentot Fig
MT,F	Cassia fistula	2	Yellow Shower
MT,F	Cassia fistula x C. javanica		Rainbow Shower (All Colors)
ST	Ceratonia siliqua	3	Carob Tree
V,GC,S	Clerodendron inerme	3	Glory Bower
MT	Clusia rosea	3	Autograph Tree
S	Clusia sp.	3	Small Leaf Clusia
MT,F	Cochlospermum vitifilum	3	Buttercup Tree
MT,F	Cordia subcordata	2	Kou
OG	Cortaderia selloana	3	Pampas Grass
S,SC,A	Crassula argentea	3	Jade Plant
ST	Cresentia cujete	3	Calabash Tree
V	Cryptostegia grandiflora	3	India Rubber Vine
A,S	Cycas revoluta	2	Sago Palm
G	Cynodon dactylon	3	Bermuda Grass
A,S,SC	Dasyliron wheeleri	3	Spoon Flower
MT,A,F	Delonix regia	2	Royal Poinciana (3 colors)
S	Dodonaea viscosa	3	'A'ali'i
LT	Enterolobium cyclocarpum	3	Earpod
MT	Eriobotrya japonica	2	Loquat
MT	Erythrina sandwicensis	3	Wiliwili
MT	Erythrina "Tropic Coral"	2	Tropic Coral
MT	E. variegata var. orientalis	2	Wiliwili
S,SC,A	Euphorbia cotinifolia	2	Tigers Claw
A,GC,SC	E. millii	3	Hierba mala
ST,A	Feijoa sellowiana	2	Crown of Thorns
S	Ficus buxifolia	2	Pineapple Guava
ST,A	Ficus carica	3	Boxwood Ficus
S,A	F. diversifolia	2	Fig
LT	F. microcarpa	2	Mistletoe Fig
S,GC	F. microcarpa var. crassifolia	3	Chinese Banyan
A,SC	Furcraea aff. giantea variegata	3	Taiwan Ficus
			Variegated Furcr

Type	Botanical Name	Zone	Common Name
S,A	Gardenia brighamii	2	Nanu
S,GC	G. radican	2	Creeping Gardenia
S	Gossypium tomentosum	3	Ma'o
S,A	Grewia occidentalis	2	Lavendar Star
ST,A	Guaiacum officinale	3	Lignum Vitae
S,A,F	Hibiscus brackenridge	2	Ma'o hau hele
S,GC	H. calyphyllus	3	Rock's Hibiscus
S,A,F	H. 'Carnation'	2	Carnation Hibiscus
S,A,F	H. 'Cooperi'	2	Calico Hibiscus
S,A,F	H. schizopetalus	2	Coral Hibiscus
S,A,F	H. schizopetalus 'Pagoda'	2	Pagoda Hibiscus
S,A,F	H. waimeae	2	Koki'o ke'o ke'o
S,F	Jasminum sambac	2	Pikake
S,F	J. sambac 'Duke of Tuscany'	2	Giant Pikake
GC	Juniperus chinensis procumbens	2	Japanese Garden Juniper
S,GC,F	Lantana camara 'Radiation'	2	Lantana
GC,F	Lantana cv 'Gold Mound'	2	Trailing Lantana
GC,F	L. montevidensis	2	Bay Laurel
S,A	Laurus nobilis	3	Naio
ST	Myoporum sandwicense	2	Dwarf Nandina
S,A	Nandina domestica compacta nana	3	Oleander
S,F	Nerium oleander	3	Dwarf Oleander
S,F	Nerium oleander f. 'dwarf'	3	Kului
S	Nototrichium sandwicensis	3	Olive
MT	Olea europaea	3	'Ulei
S	Osteomeles anthyllidifolia	2	Seashore Paspalum
G	Paspalum vaginatum	2	Variegated Opiuma
MT	Pithecellobium dulce 'variegata'	2	Wheeler's Pittosporum
S,GC	Pittosporum tobira 'wheeleri'	3	Cape Leadwort
S,F	Plumbago auriculata	3	'Ilie'e
S,GC	P. zeylanicum	2	Plumeria
MT,F	Plumeria hybrid(and spp.)	3	Miniature Jade
S,A,SC	Potulacaria afra	2	Pink Bombax
MT,F	Pseudobombax ellipticum	3	Pomegranate
S,ST	Punica granatum	3	Dwarf Pomegranate
A,GC	P. granatum nana		

Type	Botanical Name	Zone	Common Name
MT	Caesalpinia ferrea	2	Brazilian Ironwood
A,S,F	Caesalpinia pulcherrima	3	Ohai ali'i(3 colors)
S	Calotropis gigantea	3	Crown Flower
ST	Canthium odoratum	3	Alahe'e
S	Carissa grandiflora	3	Natal Plum
S,GC	C. grandiflora prostrata	3	Creeping Natal Plum
S,ST,F	C. surratensis	3	Kolomona
SC,GC	Carpobrotus edulis	3	Hotentot Fig
MT,F	Cassia fistula	3	Yellow Shower
MT,F	Cassia fistula x C. javanica	2	Rainbow Shower (All Colors)
ST	Ceratonia siliqua	3	Carob Tree
V,GC,S	Clerodendron inerme	3	Glory Bower
MT	Clusia rosea	3	Autograph Tree
S	Clusia sp.	3	Small Leaf Clusia
MT,F	Cochlospermum vitifilum	3	Buttercup Tree
MT,F	Cordia subcordata	2	Kou
OG	Cortederia selloana	3	Pampas Grass
S,SC,A	Crassula argentea	3	Jade Plant
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A,S	Cycas revoluta	2	Sago Palm
G	Cynodon dactylon	3	Bermuda Grass
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MT,A,F	Delonix regia	2	Royal Poinciana (3 colors)
S	Dodonaea viscosa	3	'A'ali'i
LT	Enterolobium cyclocarpum	3	Earpod
MT	Eriobotrya japonica	2	Loquat
MT	Erythrina sandwicensis	3	Wiliwili
MT	Erythrina "Tropic Coral"	2	Tropic Coral Wiliwili
MT	E. variegata var. orientalis	2	Tigers Claw
S,SC,A	Euphorbia cotinifolia	2	Hierba mala
A,GC,SC	E. millii	3	Crown of Thorns
ST,A	Feijoa sellowiana	2	Pineapple Guava
S	Ficus buxifolia	2	Boxwood Ficus
ST,A	Ficus carica	3	Fig
S,A	F. diversifolia	2	Mistletoe Fig
LT	F. microcarpa	3	Chinese Banyan
S,GC	F. microcarpa var. crassifolia	3	Taiwan Ficus
A,SC	Furcraea aff. giantea variegata	3	Variegated Furcraea

Type	Botanical Name	Zone	Common Name
S	Rosemarinus offcinalis	3	Rosemary
GC	R. officinalis var. prostrata	3	Creeping Rosemary
S,A,F	Russelia equisetifolia	2	Coral Plant
T	Samanea saman	3	Monkey Pod
A	Sansevieria spp.	3	Sansevieria
MT	Sapindus saponaria	2	Soapberry Tree
S	Scaevola taccada	3	Naupaka
ST	Schinus molle	3	California Pepper Tree
GC,SC	Sedum spp.	3	Sedum
V,F	Senecio confusus	2	Mexican Flame Vine
V,GC	Stapelia nobilis	3	Giant Carrion Flower
G	Stenotaghrum secundatum	2	St. Augustine Grass
OG	S. secundatum variegatum	2	Variegated St. Augustine Grass
A,F	Strelitzia reginae	2	Bird of Paradise
MT	Tabebuia argentea	2	Silver Trumpet Tree
LT	T. chrysantha	2	Trumpet Tree
LT	T. donnel-smithii	2	Gold Tree
MT	Tamarix aphylla	3	Desert Athel
V,GC,F	Thevetia peruviana	3	Be-still Tree
GC	Tradescantia spathacea	3	Oyster Plant
S,GC	Wikstroemia uva-ursi	3	'Akia
A,SC	Yucca gloriosa	3	Spanish Bayonet
G	Zoysia tenuifolia 'Elegance'	2	
G	Z. tenuifolia 'Emerald'	2	

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6272-01
May 22, 2000

Mr. David Craddick, Director
Department of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawaii 96793

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Craddick:

We are in receipt of your letter dated May 5, 1999 commenting on the subject EA. As the project is in the conceptual design stage, details regarding the projected demand for water have yet to be developed. We will continue to consult with your office, however, as the project design progresses and details on water system needs become available.

We appreciate the information you provided regarding the existing water system in the project area and required water conservation practices, and will incorporate the information into the project design.

With regard to the protection of water resources, a drainage report and Best Management Practices Plan for erosion control will be submitted to the Department of Public Works and Waste Management for review and approval prior to project construction.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

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EM

Hana Affordable Housing
and
Community Development Corporation
Post Office Box 129 Hana, Maui, Hawaii 96713
Office Telephone: (808) 248-7294

April 6, 1999.

Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793
Attention: David Ching

Subject: Comments to Draft Environmental Assessment for Hana Community Healthcare Campus

Dear David:

Enclosed, from Hana Affordable Housing and Community Development Corporation (HAH&CDC), are its Comments regarding the Draft Environmental Assessment for Hana Community Healthcare Campus.

In offering its Comments, HAH&CDC, while supportive of upgrading medical facilities and services within the Hana region, is primarily concerned with the limited discussion and the lack of supportive information provided within the Draft Environmental Assessment regarding provision of elderly housing, consistent with the Land Use Designation of the Hana Community Plan for parcel TMK (2)-1-4-03:022. Secondary concerns include (a) planning and designing of the proposed project, compatible with the standards and design guidelines of the Hana Community Plan; (b) operational viability of proposed facilities; and, (c) justification for proposed expanded facilities and additional services. Other important concerns include project funding; zoning of parcels; economic benefits to the community; the project's housing component; and Archeological Site 3150.

Should you have questions, feel free to call me.

Bill Fuhrmann
Executive Director

cc: with Comments to:

James Stone
Kober/Hanssen/Mitchell Architects

Earl Matsukawa
Wilson Okamoto & Associates, Inc.

Office of Environmental Quality Control

Comments
to
Draft Environmental Assessment
for
Hana Community Healthcare Campus

Compatibility with Hana Community Plan:

Land Use designation of Parcel TMK (2)-1-4-03:022,

A review of the legislative history of Ordinance No. 2347, the Hana Community Plan, regarding the land use designation of parcel TMK (2)-1-4-03:022 ("expansion parcel"), will show that this parcel is to be used for both medical center expansion and elderly housing. The Hana Community Plan Citizens Advisory Committee (the "Hana CAC"), in addressing the major problem of "Affordable Housing", based on the HOUSING IN HANA, MAUI, A Study of Housing Conditions and Needs, Prepared for Keola Hana Maui, Inc. by SMS Research in July 1991, recommended designation of 3 acres of the expansion parcel as MF for elderly housing and recommended designation of 7 acres of the expansion parcel as P/Q-P for the expansion of Hana Medical Center. The Planning Department concurred with the Hana CAC's Land Use recommendations for the use of the expansion parcel, however, as no specific plans were then (August/September 1993) available to delineate the meets and bounds of the elderly housing segment and the meets and bounds of the medical center expansion segment, the Planning Department recommended P/Q-P for the entire expansion parcel, noting that elderly housing is allowed in P/Q-P, "in order to provide flexibility in site planning.". The Hana Advisory Committee to the Maui Planning Commission, the Maui Planning Commission, the Land Use Committee of the Maui County Council, and finally the Maui County Council, all concurred with the Department's recommendation.

The proposed project, as presented and designed without inclusion of 3 acres of the expansion parcel for elderly housing, is incompatible with the Hana Community Plan Land Use Map, as adopted (See Page 2 of matrix entitled Proposed Revisions to the Hana Community Plan Land Use Map, an attachment of Exhibit "1" of ORDINANCE NO. 2347, BILL NO. 55 (1994), Effective Date: July 1,1994), by the Maui County Council.

The Draft Environmental Assessment ("Draft EA") should discuss the effects of the proposed project, with and without the inclusion of the 3 acre segment designated for elderly housing.

Planning Standards:

The Draft Environmental Assessment does not discuss the proposed project's "landscaping" plan, other than "To the extent possible, however, the existing large monkeypod, coconut, and other significant trees will be preserved and incorporated into the landscaping of the proposed facility."

The Hana Community Plan's Planning Standards, for development and design, specifically states "Native plant species which are found in the Hana region shall be utilized for public and quasi-public facilities to the greatest extent possible."

The Draft EA does not discuss whether the proposed project is designed in accordance with the design guidelines developed for Hana Town. Note: such design guidelines were adopted by the Maui Planning Commission in 1997.

Operational Viability of Proposed Facilities

Hana Community Health Center depends upon substantial funding from the State of Hawaii to provide current level of services in its current facilities. The Draft EA does not discuss the funding and/or operational viability of the additional services to be provided by the proposed project

Further, given the "current" economic conditions within the Hana Community, the Draft EA does not discuss whether "current" resident/users will provide sufficient revenue to provide the additional services of the proposed project.

The Draft EA, based on the inability of Hana Community Health Center to be self-supporting, should discuss the operational viability of the proposed additional services.

Justification for expanded facilities and services

The Draft EA, in discussing justification for the expanded facilities, refers primarily to projected population growth for the Hana Region, the geographic isolation of Hana from Central Maui, without discussing the needs of the resident population for such expanded facilities. (Note: The distance from Hana Medical Center to Maui Memorial Medical Center is less than 55 miles.)

The Draft EA does not discuss the "additional" services to be provided by the proposed expanded facilities other than "The proposed project will provide a comprehensive medical facility that is better equipped to service the Hana District".

The Draft EA should (a) define, with more clarity, the project's expanded facilities and additional services to be provided, and (b) discuss, in depth, the necessity for the project's expanded facilities and additional services.

Comments to Draft Environmental Assessment
Hana Community Healthcare Campus

Other General Comments

Project funding

The Draft EA needs to discuss funding for the construction and development of project.

Zoning of parcels

While the Draft EA does discuss both the allowance of the proposed project under the County's Interim Zoning, and the need to be granted State Special Use permits, based on the scope of the proposed development and the need to secure funding, the Draft EA should discuss the effects of not having the project's parcels zoned pursuant to Article 2 of Title 19 of the Maui County Code.

Economic benefits to community

While the Draft EA discusses as part of the project's long term economic benefits as "Once operational, the proposed project will increase employment opportunities in the Hana Region.", the Draft EA does not identify these employment opportunities. The Draft EA should identify these employment opportunities including the number of positions, employment status (Fulltime, Parttime, Regular, Relief, Casual), job duties, qualifications and pay ranges.

Project's housing component

The Draft EA presents no discussion on the housing component of the project. The Draft EA should discuss the Doctor's housing, as currently housing does exist within walking distance of the project site; the housing for Executive Director of the Healthcare Campus; and the housing for staff nurses, including the costs of occupancy of all proposed housing.

Archeological Site 3150

While the Draft EA discusses the Archeological Inventory Study regarding this site, the Draft EA does not discuss the "cultural significance" of this site, which purportedly served as a "*pu'u honua*". The Draft EA should discuss the "cultural significance" of Archeological Site 3150 and offer mitigation measures.

6272-01
May 22, 2000

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FAX (808)946-2253

Mr. Bill Fuhrmann, Executive Director
Hana Affordable Housing and Community Development Corporation
P.O. Box 129
Hana Hawaii 96713

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Fuhrmann:

We are in receipt of your letter dated April 6, 1999 commenting on subject EA. The following is offered in response to your concerns:

Compatibility with Hana Community Plan

Land Use Designation of Parcel TMK (2)-1-4-03:022: According to the County of Maui Planning Department, 3-acre expansion parcel for elderly housing was not adopted as part of the Hana Community Plan Land use map (Staff communication, May 1999).

Planning Standards: At this time the project design is in the conceptual stage and, a landscaping plan has yet to be developed. Pursuant to the Planning Standards of the Hana Community Plan, the project will incorporate native Hawaiian plants and trees into the proposed facility. Further, the Arborist Committee will be consulted as the project design progresses in conjunction with the development of a landscape plan regarding the disposition of the significant trees currently located on the project site.

The Final EA will include a discussion regarding the project's compliance with the design guidelines developed for Hana.

Operational Viability of Proposed Facilities
The provisions of Chapter 343 of the Hawaii Revised Statutes, Title 11, Chapter 200 , Administrative Rules, Department of Health, and 24 Code of Federal Regulations Part 58 regarding environmental review procedures for projects require the early processing of environmental assessments. At this early juncture in the project development, the operational viability aspects of the project are yet to be developed. These aspects will be evaluated as the project development progresses. An economic feasibility study will be prepared and submitted to the County of Maui Mayor's Office for review and approval as part of the procurement process for the project.

Justification For Expanded Facilities and Services
As the project is in the conceptual design stage, details regarding the project's facilities and services have yet to be developed. The necessity for a comprehensive medical facility is clear, however, based on the geographic isolation and projected population increase of the region.

Other General Comments

Project Funding: Funding assistance for the detailed design and construction of the proposed project will be sought from the Community Development Block Grant program.

Zoning of Parcels: As stated in Section 3.4 (Page 3-3) of the Draft EA, "The County of Maui Interim Zoning Ordinances for various districts of Maui are for the purpose of providing interim regulations pending the formal adoption of a comprehensive zoning ordinance and map. Hospitals are a permitted property use designated by the interim zoning regulations."

Economic Benefits to Community: The employment opportunities resulting from the project will be contingent upon the final mix of services provided at the new facility. These services will be determined as the project design and consultation with the funding agency progress. An economic feasibility study will be prepared and submitted to the County of Maui Mayor's Office for review and approval as part of the procurement process for the project.

Project's Housing Component:
Section 1.5 (Page 1-7) of the Draft EA states that 9,800 square feet of employee housing will be provided for the executive director, on-site physician, and staff nurses. In addition, Figure 3 (Conceptual Plan on Page 1-9) illustrates that the residences will be sited near the western (mauka) portion of the project site. As the project is in the conceptual design stage, no further details regarding the housing component of the project have yet to be developed.

Archaeological Site 3150:
According to the Archaeological Inventory Survey prepared by Paul .H. Rosendahl, Ph.D., Inc. (PHRI) in May 1993, Site 3150 was identified under significance category "A", which is important for information content and which requires further data collection. SHPD concurred with this recommendation and, subsequently, PHRI prepared an Archaeological Mitigation Program in April 1996. The SHPD determined

in a letter dated June 12, 1996 that the data recovery plan was complete and no additional work was recommended. Further, the SHPD determined during the Draft EA consultation period that the project will have no effect on archaeological resources.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

Maui Electric Company, Ltd. • [illegible] West Kamehameha Avenue • PO Box 398 • K[illegible]ui, Maui, HI 96733-6898 • (808) 871-8451

March 8, 1999

Mr. David Ching
Community Development Block Grant Program
Office of the Mayor
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Ching:

Subject: Hana Community Healthcare Campus
Draft Environmental Assessment
(TMK: 1-4-05:22 and 24, Hana, Maui)

Thank you for allowing us to comment on the subject project.

In reviewing the information transmitted and our records, Maui Electric Company (MECO) at this time has no objections to the proposed project.

MECO encourages that the project's consultant meet with us as soon as practical so that we may plan for the project's electrical requirements.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Edward Reinhardt

Edward Reinhardt
Manager, Engineering

ER:fo

Cc: Mr. James Stone, AIA

6272-01
May 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mr. Edward Reinhardt, Manager
Engineering
Maui Electric Company, Ltd.
210 West Kamehemaha Avenue
P.O. Box 398
Kahului, Hawaii 96733-6898

Subject: Hana Community Healthcare Campus
Environmental Assessment

Dear Mr. Reinhardt:

We are in receipt of your letter dated March 8, 1999 stating that you have no objections to the proposed project. The project designer will consult with your office once the project design progresses and details regarding electrical requirements become available.

Thank you for your participation in the environmental assessment phase of the project.

Sincerely,

Earl Matsukawa, AICP, Project Manager

cc: Mr. Alson Tamashiro, County of Maui, Office of the Mayor, CDBG Program
Mr. Dan Ide, DKI & Associates
Mr. James Stone, Kober/Hanssen/Mitchell Architects

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Appendix A

Archeological Inventory Survey
Hana Medical Center Project Area
Land of Kawaipapa, Hana District, Island of Maui
(TMK: 1-4-03:22)

Paul H. Rosendahl, PhD., Inc.
May 1993

Archaeological Inventory Survey
Hana Medical Center Project Area

Land of Kawaipapa
Hana District, Island of Maui
(TMK:1-4-03:22)

by

Jack D. Henry, B.S.
Project Supervisor

and

Donna K. Graves, M.A.
Projects Manager - Hawaii

Prepared for

Department of Accounting and General Services
Division of Public Works
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96871-01198
(DAGS Job No. 15-20-6219)

May 1993

PHRI
Paul H. Rosendahl, Ph.D., Inc.
Archaeological · Historical · Cultural Resource Management Studies & Services
365 Mehani Street · Hilo, Hawaii 96720 · (808) 969-1763 · FAX (808) 961-8998
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SUMMARY

At the request of Mr. Allen Yamanoha, planner for the Department of Accounting and General Services (DAGS), State of Hawaii, Paul H. Rosendahl, Ph.D., Inc. (PHRI) recently conducted an archaeological inventory survey of the 10.07-ac Hana Medical Center project area, located in the Land of Kawaipapa, Hana District, Island of Maui (TMK:1-4-03:22). The basic objective of the survey was to provide information sufficient for satisfying the historic preservation requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD).

The survey included a 100% pedestrian survey of the project area and the excavation of 16 shovel tests. During the pedestrian survey, four archaeological sites were identified—two complexes (Sites 3150 and 3153) and two historic boundary walls (Sites 3151 and 3152). The sites comprised the following formal feature types: enclosure, L-shape enclosure, platform, wall, and terrace. The features comprised the following functional types: habitation, animal pen, agriculture, boundary marker, and indeterminate.

Sixteen shovel tests were excavated to test for the presence or absence of buried cultural deposits. The tests were placed in the vicinities of the identified sites (excluding the historic boundary walls), and in areas modified by recent agriculture. Subsurface cultural materials were identified in four shovel tests placed at Site 3150. One test unit was placed at one site (Site 3150) to test the site for human remains. No human remains were encountered in the unit.

Based on the findings of the current work, three identified sites (3151, 3152 and 3153) are assessed as significant solely for information content, and no further work is recommended for the sites. Site 3150 is assessed as significant for information content, and further data collection, (including appropriate data recovery excavations) is recommended. The purpose of the further work is to more precisely determine the age and function of Site 3150.

CONTENTS

ILLUSTRATIONS

TABLES

INTRODUCTION

BACKGROUND

At the request of Mr. Allen Yamanoha, planner for the Department of Accounting and General Services (DAGS), State of Hawaii, Paul H. Rosendahl, Ph.D., Inc. (PHRI) recently conducted an archaeological inventory survey of the 10.07-ac Hana Medical Center project area, located in the Land of Kawaipapa, Hana District, Island of Maui (TMK:1-4-03:22). The basic objective of the survey was to provide information sufficient for satisfying the historic preservation requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD).

The field work for the current project was conducted January 11-16 and April 20, 1993 by Project Supervisor Jack D. Henry, B.S., and Crew Chief Martin Boudreau, B.A. Projects Manager Donna K. Graves, M.A., and Hawaii Projects Director Alan Walker, B.A., provided overall guidance for the project. The field work took about 105 labor-hours to complete.

SCOPE OF WORK

The basic purpose of the inventory survey was to identify all sites and features of potential archaeological significance present within the project area. An inventory survey comprises an initial level of archaeological investigation. Basically, it determines the presence or absence of archaeological resources and indicates their general nature and variety, and their general distribution and density. Finally, it permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for such further work as might be necessary. Such work could include further data collection—additional data collection involving detailed recording of sites and features, and selected limited excavations; and possibly subsequent mitigation—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 current survey were fourfold: (a) to identify (find and locate) all sites and site complexes present in the parcel; (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 data collection or other mitigation work that might be necessary.

Based on a review of readily available background literature, and based on familiarity with the current requirements of review authorities and on discussions with Mr. Allen Yamanoha and with Ms. Annie Estioko-Griffin, DLNR staff archaeologist, the following specific tasks were determined to constitute an adequate scope for the inventory 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 variable coverage (partial to 100%), variable intensity surface reconnaissance survey of the project area, with (a) relatively higher intensity coverage being given to non-cultivated and otherwise minimally modified lands, and (b) relatively lower intensity coverage to areas extensively modified by historic period and/or recent cultivation;

3. Conduct limited subsurface testing of selected locations within the project area to determine the presence or absence of potentially significant buried cultural features or deposits; and

4. Analyze background and field data, and prepare appropriate reports.

The inventory survey was carried out in accordance with the standards for inventory-level survey recommended by DLNR-SHPD. The significance of all archaeological remains identified within the project area were assessed in terms of (a) the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60), and (b) the criteria for evaluation of traditional cultural values prepared by the national Advisory Council on Historic Preservation. DLNR-SHPD uses these criteria to evaluate eligibility for both the Hawaii State and National Register of Historic Places.

To further facilitate client management decisions regarding the subsequent treatment of resources, the general significance of all archaeological remains identified during the survey were also evaluated in terms of three PHRI Cultural Resource Management (CRM) value modes—scientific research, interpretive, and cultural values. The value modes and the above federal criteria are discussed in detail in the Conclusion section.

PROJECT AREA DESCRIPTION

The project area consists of about 10.07 acres. The main portion of the project area is bounded on the east by the existing Hana Medical Center facility, and on the north, south, and west by private parcels. The project area includes a small adjoining parcel located along the northern boundary of the existing medical facility (Figure 1).

The project area is c. 160-200 feet AMSL (above mean sea level). Rainfall in the general vicinity of the project area averages 75 inches per year, and the mean annual temperature in the vicinity is 70-75 degrees F (Armstrong 1973).

Terrain within the project area slopes moderately towards the sea and comprises primarily Hana extremely stony, silty clay loam (3-15% slopes)(Foote et al. 1972). This soil type is stony over 3 to 15 percent of the surface and has a dark brown silty clay loam surface layer overlying a reddish-brown, very friable silty clay loam subsoil. Beneath the soil is a substratum of fragmented aa lava extending to a depth of 20 to 30 inches. According to Foote et al., "runoff [on the soil type] is slow to medium, and the erosion hazard is slight to moderate" (1972:37).

The project area contains both introduced and native species of plants. The introduced species are present perhaps because the area has been used for commercial cultivation. The species include breadfruit (*Artocarpus communis*), ti (*ki*; *Cordyline terminalis* L. Kunth), taro (*kalo*; *Colocasia esculenta* L. Schott),-palmetto (*Sabal palmetto* [Walt.] Lodd. and Schult. f.), coconut (*Cocos nucifera*), bird-of-paradise (*Strelitzia reginae*), red ginger (*'awapuhi-'ula'ula*; *Alpinia purpurata* Vieill.; K. Schum.), mango (*manako*; *Manifera indica* L.), bamboo (*Bambusa sp.*), Africa tulip (*Spathodea campanulata*), *milo* (*Thespesia populnea* L.), false *kamani* (*kamani-kaole*; *Terminalia catappa* L.), Hawaiian tree fern (*Niroli*; *Filicium decipiens*), papaya (*Carica papaya* L.), areca palm (*Chrysalidocarpus lutescens*), *will-will* (*Erythrina sandwicensis* Degener), *kukui* (*Aleurites moluccana* L. Willd.), and banana (*Musa paradisiaca* L.).

PREVIOUS ARCHAEOLOGICAL WORK-PROJECT AREA VICINITY

The present study represents the initial archaeological research within the current project area. Previous archaeological work conducted in the vicinity of the project area includes investigations by Walker (1931), Sterling (1969), Pearson (1970), Bevacqua (1972), Landrum (1984), and Borthwick et al. (1992). A brief summary of these previous investigations is presented in Table 1. *Figure 2* shows the locations of the investigations.

In 1931, Winslow Walker conducted an archaeological survey of the Island of Maui (Walker 1931). Walker identified six *heiau* in the Land of Kawaipapa, and another six in Wananalua Region to the south. According to Walker, the majority of these *heiau* were destroyed prior to his investigation.

In 1969, Elspeth Sterling conducted a walk-through archaeological survey of the Hana area with local informant Mathew Kalalau (Sterling 1969). This survey identified a number of platforms and enclosures in an aa lava flow adjacent to the Mormon Cemetery.

In 1969, Richard Pearson conducted an archaeological reconnaissance survey of Wai'anapanapa State Park, located in the *ahupua'a* of Waiklu (1970). Pearson identified 34 archaeological features, including one *heiau*, five cave shelters, a trail, one pictograph, six *ahu*, two U-shaped enclosures, five miniature enclosures, three shelter walls, two house platforms, and several walls and enclosures.

In 1972, Robert Bevacqua conducted a walk-through archaeological survey of the proposed Hana Elementary and High School area (Bevacqua 1972). Bevacqua noted considerable mechanical disturbance in the area, and the remains of a partially destroyed habitation site.

In 1984, Jim Landrum conducted an archaeological reconnaissance survey of a 14-acre parcel within the Land of Kawaipapa. No archaeological remains were identified during the survey.

In 1992, Borthwick et al. conducted an archaeological inventory survey of the proposed c. 400-acre Hana Ranch Country Club (1992). The survey resulted in the identification 36 agricultural sites, 13 habitation sites, and three religious sites. Most of the identified sites dated to the historic period.

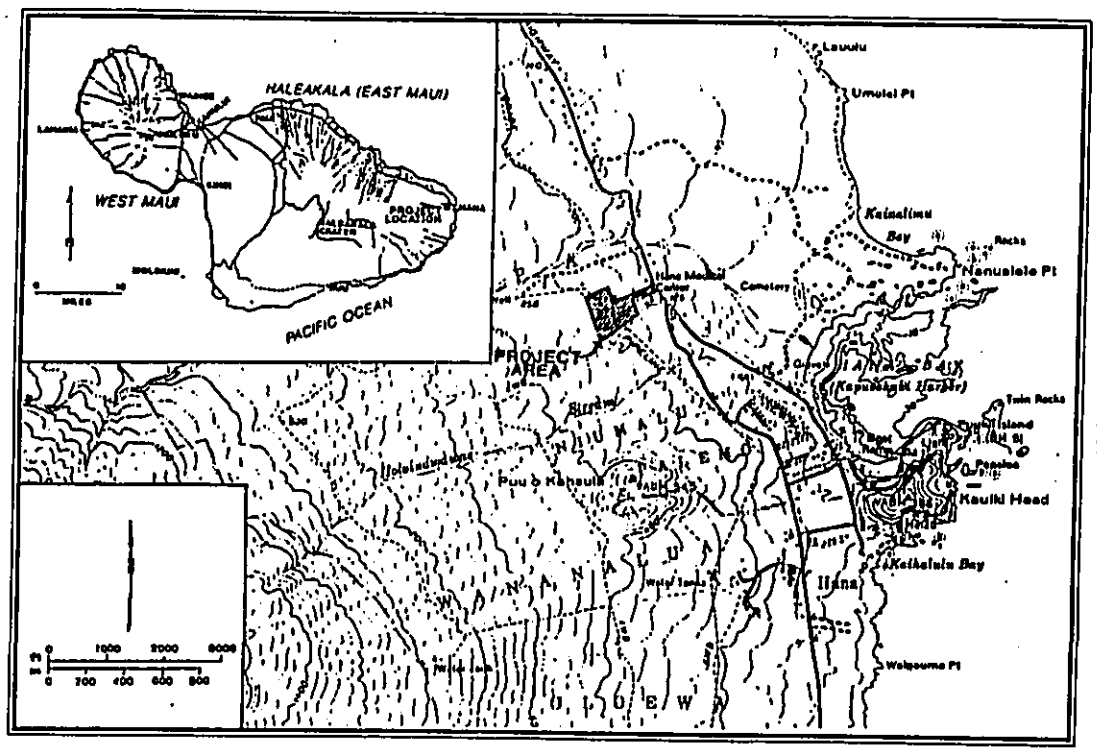


Figure 1. Project Area Location Map

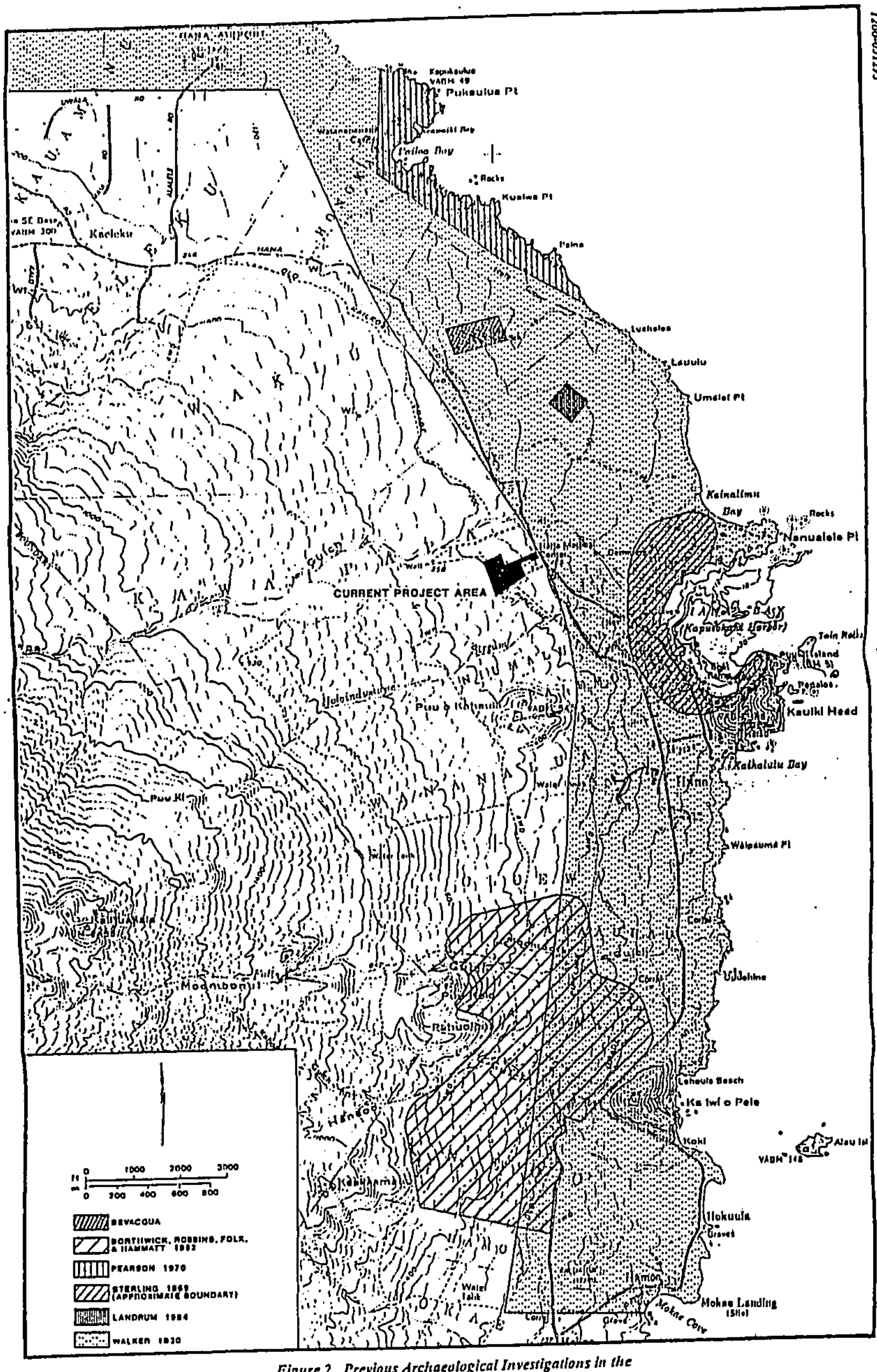


Figure 2. Previous Archaeological Investigations in the Vicinity of the Project Area

Table 1.

SUMMARY OF PREVIOUS ARCHAEOLOGICAL WORK IN THE VICINITY OF THE PROJECT AREA

Researcher	Year	Location	Level of Investigation
Walker	1931	Island of Maui	Reconnaissance Survey
Sterling	1969	Hana	Walk-through Survey
Pearson	1970	Waianapanapa State Park	Reconnaissance Survey
Bevacqua	1972	Hana High and Elemen. School	Walk-through Survey
Landrum	1984	Kawaipapa	Reconnaissance Survey
Borthwick, Robbins, Folk and Hammatt	1992	Hana Country Club	Inventory Survey

SUMMARY OF HISTORICAL DOCUMENTARY RESEARCH

This section briefly summarizes archival research conducted by Historical Researcher Lehua Kalima and Cultural Resources Specialist Kepa Maly (see Appendix A). The section includes findings from limited informant interviews conducted during the project field work.

Hana is where Maui is closest to Hawaii Island. The closeness permitted interaction between the islands during times of war and peace. Beckwith states that the Hana area was the site of many important battles—battles which eventually led to the unification of the Hawaiian Islands (1940:319). The many *heiau* in the vicinity, as well as the hilltop fortress of Ka'uiki, located on Hana Bay, reflect Hana's importance as a battleground.

During peacetime Hana was a desireable place to live due to its abundant resources. Thrum states that agriculture was extensive in the area and included cultivation of dry and wet taro, sweet potatoes, yams, and *awa*, for which the area is famous. The numerous fishponds along the coast suggests there was much aquaculture in the area (1940:380).

Sugar cane was introduced to the area in 1860, by Kelk and Needham, who also established a bullock-powered grinding mill (Clark 1980). The Ka'eleku Sugar company was formed at this time and operated until 1930. Paul Fagan purchased the plantation and turned it into the Hana Ranch Company. The ranch raised cattle on the grassy slopes above the town, and provided the economic basis for the local residents. The Hotel Hana Ranch, was opened to the public on June 15, 1947; later, in 1948, the name of the hotel was changed to Hotel Hana Maui (Clark 1980:23). The hotel continues to operate today.

During the current field work, several local informants provided information on the project area. A respected Hana *kupuna*, Mrs. Apollonia Day, indicated the area currently occupied by the Hana Medical Center was historically the site of a *pu'uhonua*, or place of refuge (pers. comm. 1-13-92). Mr. Wilfred Kala and Mr. Patrick Cosma, current employees of the Hana Medical Center, were knowledgeable about the general area. Mr. Kala has worked for the medical center as a maintenance man since it was constructed, and was involved in the initial clearing of the property. He states that at the time the land was cleared, no structures even suggesting a *pu'uhonua* were present in the area (pers. comm. 1-14-93). Cultural Resources Specialist Kepa Maly subsequently conducted further historical research concerning this matter (Appendix A). Mr. Maly concluded that there were no *pu'uhonua* within the project area but there was a *pu'uhonua* in a parcel adjacent to the project area.

SETTLEMENT PATTERNS

Despite the limited archaeological data for the Hana area, a generalized chronology of settlement and land utilization for the area can be proferred. This chronology is based on the previous archaeological research in the area, historical documentary research, and previously postulated models of settlement. Refinement of this chronology should be possible in the future as additional information is collected.

Kirch postulated a chronology of archipelago-wide aboriginal settlement and social development (Kirch 1985). In his sequence, five periods of development were defined:

Colonization — AD 300-600
Occupation of ecologically favorable area; windward valleys, & land near fishing grounds - material culture similar to East Polynesia - social structure similar to ancestral Polynesian hereditary Cheifdom;

Developmental — AD 600-1100
Population Growth - settlement of all major islands - distinctive Hawaiian material and social culture develops - social structure: some status differentiation, but still corporate descent groups;

Expansion — AD 1100-1650
Population growth - dispersal of population into leeward areas - intensified food production - altered social & political organization - class stratification - *Ahupua'a* system solidified - development of *Makahiki* - larger regions politically integrated;

Proto-Historic — AD 1650-1795
Intensified food production - elaboration of social system - cycles of conquest, integration, collapse;

Historic — 1795-present
Great Mahele - increase in trade with outside world.

Radiocarbon dates, which can provide a chronological framework for an area, are lacking for the Hana region. At present, only one archaeological investigation in the vicinity of the project area has yielded radiometric age determinations. Borthwick et al.'s (1992) examination of the proposed Hana Ranch Country Club produced three datable carbon samples. One sample dated to AD 1345-1650 (Site 2711); another to AD 1425-1950 (Site 2835); and one site dated to AD 1640-1950 (Site 2749) (Borthwick et al. 1992:6).

Borthwick et al.'s radiometric results indicate that the Hana area was occupied well into Kirch's Expansion Period. Further evidence of an Expansion Period occupation is suggested by the sheer number of important ceremonial structures in the Hana area. Walker's 1930 survey of Maui identified 11 *heiau* (Sites 105-117) within the districts of Hana and Kawaipapa (1930). Pearson's archaeological examination of Waianapanapa State Park likewise identified a large *heiau* and associated cave complex (Site 36,343). These large structures attest not only to Hana's social and political importance, but suggest the presence of a large population. According to Kirch, such temples "...evinced the power and authority of ruling chiefs, and served as constant reminders of the role in the life of the community of an extended pantheon." (Kirch 1985:6).

Evidence of social stratification and the political integration of larger regions is further reflected in ethnohistorical accounts of the Hana area. Historic documentary research suggests that the districts of Ko'olau, Hana, Kipahulu, and Kaupo were governed separately from the rest of the island, and its chiefs were often grouped about the fortified hill of Ka'uiki on Hana Bay. This broadening and integration of power bases is typical of Expansion Period political development.

The numerous Hawaiian legends and myths concerning Hana are useful in placing the occupation of Hana in a temporal framework. Soehren states that the earliest war between the islands of Hawaii and Maui is attributed to King Hua, who is said to have lived at Hana where he built the *heiau* of Honua'ula. After his successful raid on Hawaii, he returned and built Kuamalu Heiau (1931:1-25). Historian King David Kalakaua places King Hua's reign during the mid-12th century (1973). Although exact dates for Hua's exploits are unknown, it is apparent that at least several of the *heiau* in the Hana area date to the early Expansion Period.

According to Walker, Hana was also the home of Kihapiilani, a famous hero of many legends, who is said to have built the trail which circles the western portion of Maui (1931:23). Pearson's work at Waianapanapa State Park resulted in the identification of what he interpreted as a coastal portion of Kihapiilani Trail (1970:7). This trail, according to Handy and Handy, was constructed in AD 1516 after Kihapiilani's unification of Maui, further suggesting an Expansion era occupation of the Hana area (1940:398).

Both the archaeological and historical records indicate that the occupation of the Hana area continued through Kirch's Expansion Period to the present. As reflected in the historic documentary research, the increase in trade between Hana and the outside world resulted in the expanded cultivation of numerous cash crops, including sugar cane.

Borthwick et al. documented numerous historic features in Hana, including railroad structures, walls associated with cane cultivation and cattle exclusion, and terraces and mounds

used for the cultivation of sweet potato and taro (1992). As the latter two feature types were within cane fields, they were deemed historic.

Based on the above, it is apparent that the aboriginal occupation of the Hana area extended to at least the Expansion Period. Whether the initial settlement and occupation of Hana preceded the Expansion Period is presently unknown. It is hoped that as future archaeological research is conducted in the area, and the database is enlarged, Hana's earliest stage of occupation can be more accurately described.

Implications for the Current Project Area

Although the current project area had been historically disturbed it was still expected to contain archaeological sites. Evidence of prehistoric occupation was expected. Walker reported that a *heiau* (Site 106) once existed about 300 m north of the current project area. According to Walker:

> Kawaipapa was a heiau located near the point where the road crosses the gulch of the same name. It was destroyed by building the road, also a freshet washed out the remainder (Walker 1931:181).

It was thought possible that the project area would contain habitation structures associated with the *heiau*. The structures perhaps would represent either permanent, peripheral dwellings once associated with Kawaipapa temple, or would comprise more temporary features associated with agriculture—mounds and terraces possibly for cultivation of dryland taro.

Evidence of historic occupation was also expected—boundary walls, animal enclosures, or remnant structures associated with either sugar cane cultivation or cattle ranching.

FIELD METHODS AND PROCEDURES

The field work for the current project was conducted January 11-16, and April 20, 1993 by Project Supervisor Jack D. Henry, B.S., and Field Archaeologist Martin Boudreau, B.A. The field work took about 105 labor-hours to complete.

The field work consisted of a surface survey and subsurface testing. The surface survey was conducted by way of pedestrian sweeps, with crew members spaced at 10 m intervals. One hundred percent of the project area was ground surveyed. When sites or features were identified, flagging tape inscribed with the PHRI project number, temporary site number (T-), date and recorder's initials were affixed to the site's southwest corner. Sites were later assigned permanent SIHP site numbers: T-1(3150), T-2(3151), T-3(3152), and T-4(3153). Sites and features were recorded on standardized PHRI forms; site locations were plotted on topographic maps; and black-and-white photographs of each site were taken.

The subsurface survey comprised excavating 16 shovel tests (STs) and one test unit. The STs were placed either within or near features, or within areas cleared for agriculture. The test unit was placed at Site 3150, Feature D, to test the feature for human remains. All soils excavated from the STs were screened through 1/8" mesh. Portable remains recovered were bagged, assigned accession numbers, and were transported to PHRI's laboratory in Hilo for analysis. The approximate locations of the STs were plotted on a topographic map, and detailed stratigraphic information was recorded on standardized PHRI forms, following standard procedures and terminology as set forth in the *Soil Survey Manual* (Soil Survey Staff 1962). Detailed stratigraphic descriptions for the shovel tests are presented in Appendix B.

FINDINGS

During the surface survey four sites were identified—two complexes (Sites 3150 and 3153) and two boundary walls (Sites 3151 and 3152). Site locations are shown in *Figure 3*. The sites are summarized in terms of site number, site type and function, Cultural Resource Management (CRM) value mode assessments, and recommended field work tasks in Table 2.

The subsurface survey included excavating 16 shovel tests. The STs were placed either within or near features, or within areas cleared for agriculture. The locations of all STs are shown in *Figure 3*. Detailed stratigraphic descriptions for all STs are presented in Appendix B. One test unit was placed at Site 3150, Feature D. This unit is discussed in detail below.

SITE 3150

Site 3150 is a complex of four features. The site extends from the top of a N-S trending ridge, southward, across a dirt road for approximately 70 m *(Figure 4)*. Eight STs were placed at the site—two at each feature.

Feature A

This a small, rectangular enclosure 5.6 by 5 m. The average height of the walls is 0.6 m above ground surface. The walls consist of three to four courses of stacked subangular to subrounded pahoehoe and aa cobbles and small boulders (0.25-0.45 m in diameter). The walls are core-filled with small basalt cobbles 0.07-0.14 m in diameter. The walls are in relatively good condition; all are collapsed in places.

There are two entrances to the enclosure. One is about 0.4 m wide and is near the southeast corner of the eastern wall. There are upright aa boulders on both sides of this opening. The second opening is in the center of the southern wall, and there is a single similar upright on the eastern edge of the opening. The opening is about 0.5 m wide. Both openings extend from the ground surface to the top of the walls. A fallen upright of waterworn basalt is present on the exterior northeast corner of the enclosure, and a waterworn basalt cobble is present near the southern entrance.

STs 1 and 8 were placed at Feature A. The STs yielded a dark organic soil, charcoal flecks, marine shell, historic glass fragments and several waterworn pebbles. Feature A's shape and size, and the portable remains at the feature, suggest the feature functioned for historic habitation.

Feature B

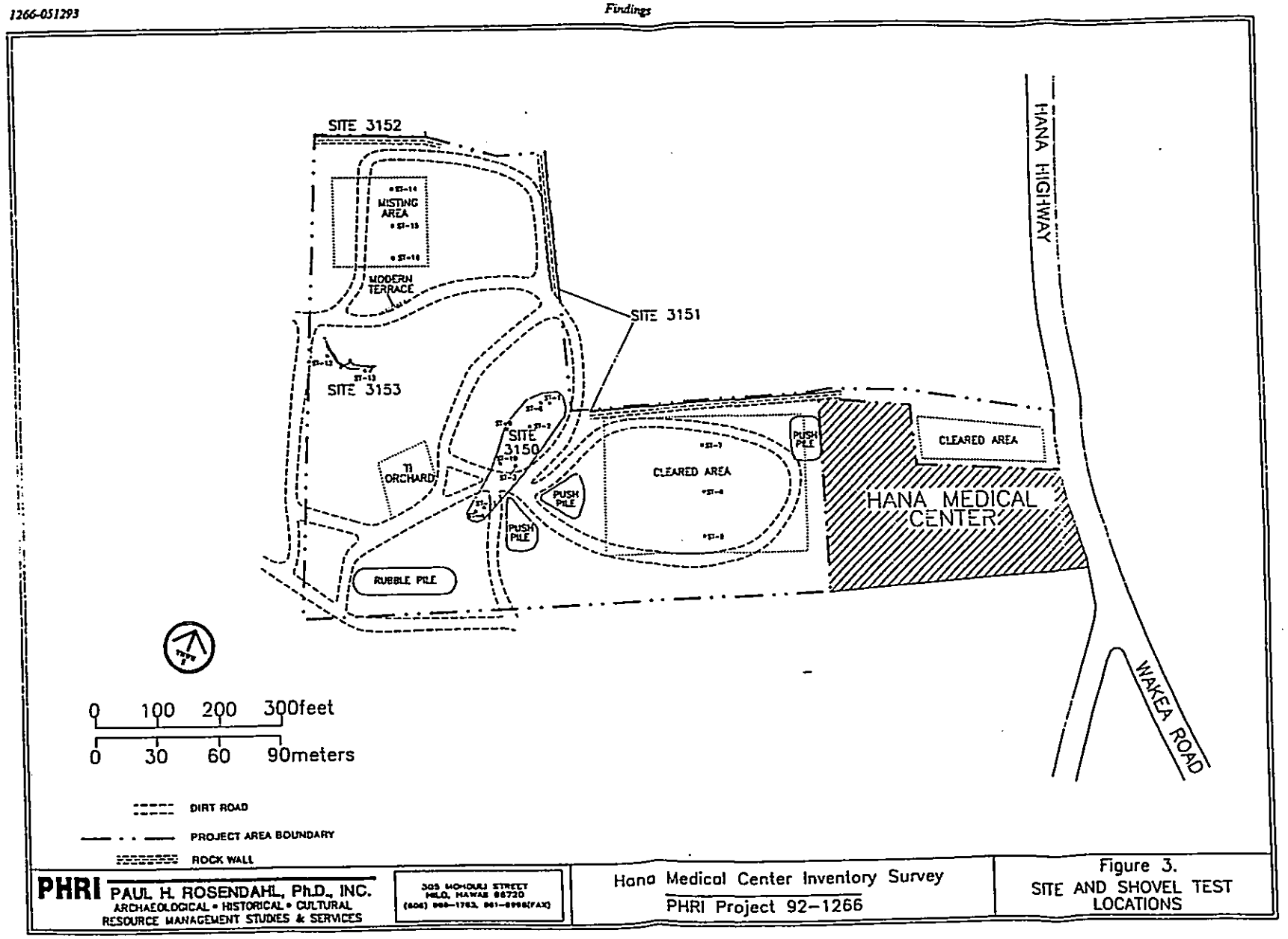
Feature B is a large rectangular enclosure about 12 m southeast of Feature A. This enclosure is oriented NW/SE and is 13.7 m long and 10.5 m wide. The enclosure walls are constructed of stacked, subangular to subrounded aa boulders and cobbles 0.25-0.40 m in diameter. The walls are six to seven courses high, and average 1.10 m above ground surface, and approximately 0.50 m thick. Large basalt boulders in excess of 1.0 m in diameter are in the northwest, northeast, and southwest corners of the structure. Portions of the enclosure along the west, south and eastern walls are collapsed. The intact portions are capped with small basalt cobbles 0.25 to 0.30 m in diameter.

A portion of the northern wall curves outward slightly to the northwest, to accommodate a large false *kamani* tree. As this portion of the enclosure appears to have been constructed around the tree, it is likely of relatively recent origin. Glass bottles and jars are scattered around the perimeter of the enclosure. Located approximately five meters from the southeast exterior corner of Feature B are five 50-gallon metal drums, and several sheets of corrugated metal roofing. The enclosure has no entrances. The lack of entrances and the height of the walls suggest the feature functioned as an animal enclosure.

Two STs were excavated at Feature B. ST-2 was placed in the center of the enclosure and yielded a small amount of burned coconut shell. ST-9 was placed west of the enclosure and yielded a single cowry shell.

Feature C

Feature C is an L-shaped enclosure and associated terrace located about 20 m southeast of Feature B. The feature is constructed of crudely aligned a'a boulders and measures approximately 3 by 3 m. The boulders are of varying sizes; some are as little as 0.50 m in diameter and others are about 1.10 m long by 0.75 m wide. The L-shape encloses an area bounded on the NE by an a'a outcrop incorporated into a terrace wall (1.0 to 1.1 m high). A dirt road is present below the terrace. The L-shaped alignment forms crude walls on the north and west. The alignment is one course wide. Recent beer cans (aluminum) were noted in the vicinity of the feature. Two STs were excavated at Feature C. ST-3 was in the center of the alignment, and ST-10 was placed outside the feature to the west. Both STs yielded no cultural materials. Feature C


SITE 3152
MISTING AREA
MODERN TERRACE
SITE 3151
SITE 3153
SITE 3150
TI ORCHARD
PUSH PILE
PUSH PILE
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CLEARED AREA
CLEARED AREA
HANA MEDICAL CENTER
HANA HIGHWAY
RUBBLE PILE
WAKEA ROAD
0 100 200 300feet
0 30 60 90meters
DIRT ROAD
PROJECT AREA BOUNDARY
ROCK WALL
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PHRI Project 92-1266
Figure 3.
SITE AND SHOVEL TEST LOCATIONS

Table 2.

SUMMARY OF IDENTIFIED SITES AND FEATURES

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks Recommended DR	SC	EX
3150	Complex (4)	Multiple	M	M	L	+	-	+
A	Enclosure	Habitation						
B	Enclosure	Animal pen						
C	L-shape align. and terrace	Indeterminate						
D	Platform	Indeterminate						
3151	Wall	Boundary	L	L	L	-	-	-
3152	Wall	Boundary	L	L	L	-	-	-
3153	Complex (2)	Multiple	L	L	L	-	-	-
A	Wall	Boundary						
B	Terrace	Agriculture						

SIHP Number = State Inventory of Historic Places numbers. SIHP numbers are five-digit numbers prefixed by 50-50-13 (50=State of Hawaii; 50=Island of Maui; 13=USGS 7.5' series quad map ["Hana, Maui"]).

Cultural Resource Management
Value Mode Assessment —Nature: R = scientific research
I = interpretive
C = cultural
—Degree: H = high
M = moderate
L = low

Field Work Tasks Recommended:
DR = detailed recording (scaled drawings, photographs, and written descriptions)
SC = surface collections
EX = test excavations

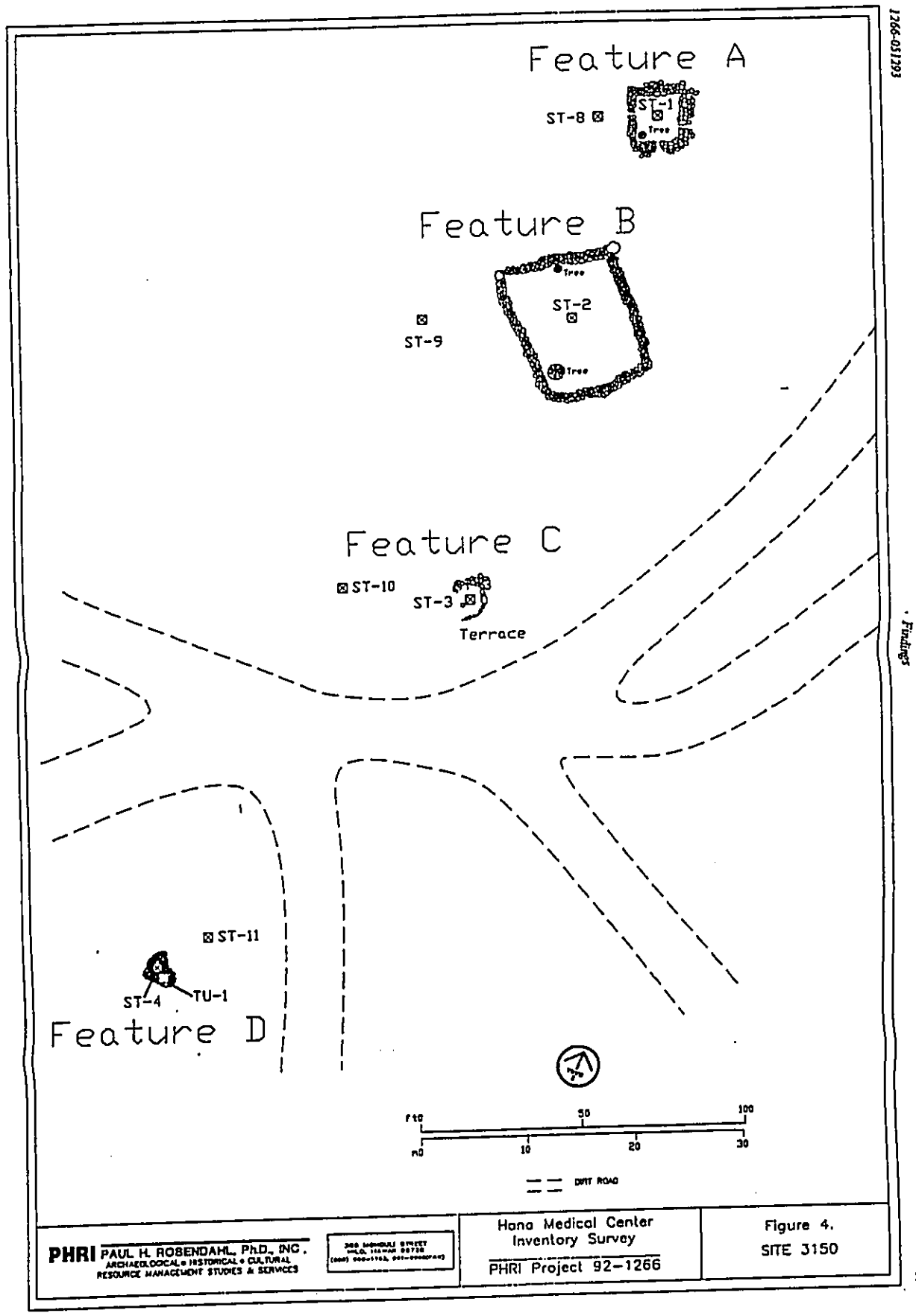

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Figure 4.
SITE 3150

was assigned an indeterminate function due to its poor condition and lack of cultural material.

Feature D

Feature D is an amorphous platform 2.5 by 2.0 m in plan. The platform is constructed of aa cobbles and small boulders (two to five courses high) and incorporates aa bedrock along its western wall. The exterior walls, except for the eastern wall, are one to three courses high. The walls are 0.36-0.78 m high. The platform is paved with large pebbles to medium cobbles and the surface is flat. A small terrace paved with small to large cobbles abuts the east wall of the platform.

Two STs were excavated at Feature D. ST-11, placed adjacent to the platform to the northeast, was culturally sterile. ST-4 was placed in the center of the platform and yielded marine shell, a waterworn stone, and historic glass and ceramic fragments. Due to sidewall collapse, ST-4 was terminated 0.39 m below the surface of the platform. It was determined that a more formal excavation unit could more comprehensively test the platform; therefore, Test Unit 1 (TU-1) (1.0 by 1.0 m) was placed in Feature0 D. The unit was placed near ST-4 to test the area for human remains *(Figure 4)*. The unit comprised two layers, which both contained cultural materials (ceramics, faunal bone, shell, and a glass button [in Layer II]). The historic artifacts noted in Layer II may have migrated downward into the layer. No human remains were located in TU-1, and the unit did not yield radiocarbon samples. TU-1 was terminated on bedrock The unit displayed the following stratigraphy:

TU-1, North Face

Layer	*Description*
I	(0.00-0.24 m BD) - Layer consisting of aa cobbles and small boulders. The layer contained historic ceramics (crockery and porcelain), possible pig bone, and *opihi* shell.
II	(0.18-0.54 m BD) - Black (10YR 2/1 moist); moderate, very fine crumb structure; soft, slightly sticky, plastic consistence. Historic items were noted; these may have migrated in from above.

Based on the results of the test unit, Feature D was assigned an indeterminate function.

SITE 3151

Site 3151 is a rock wall bordering the northeast portion of the project area *(Figure 3)*. No subsurface testing was undertaken at the site. Two segments of the wall were noted. One is near the medical center along the central NE portion of the project area. It is about 150 m long. A second section is along the NE boundary of the project area; this section is about 70 m long. The walls are constructed of stacked cobbles (about 0.2 m in diameter) and boulders (about 0.35 m in diameter). The walls are three to eight courses high. Remains of a fence were found at the wall—milled, wooden fence posts, barbed wire, and fence wire (6" by 4" pattern). It is clear that Site 3151 is a boundary wall. The wall segments correspond to a 1906 land grant awarded to Kohoolilimoku. It is not known, however, whether the wall segments date to this period.

SITE 3152

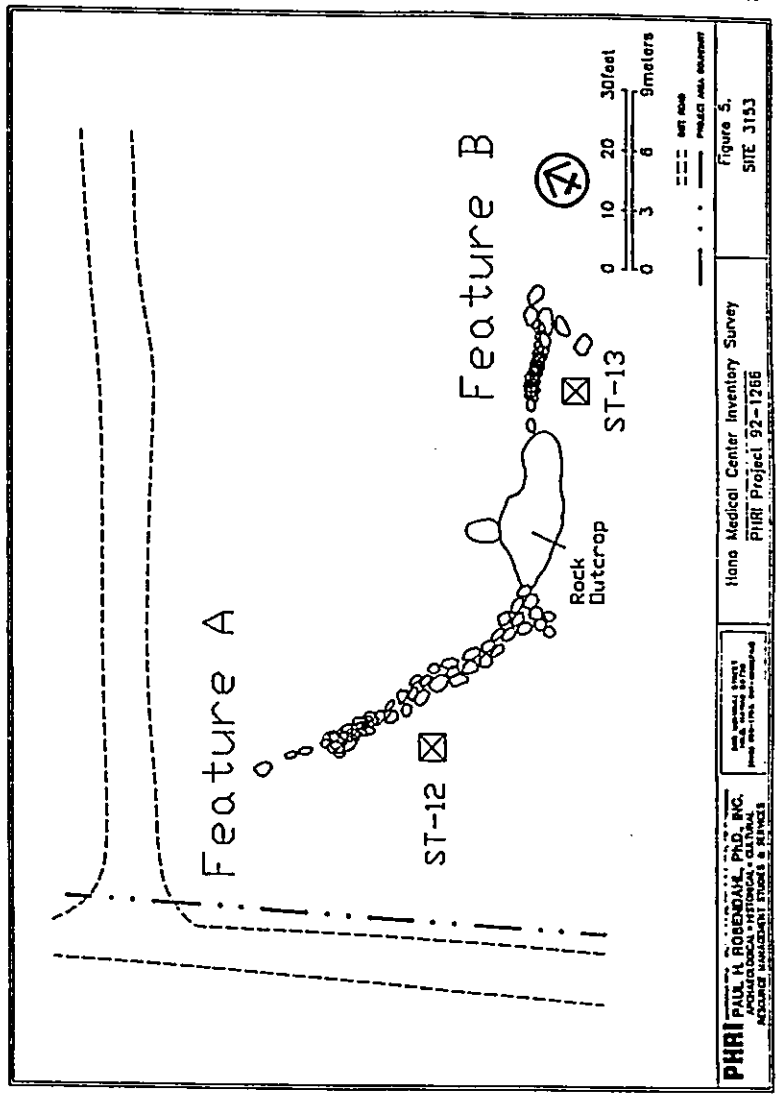
Site 3152 is a rock boundary wall bordering the northern edge of the project area *(Figure 3)*. The wall is core-filled with large pebbles to large cobbles. The exterior of the wall is constructed of cobbles (about 0.20 m in diameter) stacked four to eight course high and boulders (about 0.60 m in diameter). Overall, the wall is about 0.85 m wide, 0.90 m high, and 60.0 m long. No portable remains were noted at the site. This wall corresponds with a boundary for Land Claim Award 4566 to Wahinaea, though whether it dates to this period is unknown. No subsurface testing was undertaken at the wall.

SITE 3153

Site 3153, a complex near the western boundary of the project area, consists of two component features *(Figure 5)*. The overall dimensions of the site are approximately 25 E-W by 6 m N-S. Local informant Patrick Cosma, who worked on the property for the previous land owner (Howard Cooper), suggests that the complex may have been created within the last 20 years to accommodate the growing of anthuriums.

Feature A

Feature A is a winding rock wall in the western portion of the site. The wall is about 15 m long and is constructed of stacked aa and pahoehoe boulders and cobbles (boulders are up to 0.70 long). The wall abuts an exposed aa outcrop at the eastern end and turns southward for approximately four



meters. This four-meter section is largely collapsed and consists of cobbles and boulders up to 0.4 m in diameter. The western end of the wall is very collapsed. Sections of the middle portion of the wall are intact. Intact portions are about 0.90 m high and 0.80 m wide. The base of the wall consists of upright boulders (largest measuring 70 by 35 by 35 cm). The top of the wall is flat and is composed of medium-sized cobbles. There was no evidence that the wall functioned as a land grant boundary.

One shovel test, ST-12, was excavated west of and adjacent to Feature A. No cultural materials were noted in the unit.

Feature B

Feature B is a small terrace (6.0 by 6.0 m) on an E-W ridge approximately 8.0 m east of Feature B. The terrace was created by modifying the natural outcrop along the northern ridge edge, creating a level area to the south. The terrace wall is constructed of aa cobbles and boulders (c. 0.65 m diameter) stacked two to five courses high and one to three courses wide. The wall is 0.70-1.35 m high. The area behind the terrace is level and extends southward about 6.0 m. The ridge top westward to and past the wall is also level.

One shovel test, ST-13, was excavated on the level area at Feature B. A few charcoal flecks were recovered.

SHOVEL TESTING IN NON-SITE AREAS

A cultivated area of ti plants is in the western portion of the project area. To the north is a large "misting area," created by former land owner Howard Cooper for the fostering of young plants (pers. comm., P. Cosma). The tall, vertical plastic irrigation pipes used to create the mist are still present. To determine if subsurface cultural materials were present within the misting area, three STs were excavated (STs 14-16). No cultural material was found in the STs.

According to Mr. Cosma, former employee of Mr. Cooper, the large area immediately west of the existing medical center was cleared to cultivate pink ginger, a species introduced to Hawaii by Mr. Cooper (pers. comm.). To test for subsurface deposits in the area, three STs were excavated (STs 5-7). No cultural materials were found in any of the units. The parcel of land adjacent to the medical center, to the north, also appears to have been recently cleared and leveled.

DATA ANALYSES

PORTABLE ARTIFACTS

Fifty-five artifacts, all recent historic, were identified in the deposits associated with Features A and D of Site 3150. A detailed tabulation of the artifacts by provenience is presented in Table 3. The artifacts are described by type below.

Domestic Items

Ceramics - Most of the artifacts identified in the project area are ceramics. Of the 42 ceramic specimens, one is of low grade porcelain, five are stoneware, and 36 are earthenware. The porcelain fragment is a rim from a small bowl (diameter = 15 cm). It is finished with a thick, glossy, grayish-green glaze on the interior and exterior surfaces and is undecorated.

The stoneware fragments are all finished with a glossy white glaze on the interior and exterior. Specimen #4 is a body fragment from an unidentified vessel and, except for some crazing of the glaze, is undecorated. Specimens #12 and 13 comprise four fragments which cross-mended to form approximately 30% of a small plate *(Figure 6)*. The plate has a partial maker's mark on the base; the mark consists of a crest, "& Sons" and "...nd" (probably England). Based on the absence of the main portion of the mark, however, no definitive date or place of manufacture can be assigned to the plate.

The earthenware fragments are from at least three vessels: (a) a small vase with an unglazed base and a medium brown matte glaze on the interior and exterior surfaces, (b) a vessel of unknown shape finished with an orange-brown glaze on the interior and a speckled brown matte glaze on the exterior, and (c) a vessel of unknown shape finished with a clear glaze over orange clay on the interior and a very dark brown glossy glaze on the exterior. Twenty-six fragments of Type (a) were collected from the deposits of Feature D—ten from Layer I of TU-1, 15 from Layer II of TU-1 and one from Layer I of ST-1 *(Figure 7)*. Although it is possible that all 24 fragments belong to the same vessel, only a small number of the fragments could be cross-mended. Four fragments of vessel Type (b) were encountered in Layer I of TU-1, all of which cross-mended to form a large curved body fragment, while a fifth fragment was encountered in Layer II of ST-1. Finally, nine fragments of Type (c) were collected from Layer I of TU-1 (of which only four could be cross-mended), and one fragment was collected from Layer II of ST-1.

Glassware - The glassware consists of one bottle fragment and seven non-diagnostic glass fragments. The bottle fragment is a neck/mouth fragment from a medicine bottle. It is manufactured of clear glass (post 1880) using a semi-automatic bottling machine and has a patent neck finish. The glass fragments include four manufactured of clear glass and one manufactured of pale green glass. One of the fragments is from a window pane, while the others are vessel fragments. Although a maximum age of 1880 AD can be provided by glass color, little definitive information concerning date or place of manufacture can be derived from this assemblage.

Miscellaneous

Four fragments of an unidentified metal object were collected from Layer I of TU-1, Feature D. The fragments are manufactured from sheet metal, possibly iron, but are extremely corroded *(Figure 8)*. Place and date of manufacture, and function, could not be determined for these items.

Personal Adornment

One item of personal adornment was collected from Layer II of TU-1, Feature D. The item is a button manufactured of milk glass. It is a sew-through button with four holes and a concave center. The button measures 1.5 cm in diameter and is 4 cm thick. Mold lines are visible along the button edge, indicating fairly recent manufacture.

ECOFACTUAL REMAINS

Objectives and Methods

Ecofactual remains are archaeologically significant on a number of levels, as the variety and content of food remains contained within a given deposit provide useful information concerning prehistoric diet and resource utilization. The analysis of ecofactual remains for inventory survey projects has two primary objectives:

1. To determine the variety and distribution of the remains for each cultural deposit encountered within the project area; and

2. To provide an indication of dietary and resource exploitation patterns for each site, and for the project area as a whole.

Table 3.

DISTRIBUTION OF PORTABLE ARTIFACTS

Category	Site 3150 Fea.A ST-1 I	Fea.D ST-4 I	II	(ST-4) Total	TU-1 Sub I	II	(TU-1) Sub Total	(Fea.D) Total	Grand Total
Non-Indigenous									
Domestic Items									
Ceramic									
Fragments	-	1	3	4	23	15	38	42	42
Glass									
Bottle	-	-	-	0	1	-	1	1	1
Fragments	1	2	-	2	3	1	4	6	7
Subtotal Domestic Items	1	3	3	6	27	16	43	49	50
Miscellaneous									
Metal									
Unidentified	-	-	-	0	4	-	4	4	4
Subtotal Miscellaneous	0	0	0	0	4	0	4	4	4
Personal Adornment									
Glass									
Button	-	-	-	0	-	1	1	1	1
Subtotal Personal Adornment	0	0	0	0	0	1	1	1	1
Total	1	3	3	6	31	17	48	54	55

ST=Shovel Test; TU=Test Unit

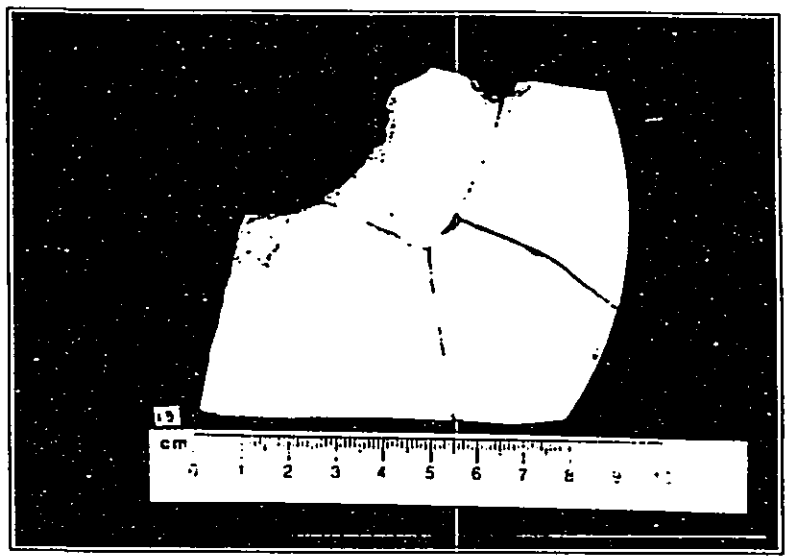


Figure 6. Cross-mended Earthenware Fragments (Neg.4433-11)

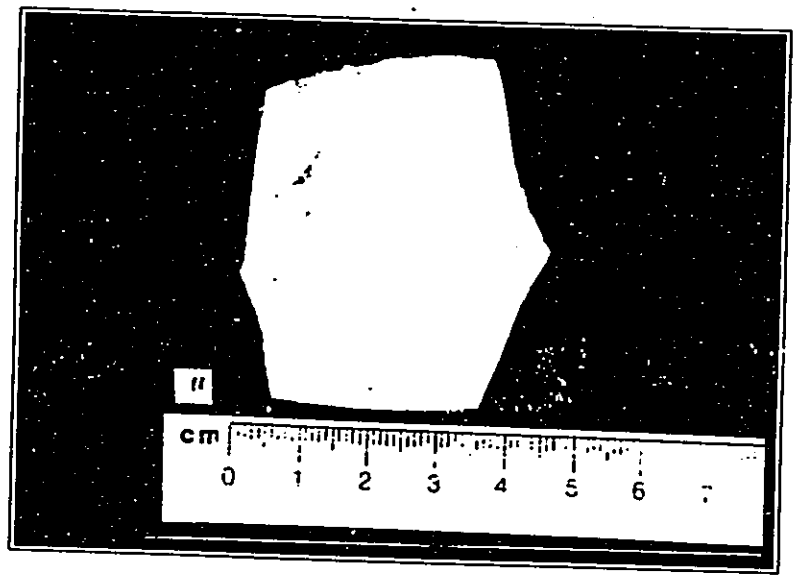


Figure 7. Ceramic Fragment (Neg.4433-8)

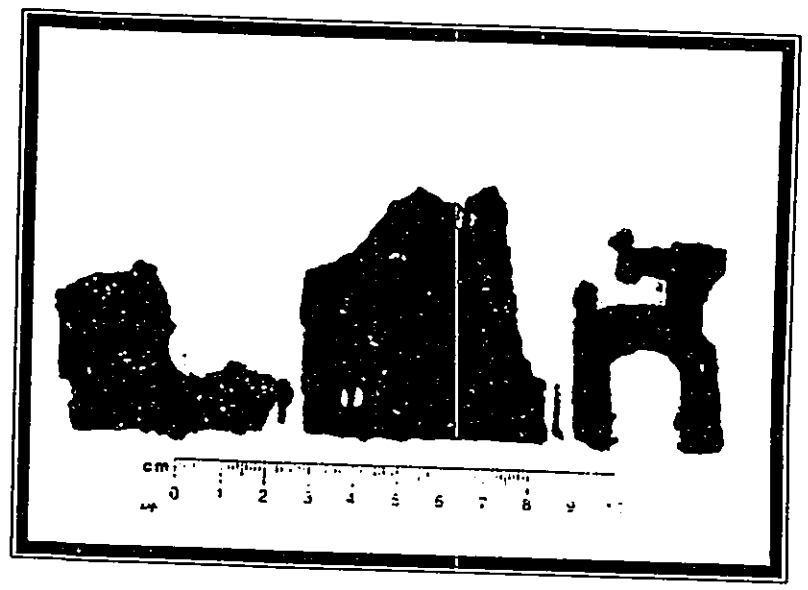


Figure 8. Unidentified Metal Fragments (Neg.4433-13)

All ecofactual remains recovered underwent detailed analysis in the laboratory. Detailed analysis involved splitting the sample into two size classes by passing each sample through 1/4-in and 1/8-in screens. One hundred percent of the material retained in the 1/4-in screen was completely sorted to the lowest taxonomic level possible, while the material retained in the 1/8-in screen was inspected both for artifacts and for taxa not encountered in the larger portion of the sample. Marine shell identifications were verified and augmented using Kay (1979). The vertebrate faunal remains derived from PHRI's investigations were submitted to Dr. Alan Ziegler for identification.

The sampling design outlined above is adapted from Kirch (1979) and is based on a series of experiments measuring the relative distribution of molluscan and bone material retained on each screen. Kirch concluded that use of the screening process increased the speed of the sorting process without decreasing either the accuracy or statistical validity of the overall analysis. The taxonomic distribution and weight of material retained on the 1/4-in screen should thus be considered as representative of the variety and relative percentages of each taxon present in the entire sample.

Results

Ecofactual remains were encountered in Layers I and II of TU-1 at Site 1266-1 (Table 4). The remains in both layers consisted of small quantities of *Cellana sp.* and large mammal bone. Layer I contained 82% of the remains while Layer II contained 18%. No other ecofactual remains were noted in the project area. Given the small size of the sample, few definitive conclusions can be drawn concerning subsistence practices in the project area. The results of the ecofactual analysis indicate that subsistence included the collection and consumption of Patellidae. Members of the family Patellidae (limpets, or *'opihi*) were extremely well-liked as a food. The favorite method of preparation was raw and salted, either with or without seaweed. They were sometimes washed clean and were then cooked in the shell; hot stones were placed in a calabash of water and the limpets were cooked in the heated water. The shells were picked out later. Using this method, broth *(kai)* was produced, and the broth was used, especially by the sick and young. The meat was pulled from the shells or sometimes was scooped out with a smaller, empty *'opihi* shell. *'Opihi*, especially *'opihi'awa*, was used extensively as medicine, and was also associated with sorcery. The empty *'opihi* shells were often used for scooping, peeling and scraping because of their sharp edges. *'Opihi* shells found in the current project area did not evidence use.

Within the Hawaiian chain, *Cellana spp.* are generally found on basalt shorelines from the spray zone seaward to the calcareous algal zone, except for *C. talcosa* which occurs at depth of 1 to 10 cm along abrupt coastlines. Taxa recognized by the Hawaiians included *C. talcosa ('opihi ko'ele)*, *C. sandwichensis ('opihi 'alinalina)* and *C. exarata ('opihi makiauli)* (taken from Titcomb *et al.* (1978: 337-353).

The large mammal remains in the assemblage indicates that terrestrial resources were utilized by local populations. The vertebrate assemblage could not be identified to family or species, but given the association of the vertebrate remains with historic artifacts, they probably represent historically utilized or introduced taxa.

Table 4.

DISTRIBUTION OF ECOFACTUAL REMAINS

Material	Site 3150 TU-1		
	Layer I	Layer II	Grand Total
Invertebrates			
Mollusca			
Gastropoda			
Patellidae			
Cellana sp.	18.88	4.25	23.13
Vertebrates			
Mammalia			
Order and Family Indeterminate			
Large mammal	48.52	11.37	59.89
Total	67.40	15.62	83.02

CONCLUSION

SUMMARY AND DISCUSSION

The findings during the current project generally concur with the expectations derived from the background research for the project. The background research indicated that the project area had been historically disturbed. The area, however, was still expected to contain archaeological sites. Evidence of prehistoric occupation was expected. It was thought that habitations associated with Kawaipapa Heiau, which once existed north of the project area, might be identified. Also expected were features associated with agriculture (mounds and terraces perhaps for the cultivation of dryland taro) and features associated with historic occupation (boundary walls, animal enclosures, or remnant structures associated with either sugar cane cultivation or cattle ranching).

During the current work it was confirmed the project area had been modified extensively. *Figure 3* shows the extent of the alterations. In the project area are numerous dirt roads, and bulldozer push piles, and areas cleared for cultivation. Also present is a modern stacked stone terrace supporting a portion of a dirt road *(Figure 9)*. Subsurface testing in the cleared areas evidenced no buried cultural deposits.

Four sites were identified in the project area—two complexes (Sites 3150 and 3153), and two boundary walls (Sites 3151 and 3152). The sites comprised the following feature types: enclosure, L-shape enclosure, platform, wall, and terrace; and the following functional types: habitation, animal pen, boundary, agriculture, and indeterminate.

Sites 3151 and 3152 are boundary walls, and Site 3153 consists of a wall and a terrace. No datable samples were obtained from any of these sites. Although the boundary walls correspond to the boundaries for historic land grants, no evidence was found suggesting that they date to this period; the walls might, in fact, be modern property walls. Site 3153, based on the lack of cultural indicators and informant testimony, is probably recent.

Site 3150 consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped enclosure; and Feature D, a rectangular platform. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. No datable samples were recovered, but the presence of the glass and ceramics suggests the features are historic. Because it was thought Feature D might contain a burial, it was subsequently determined to require further testing (memo dated 25 March 1993, from D. Hibbard, DLNR-SHPD, to G. Matsuoka, Dept. of Accounting and General Services). On April 20, 1993 PHRI archaeologists placed a formal test excavation unit in the center of Feature G, near the shovel test placed earlier. The unit yielded ceramics, faunal bone, shell, and a glass button. The findings suggest the feature is historic. No human remains were found in the unit.

During the current field work, a local informant indicated the project area might contain a *pu'ukonua*, and later, in a memo from the DLNR-SHPD (dated 25 March 93, from D. Hibbard, DLNR-SHPD to G. Matsuoka, Dept. of Accounting and General Services) it was recommended that further historical research be conducted to determine if there indeed was a *pu'ukonua* in the project area. PHRI Cultural Resources Specialist, Kepa Maly, subsequently conducted the further research and concluded there were no *pu'ukonua* in the project area, but that there once was a *pu'ukonua* in a parcel adjacent to the project area (see Appendix A).

GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

To facilitate outside review, general significance assessments and recommended general treatments for all identified sites are summarized in Table 5. 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 uses these criteria for evaluating cultural resources. Sites determined to be potentially significant for information content (Category A, Table 5) 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 (Category B) are evaluated under Criterion C, which defines significant resources as those which "...embody the distinctive 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 (Category C) are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled

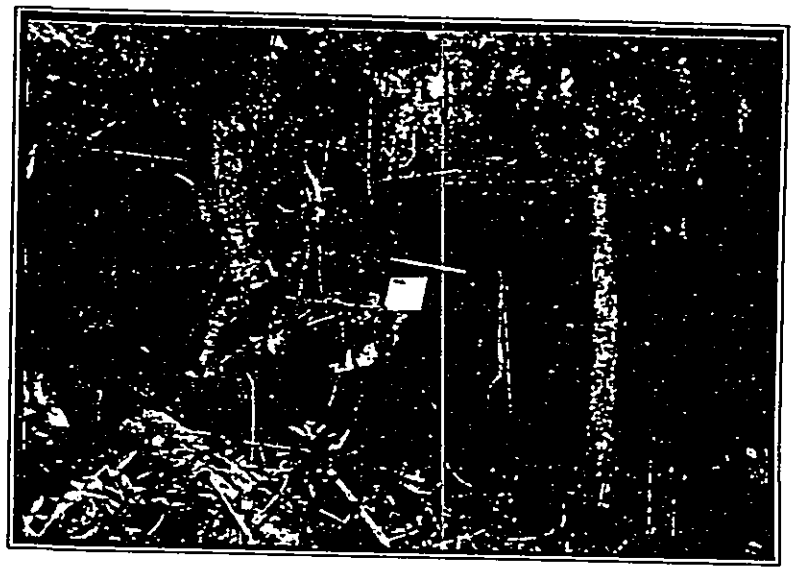


Figure 9. Modern Terrace (Neg.1266:1:21)

Table 5.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

Site Number	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
3151	-	+	-	-	-	+	-	-
3152	-	+	-	-	-	+	-	-
3153	-	+	-	-	-	+	-	-
Subtotal	0	3	0	0	0	3	0	0
3150	+	-	-	-	+	-	-	-
Subtotal	1	0	0	0	1	0	0	0
Total	1	3	0	0	1	3	0	0

General Significance Categories:

- *A = Important for information content, further data collection necessary (PHRI=research value);*
- *X = Important for information content, no further data collection necessary (PHRI=research value, SHPD=not significant)*
- *B = Excellent example of site type at local, regional, island, state, or national level (PHRI=interpretive value); and*
- *C = Culturally significant (PHRI=cultural value).*

Recommended General Treatments:

- *FDC = Further data collection necessary (further survey and testing, and possibly subsequent data recovery/mitigation excavations);*
- *NFW = No further work necessary, sufficient data collected, no preservation potential (possible inclusion into landscaping suggested for consideration);*
- *PID = Preservation with some level of interpretive development recommended (including appropriate related data recovery work); and*
- *PAI = Preservation "as is", with no further work (and possible inclusion into landscaping, or minimal further data collection necessary*

"Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (Draft Report, August 1985). The guidelines define cultural value 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."

Based on the above federal criteria, three sites (3151, 3152 and 3153) identified during the present survey are assessed as important solely for information content. These three sites have been documented to the extent that no further archaeological work is recommended. Site 3150 is also assessed as important for information content, but further data collection is recommended at this site. The further work should include appropriate excavations and should be aimed at more precisely determining the age and function of Site 3150.

It should be noted that the above evaluations and recommendations have been based on the findings of an inventory-level surface survey and limited subsurface testing. There is always the possibility, however remote, that potentially significant unidentified cultural remains might be encountered in the course of future development involving the modification of the ground surface. In such a situation, archaeological consultation should be sought immediately.

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Soil Survey Staff

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APPENDIX A

HISTORICAL DOCUMENTARY RESEARCH AND INFORMANT INTERVIEWS

by Lehua Kalima, B.A., and Kepa Maly

The project area is in the Hana District, in the *ahupua'a* of Kawaipapa. "Hana" refers not only to the district, but to the general area surrounding Hana Bay. The Hana area has a rich cultural history, as it was the site of important battles which led to the unity of the Hawaiian Islands. Hana was also the home of chiefs and chiefesses.

There are several references to Hana in Mary Kawena Pukui's *'Olelo No'eau* (1983):

Hana i ka i'a iki.
Hana of the little fish.

Hana was known in ancient times as the land where fish were scarce. Believing slanderous tales about Ku'ula and his wife, Hinahele, the ruling chief of Hana ordered them destroyed. Having *mana* over the fish of the sea, the two caused a scarcity until their son 'Ai'ai brought them back to life. Ku'ula and Hinahele were worshipped as deities by fishermen (451).

Hana, mai Ko'olau a Kaupo.
Hana, from Ko'olau to Kaupo.

The extent of the district of Hana, Maui (460).

I 'auhe'e o Ka'uiki i ka wai'ole.
Ka'uiki was defeated for the lack of water.

When 'Umi, ruler of Hawai'i, went to Hana to battle against Lono-a-Pi'ilani of Ka'uiki, thirst weakened the Maui warriors. Often used later to mean "without water or the needed supplies we cannot win" (1151).

Ka haka o ka moa kane, ua kau 'ia e ka moa wahine.
The perch of the cock is now occupied by a hen.

Said by Puna, whom Kalaniopu'u places as governor in Hana, Maui. Mahihelelima wanted Puna out of the way and lied that Kalaniopu'u had sent word for Puna to meet him in Hawai'i at once. When Puna arrived in Hawai'i, he discovered that he had been duped and the Ka'uiki hill in Hana had been taken by the Maui chiefs in the meantime. The saying was later used to mean that a superior worker had been replaced by another who was not as good (1289).

Ka ua kea o Hana.
The white rain of Hana.

Refers to the misty rain of Hana, Maui, that comes in from the sea (1566).

Ka ua Lanilia'aha'a o Hana.
The rain-of-the-low-sky of Hana.

Refers to Hana, Maui. Once the young warrior chief Ka'eokulani ran to a banana grove to escape a sudden squall. As he stood safe and dry in the shelter of the banana leaves he lifted his spear. It accidentally pierced through the leaves and a trickle of water came through. He remarked that the sky where he stood was so low he had pierced it (1578).

I ewa ka waha o ka puhi o Laumeki.
The mouth of the eel of Laumeki gapes.

Said of one who talks so much that his mouth is hardly ever closed. Laumeki was an eel-man who lived at Wailau, Moloka'i. When he saw that Ka'ula's fishpond at Hana, Maui, was always full of fish, he decided to assume his eel form and go there to steal some. On one of his thieving expeditions, he was caught by a magic hook and drawn ashore, where his jaw was smashed and left gaping (1990).

Malia Hana ke ahowale nei Kaihuokala.
Hana is calm, for Kaihuokala is clearly seen.

Kaihuokala is a hill on the Hana side of Haleakala. When no cloud rests upon it, it is a sign of clear weather. Also expressed *Malie Maui, ke waiho mai la Kaihuokala* (2124).

O Hana ia, he 'aina au peku.
That is Hana, land where lack was known. (2359).

O Wanaralua la 'aina; o Punahoa ka wai; o Ka'uiki ka pu'u.

Wanaralua is the land; Punahoa is the pool; Ka'uiki is the hill.

Noted places in Hana (2548).

The present Hana Beach Park is located on the shoreline of Hana Bay, or Kapueokahi as it was formerly known. Kapueokahi, "the single owl," is said in one legend to have been a *kupua*, a supernatural being who could take the form of an animal or a human. Kapueokahi wanted to marry a woman named Kapoulakinau, so he changed himself from an owl to a man. This incident took place in Kawaipapa, which has its seaward edge on the bay. From that time on, the bay as well as its lone sand beach were called Kapueokahi (Clark 1980:24).

Hana Bay and a small hillock in Hana, Ka'uiki, figure in the history of the *ali'i* of Maui and Hawaii, partly because they are where Maui comes closest to Hawaii Island. Alenuihaha Channel, between the islands, could easily be crossed in a couple of hours when the winds were ideal. Because of its location Hana was a sanctuary, both in wartime and peacetime, for the *ali'i* of both islands (Beckwith 1940:319).

The bay below Ka'uiki is known in legends as the home of the gods Kane and Kanaloa. The bay evidences subsidence, most likely associated with volcanic action. It is said that Kane and Kanaloa once had a garden in the area now below water; they point out two rocks, "the coconuts of Kane and Kanaloa" (Beckwith 1940:320).

From the time of La'a-mai-kahiki to the time of Umi, East Maui, comprising Ko'olau, Hana, Kipahulu, and Kaupo districts, was governed separately from the rest of the island. East Maui chiefs were often grouped about the fortified hill of Ka'uiki. There are many stories about Ka'uiki's origin. Some say that it sprang from the navel of Hanoa; others say it was born to the parents of Pele, or to the hill Kaihuakala, by his wife Kahaule. Others stories tell how Kalalawalu brought the hill from Kahiki as an adopted child, but grew tired of its nibbling at her breasts; Kalalawalu tried to leave it along the way, first at Kaloa, then at Kaena, then at Kawaipapa stream (Beckwith 1940:379).

Hana was called "a land beloved of chiefs because of the fortress of Kauiki (sic) and the ease of living in that place" (Beckwith 1940:380). On the summit was spread a springy plant which could serve as beds. Fishponds below furnished unlimited fish. Large quantities of awa root in the area "delighted the nostrils of the dear firstborn chiefs" (ibid.). The area was also loved for its fine surfing. Two other reasons why Hana was favored were (a) the best wood for making scaffolds and ladders (to scale fortresses) was in Hana, and (b) Hana had the best round smooth stones for use in slingshots (Handy and Handy 1972:504).

Pi'ilani, the older brother of Kihapi'ilani, who built the great road around Maui, was said to have dwelt at Ka'uiki (Fornander IN Handy and Handy 1972). Kaleikini was another chief who dwelt at Ka'uiki. He was much loved by the farmers. His concern for the farmers is apparent in this anecdote:

> The waves driven by tradewinds swept into underground caverns and sent up geysers through blowholes on the Hana coast. The wind would carry the spray inland and the salt in the spray would harm the plants. Kaleikini sent canoes to Lanai to retrieve the hard, durable *kauila* tree, which grew there in abundance. With logs of *kauila* he sealed the holes so that no more salt spray blew over the land. Hawaiians say that the logs can still be seen in some places, such as Honokalani. (Adapted from Handy and Handy 1972:504)

Ka'uiki's elevation is barely 400 feet, yet it stood much taller in the mythology of the early Hawaiians. One chant describes it thus:

> Engulfed is lofty Kauiki,
> Where Hanaiakamalama dwelt.
> Shooting up to heaven is Kauiki,
> Below is the cluster of islands,
> In the sea they are gathered up, O Kauiki!
> O Kauiki, mountain bending over (Thrum 1919:67).

One legend says that Hanaiakamalama leapt to the moon from Ka'uiki's summit. She is said to have been provoked by her children, Puna and Hema, and to have gone up to the moon to live. While ascending, her husband caught her by the leg and tore it off; she was thus called "Locomuku" (maimed or crippled Lono) (Thrum 1919:67-8).

Until only a few years ago the ruins of one of Maui's famous *heiau*, Honuaula, graced the base of Ka'uiki. This *heiau* was erected by King Hua-a, who, stopping enroute to a raid upon Hilo, sought to obtain the aid of the gods. The expedition proved successful and when he returned to Hana he built another smaller *heiau*, known as Kuawalu, in the same area (Thrum 1919:67).

In the story of Laieikawai, it is said that Aiwohikupua, on his way from Kauai to Hawaii, arrived in Hana during a surfing contest in which the chiefess of the district was the

center of attraction. Alwohilaupua was attracted to the chiefess and his involvement with her later caused him a great deal of distress (Thrum 1919:68).

Kiha-a-Piilani, visiting Hana from Waikiki incognito, was another who lost his heart to a charming surfrider. The contest took place off Pueokahi. Koleamoku, the daughter of the high chief Hoolae, at the close of the surfing contest betrothed herself to Kiha-a-Piilani, and in taking him "for better or worse", without seeking paternal consent, she was disowned and disinherited. Kiha-a-Piilani's later revealed who he really was. Koleamoku and her parents learned that, unsuspectingly, Keoleamoku had chosen the very one she had been pledged to. Her father then forgave her (Thrum 1919:68).

Kiha-a-Piilani is said to have been the builder of a roadway which circled the western part of the island. Remains of the roadway are still found in some places, but most of it is beneath the modern Pi'ilani Highway. Piilani is also the name of a *heiau* at Hana—Hale-o-Pi'ilani (House of Pi'ilani) (Speakman 1978:10).

One legend refers to a fishpond at Hana. The pond was called "Keko'ona" and it was associated with Ku'ula, the god of fishermen. Ku'ula and his wife Hina, and their son 'Ai'ai are said to have lived near the pond, which Ku'ula is believed to have built during a famine in Hana. With his magic hook he lured fish into the pond for the people. The pond was always full of fish until a giant eel broke the wall enclosing it and ate the fish. The eel was caught by Ku'ula and his men and was killed. The pond was then restored (Cornell In Handy and Handy 1972:504).

In the 1750s, during the early, peaceful years of Kahekili's reign, his sister, the High Chiefess Kalola, became the principal wife of Kalani'opu'u, who later launched a long war between himself and his brother-in-law by "mercilessly beating the people of Kaupo with clubs" and mistreating them. Kahekili retaliated by taking the fortress of Ka'uiki, killing its defenders, and driving out the Hawaiian chiefs who had long controlled the districts of Hana, Kipahulu, and Kaupo. About 1775, Kalani'opu'u returned with his war canoes and raided the Hana district but was defeated at Kaupo. The following year he mounted a full-scale attack, took Hana, and proceeded with his fleet of war canoes to Makena and then to Ma'alaea (Speakman 1978:16).

Ka'uiki was the birthplace of Kaahumanu, the favorite wife of Kamehameha I. An earlier queen, Piikea, also was born in Hana (Thrum 1919:67).

HEIAU

The following is a list of *heiau* in the Kawaipapa and Hana regions. These *heiau* were documented by Andrew Walker in his 1931 survey of Maui. The locations of the *heiau* are shown on *Figure A-1*.

Kawaipapa Region - Heiau Site 105, 106

Names: Kaniomoku, Kawaipapa
Location: The cane lands above the road.

Description: Kaniomoku is mentioned by Thrum as the place where Kaahumanu spent her childhood. Her birthplace was in a large cave on the side of Kauiki Hill on the bay. The heiau has been totally destroyed.

Kawaipapa was a heiau located near the point where the road crosses the gulch of the same name. It was destroyed by building the road, also a freshet washed out the remainder (Walker 1931:181).

Heiau Site 107

Name: Heiau at Waikaloa
Location: In the rough lava flow beyond the Mormon cemetery.

Description: A simple platform of rock 5 feet high, 75 feet long, 15 feet wide. There is no evidence of its being a heiau except that it looks too large for a burial platform. No coral, pebbles or beach stones are used in its construction (ibid:182).

Heiau Site 108

Name: Unknown
Location: On Keanini Point beyond the factory, 100 feet from the shore.

Description: A small heiau probably of the Kuula class. It is little more than a level spot in the lava, 30 x 35 feet. The front is toward the bay, and a line of stones marks the edge of a step terrace. On the east a natural rock ledge forms a wall, and there are indications of a small terrace below it. The back is formed by a platform 3 feet high, 10 feet wide, and 35 feet long. A large part of the interior of the heiau is occupied by a double platform whose edges do

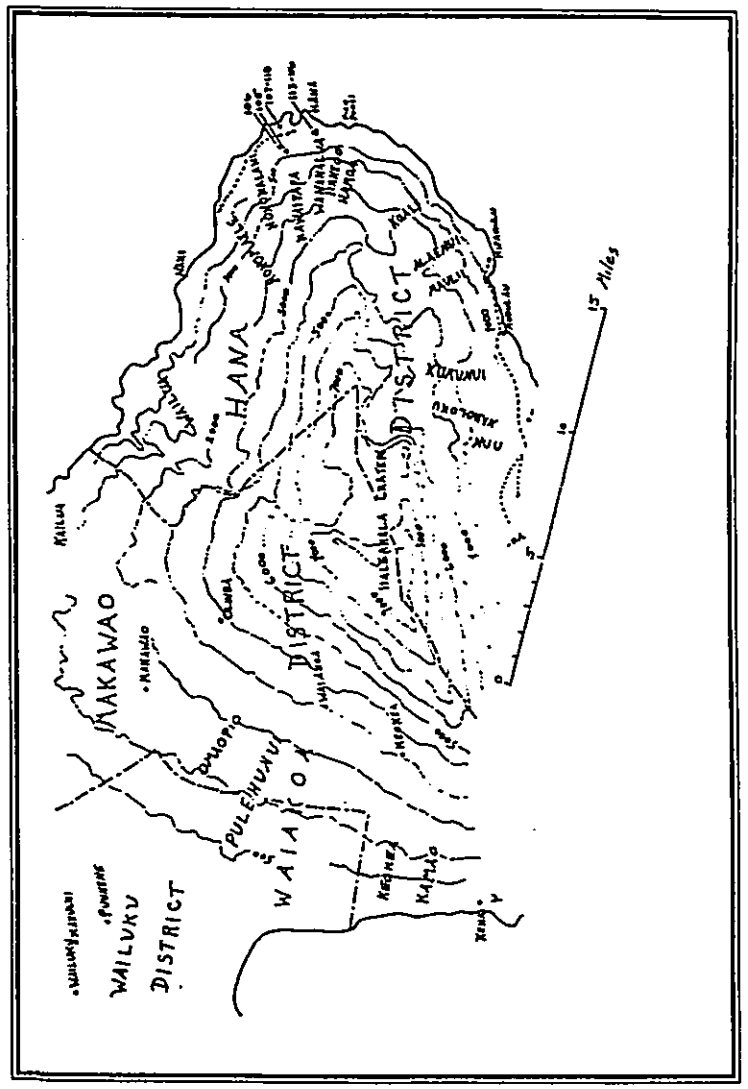

Figure A-1. Locations of Heiau in Hana (Taken from Walker 1931)

not coincide with the edge of the terrace. It is likely a burial platform. Large pieces of Aa make up the terrace with beach stones used for the divisions. Few pieces of coral seen. Drums heard near here (ibid:183).

Heiau Site 109

Name: Kauleiula?
Location: About 50 yards east of Site on the point of Nanualele.

Description: A stone platform on a rise of ground 6 to 8 feet high. It measures 60 x 95 feet and there is an additional 30 feet of level hill-top which may have been included in the heiau. On the side below the hill is a large natural pond, one of several in that vicinity. A path of stepping-stones leads across this pond and up onto the hill, crossing one corner of the heiau. The heiau is built of chunks of lava and water-worn boulders. There is a low wall on one end and several terraced platforms. Two of these at least, are graves. A house enclosure 12 x 25 feet is set [at] an angle with the heiau platforms and does not seem to conform to the general plan of the heiau. The interior of the heiau is lower than the sides, but many of the terrace edges have been broken and the stones removed for other purposes (ibid:184).

Heiau Site 110

Name: Kauleilepo-Kauleiula

Location: At Kainalimu on the point of rocks just north of Hana Bay.

Description: A twin or double heiau consisting of two elevated open platforms connected by a causeway. The larger is toward the sea and measures 42 x 54 feet. The causeway is 25 feet long, 8 feet high and 4 feet wide. On the other end is the smaller platform 22 x 26 feet and slightly lower than the front one. The south side of the larger has been terraced to a height of 15 feet. Construction is of water-worn boulders with pieces of Aa lava and coral sprinkled over the top. Modern houses and sheds have been built on the front of the heiau thus destroying much of the surface of the platform...Thrum gives the double name to this heiau but my informant, N. Silva, said the Kauleiula heiau was the nearby one site 109 which we at first thought was only a graveyard (ibid:185).

Hana Region - Heiau Sites 113-116

Names: Kaikalea (113), Kilinui (114), Lanakila (115), Puuheewale (116)
Location: The cane lands in the vicinity of Hana.

Description: All have been destroyed. Thrum's list for 1917 says they were medium-sized heiaus. Kilinui was said to be sacrificial and Lanakila a Place of Refuge (ibid:126).

Use of the Hana area during times of war is reflected in the number of important *heiau* in the area, not only in Hana, but also in the neighboring districts of Kipahulu and Kaupo. Kamehameha I alone is said to have repaired and dedicated four *heiau* in the area. The *heiau* were dedicated to the war god, Kuka'ilimoku. Kamehameha I was the last chief to use the Hana area for such purposes, however, ending a long tradition (Clark 1980:23).

AGRICULTURE

The Hana District is one of the wettest and most verdant coastal areas in the Hawaiian Islands. North Hana is gently sloping and is covered by a recent lava flow; therefore, there are no constantly flowing streams and associated agricultural terraces in the area. Other areas of Hana have rich soil composed of a mixture of humus and decomposed lava. Dry taro thrives in the area. It is grown in Hoookalani, a large native settlement above the sea cliffs, and also in the fresh-water lava caves of Waimapanapa, just north of Hana town is moderately sloping forest land called Helani. Here a number of Hawaiians recently planted patches of dry taro. In the forest zone above Hana town, at an elevation of about 1,500 feet, is a small valley below Olopawa Peak, where taro was once cultivated during the dry seasons (Handy and Handy 1972:504-505).

Yams and sugar cane were also grown in the area. Handy and Handy suggest that *'awa*, from which a favored narcotic drink was brewed, as well as *wauke* and *olona* (for cloth and cord making) were most certainly also grown in the area (Handy and Handy 1972:505). In historic times, specifically in the 1930s, the level lands between the shore and the gently sloping *kula* land was planted in sugar cane. Later the same area was used as ranch land.

On the broad flat seaward peninsula south of Hana town and Ka'uiki is Hamoa. Long ago, subsistence there depended mainly on sweet potatoes and fish. There is a large *loko i'a* (fishpond) where fish was farmed as a supplement to seasonal fishing. The pond was called Haneo'o and was said to be one of the homes of Kihawahine, the *mo'o* (lizard) goddess who

lived mainly at Lahaina in West Maui. The pond was still intact in 1934; its inlet was paved with very large flat stones said to have been brought long ago from many places on Maui.

LAND TENURE

In 1848, during the reign of Kamehameha III, the traditional Hawaiian land ownership system was replaced with a more Western-style system. This 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 Matsio Kekuanaoa and Ione II. The last Mahele was signed by the King and E. Enoka 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 quitclaimed 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. The awards were to be free of commutation except for house lots 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.

No *kuleana* were awarded within the present project area. However, two parcels were awarded adjacent to the present project area, on the north (LCA 4566 and 4846). The testimonies for these parcels are presented here and their locations are shown on *Figure A-2:*

Foreign Testimony Vol. 5:423
Claim 4846 to Kaholokai

Kauamu Sworn Keonihali an Ili in Kawaipapa has been a family possession since 1819. It now belongs to the Clt. he having received it from his father.

Mauka by Piipii's land, Koolau by Kanehailua's land, Makai by Kawainui and Kauanui's land. Kapahulu by Kahina's land.

A patch in Puako, on all sides by konohiki.
One piece more in Keonihali. Mauka by Kapawa's land, Koolau by Wahineaea's land, Makai by the Konohiki, Kipahulu by Momehu's land.

Nat. Register Vol. 6:107
No. 4846 - Kaholokai

I hereby tell of my land, at Kawaipapa, East Maui. The name of my *'ili* is Onehale. It begins at the Government Road and lies inland to the *pauku* of Kamamoku. It was given me by Looaukai, who had it in ancient times. I desire to secure this land for myself and my heirs.
Kaholokai

Nat. Register Vol. 6:183
No. 4566 - Wahineaa

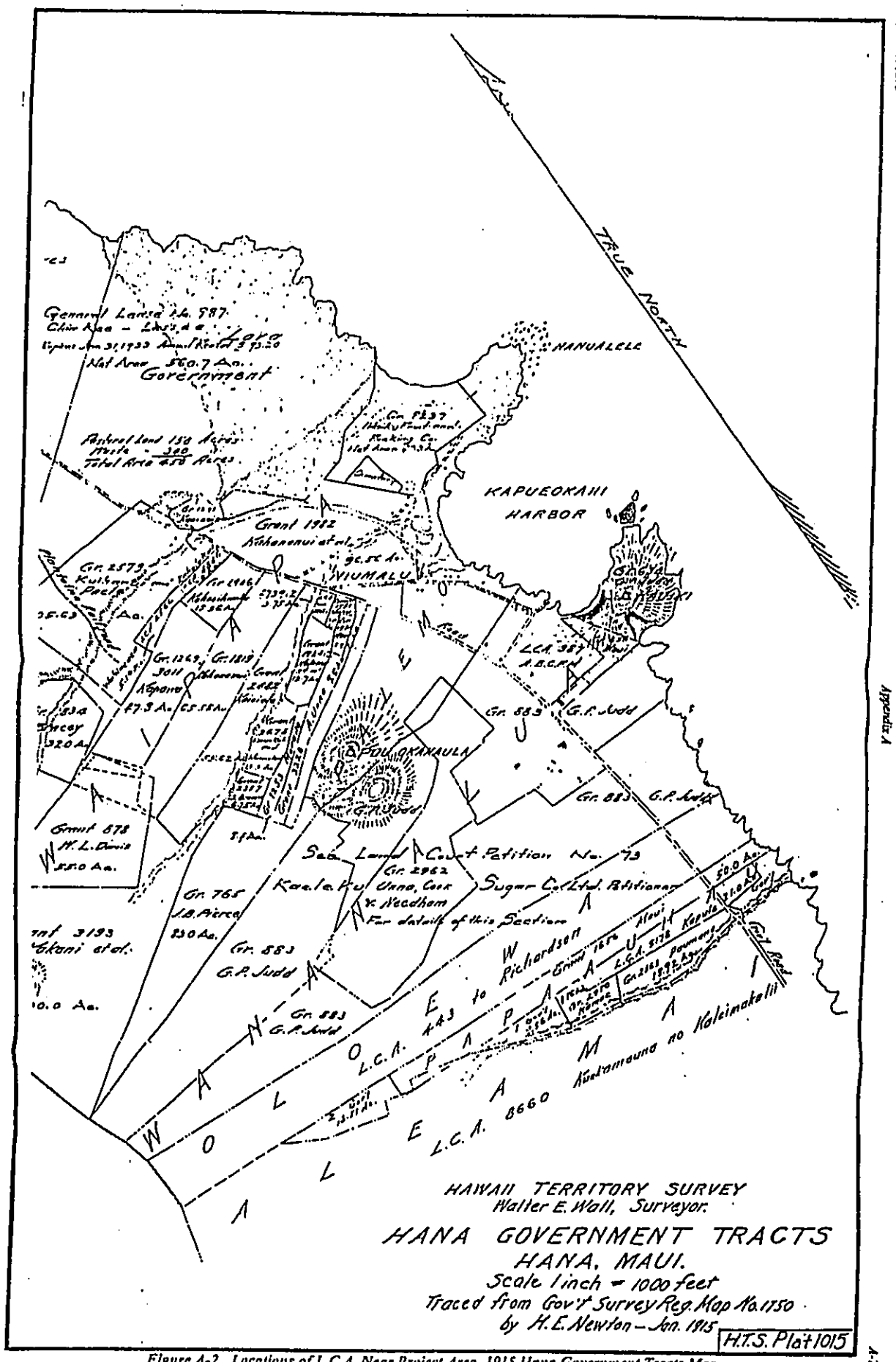

Figure A-2. Locations of L.C.A. Near Project Area, 1915 Hana Government Tracts Map (Taken from State Survey Office, Reg. Map No. 1750)

To the Land Commissioners: I hereby tell you of my land at Kawaipapa, East Maui. The name of my *'ili* is Kaniamako. On the east is the land of Puco, on the southeast is the land of Kekihinalani, on the southwest is the land of Kekalaihi. It was given to my *kupuna* by Keaumoku. I desire to secure it for myself and my heirs.

Wahineaa

Nat. Test. Vol. 5:373
No. 4566 to Wahineaa June 16, 1849

Pahili sworn He has seen Wahineaa's land, Kaniamako of Kawaipapa, a bequest land since the birth of Kaahumanu in Hana. Keeaumoku had given to Wahineaa's grandparents from that time to 1848, Kawainui took the land by force.

Section 1	Mauka	Keliipahea
	Koolau	Stream
	Makai	Puco
	Kipahulu	Kahalokai
Section 2	Mauka	Puco
	Koolau	Kalua
	Makai	Kahalokai
	Kipahulu	Kapawa

Kawainui has agreed he (Wahineaa) has lived on this land a long time without oppositions and it had been from his parents (grand).

The present project area was once a part of Grant 1906 to Kahooilimoku. The grant award for this parcel lists this grant being at Kaululoa, Kawaipapa, Hana.

E Ho'omaka ana ma ke kihi Hema a e holo ana
Akau 51 1/2° Hiki 1830 kaula ma Kahanaumi
Akau 35° Koon 893 " " Alanui Aupuni
Hema 70° Koon 1638 " " Kahalokai
Hema 15 1/2 ° Hik 680 " " Kapawa
Hema 33 3/10° Hik 540 " " a hiki i ke kihi mua

He 18 56/100 eka

Dec. 20, 1855

Roughly translated this grant reads:

Starting at the south corner and running thus:
North 51 1/2 east 1830 chains along Kahanaumi['s property]
North 35 west 893 " " the government road
South 70 west 1638 " " Kahalokai['s property]
South 15 1/2 east 680 " " Kapawa['s property]
South 33 3/10 east 540 " until the point of commencement

Comprises an area of 18 56/100 acres

Notes within the Land File Index at the State Archives list the following for Kawaipapa, Hana, Maui:

Int. Dept. Bk. 16:276 July 18, 1879
Certificate certifying that the Hawaiian Govt. has let unto his majesty, Kalakaua, 8 loko's [fishponds] on the above land, at the rate of $10 per annum, payable annually.

Int. Dept. June 19, 1891
S.W. Kaai applied to lease 7 fish ponds for 10 years, November 24, 1893 J.P. Sylva applied to lease 4 small fish ponds, June 1, 1895 J.W. Kalua applied to lease Govt. fishponds for 10 years, Oct. 1, 1891 J.H.S. Kaleo wanted to lease 8 small ponds in Kawaipapa...

Int. Dept. 1858
Is report by J.T. Gower of a/c sales showing that 18 56/100 acres of land in the above place had been sold to Kahooilimoku at $1 per acre. Also forwarding a survey of same, for which a patent is wanted.

POST-MAHELE ACTIVITIES

Sugar cane was first planted in Hana about 1860 by Kelk and Needham, who also constructed a bullock-powered grinding mill. Out of these early beginnings came the Ka'eleku Sugar Company, which formed the economic foundation for Hana until the 1930s when it closed.

After Ka'eleku Sugar Company closed, some of the resulting unemployment was offset when Paul L. Fagan purchased the plantation and hired workers (Clark 1980:23). Fagan, a member by marriage of the locally prominent Irwin family, was a millionaire sportsman, rancher, and part-owner of a professional baseball team, the San Francisco Seals. Fagan had originally planned to ranch the former plantation land but realized the implications this would have on the town and native population, who would be out of work. He decided that Hana would be an ideal spot for a tourist retreat and decided to enlarge upon his original

plan. He formed the Hana Ranch Company and built the Hotel Hana Ranch (Paradise of the Pacific, October 1946:17). It was officially opened to the public on June 15, 1947 and was primarily a resort for the rich. The hotel's present name, Hotel Hana Maui, was adopted in 1948 (Clark 1980:23).

ADDITIONAL RESEARCH
by Kepa Maly

The following is in response to a DLNR request for additional historical information concerning the possible presence of a *pu'uhonua* in the project area (memorandum dated 25 March 1993 from D. Hibbard, SHPD, to G. Matsuoka, Dept. Accounting and Gen. Services).

Mr. Sam Kalalau Jr. of the Maui/Lanai Islands Burial Council mentioned that a Hana elder had mentioned the possibility there was a *pu'uhonua* in the project area. I subsequently contacted several friends and native residents of Hana about this matter (memorandum dated 12/28/92). Mr. Wilfred Kala and Mrs. Rose Nahi, both of whom have had a long intimate relationship with Kawaipapa, along with several other residents, all stated that they were either unaware of, or did not believe there was a *heiau* within the project area. Another resident, *kupuna* Mrs. A. Day, told PHRI Project Supervisor Dave Henry that she believed there was a *pu'uhonua* somewhere in the area.

I briefly reviewed the original Mahele narratives hoping additional references on this matter might be located. Experience had indicated that the Native Registers/ Testimonies often contained references that had been omitted from the Indices of Awards, or current translations of it. In addition, it has been generally found that claims indexed in the Indices of Awards as being associated with a particular *ahupua'a* or land parcel often included information on other parcels as well. The review clarified one point—that the *'ili* (land parcel) of Kaniamako (also written as Kauiamako and Kamamoku in LCA translations) is situated in the *ahupua'a* of Kawaipapa; this *'ili* is listed in LCAs 4846 to Kahalokai and 4566 to Wahineaea. The review also identified additional LCA information: by association with the lands granted to Piele (Grant 2579), LCA 4534 to Uhunabele appears to be a little north of the project area, though not marked on the 1915 Survey Map. Another award mentioned, LCA 4074 to Akaa, has not been located on any maps to date. Both these LCAs state that coconut groves were planted upon the parcels, and Akaa lived upon the land as well. They document both agricultural and residential use of land near the project area.

As described in the above work by Kalima, the Land of Kahooilimoku (Grant 1906) lies within Kawaipapa Abupua'a, in the *'ili* of Kauhiloa. Part of the northern portion of Kahooilimoku is bounded by the *kuleana* of Kahalokai and Wahineaea.

Kahalokai's *kuleana*, in the parcel of Keoiehali, ran from the Government Road *mauka* to the boundary of Wahineaea's *kuleana*, which is identified as the beginning of the land parcel of Kaniamako. In June of 1849, when Kahalokai provided his testimony, the land granted to Kahooilimoku in 1855 was identified as the land of Momehu (Foreign Testimony 8:276).

It is important to remember here that the land granted to Kahooilimoku, and subsequently the land contained within the present project area, is called Kaululoa. To the north of Kaululoa and associated with the *kuleana* of Wahineaea is the *'ili* or *puuki* (small land parcel) of Kaniamako. The identification of Kaniamako as being within Kawaipapa Abupua'a helps clarify the confusion regarding the presence/ absence of a *heiau - puuhonua* in the project area. Hawaiian historian Samuel Kamakau and archaeologist Winslow M. Walker document some of the history of Kaniamako, and their narratives are presented below.

While describing events related to the death of Kaahumanu at Minoa, Oahu in 1832, Kamakau (1961) reflected on her birth in 1768:

> The chiefess Ka-ahu-manu was born at Mapuwena, called Paliuli, at Kauiki, Hana Maui, in a small cave on the side of the hill, and her afterbirth was taken and buried at Kani-a-makō in Kawaipapa above Pihehe...(1961:309)

> ...Women alone attended at the birth of Ka-ahu-manu, and these were her grandmother Haalou, Apo, Eleele-i-oho, and Wahine-aa. She was brought up in the land of Kawaipapa and was a great favorite with her father Kee-au-moku and the beloved child of her aunts, uncles, and grandmother... (1961:310)

It should be noted here that the name of the recipient of LCA 4566 is written in two ways, one is Wahineaea, and the other is Wahineaa. As referenced above in Kamakau's narrative, a woman by the name of Wahineaa was one of the attendants during Kaahumanu's birth. It is possible that this LCA recipient was a descendant of Wahineaa, indicating a long-term relationship with the land and royal families.

The next reference to Kaniamako is found in Kamakau (1968) when he describes the nature of *puuhonua* or places of refuge. Puuhonua lands had been handed down from ancient

times and remained sacred, but after Kamehameha unified the islands, he abolished the old *puuhonua* and established new ones. This was done because he awarded lands including *puuhonua* to his war leaders and warriors—"therefore they ceased to be puuhonua" (1968:17-18).

The concept (*ana*) of *puuhonua* came down from ancient times, and *puuhonua* lands had always existed. They were sacrosanct and inviolable lands; the blood of wrongdoers could not be shed once they entered into these *puuhonua* lands. Persons who violated *kapu* or shed blood without cause would be safe in a *puuhonua*. In the time when Kamehameha was ruling chief of the kingdom, all the lands belonging to his favorite wife Kaahumanu and to his war god (*akua kaua*) Kukailimoku were made *puuhonua* lands. Kaahumanu's lands that were set aside as puuhonua were: Paunau for Lahaina, Waipukua for Waihee, and Kaniamoku [Kaniamaku] for Hana on Maui. There were also other lands belonging to Kaahumanu and the war god of Kamehameha. Kaahumanu herself was at times a *puuhonua*, as when a lawbreaker ran to her and was thus saved from death (1968:18-19)

It must be assumed that the act of burying Kaahumanu's afterbirth in the Land of Kaniamako is the source Kaniamako's designation as a *puuhonua*. The *puuhonua* could be a specific feature upon the land or the entire parcel itself. Later, when W.M. Walker (1931) documented sites in Kawaipapa his informants identified a *heiau* named Kaniomoku (i.e., Kaniamako):

Kawaipapa Region
Heiau Site 105, 106

Names: Kaniomoku [and] Kawaipapa
Location: The cane lands above the road.

Description: Kaniomoku is mentioned by Thrum as the place where Kaahumanu spent her childhood. Her birthplace was in a large cave on the side of Kauiki Hill on the bay. The heiau has been totally destroyed .

Kawaipapa was a heiau located near the point where the road crosses the gulch of the same name. It was destroyed by building the road, also a freshet washed out the remainder (Walker 1931:181).

It is likely that his informant(s) was a parent or grandparent of one of the *kupuna* dwelling in this area of Hana today.

In summary, the above narratives from Mahele records, along with those from Kamakau and Walker, do a great deal to clarify the location of the *puuhonua* in Kawaipapa. The Mahele narratives identify the project area land as Kauhuloa, while portions of the *kuleana* on the northern boundary of Kauhuloa include the land parcel called Kaniamako. The narratives recorded by Kamakau and Walker confirm that a *puuhonua* and possibly a *heiau* were associated with Kaniamako. Though the exact location of the *puuhonua* is not known, the above indicates it was generally located in a parcel adjacent to the current project area. The recollection by at least one *kupuna*, that there is a *puuhonua* in Kawaipapa, is indeed accurate.

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APPENDIX B

SUMMARY OF SHOVEL TEST STRATIGRAPHY

SITE 3150
FEATURE A, ST-1

LAYER	*DESCRIPTION*
I	0-25 cmbs; black (10YR 2/1 moist); sandy loam; moderate, fine to medium granular structure; soft, very friable, non-sticky, non-plastic consistence; common micro to coarse roots; many micro to coarse pores; cultural material includes sparse charcoal and historic glass; abrupt, irregular boundary;
II	25-36 cmbs; very dark gray (10YR 3/1 moist); sandy loam; moderate, fine to medium granular structure; soft, very friable, non-sticky, non-plastic consistence; many micro to coarse roots; many micro to coarse pores; layer terminates on bedrock.

FEATURE A, ST-8

LAYER	*DESCRIPTION*
I	0-28 cmbs; black (10YR 2/1 moist); silt loam; moderate, fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many micro to coarse interstitial pores; cultural material includes sparse charcoal, shell and waterworn pebbles; layer terminates on rock layer.

FEATURE B, ST-2

LAYER	*DESCRIPTION*
I	0-40 cmbs; dark brown (7.5YR 3/2 moist); sandy loam; moderate, fine blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many micro to coarse interstitial pores; cultural material includes burnt coconut fragments; layer terminates on bedrock.

FEATURE B, ST-9

LAYER	*DESCRIPTION*
I	0-27 cmbs; very dark gray (7.5YR 3/0 moist); silt loam; moderate, medium to coarse blocky structure; soft, very friable, non-sticky, non-plastic consistence; common medium tubular roots; common micro interstitial pores; cultural material includes sparse shell; layer terminates on rock layer.

FEATURE C, ST-3

LAYER	*DESCRIPTION*
I	0-24 cmbs; black (7.5YR 2/0 moist); sandy loam; moderate, fine to coarse blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse vesicular roots; many fine to coarse interstitial pores; culturally sterile; layer terminates on bedrock.

FEATURE C, ST-10

LAYER	*DESCRIPTION*
I	0-26 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate, fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many medium tubular roots; many medium interstitial pores; cultural material limited to waterworn pebbles; abrupt, wavy boundary;
II	26-30 cmbs; dark brown (10YR 3/3 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; common medium tubular roots; common medium interstitial pores; layer terminates on bedrock.

FEATURE D, ST-4

LAYER	*DESCRIPTION*
I	0-9 cmbs; architectural platform; cultural material includes historic glass, ceramics and shell; abrupt, wavy boundary;
II	9-39 cmbs; very dark brown (10YR 2/2 moist); sandy loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many medium tubular roots; many medium interstitial pores; cultural material includes historic ceramics and shell; layer terminated on large rock slab.

FEATURE D, ST-11

LAYER	*DESCRIPTION*
I	0-13 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common medium to coarse tubular roots; common medium to coarse interstitial pores; culturally sterile; clear, irregular boundary;
II	13-30 cmbs; strong brown (7.5YR 4/8 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; common medium to coarse tubular roots; common medium to coarse interstitial pores; culturally sterile; layer terminated on rock layer.

SITE 3153
FEATURE A, ST-15

LAYER	*DESCRIPTION*
I	0-24 cmbs; very dark brown (10YR 2/2 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many fine to coarse interstitial pores; culturally sterile; layer terminates on rock layer.

FEATURE B, ST-16

LAYER	DESCRIPTION
I	0-22 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; many fine to coarse tubular roots; many fine to coarse interstitial pores; cultural materials includes sparse charcoal flecks; abrupt, wavy boundary;
II	22-32 cmbs; strong brown (7.5YR 4/6 moist); silt loam; moderate fine to medium blocky structure; soft, very friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; many fine to coarse interstitial pores; layer terminates on rock layer.

OTHER (NON-SITE) UNITS

ST-5

LAYER	DESCRIPTION
I	0-13 cmbs; dark brown (7.5YR 3/2 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; clear, irregular boundary;
II	13-35 cmbs; dark yellowish brown (10YR 3/4 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-6

LAYER	DESCRIPTION
I	0-16 cmbs; dark brown (7.5YR 3/2 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-7

LAYER	DESCRIPTION
I	0-13 cmbs; dark brown (7.5YR 3/2 moist); silty clay; moderate medium to coarse blocky structure; soft, friable, slightly sticky, plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; clear, irregular boundary;
II	13-29 cmbs; dark yellowish brown (10YR 3/4 moist); moderate medium to coarse blocky structure; soft, friable, slightly sticky, slightly plastic consistence; common medium tubular roots; common medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-14

LAYER	DESCRIPTION
I	0-24 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; common fine to medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-15

LAYER	DESCRIPTION
I	0-21 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; common fine to medium interstitial pores; culturally sterile; layer terminates on rock layer.

ST-16

LAYER	DESCRIPTION
I	0-25 cmbs; very dark grayish brown (10YR 3/2 moist); silt loam; moderate fine to medium blocky structure; soft, friable, non-sticky, non-plastic consistence; common fine to medium tubular roots; common fine to medium interstitial pores; culturally sterile; layer terminates on rock layer.

Appendix B

Archeological Mitigation Program
Hana Medical Center Project Area
Land of Kawaipapa, Hana District, Island of Maui
(TMK: 1-4-03:22)

Paul H. Rosendahl, PhD., Inc.
April 1996

Archaeological Mitigation Program
Hana Medical Center Project Area

Land of Kawaipapa, Hana District, Island of Maui, Hawai'i (TMK:1-4-03:22)

DAGS Job No. 1-5-20-6219
Contract No. 34174, Attachment 1

BY

Warren Wulzen, B.A. • Projects Supervisor

AND

Paul H. Rosendahl, Ph.D. • Principal Archaeologist

WITH

Susan T. Goodfellow, Ph.D. • Laboratory Director

PREPARED FOR

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APRIL 1996

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SUMMARY

At the request of Mr. Allen Yamanoha of the State of Hawai'i Department of Accounting and General Services, Division of Public Works, Paul H. Rosendahl, Ph.D., Inc. (PHRI), conducted archaeological data recovery work at the Hana Medical Center project area (TMK:1-4-03:22), situated in the Land of Kawaipapa, Hana District, Island of Maui. The work comprised Phase II of the Archaeological Mitigation Program for the project, as outlined in the project's Archaeological Mitigation Plan (Rosendahl 1994). The field work was conducted on July 5-7, 1995, and immediately after completion of the field work, an interim report of findings was completed (Rosendahl 1995). The present work constitutes the final report on archaeological activities at this site.

The purpose of the Archaeological Mitigation Program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources (DLNR) Rules Governing Procedures for Historic Preservation Review (draft - November 1994). The specific purpose of the Mitigation Plan was to guide the archaeological work required by DLNR to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 50-50-13-3150.

An earlier inventory survey of the project area, conducted by PHRI (Henry and Graves 1993), identified four sites. Two of the sites are complexes (Sites 3150 and 3153), and two are boundary walls (Sites 3151 and 3152). All four sites yielded evidence of historic activities only. All four sites were evaluated as significant solely for information content. Because the documentation of three of the sites during the inventory survey was considered to have recovered all of the significant information represented by these sites (3151, 3152, and 3153), all three were determined to be no longer significant, and no further work was recommended. For the remaining site (3150), it was determined that additional portable cultural materials as well as specialized samples might remain within a subsurface component, and that such cultural materials could be useful in further dating of the site and its component features and further evaluating feature function. Therefore, the site was recommended for further archaeological work, and a mitigation plan was prepared for the site (see Appendix A for correspondence between the DLNR, client, and PHRI, concerning the mitigation plan). The present work presents the findings of the additional work.

All four features at Site 3150 were subject to further excavation, and some additional recording. None of the features contained significant subsurface deposits, but some portable remains were collected. Most of these remains were historic, dating to the last half of the 19th and the early 20th centuries; a few remains were similar to indigenous Hawaiian artifacts.

Feature C was found to be the result of recent road grading within the parcel. The enclosures at Features A and B may be remnants of thatched houses, while the Feature D platform appears to have been used for food consumption, on an episodic basis. Features A, B, and D were assigned habitation functions.

The information potential of Site 3150 has been exhausted, as the mitigation plan has been fulfilled and the data recovery is complete. No further archaeological work in the Hana Medical Center parcel is recommended.

Contents

Contents (cont.)

Illustrations

Illustrations (cont.)

Tables

INTRODUCTION

BACKGROUND

At the request of Mr. Allen Yamanoha of the State of Hawai'i Department of Accounting and General Services, Division of Public Works, Paul H. Rosendahl, Ph.D., Inc. (PHRI), recently conducted archaeological data recovery work at the Hana Medical Center project area (TMK:1-4-03:22), situated in the Land of Kawaipapa, Hana District, Island of Maui. The work comprised Phase II of the Archaeological Mitigation Program for the project and was outlined in the project's Archaeological Mitigation Plan (Rosendahl 1994). The field work was conducted on July 5-7, 1995 under the supervision of Projects Supervisor Warren Walzen, B.A., assisted by Projects Supervisor James A. Head, B.A., Field Archaeologist Keith Colvin, B.A., and Field Technician Diane Trembly, M.D. Overall supervision for the project was provided by PHRI President and Principal Archaeologist Paul H. Rosendahl, Ph.D. The data recovery work required 12 person-days of labor. Immediately after completion of the field work, an interim report of findings was completed (Rosendahl 1995).

SCOPE OF WORK

The purpose of the Archaeological Mitigation Program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources (DLNR) Rules Governing Procedures for Historic Preservation Review (DLNR 1994). The specific purpose of the Mitigation Plan is to guide the archaeological work required by DLNR to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 50-50-13-3150.

The earlier inventory survey of the project area, conducted by PHRI (Henry and Graves 1993), identified four sites. Two of the sites were complexes (Sites 3150 and 3153), and two were boundary walls (Sites 3151 and 3152). Three of the four sites (Sites 3151, 3152, and 3153) were evaluated as significant solely for information content. Because the documentation of these sites during the inventory survey was considered to have recovered all of the significant information at the sites, all three were determined to be no longer significant, and no further work was recommended (Henry and Graves 1993:25). The Department of Land and Natural Resources - State Historic Preservation Division (DLNR-SHPD) concurred with these findings in its review of the inventory survey report (letter dated 23 July 1994, from Mr. Keith W. Ahue, Chairperson, DLNR-SHPD, to Honorable Robert P. Takushi, Department of Accounting and General Services) (see Appendix A).

For the remaining project area site (Site 3150), PHRI's original conclusion was that the site was significant not only for information content, but was also provisionally significant for cultural value. PHRI therefore recommended additional data collection work to evaluate one of the features of the site (Feature D) for the presence of human remains. This work was undertaken in April of 1993, following completion of the inventory survey field work, and the findings were presented in the final version of the inventory survey report (Henry and Graves 1993). In addition to summarizing the findings of the additional work, the inventory survey report also described the primary features at Site 50-50-13-3150, as follows:

> ...Site 3150 consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped enclosure; and Feature D, a rectangular platform. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. No datable samples were recovered, but the presence of the glass and ceramics suggests the features are historic. Because it was thought Feature D might contain a burial, it was subsequently determined to require further testing (Memo dated 25 March 1993, from D. Hibbard, DLNR-SHPD, to G. Matsuoka, Dept. of Accounting and General Services). On April 20, 1993 PHRI archaeologists placed a formal test excavation unit in the center of Feature G, near the shovel test placed earlier. The unit yielded ceramics, faunal bone, shell, and a glass button. The findings suggest the feature is historic. No human remains were found in the unit (Henry and Graves 1993:22).

Because the excavation unit placed within Feature D failed to identify human remains, the site was no longer considered potentially significant for cultural value. However, in its review of a draft of the final survey report, DLNR-SHPD stated that additional portable cultural materials as well as specialized samples might remain at the site, within a subsurface component, and that such cultural materials could be useful in (a) further dating of the site and its component features, and (b) further evaluating feature function. For these reasons, DLNR-SHPD recommended that the site be subjected to data recovery work designed to recover additional artifacts, ecofactual remains, and other specialized samples. Moreover, DLNR requested that this work be preceded by preparation of an appropriate archaeological treatment plan, which was subsequently completed (Rosendahl 1994) (see Appendix A: Correspondence).

Based on existing information concerning the site, and pursuant to DLNR's specific comments above, the primary goal of the present data recovery at Site 3150 was to more precisely date and more thoroughly evaluate the functions of the four primary features at Site 3150. This work was to be accomplished through additional detailed recording, excavation, and analysis. Variable levels of additional detailed recording were undertaken at the site's four features, and the site map was modified. All four features of Site 3150 were subjected to formal excavation. A total of seven 1.0 by 1.0 m and one 1.0 by 0.5 m excavation units (EU-1 through -8) were dug at the four features in the project area in order to identify subsurface cultural deposits: one at Feature A, four at Feature B, one at Feature C; and two at Feature D. Some surface collection was also conducted at Feature D. All collected materials were returned to the PHRI laboratory for processing and analysis.

PROJECT AREA DESCRIPTION

The Hana Medical Center project area consists of 10.07 acres (4.03 hectares) and includes a small strip adjoining the northern boundary of the existing medical facility *(Figure 1)*. The project area is bounded on the north, south, and west by private parcels. Site 50-50-13-3150 is located in the center of the project area, west and *mauka* of the existing Hana Medical Center facility. Elevations in the project area range from c. 120 feet (36.6 meters) above mean sea level (AMSL) at the Hana Highway up to c. 250 feet (76.2 meters) AMSL at the west end of the parcel (USGS 1983). Rainfall in the general vicinity of the project area averages 75 inches (191

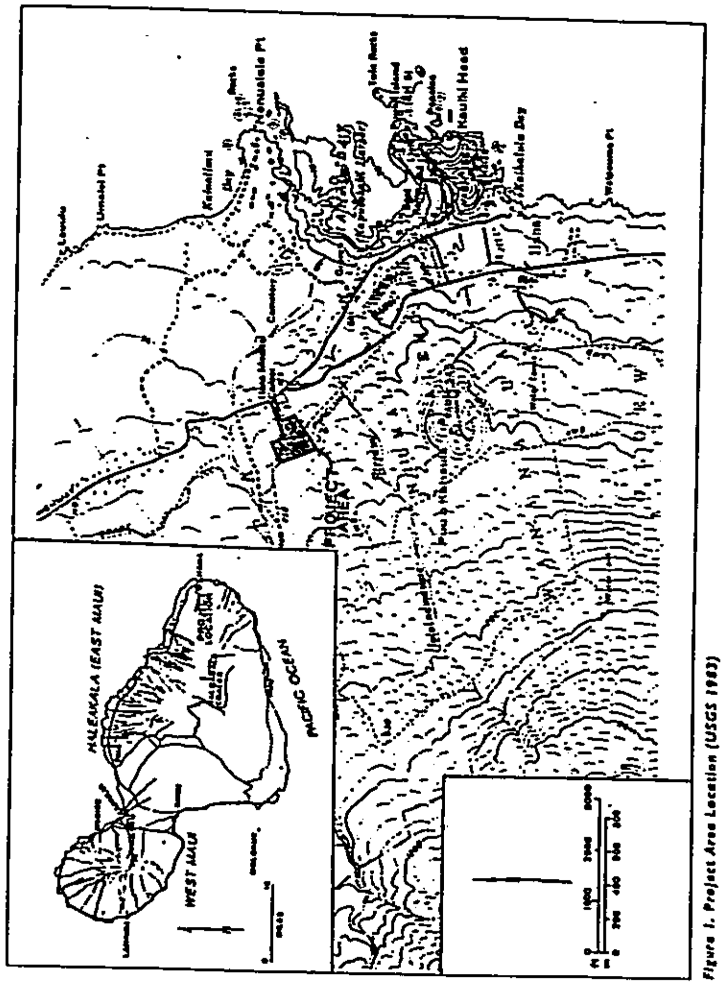

Figure 1. Project Area Location (USGS 1983)

centimeters) per year, and the mean annual temperature is 70-75 degrees F (21-24 degrees C) (Armstrong 1973).

Terrain within the project area slopes moderately from the west towards the ocean to the east. Soils are comprised primarily of Hana extremely stony, silty clay loam, a dark brown silty clay loam surface layer overlying a reddish-brown, very friable silty clay loam subsoil (Foote et al. 1972). Beneath the soil is a substratum of fragmented aa lava extending to a depth of 20 to 30 inches (50 to 76 centimeters). Several roads have been graded around and through the parcel.

The project area contains both introduced and native species of plants. Some of the introduced species are present because the area has been used for commercial cultivation (Henry and Graves 1993:22). The species (Neal 1965) include breadfruit (*Artocarpus communis*), ti (*ki*; *Cordyline terminalis*), taro (*kalo*; *Colocasia esculenta*), palmetto (*Sabal palmetto*), coconut (*Cocos nucifera*), bird-of-paradise (*Strelitzia reginae*), red ginger (*'awapuhi-'ula'ula*; *Alpinia purpurata*), mango (*manako*; *Manifera indica*), bamboo (*Bambusa* sp.), Africa tulip tree (*Spathodea campanulata*), *milo* (*Thespesia populnea*), false *kamani* (*kamani-haole*; *Terminalia catappa*), Hawaiian tree fern (*Niroli*; *Filicium decipiens*), papaya (*Carica papaya*), areca palm (*Chrysalidocarpus lutescens*), *wili-wili* (*Erythrina sandwicensis*), *kukui* (*Aleurites moluccana*), and banana (*Musa paradisiaca*). Small patches of the introduced pangola pasture grass (*Digitaria decumbens*) are also to be found in open areas.

It should be stated, however, that 50 years ago and earlier the landscape was one of rolling cane fields or grassland, with hardly a tree to be seen, except in the stream beds. The upper slopes of the Hana Medical Center property would have afforded a clear view of Hanalike Bay and Kapueokahi Harbor, and would have been exposed to the trade winds.

PREVIOUS ARCHAEOLOGICAL WORK

Very little archaeological work has been conducted in the Hana area, despite its rich cultural history. Previous archaeological work conducted in the vicinity of the project area includes investigations by Walker (1931), Soehren (1963), Sterling (1969), Cordy (1970) Pearson (1970), Bevacqua (1972), Chapman and Kirch (1979), Landrum (1984), and Kolb (1991). The majority of these center on the *heiau* of the area. Borthwick et al. (1992) conducted an inventory of 400 acres south of Hana town. The previous investigations are summarized in *Table 1*. The inventory survey (Henry and Graves 1993:10) and the present study is the only archaeological research conducted within the Hana Medical Center parcel.

In 1931, Winslow Walker conducted an archaeological survey of the Island of Maui. Walker's work, which was conducted through informant interviews and site visits, has never been published, and remains more an overview of some of the archaeology of Maui rather than an in depth study. Walker (1931:181-185) identified six *heiau* in the Land of Kawaipapa (Sites 105 through 110), most located *makai* of the project area, near the ocean. He mentions the presence of two *heiau* near the project area, Kaniomoku and Kawaipapa, both identified as in the cane lands above the road (probably the "old government road," which followed a route *makai* of the present highway [see Landrum 1984]). Kaniomoku Heiau is repeatedly mentioned by Thrum (1907, 1908, 1917) as the place where Kaahumanu spent her childhood, but this *heiau* has been totally destroyed. Kawaipapa was a *heiau* located near the point where the road crosses the gulch of the same name (c. 400 m north of the Hana Medical Center). It was destroyed by

Table 1.
Previous Archaeological Work in the Hana Area

Pub. Year	Author(s)	Institution	Location	Type of Investigation
1931	Walker	BPBM	Maui (general)	Site descriptions
1969	Sterling	BPBM	Western O'ahu Plain	Site descriptions
1970	Cordy	BPBM	Pillanihale Heiau	Site mapping
1970	Nakkim	—	Ulaino - Pu'uiki	Reconnaissance survey
1970	Pearson	DLNR	Honolulunui and Waiklu	Survey
1972	Bevacqua	BPBM	Waiaka (Hana H S)	Reconnaissance
1979	Chapman and Kirch	BPBM	Southeast Maui	Rockshelter excavations
1984	Landrum	BPBM	Kawaipapa	Recording, excavation
1987	Cleghorn	BPBM	Hana Ranch Lands	Reconnaissance survey
1987	Cleghorn and Rogers	BPBM	Hana Ranch Lands	Reconnaissance survey
1991	Kolb	UCLA	Maui Heiau	Recording, excavation
1992	Borthwick et al.	CSH	Papa'auhau - Haneo'o	Inventory survey, testing
1993	Henry and Graves	PHRI	Kawaipapa (Hana Med Ctr)	Inventory survey, testing

Key to Institutions:
BPBM B.P. Bishop Museum, Dept. of Anthropology
CSH Cultural Surveys Hawaii
DLNR Department of Lands and Natural Resources
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construction of the road, and stream flooding reportedly washed away the remainder (Walker 1931:181).

The Kipahulu and Kaupo *ahupua'a*, southwest of Hana, were surveyed by the Bishop Museum staff. The report states:

> Most house sites, agricultural terraces and ditches in Kipahulu were demolished by the operations of a sugar plantation. The majority of those which survive today, and included in this report, are probably contemporaneous with the plantation, which closed about 1923. A middle-aged informant., born and raised at Kipahulu, recalls visiting, in her childhood, residents of thatched stone wall houses as at sites [identified in the survey]....(Soehren 1963:22)

This form of thatched house was a variant on the Traditional Hawaiian form, influenced by the missionaries and other westerners (Apple 1971).

Elspeth Sterling (1969) conducted a walk-through archaeological survey of the Hana area with local informant Matthew Kalalau. The unpublished notes of this survey identified a number of platforms and enclosures in an aa lava flow adjacent to the Mormon Cemetery in Hana. No sites are specifically located in Kawaipapa.

In 1969, Richard Pearson (1970) conducted an archaeological reconnaissance survey of Wai'anapanapa State Park, located in the *ahupua'a* of Waiklu. Pearson identified 34 archaeological features, including one *heiau*, five cave shelters, a trail, one pictograph, six *ahu*, two U-shaped enclosures, five miniature enclosures, three shelter walls, two house platforms, and several walls and enclosures.

In 1972, Robert Bevacqua conducted a walk-through archaeological survey of the proposed Hana Elementary and High School area (Bevacqua 1972). Bevacqua noted considerable mechanical disturbance in the area, and the remains of a partially destroyed habitation site.

Lynn Nakkim (1970) conducted a reconnaissance level survey from the Land of Ulaino on the north to Pu'uiki on the south. She reported 66 sites, but none in the Hana Medical Center parcel. In 1987, additional reconnaissance survey was conducted by Paul Cleghorn (Cleghorn 1987; Cleghorn and Rogers 1987). Both of these surveys were able to locate some remnant agricultural features on the periphery of sugar cane land.

In 1984, Jim Landrum conducted an archaeological reconnaissance survey of a 14-acre parcel within the Land of Kawaipapa, *makai* of the present road (Landrum 1984). No prehistoric archaeological remains were identified during the survey, although a short segment of the "old government road" was identified.

On the coast, north of the project area, the largest *heiau* on Maui, Piilanihale, has been the subject of some of the most interesting archaeological work in the Hana District. Cordy (1970) produced a detailed description of the site. Kolb (1991) conducted excavations aimed at delineating the stages of construction of this massive structure, comparing it to other *heiau* on Maui, and relating this evidence to political change on the island. Radiocarbon dates obtained from this *heiau* are discussed below.

In 1992, Cultural Surveys Hawaii conducted an archaeological inventory survey of c. 400 acres in the proposed Hana Ranch Country Club, Lands of Papa'auhau, Alemai, and Haneo'o (Borthwick et al. 1992). The survey resulted in the identification of 50 sites; 31 of probable historic age and 19 which may be prehistoric. The prehistoric sites included a *heiau*, seven habitation sites, six agricultural sites (three that exhibited both habitation and agricultural features), a burial, and one wall with undetermined function. Sites were inferred to be prehistoric based on circumstantial evidence:

> The presence of certain manuports, especially large water-rounded boulders, was utilized in attempting to affix probable age determinations. The Hana area, specifically Alemai ahupua'a , is the legendary home of Ku'ula. The worship of Ku'ula is associated with water-rounded stones from the ocean. Observed during this survey were a number of large ocean (non-stream) rounded boulders termed "rollers." It was thus postulated that sites or site remnants that contained rollers, or Ku'ula stones may be pre-contact sites. (Borthwick et al. 1992:25).

Of the historic sites, 25 were assigned an agricultural function, two were habitation locations, and three were other kinds of sites.

Excavations at 14 features in 13 of the sites during the Hana Country Club survey produced only a small collection of ecofacts and artifacts (seven features were completely sterile of portable remains). Three radiocarbon dates were returned, but two were contaminated with

bomb carbon. One did yield a date range of 1345 - 1650 AD. This report demonstrates that archaeological remnants of both historic and prehistoric activities may have survived alteration of the land by mechanical agricultural (sugar and cattle) practices (Borthwick et al. 1992:105-107).

The only other inventory-level survey of a parcel in the Hana area was the first phase of the current project, the inventory survey of the Hana Medical Center. The project area was found to contain numerous dirt roads, bulldozer push piles, and areas cleared for cultivation. Four sites were identified in the project area—two complexes (Sites 3150 and 3153), and two boundary walls (Sites 3151 and 3152). Site 3150, the subject of the present data recovery work, consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped alignment; and Feature D, a rectangular platform. The features were assigned functional types of habitation, animal pen, boundary, agriculture, and indeterminate, respectively. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. Feature D was additionally tested for a possible burial, but yielded only ceramics, faunal bone, shell, and a glass button. The findings suggested that the features are of historic age. Subsurface testing in the cleared areas between sites and features yielded no evidenced of buried cultural deposits.

SUMMARY OF HISTORICAL DOCUMENTARY RESEARCH

This section summarizes historical documentary research available in the inventory survey report (Kalima and Maly 1993) and also includes additional material from other sources.

The project area is in the Hana District, in the *ahupua'a* of Kawaipapa. "Hana" refers not only to the district, but to the general area surrounding Hana Bay. The name is a shortened version of Hanaikaualaniha'aho'a (Hana of the low skies) (Soehren 1962:1). The Hana area has a rich cultural history, as it was the home of chiefs and chiefesses (Pukui 1983). From the time of La'a-mai-kahiki to the time of Umi, East Maui, comprising Ko'olau, Hana, Kipahulu, and Kaupo districts, was governed separately from the rest of the island. East Maui chiefs were often grouped about the fortified hill of Ka'uiki. Ka'uiki was the birthplace of Kaahumanu, the favorite wife of Kamehameha I. An earlier queen, Piikea, also was born in Hana (Thrum 1917).

Hana is a natural bay, formerly known as Kapueokahi. Kapueokahi, "the single owl," is said in one legend to have been a *kupua*, a supernatural being who could take the form of an animal or a human. Kapueokahi wanted to marry a woman named Kapoulakinau, so he changed himself from an owl to a man. This incident took place in Kawaipapa, which has its seaward edge on the bay. From that time on, the bay as well as its lone sand beach were called Kapueokahi (Clark 1980:24).

Hana Bay and a cinder cone forming the bay, Ka'uiki, figure in the history of the *ali'i* of Maui and Hawai'i, partly because it is a good canoe landing and is near Hawai'i Island. Alenuihaha Channel, between the islands, could easily be crossed in a couple of hours when the winds were ideal. Because of its location Hana was a sanctuary, both in wartime and peacetime, for the *ali'i* of both islands (Beckwith 1970:319). The Hana area is reported to have been the site of many important battles (ibid.; Speakman 1978), some of which eventually led to the unification of the Hawaiian Islands. The many *heiau* in the vicinity, as well as the hilltop fortress of Ka'uiki, overlooking Hana Bay, reflect the importance of Hana as a battleground. Kamehameha

I alone is said to have repaired and dedicated four *heiau* in the area. The *heiau* were dedicated to the war god, Kuka'ilimoku. Kamehameha I was the last chief to use the Hana area for such purposes, however, ending a long tradition (Clark 1980:23).

During peacetime Hana was a desirable place to live, with abundant resources. Agriculture was extensive in the area and included cultivation of dry and wet taro, sweet potatoes, yams, and *'awa*, for which the area is famous (Thrum 1907). The Hana District is one of the wettest and most verdant coastal areas in the Hawaiian Islands. North Hana is gently sloping and is covered by a recent lava flow; therefore, there are no constantly flowing streams and associated agricultural terraces in the area. Other areas of Hana have rich soil composed of a mixture of humus and decomposed lava. Dry taro thrives in the area. In the forest zone above Hana town, at an elevation of about 1,500 feet, is a small valley below Olopawa Peak, where taro was once cultivated during the dry seasons (Handy and Handy 1972:504-505).

Yams and sugar cane were also grown in the area. Handy and Handy suggest that *'awa*, from which a favored narcotic drink was brewed, as well as *wauke* and *olona* (for cloth and cord making) were most certainly also grown in the area (Handy and Handy 1972:505). Hana also had the best wood for making scaffolds and ladders (to scale fortresses), and had the best round smooth stones for use in slingshots (Handy and Handy 1972:504).

South of Hana town, there is a large *loko i'a* (fishpond) where fish were farmed as a supplement to seasonal fishing. The pond was called Haneo'o and was said to be one of the homes of Kihawahine, the *mo'o* (lizard) goddess who lived mainly at Lahaina in West Maui. The pond was still intact in 1934; its inlet paved with very large flat stones which were said to have been brought long ago from many places on Maui (Maly i.p.).

In 1848, during the reign of Kamehameha III, the traditional Hawaiian land ownership system was replaced with a more Western-style system. This 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 in charge of tracts of land on behalf of the king or a chief (Chinen 1958:vii; Chinen 1961:13).

These resolutions also 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. The awards were to be free of commutation (Chinen 1958:29). Before receiving their awards from the Land Commission, the native tenants were required to prove that they cultivated the land for a living. 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). No *kuleana* were awarded within the present project area. However, two parcels adjacent to the present project area, on the north, were awarded (LCA 4566 and 4846).

Subsequent to the Great Mahele, portions of the Government Lands were sold to defray the costs of government; purchasers were issued documents called grants (Chinen 1958:27). The Hana Medical Center project area was a portion of Grant 1906 to Kahooilimoku (Kalima and Maly 1993:A-8). Numerous other grants were sold in Kawaipapa *ahupua'a*, most of which were eventually consolidated into Hana Plantation lands.

Hana was an early center for growing sugar cane as a cash crop. Large-scale cane farming was introduced to the area in 1861, when August Unna began consolidation of small land holdings. By the end of the 19th century, the major producer in the area was Hana Plantation, which had spread across the *ahupua'a* of Hamoa on the south to Honomaele on the north

(Borthwick et al. 1992). Mechanization of the plantation was instituted, and a railroad and flume system carried the cane to the mill.

After the turn of the century, when the business fell on hard times, the Ka'eleku Sugar company was formed under Theo. H. Davies (Conde and Best 1973: 241-246). The new owners concentrated on the cane lands closest to the mill. The 1907-1909 fields map (Borthwick et al. 1992:19) depicts the current project area as under cultivation. The Hana Medical Center Property is also shown as being crossed by the railroad grade, *mauka* of the road, and bounded on the north by a "permanent flume," which apparently delivered water from Kawaipapa Gulch to the fields and mill.

Census figures (Schmitt 1968:117) for the Hana District reflect the decline of the sugar industry and a concomitant decline in employment at this time. In 1900, there were 5,276 persons in Hana; 3,100 in 1920; 2,663 in 1940; and only 1,073 in 1960. This would suggest that many former houses might have been abandoned in the area.

The plantation was transferred to C. Brewer & Co. in 1933, and closed by 1945 (Conde and Best 1973:245). The remaining 14,000 acres were purchased by Paul Fagan, who turned it into the Hana Ranch Company, raising cattle on the grassy slopes above the town. Fagan soon realized the implications that no industry was having on the town and the native population, who were out of work. He decided that Hana would be an ideal spot for a tourist resort and decided to enlarge upon his original plan, building the Hotel Hana Maui, which was opened in 1947 (Clark 1980). Tourists and cattle continue to be the mainstays of economic life in Hana.

The *mauka* portion of the Hana Medical Center project area parcel was cane land, and was used as an anthurium growing ground after World War II (Henry and Graves 1993:12). The grading and other modifications may be attributed to the latter activity.

SETTLEMENT PATTERN

Despite the limited archaeological data for the Hana area, a generalized chronology of settlement and land utilization for the area can be proffered. This chronology is based on the previous archaeological research in the area, historical documentary research, and previously postulated models of settlement. Refinement of this chronology should be possible in the future as additional information is collected.

Kirch postulated a chronology of archipelago-wide aboriginal settlement and social development (Kirch 1985:298-308). In his sequence, five periods of development were defined:

Colonization, AD 300-600 — Occupation of ecologically favorable areas; windward valleys, and land near fishing grounds; - material culture similar to East Polynesia - social structure similar to ancestral Polynesian hereditary Chiefdom;

Developmental, AD 600-1100 — Population Growth - settlement of all major islands - distinctive Hawaiian material and social culture develops - social structure: some status differentiation, but still corporate descent groups;

Expansion, AD 1100-1650 — Population growth - dispersal of population into leeward areas - intensified food production - altered social & political organization - class stratification - *Ahupua'a* system solidified - development of *Makahiki* - larger regions politically integrated;

Proto-Historic, AD 1650-1795 — Intensified food production - elaboration of social system - cycles of conquest, integration, collapse;

Historic, 1795-present — Population decline - breakdown of traditional social structure, Great Mahele - increase in trade with outside world.

The latter period could be further subdivided, based on the sweeping changes in Hawaiian society. The first wave of European contact arrived on Maui November 26, 1778, when the ships of Captain James Cook put in near present day Kahului (Speakman 1978:22-29). He arrived as Ka-hekili and Ka-lani'opu'u were conducting a war for control of Maui. Ka-hekili paid a visit to the ships off Kahului. A few days later, cruising eastward along the Hana shore, Cook was visited by Ka-lani'opu'u, accompanied by the young Kamehameha. Kamehameha, the future ruler of all of Hawai'i, spent the night aboard the ship, *Resolution*, observing western ways and technology for the first time. He was to use this knowledge later in his drive to unify the island chain.

At this time, the *ahupua'a* system of social organization was firmly established, with land units generally forming pie-shaped wedges extending from the mountains to the sea. The *ahupua'a* were controlled by local chiefs and were integrated at the district level. Districts were ruled by paramount chiefs through a system of taxation and redistribution. Social stratification was defined by a class separation between the ruling *ali'i* (chiefs) at one end, and the *maka'ainana* (commoners) at the other. Kamehameha I eventually united all of the Hawaiian islands and freely participated in the European-introduced market economy (Kamakau 1961).

European influence in the Hawaiian Islands was felt immediately, in the form of disease. Also the Hawaiians became enamored of specific trade goods, and the European sailors took advantage of the demand to replenish their shipboard supplies. The introduction of horses, cattle, and goats by the Europeans put new pressure on traditional agricultural practices—walls began to be built to protect the gardens. Lahaina, Maui became the center of the Pacific whaling industry, and the capitol of the unified Hawaiian Kingdom under Kamehaha, drawing natives away from their traditional homes and resource bases.

Traditional land use patterns saw a rapid shift after the Great Mahele in 1848. At this time land ownership was defined by grants and awards by the king (Kamehameha III) to the chiefs and other retainers. By 1850, laws were enacted under which commoners could also own land (*kuleana*) if they could prove that they actually occupied those lands. In addition, the Mahele allowed land to be sold to foreigners. By the mid-19th century, settlements were shifting away from marginal areas where earlier population increases had mandated adoption of dryland farming practices. These were now abandoned in favor of more productive resource zones on the windward side of the islands. In addition, native populations were decimated by disease and a depressed birth rate. Walled complexes became the dominant residential structure as families enclosed their holdings to protect them from feral cattle and to clearly define their *kuleana* boundaries.

By the early 20th century, a cash economy governed Hawaii society, and settlements were no longer based on traditional subsistence patterns. At this point most communities were

centered around sugar mills and were socially stratified within a plantation hierarchy. Workers were imported for the fields and mills, altering the population demographics drastically. Some remnants of traditional farming practices subsisted in areas on the margins of the cane fields. In Hana, the sugar mill closed earlier than many, and the former cane lands were subsequently used almost exclusively for cattle grazing.

ARCHAEOLOGICAL EVIDENCE

Only a few radiocarbon dates are available for the Hana region. At present, only one archaeological investigation in the vicinity of the project area has yielded radiometric age determinations. The work at the proposed Hana Ranch Country Club produced three datable carbon samples (Borthwick et al. 1992). One sample dated to AD 1345-1650 (Site 2711); another to AD 1425-1950 (Site 2835); and the third, AD 1640-1950 (Site 2749) (Borthwick et al. 1992:121). Kolb's work at Piilanihale *heiau* (1991:25) yielded weighted average dates of AD 1270-1440 and AD 1480-1954. These radiometric results indicate that the Hana area was occupied during the Expansion Period (AD 1100-1650).

Further evidence of an Expansion Period occupation is suggested by the sheer number of important ceremonial structures in the Hana area. Walker's (1931) survey of Maui identified 11 *heiau* (Sites 105-117) within the districts of Hana and Kawaipapa. Pearson's archaeological examination of Wai'anapanapa State Park likewise identified a large *heiau* and an associated cave complex. These structures attest not only to the social and political importance of Hana, but suggest the presence of a large population. Such temples "...evinced the power and authority of ruling chiefs, and served as constant reminders of the role in the life of the community of an extended pantheon." (Kirch 1985:6).

Kolb (1991) demonstrates that Lanikele and Pi'ilanihale Heiau were originally constructed between 1276 and 1415 A.D. Evidence of social stratification and the political integration of larger regions is further reflected in ethnohistorical accounts of the Hana area. Historic documentary research suggests that the districts of Ko'olau, Hana, Kipahulu, and Kaupo were governed separately from the rest of the island, and its chiefs were often grouped about the fortified hill of Ka'uiki on Hana Bay. This broadening and integration of power bases is typical of inferred Expansion Period political development.

The numerous Hawaiian legends and myths concerning Hana are useful in placing the occupation of Hana in a temporal framework. Soehren states that the earliest war between the islands of Hawaii and Maui is attributed to King Hua, who is said to have lived at Hana where he built the *heiau* of Honua'ula. After his successful raid on Hawaii, he returned and built Kuamalu Heiau (Walker 1931:1-25). Historian King David Kalakaua (1973) places King Hua's reign during the mid-12th century. Although exact dates for Hua's exploits are unknown, it is apparent that at least several of the *heiau* in the Hana area date to the early Expansion Period.

According to Walker (1931:23), Hana was also the home of Kihapiilani, a famous hero of many legends, who is said to have built the trail which circles the western portion of Maui. Pearson (1970:7) identified a coastal portion of Kihapiilani Trail at Wai'anapanapa State Park. This trail may have been constructed in AD 1516, after Kihapiilani's unification of Maui, further suggesting an Expansion era occupation of the Hana area (Handy and Handy 1972:398).

Both the archaeological and historical records indicate that the occupation of the Hana area continued through Kirch's Expansion Period to the present. As reflected in the historical documentary research, the increase in trade between Hana and the outside world resulted in the expanded cultivation of numerous cash crops, including sugar cane.

Borthwick et al. (1992) documented numerous historic features in Hana, including railroad structures, walls associated with cane cultivation and cattle exclusion, and terraces and mounds used for the cultivation of sweet potato and taro. As the latter two feature types were within cane fields, they were deemed historic.

Based on the above, it is apparent that the aboriginal occupation of the Hana area dates from at least the Expansion Period. Whether the initial settlement and occupation of Hana preceded the Expansion Period is currently unknown, although the Hana area offers the optimum conditions called for in the Colonization and Developmental Periods. One goal of research in the area must be to find evidence to better explicate the dates and ranges of settlement in Hana.

IMPLICATIONS FOR THE CURRENT PROJECT

The inventory survey (Henry and Graves 1993) demonstrated that although the Hana Medical Center project area has been heavily disturbed during historic to recent times, it contains archaeological sites. As other work in the area (especially Borthwick et al. 1992) has suggested, evidence of prehistoric activities may have survived the impacts.

Kawaipapa Heiau (Site 106) once existed about 400 m north of the current project area "...near the point where the road crosses the gulch of the same name" (Walker 1931:181). The *heiau* was destroyed by construction of the road and stream runoff. Henry and Graves (1193:7) had speculated that the project area would contain habitation structures associated with the *heiau*, or would comprise agricultural mounds and terraces. No clearly prehistoric features were located, however.

Evidence of historic activities had also been predicted (ibid.), including boundary walls, animal enclosures, or other remnant structures associated with either sugar cane cultivation or cattle ranching. The project area had been a part of the Hana Plantation, and was under cultivation after the turn of the 20th century (Borthwick et al 1992). The inventory survey (Henry and Graves 1193:8-14) revealed historic deposits, but evidence of prehistoric activities might still be sealed below these deposits. Further refinement of the dating of the historic activities might also be possible.

METHODS AND PROCEDURES

The data recovery consisted of work conducted exclusively at Site 50-50-13-3150. Detailed inventory-level recording at all sites and features had been completed during the first phase of work (Henry and Graves 1993). During the data recovery work reported here, the previous feature records from Site 3150 were compared to the evidence available on site, and a few minor corrections were made, including modification of maps presented in the earlier report. One additional potential site was noted on the periphery of the project area, and is discussed below. The main thrust of the data recovery phase of work was to conduct excavation at selected archaeological features.

EXCAVATION METHODS

All four features of Site 50-50-13-3250 were subjected to formal excavation. A total of seven excavation units (1.0 by 1.0 m and one 1.0 by 0.5 m) (EU-1 through -8) were dug in order to identify subsurface cultural deposits: one at Feature A (EU-1), four at Feature B (EU-2 through -5), one at Feature C (EU-6); and two at Feature D (EU-7 and -8). A summary of the excavations conducted at Site 3150 may be found in *Table 2*. A surface collection of artifacts was conducted at Feature D.

Excavation units were placed in the least disturbed portion of the features, and against the architecture (*Figure 2*). One goal of the excavation was to detail the relationship of the basal architecture of the feature to the surrounding and underlying soil layers. Also important was the goal of recovering portable remains that would provide information concerning feature age and function.

At Feature A, EU-1 was placed in the northwest interior corner of the rectangular enclosure. At Feature B, the units (EU-2 through -5) were placed away from the large trees on the west, and through the wall collapse, which might have sealed some deposits. Another advantage of the southeast corner was that it might prove to have the thickest deposit, with the floor sloping downhill in that direction. At Feature C, EU-6 was placed against the north alignment. At Feature D, EU-7 was placed on the exterior of the platform to test the lower terrace and the base of the platform architecture, while EU-8 was placed in the last undisturbed portion of the platform.

Excavation proceeded by hand using carefully controlled methods. Units were excavated according to cultural or natural soil layers. When necessary, excavation by arbitrary 10 cm levels was employed within thick or stratigraphically complex layers, or where cultural and natural layers could not be clearly identified during excavation. A datum was established for stratigraphic control. Line levels, trowels, brushes, dust pans and various other small instruments were employed. Excavation of the units terminated on bedrock or at the bottom of an arbitrary 10 cm level within a layer of sterile soil.

To facilitate recovery of portable remains, all material collected from the units was screened through 1/4- and 1/8-in. mesh. Ecofacts and artifacts were hand-picked from the 1/4-in. screen. After excavation was completed, one representative wall was profiled, and the soils in each natural layer were described on standard PHRI stratigraphic forms, according to U.S. Soil Conservation Guidelines (Soil Survey Staff 1962) and Munsell Soil Color Charts (Kollmorgen Instruments Corp. 1990). All units were backfilled, and features were restored to their original

Table 2.
Summary of Excavation Units at Site 3150

Feature	Designation	Max. Depth (mbs)	Unit Size (meters)	Unit Volume (cm)	Gastropods (grams)	Osteichthyes (grams)	Mammals (grams)	Indigenous Artifacts (#)	Historic Artifacts (#)	No. Architectural Layers	No. Soil Layers	No. Cultural Soil Layers
Data Recovery Phase												
A	EU-1	0.43	1.0 x 1.0	0.43	2.76	0.96	8.00	8	10	1	1	1
B	EU-2 to -5	0.55	4.0 x 1.0	1.10	0.29	-	-	0	49	2	1	1
C	EU-6	0.21	1.0 x 0.5	0.11	-	-	-	-	-	1	1	0
D	EU-7	0.28	1.0 x 1.0	0.28	-	-	-	2	0	1	1	0
D	EU-8	0.37	1.0 x 1.0	0.51	291.68	0.74	92.28	-	95	1	1	1
Inventory Survey Phase (Henry and Graves 1993)												
A	ST-1	0.36	0.5 X 0.5	0.09	+	-	-	-	1	0	2	1
A	ST-8	0.28	0.5 X 0.5	0.07	+	-	-	-	-	0	1	1
B	ST-2	0.40	0.5 X 0.5	0.10	-	-	-	-	-	0	1	1
B	ST-9	0.27	0.5 X 0.5	0.07	+	-	-	-	-	0	1	1
C	ST-3	0.24	0.5 X 0.5	0.06	-	-	-	-	-	0	1	0
C	ST-10	0.30	0.5 X 0.5	0.08	-	-	-	-	-	0	2	0
D	TU-1	0.39	1.0 x 1.0	0.98	+	-	+	-	49	1	1	1
D	ST-4	0.39	0.5 X 0.5	0.98	+	-	-	-	6	1	1	1
D	ST-11	0.30	0.5 X 0.5	0.08	-	-	-	-	-	0	2	0

Key: *EU = Excavation unit (data recovery)*
ST = Shovel test (inventory survey)
TU = Test unit (inventory survey)
+ = Present
- = Absent

condition. An aluminum strip bearing the site number, feature designation, excavation unit number, the letters PHRI, the project number (94-1481), the excavator's initials, and the date was left at each unit datum. All collected materials were returned to the PHRI laboratory for processing and analysis.

LABORATORY METHODS

Artifacts were photographed, classified as to type and material, weighed, and characterized in terms of metric attributes. Midden samples were sorted and weighed by major category (e.g., bivalves, gastropods, fish, mammal, etc.), with identifications made to the most specific levels appropriate or possible. All materials recovered during the present project were handled in compliance with Section 66.3(b) of the National Park Service's Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements, which recommends that recovered materials "...be maintained by a qualified institution or institutions as close as possible to their place of origin, and made available for future research" (CFR n.d.b).

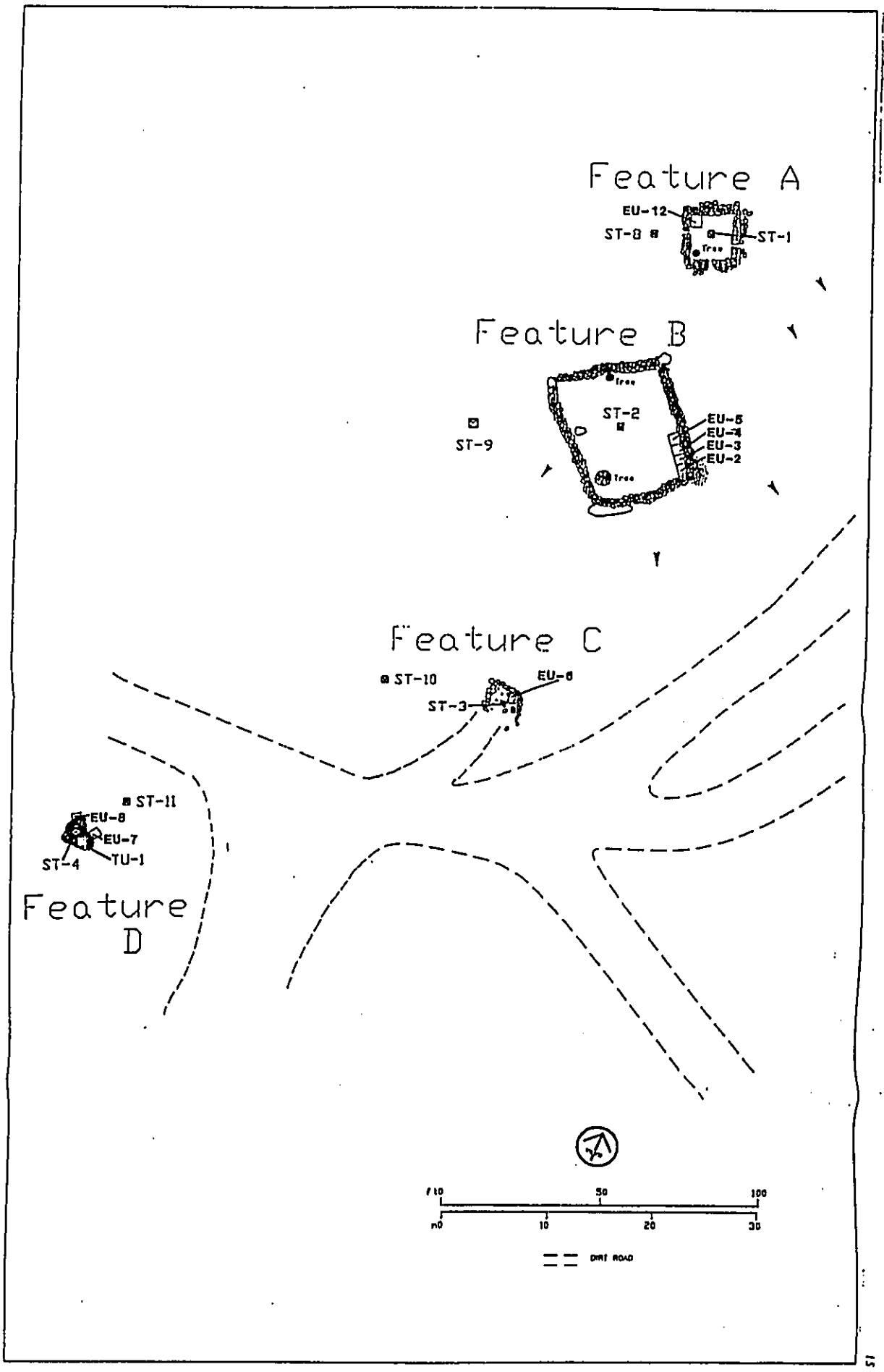

Figure 2. Plan View Map of Site 3150, Hana Medical Center

FINDINGS

Site 50-50-13-3150 is a complex of four features. The site is approximately 70 meters long and 20 meters wide, with an area of c. 942 square meters (0.094 hectares). It runs from Feature A, on a bench in the top of a N-S trending slope, to the southwest and across a graded dirt road to Feature D (*Figure 2*; note that this map is different from the previously published map). The results of the excavation units, surface collections, and additional recording are reported here, by feature.

FEATURE A

Feature A is a rectangular enclosure measuring 5.6 m (N-S) by 5.0 m, and with an interior floor space of c. 17 m². It is located on a flat bench in a northeast-facing slope (*Figure 3*). The average height of the walls is 0.6 m above ground surface. The walls consist of three to four courses of stacked subangular to subrounded pahoehoe and aa cobbles and small boulders (0.25-0.45 m in diameter). The walls are core-filled with small basalt cobbles 0.07-0.14 m in diameter. The walls are in relatively good condition; however, all four exhibit some collapse.

There are two breaks in the walls, apparent entrances to the enclosure. One is about 0.4 m wide and is near the southeast corner of the eastern wall. There are upright aa boulders on both sides of this opening. The second opening, about 0.5 m wide, is in the center of the southern wall, and there is a single similar upright on the eastern edge of the opening. A fallen upright of waterworn basalt was observed just outside the northeast corner of the enclosure, and a waterworn basalt cobble was present near the southern entrance.

During the inventory survey, two shovel tests (ST-1 and -8) were placed at Feature A, one (ST-1) in the center of the feature, and a second (ST-8) outside the feature to the northeast. The STs yielded a dark organic soil, charcoal flecks, marine shell, historic glass fragments and several waterworn pebbles. Based on Feature A's shape and size, and the portable remains at the feature, it was concluded that the feature functioned for historic habitation (Henry and Graves 1993:10).

One additional 1.0 by 1.0 m excavation unit (EU-1) was placed in the northwest interior corner of Feature A (*Figure 4*). The elevational datum for this unit was set at soil surface, in the southeast corner (corners at [cmbd]: SW 4, NW 5, SE 0, NE 5). Grid north was set at 14 degrees. A post-excavation photo of EU-1 is attached as *Figure 5*. Only one soil layer was revealed, and the unit was terminated on bedrock.

EU-1, West Face

Layer	Description
I	0-41 cmbd; 34-41 cm thick; black (10YR 2/1 moist); silt loam; black (10YR 2/1 dry); strong, fine, granular structure; hard, firm, slightly sticky, slightly plastic consistence; few, micro to very fine, vesicular roots; clear, irregular boundary; cultural layer.

The collection of ecofactual remains found in EU-1 is shown in *Table 3*. These included a total of 11.72 grams of ecofactual remains, 15.1 grams of wood charcoal, and 18 artifacts. By weight, the food remains comprise 23.55% marine gastropods, 8.19% unidentified fish bone,

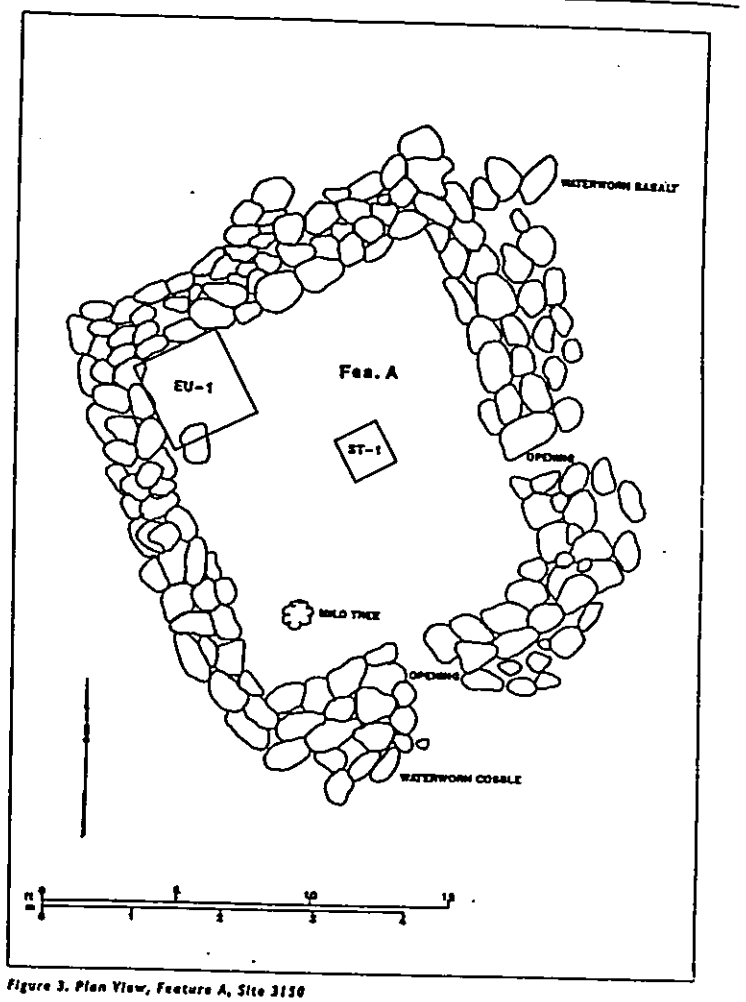

Figure 3. Plan View, Feature A, Site 3150

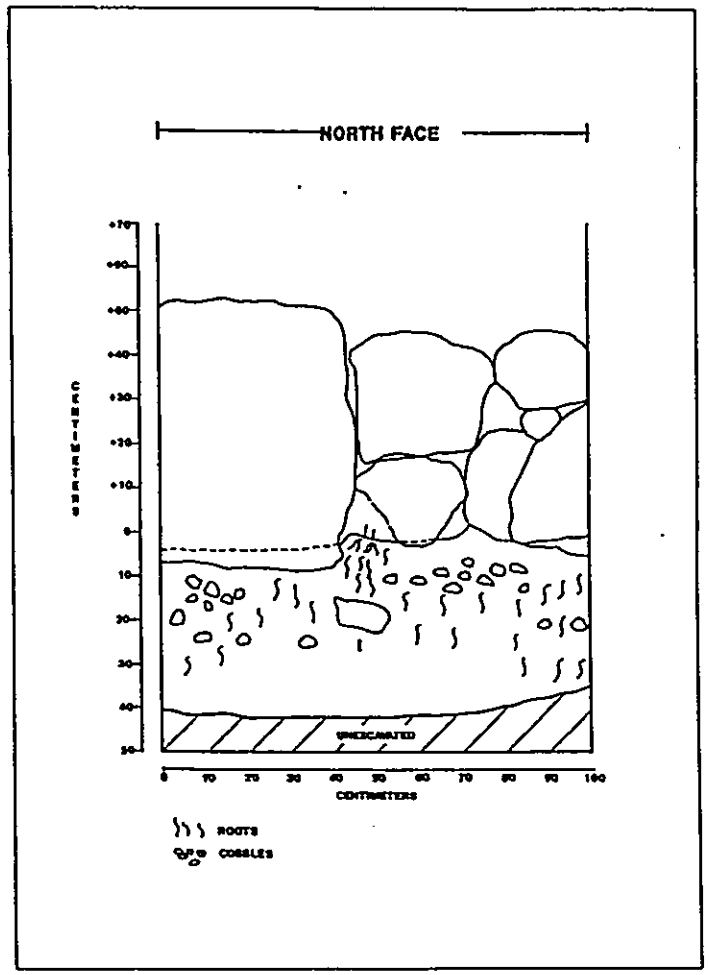

Figure 4. Profile, EU-1, West Wall, Feature A, Site 3158

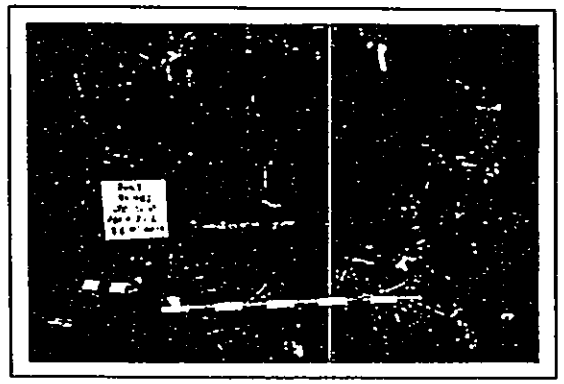

Figure 5. Feature A, EU-1, Post-excavation (Neg.4915:4a)

Table 3.
Distribution of
Ecofacts in EU-1, Feature A

Depth (cm below datum)	20-35	30-43	Feature
Layer/Level	1-2	1-3	Totals
Gastropods			
Cellana sp.	-	0.78	0.78
Thaididae	-	1.98	1.98
Subtotal Gastropods	0.00	2.76	2.76
Vertebrates			
Unidentified fish	0.96	-	0.96
Capra hircus/Ovis sp.	-	8.00	8.00
Subtotal Vertebrates	0.96	8.00	8.96
Wood Charcoal	-	15.10	15.10
Total (grams)	0.96	25.86	26.82

Table 4.
Distribution of
Artifacts in EU-1, Feature A

Depth (cm below datum)	20-35	30-43	Feature
Layer/Level	I-2	I-3	Totals
Flaked Basalt	7	-	7
Basalt, Uncertain Function	-	1	1
Nail (metal)	1	-	1
Fragment (slate)	4	3	7
Button (glass)	1	-	1
Button (wood)	-	1	1
Total (count)	13	5	18

and 68.26% sheep or goat bone. With the exception of the unidentified fish remains, all of the ecofactual materials recovered from Feature A derived from Layer I-3 of EU-1 at depths of 30 to 43 cm, just above bedrock.

The artifactual remains found in EU-1 are depicted in *Table 4*. The 18 artifacts include eight basalt fragments; one exhibits a rounded, waterworn face, and must be a manuport; the other seven are classed as flakes, although only one is recognizable as flaked rock. Seven slate fragments, all smooth on one face, may have been part of a chalkboard. One square nail piece, a wood button, and a glass button (possibly a shoe button) round out the inventory.

The sparse collection of historic domestic items and possible food remains indicates only temporary use of this enclosure for habitation. The artifact collection suggests an early 20th century date for the earliest possible use of the structure. No evidence of any occupation predating historic times was located, and clearly historic materials (the nail and buttons) were dispersed through both levels containing portable remains. EU-1 was placed on the interior of the corner of the north and west walls. The architecture does not extend more than five cm below the soil surface (*Figure 4*), underscoring the relatively recent age of the structure.

FEATURE B

Feature B is a large rectangular enclosure, located about 12 m southeast of Feature A (*Figure 6*). This enclosure measures 13.7 m long and 10.5 m wide and has an aa cobble-paved floor (c. 99 m²) which slopes from northwest to southeast. The enclosure walls are constructed of stacked, subangular to subrounded aa boulders and cobbles 0.25-0.40 m in diameter. The walls are six to seven courses high, and average 1.10 m above ground surface, and approximately 0.50 m thick. Large basalt boulders in excess of 1.0 m in diameter are in the northwest, northeast, and southwest corners of the structure. Portions of the enclosure along the west, south and eastern walls are collapsed, especially the southeast corner. The intact portions are capped with small basalt cobbles 0.25 to 0.30 m in diameter.

A portion of the northern wall curves outward slightly to the northwest, to accommodate a large false *kamani* tree. As this portion of the enclosure appears to have been constructed around the tree, it is likely of relatively recent origin. The north wall consists of an upthrust basalt bedrock ledge, topped with small boulders and cobbles, and measures 0.3 to 0.7 m high.

Glass bottles and jars of recent age are scattered around the perimeter of the enclosure. Located approximately five meters from the southeast exterior corner of Feature B are five 50-gallon metal drums, and several sheets of corrugated metal roofing. The enclosure exhibits no wall openings, but the low north wall affords easy entrance and exit.

Two STs were excavated at Feature B. ST-2 was placed in the center of the enclosure and yielded a small amount of burned coconut shell. ST-9 was placed west of the enclosure and yielded a single cowrie shell.

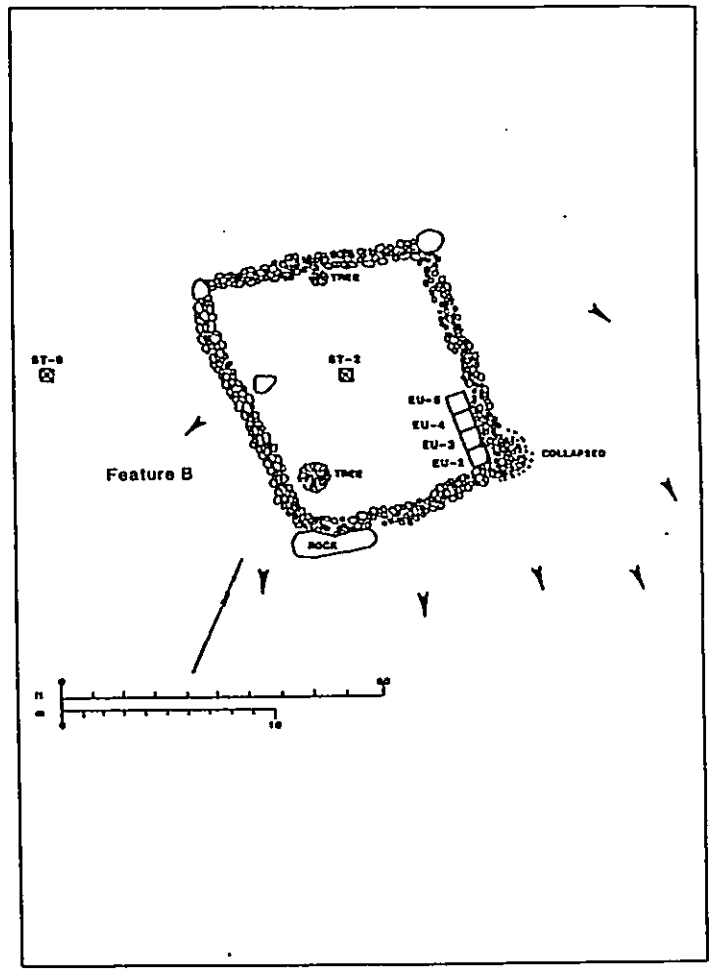

Figure 6. Plan View, Feature B, Site 3150

Four 1.0 by 1.0 m excavation units (EU-2 through -5) were placed in a block along the southeast interior wall of Feature B (*Figure 7*). The elevational datum for this unit was set at soil surface, in the northwest corner (overall corners at [cmbd]: SW 45, NW 0, SE +60, NE +95). Grid north was set at 15 degrees. A post-excavation photo of EU-2 and -3 is attached as *Figure 8*. After clearing away leaf mold, the first layer of the unit consisted of an aa gravel and cobble pavement. Upon removing the pavement, a soil layer was revealed. The unit was terminated after removal of a complete level of Layer II in EU-4 and -5, where no portable remains were recovered. In EU-2 and -3, where all of the artifacts were recovered, Layer II was taken down through three levels, and was terminated after the third level yielded no additional portable materials (*Figure 8*). Basalt bedrock was encountered in the deepest part of the excavation.

EU-2 through -5, East Face

Layer	Description
I	0-42 cmbd; 10-32 cm thick; gravel and cobbles; many roots; clear, wavy boundary; architectural layer.
II	28-81+ cmbd; very dark brown (10YR 2/2 moist); gravelly clay; dark brown (7.5YR 3/2 dry); strong, fine, medium, granular structure; extremely hard, very firm, sticky, plastic consistence; many roots; cultural layer.

The extremely sparse collection of ecofactual remains found in Feature B is depicted in *Table 5*. These comprised only 0.29 grams of *Cellana sp.* (*'opihi*). *Table 6* depicts the distribution of the 49 artifacts that were located in Feature B. All of the artifacts were located near the surface of Layer II, and appeared to have filtered down through the pavement, rather than sealed beneath it. Nail fragments (n=47, some identifiable as square, some round) constituted almost all of the artifacts. A white glass button and a small piece of tan plastic were the only other two items recovered.

This feature had previously been identified as an animal pen, but the construction deems this unlikely. The low north wall, especially, could not have restrained livestock. The large number of nails suggests that a wooden structure may have been supported by the rock walls. Since food remains or any other class of artifacts are lacking, it may be that the structure served as a sleeping shelter. The size of the structure and the investment in labor in construction further indicates that it may have been used on a recurrent or permanent basis. As at Feature A, the architecture has been demonstrated to have been constructed very near the present soil surface (*Figure 7*). The piece of plastic and pieces of round nail suggest mid-20th century use.

Table 5.
Distribution of Ecofacts in Feature B

Depth (cm BD)	6-55	16-45	Feature
Layer/Level	II-1	II-2	Totals
Cellana sp. (Gastropod)	0.29	-	0.29
Total (grams)	0.29	0.00	0.29

Table 6.
Distribution of Artifacts in Feature B

Depth (cm BD)	6-55	16-45	Feature
Layer/Level	II-1	II-2	Totals
Nail (metal)	38	9	47
Button (glass)	1	-	1
Fragment (plastic)	1	-	1
Total (count)	40	9	49

FEATURE C

Feature C was previously described (Henry and Graves 1993:10) as an "L-shaped enclosure" and associated terrace. Located about 20 m south-southeast of Feature B (*Figure 2*), Feature C consists of a bench in a southeast facing slope, with a bladed road looping

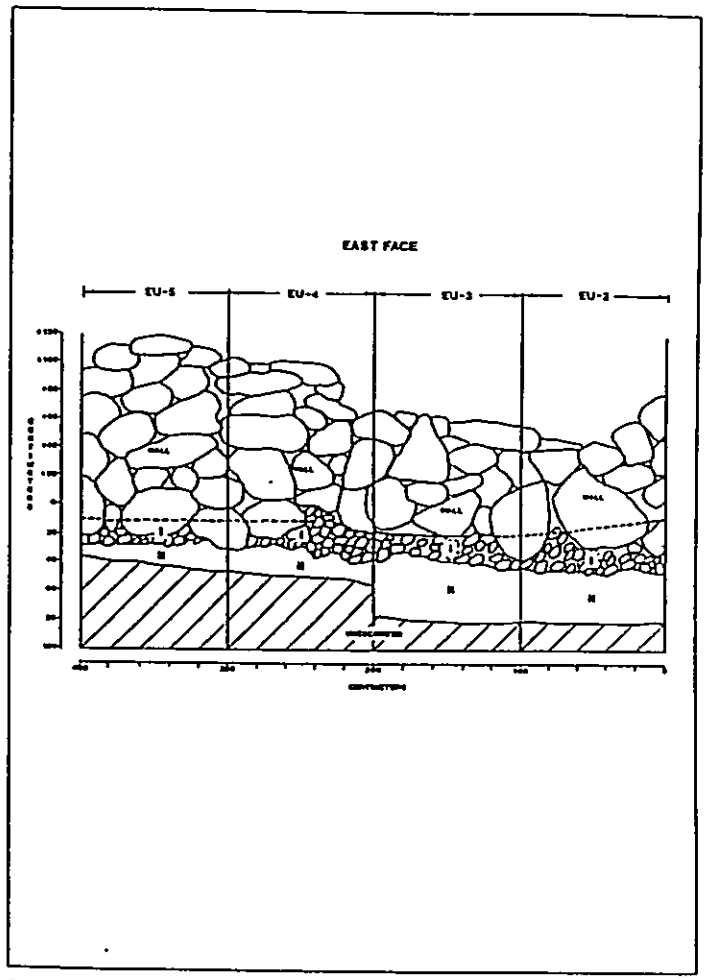

Figure 7. EU-2 through -5, Profile, East Wall, Feature B, Site 3150

Figure 8. Feature B, EU-2 and -3, Post-excavation (Neg. 4916:20a)

around the south and east sides (*Figure 9*). The terrace was said to be defined by a wall of aa boulders. In fact, there is no wall, only a loose alignment, and there appears to be some grading extending onto the "terrace." Thus, the feature may have been constructed by road grading and this may also be the means by which the boulders were aligned.

Two shovel tests were excavated during the inventory survey at Feature C. ST-3 was placed in the center of the terrace, and ST-10 was placed outside the feature to the west. Neither ST yielded any cultural materials. EU-6 was laid out as a 1.0 by 1.0 m unit against the interior of the north alignment. An unexpected, large boulder was encountered in the west half of the unit, so the EU was reduced to 0.5 by 1.0 (*Figure 10*). This unit, as with the inventory survey STs, did not yield any ecofacts or artifacts.

An elevational datum for EU-6 was established on a sapling outside the southwest corner of the unit (corners at [cmbd]: SW 104, NW 99, SE 102, NE 105). Grid north was set at True North. A post-excavation photo of EU-6 is attached as *Figure 11*. After clearing away leaf mold, the first layer of the unit consisted of an aa gravel and cobble pavement. The rocks bordering the unit were assigned Layer I, and the single soil layer was termed Layer II.

EU-6, West Face

Layer	Description
II	104-125 cmbd; 19-24 cm thick; dark brown (7.5YR 3/2 dry); stony clay loam; moderate, medium, subangular blocky structure; slightly hard, firm, sticky, plastic consistence; common, fine roots; common, medium pores; non-cultural layer.

Feature C had been assigned an indeterminate function (Henry and Graves 1993:10). It now seems clear that Feature C is unrelated to Features A, B, and D, and is most likely the result of

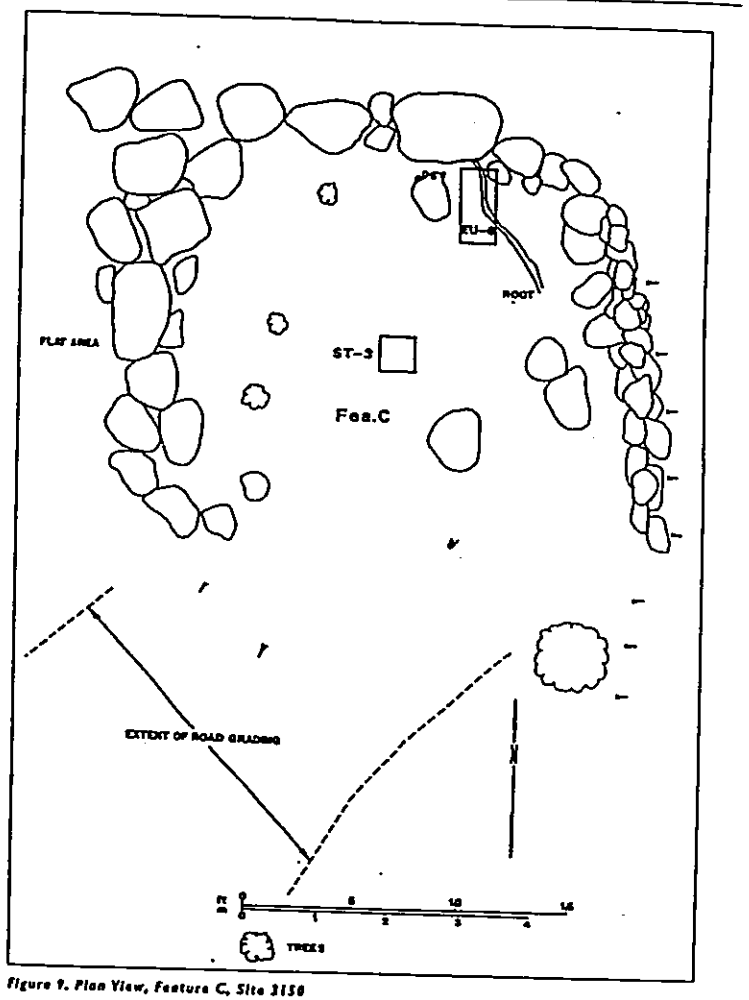

Figure 9. Plan View, Feature C, Site 3150

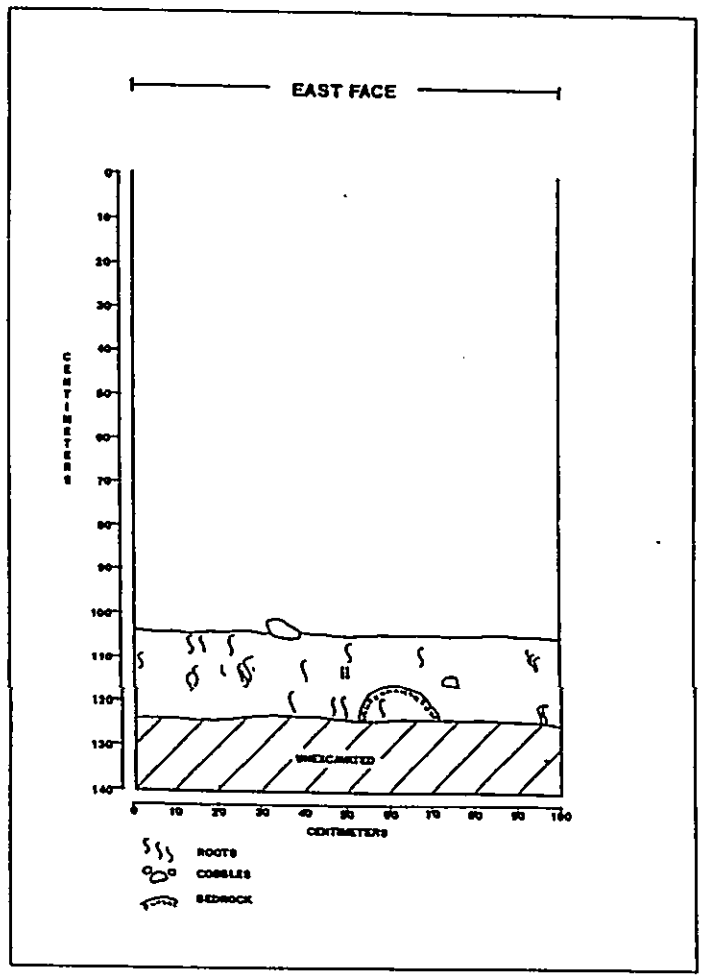

Figure 10. EU-6, Profile, East Wall, Feature C, Site 3158

Figure 11. Feature C, EU-6, Post-excavation (Neg. 4915:9a)

bulldozing of the parcel in recent time. This conclusion is based on the dearth of any ecofacts or artifacts within the feature, as well as the lack of any formal architecture.

FEATURE D

Feature D was previously described as an amorphous platform, constructed of aa cobbles and boulders, 2.5 by 2.0 m in plan (Henry and Graves 1993:12). The feature does qualify as a platform, with faced walls on the east and south sides, but only a single course of boulders raises the surface above ground level on the north and west. The platform incorporates basalt bedrock along its eastern wall. The exterior walls are constructed of one to four courses of basalt rock, faced on the east, and measure 0.36-0.78 m high. The platform is paved with large pebbles to medium cobbles, and the surface is flat. A small terrace paved with small to large cobbles was noted at the base of the east wall of the platform. The platform appears roughly triangular in plan view (*Figure 12*).

Two STs were excavated at Feature D, during the inventory survey. ST-11, placed adjacent to the platform to the northeast, was culturally sterile. ST-4 was placed in the center of the platform and yielded marine shell, a waterworn stone, and historic glass and ceramic fragments. Due to sidewall collapse, ST-4 was terminated 0.39 m below the surface of the platform. It was determined that a more formal excavation unit could more comprehensively test the platform; therefore, Test Unit 1 (TU-1) (1.0 by 1.0 m) was placed in Feature D, with the additional goal of testing for human remains (*Figure 12*). The unit comprised two layers, which both contained cultural materials (ceramics, faunal bone, shell, and a glass button [in Layer II]). No human remains were encountered, and TU-1 was terminated on bedrock.

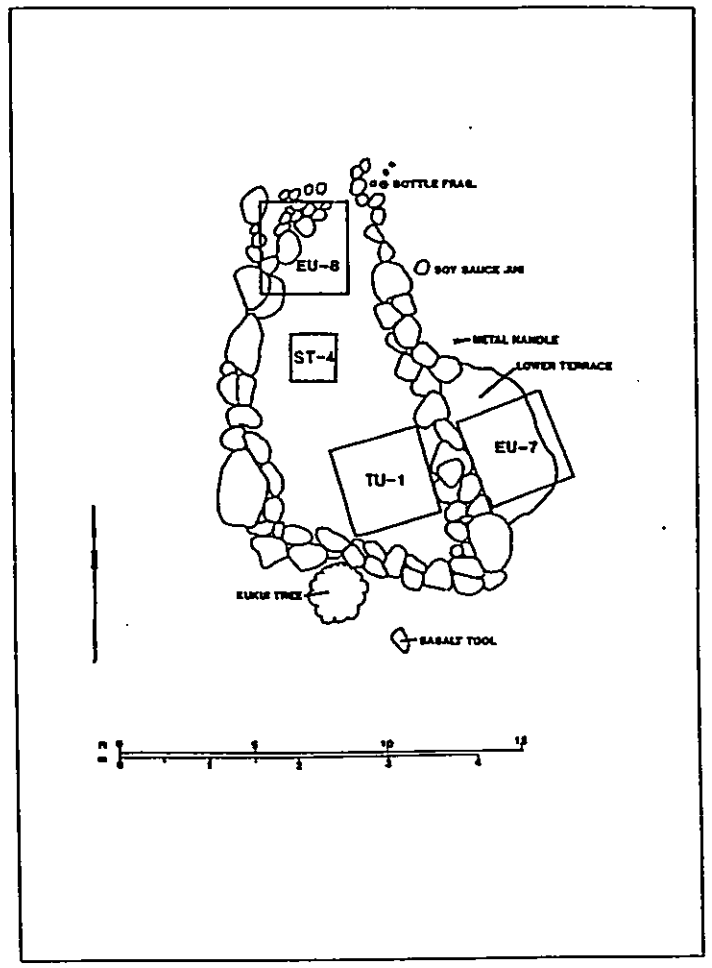

Figure 12. Plan View, Feature D, Site 3158

Two excavation units were placed at Feature D during the data recovery work. EU-7 *(Figure 13)* tested the terrace pavement to the east of the platform, while EU-8 *(Figure 14)* was excavated into the north edge of the platform (the only previously undisturbed area). An elevational datum for both of the excavations at Feature D, as well as the surface collection, was established on a *kukui* on the south edge of the platform outside the southwest corner of the unit (corners at [cmbd]: SW 104, NW 99, SE 102, NE 105). Grid north for EU-7 was set at 340°, and the corners were located at (cm BD): SW 90, NW 93, SE 106, NE 118. Grid north for EU-8 was also aligned to 340°, and the corners were located at (cmbd): SW 83, NW 84, SE 100, NE 115. A post-excavation photo of EU-7 is attached as *Figure 15*, while EU-8 is depicted in *Figure 16*.

EU-7, West Face

Layer	Description
I	83-109 cmbd; 12-20 cm thick; cobbles and gravel; clear boundary; architectural layer.
II	98-115+ cmbd; black (10YR 2/1 moist); clay; very dark brown (10YR 2/2 dry); strong, fine to coarse, granular structure; extremely hard, very firm, sticky, plastic consistence; non-cultural layer.

EU-8, South Face

Layer	Description
I	104-142 cmbd; 10-38 cm thick; stones; gradual, irregular boundary; aa pavement atop platform, architectural layer.
II	125-185 cmbd; 10-42 cm thick; dark brown (7.5YR 3/2 moist); clay loam; very dark grayish brown (10YR 3/2 dry); strong, medium, subangular blocky structure; hard, extremely firm, sticky, plastic consistence; few, fine roots; common, coarse pores; very abrupt, wavy boundary; cultural layer.

EU-7 revealed two layers, a pavement of aa cobbles and gravel over a soil that turned out to be sterile of cultural material. EU-8 also revealed two layers. The pavement of the platform was constructed using a larger average-size cobble than at the terrace where EU-7 was located. The soil beneath was very similar to that in EU-7, however.

EU-7 was sterile, except for one small waterworn basalt pebble (possibly an *'ili 'ili*) and a small amount of charcoal. EU-8 yielded a total of 374.70 grams of ecofactual remains (*Table 7*). The food remains comprised 77.84% marine gastropods, 0.20% Scaridae, 2.33% pig, and 19.63% unidentified mammal. The remains were recovered from Layers I (38.84%) and II (61.16%) of EU-8. The pig bone was sawn with a metal blade (see *Appendix B*)..

Artifactual materials, many from the surface collection, recovered from Feature D (*Table 8*) included a basalt manuport, two metal handles, two metal nail fragments, 25 fragments from an earthenware jug, eight fragments from white ware bowls, 12 non-diagnostic glass fragments, 198 non-diagnostic metal fragments, and a horseshoe.

In the previous report, Feature D was assigned an indeterminate function. It now appears that Feature D was constructed in two stages. The lower terrace which protrudes to the east, can be seen to continue beneath the wall forming the platform (*Figure 13* and *Figure 15*), and represents a first stage of construction. The platform is built up around the basalt bedrock noted in the southeast corner of the supporting wall; a portion of the bedrock forms the southeast corner of the platform and protrudes above the surface of the platform, between the locations of ST-4 and EU-8 (*Figure 16*).

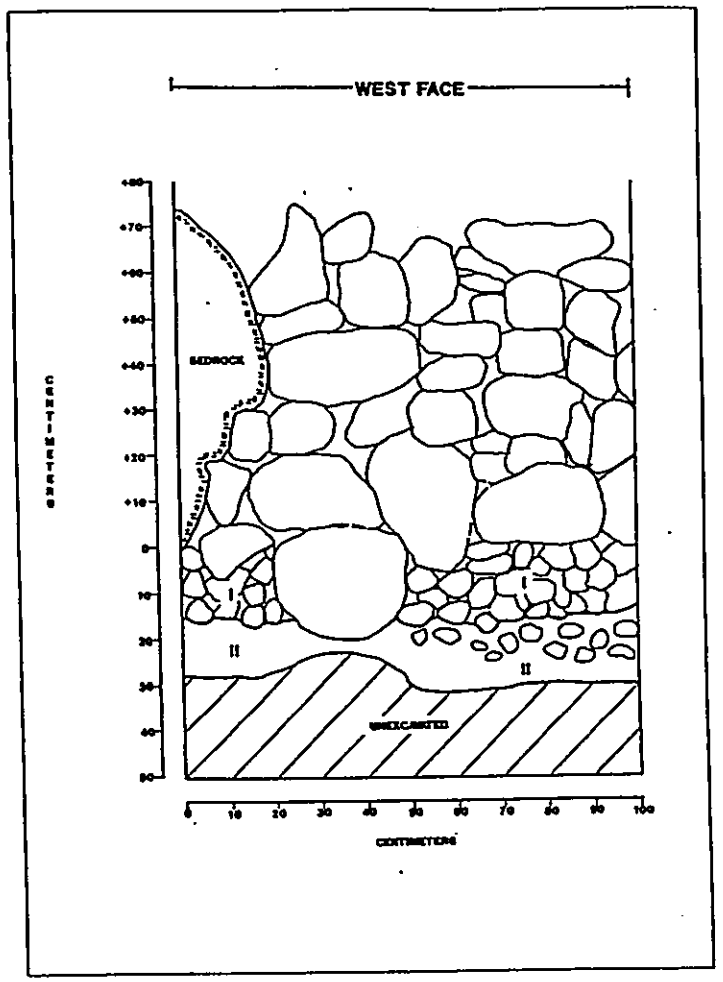

Figure 13. EU-7, Profile, West Wall, Feature D, Site 3150

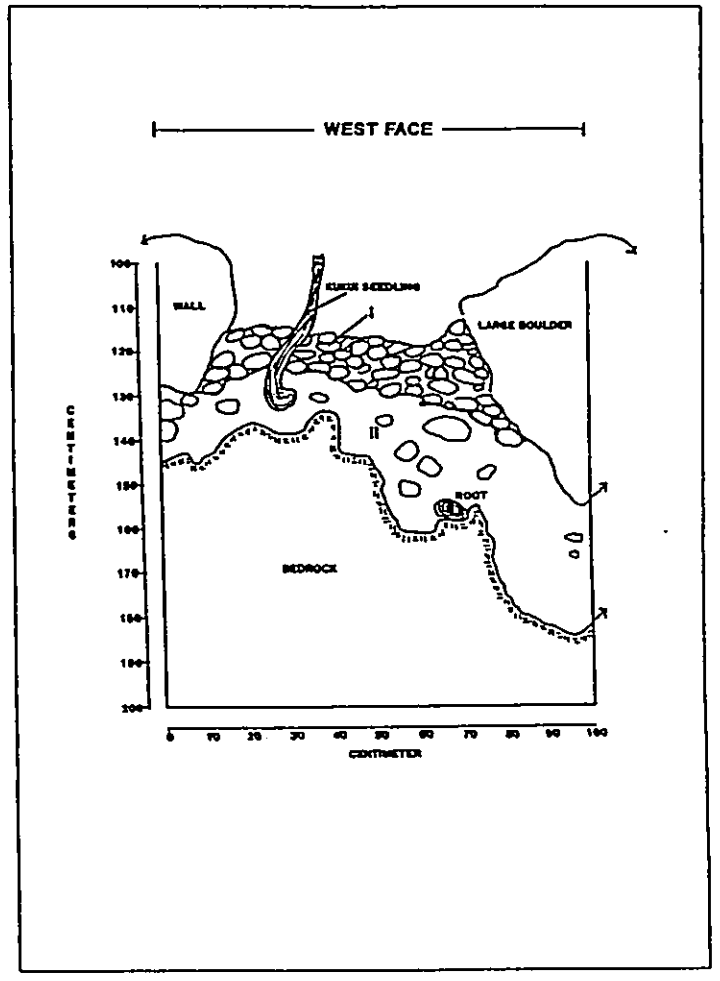

Figure 14. EU-8, Profile, West Wall, Feature D, Site 3150

Figure 15.
Feature D, EU-7, Post-excavation (Neg. 4916:12a)

Numerous (n=110) artifacts were collected at Feature D, including one fragment of waterworn basalt from the surface which exhibits some pecking on the end, and the possible *'ili'ili* from EU-7 mentioned above. While these are classed as indigenous artifacts, the association with numerous historic artifacts suggests that they may also be historic in origin. Few of the historic artifacts are date sensitive, but the fragments of square nails, brown ware (n=25, these may represent at least two soy jugs), and ceramic dishes suggest a late 19th to early 20th century date. This date is substantiated by the evidence of metal sawing on the recovered pig bone. The artifacts appear to post date the construction of the platform, as most were found littered among the pavement stones and on the surface. The pair of metal handles, which appear to have been end grips from a foot locker or trunk, were found in two locations, one on the exterior surface the other among the cobbles of the platform paving.

The high counts of gastropods and historic artifacts indicate more consumption activity at this feature than at the other features in Site 3150, although the lack of diversity in the collection suggests episodic use. The form of this feature suggests a sleeping platform, or temporary habitation. It is likely that it was used for an eating location, however, based on the high number of domestic artifacts, as well as the gastropod counts. Despite the high numbers, episodic use could have created the collections at Feature D.

Figure 16. Feature D, EU-8, Pre-excavation (Neg. 4916:9a)

OTHER OBSERVATIONS

Based on the results of the present investigation, the configuration of Site 3150 has been changed from that reported previously (Henry and Graves 1993:11). The new measured location of Feature D is approximately 25 meters northwest of the previous mapped location (*Figure 2*). The location of the other features remain unaltered.

While relocating the extant features in the parcel, a possible new site was located, but subsequently determined to be on private property to the south of the Hana Medical Center parcel. It was not recorded, but is reported here to aid other investigations in the area. The site consists of a fragment of water ditch with approximate dimensions of two meters wide and deep. It followed a contour of c 190 feet (57.9 meters) AMSL, and may be related to the "permanent flume" shown in the 1907-1909 plantation map (Borthwick et al. 1992). The ditch appears to have originally traversed the current project area, east of Feature D. It may have followed the route of a current dirt road which skirts to the east of Features A and B, but has been obliterated by grading activity.

Table 7.
Distribution of Ecofacts in Feature D

Depth (cm BD)		EU-7 89	EU-7 103-111	EU-8 108-153	EU-8 116-158	EU-8 126-168	Feature
Layer/Level	Surf	II	II-2	II	II-1	II-2	Total
Gastropods							
Cellana sp.	-	-	-	129.99	76.56	16.77	223.32
Cypraeidae	-	-	-	-	52.29	-	52.29
Thaididae	-	-	-	-	16.07	-	16.07
Subtotal Gastropods	0.00	0.00	0.00	129.99	144.92	16.77	291.68
Osteichthyes							
Sparidae	-	-	-	-	0.74	-	0.74
Subtotal Osteichthyes	-	-	-	-	0.74	-	0.74
Mammal							
Sus scrofa	-	-	-	2.81	5.17	0.74	8.72
S-to-M mammal	-	-	-	-	1.53	1.53	3.06
Medium mammal	-	-	-	12.73	54.67	1.10	70.50
Subtotal Mammal	0.00	0.00	0.00	15.54	63.37	3.37	82.28
Vegetal Remains							
Wood Charcoal	-	-	0.33	-	-	-	0.33
Subtotal Vegetal Remains	-	-	0.33	-	-	-	0.33
Total (grams)	0.00	0.00	0.33	145.53	209.03	20.14	374.93

Table 8.
Distribution of Artifacts in Feature D

Depth (cm BD)		EU-7 89	EU-7 103-111	EU-8 108-153	EU-8 116-158	EU-8 126-168	Feature
Layer/Level	Surf	II	II-2	II	II-1	II-2	Total
Indigenous							
Basalt, Uncertain Function	0	1	-	-	-	-	2
Subtotal Indigenous	0	1	-	-	-	-	2
Historic							
Nail (metal)	-	-	-	-	1	1	2
Handle (metal)	0	-	-	0	1	0	2
Jug (earthenware)	10	-	-	12	1	2	25
Bowl (stoneware)	-	-	-	5	1	-	6
Saucer (stoneware)	1	-	-	1	-	-	2
Fragment (glass)	-	-	-	2	8	2	12
Fragment (metal)	-	-	-	1	30	27	58
Horseshoe (metal)	1	-	-	-	-	-	1
Subtotal Historic	13	0	0	21	42	32	108
Total (count)	14	1	0	21	42	32	110

DATA ANALYSES

by Susan T. Goodfellow, Ph.D.

PORTABLE ARTIFACTS

A total of 177 portable artifacts or artifact fragments were recovered from data recovery excavations at Site 3150. A detailed tabulation of artifacts by feature, and unit is presented in *Table 9*. The results of the artifactual analysis are discussed below.

Indigenous Artifacts

In the following discussion, the artifact inventory is separated into two major categories: "indigenous" and "historic". The term "indigenous artifacts" generally refers to all artifacts made by indigenous people (in this case Hawaiian) regardless of temporal affiliation. Because it is often impossible to determine separate historic items used by indigenous peoples from those used by foreigners, however, for the purposes of the current discussion, "indigenous" is used to refer to the subset of artifacts manufactured through application of traditional Hawaiian manufacturing techniques, using locally available raw materials. "Historic" refers to items manufactured using non-indigenous manufacturing techniques or materials (glass, metal, plastic, etc.), regardless of the probable ethnicity of the people who used them.

The inventory of indigenous artifacts includes ten items, three of which are probable manuports and seven of which are flaked lithic items. The 167 remaining items are classified as historic items, and include fragments of domestic items, construction materials, and personal articles, as well as non-diagnostic metal, plastic and glass fragments.

The ten indigenous items were recovered from Features A and D. All are manufactured of basalt, which is a material that would have been readily obtained from local outcrops and stream beds. The indigenous artifacts are described by type below.

Manuports - The three basalt manuports are small, waterworn pebbles encountered in the matrix of Layer I at both Features A and D. They exhibit no evidence of modification and are interpreted as artifacts only because of their apparent association with the primary cultural deposit at the site. Although it is possible that these items are *'ili'ili* stones, the general scarcity of such items at each feature argues against this interpretation.

Flaked Lithics - A total of seven flaked lithic artifacts, all of which were manufactured from basalt, were recovered from Feature A of Site 3150. The flake lithic artifacts were evaluated with respect to flake/core type following established procedures for evaluating flaked stone material (Sullivan and Rozen 1985). In this system, lithic debitage is divided into four categories based on presence or absence of three variables: a single interior surface, a point of applied force, and margins. The categories are interpretation-free, as they are not linked to any particular reduction technique. Complete flakes have all three variable, including the point of applied force, where the bulb of percussion intersects the striking platform. Broken flakes lack intact margins, which include both a hinge or feather termination at the distal end and complete lateral margins. Flake fragments lack a point of applied force. Debris lacks a single discernible interior surface, such

Table 9.
Detailed Distribution of Portable Artifacts

Feature	A			B			C						D				Site Grand Total
Unit	EU-1	I-2	Total	Fea. EU 2-5	B-1	Total	EU-7 Surf.	EU-8 I	EU-8 II-1	EU-8 II-2	EU-8 Subtotal	Fea. Total	B-3	B-2	B-1	Total	
Layer-Level		I-3															
Indigenous																	
Flaked Lithics	7	*	7	*	*	0	*	*	*	*	0	0	*	*	*	0	7
Basalt																	0
Uncertain Function																	
Basalt	*	—	—	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Subtotal Indigenous	7	—	7	0	0	0	*	*	*	*	0	0	*	*	*	0	7
Historic																	
Construction Materials																	
Nail (metal)	—	*	—	38	9	47	*	*	*	*	0	0	*	*	*	0	47
Fragment (slate)	4	3	7	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Subtotal Const. Materials	5	3	8	38	9	47	*	*	*	*	0	0	*	*	*	0	47
Domestic Items																	
Handle (metal)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Jug (earthenware)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Bowl (stoneware)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Saucer (stoneware)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Fragment (glass)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Subtotal Domestic Items	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Personal Adornment																	
Button (glass)	—	*	—	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Button (wood)	—	—	—	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Subtotal Personal Adorn.	—	—	—	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Miscellaneous																	
Fragment (metal)	0	*	0	*	*	0	*	*	*	*	0	0	*	*	*	0	0
Fragment (plastic)	0	*	0	—	*	—	*	*	*	*	0	0	*	*	*	0	0
Horseshoe (metal)	0	*	0	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Subtotal Miscellaneous	0	0	0	—	—	—	*	*	*	*	0	0	*	*	*	0	0
Subtotal Historic	4	3	8	38	9	47	*	*	*	*	0	0	*	*	*	0	47
Total	13	5	18	40	9	49	*	*	*	*	0	0	*	*	*	0	49

as a bulb of percussion or ripple marks, or if there are multiple occurrences of this trait, a single interior surface cannot be discerned. Cores tend toward multifaceted polyhedral shapes dominated by one or more platforms, and typically show little evidence of subsequent use as tools. Based on these criteria, the flaked stone inventory was separated as follows: three complete flakes, one broken flake, and three pieces of debris (*Figure 17*).

The three complete flakes measure 1.5-2.0 cm in length, 1.0-1.5 cm in width, and 0.4-0.5 cm in thickness. They are manufactured from a poor quality (slightly vesicular), aphanitic, dark gray basalt. Two exhibit feathered terminations, while one has a hinged termination. The hinged flake also has a single dorsal ridge. Striking platforms on all three flakes are unmodified, and bulbs of percussion are salient diffuse. None of the three flakes exhibited cortex.

The broken flake and pieces of debris are manufactured from the same poor quality basalt as the complete flakes. The broken flake measures 2.7 cm by 2.3 cm by 0.3 cm, and has an intact, unmodified striking platform. The pieces of debris measure 1.8-2.1 cm by 0.7-0.9 cm by 0.3-0.5 cm. No cortex was noted on any of these specimens.

The flakes recovered from Site 3150 are manufactured of poor quality basalt, and would have lacked the same fine cutting edge encountered on flakes manufactured of volcanic glass. It is therefore unlikely that these specimens functioned as cutting tools. The slightly vesicular texture of the basalt does give the specimens greater abrasiveness, making it more likely that the specimens functioned as scraping or abrading tools.

Historic Artifacts

Historic items were recovered from Features A, B, and D of Site 3150. Recovered items included 57 items identified as construction materials, 47 domestic items, three items of

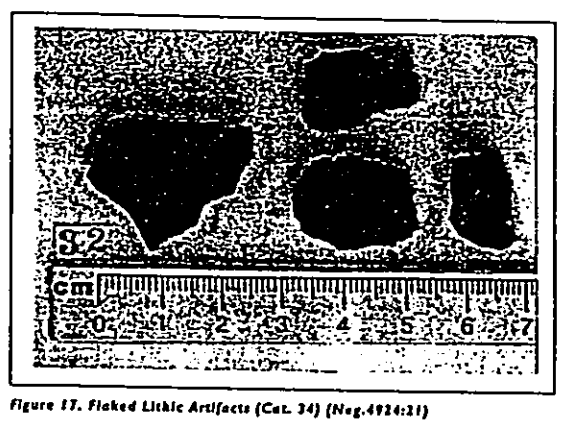

Figure 17. Flaked Lithic Artifacts (Cat. 34) (Neg.4924:21)

clothing/personal adornment, and 60 miscellaneous items. These are described by type below.

Construction Materials - The 57 items identified as construction materials consisted of 50 nail fragments, and seven slate fragments. The nails derive primarily from Feature B (47) and are extremely corroded. Three of the nails exhibited square heads; the remainder were too fragmentary to identify head type, although several were clearly cut square nails, which were manufactured in America from before 1820 until c. 1920 (Hume 1970:253-4). The slate fragments derive from Feature A, and appear to be fragments of roofing.

Domestic Items - Domestic items were recovered from Features B and D, and included two metal handles, 25 earthenware jug fragments, two stoneware saucer fragments, five stoneware bowl fragments, and 12 non-diagnostic glass fragments.

The handles were both recovered from Feature D, and were extremely corroded. They appear to have been end grips from a foot locker or trunk.

The earthenware fragments (Cat. 3, 8, 16, 18, 21, 22, 25) derive from the surface of Feature D and from Layers I and II of EU-8, and appear to represent either one or two vessels. A photograph of Cat. 25 is presented as *Figure 18*, below. Based on the morphological characteristics of the fragments, these vessels were small, flared mouth jugs measuring 12.0 cm in diameter at the base, 2.0 cm in diameter at the neck and 5.0 cm in diameter at the lip. The exterior of the jug was finished with a dark brown salt glaze—in places this glaze vitrified to form a lighter brown, glossy finish. The interior of the jug exhibited coil marks near the shoulder, and was finished with an irregular, thin brown glaze or slip. The interior base was finished with a medium brown glaze, while the exterior base was unglazed. These are characteristic of the type known as "soy jug," after the original purpose of the shipment of soy sauce from China (Munsey 1970:138).

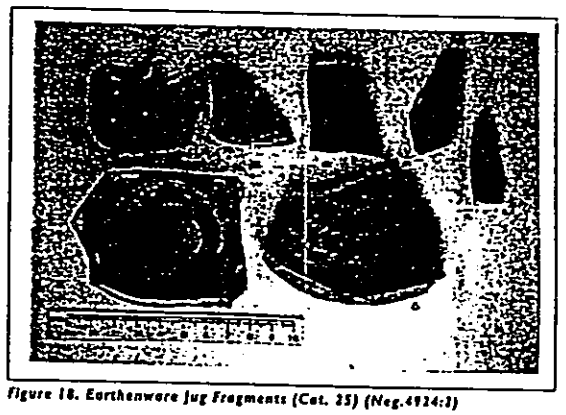

Figure 18. Earthenware Jug Fragments (Cat. 25) (Neg.4924:3)

Catalog Numbers 15 and 28 are two fragments of a whiteware (earthenware) saucer (*Figure 19*). The saucer is manufactured of white stoneware and finished with a glossy white glaze. The base has a molded foot. The saucer measures 15.0 cm in diameter. A partial maker's mark on the base of the saucer reads "Royal Patent..., George Jones ..., England". Vessels with this mark were manufactured after AD 1864.

Catalog Numbers 9, 17, and 23 comprise six fragments from a whiteware (earthenware) bowl. The paste of the fragments is white and porous, while the glaze is glossy white and crackled. The bowl appears to have been fairly shallow, with a wide, flat rim and a small molded foot. The exterior diameter of the bowl would have measured 25.5 cm. Four of the fragments (Cat.17) are shown in *Figure 20*.

The glass fragments include one clear fragment and 11 dark olive green fragments. Based on the color of the glass, the original vessels from which these fragments derived were manufactured after AD 1880 (Toulouse 1972).

Personal Adornment - The three items of clothing/personal adornment derive from Features A and B, and include two glass buttons and one wood button. Cat. 30 is a molded sew-through button manufactured of white milk glass. It has four holes and measures 1.7 cm in diameter by 0.4 cm in cross section. Cat. 38 is a one-piece button with a drilled back, and is manufactured of iridescent black glass. It measures 0.9 cm in diameter by 0.9 cm in cross section. Cat. 34 is a sew-through button with four holes. It is manufactured of a light brown wood and is extremely weathered. It measures 1.7 cm in diameter by 0.2 cm in cross section.

Miscellaneous Items - The miscellaneous items include a metal horseshoe, a non-diagnostic plastic fragment, and 58 non-diagnostic metal fragments. With the exception of the plastic fragment, all of the miscellaneous items derive from Feature D.

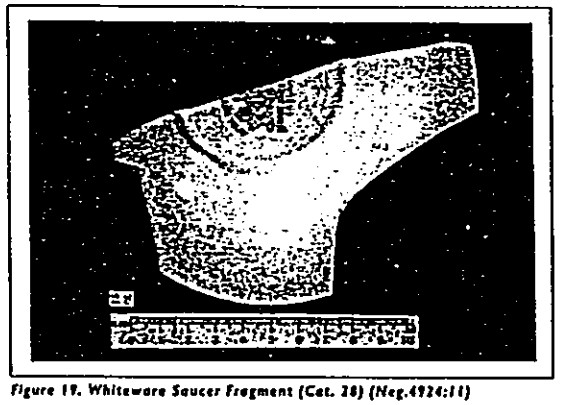

Figure 19. Whiteware Saucer Fragment (Cat. 28) (Neg.4924:11)

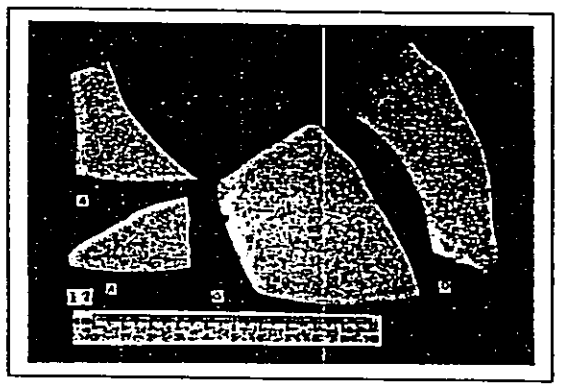

Figure 20. Whiteware Bowl Fragments (Cat. 17) (Neg.4924:13)

ECOFACTUAL REMAINS

Objectives and Methods

Ecofactual remains are archaeologically significant on a number of levels, as the variety and content of food remains contained within a given cultural deposit provide useful information concerning prehistoric diet and resource utilization patterns. The analysis of ecofactual remains for data recovery projects has three primary objectives:

To determine the variety and distribution of ecofactual remains present in each cultural deposit encountered within the project area;

To provide an indication of dietary and resource exploitation patterns for each site, and for the project area as a whole; and

To examine changes in dietary and resource exploitation patterns through time at each site, and for the project area as a whole.

All ecofactual remains recovered from the project area underwent detailed analysis in the laboratory. Detailed analysis involved splitting the sample into two size classes by passing it through 1/4-in and 1/8-in mesh screens. One hundred percent of the material retained in the 1/4-in screen was completely sorted to the lowest taxonomic level possible, while the material retained in the 1/8-in screen was inspected both for artifactual material and for taxa not encountered in the larger portion of the sample. Each category of identified invertebrate material

was then bagged and individually weighed. Relative percentages of invertebrate types were calculated for each provenience, as well as for the site as a whole. Marine shell identifications were verified and augmented using Kay (1979). Vertebrate faunal remains derived from PHRI's investigations were submitted to Dr. Alan Ziegler of Kaneohe, Oahu for identification.

The sampling design outlined above is adapted from Kirch (1979), based on a series of experiments measuring the relative distribution of mollusc and bone material retained on each screen. Kirch concluded that use of the screening process increased the speed of the sorting process without decreasing either the accuracy or statistical validity of the overall analysis. The taxonomic distribution and weight of material retained on the 1/4-in screen should thus be considered as representative of the variety and relative percentages of each taxon present in the entire sample.

Results

Ecofactual remains were recovered from Features A, B, and D of Site 3150 (*Table 10*). Total weights for each taxon (in grams) are tabulated by unit, with subtotals indicating the combined weight per site or feature for each larger material class (e.g., gastropods). The total weight of each taxon within the assemblage is provided in the final column of each table, while the final line of grand total represents the combined weight of all the ecofactual materials derived from the analyzed deposits.

By weight, 76.21% of the 386.71 grams of ecofactual remains recovered from Site 3150 is contributed by marine gastropods, 0.44% by Osteichthyes, and 23.34% by mammal. Marine gastropod taxa identified in the ecofactual samples were restricted to *Cellana sp.*, Cypraeidae, and Thaididae. Osteichthyes remains included Scaridae and unidentified fish, while mammal remains included pig, sheep/goat, small-to-medium mammal and medium mammal. Of these taxa, *Cellana sp.*, Cypraeidae and medium mammal contributed the greatest relative percentages of remains by weight. *Cellana sp.*, pig and medium mammal were also encountered in the greatest number of samples (i.e., these taxa were most ubiquitous).

Excavations at Feature A yielded a total of 11.72 grams of ecofactual remains; these comprised 23.55% marine gastropods (*Cellana sp.* and Thaididae only), 8.19% unidentified fish, and 68.26% sheep/goat. With the exception of the unidentified fish remains, all of the materials recovered from Feature A derived from Layer I-3 of EU-1.

Excavations at Feature B yielded a total of 0.29 grams of *Cellana sp.*; these were recovered from Layer II-1 of the excavation units.

Excavations at Feature D yielded a total of 374.70 grams of ecofactual remains; these comprised 77.84% marine gastropods, 0.20% Scaridae, 2.33% pig, and 19.63% unidentified mammal. The remains were recovered from Layers I (38.84%) and II (61.16%) of EU-8.

SUMMARY AND CONCLUSIONS

Data recovery excavations at Site 3150 yielded 177 portable artifacts and 386.71 grams of ecofactual remains. Although charcoal fragments were recovered from two excavation units, in both instances the fragments were directly associated with historic artifacts; because of the limited utility in submitting historic samples for radiocarbon dating, neither sample was

Table 10.
Detailed Distribution of Ecofactual Remains

	Feature	A				B		D			Site Grand Total
	Unit	EU-1		Feat.	EU-1	Feat.	EU-8		Feat.	
	Layer/Level	I-2	I-3	Subtot.	II-1	Subtot.	I	II	Subtot.	
Phylum/Class											
Gastropods											
Patellidae											
Cellana sp.			0.78	0.78	0.29	0.29	129.99		129.99	131.06
Cypraeidae				0.00	0.00	0.00			0.00	0.00
Thaididae			1.96	1.96	0.00	0.00			0.00	1.96
Subtotal Gastropods		0.00	2.74	2.74	0.29	0.29	129.99	0.00	129.99	133.02
Vertebrates										
Osteichthyes										
Scaridae				0.00	0.00	0.00			0.00	0.00
Unidentified fish		0.96		0.96	0.00	0.00			0.00	0.96
Subtotal Osteichthyes		0.96		0.96	0.00	0.00	0.00	0.00	0.00	0.96
Mammals										
Suidae										
Sus scrofa				0.00	0.00	0.00			0.00	0.00
Bovidae										
Capra hircus/Ovis sp.				0.00	0.00	0.00			0.00	0.00
Order & family indeterminate										
Small-M mammal				0.00	0.00	0.00			0.00	0.00
Medium mammal				0.00	0.00	0.00			0.00	0.00
Subtotal Mammalia		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetal										
Charcoal			15.10	15.10	0.00	0.00	0.23		0.23	15.33
Total		0.96	17.84	18.80	0.29	0.29	130.22	0.00	130.22	149.31

	Site Grand Total
	131.06
	0.00
	1.96
	133.02
	0.00
	0.96
	0.96
	0.00
	0.00
	0.00
	0.00
	15.33
	149.31

submitted for age determination analysis. The distribution of remains within each feature are discussed below, followed by a discussion of the range of activities and subsistence practices suggested by the portable inventory.

Portable remains were recovered from excavations and surface collections at Features A, B, and D of Site 3150. No portable remains were collected from Feature C, which was determined to be a bulldozer alignment during the data recovery phase field work. Materials recovered from Feature A included seven flaked lithic artifacts, a basalt manuport, a metal nail, seven slate fragments, two buttons, and 11.72 grams of ecofactual remains. Materials recovered from Feature B included 47 metal nail fragments, a button, a plastic fragment, and 0.29 grams of *Cellana sp*. Finally, materials recovered from Feature D included two basalt manuports, two metal handles, two metal nail fragments, 25 fragments from an earthenware jug, six fragments from a whiteware bowl, two fragments from a whiteware bowl, 12 non-diagnostic glass fragments, 58 non-diagnostic metal fragments, a horseshoe, and 374.70 grams of ecofactual remains.

Range of Activities and Period of Use

In general, the inventory of portable remains suggests that the site was used for a limited range of activities. Inhabitants of the site had access to marine resources (shellfish, fish); however, based on the absence of fishing gear at the site, it is possible that fish was obtained through trade or purchase rather than by direct procurement from the ocean. Domestic activities most likely included food preparation and consumption involving use of ceramic and glass items; manufacture and/or use of flaked lithic tools; and some type of construction activity (indicated by the nails).

The relative scarcity of indigenous artifacts recovered from the site indicates that use of the site was restricted to the historic period; based on the dates of manufacture for the ceramic and glass items, occupation of the site occurred after the AD 1880s. The relative abundance and diversity of items recovered from Feature D suggest that this feature was the primary locus of domestic activities, particularly with regards to food preparation or consumption. Features A and B may have served as work areas or may have been ancillary habitation features (sleeping rooms, storage areas, etc.). These interpretations are generally consistent with the field interpretations of the three features; all three of which were described as temporary habitations.

Subsistence

The results of the ecofactual analysis indicate that subsistence patterns in the project area included the collection and consumption of a limited variety of marine gastropods, and marine and terrestrial vertebrates. In general, the marine gastropods included in the assemblage are common inhabitants of the shorelines, shallow-water areas, solution benches and fringing reefs of the windward islands of the Hawaiian chain and would have been easily accessible to local populations. The most common taxa are noted below, with comments on their occurrence and probable economic value (taken from Titcomb 1978: 337-353).

Gastropods

Cypraeidae - Members of the family Cypraeidae were known as *leho* by the Hawaiians and were of major importance in the economy as food, ornaments, tools and octopus fishing lures. To prepare *leho* for consumption, the shells were broken open and the meat was removed and

worked with salt. The flesh was then wrapped in *ti* leaves and cooked over coals. Some people merely boiled the shell and then removed the meat. For the shells, small yellow and white *leho* were reserved for the *ali'i* to use as ornaments and were occasionally used as currency. Larger shells were used to make scrapers for removing the skin from cooked taro and breadfruit, and for grating coconut. Cowrie scrapers with a sharp, serrated edge were also used to incise *wauke* bark to remove it from the plant. The Mauritius and sometimes the tiger cowries were used as part of octopus lure assemblies.

In terms of habitat, the cowrie range from the intertidal zone to depths of about 100 m. The most common species in the Hawaiian Islands are found in shallow water under loose rocks and boulders along the shoreline and in crevices at the seaward edge of solution benches and fringing reefs (Titcomb 1978).

Patellidae - Members of the family Patellidae, or limpets, were grouped together and called *'opihi* by the Hawaiians. The *'opihi* were extremely well-liked as a food item and were reportedly the most commonly eaten shells. The favorite method of preparation was raw and salted, either with or without seaweed. They were sometimes washed clean and then cooked in the shell, using a calabash of water in which were placed hot stones. The shells were picked out later. This method enabled the broth (*kai*) to be used, especially by the sick and young. The meat was pulled from the shells or sometimes scooped out with a smaller, empty *'opihi*. *'Opihi* especially *'opihi'awa*, were used extensively as medicine, and were also associated with sorcery. Although no examples of utilized *'opihi* shells were encountered in the current project area, empty *'opihi* shells were often used for scooping, peeling and scraping because of their sharp edges.

Within the Hawaiian island chain, *Cellana spp.* are restricted in their occurrence to the shorelines of volcanic islands. They are generally found on basalt shorelines from the spray zone seaward to the calcareous algal zone, except for *C. talcosa* which occurs at depth of 1 to 10 cm along abrupt coastlines. Taxa recognized by the Hawaiians included *C. talcosa* (*'opihi ka'ele*), *C. sandwicensis* (*'opihi 'alinalina*) and *C. exarata* (*'opihi makaiauli*) (Titcomb 1978).

Thaididae - Members of the Thaididae family were known variously as *aupupu, 'awa, makaloa,* and *pupu makaloa*. They were primarily used as a food source, but larger specimens with a long, sharp, strong lip were often made into small adzes. *Morula spp.* are common in the intertidal zone, on hard substrates where there is strong wave action, while *Drupa spp.* are common on benches, reefs and basalt shores, where there is heavy surf action, and on rocky substrates, to depths of 15 m. The shells are often covered with a growth of coralline algae (Titcomb 1978, Kay 1979).

Vertebrates

Vertebrate faunal remains derived from Site 3150 were submitted to Dr. Alan Ziegler of Kaneohe, Oahu for identification. A complete report is attached as Appendix B. Weights of the identified bone are tallied in *Table 10*. The number of identified specimens (NISP) and minium number of individuals (MNI) are reported in *Table 11*.

Marine Vertebrates - Fish provided an additional marine resource for inhabitants of Site 3150. It is likely that fish were obtained from nearshore reefs, using a variety of techniques, including gathering, trapping, poisoning, snaring, spearing, netting, or shallow-line angling (Kirch 1979:208).

Table 11. Distribution of Faunal Material

Feature	A						D							
Unit	EU-1			Feature A Subtotal			EU-8			B-1			Site Grand Total	
Layer/Level	L-2		L-1				L							
*Count Type	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	NISP	MNI	NISP	NISP	MNI
Osteichthyes														
Sparidae	1	1	0	0	0	0	1	1	1	1	1	1	3	3
Unidentified fish	1	1	0	0	1	1	0	0	0	1	1	1	2	2
Subtotal Osteichthyes	2	2	0	0	1	1	0	0	0	2	2	2	5	5
Hummelo														
Scales														
Sea scrub					0	0	1	1	3	2	2	2	5	5
Bovidae														
Capra hircus/Ovis sp.			1	1	1	1	1	1	1	1	1	1	3	3
Order & family indeterminate														
Small-Medium mammal					0	0	0	1	4	8	4	4	12	4
Medium-Large mammal					0	0	2	2	30	4	3	3	36	5
Subtotal Mammals	0	0	1	1	1	1	4	4	34	13	8	8	51	12
Total Specimens	2	2	1	1	2	2	4	4	40	15	10	10	56	17

*Count Type: NISP = Number of Individual Specimens; MNI = Minimum Number of Individuals; L = Unable to Determine.

Three marine vertebrate specimens were recovered, two in EU-1, Feature A, and one in EU-8, Feature D. Sparidae, known popularly as grand-eyed porgy or bigeye emperor fish (MNI), was the only taxon identified of the fish remains. The only known species of Sparid in Hawai'i is *Monotaxis grandoculis*. This deer shore reef dweller is characterized by a high, compressed body, continuous dorsal fin, large eyes and mouth, which contains grinding teeth. Large specimens reach a length of 24 to 30 inches. This is a good food fish (Titcomb 1978:228-229).

Terrestrial Resources - Fifty-eight terrestrial vertebrate samples were identified during the present work. Only seven of these were identifiable; six are examples of *Sus scrofa* and one of *Capra hircus or Ovis*. The presence of pig and goat or sheep remains at Site 3150 indicates that terrestrial resources were also utilized by the site's inhabitants. Although the pig is a Polynesian introduction, pigs were domesticated and tended throughout prehistoric and historic times. Goats and sheep were not introduced to Hawai'i until 1778 and 1791, respectively. Based on the association of the pig bone at Site 3150 with historic artifacts, and since most of the pig bone exhibits sawing with a metal tool (Appendix B), it is likely that the pig remains identified at Feature D are historic period deposits.

CONCLUSION

PROJECT SUMMARY

The State of Hawai'i Department of Accounting and General Services, Division of Public Works, is planning for eventual expansion of the Hana Medical Center (TMK:1-4-03:22), situated in the Land of Kawaipapa, Hana District, Island of Maui. Phase I Inventory Survey of the parcel was conducted in 1993 (Henry and Graves 1993). Subsequently, guided by DLNR-SHPD recommendations, an archaeological treatment plan was submitted (Rosendahl 1994). Phase II Archaeological Data Recovery fieldwork, following the treatment plan, was conducted in July, 1995, and is reported here.

The purpose of the Archaeological Mitigation Program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources Rules Governing Procedures for Historic Preservation Review (DLNR 1994). The specific purpose of the Mitigation Plan is to guide the archaeological work required by DLNR-SHPD to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 50-50-13-3150.

DISCUSSION

Feature A

One Excavation Unit (EU-1) and two Shovel Tests (ST-1 and ST-8) were placed at this rectangular walled enclosure. Only one soil layer, a black silt loam, was revealed, and the unit was terminated on bedrock at a depth of 0.41 m. The portable remains included a total of 11.72 grams of ecofacnual remains and 18 artifacts. The only diagnostic artifacts are one square nail piece, a wooden button, and a glass button. The architecture was shown to not extend more than 5.0 cm below the present soil surface.

The evidence at this feature points to a historic date, possibly around the beginning of the 20th century. The presence of two buttons indicates domestic use of this feature, while the nail attests to the possibility of additional wooden structure above the walls. All are of types readily available in the late 1800s (Hume 1970:90-92 and 252-254).

At least one large, waterworn basalt rock is located on the flat beside this feature. Based on the discussion of Ku'ula stones in Borthwick et al. (1992:25), a Traditional Hawaiian presence might be indicated by this manuport. However, a use date cannot be assigned on this artifact, which might also be a carryover of prehistoric tradition into historic times. Borthwick et al (ibid.) do point out that such stones are often associated with habitations. The sparse deposits argue for a temporary or sporadic use of this structure.

Feature B

Four Excavation Units (EU-2 through EU-5) and two Shovel Tests (ST-2 and ST-9) were placed around the large rectangular enclosure at Feature B. Two layers were revealed, an aa gravel and cobble pavement overlay a dark brown gravelly clay. Portable remains include 0.29 grams of *Cellana sp.* (*'opihi*) and 49 artifacts (47 nail fragments, a button and a piece of plastic); all were found near the surface of the soil layer, and appeared to have filtered down through the pavement gravel.

The artifact collection at this feature appears younger than at Feature A. The piece of plastic and pieces of round nails suggest a mid-20th century use date. A few square nail pieces are also present, so the range of use may have begun as early as at Feature A (Hume 1970:252-4). The shallow penetration of the architecture into the soil further argues for a relatively recent age for this enclosure. The presence of a button again suggests domestic use of the feature.

Feature C

Feature C was originally described as an "L-shaped enclosure" and associated terrace (Henry and Graves 1993:10). The terrace was said to be defined by a wall of aa boulders. In fact, there is no wall, only a loose alignment of boulders, and there appears to be some grading extending onto the terrace from the road to the south. The two shovel tests (ST-3 and ST-10) and single excavation unit (EU-6) that were placed at Feature C were all devoid of portable remains.

Examination of this feature reveals differences between it and the other three features at Site 3150. Features A, B, and D are marked by careful construction and purposeful design, while Feature C lacks both of these characteristics. The available data suggests that the terrace form was constructed by road grading, and this may also be the means by which the boulders were aligned.

Feature D

The data recovery potential of Feature D has been virtually exhausted with two shovel tests (ST-4 and ST-11), a test unit (TU-1), and two excavation units (EU-7 and EU-8). Surface collection has also been conducted there. These activities have yielded 374.70 grams of ecofactual remains (by weight, 77.8% marine gastropods) and 110 artifacts.

Two of the artifacts, a fragment of waterworn basalt cobble and a possible *'ili 'ili*, resemble indigenous items, while the rest are historic, including glass and earthenware fragments, a horseshoe, metal handles, and numerous unidentifiable glass and metal fragments. One fragment of a saucer carries a maker's mark which dates the manufacture after 1864. The discard of the item could have been much later. The glass fragments were manufactured after 1880, based on color characteristics (Toulouse 1972). No specifically modern items were located at Feature D, so a use-age towards the end of the 19th and extending into the 20th century seems possible. The presence of possible soy jars (Munsey 1970:138) might indicate that the spot was used by cane workers from China or Japan, rather than by traditional Hawaiians.

Excavation of EU-7 on the exterior of Feature D revealed two stages of building: a paved terrace preceded the construction of the platform. This is evidence of a use-history spread over time. EU-7, which tested the stratigraphy of the first stage of construction, yielded only the one *'ili 'ili* stone. Thus, it is difficult to speculate on the beginning date of the use of this feature.

During the inventory survey, speculation that Feature D might be a burial platform was discounted, based on TU-1 results (Henry and Graves 1993). The lack of any sign of human remains from four excavations at this feature has now disproved this hypothesis.

Site 3150

The excavations at Site 50-50-13-3150 during both the inventory survey and the present work have revealed cultural deposits at three of the four features (Features A, B, and D). Feature C contains no cultural deposits and appears to be the result of road grading rather than any intentional construction. The deposits at the three other features appear to date to the late 19th century, at the earliest, and reflect continued use into the 20th century. All three of these features exhibit care and effort in construction, but Features A and B contain only sparse collections of portable remains and Feature D only a moderate amount.

The initial use-range (late 19th century) of Features A, B, and D is contemporary with the maximum extension of the Hana sugar plantation fields, which spread across several *ahupua'a* both north and south of the Hana Medical Center project area, in Kawaipapa. Although one reference (Borthwick et al. 1992:19) indicates that sugar was cultivated the project area in 1909, the archaeological evidence suggests that the structures at Site 3150 must have been in place by this time. As Soehren (1963:22) indicates, stone wall remains of thatched houses, occupied by field workers and contemporary with the plantations, were found on the fringes of fields at Kipahulu, south of Hana. The same pattern probably obtained in Hana, although the survey of a larger parcel to the south (Borthwick et al. 1992) did not identify any such sites.

The location of Features A and B, on the ridge of a rocky hill that may have been difficult to cultivate may explain why they survived the mechanical grading of the surrounding land. As at Kipahulu, the rock walls may have provided the base for a thatched roof, and the structures provided shelter for field hands. The nails that were found in the excavation units could have been used in the support structure for the thatching (Apple 1971:200). Both features yielded buttons, which have been taken as evidence of domestic use (i.e. habitation). Feature A, with lesser interior floor space (c. 17 m²), may have been used only as a sleeping structure. The organization of Feature B is unusual, with a sloping floor and lack of door openings. The northern wall of Feature B consists of a short basalt ledge lined with rocks, which would have afforded easy access, if the roof were peaked in this direction. The slope of the pavement would have made for an unsteady base for furnishings and uncomfortable sleeping, unless some kind of level floor were installed. Neither Feature A nor Feature B appeared to have served cooking or food consumption functions, based on the dearth of portable remains. Several explanations for this are possible:

1. Another nearby site for cooking or consumption has gone undetected;
2. The evidence of cooking or food consumption in Features A and B has gone undetected;
3. Food was prepared and consumed in a remote location, as a dining hall or other communal site;
4. Feature D served as the cooking or consumption area.

Suggestion 1 may be correct, although the small parcel has been thoroughly surveyed. Suggestion 2 is unlikely, based on the sparse portable collections of remains and the lack of

evidence of cooking fires. At Feature A, the small interior size would preclude a distinct activity area without mixing of refuse items throughout the deposit. At Feature B, the excavations were made in the downhill corner of the structure, where refuse might collect. Suggestion 3 is plausible, as laborers were sometimes fed in dining halls (Takaki 1985:64), but there is no clear evidence that this was the case in Hana.

The last explanation, that Feature D served as kitchen or dining area for the residents of Features A or B, is one possible interpretation of the portable remains excavated here. However, food remains are not numerous. The collection of ecofacts from Feature D could be the result of only a few (or even a single) meal or meals, based on both the small quantity and the lack of variety found here. The brownware artifacts (soy jugs) suggest the presence of Chinese or Japanese immigrants. The stoneware is European, however. The horseshoe and handles denote the transportation of goods to the site. A better explanation for this collection is that it reflects episodic events, picnics, or outings. Feature D may have been very near the banks of the ditch that passed through the property, and thus may have afforded water recreation, or at least a cool spot with a view of Kainalimu Bay and Kapueokahi Harbor.

All three cultural features at Site 3150 exhibit care and effort in construction but do not contain evidence of use as primary residences. The occupations were likely temporary or episodic, as the collections are very sparse at two features (A and B) and only moderate at Feature D. Features A and B are assigned functions of habitation and were probably used as sleeping shelters. Feature D is also assigned a habitation function, but must have been a temporary or episodic gathering place.

The archaeology conflicts with the documentary evidence that the Hana Medical Center property was planted to sugar cane as early as the 1860s and well into the 20th century. The Feature D pavement and platform, especially, appears to have been in use across this span of time. It may be that small rocky areas were not cultivated, and the local populace retreated to these at intervals for respite or on holidays.

The excavations demonstrated that there is not a significant subsurface deposit at Site 3150. Portable remains are scarce, and were not found in datable contexts. It appears that the potential for additional archaeological information from Site 50-50-13-3150 is minimal. The data recovery has been accomplished and no further work at the site is recommended. It should be noted, however, that there is always the possibility that previously unidentified cultural remains will be encountered in the course of development activities. In such cases, archaeological consultation should be sought immediately.

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APPENDIX A:
Correspondence

JOHN WAIHEE
GOVERNOR OF HAWAII

RECEIVED
Mar 29 12 11 PM '93
DIV. OF [illegible]

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
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WATER AND LAND DEVELOPMENT

March 25, 1993

LOG NO: 7633
DOC NO:9303AG25

MEMORANDUM

TO: Gordon Matsuoka, State Public Works Engineer
Department of Accounting and General Services

FROM: Don Hibbard, Administrator
State Historic Preservation Division

SUBJECT: Historic Preservation Review of an Archaeological Report
Hana, Maui
TMK: 1-4-03: 22

Thank you for the opportunity to comment on the draft copy of this report entitled Archaeological Inventory Survey, Hana Medical Center Project Area (Henry and Graves 1993).

We have reviewed this report and have the following comments:

I. Identification of historic sites

The background research, both historical documents and previous archaeological work, appears to be adequate. The regional and project area settlement pattern has also been presented. It seems from the description of the field methods that all historic sites have been identified in the project area. Four historic sites consisting of 2 complexes and 2 walls were identified.

Under the section on Findings, the historic sites are adequately described. The findings from the shovel tests, however, should be presented in more detail. The marine shells and the time period (19th or 20th century?) of the glass fragments should be identified. Two sites, 3151 and 3152, are identified as boundary walls. A wall and a terrace (3153) are identified as modern structures for boundary and agriculture.

Site 3150, a complex of 4 features, needs improved interpretation. It is interpreted as having been used for habitation, animal pen, and possible burial, and possibly as a

pu'uhonua. The possibility of burials being present needs to be resolved, before we are able to evalulate significance of this site. (Note, our Maui Island Burial Council would also make such a requirement prior to voting on mitigation proposals.) We recommend testing, which can be done as soon as the applicant wishes. Also, the report proposes additional documentary research to evaluate whether a pu'uhonua was present. We recommend that the research occur as soon as possible, because this could also affect the significance evaluation of the site. Findings can be submitted as an addendum to the initial report. Until these aspects of the function of site 3150 (burial, pu'uhonua) are resolved, we are unable at this time to finalize the significance evaluations and mitigation proposals for this site.

II. Significance Assessment

We concur with the assessment that the other three sites (excluding 3150) are significant for their information content (Criterion D). For site 3150, resolution of functional interpretations is needed before we can process a significance evaluation. We agree that criterion D applies, but it is uncertain if the site is significant for traditional cultural significance and, if so, for what reasons.

III. Mitigation Measures

This report finds that no further work is necessary for sites 3151, 3152 and 3153. We concur with this determination with the condition that the missing figures in this draft copy are included in the final report.

At this time, until the functional and significance of site 3150 are determined, we are unable to comment on the proposed site 3150 mitigation measures. We would like to note that in the report for site 3150, further data collection and preservation are recommended (Table 3), but the text on page 24 describes what appears to be data recovery. This contradiction needs resolution, when the mitigation proposal is considered after the additional survey work.

Also, we would appreciate two copies of the report when accepted by your office. Should you have any questions about these comments, please contact Annie Griffin at 587-0013.

AG:amk

94-1481

PHRI

Project 92-1266

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
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July 23, 1993

LOG NO: 8954
DOC NO: 9307AG23

Honorable Robert P. Takushi
State Comptroller
Department of Accounting and General Services
P. O. Box 119
Honolulu, Hawaii 96810

Attention: Mr. Allen Yamanoha

Dear Mr. Takushi:

SUBJECT: Chapter 6E Compliance -- Historic Preservation Review of An Archaeological Report on the Hana Medical Center Hana, Maui
TMK: 1-4-03: 22

Thank you for the opportunity to comment on the prefinal survey report entitled *Archaeological Inventory Survey, Hana Medical Center Project Area* (Henry and Graves 1993).

We reviewed a draft version of this report in our letter dated March 25, 1993. The previous review did not address the site significance assessments pending determination of the function of Feature D, Site 3150 (tentatively assigned as burial) and oral/historical information regarding the presence of a *pu'uhonua* in the project area. According to this report, additional testing was conducted in Feature D. No burial was found and historic period artifacts recovered indicate that the feature is historic in age, but the function is still undetermined (page 12). The additional historic data indicate that a *pu'uhonua* existed in Kawaipapa, but not in the project area. We now find this report adequate and acceptable.

Based on these findings, we are now able to determine final site significance assessment and mitigation measures. The report has assessed the four historic sites (3150, 3151, 3152 and 3153) to be "no longer significant", having been significant solely for their information content and having had sufficient amounts of this information recovered during the survey. We concur with this assessment for three of the sites, but we believe that site 3150, a habitation complex of historic period features, is still significant for its information content. Its specific age and some of its features' function need better documentation.

So far subsurface excavations, with the exception of one test pit in Feature D, have been limited only to a few shovel tests, so clearly more excavation work is meritted. Thus, we believe that one significant historic sites is present in the project area.

Archaeological data recovery of site 3150 would be an appropriate mitigation measure for this project, resulting in a "no adverse effect" determination. Please let us know in writing what mitigation approach you wish to follow, however.

Should you have any questions about these comments, please contact Ms. Annie Griffin at 587-0013.

Sincerely,

KEITH W. AHUE, Chairperson

c: Dr. Paul H. Rosendahl, PHRI

AG:lll

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GOVERNOR OF HAWAII

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DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

March 3, 1995

Mr. Allan Yamanoha, Engineer
Planning Branch, Education Section
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, Hawaii 96813

LOG NO: 14037
DOC NO: 9503KH02

Dear Mr. Yamanoha:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan -Hana Medical Center Project, Kawaipapa, Hana District, Maui
TMK: 1-4-03: 22

A draft mitigation plan for Historic Site 50-50-13-3150, located within the Hana Medical Center project area was reviewed by our office in October, 1994 (letter to Dr. Paul H. Rosendahl, October 6, 1994). The plan discusses proposed excavation and detailed recording to be conducted at four component features within the site (Feature A, a small enclosure, Feature B, a large enclosure, Feature C, an L-shaped enclosure, and Feature D, a platform). In our review letter, we indicated that the plan contains sufficient background information and presents an adequate research design. We recommended that the proposed scope of excavations be increased for Feature B, the large enclosure, in order to ensure a representative sampling of the cultural deposit within the feature. All other proposed excavations were acceptable. The recommended revisions have been made, and the corrected pages were sent to our office (Paul H. Rosendahl letter to Don Hibbard October 26, 1994). As indicated in the October 6 letter, our review of the plan is completed, and it is acceptable.

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We have requested that our Maui office be notified when the fieldwork is scheduled, so that we can verify successful completion of the data recovery work. To our knowledge, the field work has not commenced to date.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

JOHN WAIHEE
GOVERNOR OF HAWAII

FILE

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DEPARTMENT OF LAND AND NATURAL RESOURCES
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October 6, 1994

Dr. Paul H. Rosendahl
Paul H. Rosendahl, Ph.D., Inc.
305 Mohouli Street
Hilo, Hawaii 96720

LOG NO: 12855
DOC NO: 9409KD31

Dear Dr. Rosendahl:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan - Hana Medical Center Project
Kawaipapa, Hana District, Island of Maui
TMK: 1-4-03: 22

Thank you for submitting a plan for archaeological data recovery work at Site 50-50-13-3150, located within the proposed Hana Medical Center project area, Kawaipapa, Hana (PHRI letter to Don Hibbard July 22, 1994).

The plan discusses proposed excavation and detailed recording to be conducted at four component features of Site 50-13-3150 (A, a small enclosure; B, a large enclosure; C, an L-shaped enclosure; and D, a platform). The data recovery work was recommended following inventory survey work with limited subsurface testing at the site (*Archaeological Inventory Survey, Hana Medical Center, Land of Kawaipapa, Hana District, Island of Maui*, J.D. Henry and D.K. Graves 1993). The State Historic Preservation Division concurred with the recommendation, and indicated that Site 3150 was significant for information content. We also concurred that data recovery would be an appropriate mitigation measure for a determination of "no adverse effect" (Keith Ahue letter to R.F. Takushi July 23, 1993).

We find that the mitigation plan contains sufficient background information and presents adequate research issues to be addressed in the report of findings. The proposed scope of excavations appears to be adequate, with the exception of Feature B. This enclosure has an area of 143.85 sq m; proposed excavations are 2-4 m sq, which is the same excavation area proposed for Feature D (5.0 sq m area). Prior excavation in this feature was limited to two shovel tests. We feel that 4-8 m sq would provide a more representative subsurface sample of this feature.

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The mitigation plan is acceptable with the minor change as suggested above. You may forward a single page (3) indicating the revision of Table 1. Our review of this plan is considered complete at this time.

As indicated in a previous Memorandum to Gordon Matsuoka (December 3, 1993), we request that our office be notified of your field schedule at Site 3150, so that we may verify successful completion of the data recovery work.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

c: Allen Yamanoka, DAGS - Planning Division

94-1481 mwlw

WILLIAM J. CAYETANO
GOVERNOR OF HAWAII

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March 3, 1995

Mr. Allan Yamancha, Engineer
Planning Branch, Education Section
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, Hawaii 96813

LOG NO: 14037
DOC NO: 9503KD02

Dear Mr. Yamancha:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan -Hana Medical Center Project, Kawaipapa, Hana District, Maui
TMK: 1-4-09: 22

A draft mitigation plan for Historic Site 50-50-13-3150, located within the Hana Medical Center project area was reviewed by our office in October, 1994 (letter to Dr. Paul H. Rosendahl, October 6, 1994). The plan discusses proposed excavation and detailed recording to be conducted at four componant features within the site (Feature A, a small enclosure, Feature B, a large enclosure, Feature C, an L-shaped enclosure, and Feature D, a platform). In our review letter, we indicated that the plan contains sufficient background information and presents an adequate research design. We recommended that the proposed scope of excavations be increased for Feature B, the large enclosure, in order to ensure a representative sampling of the cultural deposit within the feature. All other proposed excavations were acceptable. The recommended revisions have been made, and the corrected pages were sent to our office (Paul H. Rosendahl letter to Don Hibbard October 26, 1994). As indicated in the October 6 letter, our review of the plan is completed, and it is acceptable.

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We have requested that our Maui office be notified when the fieldwork is scheduled, so that we can verify successful completion of the data recovery work. To our knowledge, the field work has not commenced to date.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

JOHN WAIHEE
GOVERNOR OF HAWAII

FILE

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

KEITH ANUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

JOHN P. KEPPELER II
DONA L. HANAIKE

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 6, 1994

Dr. Paul H. Rosendahl
Paul H. Rosendahl, Ph.D., Inc.
305 Mohouli Street
Hilo, Hawaii 96720

LOG NO: 12855
DOC NO: 9409KD31

Dear Dr. Rosendahl:

SUBJECT: Historic Preservation Review of an Archaeological Mitigation Plan - Hana Medical Center Project
Kawaipapa, Hana District, Island of Maui
TMK: 1-4-03: 22

Thank you for submitting a plan for archaeological data recovery work at Site 50-50-13-3150, located within the proposed Hana Medical Center project area, Kawaipapa, Hana (PHRI letter to Don Hibbard July 22, 1994).

The plan discusses proposed excavation and detailed recording to be conducted at four component features of Site 50-13-3150 (A, a small enclosure; B, a large enclosure; C, an L-shaped enclosure; and D, a platform). The data recovery work was recommended following inventory survey work with limited subsurface testing at the site (*Archaeological Inventory Survey, Hana Medical Center, Land of Kawaipapa, Hana District, Island of Maui*, J.D. Henry and D.K. Graves 1993). The State Historic Preservation Division concurred with the recommendation, and indicated that Site 3150 was significant for information content. We also concurred that data recovery would be an appropriate mitigation measure for a determination of "no adverse effect" (Keith Ahue letter to R.F. Takushi July 23, 1993).

We find that the mitigation plan contains sufficient background information and presents adequate research issues to be addressed in the report of findings. The proposed scope of excavations appears to be adequate, with the exception of Feature B. This enclosure has an area of 143.85 sq m; proposed excavations are 2-4 m sq, which is the same excavation area proposed for Feature D (5.0 sq m area). Prior excavation in this feature was limited to two shovel tests. We feel that 4-8 m sq would provide a more representative subsurface sample of this feature.

The mitigation plan is acceptable with the minor change as suggested above. You may forward a single page (3) indicating the revision of Table 1. Our review of this plan is considered complete at this time.

As indicated in a previous Memorandum to Gordon Matsuoka (December 3, 1993), we request that our office be notified of your field schedule at Site 3150, so that we may verify successful completion of the data recovery work.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

c: Allen Yamanoka, DAGS - Planning Division

PHRI Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services
305 Mahalani Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-8996
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Report 1481-071194 July 22, 1994

Dr. Don Hibbard, Administrator
Department of Land and Natural Resources
State Historic Preservation Division
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Attention: Dr. Ross Cordy

Subject: Archaeological Mitigation Plan for No Adverse Effect
Hana Medical Center Project, Land of Kawaipapa,
Hana District, Island of Maui

Dear Dr. Hibbard:

This mitigation plan has been prepared at the request of Mr. Allen Yamanoha, Planner with the State of Hawai'i Department of Accounting and General Services, Division of Public Works. The plan comprises Phase I of a two-phased Archaeological Mitigation Program for the Hana Medical Center project area, in the Land of Kawaipapa, Hana District, Island of Maui. The purpose of the program is to accomplish, to the appropriate standards, all archaeological work required by the Maui County Planning Department and by Title 13, Subtitle 6, Chapters 146-153 of the Department of Land and Natural Resources Rules Governing Procedures for Historic Preservation Review (third draft - November 1989). The specific purpose of the Mitigation Plan is to guide further archaeological work required by DLNR to ensure that the Hana Medical Center project will have no adverse effect on State Inventory of Historic Places (SIHP) Site 3150.

Previous archaeological work conducted by PHRI (Henry and Graves 1993) identified four sites within the project area. Two of the sites represent complexes (Sites 3150 and 3153), and two represent boundary walls (Sites 3151 and 3152). Three of these four sites (Sites 3151, 3152, and 3153) were evaluated as significant solely for information content. Because the documentation of these sites during the inventory survey was considered to have recovered all of the significant information represented by these sites, all three were determined to be no longer significant, and no further work was recommended for them (Henry and Graves 1993:25). The Department of Land and Natural Resources - State Historic Preservation Division (DLNR-SHPD) concurred with these findings in its review of the inventory survey report (letter dated 23 July 1994, from Mr. Keith W. Ahue, Chairperson, DLNR-SHPD, to Honorable Robert P. Takushi, Department of Accounting and General Services).

For the remaining project area site (Site 3150), PHRI's original conclusion was that the site was significant not only for information content, but was also provisionally significant for cultural value. PHRI therefore recommended additional data collection work to evaluate one of the features of the site (Feature D) for the presence of human remains. This work was undertaken in April of 1993, following completion of the inventory survey field work, and the findings were presented in the final version of the inventory survey report (Henry and Graves 1993). In addition to summarizing the specific findings of this additional work, the inventory survey report also describes the primary features at Site 3150, as follows:

> ...Site 3150 consists of four features—Feature A, a small rectangular enclosure; Feature B, a large rectangular enclosure; Feature C, an L-shaped enclosure; and Feature D, a rectangular platform. Shovel tests excavated at Features A, B, and D recovered glass and ceramics. No datable samples were recovered, but the presence of the glass and ceramics suggests the features are historic. Because it was thought Feature D might contain a burial, it was subsequently determined to require further testing (Memo dated 25 March 1993, from D. Hibbard, DLNR-SHPD, to G. Matsuoka, Dept. of Accounting and General Services). On April 20, 1993 PHRI archaeologists placed a formal test excavation unit in the center of Feature G, near the shovel test placed earlier. The unit yielded ceramics, faunal bone, shell, and a glass button. The findings suggest the feature is historic. No human remains were found in the unit. (Henry and Graves 1993:22)

Because the excavation unit placed within Feature D failed to identify evidence of primary burials or scattered human remains, the site was no longer considered potentially significant for cultural value. However, in its review of a draft of the final survey report, DLNR-SHPD stated that additional portable cultural materials as well as specialized samples might remain at the site, within a subsurface component, and that such cultural materials could be useful in (a) further dating of the site and its component features, and (b) further evaluating feature function. For these reasons, DLNR-SHPD recommended that the site be subjected to data recovery work designed to recover additional artifacts, ecofactual remains, and other specialized samples. Moreover, DLNR requested that this work be preceded by preparation of an appropriate archaeological treatment plan (this document).

Based on existing information concerning the site, and pursuant to DLNR's specific comments (above), the primary goal of data recovery at Site 3150 will be to more precisely date and more thoroughly evaluate the functions of the four primary features at Site 3150. This work is to be accomplished through additional detailed recording, excavation, and analysis. PHRI proposes the following specific tasks be undertaken.

Detailed Recording and Surface Collections

Variable levels of additional detailed recording will occur at the site's four features, particularly as these features are exposed during excavation work. This additional recording will be directed toward determining the full extent of each feature and will be accompanied by appropriate modifications to existing feature drawings.

Excavations

All four features will be subjected to formal excavation. Excavation units will vary in size from 1.0 m sq to 8.0 m sq and will be excavated according to cultural or natural stratigraphic layers. If necessary, excavation by arbitrary 10 cm levels will be employed for thick or stratigraphically complex layers, or where cultural or natural layers cannot be clearly identified. All fill will be screened through 1/8-inch screen, and a minimum 25% sample of the screened material will be retained for laboratory analysis.

Subsurface features will be numbered sequentially within excavations; i.e., the first horizontal feature encountered in each excavation unit will be designated HF-1, the second HF-2, and so on. Any such features will be plan-mapped, excavated, and sampled for laboratory analyses. When possible, given the confines of a one-meter-square excavation unit, subsurface features will be sectioned, and appropriate cross-section drawings will be prepared. Cross-section drawings will be prepared for a minimum of one test unit face within each excavated feature. Layers will be described in accordance with Munsell Color Notation and U.S. Soil Conservation Service guidelines, through a combination of field examination and subsequent laboratory analysis of representative fill samples. The locations of all test units will be plotted on the appropriate site map.

The level of excavation considered appropriate for each feature is indicated below, in Table 1.

Table 1. Features to Be Excavated

Feature Designation	Type	Surface Area to be Excavated
Feature A	Small, rectangular enclosure	1-2 m sq
Feature B	Large, rectangular enclosure	4-8 m sq
Feature C	L-shaped enclosure	1-2 m sq
Feature D	Rectangular platform	2-4 m sq

Laboratory

All recovered artifacts and midden remains will be cleaned and sorted in the laboratory. Artifacts will be sketched (when appropriate), classified as to type and material, weighed, and characterized in terms of metric attributes. Midden samples will be sorted and weighed by major category (e.g., bivalves, gastropods, fish, mammal, etc.), with identifications made to the most specific levels appropriate or possible. Dating analyses will include radiocarbon age determinations (including C-13/C-12 stable isotope ratio determinations). Carbon samples will be preliminarily sorted, weighed, and described prior to submission for dating to Beta Analytic, of Miami, Florida. Floral and faunal samples will be submitted for specialized analysis, if such analysis is determined appropriate.

Report Preparation

A final report will present findings of the data recovery work, as outlined in the draft guideline standards for Archaeological Data Recovery Studies and Reports prepared by DLNR-SHPD (DLNR 1989). The primary emphasis for the present project will be on interpreting Site 3150 in terms of function and age, based on the sum of findings at the individual features.

Although the range of research issues that can be addressed on the basis of information available at Site 3150 is clearly limited, an effort will be made to confront topics of regional interest concerning early historic-era occupation and habitation within the Hana area. The primary research questions guiding proposed data recovery work include the following:

- Can the intensity and duration of occupation be more clearly specified on the basis of recovered assemblage, or through evaluation of patterns of deposition and layering?
- Does it appear that a fully prehistoric episode of occupation predates the already documented historic-era use of one or more of the site's four features?
- If occupation appears fully historic in age, what is the date of initial use of the features?
- Was this site utilized in conjunction with early ranching activities? Does the site represent a locale at which "ranch hands" may have camped but engaged in essentially "traditional" subsistence activities? If so, what estimated level of subsistence may have been derived from "traditional" means, as compared with subsistence that depended on imported foodstuffs or other commodities?

- If cultigens are identified among the specialized samples recovered, which forms are present and is it likely that these were being grown at or near the site area?
- What kinds of artifacts were imported to this site, and is dating adequate to segregate any changes through time in the kinds of artifact types being utilized?

Treatment of Recovered Materials

All materials recovered during the present project will be handled in compliance with Section 66.3(b) of the National Park Service's Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements, which recommends that recovered materials "... be maintained by a qualified institution or institutions as close as possible to their place of origin, and made available for future research" (CFR).

Monitoring of Initial Construction Work

Monitoring of initial grubbing and construction work, following implementation of data recovery work, may be appropriate and warranted. However, this decision should be made following completion of data recovery field work, and in consultation with DLNR-SHPD. If such work is deemed necessary, a formal monitoring plan will be needed in order to ensure proper identification, evaluation, and treatment of any potentially significant cultural resources that might be discovered during initial construction phases of the project. The basic objectives of any such archaeological monitoring will be the following:

1. To identify and evaluate the potential significance of any archaeological remains that might be revealed during construction;
2. To immediately notify DLNR-SHPD upon discovery of any potentially significant archaeological, historical, or cultural properties or objects, in order to (a) establish the significance of such properties or objects, and (b) determine the nature and extent of any data recovery and/or preservation measures that might be warranted; and
3. To carry out an appropriate level of data recovery work—consisting of detailed recording (including plan mapping and profiles, written descriptions, and photographs), collection of portable artifacts and appropriate samples of ecofactual remains and dating materials, and any needed mitigation excavations—in order to preserve the significant archaeological information contained within any identified remains.

At a pre-construction meeting, construction personnel and project representatives will be briefed on (a) the primary locations of the potentially significant archaeological remains that had been excavated within the project area, and (b) the procedures to follow should any new archaeological remains warranting further evaluation be identified during construction.

The archaeological monitoring crew will normally consist of one person who will be on-site during initial grubbing and grading within the vicinity of the sites at which data recovery work had been completed. In general, the archaeologist will conduct the monitoring in order to identify any unique types or types that had not been evaluated during the data recovery. In the event that such archaeological remains are identified during monitoring, the archaeologist will record and collect the exposed data as expeditiously as possible. If significant remains are revealed and should the scale of work involved in the recording and data recovery be beyond the capacity of a single archaeologist, additional archaeological field personnel will be provided as appropriate and necessary.

The significance of any such unevaluated archaeological remains identified during monitoring will be assessed in terms of (a) the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60), and (b) the criteria for evaluation of traditional cultural values prepared by the National Advisory Council on Historic Preservation (ACHP). Upon completion of monitoring field work, a memorandum report will be prepared, which will summarize (a) the findings of monitoring field work, (b) appropriate interpretation and evaluation of these findings, and (c) any recommendations for additional work that might be appropriate or justified. If, at the time of monitoring, the final report for the data recovery program has not yet been submitted, the findings of monitoring will be incorporated within that document and no separate memorandum report will be necessary. In either case, all findings will be presented in a manner compatible with the draft guideline standards for Archaeological Data Recovery Studies and Reports prepared by DLNR-SHPD, as referenced above.

In the opinion of PHRI, implementation of the data recovery program (including possible archaeological monitoring), as outlined herein, will ensure that construction of the Hana Medical Center facility will have no adverse effect on the archaeological resource identified as Site 3150. If you have any questions or comments, please contact me at our main Hilo office (808) 969-1763.

Sincerely yours,

Paul H. Rosendahl /kb

Paul H. Rosendahl, Ph.D.
President and Principal
Archaeologist

Attachments: 1. Plan Map, Site 3150, Showing Feature Locations
2. Certification of Curation Facilities

PI/kb
cc: Mr. Allen Yamanoha, DAGS

References Cited

CFR (Code of Federal Regulations)

36 CFR Part 60: National Register of Historic Places. Department of the Interior, National Park Service, Washington, D.C. Historic Sites Section, Division of State Parks, Department of Land and Natural Resources.

36 CFR Part 66: Proposed Guidelines: Recovery of Scientific, Prehistoric, Historic, and Archaeological Data: Methods, Standards, and Reporting Requirements. Department of the Interior, National Park Service, Washington, D.C.

DLNR (Department of Land and Natural Resources)

1989 Title 13, Subtitle 6, Chapter 146. Rules Governing Procedures for Historic Preservation Review. Department of Land and Natural Resources - Division of State Parks, Outdoor Recreation and Historic Sites. (Third Internal Working Draft, November 1989)

Henry, J.D., and D. Graves

1993 Archaeological Inventory Survey, Hana Medical Center Project Area, Land of Kawaipapa, Hana District, Island of Maui (TMK:1-4-03:22). PHRI Report 1266-051293. Prepared for Department of Accounting and General Services, Division of Public Works, State of Hawaii.

APPENDIX B: FAUNAL ANALYSIS (Memorandum)

by Alan C. Ziegler, Ph.D.

ALAN C. ZIEGLER, Ph.D.
Zoological Consultant

45-636 Liula Place
Kane'ohe, Hawai'i 96744

Telephone:
(808) 247-5318

MEMORANDUM

DATE: 28 July 1995

TO: Paul H. Rosendahl, Ph.D., Inc.
(Attn.: Dr. Susan T. Goodfellow, Lab Director)

FROM: Alan C. Ziegler, Zoological Consultant

SUBJECT: Identification of faunal material from PHRI Project 94-1481, Hāna, Maui, Hawai'i, (Site 3150, Fea. A and Fea. D), received 28 July 1995.

I have identified this faunal material to the lovest taxonomic level possible for me, and am returning it all to you along with this MEMO in one box by prepaid Certified First Class mail, Return Receipt Requested. An INVOICE covering the 2 hours spent on this work is also enclosed here.

Each of the labeled plastic bags I received contained primarily the vertebrate faunal remains from a discrete excavation unit (i.e., from a particular site, feature, unit, layer and/or level, etc.). For each of these excavation units I have identified and separated the material into various faunal categories, and placed the remains of each category in an individual stapled plastic bag along with a yellow-paper slip giving the name of the particular category represented, and sometimes a pertinent comment on the material (--but, note, to keep the identification time to a minimum, not the provenience, which appears only on the labeled original plastic container bag(s) kept with the material).

To allow possible future weighing of the material from each faunal category without the time and trouble of removing the material from each of my faunal-category bags, I might note that each of these bags is of (approximately) the same weight as all of the others, bears one staple, and contains a single paper-slip label of uniform weight; thus you should be able to deduct an identical tare weight throughout any in-bag weighing procedure.

All of the lots of stapled faunal category bags from each excavation unit have then been put in a sandwich-size plastic bag along with the original labeled container bag(s). (These various stapled bags with yellow-paper identification slips are arranged within each zip-loc bag in the same order as the category names appear on the Faunal Category List described below.) Any remains identified as "Artifact" have similarly been placed in individual stapled bags, with an identification of the faunal material or non-faunal substance apparently represented by the original raw material. Additionally, from the original bags I segregated and saved in individual stapled plastic bags any non-faunal and invertebrate items encountered; although you may not need some of them, this retention and segregation will allow their weights to be deducted from the "Bone" weights appearing on the original container bags if this is desired.

To explain the faunal categories used for the present material, I have included with this MEMO a 2 March 1995 revision of essentially the same general Faunal Category List used in all earlier work for you, which still contains all previously identified categories, and which did not need updating because no new faunal categories appeared in the present material. It should be noted in this Faunal Category List that when I mention the common or scientific name of genera or species in explanations of the more-generalized faunal categories--as, for example, in "Medium Bird" or "Small-to-Medium Mamal"--unless it is obviously indicated otherwise, I intend these names to convey only an idea of the general size of the animal represented rather than to definitely indicate that any specific taxon mentioned is necessarily present in the material.

For some identifications on the yellow-paper slips, I have prefixed the name of a family, genus, or species with "cf.". This means that the material seems extremely close osteologically to the taxon named and quite likely belongs to it, but I cannot entirely rule out the possibility that an extinct, accidental, or extremely rare, morphologically similar form--although, usually of the same order, family, or genus--is represented instead. For most later compilation purposes, however, I would advise simply omitting the "cf." whenever you see it in my identifications (--I guess the main reason I use it at all is to let any possible future identifiers examining the bones know that I did realize that in some cases there was an alternative, although unlikely, identification possible).

In the case of fish other than sharks, rays, and eels, whenever vertebrae were present, I have given approximate total lengths of the particular individuals involved (written as "Len's. = ..."), based on comparison of vertebra size with that of prepared skeletal specimens of known length. These estimates could well be off by perhaps 20-30% (depending on species represented and position of the vertebrae in the spinal column) but they will serve to give you at least a general idea of the size of many of the fish present.

I have not attempted to age birds, except to note on the yellow-paper slips any obviously immature bones present (usually meaning nestlings in species other than chicken and other precocial ground-living birds), lack of any such notation meaning that the bird bones are apparently of adult individuals. For mammals other than rodents, whenever possible I have endeavored to give a general idea of age at death (in the case of appropriate material often estimating the probable minimum and/or maximum chronological age at death by reference to published tables--when available--of dental replacement sequence or stage of long-bone epiphyseal union).

You may already routinely present the following in each of your archaeological excavation reports but, in case you do not, I hope you will consider including a minimal faunal-data table in each such final paper. That is, a simple table (similar to the sample included as an ATTACHMENT to this MEMO) for each test pit or other equivalent unit, giving at least the actual numbers and/or weights of the bones/fragments per level assigned to each faunal category that occurs in the excavation unit. This is so possible future investigators will always have available these raw faunal data, along with other information such as midden volumes contained in your

report, for use in faunal analysis calculations that, for one reason or another, you may not have carried out.

As I mentioned to you previously, I usually do not write up a formal faunal analysis report per se (--having found that, in terms of the amount that would have to be paid for my time, this is much more expeditiously done by personnel who have more ready access than I do to the complete original excavation data in your files--) but, instead, I provide a series of general and specific, largely subjective, comments (as I have done below) regarding the identified faunal material. I assume these comments would be most meaningful to you when considered jointly with any tabulation you may make of the material. These comments can then be quoted or paraphrased, or the information contained in them otherwise utilized in the manner most suitable to the style of the final overall project report.

COMMENTS ON PHRI PROJ. 94-1481, HĀNA, MAUI, HAWAI'I, FAUNAL MATERIAL

Both of the Features excavated seem obviously related to human activity during at least the Historic Period, both containing presumed discarded food remains. There is no evidence that the areas were ever significantly used by a nonhuman mammalian or avian predator. Remains of only two vertebrate classes are present: bony fishes and mammals; none of the latter type seems obviously to be human.

FEA. A. The material from this sample comprises only a medium-sized fish of undetermined family, and an adult Domestic Goat/Sheep; the presence of the latter category indicates a post-Contact deposition time.

FEA. D. The only fish represented in this sample is apparently a "Sparid", and is of relatively very large body size (50-60 or more cm in length?) for the single species of the family found in Hawai'i. This fish was probably hooked over the reef (as opposed somewhere in the open ocean), with or without the use of a watercraft, but, of course, it could also possibly have been speared, netted, or taken in some other manner in this same area.

As far as the mammals are concerned, at least two pig individuals are represented, both of which are relatively well grown, that is, fairly large in body size. Remains of a "Large Mammal" (--terrestrial, and thus post-Contact--) are also present, and some of these bones as well as probably those of pig are metal-sawed, confirming a post-Contact deposition time for at least part of the sample.

The preceding information is obviously limited because of the relatively small size of both samples, but I hope it will still be of some interest and aid to you. Many thanks for the chance to work on this material, and please be sure to let me know if there are any questions on any of my procedures, identifications, or comments. Continued best in everything !!

• • •

Appendix C

Traffic Assessment for the Proposed Hana Community Healthcare Campus

Wilson Okamoto & Associates, Inc.
December 1998

TRAFFIC ASSESSMENT

FOR THE PROPOSED

HANA COMMUNITY HEALTHCARE CAMPUS

Prepared For:

KOBER/HANSSEN/MITCHELL ARCHITECTS
55 Merchant Street
Honolulu, HI 96813

Prepared By:

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

December 1998

TABLE OF CONTENTS

LIST OF EXHIBITS

APPENDICES

TRAFFIC ASSESSMENT
FOR THE PROPOSED
HANA COMMUNITY HEALTHCARE CAMPUS

I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to identify and assess the potential traffic impacts resulting from the redevelopment of the Hana Community Healthcare Campus, which is located on Hana Highway on the island of Maui. The proposed project will include the redevelopment of the existing health care facility as well as a health and wellness center, on-site staff housing, administrative and medical support facilities, and additional parking.

B Scope of Study

This report presents the findings and conclusions of the traffic study, the scope of which includes:

1. Description of the existing and proposed functions.
2. Description of the proposed redevelopment.
3. Evaluation of existing traffic operations in the immediate vicinity of the project.
4. Development of trip generation characteristics for the proposed project.
5. Evaluation of site-generated traffic and traffic distribution.
6. Analysis of future roadway and traffic conditions.
7. Identification and analysis of traffic impacts resulting from the proposed redevelopment.

8. Recommendations of improvements, if appropriate, that would mitigate the traffic impact resulting from the proposed redevelopment.

II. PROJECT DESCRIPTION

A. Location

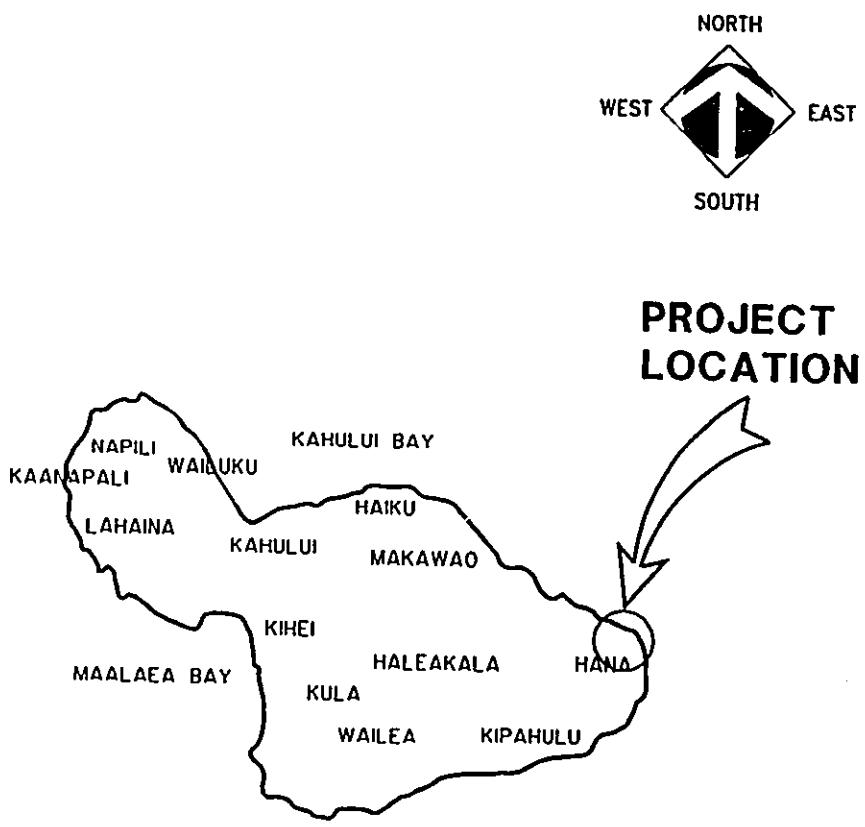
The project site is located on Hana Highway in Hana, Maui, as shown on Exhibit 1. The project site is further identified as Tax Map Key: 2-1-4-03: 24 and 22. Access to the site is through a driveway intersecting Hana Highway just north of the intersection with Uakea Road.

B. Project Characteristics

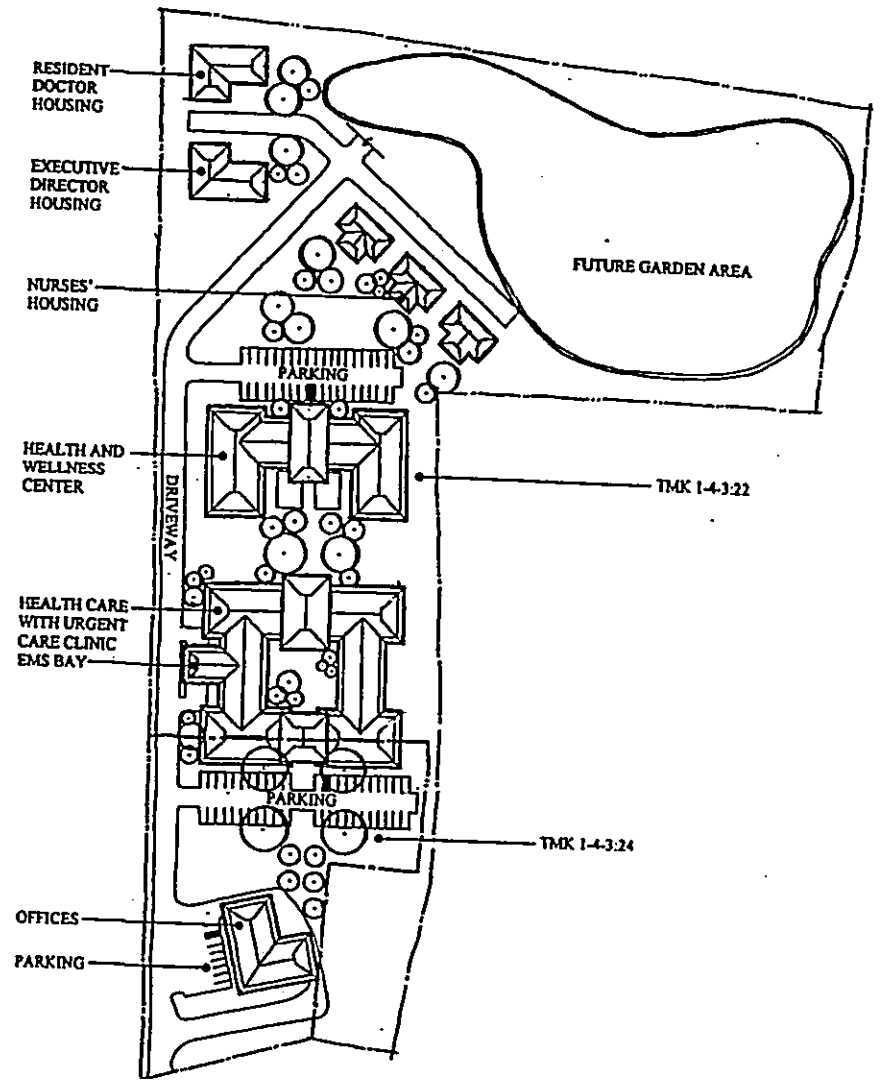
The Hana Community Healthcare Campus redevelopment plans include the following proposed floor areas and respective functions:

1. Additional Medical Facilities	3,530 square feet (sf)
2. Ancillary Medical Service Facilities	480 sf
3. Miscellaneous Shared Facilities	1,550 sf
4. Administrative Facilities	2,840 sf
5. Utility Support Facilities	280 sf
6. Health and Wellness Center	10,360 sf
7. Staff Housing	9,800 sf
8. Existing Clinic Renovation	3,700 sf
TOTAL PROJECT AREA =	34,710 sf

Exhibit 2 shows the proposed site plan.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS	EXHIBIT
	LOCATION MAP	1



KOBER/HANSSEN/MITCHELL ARCHITECTS

WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS	EXHIBIT
	PROJECT SITE PLAN	2

The existing Hana Medical Center is a 4,020 square-foot (sf) building that is accompanied by a 1,392 sf office and residence of the facility's Executive Director, a 1,233 sf building used for emergency medical services, and a 1,100 sf structure used for storage and utility purposes. The gross floor area for the existing Hana Medical Center is approximately 7,745 sf.

III. EXISTING TRAFFIC CONDITIONS

A. General

Hana Highway is the only paved roadway that provides vehicular access for residents and tourists to Hana Town, a community that is remote from Maui's urbanized areas. The scenic drive to Hana Town is a major visitor attraction for the island. Consequently, tourists comprises a large portion of the traffic on the highway. The highway provides access to other popular tourist areas south of Hana Town, including Hamoa Beach, Seven Pools, and Kipahulu Falls.

B. Area Roadway System

Hana Highway traverses the north-northeast portions of the island linking the various communities and commercial/industrial centers along its alignment. Hana Highway is oriented along the coast from Kaahumanu Avenue in Kahului to Hana Bay. Fronting Hana Medical Center, Hana Highway is a two-lane, two-way roadway that traverses Hana Town. Just south of the Hana Medical Center, Hana Highway intersects Uakea Street to form an unsignalized intersection.

C. Traffic Volumes and Conditions

1. General

a. Vehicular Traffic Survey

Traffic volumes on Hana Highway obtained from the State Department of Transportation (DOT) were taken on May 5, 1997 at the closest count station located on Hana Highway at Kailua Bridge, north of the project site. Average Daily Traffic (ADT) along Hana Highway is comprised of approximately 1700 trips, which is distributed fairly consistently between the hours of 6:00 AM and 8:00 PM. However, the data indicates that there are minor peaks in traffic during the morning, mid-day, and afternoon periods which generally occur between 8:00 and 9:00 AM, 10:00 AM and 11:00 AM, and 3:15 and 4:15 PM, respectively. For the purpose of this study, the traffic volumes in each study period were increased by 20% to conservatively account for internal vehicular trips within Hana Town.

b. Capacity Analysis Methodology

The highway capacity analysis performed for this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, 1994, and the "Highway Capacity Software", developed by the Federal Highway Administration.

Level of Service (LOS) is a quantitative and qualitative assessment of traffic operations. Levels of

Service are defined by LOS "A" representing a desirable or an ideal operating condition and LOS "F" representing an undesirable operating condition. The LOS definitions are attached for reference.

"Volume-to-Capacity" (v/c) ratio is another measure indicating the relative traffic demand to the road carrying capacity. A v/c ratio of one (1.00) indicates that the roadway is operating at capacity. A v/c ratio of greater than 1.00 indicates that the projected traffic demand exceeds the road's carrying capacity.

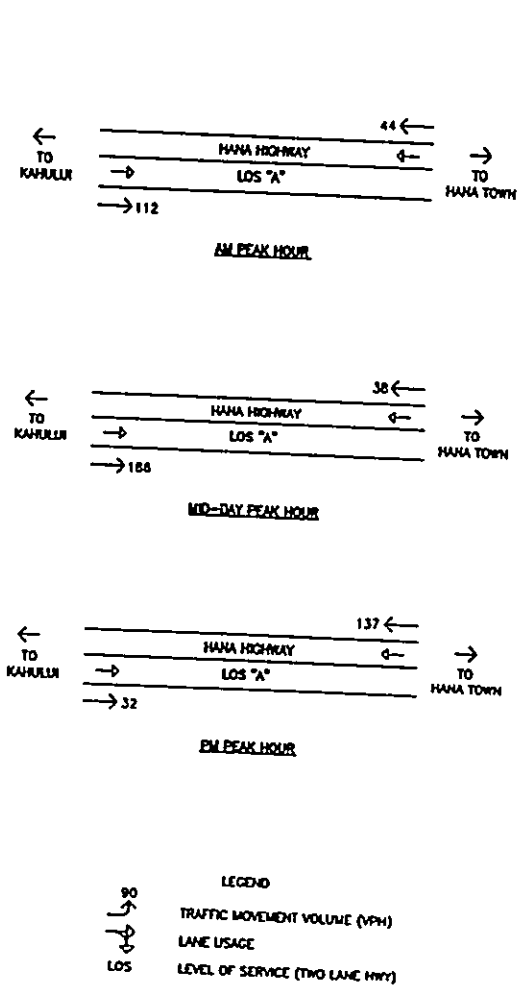
2. Existing Peak Hour of Traffic

a. General

Exhibit 3 shows the existing AM, mid-day, and PM peak hour traffic volumes and operating traffic conditions. The aforementioned AM peak hour of traffic would generally occur between 8:00 AM and 9:00 AM on Hana Highway fronting the Hana Medical Center. The mid-day peak hour would generally occur between 10:00 AM and 11:00 AM. The PM peak hour would generally occur between 3:15 PM and 4:15 PM.

b. AM Peak Hour

During the existing AM peak hour of traffic, Hana Highway, fronting the Hana Medical Center carries approximately 156 vehicles, 112 vehicles southbound and 44 vehicles northbound. This section of roadway operates at LOS "A" and at a v/c ratio of 0.08. Traffic is generally light with no observed traffic operational problems.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS	EXHIBIT
	EXISTING PEAK HOUR TRAFFIC	3

c. Mid-Day Peak Hour

During the existing mid-day peak hour of traffic, Hana Highway, fronting the Hana Medical Center carries approximately 224 vehicles, 186 vehicles southbound and 38 vehicles northbound. This section of roadway operates at LOS "A" and at a v/c ratio of 0.11. No traffic operational problems were also observed during the mid-day peak hour of traffic.

d. PM Peak Hour

During the PM peak hour of traffic, Hana Highway, fronting Hana Medical Center, carries approximately 169 vehicles, 137 vehicles northbound and 32 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ratio of 0.09. Similar to the AM and mid-day peak hour operations, traffic is generally light with no observed traffic operational problems.

IV. PROJECTED TRAFFIC CONDITIONS

A. Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 5th Edition", 1991. The ITE trip rates are developed empirically, by correlating the vehicle trip generation data with land use characteristics, such as the total number of vehicle trips generated per 1,000 gross square feet of the facility. Table 1 shows a summary of the project vehicle trip generation.

TABLE 1. TRIP GENERATION SUMMARY

INDEPENDENT VARIABLE: GROSS SQUARE FEET INCREASE			
			TRIP ENDS (PROJECTED)
PEAK HOUR OF ADJACENT STREET	AM PEAK HOUR	ENTER	56
		EXIT	17
		TOTAL	73
	MID-DAY PEAK HOUR	ENTER	64
		EXIT	33
		TOTAL	97
	PM PEAK HOUR	ENTER	33
		EXIT	77
		TOTAL	110

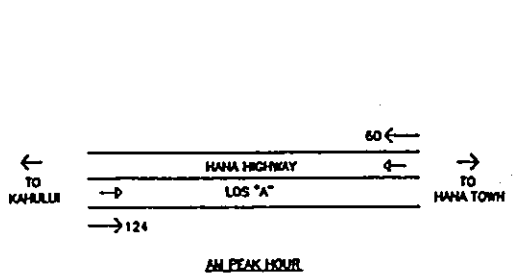
2. Trip Distribution

The projected site-generated trips were assigned to Hana Highway based upon the existing travel characteristics and directional distribution of traffic on the roadway.

For the purpose of this study, it is assumed that this directional distribution of traffic generated by the proposed project would remain the same as existing. Although traffic volumes are expected to increase minimally, the distribution of traffic should remain similar to existing conditions.

D. Total Traffic Volumes With Project

Exhibit 4 shows the projected cumulative AM, mid-day, and PM peak hour traffic conditions resulting from the proposed Hana Community Healthcare Campus. The cumulative volumes consist of site-generated traffic superimposed over existing traffic demands.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	HANA COMMUNITY HEALTHCARE CAMPUS PEAK HOUR TRAFFIC WITH PROJECT	EXHIBIT 4

V. TRAFFIC IMPACT ANALYSIS

A. Projected AM Peak Hour of Traffic

During the projected AM peak hour of traffic, Hana Highway, just north of Uakea Road, would carry 184 vehicles, 60 vehicles northbound and 124 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ratio of 0.09. The traffic impact to existing traffic conditions on Hana Highway fronting the project site would be relatively minimal as a result of the proposed medical facility.

B. Projected Mid-Day Peak Hour of Traffic

During the projected mid-day peak hour of traffic, Hana Highway, just north of Uakea Road, would carry 262 vehicles, 49 vehicles northbound and 213 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ration of 0.12. Traffic operations during the mid-day peak period would operate satisfactorily

C. Projected PM Peak Hour of Traffic

During the projected PM peak hour of traffic, Hana Highway, just north of Uakea Road, is expected to carry 211 vehicles, 164 vehicles northbound and 47 vehicles southbound. This section of roadway would operate at LOS "A" and at a v/c ratio of 0.11.

Similar to projected AM and mid-day traffic conditions, vehicular traffic would continue to operate at satisfactory conditions.

VI. CONCLUSIONS

The proposed Hana Community Healthcare Campus would not have a significant impact on traffic operations in the vicinity of the project. The vehicular traffic generated by the proposed project during the AM peak hour and PM peak hour is relatively low and near the suggested minimum of 100 vehicles per hour to warrant a traffic impact study as recommended by ITE. The majority of the traffic

demand on Hana Highway resulting from the project would primarily be spread evenly throughout the study peak periods.

The following section presents recommendations to improve or maintain traffic conditions at the intersection of Hana Highway and the project driveway.

VII. RECOMMENDATIONS

1. Maintain sufficient sight distances for motorists to safely enter and exit the project driveway.
2. Provide adequate patient loading and off-loading areas.
3. Provide adequate turn-around area for delivery and refuse vehicles to maneuver on the project property.
4. Provide sufficient roadway width to accommodate safe vehicular ingress and egress.

APPENDIX A

LOS DEFINITIONS

LEVELS OF SERVICE CRITERIA FOR TWO-LANE HIGHWAYS

The highest quality of traffic service occurs when motorists are able to drive at their desired speed, representative of Level of Service A. Almost no platoons of three or more vehicles are observed. Drivers would be delayed no more than 30 percent of the time by slow-moving vehicles. A maximum flow rate of 420 pcph, total in both directions, may be achieved under ideal conditions.

Level of Service B characterizes the region of traffic flow where drivers are delayed up to 45 percent of the time on the average. Service flow rates of 750 pcph, total in both directions, can be achieved under ideal conditions. Above this flow rate, the number of platoons forming in the traffic stream begins to increase dramatically.

Further increases in flow characterize Level of Service C, resulting in noticeable increases in platoon formation, platoon size, and frequency of passing impediment. At high volume levels, chaining of platoons and significant reductions in passing capacity begin to occur. While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles. Percent time delays are up to 60 percent. A service flow rate of up to 1,200 pcph, total in both directions, can be accommodated under ideal conditions.

Unstable traffic flow is approached as traffic flows enter Level of Service D. The two opposing traffic streams essentially begin to operate separately at higher volume levels. Mean platoon sizes of 5 to 10 vehicles are common, although speeds of 50 mph can still be maintained under ideal conditions. The fraction of no passing zones along the roadway section usually has little influence on passing. Turning vehicles and/or roadside distractions cause major shockwaves in the traffic stream. The percentage of time motorists are delayed approaches 75 percent. Maximum service flow rates of 1,800 pcph, total in both directions, can be maintained under ideal conditions. This is the highest flow rate that can be maintained for any length of time over an extended section of level terrain without a high probability of breakdown.

Level of Service E is defined as traffic flow conditions on two-lane highways having a percent time delay of greater than 75 percent. Passing is virtually impossible under Level of Service E conditions, and platooning becomes intense when slower vehicles or other interruptions are encountered.

The highest volume attainable under Level of Service E defines the capacity of the highway. Under ideal conditions, capacity is 2,800 pcph, total in both directions. Operating conditions at capacity are unstable and difficult to predict. Traffic operations are seldom observed near capacity on rural highways, primarily because of a lack of demand.

As with other highway types, Level of Service F represents heavily congested flow with traffic demand exceeding capacity. Volumes are lower than capacity. Level of Service E is seldom attained over extended sections on level terrain as more than a transient condition; most often, perturbations in traffic flow as Level E is approached cause a rapid transition to Level of Service F.

APPENDIX B

CAPACITY ANALYSIS CALCULATIONS (Existing Condition)

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... AM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.81
DIRECTIONAL DISTRIBUTION (UP/DOWN)	28 / 72
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.82	1
B	2.2	2	2.5	1	.82	1
C	2.2	2	2.5	1	.82	1
D	2	1.6	1.6	1	.82	1
E	2	1.6	1.6	1	.82	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 156
ACTUAL FLOW RATE: 193

LOS	SERVICE FLOW RATE	V/C
A	344	.15
B	620	.27
C	987	.43
D	1469	.64
E	2296	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... MID-DAY PEAK
DATE OF ANALYSIS..... 12-28-98
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.94
DIRECTIONAL DISTRIBUTION (UP/DOWN)	17 / 83
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.81	1
B	2.2	2	2.5	1	.81	1
C	2.2	2	2.5	1	.81	1
D	2	1.6	1.6	1	.81	1
E	2	1.6	1.6	1	.81	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 224
ACTUAL FLOW RATE: 238

LOS	SERVICE FLOW RATE	V/C
A	339	.15
B	609	.27
C	970	.43
D	1444	.64
E	2257	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... PM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.84
DIRECTIONAL DISTRIBUTION (UP/DOWN)	81 / 19
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.82	1
B	2.2	2	2.5	1	.82	1
C	2.2	2	2.5	1	.82	1
D	2	1.6	1.6	1	.82	1
E	2	1.6	1.6	1	.82	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 169
ACTUAL FLOW RATE: 201

LOS	SERVICE FLOW RATE	V/C
A	345	.15
B	621	.27
C	990	.43
D	1473	.64
E	2302	1

LOS FOR GIVEN CONDITIONS: A

D

APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
(Projected Conditions)

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... AM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION.... WITH PROJECT

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.81
DIRECTIONAL DISTRIBUTION (UP/DOWN)	33 / 67
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.91	1
B	2.2	2	2.5	1	.91	1
C	2.2	2	2.5	1	.91	1
D	2	1.6	1.6	1	.91	1
E	2	1.6	1.6	1	.91	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 184
ACTUAL FLOW RATE: 227

LOS	SERVICE FLOW RATE	V/C
A	382	.15
B	688	.27
C	1096	.43
D	1631	.64
E	2548	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... MID-DAY PEAK
DATE OF ANALYSIS..... 12-28-98
OTHER INFORMATION.... W/ PROJECT

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.94
DIRECTIONAL DISTRIBUTION (UP/DOWN)	19 / 81
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.82	1
B	2.2	2	2.5	1	.82	1
C	2.2	2	2.5	1	.82	1
D	2	1.6	1.6	1	.82	1
E	2	1.6	1.6	1	.82	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 262
ACTUAL FLOW RATE: 279

LOS	SERVICE FLOW RATE	V/C
A	345	.15
B	621	.27
C	990	.43
D	1473	.64
E	2302	1

LOS FOR GIVEN CONDITIONS: A

1985 HCM:TWO-LANE HIGHWAYS

FACILITY LOCATION.... HANA MEDICAL CENTER
ANALYST..... CK
TIME OF ANALYSIS..... PM PEAK
DATE OF ANALYSIS..... 12-21-1998
OTHER INFORMATION.... WITH PROJECT

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	0
PERCENTAGE OF RECREATIONAL VEHICLES	0
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.84
DIRECTIONAL DISTRIBUTION (UP/DOWN)	78 / 22
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	0

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	2	1.8	2.2	1	.84	1
B	2.2	2	2.5	1	.84	1
C	2.2	2	2.5	1	.84	1
D	2	1.6	1.6	1	.84	1
E	2	1.6	1.6	1	.84	1

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 211
ACTUAL FLOW RATE: 251

LOS	SERVICE FLOW RATE	V/C
A	354	.15
B	637	.27
C	1014	.43
D	1509	.64
E	2358	1

LOS FOR GIVEN CONDITIONS: A